ABSTRACTS

R.A. REINERS, Editor. Abstractors: N.E. Bednarcyk, J.E. Covey, J.C. Harris, S.F. Herb, F.A. Kummerow, Biserka Matijasevic, E.G. Perkins, and R.W. Walker

• Fats and Oils

NUCLEAR MAGNETIC RESONANCE STUDIES OF LECITHIN-SKATOLE INTERACTION. T.M. Bray, J.A. Magnuson and J.R. Carlson (Nutr. Program, Biophys. Program, Biochem. Program, and Depts. of Chem. and Animal Sci., Wash. State Univ., Pullman, Wash. 99163). *J. Biol. Chem.* 249, 914–8 (1974). The interaction of indole and skatole with lecithin micelles has been examined in three apolar solvents using proton magnetic resonance spectroscopy at 60 MHz. Interactions lead to large chemical shift changes in resonances of both the indoles and the phospholipid. These results are consistent with the model that skatole and indole intercalate between the lecithin fatty acid chains near the polar head. The amine proton of the indole ring is hydrogen bonded with the phosphate and the $-N(CH_3)_3$ moves closer to the indole ring. Water mobility is reduced around the polar head.

LIPID AUTOXIDATION IN PRECOOKED DEHYDRATED SWEET POTATO FLAKES STORED IN AIR. W.M. Walter, Jr. and A.E. Purcell (Agr. Res. Service, Mid-Atlantic Area, Southern Region, U.S. Dept. of Agr. and Dept. of Food Sci., N.C. State Univ., Raleigh, N.C. 27607). *J. Agr. Food Chem.* 22, 298–302 (1974). Destruction of carotene and fatty acids during autoxidation of precooked dehydrated sweet potato flakes was studied in relation to oxygen uptake. Lipids of the oxidized flakes were separated into surface and bound components before analysis. Major fatty acids were identified and quantitated by gas chromatography. Carotene was determined spectrophotometrically. Results showed that surface carotene was lost about 100 times more rapidly than bound carotene. In addition it was observed that surface fatty acids were not destroyed nearly as rapidly as carotene but much faster than bound fatty acids. More oxygen was absorbed than could be accounted for by peroxide formation, indicating that other oxygen-consuming reactions are involved in flake autoxidation. The data confirmed an earlier observation that autoxidation of sweet potato flakes occurs *via* a dual reaction mechanism, with surface and bound lipids oxidizing concurrently but at very different rates.

FAT CHARACTERISTICS AND STABILITY OF NONDAIRY POWDERED CREAMERS. R.C. Jolly and F.V. Kosikowski (Dept. of Food Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Agr. Food Sci.* 22, 295–298 (1974). Four representative nondairy powdered creamers and two cow's milk powdered creamers were analyzed for fat and fatty components and changes induced before and after room temperature incubation. They were analyzed for melting point, refractive index, unsaponifiable matter and peroxide value. The sterols in nondairy powdered creamers were mainly plant (campesterol, stigmasterol and β-sitosterol) and their fatty acids were very highly saturated, 95.0 to 97.8%. Incubation of powders for 3 months at room temperature developed astringent and oxidized flavor and an increase in oxidized fatty acids and peroxide value but not in acid number. In cow's milk powdered creamers, the sterols were cholesterol and related sterols, and their fatty acids were partly saturated with a few branched chains developing during storage. Incubation for 3 months at room temperature developed slight astringent flavor and an increase in oxidized fatty acids, acid number and peroxide value.

MEASURING UNSATURATION IN MILKFAT AND OTHER OILS BY DIFFERENTIAL INFRARED SPECTROSCOPY. B.A. Anderson, R. Miller and M.J. Pallansch (Dairy Prod. Lab., Agr. Res. Service, U.S. Dept. of Agr., Washington, D.C. 20250). *J. Dairy Sci.* 57, 156–9 (1974). Infrared absorbance at 3.3 μ was directly related to the iodine value of milkfat samples with unusual unsaturation when a totally saturated analog was a reference. Unsaturation was determined from differential infrared absorbance using a calibration curve. This technique was suitable for seven natural vegetable oils but not castor oil or cod-liver oil. The calibration curve was not applicable to hydrogenated oils because of the decrease in intensity due to isomerization (cis-trans) of the olefinic bond.

AMINO ACID, FATTY ACID AND PROXIMATE COMPOSITION OF SNOW CRAB (*CHIONOECETES BAIRDI*). R.A. Krzeczkowski & F.E. Stone (USDA Nat'l. Oceanic & Atmos. Admin., Nat'l. Marine Fisheries Serv., Fishery Prod. Technol. Lab., P.O. Box 1638, Kodiak, AK 99615). *J. Food Sci.* 39, 386–388 (1974). The proximate analysis and fatty acid content of the lipids were determined on four separate types of cooked snow crabmeat plus composite samples of the cooked meat and a commercially canned product. The amino acid, sodium and potassium content were determined on a commercially canned product. These results show that snow crabs contain a considerable amount of meat (33.7%) which is high in protein (18.8%) and nutrition. The fatty acid content is over 50% polyunsaturated. Fatty acid 20:5 was the predominant acid (26.0–30.6%) followed by 18:1 (17.0–19.3%), 22:6 (15.0–16.6%) and 16:0 (12.5–13.5%). Amino acid content is similar to dungeness and Chesapeake Bay blue crabmeat.

SPECIFICITY OF LIPOLYSIS DURING DRY SAUSAGE RIPENING. D. Demeyer, J. Hoozee & H. Mesdom (Lab. voor Voeding en Hygiene, R. U. G., Bosstraat, 1, 9230 Melle, Belgium). *J. Food Sci.* 39, 293–6 (1974). The amounts of total and individual fatty acids present in triglycerides (TG), free fatty acids (FFA), diglycerides (DG), monoglycerides (MG) and polar lipids (PL) were determined at various stages of dry sausage ripening using a combination of thin-layer and gas chromatography. Total FFA increased from 1 to 5% of total fatty acids and DG fatty acids from 0.5 to 4%, whereas TG fatty acids showed a corresponding decrease. The rate of liberation of FFA was in the order 18:2 > 18:1 > 18:0 > 16:0 while MG and DG were enriched in 16:0. These results suggest specificity of lipolysis.

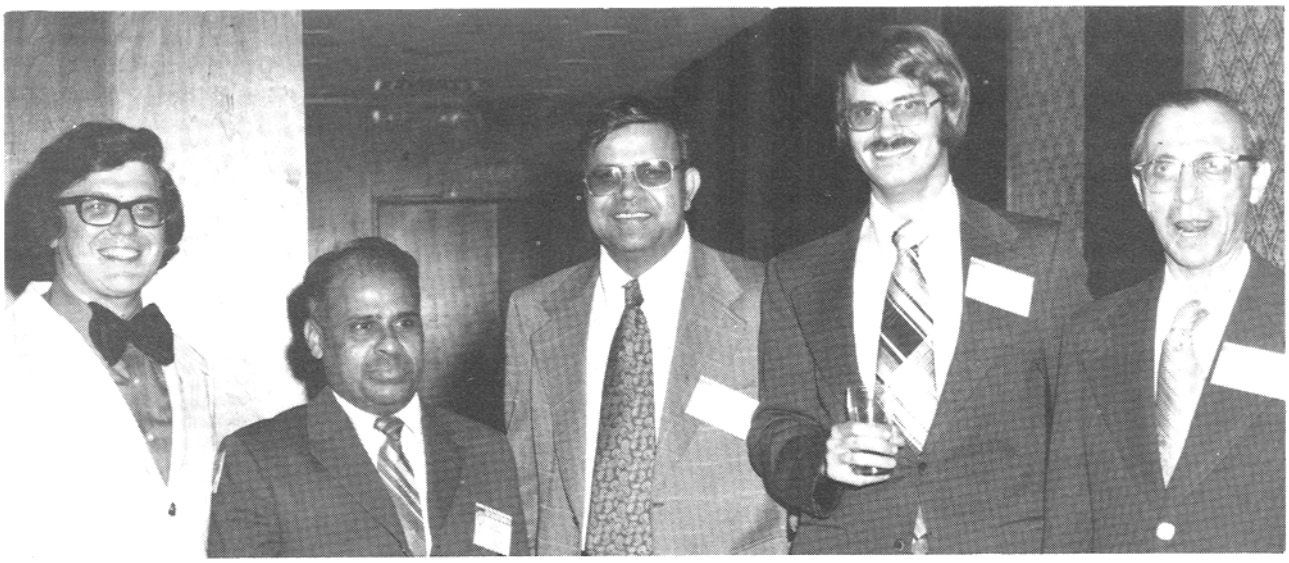
Chemical Abstracts re-organizes its energy-related sections

Effective with Volume 81 (July-December 1974) of *Chemical Abstracts*, abstracts in several sections will be reorganized to better serve the needs of the growing number of investigators working on energy-related problems. The majority of abstracts on topics related to energy technology will be brought together in three sections published in the same *CA* issue. Both AOCS publications, *Lipids* and *JAOCS*, are abstracted by *Chemical Abstracts*.

Abstracts concerning chemical and chemical engineering aspects of non-fossil energy sources (other than nuclear fuels, propellants and explosives) will appear in a new section entitled Electrochemical, Radiational, and Thermal Energy Technology (section 52). Topics covered in this section will include thermal, solar, geothermal, and waste heat energy sources; electrical and electrochemical energy conversion devices; energy handling, storage, and transport technology; and safety aspects of energy production and use. Abstracts on these topics previously have been scattered throughout various sections of *CA*.

Abstracts on the chemical and chemical engineering aspects of the extraction, production, processing, and use of coal, natural gas, petroleum and their derivative products, which formerly appeared in sections 51 and 52, will be combined in a single section, Fossil Fuels, Derivatives, and Related Products (section 51). Abstracts related to nuclear energy sources and applications will continue to appear in section 76, Nuclear Technology.

The reorganization represents no change in *CA*'s coverage but is an effort to bring together information on the chemical and chemical engineering aspects of energy-related subjects to make it more visible and easier to locate. Cross references in each of the energy-related sections also will direct the user to abstracts of possible interest in other sections of *CA*. ■



By unanimous vote, the 1974-75 North Central Section officers were chosen at a recent meeting. From left are: President B.F. Szuhaj, Central Soya Co.; Vice president R.G. Krishnamurthy, Kraftco Corp.; Secretary-treasurer R.S. Kadan, Lubin Maselli Labs.; Members-at-large M.M. Chrysam, Kraftco Corp. and R. Husch. Not pictured is member-at-large K.A. Delaney. Bailey Award Committee chairman for next year is L.P. Goodman, Kraftco Corp., and members are L.H. Wiedermann and D.R. Erickson, both from Swift Co.

CONDITIONS FOR THE SEPARATION OF OIL AND PROTEIN FROM COCONUT MILK EMULSION. K.G. Gunetileke and S.F. Laurentius (Food Technol. Section, Ceylon Institute of Scientific & Industrial Res., Colombo 7, SRI Lanka, Ceylon). *J. Food Sci.* 39, 230–3 (1974). Coconut milk, extracted from fresh coconuts, was centrifuged to obtain cream and skim milk. The whole mass of cream was chilled to 17C or below. It was established that 17C was the critical temperature for subsequent phase separation. At 17C, crystallization of the oil phase was observed under the microscope. On warming to 25C, the emulsion broke with separation of oil and protein. This process differs from similar processes in that no enzymes are used and the temperature of the whole mass of cream has to be lowered only to 17C. The oil obtained did not differ significantly from commercially available oil. Amino acid composition of different protein fractions was determined.

ADSORPTION CHROMATOGRAPHIC SEPARATION OF CHLORINATED HYDROCARBONS FROM LIPIDS. R.R. Claeys and R.D. Inman (Dept. Agr. Chem., Oregon State Univ., Corvallis, Ore. 97331). *J. Assn. Off. Anal. Chems.* 57, 399–404 (1974). Florisil, alumina and silicic acid were compared for the column chromatographic separation of lipids from chlorinated hydrocarbons. Alumina had the largest capacity per unit volume to retain lipids and oils while eluting dieldrin. Florasil had a larger capacity than silicic acid. Deactivation and elution with a nonpolar solvent gave superior separation over previously used polar solvent elution from activated adsorbents. The effects of temperature, water and lipid load on the elution of dieldrin were studied. A yellow dye, *p*-methoxyazobenzene, was found to have a slightly larger elution volume than dieldrin, and is useful as a visible reference material for the elution of chlorinated hydrocarbons.

MINOR SEED OILS. IV—COMPONENT ACIDS OF NINE SEED OILS. R.C. Badami and S.M. Kudari. *J. Oil Technol. Assoc. India*, 4(2), 59–64 (1972). Nine seed oils from different families have been analyzed for their component acids by reverse phase partition chromatography. The following fatty acids were identified in the respective seed oils: ricinoleic acid in *Pterocarpus marsupium* seed oil; 9-hydroxy-10, -12- and -13-hydroxy-9,11-octadecadienoic acids in *Cosmos sulphureus* and *Bidens biternata* seed oils, respectively; and hexadecenoic and dihydroxystearic acids in *Feronia elephantum* seed oil. (World Surface Coatings Abs. No. 379)

PRESSURE DEPENDENCE OF THE VISCOELASTIC PROPERTIES OF CASTOR OIL. A.J. Barlow, G. Harrison, M.G. Kim and J. Lamb. *J. Chem. Soc; Faraday Transactions II*, 69(9), 1446–53 (1973). At atmospheric pressure the behaviour of castor oil differs markedly from usual and, for this reason, a series of measurements has been made on this liquid at frequencies of 10 and 30 MHz in the temp. range −30 to +30C and for pressures up to 300 MN/m.^{2} at intervals of 25 MN/m.^{2} Values of density, ρ, viscosity, η, and the resistive component, E_L, of the shear mechanical impedance have been determined. (World Surface Coatings Abs. No. 379)

SEED OIL OF CASSIA OCCIDENTALIS. K.K. Patnaik and M.K. Rout. *Indian J. Appl. Chem.* 34(6), 291–6, (1971). The composition of the fatty acids and of the triglycerides of the seed oil of *Cassia occidentalis* have been determined by methods which include gas liquid chromatography, low pressure fractionation of methyl esters and urea adduct formation. (World Surface Coatings Abs. No. 379)

EXAMINATION OF BRASSICA SEED OILS. R.C. Badami et al. *J. Oil Technol. Assoc. India*, 4(2), 65–73 (1972). Analysis of 25 samples of *Brassica* seed oils has been reported. Fifteen of these seed oils contained eicosenoic acid (4–12%), one seed oil contained 5% of eicosadienoic acid, and 5 seed oils contained docosadienoic acid (7–13%), while all 25 seed oils contained erucic acid (7.5–55%). The seed oil of *Camelina sativa* contained a dihydroxy acid (dihydroxycicosanoic acid). (World Surface Coatings Abs. No. 379)

ACTION OF A GROWTH REGULATOR ON GROUNDNUTS IN SENEGAL. A. Bockelee-Morvan and P. Gillier (I.R.H.O.). *Oléagineux* 28, 457–60 (1973). Four years experimentation on comestible groundnuts in Senegal with a growth regulator, "KYLAR," have enabled the conditions in which this product should be applied to be defined and its effects measured. Its action is most effective when applied on the 45th day after sowing; it reduces growth for three weeks, diminishes the length of the main stems and cotyledonary branches, increases the number of pegs and pods, and consequently the yield in pods and the ratio pods/foliage, at the same time improving the quality of the seeds. It allows greater sowing density.

RAPESEED SELECTION. M. Rollier (C.E.T.I.O.M.). *Oléagineux* 28, 405–8 (1973). After reviewing the botanical and genetic origins of the Brassica genus, the characteristics of production are analyzed for selection criteria. The aims of selection are described from the quantitative and agronomical viewpoints. The study of the selection method brings out the possibility of producing pure progenies from the examination of the flower biology, and of the results of crossings between selected plants and self-crossings.

THE SELECTION OF RAPESEED. M. Rollier (C.E.T.I.O.M.). *Oléagineux* 28, 461–66 (1973). This second part of the study of rapeseed selection is devoted to qualitative selection with a

view to eliminating erucic acid, reducing the linolenic acid content of the oil, and getting rid of the sulfur compounds in the press-cake. The study of the genetic determinism of an absence of erucic acid enabled a plant breeding plan to be worked out which led to the creation of a variety of erucic acid-free winter rapeseed.

A FEW ASPECTS OF PROGRESS IN OIL MILL EQUIPMENT AND PROCESSING. J. Colin. *Oléagineux* 28, 471–76 (1973). In the last few years, progress in the oil industry has been particularly marked in the following technical fields: the unit capacity of the machines has been increased, better-designed machines have been created, sequence automatization has gradually been introduced, conventional processes have been improved and certain new refining techniques have come into operation. The author gives among other examples, the latest crushing and flattening machines, high-capacity presses, the purification of crude oils, various types of neutralization and deodorization, the recovery of certain by-products and also the fractioning of oils and fats.

CLEARING THE OLD STAND AND SOME PREPARATIONS FOR REPLANTING COASTAL OIL PALMS. K.M.S. Stimpson and A.N. Rasmussen (United Plantation Berhad Teluk Anson, Perak, Malaysia). *Oléagineux* 28, 435–41 (1973). The complete destruction of the old palms is desirable before replanting if the danger of Ganoderma infection in the new stand is to be avoided. Burning is the best solution but this is difficult to achieve since palm trunks do not burn easily, even when cut into short lengths, unless the pieces are split and stacked, and allowed to dry. On one estate, a method has been developed in which the felled palms are stacked by drag-line excavator, in large heaps of 300–400 palms, and burned in two stages. After burning starts, the heaps are restacked daily by the excavator and in good weather, three heaps can be destroyed simultaneously in a week. The mechanical operations after the stages of heaping and windrowing are also described in the paper and some data of the costs are given.

BLEACHING BEHAVIOR OF CHLOROPHYLL IN FATTY SUBSTRATES UNDER VACUUM ON EXPOSURE TO VISIBLE LIGHT. Y. Sita Rama Sastry et al. (Reg. Res. Lab., Hyderabad 500009, India). *Oléagineux* 28, 467–70 (1973). Bleaching behavior of chlorophyll in various fatty substrates was studied with limited access to oxygen. The substrates containing chlorophyll were exposed to light from a 500-W tungsten bulb. Peroxide development was observed in bleached samples, except in the short-chain esters. Incorporation of butylated hydroxytoluene considerably delayed bleaching. Bleaching in peroxidized oleate was considerably longer in the dark than in the light. Bleaching seems to depend on the facility of formation of peroxides from substrate molecules and their subsequent decomposition to free radicals. A mechanism involving these free radicals is proposed for the bleaching of chlorophyll.

CHANGES OF TOCOPHEROLS DURING HEATING AND STORAGE OF VEGETABLE OILS. J. Pokorny et al. (Inst. of Food Chem., 16628 Prague, Czechoslovakia). *Oléagineux* 28, 409–412 (1973). Tocopherols can be oxidized during storage by fat peroxides and oligomers are formed. The decomposition of tocopherols was proportional both to the time of storage and to the peroxide value at moderately increased temperature. One peroxide molecule oxidized one molecule of tocopherol to tocoquinone but the yield of tocoquinone was not equivalent to the loss of peroxides. The reason was the varying effect of two competing reactions: bimolecular decomposition of hydroperoxides and reaction of tocoquinone with tocopherols with formation of a dimer. At higher levels, the destruction of tocopherols was proportional to the original content so that the induction period of oil did not depend on the tocopherol content. These results confirmed the literature data on tocopherol content. These results confirmed the literature data on tocopherol antioxidant activity.

CAN PRODUCTIVE EFFICIENCY IN CULTIVATED PEANUTS BE IMPROVED? D.A. Emery, J.C. Wynne and P.W. Rice. *Oléagineux* 28, 399–403 (1973). Harvest indices (percentage of biological yield represented by economic yield) were determined for four commonly grown peanut cultivars. The cultivars represented a range of vegetative growth habits and produced Virginia market-type fruit. Fruit and kernel weight-plant weight ratios were used to differentiate the four cultivars over four harvest dates in each of two seasons. Application of the harvest index technique to studies of peanut cultivar management and to estimate potential fruit yields were suggested.

SOCIÉTÉ CAMEROUNAISE DE PALMERAIES (SO. CA. PALM) AND THE DEVELOPMENT OF OIL PALM IN CAMEROONS. F. Corrado (I.R.H.O.). *Oléagineux* 28, 385–92 (1973). In Cameroons, in 1964 there were about 20,000 ha of industrial oil palm plantings which will be extended to 45,000 ha by 1976–77. So. CA. PALM, a state-owned Company in charge of oil palm development in Cameroons, will cover 15,000 ha. This paper describes the geographic position, the natural conditions of the various sectors of development, and the technical characteristics of implementation. The development program provides a total production of 125,000 t of palm oil by 1985, of which 30,000 will be available for export.

SELECTION AND BREEDING OF COCONUTS FOR RESISTANCE TO DISEASES SUCH AS LETHAL YELLOWING. H.C. Harries (Research Dept., Coconut Industry Board, Kingston, Jamaica). *Oléagineux* 28, 395–8 (1973). In Jamaica, "Malayan Dwarf" coconuts have been found to have good resistance to lethal yellowing disease. Mycoplasma-like bodies have been found in tissues from lethal yellowing diseased coconut palms, but the nature of the resistance of the "Malayan Dwarf" has not been determined. It is very important that additional sources of resistance should be located, if they exist, because unless other methods of control can be found, breakdown of the "Malayan Dwarf" resistance would be disastrous. Using a mass controlled pollination technique to produce large quantities of the seed, the investigation of inheritance of such resistance and the production of superior hybrids of varieties have been done.

A COMPARISON OF MINOR CONSTITUENTS IN PEANUT BUTTER AS POSSIBLE SOURCES OF FATTY ACID PEROXIDATION. A.J. St. Angelo et al. (Southern Regional Research Lab., Southern Marketing and Nutr. Res. Div., New Orleans, LA 70179). *Oléagineux* 28, 351–4 (1973). Enzymic and nonenzymic causes of lipid oxidation in peanut butter were investigated. Various minor constituents were added to peanut butter samples that were stored and analyzed for lipid peroxidation. Two methods of analysis were used: a spectrophotometric method for measuring the oxidation of polyunsaturated fatty acids present in the peanut butter and peroxide value. Results indicated that the metal-containing enzymes, whether added in water or in oil, appeared to cause the greatest increase in peroxidation. All additives when emulsified in oil caused the greatest increase in peroxidation. A correlation of the two analytical methods and interpretation of these results are discussed.

HYDROGENATION OF VEGETABLE OILS. TECHNOLOGY OF HYDROGENATION. H.B.W. Patterson (Unilever Ltd., London). *Oléagineux* 28, 355–9 (1973). Because the treatment of oil before hydrogenation (pre-refining) bears directly on the hardening, some of the refining processes are discussed. The two methods of hydrogenation, batch or continuous, are compared. The problem of safety in hydrogenation installations is treated at length; details are given on alarm systems, instructions and precautions to be observed.

THE COCONUT IN THE COMORE ISLANDS. M. Delorme (I.R.H.O., Madagascar). *Oléagineux* 28, 341–46 (1973). The environmental conditions in Comoro Islands are reviewed. The total area of the coconut groves is estimated, by photo-interpretation, at 36,000 hectares or about 35% of the total cultivatable area. An examination of the conditions of tillage in these groves leads showed the economic importance of rat damage, which is estimated at 37% of the total production. The proportion exported is no more than 30%. This is a considerable loss to the archipelago's economy. Measures for the improvement of productivity in the coconut groves are set forth, rat control appearing as the most important and the most profitable short-term action.

CASTOR SEED PROCESSING. H. Janson (German Castorseed Oil Factory, Boley and Co., Krefeld-Uerdingen, West Germany). *Oléagineux* 28, 307–10 (1973). The crude oil from the castor seed is obtained by pressing and extraction. For castor seeds, being too oil-rich and soft for crushing by automatic screw presses, hydraulic installations, preferably automatically operated, are recommended. The press cake contains 12% of oil, which is then solvent extracted. Vertically operating extractors of modern design are offered by a Belgian firm, de Smet of Antwerp, and other manufacturers. As a solvent, hexane yields the best results on account of its low content of aromatics. Refining of castor oil includes de-acidification, bleaching, and cleaning, the equipment for which is not completely identical with that for refining other—edible—vegetable oils.

THE I.R.H.O. LEAF ANALYSIS LABORATORY: ORGANIZATION AND ACTIVITIES. A. Bonvalet and M. Servant (I.R.H.O., Paris). *Oléagineaux* 28, 301–306 (1973). The organization and running of the Leaf analysis section of the Research Institute for Oils and Oilseeds (I.R.H.O.) is described. Annually, about 8,500 leaf samples from oil palm, coconut and groundnuts are analysed. Newly 50,000 major element and trace element determinations are carried out. The modern and, in a large extent, automatized equipment, such as atomic absorption spectrophotometry, is used for these analyses. Methods for evaluating the analytical results are described.

AERIAL APPLICATION IN OIL PALMS. B.J. Wood et al. *Oléagineux* 28, 275–82 (1973). Experience of the aerial application technique in oil palms is reviewed. Speed of operation, low labor intensity and access in difficult terrain are among the advantages of the aerial method. Large scale field use has been mainly restricted to control of leaf-eating pests, where costs (fixed wing aircraft) become competitive with ground application (around $5 per ac.) at only a few hundred acres, and become much cheaper at higher acreages. Careful ground organization is required to delimit the area, ensure speedy loading, and provide a suitable swathe marking system. Weather and terrain in Malaysia are rarely limiting factors. Aerial pollination appears to offer no promise of success under present circumstances.

POTASH FERTILIZATION OF THE OIL PALM IN DAHOMEY. G. de Taffin and R. Ochs (I.R.H.O., Paris). *Oléagineux* 28, 269–73 (1973). There was no increase in yields due to potash fertilization of the oil palm. The yield is quite variable from one year to the other. These results should be attributed to the water deficits, which are very severe certain years, and which affect both the sexualization phase, thus limiting the potential later yield of the trees (a shift of 28 months), and on the level of potash assimilation.

NATURE OF PHOSPHOLIPIDS FROM CRUDE RAPESEED OIL. B. Solomon (ITERG, Paris). *Rev. Franc. Corps Gras* 20, 567–9 (1973). Phospholipids from rapeseed oil contain 22% phosphatidylcholine, 15% phosphatidylethanolamine, 18% phosphatidylinositol (R_f 0.08 in phenol-water), 16% lipids from unknown acids and about 9% "phytoglycolipid." The phosphatide content of raw rapeseed oil is about 0.39%. The quantity of lecithin present in this oil is lower if the seeds are pressed at the lowest possible temperature. The quantity of phosphatides in the oil is increased as the quantity of lipid in the cake going to the extractor is decreased.

RESEARCH ON THE ANALYSIS OF POSITIONAL ISOMERS IN OLEIC ACID. II. FURTHER TESTS AND THE DEVELOPMENT OF AN ANALYTICAL METHOD. A. Pelloquin, and E. Ucciani (Lab. National des Matieres Grasses, Univ. de Provence, Marseille). *Rev. Franc. Corps Gras* 20, 557–65 (1973). The quantitative analysis of positional isomers of oleic acid may be accomplished on a semimicro scale by a combination of low temperature ozonation of esters, ozonide reduction by triphenylphosphine and simultaneous analysis of aldehydes and aldesters by gas chromatography. The authors studied the extent and the limits of each stage of this method and some modifications are proposed. This method is simple, rapid, precise and sensitive.

DETERMINATION AND ELIMINATION OF HEAVY METAL-TRACES IN EDIBLE OILS. PARTICULAR CASE OF OILS HYDROGENATED ON COPPER CATALYSTS. J. Lefebvre (Harburger Oelwerke Brinckman & Mergell 21, Hamburg 90). *Rev. Franc. Corps Gras*, 20, 553–6 (1973). A copper catalyst is used for selective hydrogenation of soybean oil to eliminate the linoleic acid content. The copper must be completely eliminated during refining to avoid copper catalyzed oxidation. Methods for determining traces of copper are described. The determination of copper by atomic absorption spectrophotometry with graphite oven is described as is the application of this method to confirm the elimination of copper in hydrogenated oil by bleaching earth. The maximum copper content admissible is 0.03 ppm.

HEATED OILS: II.—PHYSICO-CHEMICAL APPRECIATIVE METHODS. RESULTS OBTAINED. R. Guillaumin (ITERG, Paris). *Rev. Franc. Corps Gras* 20, 457–62 (1973). Results obtained by the so-called ECN method (determination of New Chemical Species or N.C.S.) are given. The method is used to evaluate the chemical modifications which occur during frying. In the method fatty acids methyl esters are chromatographed over a hydrated alumina column (20% water) on elution with solvents of increasing polarity. Examples show that heating parameters and frying conditions are more important, as judged by the percentage ECN formed, than the degree of unsaturation of the oil.

HEATED OILS: III.—STUDY OF THEIR CHEMICAL MODIFICATIONS DURING THE HEATING. P.Y. Vigneron, P. Spicht and M. Audegong (Ste Lesieur-Cotelle et associes, Coudekerque, France). *Rev. Franc. Corps Gras* 20, 463–69 (1973). The chemical modifications which occur in vegetable oils during heating have been studied by CPG with an international standard. The new chemical species (N.C.S.) formed on heating are determined. The amount of these new compounds is related to the temperature and the time of heating. Blends of peanut and sunflower oils were studied and it was found that the quantity of sunflower oil used is not the primary factor governing the amount of N.C.S. formed. A mathematical interpretation of the results is also given.

HEATED OILS: IV.—EVALUATION OF FRYING FATS QUALITY: NUTRITIONAL ASPECTS. B. Potteau (Station de Recherches sur la Qualite des Aliments de l'Homme, I.N.R.A., 21–Dijon). *Rev. Franc. Corps Gras* 20, 471–80 (1973). Physiological effects o. heated and oxidized fats are reviewed.

HEATED OILS: V.—SENSORIAL ASPECTS. B. Lesieur (Lesieur-Cotelle, Boulogne-Billancourt). *Rev. Franc. Corps Gras* 20, 481–3 (1973). The odor and the color of frying oils and the flavor of fried products must be examined to properly evaluate the sensory characteristics of heating oils. A blind test has been used to determine the acceptability of some binary blends of peanut oil with sunflower, rapeseed, or soybean oils. Pure peanut oil was used as a standard. The best results were obtained with a blend of peanut and sunflower oil. A study of the temperature employed for frying showed that 80% of the French consumers fry at a temperature lower than 195C.

VARIATION OF ACIDITY VALUE OF SUNFLOWERSEED OIL AS THE FUNCTION OF THE CONDITIONS AND THE TIME OF STORAGE. G.I. Bliznak et al. *Maslozir. Prom.* 1973 (12), 6–8. The development of acidity has been mathematically related to the time of storage, taking into consideration the conditions of storage and the initial quality of the seed. From the results, it can be seen that even at 7.5–10.0% moisture some heating of the seeds occurs (Rev. Franc. Corps Gras)

OPTIMIZATION OF THE THREE STAGE DISTILLATION OF MISCELLA OF COTTONSEED OIL. N.R. Jusupbekov et al. *Maslozir. Prom.* 1973 (12), 9–11. One of the most important ways of increasing the capacity of the extractor, ND-1250, from 340 to 400t of cottonseed per day is to use a three-stage distillation system instead of a two-stage system. First and second stages are preliminary evaporations and the third one is the final distillation of the miscella. (Rev. Franc. Corps Gras)

REFINING OF THE BRAN RICE OIL WITH HIGH ACIDITY. A.P. Necaev et al. *Maslozir. Prom.* 1973 (12), 14–6. For refining bran rice oil, neutralization with alkali and bleaching with an active earth are normally used. This method cannot be applied if acid value of oil is higher than 20. The authors studied the possibility of elimination of the undesirable constituents from high acidity oils. Free fatty acids are separated by adsorption. The optimal conditions for this process are: adsorbent—kaolin, ratio between oil and adsorbent 1:5, miscella concentration 20%, velocity of passing miscella 4m/h, granulometry of adsorbent 0.5–0.25mm. (Rev Franc. Corps Gras)

LOSS OF MOISTURE IN SUNFLOWER SEED DURING PNEUMOTRANSPORT. N.E. Hodeev et al. *Maslozir Prom.* 1973 (12), 8–9. During pneumatic transport and cleaning of sunflower seed, the loss of moisture depends on the initial humidity of the seeds before transport and on the kind of equipment used for transport and cleaning of seeds. (Rev. Franc. Corps Gras)

STUDY OF THE CRUDE OIL OF WILD AND CULTIVATED HAZEL NUT. T.D. Kostyrkina et al. *Maslozir. Prom.* 1973 (12), 11–13. The fruits of the wild and cultivated hazel nut contain large quantities of oil and proteins. For this reason, the confectionery industry is interested in using them not only in place of almonds but also for meal. Cultivated hazel nuts can be stored up to two years without a change in the quality of oil. (Rev. Franc. Corps Gras)

SOME PROBLEMS REGARDING THE CONSUMPTION OF FATS IN USSR. V.D. Goncarov et al. *Maslozir. Prom.* 1973 (12), 1–3. According to the data from the annual "Foreign Commerce of USSR," the export of vegetable oils from the Soviet Union is as follows (in millions of tons): in 1965—242.1, of that

221.2 was sunflower oil; in 1967—707.2, of that 669.2 was sunflower oil; in 1969—695.9, of that 656.1 was sunflower oil, in 1971—408.3, of that 378.6 was sunflower oil. (Rev. Franc. Corps Gras)

DRYING OF SUNFLOWER SEED BY A COMBINED METHOD. V.J. Alejnikov et al. *Maslozir. Prom.* **1973** (11), 35–8. A combined drying method is described which consists of drying sunflower seed in fluid and compact layers. The humidity level, recommended for passing from the fluid to compact layer, was determined. The optimal temperature for each layer was also established. A ten-minute holding period is recommended between drying in the fluid and the compact layer. (Rev. Franc. Corps Gras)

STUDY OF THE HYDROLYTIC SCISSION OF DEHYDRATED CASTOR OIL. P.S. Lescenko (Karpov Combinat of Synthetic Detergents, Leningrad). *Maslozir. Prom.* **1973** (11), 21–5. The authors studied different processes of hydrolysis to obtain the linoleic acid from dehydrated castor oil. The influence of scission conditions on the content of conjugated isomers of linoleic acid was studied. The results show that the content of conjugated linoleic acid obtained by hydrolysis of dehydrated castor oil is independent of the conditions of this process. (Rev. Franc. Corps Gras)

SOME PHYSICO-CHEMICAL VALUES OF OIL FROM APRICOT KERNELS. R. Normahmatov et al. *Maslozir. Prom.* **1973** (12), 13. The oil obtained from apricot seeds has a very pleasant flavor. The oil is colorless and only becomes yellow after prolonged storage. Some of the characteristics of this oil are: refractive index 1.4706–1.4720, iodine value 80–94, acid value 1.8 and saponification value 184.6–192.2. (Rev. Franc. Corps Gras)

USE OF COPPER-NICKEL CATALYST IN THE COMBINED PROCESS OF HYDROGENATION-HYDROLYSIS OF VEGETABLE OILS. N.P. Gavrilko et al. *Maslozir. Prom.* **1973** (11), 16–21. In hydrogenation-hydrolysis, the optimum concentration of the reduced catalyst is 0.2–0.3% with the use of 75% of the theoretical amount of hydrogen and 0.05–0.1% with the use of 150%. The rate of the hydrolysis reaction can be increased with the use of 0.1–0.2% of ZnO. The combined process can be done at a low partial pressure of hydrogen which makes the industrial realization of this process possible in the autoclave usually used for scission of fats. (Rev. Franc. Corps Gras)

DETERMINATION OF CYCLOPROPENIC ACIDS IN COTTONSEED OIL ACCORDING TO THE VEGETATION PERIOD. G.A. Preobrazenskaja et al. *Maslozir. Prom.* **1973** (11), 11–14. The maximal quantity of cyclopropenic acids is found in cottonseed oil from unripe seeds; in oil from mature seeds, its quantity is decreased 2.5 times. For the study of cyclopropenic acids, it is best to freeze dry the wet seeds before the extraction with petrol-ether (30–60C) by the infusion method at room temperature. (Rev. Franc. Corps Gras)

THERMOPHYSICAL CHARACTERISTICS OF OIL SEEDS. M.A. Gromov et al. *Maslozir. Prom.* **1973** (11), 8–11. For the calculation of mass heat of perfectly dry seeds, it is necessary to take in consideration the oil content and temperature. The authors recommended the following formula: $C = 1093 + 13.65\ H + (0.83 + 0.023\ H)\ (t - 18)$. (Rev. Franc. Corps Gras)

EXPERIMENTAL AUTOMATIC VIBRATING DRYERS FOR SUNFLOWER SEEDS: V.I. Popov et al. *Maslozir. Prom.* **1973** (10), 42–4. Experimental vibrating dryers for sunflower seeds are described. In this installation, it is possible to change the frequency, amplitude, and speed of vibration of the dryer. Air speed, relative humidity and temperature are also automatically regulated. The installation can be used for studying the influence of vibrating action on the drying process not only for sunflower seed but also for similar materials. (Rev. Franc. Corps Gras)

FORMATION OF PIGMENTS DURING BLEACHING OF SOYBEAN OIL WITH ACTIVATED EARTH. V.V. Kljuckin et al. (VNIIZ; KNIIPP). *Maslozir. Prom.* **1973** (10), 15–16. Soybean oil neutralized by the Kaminskij method was studied for the formation of pigments during treatment with activated bleaching earth. The influence of bleaching earth on the pigment formation was studied by changes in the visible and UV spectra. Results obtained when bleaching is done with different quantities of activated earth show that, when the bleaching is done in a vacuum and with small quantity of the earth, brown pigments appear while at the same time carotenoids and chlorophyll are eliminated. Only when larger quantities of earth are used do the brown pigments disappear. If 1.2% bleaching earth is used, their concentration in the oil is still high enough to influence the color of bleached oil. The authors found that the pigments formed during bleaching are melanophosphatides and have maximum absorption at 350 nm. (Rev. Franc. Corps Gras)

MICROBIOLOGICAL ANALYSIS DURING MAYONNAISE PRODUCTION. S. Jara et al. *Zesz. nauk. ART Olszt. Tech. Zywn.* **1973** (2), 39–48. The protection of this mayonnaise against the contamination, can be obtained by rigorous hygienic conditions of place, equipment and workers. The raw materials must be fresh and free of bacteria, especially the milk and egg yolks. The use of powdered milk, compared with pasteurized milk, improves the bacteriological quality of the product. (Rev. Franc. Corps Gras)

COMPARISON OF THE RESULTS OBTAINED BY DETERMINATION OF DDT, DDE AND DDD IN MILK FAT BY THE METHOD OF GAS-LIQUID CHROMATOGRAPHY AND THE MODIFIED GERTIG METHOD. J. Jaworski et al. *Zesz. nauk. ART Olszt Tech. Zywn.* **1973** (2), 151–8. The modified Gertig method gives satisfactorily precise results for DDT and its derivatives in milk fat. The results also correlate well with those obtained by the gas-liquid chromatographic method. However, it is necessary to take into consideration that the GLC method, recommended by the UICPA, gives the results about ⅓ higher than those obtained by the modified Gertig method. (Rev. Franc. Corps Gras)

USE OF ANIMAL FATS IN FOOD PRODUCTS, FORAGE AND FOR TECHNICAL PURPOSES. M. Grdev et al. *Maslosap. Prom.* **9**, 28–35 (1972). As the consumption of animal fats in Bulgaria is very low, the authors studied the use of these fats in different fields. A study of the use of animal fats in food products, fatty acids and derivatives and feeds has been completed. (Rev. Franc. Corps Gras)

HYDROTHERMAL TREATMENT OF SUNFLOWER OIL BEFORE COOKING. Ju.P. Macuk et al. *Trudy VNIIZ-a* 29, 23–32 (1972). The authors constructed and tested under factory conditions, a conditioner for the treatment of sunflower meal. The meal is hydrated and heated with direct steam to a temperature of 80–85C and a moisture of 8 9% in this apparatus. After this treatment, the obtained oil is easily hydrated and has lower acidity value. In the oil factory of Gheorghiu-Dej, such a conditioner with the daily capacity of 400 tons of sunflower meal has been in use since 1970. (Rev. Franc. Corps Gras)

COMPARISON OF SOME METHODS FOR FAT DETERMINATION IN THE PRODUCTS OF ANIMAL AND VEGETABLE ORIGIN. J. Jaworski et al. *Zesz. nauk. ART Olszt. Tech. Zywn.* **1973** (2), 121–32. The method for fat determination (Standard NEN) recommended by the Holland Institute for Standardization is certainly more rapid and precise than the widely used Soxhlet method. Carbon tetrachloride is used as a solvent which is safer than the ethyl ether used in the Soxhlet method. The results by Standard NEN method are higher than those obtained by Soxhlet method. (Rev. Franc. Corps Gras)

PRODUCTION OF BUTYLATED HYDROXYANISOLE OF HIGH 3-ISOMER CONTENT. J.M. Cole and C. E. Osborne. *Defensive Publication T921,002.* The process comprises providing an agitated reaction system of *t*-butylhydroquinone and dimethyl sulfate in an organic solvent and a limited amount of water. An aqueous solution of NaOH or other hydroxide is slowly added over a period of 1–3.5 hours while maintaining the system at 30–50C. The total amount of water in the system is 2.5–5 parts of dimethyl sulfate; the amount of dimethyl sulfate is 1–3 moles per mole of hydroxide; and the amount of *t*-butylhydroquinone is 0.1–0.5 mole per mole hydroxide, which is a slight excess.

FATTY OIL-WATER SEPARATION PROCESS. H.F. Keller, Jr. (GBK Enterprises, Inc.). *U.S. 3,803,031.* Aqueous systems containing fatty constituents and particulate solids and having a pH of 1–4.8 are filtered through a finely divided, acid and alkali resistant filter medium, of 12–60 mesh, at a rate of 1–50 gallons per minute per square foot. The filter medium is periodically regenerated by: (1) agitating it in the presence of a saponifying alkaline solution to remove the fatty constituents, (2) withdrawing the alkaline solution, (3) passing fresh water through the filter in the same direction of flow as that of the aqueous system to remove residual water soluble materials, and (4) backwashing the filter with fresh water to remove insoluble and nondispersible particulate solids.

PRODUCTION OF TALL OIL PRODUCTS FREE OF UNSAPONIFIABLES.

(Continued on page 495A)

• Abstracts . . .

(Continued from page 494A)

D.L. Mitchell, F. Greebe, and D.A. Redford (St. Regis Paper Co.). *U.S. 3,803,114.* Crude soap skimmings, from the Kraft pulp process, are upgraded by removing unsaponifiables. Removal is carried out by mixing the skimmings with water and a demulsifying alcohol (e.g., methanol), clarifying the mixture, and extracting the unsaponifiables with heptane. Only a small amount of the soaps are removed to the hydrocarbon phase. The raffinate is then distilled to recover the alcohol.

PRODUCTION OF OIL- AND FAT-ENCAPSULATED AMINO ACIDS. K. Yazawa, F. Arai, M. Kitajima, and A. Kondo (Fuji Photo Film Co.). *U.S. 3,804,776.* The amino acids or polypeptides are dispersed in a molten mixture of oils and fats. Some of the oils and fats have melting points above 40C and some below 40C. Thereafter, the mixture is poured into water at 20–40C.

RECOVERY OF ROSIN AND FATTY ACID FROM ALKALINE BLACK LIQUOR. P.D. Patrick, Jr. and B.D. Thomas, Jr. (Westvaco Corp.). *U.S. 3,804,818.* The imtimate mixing with a sufficient amount, e.g., a trace to 0.025%, of a high molecular weight water soluble cationic polymer increases the rate of separation of crude tall oil from the brine and lignin of alkaline black liquor soap skimmings, and decreases the pitch yield, thereby increasing the yields of rosin and fatty acids.

RECOVERY OF FATTY ACIDS FROM TALL OIL HEADS. H.R. Wengrow, W.D. Stoufer, C.W. Morris, D.E. Leavens and G.S. Watkins (SCM Corp.). *U.S. 3,804,819.* Disclosed is a method for recovering higher fatty acids from tall oil by distilling the tall oil to isolate the distillate fraction known as tall oil heads, saponifying fatty acids in the heads, solvent extracting unsaponified material, acidulating the extracted soap and stripping the fatty acids with or without the presence of a boron compound, such as boric acid, to produce the specific acids desired. In a preferred practice, the saponification is carried out at a pH of 7–8.5 for improved color in the distilled fatty acid fractions. Bleaching of the fatty acids with activated carbon or clay can be employed if desired.

PRODUCTION OF A PEANUT COMPOSITION. C.M. Gooding and H.P. Rowley (CPC International Inc.). *U.S. 3,804,867.* Peanut oil is hydrogenated to an I.V. of 78–90. The resulting oil is pourable at room temperature and exhibits improve stability at high temperatures. The hydrogenated oil can be winterized to obtain a high stability liquid oil which exhibits substantially no solids formation at room temperature.

PRODUCTION OF MAYONNAISE. E.R. Purves (Procter & Gamble). *U.S. 3,804,957.* A highly stable, nonpourable mayonnaise or mayonnaise-like salad dressing is prepared by simultaneously introducing vegetable oil, water, an egg yolk containing ingredient and acid into a single mixing chamber, mixing the ingredients with a high speed impeller to impart high shear forces and to provide a stable emulsion.

PREPARATION OF SYNTHETIC CHEESE. P. Seiden (Procter & Gamble). *U.S. 3,806,606.* The cheese comprises 10–40% of a narrow melting range fat which has an SCI of less than 3 at 92F and an SCI of 15–25 at 70F, 10–25% of wheat gluten, 3–6% of egg white, and 3–6% of gelatin. The remainder comprises water, salt and cheese flavor.

• Biochemistry and Nutrition

CHOLESTEROL-ESTERIFYING ACTIVITY OF AORTAS FROM ATHEROSCLEROSIS-RESISTANT AND ATHEROSCLEROSIS-SUSCEPTIBLE SPECIES. S. Hashimoto and S. Dayton (Res. Service and Med. Service, V.A. Wadsworth Hosp. Center, Los Angeles, Cal. 90073). *Proc. Soc. Exp. Biol. Med.* **145**, 89–92 (1974). A study was undertaken to relate the magnitude of the cholesterol-esterifying activity in aortic microsomes to the susceptibility of species to atherosclerosis and to the propensity of the thoracic and abdominal segments within a species to develop atherosclerosis. The cholesterol-esterifying activity was the greatest in the rat, probably the most resistant to atherosclerosis, and the least in the cockerel, one of the species more susceptible to atherosclerosis. The cholesterol-esterifying activity in the aorta was the same for the dog (atherosclerosis resistant) and the rabbit (atherosclerosis susceptible). Relative cholesterol-esterifying activities of thoracic and abdominal portions of the aorta within a species also did not coincide with the relative susceptibility of these anatomical sites to atherosclerosis. The cholesterol-esterifying activity was examined in the aortas of two genetic strains of pigeons which vary in their susceptibility to atherosclerosis; the enzyme activity in the aorta of the White Carneau (atherosclerosis resistant) was the same as that of the Show Racer (atherosclerosis susceptible). Thus, cholesterol-esterifying activity does not consistently reflect the predisposition of the tissue to develop atherosclerosis.

EFFECT OF PROLONGED FASTING ON CARCASS COMPOSITION AND BLOOD FATTY ACIDS AND GLUCOSE OF NEONATAL SWINE. R.W. Seerley and D.R. Poole (Dept. of Animal Sci., Univ. of Georgia, Athens, Ga. 30602). *J. Nutr.* **104**, 210–7 (1974). Eight littermate pigs from each of four purebred Yorkshire sows were used to determine the relative change in carcass composition and blood fatty acids and glucose in piglets during a 72-hour fast or feeding period at birth and at 1 week of age. These data support other evidence of differences in fatty acid metabolism during fasting.

EFFECT OF FEEDING CARBOHYDRATE OR FAT ON INCORPORATION OF ^{14}C-PHENYLALANINE IN VIVO AND IN VITRO INTO RAT LIVER AND MUSCLE PROTEIN. K. Nakano, T. Ando and K. Ashida (Lab. of Nutr. Biochem., Dept. of Agr. Chem., Nagoya Univ., Chikusa, Nagoya, Japan). *J. Nutr.* **104**, 264–71 (1974). The incorporation of phenylalanine-U-^{14}C into liver, muscle protein and expired CO_2 was determined in rats fed either carbohydrate or fat in order to elucidate the biochemical mechanism underlying the "protein sparing" action of dietary carbohydrate and fat The rate of incorporation of this radioactive amino acid into these tissue proteins in vivo was compared by calculating relative specific activity: the ratio of specific activity of the protein to that of the acid-soluble fraction in muscle and liver and recovery ratio: the ratio of radioactivity recovered in total muscle and/or liver protein versus that recovered in expired CO_2. The incorporation of phenylalanine-U-^{14}C into protein increased in both liver and muscle of rats fed either carbohydrates or fat and the ratio of radioactivity recovered in muscle protein to that in liver protein increased. Feeding either carbohydrate or fat caused a significant increase in rate of incorporation of this radioactive amino acid by liver slices as well as isolated diaphragm compared with that in fasted rats. The overall results indicate that feeding either carbohydrate or fat to fasted rats causes an increase in reutilization of endogenous amino acids and that this may be one of the possible mechanisms underlying the "protein sparing" action of dietary carbohydrate and fat.

UNSATURATED FATTY ACID SYNTHESIS IS NOT REQUIRED FOR INDUCTION OF LACTOSE TRANSPORT IN ESCHERICHIA COLI. W.D. Nunn and J.E. Cronan, Jr. (Dept. of Molec. Biophys. and Biochem., Yale Univ., New Haven, Conn. 06510). *J. Biol. Chem.* **249**, 724–731 (1974). In 1969, Fox reported that induction of lactose transport in *Escherichi coli* required the simultaneous synthesis of lipids containing unsaturated fatty acids. Later experiments from other laboratories gave differing results. We have reinvestigated this relationship. We starved cells for unsaturated fatty acid by several different methods and examined induction of lactose transport and of β-galactosidase, synthesis of phospholipids containing unsaturated fatty acid, phospholipid synthesis and cell growth. We find that the induction of lactose transport to be normal under conditions allowing only about 4% of the normal rate of unsaturated fatty acid synthesis.

IN VITRO ALTERATIONS OF THE PRODUCT DISTRIBUTION OF THE FATTY ACID SYNTHETASE FROM MYCOBACTERIUM PHLEI. P.K. Flick and K. Bloch (J.B. Conant Labs., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* **249**, 1031–6 (1974). The spectrum of fatty acids produced by the fatty acid synthetase complex *Mycobacterium phlei* under several conditions has been examined. The observed pattern is always bimodal, consisting of palmitate and tetracosanoate as the two principal products and of lesser amounts of myristate, stearate, arachidate and behenate. To account for the widely varying fatty acid patterns in response to experimental conditions, it is proposed that fatty acyl chains (C_{16} and C_{18}), either enzyme bound or accumulating as free CoA derivatives, regulate the over-all rate of synthesis, perhaps by feed-back inhibition. Reagents that lower the levels of free or enzyme bound C_{16}-CoA (or C_{18}-CoA) will therefore affect the synthetic rate, the product distribution or both. They may do so by competition (high concentrations of acetyl-CoA), by complexing acyl-CoA (MMP, MGLP and BSA), or by thioester hydrolysis (palmitoyl thioesterase). Explanations are offered for the ability of the poly-

saccharides and the failure of BSA to stimulate over-all synthesis.

EFFECTS OF PHOSPHOLIPID ACYL CHAIN FLUIDITY, PHASE TRANSITIONS AND CHOLESTEROL ON $(Na^+ + K^+)$-stimulated adenosine triphosphatase. H.K. Kimelberg and D. Papahadjopoulos (Depts. of Neurosurgery and Exper. Pathol., Roswell Park Memorial Inst., Buffalo, N.Y. 14203). *J. Biol. Chem.* 249, 1071–80 (1974). A soluble delipidized (Na + K)-stimulated ATPase was obtained from rabbit kidney outer medulla by the use of sodium deoxycholate. The activity of this enzyme was stimulated 20-fold to an activity of 100 to 120 μmoles of P_i per mg of protein per hour by either phosphatidylserine or phosphatidylglycerol. These results are discussed in relation to phase transitions in phospholipid bilayers and biomembranes and the activity of membrane-bound enzymes. A role of cholesterol in controlling the activity of membrane-bound enzymes is suggested. Implications for protein-lipid interactions in membranes are also considered.

THE EFFECT OF INTRAVENOUS HYPERALIMENTATION ON ERYTHROCYTE LIPIDS. D. Sgoutas and R. Jones (Dept. of Pathol. and Lab. Med., Woodruff Memorial Center, Emory Univ., Atlanta, Ga. 30322). *Proc. Soc. Exp. Biol. Med.* 145, 614–9 (1974). Lipid analyses of erythrocytes from patients undergoing intravenous hyperalimentation therapy are presented herein. The amount of membrane cholesterol and phospholipid remained normal during the 4-month therapy and so did individual phospholipids. Phospholipid fatty acids, however, showed variations with a tendency toward increased percentages of palmitic and oleic acids and decreased percentages of linoleic and arachidonic acids. 5,8,11-Eicosatrienoic acid, characteristic of essential fatty-acid deficiency, increased markedly as the therapy progressed. Similar changes were observed in plasma fatty-acid phospholipids. The results suggested that during intravenous hyperalimentation, cell-membrane phospholipids became responsive to altered plasma lipid concentrations. The exchange of phospholipids between red blood cells and lipoproteins in man is less selective in essential fatty-acid deficiency resulting from intravenous hyperalimentation than from other causes.

EFFECT OF HEPARIN ON THE KINETICS OF GUINEA PIG AND HUMAN POSTHEPARIN LIPASE ACTIVITY. T.F. Whayne, Jr. (Div. of Cardiology, Dept. of Med., Ohio State Univ. College of Med., Columbus, Ohio 43210). *Proc. Soc. Exp. Biol. Med.* 145, 595–603 (1974). Lipoprotein lipase plays a major role in mammalian lipid metabolism. It is the key enzyme for hydrolysis of triglycerides contained in very-low-density lipoproteins (VLDL) and chylomicrons. Triglyceride hydrolysis by this enzyme requires that peptides be present on the chylomicron and VLDL surfaces. When artificial triglyceride emulsions are used in a postheparin lipase system, triglyceride hydrolysis depends upon emulsion activation by these same peptides. When triglyceride concentration is held constant in the assay system, an increase in high density lipoproteins or VLDL produces a Michaelis-Menten hyperbolic increase in lipase activity. Previous work has suggested that heparin added to the assay system modifies the kinetics of interaction of postheparin lipase with its triglyceride substrate. The result is a sigmoid substrate saturation curve, with heparin apparently acting as an allosteric modifier of the lipase. This study supports the role of heparin as an allosteric modifier of postheparin lipase. The postheparin lipase substrate saturation curves shift to the right as heparin concentration increases in the assay system. Moreover, the results indicate an allosteric effect of heparin on human postheparin lipase. Because of the importance of triglyceride hydrolysis in lipoprotein metabolism, abnormalities in its regulatory control could be important in the relationship of lipoproteins to atherosclerosis.

CHARACTERISTICS OF THE CHOLESTEROL-ESTERIFYING ACTIVITY IN NORMAL AND ATHEROSCLEROTIC RABBIT AORTAS. S. Hashimoto, S. Dayton, R.B. Alfin-Slater, P.T. Bui, N. Baker and L. Wilson (Res. Service, Med. Service and Radioisotope Res., V.A. Wadsworth Hosp. Center, Los Angeles, Cal. 90073). *Circulation Res.* 34, 176–83 (1974). Esterification of cholesterol with [1-^{14}C] palmityl-CoA by an atherosclerotic cell-free homogenate was approximately 16–50-fold greater than that by a normal cell-free homogenate for a given amount of protein in the homogenate. This difference was due to hyperactivity of the cholesterol-esterifying system in the atherosclerotic cell-free homogenate rather than to depletion of radioactive palmityl-CoA in the reaction mixture containing normal homogenate. Neither an activator of cholesterol esterification in the soluble fraction of the atherosclerotic aortic homogenate nor an inhibitor in the soluble fraction of the normal aortic homogenate could be demonstrated. The rate of cholesterol esterification by atherosclerotic microsomes varied with the substrate: oleyl-CoA > palmityl-CoA > linoleyl-CoA.

A LYSOPHOSPHOLIPASE D PATHWAY IN THE METABOLISM OF ETHER-LINKED LIPIDS IN BRAIN MICROSOMES. R.L. Wykle and J.M. Schremmer (Med. Div., Oak Ridge Associated Univs., Oak Ridge, Tenn. 37830). *J. Biol. Chem.* 249, 1742 6 (1974). Microsomal preparations from rat brain in the presence of Mg^{2+} hydrolyzed the ethanolamine, choline, and phosphate moieties from 1-[1-^{14}C]hexadecyl-*sn*-glycero-3-phosphoryl-ethanolamine, 1-[1-^{14}C]hexadec-1-enyl-*sn*-glycero-3-phosphorylethanolamine and 1-[1-^{14}C]hexadecyl-*sn*-glycero-3-phosphorylcholine. Studies of the hydrolysis of 1-[1-^{14}C]hexadecyl-*sn*-glycero-3-phosphorylethanolamine in this system indicated that the ethanolamine moiety was first removed by a phosphodiesterase to form 1-[1-^{14}C]hexadecyl-glycero-3-phosphate which was then dephosphorylated to form 1-[1-^{14}C]hexadecylglycerol. Only minimal hydrolysis occurred when the 2-positions of the substrates were acylated; otherwise the phosphodiesterase activity was similar to that of phospholipase D from plants. The occurrence of such a lysophospholipase D pathway has not been previously reported. When Ca^{2+} (5 mM) was added to the system instead of Mg^{2+} (5 mM), little, if any, stimulation occurred; higher concentrations of Ca^{2+} (25 mM) inhibited the reaction.

EFFECTS OF DIETARY CHOLESTEROL ON BILE ACID SYNTHESIS IN LIVER AND HEPATOMAS. L.A. Bricker, J.V. Marraccini, S. Rosenblatt, P.L. Kozlovskis and H.P. Morris (Dept. of Med., Univ. of Miami Schl. of Med., Miami, Fla. 33162). *Cancer Res.* 34, 449–53 (1974). The effects of cholesterol feeding on bile acid production in vitro in liver were contrasted with those in a strain of Morris hepatoma active in sterol synthesis. Bile acid synthesis by a malignant tumor is described in this report. The tumor (Morris hepatoma 3924A) is active in bile acid production from both acetate and mevalonate, but these syntheses are totally unaffected by dietary cholesterol. Moreover, dietary cholesterol cannot itself be utilized by the tumor for bile acid synthesis.

EFFECT OF ESSENTIAL FATTY ACID DEFICIENCY ON AMINO ACID UPTAKE BY THE SMALL INTESTINE OF RATS. J.T. Johns and W.G. Bergen (Dept. of Animal Husbandry, Mich. State Univ., East Lansing, Mich. 48824). *J. Nutr.* 104, 300–5 (1974). The role of an essential fatty acid (EFA) deficiency on intestinal amino acid transport was studied with rats. Extra cellular space (measured by inulin) became constant after a 40-minute in vitro incubation of intestinal rings from rats fed the control diet but continued to increase for rats fed the EFA-deficient diet. The K_m and V_{max} values of lysine and methionine transport were not affected by dietary treatments. However, the amino acid distribution ratios (capacity of cells to retain concentrated amino acids) were lower for intestinal rings from EFA-deficient rats. In intestinal rings from control and EFA-deficient rats, glucose was an inhibitor of methionine transport. It was concluded that the major effect of an EFA deficiency was to induce membrane alterations of intestinal mucosa that lowered the ability of mucosal cells to retain amino acids (enhanced noncarrier mediated efflux).

EFFECT OF DIETARY BIOTIN AND LIPID ON GROWTH, STAMINA, LIPID METABOLISM AND BIOTIN-CONTAINING ENZYMES IN BROOK TROUT (SALVELINUS FONTINALIS). H.A. Poston and T.H. McCartney (Tunison Lab. of Fish Nutr., U.S. Bureau of Sport Fisheries and Wildlife, Cortland, N.Y. 13045). *J. Nutr.* 104, 315–22 (1974). Simultaneous dietary fat and biotin deficiencies in brook trout suppressed weight gain, feed/gain efficiency, swimming stamina and total liver lipids. Dietary fat alone reduced body water, increased body fat and ash, reversed the elevating effect of biotin plus fat on liver palmitic and stearic acids, and widened the 16:0 to 16:1, 18:0 to 18:1, 18:2 to 20:4 and 18:3 to 22.5 liver fatty acid ratios. Fat also accentuated the accumulation of liver oleic and linoleic acids caused by biotin deprivation and apparently prevented docosapentaenoic acid biosynthesis in biotin-deprived trout. Fish fed fat with no biotin had the least, and those fed biotin with

no fat the most, liver acetyl CoA carboxylase (ACC) and pyruvate carboxylase (PC) activities. Those fed neither supplemental biotin nor fat and those fed both showed equal liver ACC activity.

GRADING OF CORONARY ATHEROSCLEROSIS. COMPARISON OF A MODIFIED IAP VISUAL GRADING METHOD AND A NEW QUANTITATIVE ANGIOGRAPHIC TECHNIQUE. D.W. Crawford, E.S. Beckenbach, D.H. Blankenhorn, R.H. Selzer and S.H. Brooks (Dept. of Med., Cardiol. Section, Univ. of Southern Cal. Schl. of Med., Los Angeles, Cal.). *Atherosclerosis* 19, 231–41 (1974). We submit a quantitative method for measuring atherosclerosis from angiograms of autopsied hearts. Casts were made of the coronary vessels of human excised hearts by filling coronary arteries with rapid polymerizing radiopaque silicone rubber. Angiograms of the casts resembled clinical arteriograms. Corresponding segments were marked off on angiograms, and the arterial intimal surface and the arteries graded visually by four graders four times. Vessel edges on the angiograms were located by a film digitizer coupled to a computer. Estimates of atherosclerosis were derived from deviations in the smoothness of the edge. Correlation with pooled visual grades was 0.56, $P < 0.001$. Computer grading was significantly more reproducible. The standard deviation among graders was 19.5 (coefficient of variation 45%); between computer runs 0.10 (coefficient of variation 1.17%).

NEUROGENIC HYPERCHOLESTEROLEMIA: INFLUENCE UPON LIPOPROTEINS. S.O. Byers, M. Friedman and R. Neuman (Harold Brunn Inst., Mt. Zion Hosp. and Med. Center, Box 7921, San Francisco, Cal. 94120). *Proc. Soc. Exp. Biol. Med.* 145, 442–5 (1974). Neurogenic hypercholesterolemia was induced in cholesterol-fed Long-Evans male rats by bilateral injury of the ventromedial nuclei, the fornices and the medial portions of the lateral hypothalamic areas. Serum lipoproteins from these rats and from sham-operated controls were separated into three electrophoretic fractions (beta, prebeta and alpha) and into four fractions by ultracentrifugal flotation (chylomicrons, VLDL, LDL and HDL). No differences were observed between operated and control groups in the distribution of oil red 7B dye among electrophoretic fractions. The excess cholesterol present in the serum of rats with neurogenic hypercholesterolemia was observed to be carried chiefly in the VLDL.

STEROL BIOSYNTHESIS IN THE FREE-LIVING NEMATODE, PANAGRELLUS REDIVIVUS. J.D. Willett and W.L. Downey (Dept. of Chem., Univ. of Idaho, Moscow, Idaho 83843). *Biochem. J.* 138, 233–7 (1974). The fate of the known sterol precursor, squalene 2,3-oxide, was investigated in the free-living nematode, *Panagrellus redivivus*. The nematodes were cultured axenically in the presence of [4-^{3}H]squalene 2,3-oxide. Radioactivity was found in the total lipids of the isolated nematodes. Essentially all of the radioactivity encountered in the total lipids was found in the non-saponifiable fraction. The components present in the non-saponifiable fraction were separated and isolated by TLC. Three labelled components were identified by a combination of TLC, GLC and mass spectroscopy. It is established that *P. redivivus* has the capacity for biosynthesis of lanosterol. No labelled C_{27} sterols could be detected.

PHYSIOCHEMICAL PROPERTIES OF LOW-DENSITY LIPOPROTEINS OF NORMAL HUMAN PLASMA. EVIDENCE FOR THE OCCURRENCE OF LIPOPROTEIN B IN ASSOCIATED AND FREE FORMS. D.M. Lee and P. Alaupovic (Cardiovascular Res. Program and Lipoprotein Lab., Okla. Med. Res. Found. and the Dept. of Biochem. and Molecular Biol., Okla. Univ. Schl. of Med., Oklahoma City, Okla. 73104). *Biochem. J.* 137, 155–67 (1974). Low-density (d 1.006–1.063 g/ml) lipoproteins from normal human plasma were separated by differential preparative ultracentrifugation into six subfractions. Each low-density (LD) lipoprotein subfraction contained lipoprotein B as the major and lipoproteins A and C as the minor lipoprotein families. The results indicate a fundamental difference between the LD lipoprotein subfractions with d 1.006–1.019 g/ml and those subfractions with d 1.030–1.063 g/ml. In the former, lipoprotein B occurs as a part of an association complex, whereas in the latter it occurs as a separate entity.

LIVER MICROSOMAL PHOSPHATIDYL CHOLINE BIOSYNTHESIS IN CHOLINE DEFICIENCY. D.N. Skurdal and W.E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of North Dakota Med. School, Grand Forks, N. Dak. 58201). *Proc. Soc. Exp. Biol. Med.* 145, 992–5 (1974). In choline deficiency, there is a decrease in activity of the phosphatidyl ethanolamine methyltranserase of liver microsomes. There is an impairment in the conversion of phosphatidyl ethanolamine to phosphatidyl choline via the Bremer-Greenberg pathway. The phosphatidyl choline synthesized via the Kennedy pathway shows that the choline phosphotransferase activity is unaltered in animals fed a diet made choline deficient by feeding 5% casein-5% fat and 1% guanidoacetic acid when compared to controls fed a 25% casein-5% fat diet. However in animals fed Purina laboratory chow which contains 2.4 mg choline/g diet, the choline phosphotransferase activity is 3.8 times greater than the values from rats fed the 25% casein-5% fat diet with no dietary choline.

MECHANISMS OF THE GENETIC CONTROL OF PLASMA CHOLESTEROL IN SELECTED LINES OF SHOW RACER PIGEONS. W.D. Wagner and T.B. Clarkson (Arteriosclerosis Res. Cntr, Bowman Gray Schl. of Med., Wake Forest Univ., Winston-Salem, N.C. 27103). *Proc. Soc. Exp. Biol. Med.* 145, 1050–7 (1974). Cholesterol absorption, synthesis and turnover were studied in selected lines of hypo- and hyperresponder Show Racer pigeons by feeding a diet containing [^{3}H]cholesterol and injecting a [^{14}C]cholesterol-labeled serum. The decline in plasma [^{14}C] cholesterol specific activity with time was analyzed according to a two-pool model. The mass of cholesterol in pool A was higher in the hyperresponder line than in the hyporesponders, reflecting mainly plasma cholesterol differences of 1417–2253 mg/dl in the former compared with 319–457 mg/dl in the latter. No strain differences were found for the rates at which new cholesterol appeared in pool A, but the rate constant describing removal of cholesterol from that pool was higher for the hyporesponder line, signifying genetic control of plasma cholesterol at the level of excretion. Cholesterol absorption was calculated as 58 mg/day in the hyperresponders and 48 mg/day in the hyporesponders, while endogenous synthesis was 12 and 28 mg/day, respectively.

EFFECT OF DIETARY CHOLINE AND ETHANOL ON HEPATIC TRIGLYCERIDES AND ACTIVITY OF HEPATIC ETHANOL OXIDIZING ENZYMES IN RATS. D.H. Rifenbrick, S.A. Narrod, R.M. Myerson and R.M. Scorpio (Depts. of Biochem. and Med., The Med. College of Pennsylvania, Philadelphia, PA 19129). *Proc. Soc. Exp. Biol. Med.* 145, 1061–64 (1974). Female rats were maintained for 21 days on a liquid diet with and without choline supplementation. Ethanol was given to half of the rats as an isocaloric substitution for dietary sucrose. Choline supplementation inhibited the accumulation of hepatic triglycerides and was required for maximum stimulation of the hepatic microsomal ethanol oxidizing system (MEOS) activity. Increase in hepatic alcohol dehydrogenase (ADH) activity did not occur.

OXIDATION OF MEDIUM CHAIN FATTY ACIDS BY THE RUMINANT MAMMARY GLAND. P.E. Swenson and P.S. Dimick (Div. of Food Sci. and Industry, Penn. State Univ., University Park, PA 16802). *J. Dairy Sci.* 57, 290–5 (1974). Sodium (1-^{14}C) decanoate and sodium (1-^{14}C) dodecanoate were administered via intramammary infusion into two healthy lactating goats. Milk samples were collected from each side of the gland at specified intervals, and the lipids extracted. In the decanoate experiment, the esterified short chain acids (butyrate through caprylate) contained approximately 6% of the radioactivity in the milk lipids isolated from the infused side of the gland, and the short chain acids from the noninfused side contained 20% of the radioactivity. Following the infusion of labeled dodecanoate, 2 and 5% of the lipid radioactivity was accounted for in the short chain fatty acids from the infused and noninfused side. Esterified butyrate was isolated and decarboxylated to determine the radioactive labeling pattern. Fifty-six percent of the butyrate label from the infused decanoate was in the carboxyl carbon whereas 65% from the dodecanoate was in the carboxyl carbon. These data indicate oxidation of the medium chain fatty acids in the mammary gland and subsequent contribution to the short chain fatty acids of milk lipids. The contribution of a four carbon unit is evident rather than exclusively a two carbon unit as expected from β-oxidation.

ISOLATION AND PARTIAL CHARACTERIZATION OF CHIMPANZEE PLASMA HIGH DENSITY LIPOPROTEINS AND THEIR APOLIPOPROTEINS. V. Blaton, R. Vercaemst, N. Vandecasteele, H. Caster and H. Peeters (Simon Stevin Inst. voor Wetenschappelijk Onderzoek, B-8000 Brugge, Belgium). *Biochemistry* 13, 1127–34 (1974). Chimpanzee high density lipoprotein (HDL) fractions were isolated by preparative ultracentrifugation between d = 1.063–1.125 g/ml (HDL_2) and 1.125–1.21 g/ml (HDL_3). The HDL_2 and HDL_3 contain 42 and 58% protein and have the same lipid components although present in different amounts. These studies demonstrate that chimpanzee and

human high density lipoproteins have similar physical and chemical properties. Because of the similarities between the human and chimpanzee high density apolipoproteins, the use of the chimpanzee as a research animal for lipoprotein metabolism seems logical.

BIOSYNTHESIS OF A HYDROXY FATTY ACID POLYMER, CUTIN. IDENTIFICATION AND BIOSYNTHESIS OF 16-OXO-9- OR 10-HYDROXYPALMITIC ACID, A NOVEL COMPOUND IN VICIA FABA. P.E. Kolattukudy (Dept. of Agr. Chem., Wash. State Univ., Pullman, Wash. 99163). *Biochemistry* **13**, 1354–63 (1974). In the cuticular polymer, cutin, of young *Vicia faba* leaves 16-oxo-9-hydroxypalmitic acid and its 10-hydroxy isomer were identified by combined gas-liquid chromatography-mass spectrometry of the products derived by $LiAlH_4$ and $LiAlD_4$ treatment of the polymer as well as hydroxylamine treated polymer. These results for the first time clearly show that dramatic structural changes occur in cutin as a plant tissue develops. That [1-^{14}C] palmitic acid was incorporated into 16-oxo-9- or 10-hydroxypalmitic acid was shown by isolation and identification of the dimethyl acetal, semicarbazone and oxime of the labeled aldehyde. Exogenous [G-^{3}H]-16-hydroxypalmitic acid was converted into 16-oxo-9- or 10-hydroxypalmitic acid in young *V. faba* leaves without involving degradation of the carbon chain. Direct conversion of 10,16-dihydroxypalmitic acid into 16-oxo-10-hydroxypalmitic acid was also demonstrated in this tissue.

25-HYDROXYVITAMIN D_3-24-HYDROXYLASE. SUBCELLULAR LOCATION AND PROPERTIES. J.C. Knutson and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wis.-Madison, Madison, WI 53706). *Biochemistry* **13**, 1543–8 (1974). The 25-hydroxyvitamin D_3-24-hydroxylase activity is shown to be localized in renal mitochondria of chickens raised on a high calcium (3%), vitamin D_3-supplemented diet. The product, 24,25-dihydroxyvitamin D_3, was identified through periodate oxidation and Sephadex LH-20, silicic acid and Celite liquid-liquid partition cochromatography. This reaction requires NADPH and oxygen. When NADPH is supplied through the oxidation of succinate and malate, the electron transport inhibitors, cyanide, antimycin and carbon monoxide, inhibit the reaction; however, when the NADPH is supplied directly, these inhibitors have no effect on the 24-hydroxylase activity. Neither added phosphate nor magnesium is required for 24-hydroxylase activity, but each will stimulate the activity. The 24-hydroxylase is inhibited by its product, 24,25-dihydroxyvitamin D_3, and by another metabolite of 25-hydroxyvitamin D_3, 1,25-dihydroxyvitamin D_3, but is not affected by vitamin D_3, vitamin D_2, dihydrotachysterol$_3$ or 25-hydroxdihydrotachysterol$_3$ when present in the incubation mixture at a 2:1 molar ratio with the substrate.

LIPOGENESIS IN RAT HEPATOCYTES. D.G. Clark, R. Rognstad and J. Katz (Cedars-Sinai Med. Res. Inst., Los Angeles, CA 90029). *J. Biol. Chem.* **249**, 2028–36 (1974). Hepatocytes, prepared by collagenase treatment of livers of ad libitum- and meal-fed rats, were incubated with glucose, fructose, lactate and a number of other substrates labeled uniformly with ^{14}C and in the presence of ^{3}HOH. Fatty acid synthesis is greatly increased in meal-fed as compared to ad libitum-fed animals. Incorporation of glucose and of lactate carbon into fatty acids increases with concentration up to concentrations of 100 mM. Lactate carbon is a much better fatty acid precursor than glucose carbon.

PURIFICATION AND CHARACTERIZATION OF LIPOPROTEIN LIPASE FROM PIG ADIPOSE TISSUE. A. Bensadoun, C. Ehnholm, D. Steinberg and W.V. Brown (Div. of Metabolic Disease, Dept. of Med., Univ. of Cal., San Diego, La Jolla, CA 92037). *J. Biol. Chem.* **249**, 2220–7 (1974). Lipoprotein lipase was purified from acetone powders of pig adipose tissue. Extraction of acetone powders with 1.2 M NaCl in 0.005 M sodium-barbital buffer (pH 7.4) or heparin (200 units per ml) in distilled water, was 6 times as effective as extraction with 0.025 M NH_4OH-NH_4Cl buffer at pH 8.6, the common extractant for lipoprotein lipase. At pH values below 7.5, over 85% of the activity extracted into 1.2 M NaCl could be recovered after 4 hours. The partially purified enzyme at later stages was stabilized by the inclusion of 20% glycerol in the buffers. Of the three very low density lipoprotein apoproteins studied, only apoLp-Glu could substitute for serum as an activator. In the presence of serum in the assay system, apoLp-Ser was as potent an inhibitor of lipoprotein lipase as apoLp-Ala.

FATTY ACID COMPOSITIONS OF BOVINE ADIPOSE TISSUE AND OF IN VITRO LIPOGENESIS. M.A. Pothoven, D.C. Beitz and A. Zimmerli (Dept. of Animal Sci., Iowa State Univ., Ames, IA 50010). *J. Nutr.* **104**, 430–3 (1974). Fatty acids, synthesized in vitro, were determined in bovine adipose tissue and compared with the fatty acid composition of each corresponding tissue. Tissues were taken from five sites (outer and inner layers of backfat, perirenal, omental and intermuscular) of Holstein steers weighing 278, 385 and 528 kg. Bovine backfat adipose had a higher percentage of unsaturated fatty acids (16:1 and 18:1) than the internal sites (perirenal and omental) which had a higher percentage of saturated fatty acids (14:0, 16:0, 18:0). The percentage of saturated fatty acids was similar to that of the unsaturated fatty acids in the intermuscular adipose. Large (528 kg) steers had a higher percentage of unsaturated fatty acids than did the small and medium weight steers. Composition of the fatty acids synthesized in vitro was similar to that present in the tissue, with the exception that more 18:0 and less 18:1 were synthesized in comparison to amounts contained in adipose.

BODY FAT AND FATTY ACID SYNTHESIS IN FIVE LINES OF MICE SELECTED FOR GROWTH RATE. D.R. Romsos and G.A. Leveille (Dept. of Food Sci. and Human Nutr., Mich. State Univ., East Lansing, MI 48824). *Proc. Soc. Exp. Biol. Med.* **145**, 591–4 (1974). Two lines of mice (O_{10} and C_{10}) were derived from an ICR strain. The O_{10} mice weighed 52 g and contained 15.5% fat while the C_{10} mice weighed 36 g and contained 8.3% fat at 14 weeks of age. At this time, the O_{10} mice exhibited hyperglycemia and an increased rate of hepatic fatty acid synthesis when compared with the C_{10} mice. Although three other lines of mice (H_6, C_2, and L_6) derived by reciprocally crossing CAF_1 and $AKD2F_1$ mice exhibited marked difference in body weight at 14 weeks of age (H_6 = 37 g; C_2 = 29 g; and L = 22 g), the percentage of body fat, blood glucose values and in vitro rates of fatty acid synthesis in liver and adipose tissue were similar in these mice.

THE INVOLVEMENT OF ENDOGENOUS DOLICHOL IN THE FORMATION OF LIPID-LINKED PRECURSORS OF GLYCOPROTEIN IN RAT LIVER. H.G. Martin and K.J.I. Thorne (Dunn Nutr. Lab., Univ. of Cambridge and Med. Res. Council, Cambridge CB4 1XJ, U.K.). *Biochem. J.* **138**, 281–9 (1974). Endogenous dolichol was shown to function as a natural acceptor of mannose residues by using regenerating rat liver containing [^{3}H]dolichol. When subcellular fractions from this liver were incubated with GDP-[^{14}C]mannose, a double-labelled lipid, which represented 30% of the total [^{14}C]mannolipid, could be isolated. This lipid was shown to be identical with the dolichol phosphate mannose formed from exogenous dolichol phosphate, by chromatography, stability to alkali and by chemical cleavage to mannose and dolichol derivatives. It was formed by the rough endoplasmic reticulum and mitochondria. If it is concerned in glycoprotein synthesis, this would suggest that it functions in the formation of both secreted and mitochondrial glycoproteins. When both the dolichol and retinol of rat tissue were radioactive, they made similar contributions to the synthesis of the lipid by liver microsomal fractions and intestinal epithelial cells.

ERUCIC ACID OXIDATION BY BEATING HEART CELLS IN CULTURE. A. Pinson and P. Padieu (Lab. de Biochim. Med., Faculté de Med., 7, bd. Jeanne d'Arc, 21033 Dijon, France). *FEBS Letters* **39**, 88–90 (1974). Oxidation of erucic acid by beating heart cells in culture has been studied. Two differently labelled erucic acids were used in order to determine whether differentiated cultured cardiac cells in a tissue-like structure, are able themselves to oxidize erucic acid and whether transformation is an essential step prior to oxidation. The incorporation of erucic acid into triglycerides is also reported in order to support our proposition that transformation before oxidation is an obligatory step followed by erucic acid in the cultured myocyte.

(ω-2) HYDROXYLATION OF FATTY ACIDS BY A SOLUBLE SYSTEM FROM BACILLUS MEGATERIUM. Y. Miura and A. J. Fulco (Dept. of Biol. Chem., UCLA Schl. of Med., Los Angeles, CA 90024). *J. Biol. Chem.* **249**, 1880–8 (1974). A cell-free hydroxylating system which acts on long chain fatty acids has been isolated from *Bacillus megaterium*. When palmitic acid is used as a substrate, the major product is 14-hydroxypalmitate (about 50% of the total) while 15-hydroxypalmitate (30%) and 13-hydroxypalmitate (20%) are also produced. No 16-hydroxypalmitate is formed in this system. The effect of substrate chain length on hydroxylation activity was tested with various saturated fatty acids. The relative activity of the hydroxylase with the substrates tested was as follows: C_{15} (1.00), C_{16} (0.89), C_{14} (0.72), C_{17} (0.34), C_{18} (0.17), and C_{12} (0.08). When the distributions of isomeric hydroxy acids formed from C_{18} and C_{14} were determined, it was found that

the major product from C_{18} was the (ω-2) derivative with the (ω-1) and (ω-3) components being present in about the same ratio as for palmitate.

DEUTERIUM-LABELED LIPIDS AS STRUCTURAL PROBES IN LIQUID CRYSTALLINE BILAYERS. A DEUTERIUM MAGNETIC RESONANCE STUDY. J. Seelig and W. Niederberger (Biocenter of the Univ. of Basel, Dept. of Biophys. Chem., Basel, Switzerland). *J. Amer. Chem. Soc.* 96, 2069–72 (1974). Selectively deuterated lipids are used as building stones for liquid crystalline bilayers. The deuteron magnetic resonance signal is found to be doublet as a consequence of the anisotropic motion of the lipid molecules. From the separation of the lines the order parameter at different positions in the bilayer is easily evaluated. Similar to spin label probes, the deuterated lipids detect a flexibility gradient in the bilayer, but quantitatively the two methods differ by about 20 to 30%. The deuterium results seem more reliable since deuterium labels do not perturb the bilayer structure.

THE ENZYMIC AND NON-ENZYMIC DEGRADATION OF COLNELEIC ACID, AN UNSATURATED FATTY ACID ETHER INTERMEDIATE IN THE LIPOXYGENASE PATHWAY OF LINOLEIC ACID OXIDATION IN POTATO (SOLANUM TUBEROSUM) TUBERS. T. Galliard, D.A. Wardale and J.A. Matthew (Agr. Res. Council Food Res. Inst., Colney Lane, Norwich NOR 7OF, U.K.). *Biochem. J.* 138, 23–31 (1974). Colneleic acid is an unsaturated ether fatty acid derived from linoleic acid via a lipoxygenase-mediated enzyme pathway. It is degraded by an enzyme in potato tubers which is heat-labile and non-dialysable and by a model system containing catalytic amounts of Fe^{2+} ions. Both enzyme- and Fe^{2+}-catalyzed systems have similar properties with respect to pH optima (pH 5.0–5.5), oxygen requirement (0.6–0.7 mol of O_2 consumed/mol of ether degraded), inhibitors and reaction products. An unstable product breaks down to C_8 and C_9 carbonyl fragments. Both systems are inhibited by low concentrations of antioxidants (e.g. 5μM-butylated hydroxtoluene) and some chelating agents (e.g. 5μM-diethyldithiocarbamate). The model system is strongly inhibited by metal ions, particularly Cu^{2+} and Fe^{3+}, at 20 μM. Hydrogen peroxide and haemoproteins do not substitute for the enzyme or Fe^{2+} ions but the non-haem iron protein, ferredoxin, does catalyse the degradation.

A SIMPLE AND INEXPENSIVE MEMBRANE "LUNG" FOR SMALL ORGAN PERFUSION. R.L. Hamilton, M.N. Berry, M.C. Williams and E.M. Severinghaus (Dept. of Anatomy and Cardiovascular Res. Inst., Univ. of Calif., San Francisco, CA 94122). *J. Lipid Res.* 15, 182–6 (1974). A disposable coil of thin-walled Silastic tubing, permeable to oxygen and carbon dioxide, functioned as a "lung" for perfusion of isolated rat liver. This "lung" which can be easily assembled from laboratory supplies, has a number of advantages over devices that utilize large air-liquid interfaces for gas exchange. Rates of hepatic lipoprotein triglyceride secretion, comparable to those obtained with more complex oxygenation systems, are achieved with this simple device.

ARTIFACTS PRODUCED BY ACIDIC HYDROLYSIS OF LIPIDS CONTAINING 3-HYDROXYALKANOIC ACIDS. S.G. Wilkinson (Dept. of Chem., The Univ. Hull HU67RX, England). *J. Lipid Res.* 15, 181–2 (1974). After acidic hydrolysis of lipid A preparations from pseudomonads, products containing both hydroxy and nonhydroxy fatty acids were obtained. The major products were alkanoate esters of the hydroxy acids. Similar compounds were formed when a 3-hydroxy acid was heated with a nonhydroxy acid under the same conditions.

DETERMINATION OF LONG-CHAIN BASE IN GLYCOSPHINGOLIPIDS WITH FLUORESCAMINE. A. Kisic and M.M. Rapport (Div. of Neuroscience, N.Y. St. Psychiatric Inst., and Dept. of Biochem., Columbia Univ. Coll. of Physicians and Surgeons, N.Y. 10032). *J. Lipid Res.* 15, 179–80 (1974). A method is described for determining the long-chain base content of glycosphingolipids after acid hydrolysis, using the new reagent fluorescamine. The reaction is sensitive and can be used to characterize or measure glycosphingolipids in quantities routinely separated by thin-layer chromatography.

PRODUCTS OF A LINOLEIC HYDROPEROXIDE-DECOMPOSING ENZYME OF ALFALFA SEED. W.J. Esselman and C.O. Clagett (Dept. of Biochem., Pennsylvania St. Univ. University Park, PA 16802). *J. Lipid Res.* 15, 173–8 (1974). Alfalfa seeds and seedlings contain an enzyme that catalyzes a reaction with the 13- and 9-hydroperoxides of linoleic acid to form 13-hydroxy-10-oxo-*trans*-octadecenoic acid and 9-hydroxy-12-oxo-*trans*-10-octadecenoic acid, respectively. When commercial lipoxygenase is used to generate the hydroperoxides, the above acids appear in about 2:1 proportions, respectively. The products of the action of the enzyme on the hydroperoxides were stabilized for analysis by reduction with H_2 and $LiAlH_4$. Trimethylsilyl derivatives of reduced products were analyzed by combined gas-liquid chromatography-mass spectrometry. Specific deuterium labeling permitted definite location of the oxo functions. $^{18}O_2$ labeling experiments showed that the oxygens of both the oxo and the hydroxyl functions were derived from the hydroperoxide. Retention of both oxygens suggests that the reaction proceeds through a cyclic epiperoxide followed by a ketohydroxy-forming rearrangement. No products of hydroperoxide isomerase were found in reactions catalyzed by the crude enzyme from alfalfa seeds.

MONOGLYCERIDE MODIFICATION OF JEJUNAL ABSORPTION OF FATTY ACID IN THE RAT. A.T. Marubbio, Jr., J.A. Morris, Jr., S.B. Clark and P.R. Holt (Div. of Gastroenterol., Med. Service, St. Luke's Hosp. Center, and Dept. of Med., Coll. of Physicians and Surgeons, Columbia Univ., New York 10032). *J. Lipid Res.* 15, 165–72 (1974). The effect of increasing the intracellular pool of monoolein upon the subsequent uptake and esterification of oleic acid was investigated using in vitro rat jejunal slice techniques. The mucosal pool of monoglyceride was expanded by preincubation of jejunal slices in a monoglyceride-containing bile salt medium at a temperature close to 1C, which inhibited esterification. Subsequent incubation in micellar [^{14}C]oleic acid was performed either at 37C or in the cold. Monoglyceride preincubation increased [^{14}C]oleic acid uptake by about 60% without increasing incorporation of fatty acid into triglyceride. This was not due to inhibition of esterifying capacity nor to changes in oleic acid binding to a mucosal fatty acid-binding protein. It is suggested that under these experimental conditions monoglyceride may modify intracellular pools of fatty acid. However, when monoglyceride and fatty acid were preincubated together, mucosal esterification rates during subsequent incubation at 37C more than doubled. Implications of these data for present theories of rate-limiting steps in lipid absorption are discussed.

ISOLATION AND IDENTIFICATION OF CEREBROSIDES FROM THE MARINE SPONGE CHONDRILLA NUCULA. F.J. Schmitz and F.J. McDonald (Dept. of Chem., Univ. of Oklahoma, Norman, Oklahoma 73069). *J. Lipid Res.* 15, 158–64 (1974). A cerebroside mixture has been isolated from the marine sponge *Chondrilla nucula*. Acid-catalyzed methanolysis of this cerebrosides mixture afforded methyl glucosides, three long-chain bases and a mixture of α-hydroxy fatty acid methyl esters. The bases were identified as saturated C_{17}, C_{18} and C_{19} trihydroxy bases (1,3,4-trihydroxy-2-aminoalkanes) by gas-liquid chromatographic-mass spectrometric analysis of their corresponding trimethylsilyl derivatives. The methyl ester fraction consisted of a mixture of homologous C_{16} to C_{26} saturated straight-chain α-hydroxy esters plus a trace of saturated C_{25} iso α-hydroxy ester.

POLYENOIC ACID METABOLISM IN CULTURED DISSOCIATED BRAIN CELLS. E. Yavin and J.H. Menkes (Div. of Pediatric Neurology, Univ. of Calif. at Los Angeles, Los Angeles, Calif. 90024). *J. Lipid Res.* 15, 152–7 (1974). The incorporation of [^{14}C]linolenate (18:3 n − 3) into cellular lipids of cultured dissociated brain cells was studied. During the initial phases of incubation, radioactivity was found in free fatty acids, diacylglycerols, triacylglycerols and choline phosphoglyceride pools preferentially. Incorporation into the ethanolamine phosphoglyceride pool increased steadily and paralleled desaturation and chain elongation of 18:3 → 20:3 → 20:4 → 20:5 22:5 → 22:6. From pulse-chase studies it was evident that the label of the highly polyunsaturated fatty acids in ethanolamine phosphoglycerides is constantly increased while the label in the fatty acids of choline phosphoglycerides decreased. Uptake of 18:3 by the cells was reduced by lowering incubation temperature, the triacylglycerol and ethanolamine phosphoglyceride pools being mainly affected. Lowering the incubation temperatures essentially abolished conversion of labeled 18:3 to the higher polyenoic acids. At intermediate temperatures, conversion of 18:3 to 20:5 n − 3 was still active, but conversion of 20:5 n − 3 to 22:6 n − 3 was abolished, suggesting that formation of 22:6 from 18:3 proceeds by at least two reactions distinguishable by their temperature dependency.

DETERMINATION OF HEPATIC CHOLESTEROL 7α-HYDROXYLASE ACTIVITY IN MAN. G. Nicolau, S. Shefer, G. Salen and E.H. Mosbach (Dept. of Lipid Res. of the Public Health Res. Inst. of the City of N.Y., Inc., Dept. of Med., N.Y. Univ. Med.

Center, and the Manhattan Veterans Admin. Hosp., N.Y. 10016). *J. Lipid Res.* 15, 146–51 (1974). Methods were developed to determine the activity of the microsomal enzyme cholesterol 7α-hydroxylase in human liver. The enzyme assay could be performed with as little as 20 mg of fresh liver tissue, thus making the procedure applicable to specimens obtained by percutaneous liver biopsy. Optimal assay conditions were determined and the identity and radioactive purity of the reaction product, cholest-5-ene-3β,7α-diol (7α-hydroxycholesterol) were established. Specific enzyme activity was measured in a number of patients with disorders of lipid metabolism.

CHOLESTEROL METABOLISM IN RHESUS MONKEY, SQUIRREL MONKEY AND BABOON. D.A. Eggen (Dept. of Pathol., La. St. Univ. Med. Center, New Orleans, LA 70112). *J. Lipid Res.* 15, 139–45 (1974). The metabolism of cholesterol was studied in baboons, rhesus monkeys and squirrel monkeys while they were being fed either a low fat, low cholesterol (basal) diet or the basal diet supplemented with saturated fat and cholesterol (atherogenic diet). When the diet was changed from basal to atherogenic, the mean total serum cholesterol concentration increased from 70 to 180 mg/dl in the baboon, from 168 to 283 mg/dl in the squirrel monkey and from 144 to 608 mg/dl in the rhesus monkey. In animals fed the atherogenic diet, the percentage of dietary cholesterol absorbed was greatest in the rhesus monkey and least in the baboon. The fraction of the total body pool of cholesterol that was derived from the diet was greatest in the squirrel monkey and least in the baboon. The turnover of the body pool of cholesterol was several times faster in the squirrel monkey than in the baboon or the rhesus monkey when either diet was fed. The mean total fecal excretion of endogenous cholesterol and bile acid increased in all species on transition to the atherogenic diet; however, the relative contributions of the neutral and acidic fractions to the increase in total excretion differed among species. The difference in percentage of dietary cholesterol absorbed may, in part, account for the large differences in serum cholesterol during the atherogenic diet period. Comparison with other published results indicates, that, of these species, cholesterol metabolism in the baboon is most like that in the human.

• Edible Proteins

ENRICHMENT OF TORTILLAS WITH SOY PROTEINS BY LIME COOKING OF WHOLE RAW CORN-SOYBEAN MIXTURES. F.R. Del Valle (Mexicana de Jugos y Sabores, S.A., Monterrey, Mexico) and J. Perez-Villasenor. *J. Food Sci.* 39, 244–7 (1974). A simple and inexpensive method for enriching tortillas with soy proteins was studied. The method consisted of application of the traditional process for making corn tortillas to whole raw corn-soybean mixtures: lime cooking of a mixture, allowing the cooked mixture to stand overnight in the cooking liquor, washing the mixture with tap water, grinding the cooked mixture into a dough, and making tortillas from the dough. This method of enrichment was found to give tortillas with significantly higher protein content and protein quality than normal unenriched tortillas. Toxic factors present in raw soybeans were not detected in enriched tortillas by the urease method, having been apparently inactivated by the tortilla-making process. The method permits uniform introduction of soya proteins within the tortillas, and changes neither food recipes nor eating habits.

EFFECT OF ENZYMATIC HYDROLYSIS ON SOME FUNCTIONAL PROPERTIES OF WHEY PROTEIN. C.A. Kuehler and C.M. Stine (Dept. of Food Sci. & Human Nutr., Michigan State Univ., East Lansing, MI 48823). *J. Food Sci.* 39, 379–82 (1974). A study was undertaken to elucidate the functional properties of whey protein with respect to foaming and emulsifying capacities and to observe the effect of enzymatic hydrolysis on these properties. Emulsion capacity decreased as proteolysis continued suggesting there is an optimum mean molecular size of the proteins involved which is lower than that of casein. Heat treatment of the reconstituted protein concentrate was necessary for foam stability; specific volume and foam stability increased directly with temperature of heating. In regard to the effect of pH on whippability, data indicate that the greater the net charge the greater the tendency to foam. A limited amount of hydrolysis appears desirable to increase foaming but greatly decreases foam stability.

PROPERTIES OF WHEY PROTEIN CONCENTRATE FOAMS. E.D. DeVilbiss, V.H. Holsinger, L.P. Posati and M.J. Palansch (Dairy Prod. Lab., Eastern Reg. Res. Ctr., USDA-ARS, 600 E. Mermaid Lane, Philadelphia, Pa. 19118). *Food Technol.* 28(3), 40–8 (1974). When dehydrated whey protein concentrates are mixed with water, dispersions are produced which can be mechanically whipped into foams. The physical properties of such foams are discussed. Although whey protein concentrates are excellent foaming agents, in situations in which the foams are exposed to high heat, such as during cake baking, rapid foam collapse occurs.

NUTRITIVE VALUE OF BREAKFAST CEREAL MILK COMBINATIONS. M. Womack, D.A. Vaughan and L.R. Miller (USDA Nutr. Inst. & Data Systems Applic. Div., ARS, Beltsville, Md. 20705). *J. Food Sci.* 39, 371–3 (1974). The protein quality of 11 breakfast cereal-milk mixtures combined as normally eaten (1 oz. cereal and 4 oz. fluid milk) was determined by using a modified slope-ratio assay. Slope ratios (milk = 100) of three of the mixtures (oatmeal-milk, cream of rice-milk and shredded wheat-milk) were higher than that of milk alone. Using protein content and slope ratios, it was calculated that 1 oz. of the various cereals could increase potential protein value over that of milk alone by 26 to 117%, and that some of the mixtures could supply as much as 22% of the recommended daily allowance for an 8–10-yr-old child. It is suggested that information of this sort combining the protein quality of food mixtures as eaten with the protein content of a serving would be welcomed by consumers.

CERTAIN FUNCTIONAL PROPERTIES OF SUNFLOWER MEAL PRODUCTS. J.J.Y. Lin (Dept. of Dairy & Food Sci., Univ. of Saskatchewan, Saskatoon, Canada S7N OWO), E.S. Humbert and F.W. Sosulski. *J. Food Sci.* 39, 368–70 (1974). Certain functional properties including water absorption, fat absorption, emulsification, whippability and foam stability were determined on the sunflower flour, protein concentrates and isolate. The results were also compared to those obtained on soy products. Data on water and fat absorption studies suggest that soy products are more hydrophilic in nature while sunflower material exhibited greater lipophilic properties than the soy products. Emulsification tests showed that sunflower flour was superior to all other soy and sunflower products. In general, whipping properties of soy and sunflower isolates were similar while less whippability was observed for the soy flour and protein concentrates. Whipped foams produced by soy and sunflower protein isolates and sunflower flour were more stable than those from soy flour, soy or sunflower protein concentrates.

• Drying Oils and Paints

COMPARISON OF REFLECTANCE AND RELATED METHODS FOR STUDIES OF FILM SURFACE DETERIORATION. II. NATURAL WEATHERING OF ALKYD, URETHANE AND EPOXYAMINE COATINGS. M. Tahan and B. J. Tighe (U. of Aston, Birmingham, England). *J. Paint Technol.* 46(590), 48–57 (1974). Deterioration during outdoor exposure of white pigmented coatings based on polyurethane, epoxypolyamine and linseed oil-modified alkyd resins has been studied. Goniophotometry, attenuated total reflection (ATR) spectroscopy and AHRI (average height of roughness irregularity) measurements were used, and their effectiveness compared. Goniophotometry was found to be very sensitive, equally applicable to all coatings, and obviously useful as a kinetic technic for degradation studies. ATP spectroscopy gave a great deal of information relating to the chemical changes taking place at the surface of the coatings, but was difficult to use in a reproducible manner. It was not possible to obtain accurate quantitative results using this technique. AHRI measurements which had proved so valuable for PVC-based coatings proved uninformative in this work. This was due to the relatively small ($<100m\mu$) dimensions of the irregularities produced.

USE OF THERMAL ANALYSIS TO SCREEN BINDERS FOR INTUMESCENT COATINGS. S.H. Roth and J. Green (Cities Service Co. Cranbury, N.J. 08512). *J. Paint Technol.* 46(590), 58–62 (1974). The thermal properties of a polymeric binder are critical to the functioning of an intumescent coating. The binder must not soften or melt at too low a temperature or it will permit the decomposition gases from the intumescent agents to escape before a stable foamed char is achieved. Neither can the binder remain rigid in the region of intumescence to inhibit the formation of foam. The empirical approach to binder selection in the development of coatings from intumescent agents is very time consuming. In this paper,

differential scanning calorimetry and thermal gravimetric analysis are used to match the thermal behavior of a number of conventional binders with that of two novel intumescing compounds. Predicted behavior is then compared with experimentally determined flame spread ratings for the formulated coatings.

NEW ISOCYANATE CROSSLINKING AGENTS FOR ALKYD RESIN VARNISHES. L. Fleiter and M. Dislich (Bayer AG). *Farbe u. Lack* 80(3), 217–20 (1974). Report on new polyisocyanate products, which owing to their better or perfect compatibility with alkyd resins dissolved in white spirit, are presented as interesting additional resins, especially for air-drying alkyd enamels to which they impart essential technological improvements e.g. as far as drying, curing, assembly stability and recoatability are concerned. The quality of present paint systems based on alkyd resins (e.g. automotive repair finishes) can thus be substantially improved without any technical change being required, by merely using a special thinner for spray application, the material thus being well adapted to the demands of today's processing practice.

MALEINISED LINSEED OIL BEHAVIOUR IN ELECTROPAINTS. Yu F. Vorober et al. *Lakokras. Mat.* 1973, No 3, 26 8. The hydrolysis and oxidation of water-soluble maleinised linseed oil in the course of electrophoretic deposition were investigated. The kinetics of these processes and their effect on mol. wt. fractional distribution are fully illustrated. These processes have a detrimental effect on both stability and operation and may be controlled by careful adjustment of pH and use of anti oxidants. (World Surface Coatings Abs. No. 379)

PAINT COMPOSITIONS EMULSIFIABLE IN AQUEOUS DETERGENT. P.F. Nicks, G.M. Jones and A.S. Baker (Imperial Chemical Inds. Ltd.). *U.S. 3,804,787.* Paints based on water immiscible liquid which can be removed from an applicator by emulsification in aqueous synthetic detergent are prepared by a process including a step in which the pigment is treated with an auxiliary resin which will co-emulsify with the pigment in the detergent and is adsorbed on the pigment in preference to the base resin of the paint.

• Fatty Acid Derivatives

N-SUBSTITUTED FATTY ACID AMIDE LUBRICANTS. F.C. Magne, R.R. Mod, G. Sumrell and W.E. Parker(U.S. Secy. of Agriculture). *U.S. 3,801,609.* N-acylmorpholines and N-mono and N,N-disubstituted fatty acid amides and similar derivatives of epithioamides are useful as base and extreme pressure lubricants and additives.

PREPARATION OF CARBOXYLIC ACID AMIDES. A. Werdehausen and H. Weiss (Henkel & Cie). *U.S. 3,801,610.* A method for the production of N-substituted amides of fatty acids of 8–24 carbon atoms comprises reacting the free carboxylic acids or their esters with amines in the presence of catalysts consisting of compounds of metals in Group IV*b* and V*b* of the Periodic Table which are soluble in the reaction mixture.

MANUFACTURE OF METALLIC SOAPS. L.F. Scott, H.D. Strachan, and C. M. McCloskey (The Norac Co.). *U.S. 3,803,188.* Metallic soaps of Group II of the Periodic Table are prepared by dispersing the metal oxide in a higher fatty acid and mixing in 3.5–40 mole equivalents of water based on fatty acid. Surfactants are useful catalysts for the reaction.

FLUFFY FROSTING COMPOSITIONS. R.M. Roudebush (Procter & Gamble). *U.S. 3,803,333.* Fluffy frosting compositions, in the form of a dry mix or a finished product, contain fatty acid esters of polyglycerol and exhibit excellent heat stability characteristics. The esters comprise more than 50% stearate with the rest palmitate.

SINTERED POROUS IRON ARTICLE IMPREGNATED WITH OLEIC ACID. J.F. Holman (Allegheny Ludlum Inds., Inc.). *U.S. 3,804,600.* Relatively moving metal parts with matching surfaces are formed by preparing at least one part from porous sintered iron, impregnating the pores with oleic acid containing an antioxidant, and subsequently bringing the parts into sliding contact until the heat developed is sufficient to effect the reaction between iron and oleic acid.

• Detergents

APPRAISAL OF EFFICACY OF ANTIDANDRUFF FORMULATIONS. A.M. Kligman, R.R. Marples, L.R. Lantis and K.J. McGinley (School of Medicine, U. of Pennsylvania, Philadelphia, Pa.). *J. Soc. Cosmet. Chem.* 25, 73–91 (1974). The effectiveness of antidandruff shampoos and grooming agents can be reliably assessed in a month's time on groups as small as 10 persons. The important prerequisites are that the subjects have at least moderately severe dandruff and that estimations be made at a fixed interval after washing the scalp. Two modes of evaluation are utilized: (a) a subjective one in which the amount of scaling is scored on a 0 to 10 scale, and (b) an objective one in which the quantity of horny cells produced is measured in a hemocytometer. Data are given for two widely used efficacious shampoos and for a nonmedicated control. These are valuable benchmarks which enable products to be compared on a scale of comparative merit.

EFFECT OF SURFACTANT MIGRATION ON THE STABILITY OF EMULSIONS. T.J. Lin, H. Kurihara and H. Ohta. *J. Soc. Cosmet. Chem.* 24, 797–814 (1973). A new technique, which involves analyzing solutions from successively centrifuged emulsions, was developed and applied to determine the surfactant concentrations in the aqueous phase of O/W emulsions. By following the surfactant migration from one phase of the freshly prepared emulsion to the other phase, the effects on the migration on the droplet size distribution and emulsion stability were investigated. It was found that at a low mixing speed, the surfactant location had a significant influence on the stability as well as the droplet size distribution of the newly formed O/W emulsions. In general, the emulsion prepared by initially placing the surfactant in the oil phase produced a more stable emulsion than a corresponding emulsion, with identical composition, prepared by placing the surfactant in the aqueous phase. Microphotographic examinations suggested that the initial formation of a double emulsion was probably responsible for the difference. At a high mixing speed, this effect was not very pronounced. The data indicated that under intensize mixing, the time required from the moment of emulsification to the time when the average emulsion droplet size reached the minimum was approximately equal to, or slightly less than, the time required to reach surfactant equilibrium. Once the surfactant equilibrium was attained, further mixing of the emulsion did not improve the emulsion stability.

A QUANTITATIVE CHARACTERIZATION OF COMBING FORCE. W. Newman, G.L. Cohen and C. Hayes. *J. Soc. Cosmet. Chem.* 24, 773–782 (1973). A quantitative method for measuring and comparing the effect of various cosmetic treatments and products on the amount of force needed to comb a tress of hair is described. Photographs of the apparatus and a detailed description of the experimental procedure are given. The results of several experiments evaluating the effects of several commercial hair conditioners, bleaching, and various texturizing resin-containing formulations are summarized.

POLARITY INDEX OF SURFACE-ACTIVE AGENTS. J. Broniarz, M. Wisniewski and J. Szymanovski (Poznańska Polytechnical Inst. of Chemical Technol., Poznań, Poland). *Tenside Detergents* 11(1), 27–30 (1974). The possibilities of using the polarity index and the dielectric constant to determine the polarity of surfactants and for classification of nonionic surface-active agents were examined and the relationships between HLB values and the polarity index are given. ■

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