

• Fats and Oils

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF DOCOSENOIC ACID IN FATS AND OILS: COLLABORATIVE STUDY. H.B.S. Conacher (Food Directorate, Health Protection Branch, Health and Welfare Canada, Ottawa, Ontario, Canada K1A 0L2) *J. Assoc. Off. Anal. Chem.* 58, 488-91 (1975). A gas-liquid chromatographic method for the determination of docosenoic acid in fats and oils was studied collaboratively, using 2 corn oil mixtures spiked with 3.73 and 5.59% methyl erucate, respectively, and 10 oil mixtures containing docosenoic acid at levels between 2 and 30%. Average recoveries from the 2 spiked corn oil samples were 96.5 and 98.7% with coefficients of variation of 4.0 and 3.1%, respectively. With the 10 oil mixtures coefficients of variation ranged from 1.9% at 28.1% docosenoic acid level to 11.1% at 2.7% docosenoic acid level. The method has been adopted as official first action.

EVALUATION OF METHODS FOR THE DETERMINATION OF POLYMERS AND OXIDATION PRODUCTS OF HEATED VEGETABLE OILS: COLLABORATIVE STUDY OF THE GAS-LIQUID CHROMATOGRAPHIC METHOD FOR NON-ELUTION MATERIALS. A.E. Waltham (Best Foods Research Center, CPC International Inc., P.O. Box 1534, Union, NJ 07083) *J. Assoc. Off. Anal. Chem.* 58, 898-901 (1975). A method for measuring non-elution materials from a gas chromatographic column has been collaboratively studied. The average standard deviation is 1.8%. It is the first of 2 companion methods which are expected ultimately to provide a means of measuring the polymers and oxidation products of edible fats and oils. Data from some preliminary studies, which have been confirmed by the collaborative study, indicated that only those oils heated in an unnatural manner contained elevated levels of polymers. The collaborated method may be used as a rapid means for screening samples for further study when it is understood that any measurement obtained is a product of the polymers, oxidation products, and unsaponifiable matter of the sample.

STUDY BY INFRARED SPECTROSCOPY OF THE CATALYTIC HYDROGENATION OF LINSEED OIL METHYL ESTERS. A.M. Baialardo and J. Bellanato (Instituto de Optica. C. S. I. C. Madrid) *Grasas Aceites (Seville)* 26, 208-14 (1975). The changing isomer distribution during the catalytic hydrogenation of linseed oil methyl esters was followed by Infrared Spectroscopy. The results are discussed and compared with those obtained by other methods.

PHYSICO-CHEMICAL STUDIES CONCERNING MISCELLAS OF VEGETABLE OILS. I. PARTIAL MOLAR VOLUMES, REFRACTION INDICES AND VISCOSITIES OF LAURIC ACID SOLUTIONS IN HEXANE AND CYCLOHEXANE. V. Flores Luque, C. Gómez Herrera and P. Tabernero de la Linde (Departamento de Química Técnica de la Universidad de Sevilla e Instituto de la Grasa y sus Derivados) *Grasas Aceites (Seville)* 26, 216-20 (1975). In order to improve automations in several industrialized processes for extraction and transformations (de-acidification, fractionation, hydrogenation, etc.) of these oils, it is very helpful a knowledge of physico-chemical characteristics of their miscellas. The obtained results show that the solvent hydrocarbon chain structure, lineal or cyclic, modifies significantly the values of molar refraction, intrinsic viscosity coefficient and partial molar volume corresponding to dissolved fatty acid. These modifications are justified by accepting that most of fatty acid in hexane bulk is present as a dimer with two hydrogen bonds; whereas in cyclohexane bulk most of this acid occurs as a monomer.

MICRODETERMINATION OF EPOXYACIDS IN OILS. M.P. Maza and E. Vioque (Instituto de la Grasa y sus Derivados.—Sevilla) *Grasas Aceites (Seville)* 26, 78-83 (1975). Using the known reaction between the epoxy group and the picric acid a method has been developed for the determination of the epoxy-acid content. The method allows the estimation of amounts of epoxy-compounds of the microgram order. The method gives results which agree well with those obtained with the hydrogen bromide standard procedure and has been applied for the searching of epoxyacids in both crude and refined oils. In all the oils tested small amounts of those compounds have been found. In the refined oils the content of epoxyacid is always smaller than the amount found in the crude oils.

SALAD OIL AND EDIBLE FATS FROM PALM OIL BY A NEW FRACTIONAL CRYSTALLIZATION METHOD IN ISOPROPYL ALCOHOL. L. Koslowsky (I.C.S.—H.L.S. LTD., Industrial Engineering Company.—Petah Tikva.—Israel) *Grasas Aceites (Seville)* 26, 95-103, 1975. The H. L. S. Palm Oil Fractionating process described in a previous report, was improved in the prolonged running of the pilot plant we designed and built. A series of problems were solved and phenomena clarified. Thus it was proved that the Alpha crystals are very well suited to the decantation process. The solvent losses were minimized by the use of a new deflagration unit. It was proved too that the presence of monoglycerides in Palm Oil can inhibit the fractional crystallization of the oil. The monoglyceride content in the oil can be reduced by esterification between the monoglycerides and free fatty acids present in the oil. We reviewed the capacity reached in the pilot plant, yields obtained and calculated with the help of a graph as a function of the fully saturated fatty acid content in the oil, utility consumption and characteristics of the fractions. It was proved by a series of experiments that the liquid fraction is remarkably heat stable oil and is suitable also for frying purposes.

STUDIES ON OIL QUANTITY AND QUALITY OF SOME EGYPTIAN COTTONSEED CULTIVARS AS AFFECTED BY GROWING LOCATION. S.A. Youssef (Faculty of Agriculture, Kafr El-Sheikh, Tanta University) A.Y. Abdel-Rahman and A.A. Abdel-Bary (Faculty of Agriculture, Alexandria University, Alexandria, Egypt) *Grasas Aceites (Seville)* 26, 233-6 (1975). Cottonseeds of twelve Egyptian cultivars were used to study the effect of three different locations on oil quantity and quality (moisture, free fatty acids and refining loss contents). These varieties included the three commercial cotton, staple groups, the medium (Giza 66, Ashmouni, and Dandara), the medium long (Giza 47, Giza 67 and Giza 69), and the extra long (Giza 45, Giza 68, Menoufi, Alex. I, Alex. II and Alex. III). The three locations were: Assiut (upper Egypt), Bahtim (Middle) and Alexandria (North). The results obtained revealed a highly significant effect for location on oil content and refining loss. All varieties gave higher oil and lower refining loss percentages at Alexandria than at Assiut, and Bahtim was of intermediate level. Also significant differences exist between varieties in oil content. Both variety and location had no significant influence on moisture and free fatty acids contents.

THE SYNTHESIS OF α -AMINOOLEIC AND α -AMINOELAIDIC ACIDS FROM THE OLEIC AND ELAIDIC ACIDS. F.A. Guerri. (Instituto de Productos Lácteos, Arganda del Rey.—Madrid.) *Grasas Aceites (Seville)* 26, 90-4 (1975). The synthesis of α -aminooleic (VIIa) and α -aminoelaidic (VIIb) acids from the corresponding oleic and elaidic acids is reported. Their α -lithiated lithium salts (I) were converted into substituted malonic acids (II). From the ethyl esters of these malonic acids, α -hydroxyaminoesters (V) were obtained, whose hydrolysis and reduction yielded the α -amino-acids.

24-METHYLENEDAMMARENOL: A NEW TRITERPENE ALCOHOL FROM SHEA BUTTER. T. Itoh, T. Tamura and T. Matsumoto (Col. of Sci. and Technol., Nihon Univ., 8, Kanda Surugadai, 1-chome, Chiyoda-ku, Tokyo, 101 Japan) *Lipids* 10, 808-13 (1975). A new triterpene alcohol was isolated from shea butter and its structure was shown to be 24-methylenedammarenol (24-methylene-5 α -dammar-20[21]-en-3 β -ol). Dammariadienol (5 α -dammara-20[21], 24-dien-3 β -ol) also was isolated from shea butter.

STEREOSPECIFIC ANALYSIS OF SOME CRUCIFERAE SPECIES. R. Ohlson, O. Podlaha and B. Töregård (Res. Lab., AB Karlshamns Oljefabriker, Karlshamn, Sweden) *Lipids* 10, 732-5 (1975). Results of stereospecific analysis of nine Cruciferae seed oils are presented. The major fatty acids in the oils investigated are nonrandomly distributed, not only between inner and outer positions, but also between sn-1 and sn-3 positions. When the positional data were plotted versus erucic acid content, a regular and characteristic distribution pattern for each fatty acid was obtained. Category I acids (saturated acids and acids with more than 18 carbon atoms) prefer either of the outer positions. Erucic acid, however, has a

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clear preference for the sn-3 position. When in the outer positions, Category II acids (unsaturated acids with 18 carbon atoms) as a rule prefer the sn-1 to the sn-3 position. This tendency increases with decreasing unsaturation.

QUANTITATIVE, MULTICOMPONENT ANALYSIS OF FATTY ACIDS FROM CHOLESTERYL ESTERS BY CHEMICAL IONIZATION RECONSTRUCTED MASS CHROMATOGRAPHY. F. Petty, J.B. Ragland, L.B. Kuiken, S.M. Sabesin and J.D. Wander (Charles B. Stout Lab. for Neurosci. Univ. of Tenn. Ctr. for the Hlth. Sci., Memphis, Tenn. 38163) *Lipids* 10, 800-3 (1975). Reconstructed mass chromatography using methane as a carrier and reagent gas for chemical ionization gas chromatography-mass spectrometry of the derived methyl esters allows rapid, quantitative microdeterminations of complete cholesteryl ester fatty acid profiles. The sensitivity of this method is consistent with completely specific, multicomponent assay at the picomole level. Introduction of two homologues as internal standards, one into the intact biological specimen and the other after derivatization, provides a measure of the net efficiency of the processes of extraction and derivatization. This procedure may be extended readily to the determination of fatty acid profiles in most biological fluids.

OXIDIZED PHOSPHATIDYLCHOLINES FROM DEFATTED SOYBEAN FLAKES TASTE BITTER. D.J. Sessa, K. Warner and J.J. Rackis (Northern Reg. Res. Lab., Agric. Res. Service, U.S. Dept. of Agric., Peoria, Ill. 61604) *J. Agric. Food Chem.* 24, 16-21 (1976). Three phosphatidylcholines differing in chromatographic mobility on thin-layer plates were isolated from residual lipids of hexane-defatted soy flakes. These soy phosphatidylcholines (SPC) were designated SPC-A, SPC-B, and lyso-SPC. All three possessed keto and hydroxy fatty acid esters but no aldehydic esters. A seven-member panel rated 0.05% suspensions of these phospholipids for intensity of bitter taste, based on the scoring system 0 = none to 3 = strong. Suspensions of SPC-A scored 0.9. Both SPC-B and lyso-SPC at the 0.05% level rated 3.0 and upon reevaluation at 0.01% scored about 1.0. Based on recovered weights, these phosphatidylcholines represent a minimum of 0.08% in defatted flakes. They may well contribute to the bitter taste in soy flakes.

EFFECT OF TOTAL LIPIDS AND PHOSPHOLIPIDS ON WARMED-OVER FLAVOR IN RED AND WHITE MUSCLE FROM SEVERAL SPECIES AS MEASURED BY THIOBARBITURIC ACID ANALYSIS. B.R. Wilson, A.M. Pearson and F.B. Shorland (Dept. of Food Sci. and Human Nutr., Mich. State Univ., East Lansing, Mich. 48824) *J. Agric. Food Chem.* 24, 7-11 (1976). TBA (2-thiobarbituric acid) analysis demonstrated that turkey meat is most susceptible to WOF (warmed-over flavor) development, followed closely by chicken, then by pork, beef, and mutton in that order. Although freshly cooked muscle from all species except mutton had higher TBA numbers than fresh raw samples, the most dramatic change occurred during storage of cooked meat at refrigerated temperature (48 hr at 4°C). Red muscles had consistently higher TBA values than white muscles under these storage conditions, indicating that red muscles were more susceptible to oxidative deterioration. Correlation coefficients between TBA numbers and total lipid levels and between TBA values and phospholipids suggest that phospholipids play a major role in development of WOF in all cooked meats, except for pork, where total lipid levels seem to be the major contributor to WOF.

A COMPARATIVE EVALUATION OF RAPID METHODS FOR DETERMINING FAT CONTENT OF GROUND BEEF. E.P. Young, A.W. Kotula and G.G. Twigg (U.S. Dept. of Agr., Beltsville, Md. 20705) *J. Anim. Sci.* 42, 67-71 (1976). Fat in 52 ground beef samples (5.9 kg) determined by the Anyl-ray, Univex, Hobart, Honeywell, Bligh and Dyer, and Soxhlet procedures, ranged between 15 and 32%. The mean fat content of all samples determined by Anyl-ray was 23.29%. The standard error for this method was not calculated because each sample was measured only once. Means of three observations per sample for the other methods in the order listed above were 23.14, 22.24, 23.81, 25.10 and 25.02%, respectively. The among-section error, which describes the non-homogeneity within the 5.9 kg sample, as determined by fat analysis of subsamples selected from three different sections of the total sample and expressed as coefficient of variation ranged from 2.94 to 5.45%. The within-section errors for fat determinations by Bligh and Dyer and Soxhlet of subsamples from within the same sections were 2.92 and 3.42%, respectively. Correlation coefficients between methods ranged from .87 for Anyl-ray with Univex to .96 for Soxhlet with Bligh and Dyer.

BIOTIC CAUSES OF LOSSES IN OIL-BEARING SEEDS DURING TRANSPORT AND STORAGE. M. Pazlar and P.H. Verner. *Prüm. Potravin* 25 No 9, 268-70 (1974). The causes of qualitative and quantitative losses in oil seeds are summarised. Some microorganisms, particularly fungi, cause deterioration of fatty components and proteins. Fungi release metabolic products into seeds which can then become dangerously toxic. Fungi of the *Aspergillus flavus* group, *A. niger*, *A. fumigatus*, *A. awamori*, *A. parasiticus* and *A. oryzae* have high lipolytic activity. Growth of microorganisms in oil seeds depends on temp. and the relative humidity of the environment. A regular check of stores is therefore very important. A high loss of oil seeds due to internal biotic factors has also been recorded, mostly owing to biochemical processes such as respiration, germination and other enzymatic processes. (World Surface Coatings Abs. No. 400)

STUDIES ON VEGETABLE OIL HARDENING TECHNOLOGIES USING ANALYTICAL PARAMETERS OF FATS, WITH SPECIAL REFERENCE TO FORMATION OF TRANS ISOMER FATTY ACIDS. E. Kurucz et al. *Acta Alimentaria Acad. Sci. Hung.* 3 No 4, 357-69 (1974). The products of selective and non-selective stages of commercial hydrogenation of sunflower seed oils, hardened to the same slip point, are compared. (World Surface Coatings Abs. No. 399)

APPARATUS FOR DEODORIZING FATS AND OILS. M. Leva. *U.S.* 3,933,953. The apparatus comprises a chamber enclosing a series of vertically stacked horizontal plates, means for introducing oxygen-free oil at the top of the plates, means for introducing superheated steam in the lower portion of the chamber, and means for evacuating fatty acids and odor forming material stripped from the oil in the upper portion of the chamber. The plates contain a series of apertures and chimneys extending vertically downward from the apertures. Thin films of heated oil form on the plates, and the steam moving countercurrent to the oil removes the fatty acids and odorous materials.

FAT OR OIL COMPOSITION STABILIZED WITH POLYSTYRENE ANTIOXIDANT. J.A. Dale and W.J. Leonard (Dynapol). *U.S.* 3,930,047. A stabilized food composition comprises an edible fat or oil normally subject to oxidative deterioration and a polymer intimately mixed with it. The amount of the polymer is in the range 0.001-0.2% of the fat or oil.

WATER SOLUBLE TRIGLYCERIDE COMPOSITIONS. R.J. Sturwold and F.O. Barrett (Emery Industries, Inc.). *U.S.* 3,928,401. A water soluble mixed ester product is obtained by the single step transesterification of: (a) 5-35% of a triglyceride derived from animal fats or vegetable oils; (b) 60-85% of a polyethylene glycol having a molecular weight of 400-800; and (c) 1-20% of a carboxylic acid containing 1 or 2 carboxylic groups and 2-12 carbon atoms.

PAN RELEASE PRODUCT. B.F. Szuhaj. *U.S.* 3,928,056. A pan release product comprises an aqueous suspension of an acylated, hydroxylated lecithin. The acylation is carried out to reduce the free amino nitrogen value from 10 to 90% relative to crude lecithin. The hydroxylation is carried out with at least 1% hydrogen peroxide to reduce the iodine value from 5 to 20% relative to crude lecithin.

WATER-WASHABLE INSPECTION PENETRANT EMPLOYING TRIGLYCERIDES AND POLYGLYCERIDES OF FATTY ACIDS. J.R. Alburger. *U.S.* 3,929,664. In the process, a water-dispersible dyed liquid penetrant is applied to test parts, surface penetrant is removed by washing with water, and the parts are inspected for residual entrapments of penetrant liquid in surface flaws. The penetrant consists of the following: 30-99.8% low solubility solvent liquid, 0.2-30% indicator dye, and 0-40% solvent coupler. The low solubility solvent liquid is selected from the group consisting of vegetable oils, animal fats, and marine oils. The solvent coupler consists of one or more alcohols, glycol ethers, and triglycols.

WATER-WASHABLE INSPECTION PENETRANT. J.R. Alburger. *U.S.* 3,390,407. In the process, a water dispersible liquid penetrant is applied to test parts, surface penetrant is removed by washing with water, and the parts are inspected for residual entrapments of penetrant liquid in surface flaws. In this case, the penetrant consists of 98-75% mineral solvent and 2-25% fatty acid. The penetrant vehicle also contains 0.2-30% indicator dye.

COSMETIC COMPOSITION CONTAINING AN ETHOXYLATED GLYCERIDE MIXTURE. R. Tuma and F. Neuwald (Chemische Werke Witten GmbH). *U.S.* 3,934,003. A water soluble and fat

restoring composition consists of an ethoxylated glyceride mixture of saturated vegetable fatty acids of 8-14 carbon atoms. The mixture comprises the mono- and diglycerides of the acids having chemically linked to them 2-8 moles of ethylene oxide per free hydroxyl group. The ethoxylated glyceride mixture has an acid number of 0.1-0.2, a saponification number of 65-120, and a hydroxyl number of 130-260.

EGG SUBSTITUTE PRODUCT. E. Glaser and P.F. Ingerson (Avoset Food Corp.). *U.S. 3,923,632*. A liquid egg substitute product comprises 65-90% egg white, 0.5-5% of an unsaturated vegetable oil, and 0.05-1% of a fatty acid lactylate alkali metal salt.

CHARACTERISTICS OF MALAYSIAN PALM OIL. B. Jacobsberg (Insitut Industries Fermentation-Meurice Chimie—C.E.R.I.A., Brussels). *Oleagineux* 30, 271-6 (1975). Because of the sharp increase in palm oil production in Malaysia, which covers at present over 65% of the world export, it is important to know the characteristics of this oil. This paper illustrates the importance of the set-up of regular and efficient quality control. The characteristics of crude palm oil linked to oxidative deterioration and the quality after storage and transport are especially examined. It appears that the average quality is of a high standard and that over 20% of the production meets selected palm oil quality.

IMPROVEMENT IN THE YIELD OF YOUNG OIL PALM IN PERU BY THE USE OF CHLORINATED FERTILIZERS. C. Daniel and R. Ochs (Dept. Agronomie, I.R.H.O.). *Oleagineux* 30, 295-8 (1975). The application of magnesium chloride increased the yield. On the other hand, magnesium sulphate does not increase yields with or without fertilizer. These observations should make it possible to fix the optimum level of Cl nutrition; provisionally, according to the first results, this could be 0.2% for young trees in local conditions.

CHARACTERISTICS OF MALAYSIAN PALM OIL. B. Jacobsberg (Institut Industries Fermentation-Meurice Chimie—C.E.R.I.A., Brussels). *Oleagineux* 30, 319-24 (1975). A pronounced difference exists between the average and the selected palm oil quality. It was shown that in Malaysia, over 20% of the total palm oil production is of the selected quality. The results show large similarity with Zaire palm oil. The study will be continued by systematic examinations of quality of crude and refined palm oils of various origins.

AMINO ACID AND FATTY ACID COMPOSITION OF CHLOROPHYLL-DEFICIENT MUTANTS IN PEANUTS, *ARACHIS HYPOGAEA* L. Y.P. Tai et al. (Dept. of Agronomy, Coastal Plain Station, Tifton, Georgia 31794). *Oleagineux* 30, 365-8 (1975). Mature seeds of three lutescens mutants and three normal peanut varieties grown in the greenhouse under restricted sunlight suggested that all mutants regulated protein and oil synthesis as did normal peanuts. Differences in amino acid composition of mature seeds among the six genotypes were quantitative rather than qualitative. Of 18 amino acids quantified, only differences of threonine, glutamic acid, glycine, and valine appeared to be significant among the six peanut genotypes. Among 8 essential amino acids examined, phenylalanine was higher in the mature seeds; whereas, the immature seeds had higher alanine, valine, methionine, isoleucine, and lysine content. Among 8 fatty acids examined, differences among genotypes were also quantitative rather than qualitative.

WORLD SITUATION OF FATS AND OILS. STATISTICS AND PROBLEMS. J.E.Th.M. Randag. *Oleagineux* 30, 371-81 (1975). International Association of Seed Crushers (I.A.S.C.) has held the annual congress at Abidjan (Ivory Coast). In the paper, data about the production, prices, and world situation of oilseeds, fats, oils, and meals are given. Tables, which contain world statistics about fats and oils for the period of 1971-4 were prepared by the Department of Economy and Statistics of Unilever Ltd., are also given in this paper. Resources of oilseeds and treatment of seeds in the developing countries are discussed. Countries which will be oil and fat exporters and those which will be oil and fat importers are pointed out.

EVALUATION OF THE NEW PROCESS OF DRYING OF SUNFLOWER SEED WITH THE USE OF CHEMILUMINESCENCE. V.K. Kostenko et al. *Maslo-zhir. Prom-st.* 1975(6), 15-6. The process of drying sunflower seed with recycling and in a fluid bed assure higher quality and good technico-economic values of the process. The quality of the oil dried by the method of chemiluminescence is especially better. (Rev. Fr. Corps Gras)

OBTAINMENT OF NEW KINDS OF COSMETIC RAW MATERIAL. T.N. Korgagina et al. *Maslo-zhir. Prom-st.* 1975(7), 30-1. The

authors elaborated a new method for obtaining esters of polyethylenglycol, which consists of an esterification of the corresponding acids with polyethylenglycol-400, in the presence of zinc stearate. To obtain the stearate of polyethylenglycol-400, the reaction mass is heated till 65-70C, before zinc stearate is added. With residual pressure of 150-170 mm Hg, the mass is heated till 150-155C and maintained at this temperature for 13 hr, after which the mass is cooled to 30-40C. The reaction is completed when the acid value of the mass is a maximal value of 5. By the same method, the oleate and laurate are obtained. (Rev. Fr. Corps Gras)

USE OF HORIZONTAL DISC FILTER WITH AUTOMATIC DISCHARGE DURING THE FILTRATION OF NON-REFINED, WINTERIZED SUNFLOWERSEED OIL. S.N. Volotovskaja et al. *Maslo-zhir. Prom-st.* 1975(5), 35-7. For filtration of winterized oils with the use of auxiliary filtrating powder, it is good to use the horizontal disc filter with automatic discharge. With a pressure of 0.8-1.5 kg/cm² and the temperature of filtration till 18C, the speed of the process during 6 hr of continual work of the filter is 40-60 kg/(m²hr). The use of this filter allows, not only the intensification of the filtration process, but also the exclusion of the manual work. (Rev. Fr. Corps Gras)

REFINING OF CORN OIL. S.N. Volotovskaja et al. (VNIIZ). *Maslo-zhir. Prom-st.* 1975(8), 11-2. Corn germs contain up to 50% oil and 1.5-8% starch. During heating, starch is decomposed and small molecules called dextrin are formed. Under certain conditions, they are transformed to simple sugars: maltose and glucose. During the miscella distillation, the sugar participates in the formation of melanoides which give darker color to the oil. VNIIZ has elaborated a method of a direct extraction of the oil from corn germs. The method is applied in the oil factory of Bendery. In the paper, the work done for starch elimination of miscella is described. The studies of amidon elimination during the oil refining have also been done. To obtain good quality oil, the results show that it is necessary to eliminate starch from the miscella before distillation. (Rev. Fr. Corps Gras)

STUDY OF ANTIOXIDANT ACTIVITY OF TOCOPHEROLS OF COTTONSEED OIL. R.H. Hafizov et al. *Pishch. Technol.* 1975(4), 37-40. The best stability of cottonseed oil is found when total tocopherol content is 40-70 mg % g. If this content is higher, the prooxidant effect is observable. The optimal concentration of alpha-tocopherol is 75 mg % g; for gamma-tocopherol, this concentration is 25 mg % g. Gamma-tocopherol has the best antioxidant properties. Alpha-tocopherol has also very good antioxidant properties but only in the first stage of oxidation and at temperatures which are near to the physiological temperature. (Rev. Fr. Corps Gras)

STUDIES BY ELECTRON MICROSCOPE OF BEEF FAT TREATED BY THE ACTION OF A CONTINUAL MAGNETIC FIELD. Ju. A. Lapsev (Faculty of Voronez, USSR). *Pishch. Technol.* 1975(3), 53-6. The author has found that beef fat treated shortly in a homogeneous continual magnetic field has better stability. The microstructure of the melted beef fat shows certain modification of macromolecule structure. The chain of fatty acids has the extended form. This and some other changes can be seen by the electron microscope in the beef fat treated by a continual magnetic field. (Rev. Fr. Corps Gras)

INFLUENCE OF MICROELEMENTS ON THE VITAMIN COMPOSITION OF THE FRACTIONS OF THE MILK FAT. M.M. Merzametov et al. *Pishch. Technol.* 1975(4), 76-80. Milk fat contains 15 minor elements among which silicon, aluminum, sodium, and calcium are in higher quantities; manganese, chromium, lead, and silver are in lower quantities. These minor elements contribute considerably to the destruction of vitamins A, E, and carotenes. Destruction is more intensive in the liquid fraction than in the solid fraction. (Rev. Fr. Corps Gras)

FACTORS WHICH INFLUENCE THE RESULTS OF ACIDITY DETERMINATION OF AN OIL IN THE OILSEEDS. B. Nering et al. *Tluszcze jadalane* 19, 129-36 (1975). The principal factor which influences the results of acidity determination of an oil in the seeds is the method of oil separation. Extraction of the oil in Soxhlet apparatus and the one at low temperature with agitation have no influence on the results of acidity determination if the time of extraction is long enough. As to the simplicity and the rapidity of the action, the method of cool extraction and neutralization in the miscella can be recommended. (Rev. Fr. Corps Gras)

DOSAGE OF WATER IN MARGARINE WITH THE APPARATUS TYPE "ULTRA X" OF GERBER COMPANY. K. Pilat et al. *Tluszcze*

jadalane 19, 137-44 (1975). The apparatus of Gerber company, type "Ultra X" allows water dosage in the margarine and vegetable butter in the domain of 0-75%. The reproducibility of determination, done with this Gerber apparatus, represents 0.8% and the repeatability 0.6%. Apparatus "Ultra X" is a kind of the balance with a tray on which a certain quantity of the sample is weighed. The sample is then dried with infrared and weighed again. (Rev. Fr. Corps Gras)

BLEACHING EARTH AS A COMPONENT OF THE REACTION SYSTEM DURING THE CATALYTIC HYDROGENATION OF OILS. I. INFLUENCE OF BLEACHING EARTH ON THE KINETICS OF THE REACTION OF OIL HYDROGENATION. B. Drozdowski et al. *Thuszczę jadalane* 19, 181-9 (1975). In the first part of this study, the mechanism of cooperation between catalyst and bleaching earth in the reaction system of oil hydrogenation is discussed. It was interesting, from a practical point of view, to verify the possibility that the presence of bleaching earth increases the speed of the reaction. It was found that the influence of bleaching earth on the hydrogenation process depends on the type of catalyst used and on the kind of oil. In each case, an optimal quantity of adsorbent exists; for rapeseed oil, it is 0.9-1.5%, for soybean 0.3%. (Rev. Fr. Corps Gras)

BLEACHING EARTH AS A COMPONENT OF THE REACTION SYSTEM DURING THE CATALYTIC HYDROGENATION OF OILS. III. EXPERIMENTS OF MODIFICATION OF REFINING PROCESS OF OILS DESTINED TO HYDROGENATION. B. Drozdowski et al. *Thuszczę jadalane* 19, 197-204 (1975). In this work, the importance of the effect of increasing speed of hydrogenation reaction of oils of different stages of refining is studied. The addition of bleaching earth in the system is also checked. The influence of bleaching earth on the kinetics of this reaction is observed during the hydrogenation of deodorized oil. By the addition of 0.9% of bleaching earth, it is possible to reduce the quantity of the catalyst by half. (Rev. Fr. Corps Gras)

CHARACTERISTIC OF KINETIC CURVES OF HYDROGENATION OF SOYBEAN OIL IN THE PRESENCE OF A NICKEL CATALYST PARTIALLY POISONED BY A SULPHUR COMPOUND. B. Drozdowski et al. *Thuszczę jadalane* 19, 205-14 (1975). The influence of sulphur added to the hydrogenation process of soybean oil has been determined. The obtained results, as the results obtained before, which show the deactivation of catalyst by the phospholipids, have served as a base for a comparison of the action of these two inhibitors on the kinetics and the mechanism of hydrogenation of soybean oil. (Rev. Fr. Corps Gras)

• Fatty Acid Derivatives

METHOD OF PREPARING FATTY HYDROXAMATES. J.A. Hartlage (Ashland Oil, Inc.). *U.S. 3,933,872*. A process for preparing an alkali metal or ammonium salt of a fatty hydroxamic acid comprises the steps of (a) reacting an anhydrous slurry of hydroxylamine sulfate and a lower alkanol solution of a lower alkyl ester of a C₆-C₂₆ fatty acid with dimethylamine to provide an alcoholic solution of the corresponding fatty hydroxamic acid, (b) neutralizing the acid from step (a) with a lower alkanol solution of an alkali metal hydroxide, lower alkoxide, or ammonia, and (c) recovering the resulting fatty hydroxamate.

PREPARATION OF FATTY ACID AMIDES. C.R. Bergeron (Ethyl Corp.). *U.S. 3,932,476*. The process comprises reacting in an anhydrous system (1) an ester of a fatty acid having 8-20 carbon atoms and an alcohol containing 1-6 carbon atoms with (2) ammonia or a mono- or dialkyl methyl or ethyl amine fed at a rate in excess of the reaction rate. The excess of (2) is removed from the system along with the lower alcohol component released from the ester during the reaction.

SELECTIVE HYDROCARBOXYLATION OF UNSATURATED FATTY COMPOUNDS. E.N. Frankel (U.S. Secy. of Agriculture). *U.S. 3,928,231*. A process for reactivating a spent hydrocarboxylation catalyst contained in the pot residue from the distillation of carboxylated unsaturated fatty compounds comprises the steps of: (a) oxidizing the pot residue with concentrated nitric acid; (b) mixing the oxidized residue with water at 0°C; (c) extracting the mixture with diethyl ether; (d) neutralizing the ether solution; (e) drying the ether solution; (f) removing the ether from the dried, neutralized solution; and (g) mixing the product from step (f) with trisubstituted phosphine and hydrogen chloride in weight ratios of 1:0.2:0.02 to 1:3.0:0.06, respectively. The catalyst used in the process

is palladium chloride mixed with a trisubstituted phosphine selected from the group consisting of triphenylphosphine and trialkylphosphines, in molar ratios of 1:2 to 1:4, palladium chloride:trisubstituted phosphine. The yield of carboxylated products is 86-99%. Substantially all of the added carboxyl groups are attached to one of the originally unsaturated carbon atoms.

• Drying Oils & Paints

LINSEED OIL—METAL ACETYLACETONATE SYSTEMS. II. FUNGICIDAL STUDIES ON CANVAS SUPPORTS. J.H. Stoner, N.S. Baer and N. Indictor. (N.Y. Univ., and Brooklyn Coll.). *J. Paint Technol.* 47(611), 39-49 (1975). The effects of two organisms, *Chaetomium globosum* and *Aureobasidium pullulans*, on cotton and linen canvas supports, commonly used for paintings, coated with 16 metal acetylacetonates dispersed in three different media—linseed oil, egg yolk, and commercial polyacrylate (Acryloid B-72) in xylene—were observed. Surfaces were examined microscopically and visually for two weeks and recorded photographically. The order of observed resistance was: linseed oil > Acryloid B-72 > egg yolk; linen > cotton. The effect of the metal acetylacetonate depended on the organism. Copper consistently imparted the greatest resistance to fungal growth.

PREFACE FOR THE PAINT/COATINGS DICTIONARY. S. LeSota (Chairman, Federation Definitions Comm.). *J. Paint Technol.* 47(611), 68-71 (1975). After 10 years of considerable effort, a comprehensive updated Paint/Coatings Dictionary has been compiled and intensively edited by the Federation's Definitions Comm. Defining the jargon and technical terms of the coatings industry and its interfacing technologies, this dictionary contains about 5,000 definitions derived through research and consensus. Unique is the classification of these definitions into one or more of 72 categories (color, pigments, additives, etc.). These categories have been number coded and appear as superscripts at the end of each definition. Conversely, all of the terms defined under each category are listed in back of the dictionary and serve as a checklist for key words, research papers and literature searches. Pigments have also been classified into their Color Index numbers. Pigment synonyms have been extensively cross-indexed to a commonly accepted name. About 400 of the color terms have been defined by the Federation's Inter-Society Color Council Committee.

SOME ASPECTS OF INDUSTRIAL APPLICATION OF EGYPTIAN RICE GERM OIL IN THE FIELD OF SURFACE COATINGS. I—SEPARATION AND MODIFICATION OF RICE GERM WAX. A.M. Naser, M.A. El-Azmiry and A.Z. Goma. *JOCCA* 58 No 4, 131-4 (1975). Egyptian rice germ oil, produced by solvent extraction of the rice germ, is of minor industrial importance and is characterized by relatively high contents of wax and sated matter. Separation of the crude wax using different methods and modifying the wax properties (softening pt. and hardness) are discussed.

II—PREPARATION AND EVALUATION OF RICE GERM AND RICE GERM/LINSEED OIL ALKYDS. *JOCCA* 58 No 4, 135-40 (1975). Three alkyds with different oil lengths have been prepared from rice germ oil. Replacement of part of the rice germ oil by linseed oil has also been investigated. It is observed that only short rice germ alkyds are air drying, while medium and long rice germ alkyds dry only upon stoving at 90°C. for 3 hrs, after addition of suitable driers. This behaviour is also true for rice germ/linseed oil alkyds. Replacement of part of the rice germ oil by the drying oil leads to improvement in drying characteristics and better film performance of the finished alkyds compared with those made from rice germ oil alone. (World Surface Coatings Abs. No. 400)

FUTURE FOR PAINTS AND VARNISHES AND THEIR METHODS OF APPLICATION. J.M. Wyns. *Double Liaison* 22 No 233, 39-44 (1975). Total production, imports and exports, employment and *per capita* productivity figures of the Belgian paint and varnish industry are presented for the years 1962 and 1973. The general economic situation, raw material shortages and environmental considerations, and problem-solving responses of the industry are discussed. The author concludes with cautious optimism for the future. (World Surface Coatings Abs. No. 399)

WHITHER STATISTICS? A.K. Unsworth. *Polym. Paint Col. J.* 165 No 3893, 246 (1975). If in the future the world achieves a *per capita* consumption of edible fats equal to that of the

U.K., then vegetable oils will be too valuable for paint manufacture. The author suggests, therefore, that air-drying water-soluble compositions will have a short production life. Standards of living in various countries are compared by tabulating statistics of consumption of plastics, paints, man-made fibres and automotive production. (World Surface Coatings Abs. No. 399)

MALAWI TUNG OIL IN SURFACE COATINGS AND ALLIED PRODUCTS. H.W. Chatfield. *Polym. Paint Col. J.* 165 No 3895, 375 (1975). A summary of experiments designed to exploit the high level of reactivity of the conjugated double bonds in Malawi tung oil (MTO). (1) Xylol solns. of Cu and Zn tungate, produced by metathesis from sodium tungate, were used as preservative impregnants for soft whitewood panels. Dried coatings of the tungates showed good white spirit and water resistance compared with the corresponding naphthenates. (2) The partial or complete replacement of linseed oil in putties by MTO was briefly examined. (3) A steel primer incorporating MTO was prepared to a stated formulation and coated panels were exposed to salt spray and accelerated weathering according to BS3900. Results indicate that weathering resistance was good. Ca plumbate and Zn phosphate primers were formulated with MTO and similarly tested. Results were encouraging. (World Surface Coatings Abs. No. 400)

MEANS OF REPLACING VEGETABLE OILS. I.D. Okorochlov, T.S. Skrodskaia, L.D. Shapovalov and B.F. Varnavskii. *Lakokras. Mat.* 1975, No 1, 63-5. The results obtained at Denepropetrovsk Paint Works in attempts to replace vegetable oils, in particular castor oil, by various natural and synthetic fatty acids and diols are described, and it is indicated that positive results and economy were obtained. (World Surface Coatings Abs. No. 400)

SALTS OF AMINE-ALKYLENE OXIDE ADDUCTS FOR PREVENTING SEDIMENTATION OF PIGMENT SUSPENSIONS. H. Linden, J. Gartner, W. Offermann, and G. Demmering (Henkel & Cie). *U.S.* 3,928,276. Sedimentation is prevented by utilizing a salt from tertiary and/or quaternary amine-alkylene oxide adducts and organic acids of the formula $K_x Y$. Y is an anion of an acid selected from the group consisting of fatty acids having 1-37 carbon atoms and dimeric fatty acids having 12-36 carbon atoms; x is 1 or 2; and K is a quaternary ammonium cation. The sedimentation preventing agent is added to pigment suspensions in varnishes with an organic solvent.

COMPOSITIONS OF ACRYLATED EPOXIDIZED SOYBEAN OIL AMINE COMPOUNDS USEFUL AS INKS AND COATINGS. D.J. Trecker, G.W. Borden, and O.W. Smith (Union Carbide Corp.). *U.S.* 3,931,071. The composition comprises (a) an acrylated epoxidized soybean oil amine compound formed by the reaction of 1 mole of epoxidized soybean oil with at least 2 moles of acrylic acid or methacrylic acid and 5-40 mole per cent of an organic amine and (b) an acrylyl compound.

• Edible Proteins

MODIFIED VEGETABLE PROTEIN SIMULATING CASEIN. S. Kumar and K.S. Ramachandran. *U.S.* 3,930,058. A process for producing a modified vegetable protein having thermoelastic and forming properties similar to casein and caseinate salts comprises (a) making an aqueous slurry containing 3-16% solids of a vegetable protein selected from the group consisting of oat and oil seed protein; (b) adjusting the pH of the slurry to 7.0-10.5 by addition of an alkali metal carbonate; (c) heating the slurry to 280-370 F for 2.5-5 minutes to react the carbonate with the protein; (d) neutralizing the slurry to pH 6.6-7.0 with an edible acid; and (e) drying the neutralized slurry.

METHOD OF PRODUCING DETERGENT CAKES. G. Perla and G. Mattiello (Colgate-Palmolive Co.). *U.S.* 3,926,863. The process comprises reacting stoichiometric quantities of a butenedioic acid or anhydride and a compound containing a reactive hydroxyl group and an acyclic chain at least predominately of 12 carbon atoms to produce a monoalkyl ester of butenedioic acid; reacting stoichiometric quantities of the ester with an alkali metal, ammonium, or alkaline earth metal sulfite or bisulfite in the presence of 5-60% of a molten plasticizer chosen from the group consisting of fatty acid esters of polyhydric alcohols and paraffin wax and 15-20% water to form a water soluble monoalkylsulfosuccinate; cooling, drying, and forming the resulting product into cakes. The cakes include at least 40% of the monoalkylsulfosuccinate.

METHOD OF MAKING TRANSPARENT SOAP BARS. J.J. O'Neill,

J.A. Komor, T.E. Babcock, R.J. Edmundson and E.G. Shay (Avon Products, Inc.). *U.S.* 3,926,828. The method comprises mixing at 130-210 F 25-75 parts of a C_{12} - C_{18} saturated straight chain fatty acid and 10-20 parts of a branch chain C_5 - C_{18} saturated unsubstituted aliphatic monocarboxylic acid, neutralizing, and then cooling. The neutralizing agent consists of an alkaline sodium compounds present in an amount sufficient to neutralize 40-80% of the acids and an ethanolamine selected from diethanolamine, triethanolamine, and mixtures of these in an amount above that required for neutralization.

DOUBLE SOAP BAR. D.J. Morrison. *U.S.* 3,925,225. The soap bar comprises a first bar formed into a predetermined shape and a second bar disposed within the first bar.

APPARATUS FOR MAKING VARIEGATED SOAP BASE. G. Perla (Colgate-Palmolive Co.). *U.S.* 3,923,438. The apparatus for the continuous production of striped soap comprises a terminal cone of a soap plodder having an internal conical passageway and a series of circumferentially spaced apertures in its surface.

AN ANIMAL MODEL FOR ESTIMATING THE RELATIVE STING POTENTIAL OF SHAMPOOS. R.W. Shanahan and C.O. Ward (Clinical Eval. Sec., Dept. Toxicology, Avon Prods. Inc., Suffern, New York 10901 and Grad. Div. Coll. Pharmacy and Allied Health Professions, St. John's U. Jamaica, N.Y.). *J. Soc. Cosmet. Chem.* 26(12), 581-92 (1975). Comparative studies of various experimental and commercially available shampoos, utilizing the mouse writhing test as an assessment of pain, discomfort, or stinging, showed a reasonable rank-order correlation of mildness with that found through controlled eye sting studies in man. In view of the poor predictive value of conventional animal primary irritancy studies in determining discomfort or eye sting properties of shampoos and other cosmetic materials, the mouse writhing test can provide a valuable adjunct in predicting the potential for discomfort and stinging in man. The pHs of 29 shampoos studied were between 5.5 and 7.7. This narrow range did not appear to influence the potential for discomfort in the mouse, eye irritancy in the rabbit, or eye stinging in humans.

• Detergents

MEASUREMENT OF THE DYNAMIC SURFACE TENSION BY THE DROP WEIGHING METHOD. J. Kloubek (J. Heyrovsky Inst. Phys. Chem. and Electrochem., Czechoslovakian Acad. Sci., Prague). *Colloid Polym. Sci.* 253(11), 929-36 (1975). The tips of capillaries of common stalagmometers do not often meet conditions enabling the application of the well known correction factors according to Harkins and Brown to a correct determination of the surface tension of liquids. Shown that those corrections are not suitable for the determination of the dynamic surface tension, γ_t . Therefore for pure liquids the relationship between the mass of drops formed under dynamic conditions, G_t , and their formation interval, t , was determined. By means of the G_t values extrapolated to static conditions ($1/t = 0$) a correction graph was designed (dependency of ΔG_t on t). It was learned that the relationship $G_s = G_t - \Delta G_b = k\gamma t$ (k is the empirical constant) is valid not only for pure liquids but also for equilibrium as well as dynamic surface tension of solutions which was demonstrated on aqueous solutions of sodium dodecyl sulfate to which ΔG_b determined for water were applied. Consequently, the drop weighing method enables, with the help of empirical corrections, to determine the dependency of γ_t on the static surface age within the range from several seconds to the extrapolated equilibrium value γ_e . The advantage of the above method resides in the fact that it yields correct and well reproducible results.

DETERGENT COMPOSITION. T. Fujino and R. Matsui (Kao Soap Co.). *U.S.* 3,932,295. A bleaching detergent composition consists of an anionic or nonionic surfactant, 1-50% of sodium percarbonate, and a polymer selected from the group consisting of polyethylene glycol, and polyvinylpyrrolidone. The amount of polymer is 0.01-10 times the amount of sodium percarbonate. In aqueous solution, the composition is effective in removing soil from textiles and bleaching them. The polymer is effective in reducing migration of dyestuffs from colored textiles to white textiles present in the same washing bath.

DETERGENT COMPOSITIONS. J.A. Sagel and C.E. Weber (Procter & Gamble). *U.S.* 3,932,316. A nonphosphate, noncalcium carbonate-containing spray dried granular detergent comprises

(a) 5-90% builder, (b) 5-50% synthetic detergent, and (c) 0.10-13.0% of a salt of benzoic acid.

SURFACE ACTIVE COMPOSITIONS. J.W. Willard, Sr. (CAW Industries, Inc.). *U.S. 3,931,031*. The composition, for use in removing stains and soil from substrates, consists of a major proportion of a surface active agent effective in water and a minor proportion of a catalyst. The catalyst is prepared by reacting an alkali metal silicate with dissolved calcium and magnesium ions to produce an aqueous suspension of finely divided particles. A micelle-forming surfactant is then mixed into the suspension to form catalyst micelles.

ANTIBACTERIAL AND GERMICIDAL N,N-DIALKYLTHIOCARBAMOYL SULFENAMIDE DETERGENT COMPOSITIONS. K.S. Karsten (R.T. Vanderbilt Co.). *U.S. 3,931,032*. A skin-substantive micro-organism-inhibiting cleansing composition comprises a synthetic organic detergent or a fatty acid soap and a biostatically effective amount of an N,N-dialkylthiocarbamoyl sulfenamide.

LIQUID FOAM-REGULATED NONIONIC DETERGENT COMPOSITIONS. A. Lohr, M. Hennemann, and G. Jakobi (Henkel & Cie). *U.S. 3,931,033*. The composition contains nonionic surface active compounds and organic water-miscible solvents comprising (a) 30-60% of a combination of two ethoxylated alcohols, (b) 2-6% of an alkali metal soap of fatty acids, (c) 0.1-1% of a water soluble organic sequestering agent for heavy metal ions, (d) 20-35% of a water-miscible solvent combination of a monohydric ether alcohol and a diol, and (e) at least 8% up to the balance of 100% of water.

DETERGENT MATERIALS CONTAINING ENZYMES. J.T. Inamorato and R.T. Hunter, Jr. (Colgate-Palmolive Co.). *U.S. 3,931,034*. The composition consists of a mixture of a surface active synthetic organic detergent and a mixture of enzyme powders. The enzyme powder mixture consists of 90,000 Novo alpha-amylase units of a bacterial alpha-amylase to $\frac{3}{8}$ Anson unit of an alkaline protease. The alkaline protease is present in an amount to provide 1 Anson unit for each 100-500 grams of detergent composition.

SOAP BAR. T.G. Brown. *U.S. 3,931,035*. The bar comprises a hollow shell of soap bar material with an access opening and a hard core of soap material filling the cavity.

UNCOLORED DETERGENT PRODUCTS CONTAINING COLORING MATERIALS. R.B. Hall (Procter & Gamble). *U.S. 3,931,037*. The product is made by mixing together 0.001-10% of a dry particulate coloring material having no particles larger than 150 μ and 90-99.999% of hydratable salts and detergents having an average particle size of 150-1,000 μ . Onto this mixture is sprayed 1-15% of water to form agglomerates.

SURFACTANT COMPOSITIONS. S.K. Liu (Monsanto Co.). *U.S. 3,931,057*. A detergent formulation consists of at least 2% of a mixture of alkane vicinal methyl ether sulfate compounds and a detergency builder in ratios of 10:1 to 1:10.

PRODUCTION OF SECONDARY ALCOHOL ETHER SULFATES. H. Baumann, W. Umbach, and W. Stein (Henkel & Cie). *U.S. 3,931,271*. The process consists of reacting crude adducts of secondary alkanols and alkylene oxides, without purification, with 1.0-1.2 mols of a sulfating agent stronger than concentrated sulfuric acid and selected from the group consisting of SO₃, SO₃/air mixtures, oleum, and chlorosulfonic acid at 10-30 C and recovering the secondary alcohol ether sulfate having a high degree of sulfation.

LIQUID DETERGENT BLEACHING COMPOSITION. Y. Nakagawa, Y. Inamoto, and K. Aigami (Kao Soap Co.). *U.S. 3,929,661*. The composition consists of a stabilized, alkaline, aqueous solution of (a) 0.5-10% of sodium hypochlorite, (b) 0.1-20% of a surfactant, (c) 0.1-5% of a water soluble inorganic alkali effective for stabilizing the sodium hypochlorite in aqueous alkaline solution, and (d) the balance water.

CONTROLLED FOAMING DETERGENT COMPOSITIONS. H. Arai and Y. Minegishi (Kao Soap Co.). *U.S. 3,929,663*. The composition consists of (a) 5-40% of anionic surface active agent, (b) 0.1-15% of fatty acid salt which additionally amounts to 1-40% of the anionic surface active agent, and (c) the balance builder.

DETERGENT COMPOSITION HAVING ENHANCED PARTICULATE SOIL REMOVAL PERFORMANCE. R.G. Laughlin and V.P. Heuring (Procter & Gamble). *U.S. 3,929,678*. The composition comprises 1-99% of a zwitterionic compound and 99-1% of an organic detergent.

BUILT DETERGENT COMPOSITIONS. F.R. Cala (Colgate-Palmolive Co.). *U.S. 3,929,679*. A particulate heavy duty synthetic organic detergent composition comprises 5-30 parts of anionic detergent and/or 1-10 parts of nonionic detergent and, as a builder, 15-50 parts of a water soluble salt of a hydroxy C₂-C₄ alkyl iminodi C₂-C₄ carboxylic acid hydrated by 3-10 moles of water per mole of iminodicarboxylate.

PHOTOACTIVATED BLEACHING PROCESS. P.R.H. Speakman (Procter & Gamble). *U.S. 3,927,967*. A process for removing stains from textiles comprises (a) treating the textiles in the presence of oxygen with an aqueous liquor containing (i) 0.2-2.0 g/l of organic detergent; (ii) 0.2-2.0 g/l of alkaline detergency builder; and (iii) 1-50 mg/l of a photoactivator selected from the group consisting of eosin, rose bengal, fluorescein, chlorophyll, metal-free porphyrin, sulfonated phthalocyanine, and sulfonated zinc phthalocyanine; and (b) simultaneously irradiating the textiles with visible light which includes light of wavelength 640 nm and higher.

LIQUID LAUNDRY BUILDER CONTAINING ALKALI HYDROXIDE AND BORAX. J.D. Ciko and J.J. Cramer (BASF Wyandotte Corp.). *U.S. 3,927,970*. In a method of cleaning fabrics with an aqueous solution containing alkali metal hydroxide builder selected from the group consisting of sodium and potassium hydroxides, there is claimed an improvement wherein borax is included in the aqueous solution at levels of 5-15% of the hydroxide. There is formed *in situ* alkali metal metaborate in amounts of 6.5-19.5% of the hydroxide initially present.

HARMLESS SOFTENING AGENT FOR FABRICS HAVING EXCELLENT MOISTURE ABSORBABILITY. S. Goto and K. Ishihara (Dai-ichi Kogyo Seiyaku Co.). *U.S. 3,928,212*. The softening agent consists of 5-50% of a natural fat and oil or their hardened products selected from the group consisting of beef tallow, cottonseed oil, soybean oil, and coconut oil and 95-50% of a polyvalent alcohol fatty acid ester selected from the group consisting of sugar fatty acid ester, sorbitan fatty acid ester, glycerin fatty acid ester, and propylene glycol fatty acid ester. The fatty acid ester includes at least 10% monoester.

FABRIC SOFTENER AND SOIL RELEASE COMPOSITION. R.D. Temple, V.P. Heuring, and J.B. Prentice (Procter & Gamble). *U.S. 3,928,213*. The liquid softener composition consists of (A) 2-15% of a cation-active fabric softener compound; (B) 0.1-10% of a soil release agent selected from the group consisting of hydroxyalkyl alkyl cellulose and alkyl cellulose; (C) 0-2% of an emulsifier selected from the group of consisting of (1) the condensation product of 1 mole of alkylphenol and 1-100 moles of ethylene oxide, (2) the condensation product of 1 mole of an aliphatic alcohol and 1-100 moles of ethylene oxide; (3) polyethylene glycol; and (4) mixtures of these agents; and (D) the balance water.

BLEACHING AND DETERGENT COMPOSITIONS. L.T. Murray (Colgate-Palmolive Co.). *U.S. 3,928,223*. The composition consists of a water soluble peroxygen bleaching compound and a water soluble imide. The mole ratio of imide to peroxygen compound ranges from 0.01 to 2.0.

LIQUID DETERGENT COMPOSITION. G. Nunziata, R.W.M. Schone, and G. Spadini (Procter & Gamble). *U.S. 3,928,249*. A liquid, clear, concentrated detergent composition contains (A) 5-15% of a polyethylene glycol ether sulfate; (B) 8-20% of an aliphatic hydrocarbon sulfonate; (C) 3-12% of nonionic surface active detergent of which 20-100% consists of a tertiary amine oxide; (D) 2-15% of a solubilizing agent selected from the group consisting of C₁₋₄ alcohol; potassium, sodium, and ammonium salt of C₁₋₃ alkyl and di-C₁₋₂ alkylphenyl sulfonic acid; and urea; and (E) 5-9% of an organic acid. The ratio A:B varies between 1:3 and 1:1 and C:(A + B) varies between 1:5 and 1:2. The composition can also contain 2-3% of Na or K salt of meta-, ortho-, or pyroboric acid.

WASHING COMPOSITION CONTAINING SUDS SUPPRESSING AGENT. K. Kosswig and H. Meister (Chemische Werke Huls Ag.). *U.S. 3,928,250*. The composition comprises detergent compounds and additives and 1-40%, based on the weight of active detergent compounds, of a piperazine derivative suds-suppressing agent.

GERMICIDAL CLEANING COMPOSITION. B.J. Heile (Procter & Gamble). *U.S. 3,933,671*. A concentrated, physically stable germicidal cleaning composition effective against bacteria of the family *Pseudomonadaceae* consists of water, potassium

hydroxide, coconut fatty acids, potassium toluene sulfonate, tetrapotassium pyrophosphate, sodium salt of the sulfuric acid ester of the reaction product of 1 mole of coconut fatty alcohol with 3 moles of ethylene oxide, sodium *n*-decyldiphenyl ether disulfonate, isopropanol, 4-chloro-2-cyclopentyl phenol (CCPP), and sodium sulfate.

CONTROLLED SUDSING DETERGENT COMPOSITIONS. G. Bartolotta, N. Tieme de Dude and A.A. Gunkel (Procter & Gamble). *U.S. 3,933,672*. The composition consists of 0.01-10% of a suds controlling agent comprising a mixture of silicone and silica, in ratios of 19:1-1:2, incorporated in a water dispersible, detergent impermeable carrier selected from the group consisting of gelatin, agar, gum arabic, algae gel, and the condensation product of tallow alcohol and 25 moles or more of ethylene oxide. The remaining 5-95% of the composition comprises a detergent compound.

DETERGENT COMPOSITIONS CONTAINING POLYMERIC BUILDERS. R.L. Davies (Lever Bros. Co.). *U.S. 3,933,673*. The dry composition comprises a detergent active compound and a builder which is a partial alkali metal salt of a polymeric aliphatic carboxylic acid containing at least 50% of monomeric units selected from acrylic or maleic acids. Molecular weight of the polymeric carboxylic acid ranges from 5,000 to 1,000,000. The partial salt is neutralized to the extent of not more than 60%. Ratio of the detergent active compound to partial salt is 3:1 to 1:10.

LIQUID DETERGENT COMPOSITION. H. Arai, K. Tachibana, Y. Naganuma and M. Murata (Kao Soap Co.). *U.S. 3,929,680*. The composition, having improved low temperature stability, consists of an aqueous solution of a surfactant selected from the group consisting of anionic and nonionic surfactants in an amount effective for washing foodstuffs, tableware or clothes, or as a shampoo. It also contains a first solubilizing agent selected from the group consisting of alkanols having 1-3 carbon atoms; benzene, *p*-toluene, xylene, and acetyl benzene sulfonates; glycols; acetamides; pyridine dicarboxylic acids amides; benzoates; salicylates; and urea; and a second solubilizing agent selected from the group consisting of hexyl, octyl, nonyl, dodecyl, and tetradecyl benzene. The amount of the second solubilizing agent is 3-30% of the weight or surfactant, and the ratio of the second to the first solubilizing agent ranges from 1:40 to 2:1.

PROCESS FOR MAKING AGGLOMERATED DETERGENTS. J.B. Brill, C.A. Morris and S.D. Moon (Economics Laboratories, Inc.). *U.S. 3,933,670*. A continuous, single stage agglomeration process comprises the steps of (a) distributing nonagglomerated particles onto a bed of rotating, sliding detergent particles; (b) contacting the nonagglomerated particles with water in an amount sufficient to form a partially hydrated builder salt and agglomerate the particles; (c) heating the particles to remove some of the water of hydration; and (d) cooling the particles. The nonagglomerated particles consist of a partially hydrated condensed phosphate salt capable of sequestering hardness-causing metal ions and capable of retaining all of its water of hydration at temperatures below at least 45°C, a solid chlorine releasing agent such as a chlorinated isocyanurate, and a hydratable detergent builder salt.

ADJUVANTS FOR DETERGENTS. K. Schulze. *Pluszce, Srodki Piorace, Kosmet.* 19, 263-78 (1975). In this paper, the adjuvants for detergents and the methods for their determination are reviewed. Some of their properties are compared. It was found that detergents with low or no phosphates can be used only for washing at 60°C; their dose must be adjusted according to the hardness of water. (Rev. Fr. Corps Gras)

USE OF ISOTOPIC TECHNIQUE FOR THE STUDY OF THE STABILITY OF EMULSIONS. M. Konstanski et al. *Pluszce, Srodki Piorace, Kosmet.* 19, 260-2 (1975). The radio-isotopic method for evaluation of emulsion stability is described. This method is applied for HLB value determination of non-ionic surface active agent. Use of this isotopic method gives more precise results and eliminates many errors connected to the use of conventional Griffin method. (Rev. Fr. Corps Gras)

• Biochemistry and Nutrition

A STUDY OF DIFFERENT METHODS FOR THE ASSAY OF LIPOPROTEIN LIPASE ACTIVITY IN HUMAN ADIPOSE TISSUE. B. Persson, U. Smith and B. Larsson (First and Second Med. Depts., Sahlgrenska Sjukhuset, Univ. of Göteborg, Göteborg, Sweden)

Atherosclerosis 22, 425-30 (1975). A method for the assay of lipoprotein lipase activity (LPLA) in heparin eluates of needle biopsies of adipose tissue is presented. A serum activated phosphatide-stabilized emulsion of labelled triolein has been used as substrate. This method and a previously described method using heparin eluates as enzyme source and a commercial triglyceride emulsion, Ediol, as substrate, showed a high degree of correlation (correlation coefficient = 0.94) when parallel determinations were performed on biopsies from 16 subjects. Further, the Ediol method similarly correlated well with a method for LPLA assay, previously described by Nilsson-Ehle and Belfrage, on acetone-ether extracts of adipose tissue (correlation coefficient = 0.88; 19 subjects).

CONVERSION OF LINOLEIC ACID HYDROPEROXIDE BY SOYBEAN LIPOXYGENASE IN THE PRESENCE OF GUAICOL: IDENTIFICATION OF THE REACTION PRODUCTS. G. Streckert and H.J. Stan (Inst. für Lebensmittelchemie der Technischen Univ. Berlin, D-1000 Berlin 12, Müller-Breslau-Strasse 10, West Germany) *Lipids* 10, 847-54 (1975). Linoleic acid hydroperoxide formed by soybean lipoxygenase was metabolized by the same enzyme in the presence of guaiacol. The products of this reaction included trihydroxyoctadecenoic acids, hydroperoxydihydroxyoctadecenoic acids, hydroxyepoxyoctadecenoic acids, dihydroxyoctadecenoic acids, hydroxyoctadecadienoic acids, and oxo-octadecadienoic acids.

GENETIC CONTROL OF STEROL ESTERIFICATION IN DEVELOPING WHEAT ENDOSPERM. J.V. Torres and F. Garcia-Olmedo (Dept. de Bioquímica, E.T.S. Ingenieros Agrónomos, Univ. Politécnica, Madrid-3, Spain) *Biochim. Biophys. Acta* 409, 367-75 (1975). The action of gene *Pln*, previously characterized by the sterol ester patterns of mature whole wheat kernels, has been found to be restricted to the endosperm and not to affect the embryo, the pericarp or the seed coat. The dominant allele *Pln*, which determines a sterol ester pattern with palmitate as the main ester, is also responsible for a low level of free sterol at maturity. A high level of free sterol is associated with the recessive allele *pln*, which determines an ester pattern with linoleate as the main ester. Divergence between the two phenotypes starts at about 21 days after anthesis, when cell proliferation has been completed, the aleurone layer has differentiated, and only cell enlargement is taking place. A marked increase in esterification, mainly by palmitate, which is controlled by the dominant allele, is concomitant with a sharp decrease in free sterol. The increased net esterification is non-specific with respect to 4-demethyl sterols, because it affects the four main ones, namely sitosterol, stigmasterol, campesterol and cholesterol.

TRANSPORT OF 8-ANILINO-1-NAPHTHALENESULFONATE AS A PROBE OF THE EFFECT OF CHOLESTEROL ON THE PHOSPHOLIPID BILAYER STRUCTURES. T.Y. Tsong (Dept. of Physiol. Chem., The Johns Hopkins Univ. Schl. of Med., Baltimore, Md. 21205) *Biochemistry* 14, 5415-7 (1975). The transport of 8-anilino-1-naphthalenesulfonate in dimyristoyl-L- α -lecithin bilayers has been found to be extremely sensitive to the crystalline state of the phospholipid dispersions. Thus this reaction may be used for probing the membrane structures. In binary mixtures of cholesterol and phospholipid the fluorescence enhancement of the dye completely disappears when the mole fraction of cholesterol reaches 33%. At temperatures below and above the phase transition of the lipid bilayers, the rate of the probe transport increases significantly in the binary mixtures. It reaches a maximum at 17 mol % of cholesterol. The rate at this cholesterol content approaches the maximum value obtained for the probe transport in pure phospholipid, i.e., the rate at the midpoint of the phase transition. These observations indicate that the effect of cholesterol in the phospholipid dispersion is to maintain the bilayer structure close to the melting temperature of the lipid phase transition. In other words, cholesterol may be an effective buffer for membrane crystalline state when its concentration is near 17 mol %.

CRYSTALS IN ATHEROSCLEROTIC LESIONS: REAL OR ARTEFACT? C.W.M. Adams and O.R. Bayliss (Dept. of Pathol., Guy's Hosp. Med. Schl., St. Thomas' St., Univ. of London, London SE1 9RT, Great Britain) *Atherosclerosis* 22, 629-36 (1975). Atherosclerotic lesions were obtained from man during surgery and from cholesterol-fed rabbits. They were maintained at about 37°C during handling. Smears were prepared on glass slides and these were examined microscopically at 37°C. Solid rhomboidal or thick needle-like crystals were present at 37°C but increased in numbers or in size or both on cooling. Staining studies and measurement of melting point (133-

153°C) suggested that such crystals are composed largely of free cholesterol or a related sterol. Liquid crystals exhibiting conic focal (Maltese cross) anisotropism were present at 37°C and did not appreciably increase in either size or numbers on cooling. Staining studies and their resistance to digitonin suggested that these Maltese cross crystals are largely esterified cholesterol. Thin needle-like crystals arranged like feathers or in rosettes were seen in smears of adipose tissue and were attributed to triglycerides.

SUBSTITUTION OF CELLULAR FATTY ACIDS IN YEAST CELLS BY THE ANTIBIOTIC CERULENIN AND EXOGENOUS FATTY ACIDS. J. Awaya, T. Ohno, H. Ohno and S. Omura (The Kitasato Inst., Shirokane, Minato-ku, Tokyo 108, Japan) *Biochim. Biophys. Acta* 409, 267-73 (1975). Cell growth of *Saccharomyces cerevisiae* ATCC 12341 inhibited by the antibiotic cerulenin, a specific inhibitor of fatty acid and sterol syntheses, was reversed by various exogenous fatty acids. Myristic acid (14:0), pentadecanoic acid (15:0), palmitic acid (16:0), and oleic acid (18:1) reversed effectively the growth inhibition by cerulenin. When these cells were reversed by adding pentadecanoic acid, over 90% of native even-numbered fatty acids was substituted by odd-numbered fatty acids. Those in the cells reversed by adding oleic acid were almost all unsaturated fatty acids. Cerulenin did not inhibit either elongation or desaturation systems in *S. cerevisiae*.

INVESTIGATIONS OF FLUORESCENT PEPTIDES AND LIPOFUSCINS OF HUMAN INTERVERTEBRAL DISCS RELATING TO ATHEROSCLEROSIS. I. Banga (Res. Dept. of Gerontology, Semmelweis Univ. Med. Schl., Budapest, Hungary) *Atherosclerosis* 22, 533-41 (1975). Annulus fibrosus and nucleus pulposus of human intervertebral discs at different degrees of atherosclerosis were disintegrated by elastase. The material disintegrated by elastase—called elastolysate—could be separated into hydrophobic (apolar) and hydrophilic (polar) peptides. Parallel with the degree of atherosclerosis the amount of hydrophobic peptides increased, whereas that of the hydrophilic peptides decreased. In annulus fibrosus and nucleus pulposus two kinds of fluorescent maxima were measured. The one, A:F 350:405, is known as fluorescence maxima of elastin- and collagen-peptides. The other, A:F 410:470, is related to a similar substance called athero-fluorescent component (AFC), which has been isolated before from the plaques of atherosclerotic aorta. This substance accumulates mainly in nucleus pulposus and resembles lipofuscin-like bodies. These bodies show a positive reaction with thiobarbituric acid, giving a red coloration characteristic for malondialdehyde. In nucleus pulposus the amount of lipofuscin-like substances is much greater than in annulus fibrosus. The hydrophilic peptides, although they show the same fluorescence maxima as the hydrophobic peptides, do not give any reaction with thiobarbituric acid. It is supposed that in these cases the cross-linked protein contains instead of malondialdehyde other reactive aldehydes.

TRANSFER OF CHOLESTEROL IN VITRO BETWEEN NORMAL ARTERIAL SMOOTH MUSCLE TISSUE AND SERUM LIPOPROTEINS OF NORMOLIPIDEMIC RABBITS. G. Bondjers and S. Björkerud (Dept. of Internal Med. I, Univ. of Göteborg, S-413 45 Göteborg, Sweden) *Atherosclerosis* 22, 379-87 (1975). During incubation of normal arterial tissue with serum lipoproteins, net transfer of cholesterol was observed in the direction from the lipoproteins into the arterial tissue. Such transfer was only observed during incubations with single, isolated lipoprotein fractions. It was independent of the type of lipoprotein, VLDL, LDL or HDL, which was incubated with the arterial tissue. On the other hand, no net transfer of cholesterol was observed during incubations of arterial tissue with a combination of serum lipoproteins equivalent to that in native serum. Studies on the transfer of radioactive cholesterol suggested that cholesterol elimination from arterial tissue *in vitro* was not affected by the composition of the incubation medium. Therefore, it is suggested that cholesterol accumulation more easily is influenced by the serum lipoprotein composition, and that serum lipoprotein dysbalance may promote cholesterol accumulation in the tissue. This effect may be present even when the dysbalance involves a decrease of specific serum lipoprotein fractions.

FATTY ACYL CoA SYNTHETASE ACTIVITY IN NORMAL AND ATHEROSCLEROTIC RABBIT AORTIC TISSUE. P. Brecher, M. Kessler and A.V. Chobanian (Cardiovascular Inst. and Dept. of Med., Boston Univ. Schl. of Med., Boston, Mass. 02118) *Atherosclerosis* 22, 485-9 (1975). The activity of fatty acyl CoA synthetase and fatty acyl CoA:cholesterol acyltransferase was determined in microsomal fractions from normal and

atherosclerotic rabbit aortic tissue. No change in fatty acyl CoA synthetase activity was observed as a result of cholesterol feeding in contrast to the several-fold increase in the activity of fatty acyl CoA:cholesterol acyltransferase seen in atherosclerotic tissue. Inhibition of both enzymes was observed when clofibrate, or the tetrahydronaphthyl analog of this drug were added *in vitro*. The inhibitory effects were most pronounced on the fatty acyl CoA:cholesterol acyltransferase.

LECITHIN:CHOLESTEROL ACYLTRANSFERASE ACTIVITY IN HYPERCHOLESTEROLEMIC SUBJECTS AND IN HYPERCHOLESTEROLEMIC SUBJECTS TREATED WITH CLOFIBRATE. A. D'Alessandro, A. Zucconi, F. Bellini, L. Boncinelli and R. Chiostrì (Dept. of Gerontology, Florence Univ., Florence, Italy) *Lipids* 10, 804-7 (1975). The lecithin:cholesterol acyl transfer reaction in the plasma of hypercholesterolemic subjects and of hypercholesterolemic subjects treated with clofibrate was studied. An increased enzyme activity was found in the first group of patients, while lecithin:cholesterol acyl transfer activity tended to normalize in the second group. This increased enzyme activity might be a defense mechanism against the accumulation of cholesterol in the arterial wall.

LONG-TERM EFFECTS OF COLESTIPOL (U-26,597 A) ON PLASMA LIPIDS IN FAMILIAL TYPE II HYPERBETALIPOPROTEINAEMIA. R. Fellin, G. Briani, P. Balestrieri, G. Baggio, M.R. Baiocchi and G. Crepaldi (Dept. of Internal Med., Div. of Gerontol. and Metabolic Diseases, Univ. of Padova, Padova, Italy) *Atherosclerosis* 22, 431-45 (1975). Results related to long term treatment with Colestipol (a new resin sequestering bile acids) in 23 subjects with familial hypercholesterolaemia, 12 with Type IIA, 8 with Type IIB and 3 homozygotes are reported. Patients were given 15 g/day active drug for a period of 12 months and a double dose (30 g/day) for a successive period of 4 months along with a low cholesterol, low saturated fat, polyunsaturated fat-rich diet. Mean cholesterol decrease was -42 ± 18 mg/dl ($P < 0.05$) after 12 months of 15 g/day Colestipol and -69 ± 17 mg/dl ($P < 0.01$) after the following 4 months of 30 g/day Colestipol. The difference between the two periods of treatment (15 g and 30 g/day) was not statistically significant. A slight but not significant increase in triglyceride levels was observed. Serum uric acid showed a significant increase throughout the entire period of treatment. No malabsorption syndrome or signs of toxicity were seen. Most frequent side effects were constipation, nausea, and meteorism which, with the exception of 4 cases which were withdrawn from the study, were reported as being transitory and mild.

EFFECT OF VITAMIN B₁₂ STATUS ON THE OCCURRENCE OF BRANCHED-CHAIN AND ODD-NUMBERED FATTY ACIDS IN THE LIVER LIPIDS OF THE BABOON. G.A. Garton, J.R. Scaife, A. Smith and R.C. Siddons (Rowett Res. Inst., Bucksburn, Aberdeen, UK) *Lipids* 10, 855-7 (1975). Branched chain fatty acids of the anteiso series and others with methyl substitution nearer to the carboxyl group were found, together with odd numbered; straight chain fatty acids, in very small proportions in baboon liver lipids. The proportions were increased in vitamin B₁₂-depleted animals, especially after administration of a B₁₂ analogue.

UPTAKE AND METABOLISM OF EXOGENOUS EICOSA-8,11,14-TRIENOIC ACID IN MINIMAL DEVIATION HEPATOMA 7288 C CELLS. G. Gaspar, M.J.T. de Alaniz and R.R. Brenner (Cátedra de Bioquímica, Instituto de Fisiología y Facultad de Ciencias Médicas, La Plata, Argentina) *Lipids* 10, 726-31 (1975). Minimal deviation hepatoma 7288 C cells were cultured in Swim's medium containing 10% serum for 48 hr. The growth medium was replaced with serum free media containing different concentrations of [¹⁴C]eicoso-8,11,14-trienoic acid and the cells were incubated for 24 hr. Incorporation into cell lipids, oxidation to CO₂, and desaturation to arachidonic acid were studied. The oxidation of the acid was very low. It was preferentially incorporated into the polar lipids of the cell. The incorporation depended on the number of cells and fatty acid concentration. Saturation of the cells with the acid was reached when 144.7 nmoles per mg of cellular protein were incorporated. The acid was desaturated readily to arachidonic acid. The nmoles of eicosatrienoic acid converted to arachidonic acid per mg of cellular protein were hyperbolic function of the acid incorporated. Maximal desaturation, 23 nmoles per mg of cellular protein, was reached when the cells were saturated with the acid. The calculations of the desaturation capacity and of the endogenous pool of eicosatrienoic acid available for desaturation in the cell are discussed.

ABNORMAL POST-HEPARIN LIPOLYTIC ACTIVITY IN OBESITY. A PRELIMINARY NOTE. B.W. Glad, D.E. Wilson, C.M. Flowers and J.C. Reading (Depts. of Med. and Family & Community Med., Univ. of Utah, Col. of Med., Salt Lake City, Utah 84132) *Atherosclerosis* 22, 491-8 (1975). Published data have suggested that hypertriglyceridemia in obesity may result from the combination of hepatic overproduction and diminished removal of triglyceride-rich lipoproteins. Diminished catabolism might be expected if tissue lipoprotein lipase activity were decreased, a finding which has been reported in biopsies of adipose tissue from obese subjects. Abnormalities in heparin-released triglyceride lipase activity (PHLA) in obesity have not been reported, however. We have examined the possibility that methods for the measurement of PHLA might have failed to reveal such a defect because of the disproportionality between plasma volume and increasing body mass in obesity. Since it is usual to administer heparin on the basis of body weight, higher plasma heparin levels would be achieved in obese individuals. We performed standard PHLA assays in lean and obese volunteers. In the obese, heparin levels were consistently higher than in lean individuals although PHLA values were similar in both. Thus, PHLA in obesity appeared to be inappropriate for the heparin levels attained in plasma. Pharmacokinetic studies suggest that a decrease in PHLA available for release by heparin rather than heparin insensitivity underlies this phenomenon.

VITAMIN A: NOT REQUIRED FOR ADRENAL STEROIDOGENESIS IN RATS. K.A. Gruber, L.V. O'Brien and R. Gerstner (Dept. of Anatomy, N.Y. Univ., 342 East 26 Street, N.Y. 10010) *Science* 191, 472-5 (1976). Previous work supporting the vitamin A dependency of adrenal function in rats neglected to take into account a secondary effect of the deficiency, a decrease in hepatic ascorbic acid biosynthesis. Vitamin A-depleted rats maintained on a diet free of ascorbate had a decrease in the activity of adrenal β -hydroxysteroid dehydrogenase, and extensive adrenocortical degeneration. The use of an ascorbate supplement prevented the symptoms. The results suggest that previous evidence for direct involvement of vitamin A in steroidogenesis may have been due to the production of a secondary deficiency, a chronic scorbutic condition.

SPECIFICITY OF NEONATAL, ANDROGEN-INDUCED IMPRINTING OF HEPATIC STEROID METABOLISM IN RATS. J. Gustafsson and A. Stenberg (Depts. of Chem. and Germfree Res., Karolinska Institutet, S-104 01, Stockholm 60, Sweden) *Science* 191, 203-4 (1976). The specificity of the neonatal, androgen-induced, irreversible programming of hepatic steroid metabolism in the rat was investigated. 5α -Dihydrotestosterone propionate and estradiol benzoate were as efficient as testosterone propionate in inducing a male type of liver metabolism in the adult animal, whereas epitestosterone propionate, etiocholanolone propionate, and o,p'-DDT were practically inactive in this respect. These findings indicate that different mechanisms are involved in neonatal imprinting of hepatic steroid metabolism and in the well-known neonatal androgenic and estrogenic induction of persistent estrus and acyclic gonadotropin secretion.

FATTY ACID SYNTHESIS FROM $2\text{-}^{14}\text{C}$ -ACETATE IN RAT TESTIS MITOCHONDRIAL AND CYTOSOL FRACTIONS IN VITRO. E.W. Haeflner and O.S. Privett (The Hormel Inst., Univ. of Minnesota, 801 16th Ave. N.E., Austin, Minn. 55912) *Lipids* 10, 814-7 (1975). An *in vitro* system for acetate incorporation into fatty acids by the mitochondrial and the cytosol fractions of rat testis is described. The rate of incorporation of acetate into fatty acids was twice as fast with the mitochondrial as with the cytosol fraction; both systems were stimulated in the presence of adenosine triphosphate, reduced nicotinamide adenine dinucleotide phosphate, coenzyme A, and MgCl_2 . The optimum pH was between 7.0-7.5 for the mitochondrial fraction and between 6.5-8.0 for the cytosol fraction. Radio gas chromatography showed that palmitic acid was the most highly labeled acid, followed by stearic acid, in the mitochondrial fraction in accord with the pathway of *de novo* fatty acid synthesis. Some of the labeled acetate was also incorporated into the 16:1 and 18:1 fatty acids of this fraction. Distribution of radioactivity among the mitochondrial lipid classes was highest in the phospholipids and monoglycerides, followed by diglycerides and cholesterol; little radioactivity was present in the triglyceride fraction. These observations are in accord with studies of the incorporation of labeled metabolites into testicular lipids following intratesticular injection and indicate the validity of the *in vitro* system for studies of specific reactions occurring *in vivo*.

DETECTION AND PARTIAL CHARACTERIZATION OF LIPOPROTEIN LIPASE IN BOVINE AORTA. L.C. Henson and M.C. Schotz (Res. Service, Veterans Admin. Wadsworth Hosp. Ctr., Los Angeles, Calif. 90073) *Biochim. Biophys. Acta* 409, 360-6 (1975). Extracts of acetone-ether powders of bovine thoracic aorta contain lipase activity which has an alkaline pH maximum (7.8-8.4) and is stimulated 4-10-fold by adding serum or isolated apolipoprotein-glutamate to the assay mixture. Serum activation is completely reversed by isolated apolipoprotein-serine or apolipoprotein-alanine. Lipolysis is strongly inhibited by NaCl (0.5M) and protamine sulfate (1 mg/ml) and partially inhibited by heparin. Based on these characteristics, the lipase is identified as lipoprotein lipase.

VIRAL STIMULATION OF CHOLINE PHOSPHOTRANSFERASE IN SPLEEN MICROSOMES. D.R. Hoffman, D.N. Skurdal and W.E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of North Dakota Med. Schl., Grand Forks, N.D. 58202) *Lipids* 10, 829-34 (1975). Choline phosphotransferase and phosphatidyl ethanolamine methyltransferase enzymatic activities (nmoles phosphatidyl choline/min/mg protein) have been determined in spleen microsomes of Rauscher virus infected BALB/c male mice at 5, 10, 14, and 21 days following inoculation of the virus. There is a significant stimulation of the choline phosphotransferase activity in the virus infected spleens with the peak activity at about 10 days of viral infection. The specific activity of choline phosphotransferase is 10 times that of the phosphatidyl ethanolamine methyltransferase at 10 days of viral infection. There is a 51-fold increase over controls for the total microsomal choline phosphotransferase at 14 days of viral infection and only an 18-fold increase over controls for the phosphatidyl ethanolamine methyltransferase activity. There is a significant ($P < 0.001$) increase over controls in the concentration of total phospholipid-P, phosphatidyl choline-P, and phosphatidyl choline-P fractions as separated by argentation chromatography of microsomes from spleens of mice infected with Friend virus or Rauscher virus for 14 days. The choline phosphotransferase and phosphatidyl ethanolamine methyltransferase specific activities in liver microsomes of 14 day Friend and/or Rauscher virus are unaltered during viral infection.

CHANGES IN PLASMA LIPOPROTEIN CONSTITUENTS DURING CONSTANT INFUSIONS OF HEPARIN. Y. Homma and P.J. Nestel (Dept. of Clin. Sci., The Australian Natl. Univ., Canberra, Australia) *Atherosclerosis* 22, 551-63 (1975). Constant infusions of heparin of 4 to 6 hours' duration were used to estimate the transfer of very low density lipoprotein constituents to other plasma lipoproteins. Eleven subjects were studied, 3 with Type III and the remainder with either Type IV or V hyperlipoproteinemia. Whereas only about 5% of the triglyceride lost from VLDL was recovered in the other lipoproteins, 44% of the cholesterol was retained in the circulation, in equal amounts within low density (d 1.019-1.063) and intermediate density (d 1.006-1.019) lipoproteins. By contrast, there was no apparent loss of protein, more than half of that originally in VLDL being recovered in high density lipoprotein. In subjects with Type III hyperlipoproteinemia, lipid and protein was lost from the intermediate density lipoprotein as well as from VLDL. In subjects with marked hypertriglyceridemia, cholesterol became redistributed from larger to smaller VLDL. The esterification of plasma cholesterol as measured *in vitro*, was apparently suppressed during the early phase of the heparin infusions, but tended to recover later.

RELATIONSHIP BETWEEN THE TYPE OF DIETARY FATTY ACID AND ARTERIAL THROMBOSIS TENDENCY IN RATS. G. Hornstra and R.N. Lussenburg (Unilever Res., Vlaardingen, The Netherlands) *Atherosclerosis* 22, 499-516 (1975). The effect of dietary fatty acids on the formation and growth of intra-arterial occlusive thrombi in rats was investigated. It appeared that fats containing a large amount of saturated fatty acids promote arterial thrombus formation, whereas dietary linoleic acid has a specific anti-thrombotic effect. Oleic acid on its own does not seem to act as an anti-thrombotic substance. However, the replacement of thrombogenic fatty acids by oleic acid results in a decrease of the dietary thrombogenic potency. Moreover, the results indicated that the thrombogenicity of the saturated fatty acids increases with their chain length. As for the anti-thrombotic effect of *cis* fatty acids and their *trans* isomers, no obvious differences have been observed. Almost identical results were obtained when thrombogenicity was related to either absorption or to composition of the dietary fatty acids. Further

research can therefore be restricted to this latter criterion. For the majority of the fats tested, thrombosis tendency and ADP-induced platelet aggregation were closely associated. It is therefore highly probable that platelet aggregation is involved in the mechanism by which dietary fats affect arterial thrombus formation.

METABOLISM OF LIPOPROTEINS IN NONHUMAN PRIMATES. REDUCED SECRETION OF VERY LOW DENSITY LIPOPROTEINS IN SQUIRREL MONKEYS WITH DIET-INDUCED HYPERCHOLESTEROLEMIA. D.R. Illingworth, L.E. Whipple and O.W. Portman (Dept. of Nutr. and Metabolic Diseases, Oregon Regional Primate Res. Ctr., Beaverton, Ore. 97005) *Atherosclerosis* 22, 325-34 (1975). We have studied the effects of diet-induced hypercholesterolemia on the rates of secretion of triglycerides into the plasma of fasted squirrel monkeys. Two groups of monkeys were studied: control animals which were fed a semipurified diet not associated with hyperlipemia (plasma cholesterol 127 ± 8 mg/100 ml), and animals made hypercholesterolemic (plasma cholesterol 307 ± 31 mg/100 ml) by being fed a diet containing 25% butter and 0.5% cholesterol. After intravenous infusion of Triton WR 1339 (300 mg/kg body wt), plasma triglycerides increased almost linearly for 9-12 hours. Analysis of individual lipoproteins separated by ultracentrifugation showed that newly secreted triglycerides were present almost exclusively in the very low density lipoprotein fraction. The rates of triglyceride secretion in the hypercholesterolemic group of monkeys (5.15 ± 0.86 mg/kg/hr) were less than half those of the control animals (10.96 ± 2.15 mg/kg/hr). We suggest that in monkeys with diet-induced hypercholesterolemia high concentrations of plasma low density lipoproteins may inhibit the synthesis and/or secretion of their parent very low density lipoprotein molecules into the circulation.

EFFECT OF WHEAT FIBER ON BLOOD LIPIDS, FECAL STEROID EXCRETION AND SERUM IRON. D.J.A. Jenkins, M.S. Hill and J.H. Cummings (M.R.C. Gastroenterology Unit, Central Middlesex Hosp., Acton Lane, London N.W. 10) *Am. J. Clin. Nutr.* 28, 1408-11 (1975). Adding 36 g of wheat fiber for 3 weeks to the metabolically controlled diets of six subjects produced a significant increase in daily fecal weight from $70.8 \text{ g} \pm 6.2$ SEM to $217 \text{ g} \pm 12.1$; serum iron also fell by $21 \text{ } \mu\text{g}/100 \text{ ml} \pm 2.1$ SEM ($P < 0.001$) during the added fiber period (measured in five subjects) as did mean corpuscular volume and mean corpuscular hemoglobin. Fecal neutral steroid concentration (measured in four subjects) fell from 31 to 17.3 mg/g dry weight ($P < 0.05$) but the change in neutral steroid output and in acid steroid concentration and output was not significant. No change was seen in the serum levels of cholesterol and triglyceride.

EFFECT OF ETHANOL ON UTILIZATION OF PLASMA FREE FATTY ACIDS FOR LIVER TRIACYLGLYCEROL SYNTHESIS AND ITS RELATION TO HEPATIC TRIACYLGLYCEROL ACCUMULATION IN RATS. O. Johnson, O. Hernell and T. Olivecrona (Dept. of Chem., Sec. on Physiol. Chem., Univ. of Umeå, S-901 87 Umeå, Sweden) *Lipids* 10, 765-9 (1975). The effect of 3 different single doses of ethanol on the liver triacylglycerol concentration and on the metabolism of intravenously injected ^{14}C -oleic acid in fasted rats was studied. All 3 doses (2, 3.75, and 6 g ethanol/kg body wt) caused a rapid increase in the liver triacylglycerol concentration during the first 5-6 hr after the ethanol was given. Until the plasma ethanol concentration had fallen to low values, the high liver triacylglycerol levels were raised and were independent of the ethanol dose given. The incorporation of radioactivity from intravenously injected ^{14}C -oleic acid into liver triacylglycerols was increased over control values to the same extent in all rats given ethanol as long as the plasma ethanol concentration was above a low level. High rates of ethanol oxidation and increased utilization of plasma free fatty acids for liver triacylglycerol synthesis were closely correlated with the development and maintenance of the ethanol induced liver triacylglycerol accumulation.

AN IN VITRO STUDY OF VITAMIN D₂ HYDROXYLASES IN THE CHICK. G. Jones, H.K. Sehnoes, and H.F. DeLuca (Dept. of Biochem., Col. of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, Wis. 53706) *J. Biol. Chem.* 251, 24-8 (1976). An *in vitro* study of the liver 25-hydroxylation of vitamin D₂ and the kidney 1- and 24-hydroxylations of 25-hydroxyvitamin D₂ was undertaken in order to determine whether the discrimination against vitamin D₂ seen in chicks *in vivo* is the result of a block of one or more of the steps in the activation of the vitamin D₂ molecule. Vitamin D₂

hydroxylation reactions in the chick are virtually identical with those observed with the vitamin D₃ series. It is, therefore, concluded that the chick possesses the required enzymatic machinery to synthesize 1,25-dihydroxy-vitamin D₂ and that the discrimination must be because of some unknown metabolic reaction of the vitamin D₂ compounds, to a defect in the transport of vitamin D₂ metabolites, or to target organ discrimination.

GANGLIOSIDES OF THE HUMAN GASTROINTESTINAL MUCOSA. A. Keranen (Dept. of Med. Chem., Univ. of Helsinki, Silravuorenperä 10 A, SF-00170 Helsinki 17, Finland) *Biochim. Biophys. Acta* 409, 320-8 (1975). Gangliosides of the human alimentary mucosa were purified and analysed with thin-layer chromatography and gas chromatography. The content of ganglioside neuraminic acid was $0.16 \text{ } \mu\text{mol/g}$ dry weight in the stomach, $0.07 \text{ } \mu\text{mol/g}$ dry weight in the small intestine and $0.11 \text{ } \mu\text{mol/g}$ dry weight in the small intestine and $0.11 \text{ } \mu\text{mol/g}$ dry weight in the large intestine. Mono- and disialosylsides were the major gangliosides, on a molar basis 68% of the total found in the stomach and 44% of the total in the small and large intestine. Considerable amounts of more complex gangliosides were found, especially in the small and large intestine, in which the molar content of tri- and tetraglycosylgangliosides containing galactosamine made up 38% of the total. Two glucosamine-containing gangliosides were also found, the probable structures of which were mono- and disialotetraglycosylceramide. The presence of the latter is reported for the first time.

THE SQUALENE CONTENT OF ATHEROMATOUS PLAQUES. A RE-EXAMINATION. R.W. Lewis (Dept. of Clin. Biochem., Otago Univ. Schl. of Med., Dunedin, New Zealand) *Atherosclerosis* 22, 637-40 (1975). Eight samples of human aorta wall and plaques contained between 0.35 and 1.3 ppm squalene, in contrast to the high concentrations of 550 ppm and 1000 ppm reported previously for atherosclerotic pigeon aorta and human atheromatous plaques.

LIPID AND LIPOPROTEIN MEASUREMENTS IN A NORMAL ADULT AMERICAN POPULATION. F.T. Lindgren, G.L. Adamson, L.C. Jensen and P.D. Wood (Donner Lab., Univ. of California, Berkeley, Calif. 94720) *Lipids* 10, 750-6 (1975). From a parent population of 774, a subpopulation of 160 normal adults ages 27-66 was randomly selected, 20 from each decade and sex. A detailed comparison was made by analytic ultracentrifugation and complete agarose gel electrophoresis on serum and the 1.006 g/ml top and bottom preparative ultracentrifuge lipoprotein fractions. The latter was internally standardized by total lipid and plasma total cholesterol and triglyceride determinations giving normal reference lipoprotein values. The reading procedure allowed the identification and quantification of floating β and sinking pre- β . In the subpopulation, there were two of the former and 13 of the latter. For large scale clinical application of such quantitative lipoprotein electrophoresis full automation of the microdensitometry and calculations will be required.

THE RELATIONSHIP BETWEEN DIETARY FAT COMPOSITION AND PLASMA CHOLESTEROL ESTERIFICATION IN MAN. J.P. Miller, A. Chait and B. Lewis (Univ. Dept. of Med., St. James's Hosp., Leeds, England) *Clin. Sci. Mol. Med.* 49, 617-20 (1975). Cholesterol esterification has been studied in the plasma of subjects on diets rich in saturated or polyunsaturated fat. The diet rich in polyunsaturated fat was associated with lower rates of plasma cholesterol esterification *in vitro*. The data suggest that there was a reduction of plasma lecithin-cholesterol acyltransferase activity as well as decreased ability of the lipoprotein substrates of the enzyme to support esterification. On this diet, there was no change in the proportion of the plasma cholesterol esterified but the plasma cholesterol and triglyceride concentrations were reduced.

GROWTH HORMONE RESPONSE TO INSULIN AND TO ARGININE IN PATIENTS WITH FAMILIAL HYPERCHOLESTEROLAEMIA. M. Muggeo, A. Tiengo, D. Fedele and G. Crepaldi (Dept. of Internal Med., Div. of Gerontology and Metabolic Diseases, Univ. of Padova, Italy) *Atherosclerosis* 22, 543-50 (1975). Human growth hormone (HGH) response to i.v. insulin (0.1 U/kg body weight) and arginine infusion (25 g of L-arginine for 30 min) was studied in 9 patients (5 males and 4 females) with primary familial hypercholesterolaemia and belonging to 4 families. Mean age was 28 ± 2 years (range 18-36) and body weight was $<105\%$ of ideal body weight.

Glucose tolerance and insulin response to oral glucose were normal in all patients. HGH release after insulin and after arginine was slightly increased as compared to 21 normal controls, but the differences were not significant. Insulin and glucagon response to arginine in these patients was within the normal range. Plasma glucose and free fatty acids were normal after both insulin and arginine. Moreover, no significant correlation was found between fasting cholesterol and HGH peaks after insulin and after arginine, nor between cholesterol and insulin and glucagon responses. Despite marked hyperlipidaemia, HGH-deficient patients examined by other authors never present signs of atherosclerotic disease. Our data suggest that HGH, in the presence of elevated cholesterol levels, might play an important role in the development of Atherosclerotic lesions.

PLASMA SQUALENE AS AN INDEX OF CHOLESTEROL SYNTHESIS. P.J. Nestel and B. Kudchodkar (Dept. of Clin. Sci., The Australian Natl. Univ., Canberra, Australia) *Clin. Sci. Mol. Med.* 49, 621-4 (1975). Seven subjects were studied before and after the rate of cholesterol synthesis was altered with drugs or dietary cholesterol. The rate at which plasma free cholesterol was formed from squalene during constant infusions of radioactive mevalonate increased with colestipol treatment, decreased with clofibrate treatment and decreased when cholesterol was added to the diet. The plasma squalene concentration showed corresponding changes, confirming that its measurement may qualitatively define changes in cholesterol synthesis. The mean plasma squalene concentration in seven hypertriglyceridaemic, slightly overweight subjects, which is consistent with other evidence for increased cholesterol synthesis in hypertriglyceridaemia.

EFFECT OF DIET ON FATTY ACIDS IN THE LIPOPROTEIN CHOLESTERYL ESTERS OF TYPE IIA AND NORMAL INDIVIDUALS. R.S. Newton, R.E. Pitas and R.G. Jensen (Dept. of Nutr. Sci., Univ. of Connecticut, Storrs, Conn. 06268) *Lipids* 10, 858-62 (1975). Four normal and two individuals with type IIA hyperlipoproteinemia were placed on the National Heart and Lung Institute Type IIA Diet (<300 mg of cholesterol per day, high polyunsaturated, low saturated fat diet) for 1 week and on a normal diet the following week. Plasma samples were obtained and the cholesterol contents of plasma and of very low density, low density and high density lipoproteins determined. The cholesteryl esters in one type IIA and two normal individuals were identified. The cholesteryl esters in type IIA very low density lipoproteins from blood drawn 45 min after the last meal in each dietary period, contained less 18:2 than from the normal. After the first dietary period, the very low density lipoprotein cholesteryl ester 18:2 content for the type IIA was 37.2M% and for the normals, 54.7M%. After the second dietary period, the corresponding values were 49.7M% and 56.7M%. Fasting samples had lower 18:2 contents in the low density lipoproteins from the Type IIA subject following both dietary periods and in the high density lipoproteins following the Type II diet.

FAT METABOLISM IN HIGHER PLANTS. PRODUCTION OF SHORT- AND MEDIUM-CHAIN ACYL-ACYL CARRIER PROTEIN BY SPINACH STROMA PREPARATIONS TREATED WITH CERULENIN. N.M. Packter and P.K. Stumpf (Dept. of Biochem. and Biophys., Univ. of Calif., Davis, Calif. 95626) *Biochim. Biophys. Acta* 409, 274-82 (1975). Incubation of stroma preparations from spinach chloroplasts with low concentrations of cerulenin (10 μ M) resulted in severe inhibition of fatty acid synthesis but stimulated the release of medium-chain acids in very high proportions (60-70%). Preincubation of these preparations with cerulenin in the absence of substrate exerted no additional effect on subsequent fatty acid synthesis (as measured by incorporation of [¹⁴C] acetate into fatty acids) or the pattern of radioactive acids obtained. Acyl-protein, acyl-CoA, free fatty acids and lipids were resolved from each other and analysed for their distribution of ¹⁴C-labelled fatty acids. Acyl-protein derived from cerulenin-treated preparations was the only fraction which contained short- and medium-chain acids (C₆-C₁₂). The other fractions from both control and cerulenin-treated groups consisted exclusively of C₁₆ and C₁₈ acids. Acyl-protein was purified by gel filtration chromatography and was characterized as acyl-acyl carrier protein.

THE INFLUENCE OF ATHEROGENIC DIET AND "ESSENTIAL" PHOSPHOLIPIDS UPON THE CONTENTS OF NORADRENALINE AND DOPAMINE IN THE BRAIN OF RATS AND THEIR EXPLORATORY ACTIVITY. R. Pilecki, L. Samochowiec and K. Szyszka (Dept.

of Pharmacol., Pomeranian Med. Acad., Powstańców Wlkp. 72, 70-111 Szczecin, Poland) *Atherosclerosis* 22, 401-10 (1975). The influence of atherogenic diet and "essential" phospholipids (EPL) both on exploratory activity and catecholamine content in the brain of rats has been examined. The atherogenic diet caused a decrease of the animals' exploratory activity as well as a diminution of catecholamines. It was observed that these changes correlated. Prophylactic administration of EPL is capable of preventing such changes. Therapeutic administration of EPL increased exploratory activity and catecholamines in the atherogenic group which subsequently received the basic laboratory diet.

ONEQUILIBRATION OF ACETYL UNITS FROM FATTY ACIDS AND GLUCOSE IN MAMMARY GLANDS OF LACTATING MICE. G.A. Rao and S. Abraham (Veterans Admin. Hosp., Martinez, Ca. 94553) *J. Dairy Sci.* 58, 1799-802 (1975). Lipid synthesis by lactating mouse mammary gland slices from [1-carbon-14] propionate, [1-carbon-14] valerate, and [1-carbon-14] heptanoate, in the presence of glucose and from [uniformly labeled carbon-14] glucose in the presence of propionate, valerate, and heptanoate was studied. Regardless of the labeled substrate, almost all of the radioactivity incorporated into the total lipid fraction was in triglycerides. In experiments with labeled glucose and either the propionic, the valeric, or the heptylic acid, the carbon-14 fatty acids in triglycerides were almost exclusively composed of even-chain fatty acids. When the substrate was either [carbon-14] propionate, [1-carbon-14] valerate, or [1-carbon-14] heptanoate, in the presence of glucose, the pattern changed to one in which a larger proportion of the radioactivity was in the odd-chain fatty acids. These findings suggest that in mouse mammary gland, acetyl units produced via β -oxidation of fatty acids may not equilibrate with those formed from oxidation of pyruvate which is derived from glucose.

CHYLOMICRON FORMATION AND COMPOSITION IN UNANAESTHETIZED RABBITS. T.G. Redgrave and K.B. Dunne (Dept. of Physiol., Univ. of Melbourne, Parkville, Victoria 3052, Australia) *Atherosclerosis* 22, 389-400 (1975). Emulsified lipid was infused steadily into the upper small intestine of unanaesthetized rabbits for 6 h and 24 h periods. Lymph was collected from a thoracic duct cannula, the output of infused lipids was measured and the lymph chylomicrons were isolated. Recovery of infused triacylglycerol was $63 \pm 6.4\%$ and recovery of infused radioactive cholesterol was $24 \pm 4.2\%$ during a 24 h period. There was considerable dilution of radioactive exogenous cholesterol with endogenous cholesterol. Provided that absorption was well-established most exogenous lipid was present in the lymph in the form of chylomicrons, and there was a close relationship between lipid content of the lymph and the presence of chylomicrons. During absorption of fats of differing fatty acid composition chylomicrons remained the predominant transport form in the lymph. Chylomicrons obtained during absorption of several fats have been analysed in detail. The protein, phospholipid, free and esterified cholesterol content of these chylomicrons varies within narrow limits. The fatty acid composition of chylomicron triacylglycerols reflects the type of fat in the test meal but the composition of chylomicron phospholipids and cholesteryl esters shows clear discrimination. During absorption of coconut oil there is a strong negative discrimination towards lauric acid both for cholesteryl esters and for phospholipids.

AGE-RELATED INTERRELATIONSHIPS OF BLOOD PRESSURE AND ARTERIAL STEROL ACCUMULATION IN SPONTANEOUSLY ATHEROSCLEROSIS-SUSCEPTIBLE AND ATHEROSCLEROSIS-RESISTANT PIGEONS. Z. Rymaszewski, M. Langelier, I.A. Carlo, M.T.R. Subbiah and B.A. Kottke (Mayo Clinic and Mayo Found., Rochester, Minn.) *Atherosclerosis* 23, 111-6 (1976). Interrelationships of arterial sterol accumulation and blood pressures were examined in age-matched White Carneaux and Show Racer pigeons. It was found that the systolic blood pressure of White Carneaux changed from 155.0 mm Hg at nine months of age to 168.8 mm Hg at 17 months of age ($P < 0.005$) while that of the Show Racers did not show any age-related increases. In White Carneaux, the total sterol content in the aorta increased by 43.6% from 9 months to 17 months of age ($P < 0.001$) with major changes in the sterol ester fraction while no such changes were evident in the Show Racers. This indicates interrelationships of the arterial sterol content and blood pressure in the White Carneaux pigeon.

INTESTINAL LIPID ABSORPTION: EVIDENCE FOR AN INTRINSIC DEFECT OF CHYLOMICRON SECRETION BY NORMAL RAT DISTAL INTESTINE. S.M. Sabesin, P.R. Holt and S.B. Clark (Div. of Gastroenterology, Dept. of Med., The Univ. of Tennessee, Ctr. for the Hlth. Sci., Memphis, Tenn. 38163) *Lipids* 10, 840-6 (1975). Intracellular triglyceride accumulation and delayed chylomicron secretion were demonstrated in distal but not in proximal fat intestine following prolonged steady state fat absorption. After 1 and 4 hr of intraduodenal triolein infusion, the mucosal triglyceride content in distal intestinal segments was greatly increased compared with proximal segments. Electron microscopy at each time interval disclosed greater quantities of lipid droplets within the distal cells and these were much larger than the intracellular droplets in the proximal cells, some attaining an enormous size (9000 m μ). When proximal and distal cells were compared at intervals after cessation of a 4 hr triolein infusion, the differences in intracellular lipid accumulation were also evident because, even after 6 hr the distal cells were still filled with large droplets, whereas the proximal cells were almost devoid of fat. These results indicate a basic cellular difference between proximal and distal intestine in the processing of fat and, in contrast to current concepts, suggest that defective chylomicron secretion is not necessarily associated with limited B-apoprotein availability.

LIPOPROTEIN AND LECITHIN: CHOLESTEROL ACYLTRANSFERASE CHANGES IN GALACTOSAMINE-INDUCED FAT LIVER INJURY. S.M. Sabesin, L.B. Kuiken and J.B. Ragland (Div. of Gastroenterology, Dept. of Med., Univ. of Tenn. Col. of Med., Memphis 38163) *Science* 190, 1302-4 (1975). Abnormal lipoproteins and decreased lecithin: cholesterol acyltransferase activity are found in rat plasma following intraperitoneal injection of D-galactosamine. The changes observed including absence of α -lipoprotein and the presence of lipoproteins rich in phospholipid and unesterified cholesterol but deficient in cholesteryl esters, are remarkably similar to changes found in human pathologic states of lecithin: cholesterol acyltransferase deficiency. When examined by electron microscopy, all of the major lipoprotein classes isolated by ultracentrifugation showed morphological abnormalities including the formation of rouleaus consisting of disk-shaped particles.

ELECTRON PARAMAGNETIC RESONANCE STUDIES OF ACTIN-LIPID INTERACTION IN AQUEOUS MEDIA. S.Y.K. Shenouda and G.M. Pigott (Food and Nutr. Sci. Dept., Univ. of Rhode Island, Kingston, Rhode Island 02881) *J. Agric. Food Chem.* 24, 11-5 (1976). The interaction between fish lipid and fish actin in aqueous media was investigated by the use of spin-label techniques. Three types of spin-labels were used in the study. 12-Doxyl stearic acid was incorporated into lipid-liposomes by sonication. The incorporation of the spin-label took place at a lipid/water ratio of 3 mg of lipid/1 ml of H₂O. Addition of actin to the labeled liposomes showed that both neutral fish lipids interact with actin. The neutral lipids showed stronger interaction than polar lipids. Results of maleimide and iodoacetamide spin-labels suggested that all the sulfhydryl groups and the majority of the amino groups, which bind the labels, were on the surface of the actin molecules and exhibited considerable mobility. The results also showed that these sites did not experience any conformational changes, which would restrict the spin-label mobility, during actin-lipid interaction. At the isoelectric precipitation region of action, the mobility at these sites was considerably restricted. Raising the pH to the alkaline side, i.e. pH 10.0, caused expansion of the actin molecules, accompanied by exposure of the hidden amino group sites to the surface of the molecule.

THE EFFECT OF HYPERCHOLESTEROLEMIA ON AORTIC ENDOTHELIUM STUDIED EN FACE. J.B. Silkworth, B. McLean and W.E. Stehbens (Dept. of Pathol. and Specialized Ctr. of Res. on Arteriosclerosis, Albany Med. Col. of Union Univ. and Veterans Admin. Hosp., Albany, N.Y. 12208) *Atherosclerosis* 22, 335-48 (1975). The aortic endothelium of rabbits fed a stock diet containing 1 or 2% cholesterol for intervals of 1 day to 21 weeks was compared with that of normal rabbits on a stock diet without cholesterol. The endothelium was examined *en face* using the Häutchen technique. The aortic endothelium of the experimental animals revealed an increase in stigmata and stomata, multinucleated giant cells and leukocytes particularly about sites of branching. These changes were also observed in the endothelium overlying lipid deposits but in addition, there was an increase in mitoses, an alteration

in the orientation of endothelial cells and their nuclei, and a change in their argyrophilic staining properties. Closely related to the endothelium was an increasing number of foam cells which appeared to be derived from monocytic leukocytes.

FAT METABOLISM IN HIGHER PLANTS: METABOLISM OF MEDIUM CHAIN FATTY ACIDS. A. Sodja and P.K. Stumpf (Dept. of Biochem. and Biophys., Univ. of California, Davis, Calif. 95616) *Lipids* 10, 818-28 (1975). Cell free preparations of avocado mesocarp and spinach leaf tissue rapidly convert lauryl CoA to DL-3-hydroxyl lauric acid as well as 2-, and 3-dodecanoic acids. The conversion does not occur under anaerobic conditions unless a suitable redox carrier such as ferredoxin is present. H₂¹⁸O is incorporated into the 3-hydroxyl function, but O₂¹⁸ is not. The characteristics of this system are presented and a possible function of this system is proposed.

EFFECTS OF PALM-KERNEL OIL AND SUNFLOWER-SEED OIL ON SERUM LIPIDS AND ATHEROGENESIS IN ALLOXAN-DIABETIC RABBITS. J. Kloeze and A.M.M. Abdellatif (Unilever Res., Vlaardingen, The Netherlands) *Atherosclerosis* 22, 349-68 (1975). Groups of metabolically normal (controls) and alloxan-diabetic adult female rabbits were fed semi-synthetic diets containing 40 cal% palm-kernel oil (PKO) or sunflower-seed oil (SSO) for 54 weeks. In contrast to control rabbits fed PKO-diet, the alloxan-diabetic rabbits on this diet, developed no or only a negligible degree of atherosclerosis, although the serum levels of all lipid classes had increased in the diabetic rabbits above that of the controls during almost the whole experimental period. The diabetic rabbits and the controls fed SSO-diet were both free from any significant atherosclerotic involvement in spite of the fact that the SSO-diet appeared unable to suppress the very high levels of the various serum lipid classes induced by the diabetic state. On both diets, the diabetic rabbits showed a significantly higher cholesteryl linoleate/oleate ratio than the controls, which was caused by an increase in the cholesteryl linoleate level in the diabetics. No serious aorta atherosclerosis was found in rabbits with a cholesteryl linoleate/oleate ratio higher than 0.6, although no correlation was found between the atherosclerosis indices and these ratios at values lower than 0.6. Rabbits with cholesteryl linoleate/oleate ratios below 0.6 seemed to run a greater risk of developing atherosclerosis. It is suggested that insulin might be required for atherogenesis in addition to hyperlipemia and hypercholesterolemia.

DIETARY LYSINE AND CARNITINE: RELATION TO GROWTH AND FATTY LIVERS IN RATS. V. Tanphaichitr, M.S. Zaklama and H.P. Broquist (Dept. of Biochem., Vanderbilt Univ. Schl. of Med., Nashville, Tenn. 37232) *J. Nutr.* 106, 111-7 (1976). Male weaning rats were fed a 72% rice diet containing no detectable carnitine and limiting in threonine and lysine. Such dietary conditions may simulate protein malnutrition in man. Under these conditions growth impairment, anemia, hypoproteinemia, and fatty liver developed. The study focused principally on the fatty liver syndrome which was corrected to varying extents depending on degrees of supplementation with carnitine, lysine, threonine, and appropriate combinations of these nutrients. Such reduction in fatty liver accumulation was accounted for principally by the lowering of triglycerides, but also in part by total cholesterol levels. All the data, which also included monitoring carnitine uptake by the tissues and measurement of plasma triglycerides, were consistent with the view that fatty liver accumulation occurs in amino acid deficient diets because of an impairment in the synthesis of the lipoprotein complex mandatory for triglyceride secretion from the liver and from a deficiency of carnitine needed for the intramitochondrial transport of fatty acids prerequisite for their oxidation.

EFFECT OF THIOURACIL UPON CANINE ARTERIAL ELASTIC TISSUE. A. Trillo (Dept. of Pathol., The Univ. of Western Ontario, London, Ontario, Canada) *Atherosclerosis* 22, 369-77 (1975). Unlike some other mammalian species, the dog is relatively resistant to the development of elevated levels of serum cholesterol after prolonged cholesterol feeding. This may be overcome by suppressing thyroid activity with thiouracil. Information regarding possible activity of thiouracil itself upon the arterial tissues is almost nonexistent. The present investigation was undertaken to test whether this drug has any such action, especially upon the arterial elastic tissues. Destructive changes were observed in arterial elastic tissues

in dogs given thiouracil for three and six months. The changes consisted of accentuation of the elastic fibrillar components, formation and subsequent coalescence of clefts, and fragmentation and ultimate "dissolution" of the elastic elements. The results suggest that thiouracil may exert a damaging effect upon the arterial elastic fibers; thus, it is possible that one of the mechanisms by which thiouracil and cholesterol administration induces experimental atherosclerosis in the dog is by elastic tissue destruction, possibly promoting the subsequent lipid accumulation in the arterial wall.

RAT HEART LIPOPROTEIN LIPASE. J.S. Twu, A.S. Garfinkel and M.C. Schotz (Res., Veterans Admin. Wadsworth Hosp. Ctr., Los Angeles, Calif. 90073) *Atherosclerosis* 22, 463-72 (1975). Rat heart lipoprotein lipase was highly purified by affinity chromatography using heparin-Sepharose 4B. When extracts of acetone powder were applied to columns, lipase activity was firmly bound to the gel matrix and was later eluted with 1.5 M NaCl. At this stage the eluted enzyme was purified 1500-fold. Disc gel electrophoresis yielded a single protein band corresponding with the enzyme activity. The apparent molecular weight was 60,000. The purified enzyme was highly unstable; however, its activity could be partially stabilized by glycerol or ethylene glycol. In studying the purified enzyme we observed: a cofactor in serum was required for full enzymatic activity; ApoLp-Glu could be substituted for this cofactor; ApoLp-Ser was inhibitory to lipase activity; NaCl and protamine sulfate also markedly inhibited the lipase activity; heparin stimulated the enzymatic activity.

THE INTERACTION OF PHOSPHOLIPASE A₂ WITH MICELLAR INTERFACES. THE ROLE OF THE N-TERMINAL REGION. M.C.E. van Dam-Mieras, A.J. Slotboom, W.A. Pieterse and G.H. de Haas (Dept. of Biochem., State Univ., De Uithof, Trans III, Padualaan 8, Utrecht, The Netherlands) *Biochemistry* 14, 5387-93 (1975). The localization of the previously postulated interface recognition site (IRS) in porcine pancreatic phospholipase A₂, required for a specific interaction between the enzyme and organized lipid-water interfaces, was investigated by ultraviolet difference spectroscopy, by measurements of the intrinsic fluorescence of the unique Trp residue, and by protection experiments against specific tryptic hydrolysis. Using the enzymically nondegradable substrate analogues: C_nH_(2n+1)-O-P(O)-OOCCH₂CH₂N⁺(CH₃)₃(H,OH), it is shown that the rather hydrophobic N-terminal sequence of the enzyme, viz., Ala-Leu-Trp-Gln-Phe-Arg, is directly involved in the interaction with the lipid-water interface. Besides hydrophobic probably also polar interactions contribute to the binding process. At neutral or acidic pH the presence of a salt bridge between the N-terminal α-NH₃⁺ group and a negatively charged side chain stabilizes the interface recognition site and allows the enzyme to penetrate micellar surfaces, even in the absence of metal ion. At alkaline pH, interaction of the enzyme with micellar interfaces requires the presence of Ca²⁺ (or Ba²⁺) ions.

AORTIC WASHOUT OF ¹²⁵I COMPOUNDS IN ATHEROSCLEROTIC AND NORMAL RABBITS. R. Watts and H. Pena (Nuclear Med. Service, Vet. Admin. Hosp. and the Univ. of New Mexico's Schl. of Med., Albuquerque, New Mexico, U.S.A.) *Atherosclerosis* 22, 573-82 (1975). An *in vivo* rabbit model is described for the study of aortic washout of ¹²⁵I tagged compounds. Washout is compartmental and in sequence from the lumen, aortic wall, and periaortic fat. Toluene-azo-naphthol (TAN) affixed chiefly to periaortic fat. A double isotope method with TAN plus a cholesterophilic substance is suggested for the assay of atherosclerosis *in situ*.

REPAIR OF EARLY CHOLESTEROL-INDUCED AORTIC LESIONS IN RABBITS AFTER WITHDRAWAL FROM SHORT-TERM ATHEROGENIC DIET. SCANNING ELECTRON-MICROSCOPICAL (SEM) AND TRANSMISSION ELECTRON-MICROSCOPICAL (TEM) OBSERVATIONS. G. Weber, P. Fabbri, E. Capaccioli and L. Resi (Inst. of Pathol. Anat., Univ. of Siena, Italy) *Atherosclerosis* 22, 565-572 (1975). Signs of repair of early atherosclerotic lesions after withdrawal of rabbits from a short-term atherogenic diet have been observed by means of scanning and transmission electron microscopy. The endothelial lining was lacking over large portions of the plaques during early atherogenesis. During the regression phase, hematic cholesterol values returned to normal, the smooth muscle cells of the plaques lost a large part of the lipids they had accumulated, while the surface of the plaques was covered by a continuous layer of endothelial cells.

STUDIES IN VITRO OF LIPOGENESIS IN RAT TESTICULAR TISSUE. A.R. Whorton and J.G. Coniglio (Dept. of Biochem., Vanderbilt Univ., Nashville, Tenn. 37232) *Lipids* 10, 783-9 (1975). Testicular tissue was shown to contain the full complement of enzymes required for de novo synthesis of fatty acids. The enzymes capable of synthesizing palmitic acid from citrate, acetate, or acetyl CoA were found to be present in the soluble (cytoplasmic) fraction. These included fatty acid synthetase, acetyl CoA carboxylase, citrate-cleavage enzyme, malic enzyme, glucose-6-phosphate dehydrogenase, and 6-phosphogluconate dehydrogenase. Optimal conditions for assaying activities of fatty acid synthetase and acetyl CoA carboxylase in the soluble fraction from rat testes were established, and the activities of these two enzymes were determined to be 0.54 ± 0.1 and 0.030 ± 0.002 (nmoles of substrate incorporated into fatty acid per min per mg of soluble fraction protein), respectively. The activities of citrate-cleavage enzyme, malic enzyme, and the glucose-6-phosphate dehydrogenase/6-phosphogluconate dehydrogenase pair were also measured. The activities were 6.0 ± 0.7, 34.9 ± 4.2, and 29.9 ± 9.3 nmoles/min/mg, respectively.

THE ROLE OF ESSENTIAL FATTY ACIDS (EFA) IN THE REGULATORY PROCESSES OF MALPIGHIAN CELL MEMBRANES. M. Cambrai (Unilever Res., Saint-Denis Lab., La Plaine Saint-Denis 93212, France). *J. Soc. Cosmet. Chem.* 26(10), 485-96 (1975). Living cells possess the ability to adjust their membrane permeability in response to various stimulations. The electrical resistance of membranes as a function of current intensity proved a convenient means for studying this property. The non-linearity of membranes, i.e. the sudden change in electrical resistance which occurs beyond a critical current intensity, has been the subject of extensive studies. Evidence is presented showing that, in rats deficient in essential fatty acids, the membranes of living epidermal cells do not retain their normal, non-linear behavior. Others have established that, under similar conditions, membrane-bound enzymes lose their allosteric properties. These findings lead to the conclusion that essential fatty acids are a fundamental requirement for the manifestation of regulatory processes in cell membranes. Possible mechanisms and the influences on hormonal regulation at the level of the skin are discussed.

NUTRITIVE CONTENT OF COLLEGE MEALS. II. LIPIDS. M.A. Walker and L. Page (Consumer and Food Economics Inst., A.R.S., U.S.D.A., Hyattsville, Md.). *J. Am. Diet. Assoc.* 68, 34-8 (1976). Samples consisting of complete breakfasts, lunches, and dinners as offered to college students were collected for seven consecutive days from each of fifty colleges. The meals from each college were composited and analyzed for fat and fatty acids. Fat content of the meals averaged 125.58 g with a range of 96.96 to 163.74 g, providing an average of 42.33% of total calories (range, 36.68-47.67%). No college served meals with as little as 35% of calories derived from fat. The meals contained an average of 46.3 g of saturated fatty acids; 48.98 g of monounsaturated fatty acids, of which 48.19 g were oleic acid; and 18.25 g of polyunsaturated fatty acids, of which 17.22 g were linoleic acid. Four fatty acids—palmitic, stearic, oleic, and linoleic—contributed approximately 92% of total fatty acids. Average P:S ratio was 0.39 (range 0.22-0.69). Six colleges served meals with a P:S ratio of 0.30 or below while five had a ratio of 0.50 or above.

DIETARY REGULATION OF SERUM LIPIDS IN HEALTHY, YOUNG ADULTS. P. Hill and E.L. Wynder (American Health Foundation, Valhalla, N.Y.). *J. Am. Diet. Assoc.* 68, 25-30 (1976). The subjects of the study, comprising both men and women, ate "prudent" diets composed of customary food products for four weeks. The diets supplied an average of 2375 kcal and 250 mg of cholesterol per day. Average serum cholesterol was lowered 17.5%, from 175 ± 7.5 to 147 ± 7.8 mg/100 ml in the male subjects. No corresponding weight losses were recorded. Under the conditions of the controlled menu in the study, an increase in the P:S ratio from 0.3 to 1.2 produced no further lowering of the serum cholesterol in subjects of either sex. Serum triglyceride levels in the wives of the men in the study were significantly lower, although both ate the same food. Regardless of the P:S ratio, none of the diets altered nonfasting serum triglycerides. Serum phospholipids were lowered in the males eating the high P:S diet but not in their wives, suggesting a sex difference in response to diet. Results of the study indicate that cholesterol intake and caloric balance are of prime importance in maintaining the level of serum cholesterol.

PREVALENCE AND AWARENESS OF HYPERLIPOPROTEINEMIA IN PHYSICIANS AND THEIR SPOUSES. C.P. Wen and D.S. Greenbaum (College of Human Medicine, Michigan State Univ., East Lansing). *J. Am. Diet. Assoc.* 68, 31-3 (1976). Members of a local medical society and their spouses were approached and given the opportunity to participate in a blood lipid screening program. Serum cholesterol and triglycerides were determined. A questionnaire concerning their awareness of hyperlipoproteinemia and related medical conditions was also answered by each respondent. Altogether, 113 males and 85 females participated. Of all subjects, 34.8% showed hypercholesteremia (240 mg/100 ml or above) and 24.2% showed hypertriglyceridemia (140 mg/100 ml or above). After age 50, minimal sexual differences in these conditions were observed. Of the subjects found with abnormal blood lipids, less than 20% of the men and 10% of the women were aware of the conditions. Implications of these findings for the medical profession and for the patients they treat are discussed. ■

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MS organic chemist seeks a change. BS in technology of oils, fats and waxes. Experienced in quality control, production, product development, synthesis, various analytical and separation methods. Interested in studying for MBA. Midwest preferred. Please reply **Box 204**, JAOCs, 508 S. 6th St., Champaign, Ill. 61820.

POSITION WANTED

EXPERIENCED CHEMIST in environmental sciences, toiletries and detergents, Ph.D., seeks position at group leader or senior scientist level. Publications, languages.

Send replies to: **Box 205**
American Oil Chemists' Society
508 S. Sixth Street
Champaign, IL 61820

PLANT SUPERINTENDENT

New soybean processing plant in Jamaica seeking an experienced plant superintendent to start up a medium-size operation. We are only looking for an experienced, flexible individual, capable and interested in training others and in operating plant in different circumstances. This position would require living abroad for three to five years. Good salary, benefits available for the right person. Prefer chemical engineer, although others will be considered.

Reply: **Box 206**
American Oil Chemists' Society
508 S. Sixth Street
Champaign, IL 61820

POSITION WANTED

Available now. Experienced production manager. Over 20 years experience in managing all stages of vegetable oil processing. Thoroughly familiar with refining, hydrogenation, margarine packaging, and quality control.

Reply: **Box 207**
American Oil Chemists' Society
508 S. Sixth Street
Champaign, IL 61820