ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarcyk, J. E. Covey, J. G. Endres, J. Iavicoli, S. Kawamura, F. A. Kummerow, E. G. Perkins, and R. W. Walker

• Fats and Oils

LIPID COMPOSITION OF SOME SPECIES OF FUCACEAE. I. C. Paquot, L. Pham Quang, and M.-H. Laur (C.N.R.S., 2, rue Henry-Dunant, 94-Thiais). *Rev. Franc. Corps Gras* **17**, 547–50 (1970). Lipids were extracted from different parts of *Fucus serratus, Fucus vesiculosus,* and *Pelvetia canaliculata* by a nonpolar solvent (hexane) and by a polar solvent (methanol). The composition of the various extracts was studied. There were significant differences between the two extracts from the same species. In both cases, the unsaponifiable fraction was quite large and the fatty acid fraction small. A table of the fatty acid composition of these fractions is given.

TOCOPHEROLS IN VEGETABLE OILS. II. EXPERIMENTAL. F. Mordret (Ecole Sup. d'Appl. Corps Gras, Paris). *Rev. Franc. Corps Gras* **17**, 537–46 (1970). Methods are described for determining the total tocopherols in crude and refined oils and also for determining individual tocopherols in the unsaponifiable fraction. The methods include TLC, GLC and colorimetry. In the crude oils, most of the tocopherols are free; a very small amount are bound as oxypolymers. Because the tocopherol composition of a given oil is relatively constant, it is possible to analyze mixtures of similar oils.

THE NATURE AND COMPOSITION OF DEODORIZER DISTILLATE. II. IDENTIFICATION OF NON-VOLATILE CONSTITUENTS. M. Naudet and G. Cecchi (Lab. Nat. des Matieres Grasses, ITERG, Marseille). *Rev. Franc. Corps Gras* **17**, 529–35 (1970). Refined and bleached peanut, soybean and rapeseed oils were deodorized in small batches and the distillates collected. Free fatty acids were removed on an ion exchange resin and the remainder roughly fractionated on a Florisil column. Each fraction was then examined further by TLC on silica gel G under various conditions. The fractions obtained were triglycerides, partial glycerides, methyl esters and waxes. The unsaponifiables consisted of saturated and unsaturated hydrocarbons, sterols, triterpenic alcohols, fatty alcohols and tocopherols. A fraction of higher molecular weight oxidation products arising from both the fatty esters and also the unsaponifiables was also obtained. The percentages of these constituents were related to the nature and quality of the oil and also to the deodorization conditions. Qualitatively, the compositions were similar for all three oils.

NITROGEN DETERMINATION FOR RAPID QUALITY CONTROL OF OILSEED MEALS. R. M. McCready, G. Fuller and Mona Gauger (Western Reg. Lab., U.S.D.A.), *Oils Oilseeds J.* **23**, 8–10 (July-Aug., 1970). This work was undertaken in order to find a rapid method for nitrogen determination which would be useful for process control. The accelerated AOAC method, using a digestion time of 15 minutes, a distillation time of 10–15 minutes for 90 ml of distillate followed by titration, was the preferred procedure. It was shown to be satisfactory for analyzing safflower meal and seeds; all analyses were in excellent agreement with those obtained by the official method.

THE DEHYDRATION OF PALM OIL. B. Zachariassen (Alfa Laval Co., Kuala Lumpur). *Oleagineux* **25**, 543–5 (1970). Modern centrifugal clarifiers have advantages over older drying procedures in that less oxidation of the oil occurs. This improvement is due to the lower temperatures and shorter holding times used. However, moisture removal is not quite as complete, and a vacuum post-dryer must be used.

LIPIDS IN THE GLYCERINE-WATER RESULTING FROM THE HYDROLYSIS OF FATS IN THE ABSENCE OF A REAGENT. M. A. Kamyson *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* **1970**(4), 64–6. Using thin-layer chromatography on silica gel, the lipids in the glycerine-water coming from the hydrolysis reaction were identified. They separated eight fractions: phosphatidic acids, monoglycerides, carotenoids, sterols, diglycerides, free fatty acids, triglycerides and sterol esters and hydrocarbons. Because of the large amount of free fatty acids in the glycerine water, it could not be recycled. (Rev. Franc. Corps Gras)

EFFECT OF IMPURITIES ON THE HYDROGENATION OF COTTONSEED OIL IN THE MISCELLA. A. Abduzabbarov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* **1970**(4), 67–9. Measurement of the area included between the kinetic curve and the axes gives an indication of the degree of catalyst poisoning. The area decreases as the impurities in the oil are eliminated. The nature of the solvent affects the rate of hydrogenation of the oil. In the usual extracting solvent, the hydrogenation occurs at a minimal rate. (Rev. Franc. Corps Gras)

STUDY OF THE KINETICS OF MILK FAT CRYSTALLIZATION BY ANALYSIS OF X-RAY SPECTRA. V. M. Vergeleson *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* **1970**(4), 160–4. Using continuous recording of the X-ray spectra of model mixtures of triglycerides, the authors studied the successive changes of the glycerides over small intervals during the polymorphic transitions of the α-2 form to the β'-2 and directly to the β-2. The transition of the α form (possibly mixed with γ), formed during rapid cooling to 2–8C, to the stable β'-2 form begins after 15–30 minutes from the time of cooling and is completed during the first two hours. (Rev. Franc. Corps Gras)

DILATOMETRY IN THE STUDY OF FATS. I. V. Nikonov. *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* **1970**(4), 170–3. There are a number of inherent errors in the determination of solid fat by dilatometry. Determination of solids by nuclear magnetic resonance and by calorimetry gives more accurate results which also tend to be higher than those found by dilatometry. (Rev. Franc. Corps Gras)

THE HYDROPEROXIDES FORMED BY AUTOXIDATION OF ESTERS OF SATURATED FATTY ACIDS AT MODERATE TEMPERATURES. J. Mercier and M. F. Serim (CNRS, 2, rue H.-Dunant, 94-Thiasis). *Rev. Franc. Corps Gras* **17**, 619–25 (1970). Methyl laurate, palmitate and stearate were autoxidized at 98C to low levels of hydroperoxide. Hydroperoxide groups were found attached at all carbon atoms except the 2 and 3 in the different isomers. Quantitative analysis of the isomers indicated that relatively greater amounts of hydroperoxide groups were attached at the methyl end of the chain; at the ω-1, -2, -3, and -4 positions.

ETHANOLAMINOLYSIS OF LECITHINS. I. MONOETHANOLAMINE VALUE OF A LECITHIN. H. B. Wicek. *Oleagineux* **25**, 473–8 (1970). After briefly reviewing methods of hydrolysis of lecithins and methods for quantitative analysis of lecithins, a procedure is described for determining the monoethanolamine value for lecithins. This value is defined as the number of milligrams of monoethanolamine consumed per gram of sample. In this determination, monoethanolamine reacts quantitatively with the fatty acids on the lecithin molecule. The excess monoethanolamine is then titrated with alkali. This reaction has the advantages that the end products, the fatty amides, are relatively stable, and the solvent does not affect the reaction, as it sometimes does during alcoholysis reactions.

II. ANALYSIS OF INDUSTRIAL LECITHINS. *Ibid.*, 537–41. Conditions used for the analysis of egg yolk and soya lecithins are described. Free fatty acids do not interfere with the determination because the ethanolamine soaps are decomposed during the titration. However, triglycerides do affect the results because they also react with the monoethanolamine. The monoethanolamine value can be used as an aid in studying complex industrial lecithins together with the determination of phosphorus level.

LIPID COMPOSITION OF BEEF AND HUMAN PITUITARY GLANDS. H. Singh, and K. K. Carroll (The Collip Med. Res. Lab., and Dept. of Biochem., Univ. of Western Ontario, London, Ontario, Canada). *Lipids* **5**, 121–27 (1970). The lipid composition of beef and human pituitary was determined by chromatographic and spectrophotometric methods. Beef pituitary lipid contained about 25% nonpolar lipids and 75% phospholipids whereas nonpolar lipids made up approximately 60% of the total in human pituitaries. The fatty acid composition of total nonpolar lipids, free fatty acids, total phospholipids, phosphatidyl ethanolamine and phosphatidyl choline of beef anterior and posterior pituitary was determined by gas-liquid chromatography. Mixtures of saturated and unsaturated fatty acids ranging from C_{12} to C_{22} were present; the main fatty acids were palmitic, stearic, oleic, linoleic and arachidonic.

PHYSICAL AND CHEMICAL STABILITY OF SOYBEAN OIL-FILLED MILK. H. W. Modler, A. L. Rippen and C. M. Stine (Dept. of Food Sci., Mich. State Univ., East Lansing, Mich., 48823). *J. Food Sci.* 35, 302–5 (1970). Filled milks were formulated from fresh skim milk, vegetable oils and emulsifiers. The filled milks were pasteurized at 170F (except in off-flavor studies), homogenized at 500/2,500 psi and cooled to 36F. Lightly hydrogenated salad oil, prepared from soybean oil, was quite acceptable when evaluated organoleptically at 24-hour intervals of approximately 1 week. Thiobarbituric acid and peroxide values revealed that very slight oxidation had occurred during storage for approximately 1 week at 40F. Four monoglyceride emulsifiers with varying degrees of saturation were used to stabilize the emulsion of soybean oil in skim milk. Two of the more unsaturated monoglycerides tended to impart a bitter flavor to the milk when used at 0.1% (based on weight of product) and also were less efficient emulsifiers when compared to saturated monoglycerides. Development of a very undesirable sulfide-like odor and taste occurred under extremely high pasteurization temperatures. The degree of off-flavor was directly proportional to time and temperature of heating.

QUANTITATIVE ASPECTS OF ISOTHERMAL AND PROGRAMMED TEMPERATURE GAS CHROMATOGRAPHY OF FATTY ACID ESTERS AND A PRACTICAL LOWER LIMIT OF DETECTION. J. L. Iverson (Div. of Food Chem. and Technol., FDA, Washington, D. C. 20204). *J. Assoc. Offic. Anal. Chemists* 53, 1214–23 (1970). This study was initiated to define the importance of temperature and retention volume in quantitative gas chromatography with thermal conductivity detectors (TCD) and flame ionization detectors (FID). Optimum temperature and optimum retention volume increase with molecular weight for the C_{12} to C_{28} saturated esters. It is demonstrated that relatively large amounts of very long chain methyl esters would be undetected by present optimum isothermal methods for the usual fatty acids reported. The shape of gas chromatographic peaks is correlated with the linear range of detector response as a basis for a limit of detection. The limit of detection varies logarithmically with molecular weight in isothermal analysis. However, by using optimum programmed temperature gas chromatographic (PTGC) techniques, the limit of detection increases slowly with molecular weight and increased retention volumes.

AN EVALUATION OF FIVE METHODS FOR THE QUANTITATIVE DETERMINATION OF CYCLOPROPENOID FATTY ACIDS. E. C. Coleman (Div. of Food Chem. and Technol., FDA, Washington, D.C. 20204). *J. Assoc. Offic. Anal. Chemists* 53, 1209–13 (1970). An evaluation of 5 methods for determining 5% or less cyclopropenoid fatty acids was made in terms of accuracy, precision and sensitivity. GLC of the methyl mercaptan derivatives of cyclopropenoid fatty acids and titration with hydrobromic acid in toluene were found to be unsuitable. GLC of the silver nitrate-methanol derivatives (quantitation by an internal standard) and titration with hydrobromic acid in acetic acid were equally precise, and the former required less sample; however, both methods gave low recoveries. GLC of silver nitrate-methanol derivatives (quantitation by peak area normalization) and a hydrobromic acid-benzene back-titration method gave good recoveries. The Halphen test was found to be the best general method when calibrated with a cyclopropenoid fatty acid standard analyzed by the silver nitrate-methanol GLC method (quantitation by peak area normalization) or the hydrobromic acid-benzene back-titration method.

CREATES UNIQUE CHEESE AND BUTTER FLAVORS. G. Rondenet (Edlong Chem. Co., Elk Grove Village, Ill.) and J. V. Ziemba. *Food Eng.* 42(10), 69–73 (1970). Research and development ingenuity has produced cost-cutting flavors that closely simulate their natural counterparts. Short chain fatty acids and lipoproteins are isolated, then encapsulated using a unique process. These flavor concentrates are then chemically combined with fat components to produce cheeses, margarines, and imitation milk. The formulated food products then contain flavors that resist loss of volatiles in extrusion-cooking or baking. Properties, applications and economics are given.

HOW TO EVALUATE MARGARINE QUALITY. M. E. Dritschel (Anderson-Clayton Foods, P. O. Box 63, Richardson, Texas 75080). *Food Eng.* 42(10), 90–3 (1970). The prime factors are surface appearance, texture, flavor and packaging. Included in the discussion are major product defects, their causes and preventions. A sample score sheet illustrates the rating system.

RAPID DETERMINATION OF NICKEL IN EDIBLE FATS BY ATOMIC-ABSORPTION SPECTROPHOTOMETRY. W. J. Price, J. T. H. Roos and A. F. Clay (Pye Unicam Ltd., Cambridge, England). *Analyst* 95, 760–62 (1970). The determination, by atomic-absorption spectrophotometry, of small amounts of nickel in edible fats is described. Nickel is extracted from the samples with 10 per cent nitric acid in the presence of carbon tetrachloride, to break the emulsion, and the aqueous layer is aspirated directly to determine the nickel. The method requires only 15 minutes for completion, and the detection limit for nickel is better than 0.1 parts per million.

THE RAPID DETERMINATION OF FAT IN COCOA PRODUCTS BY USING A DIFFERENTIAL DENSITY TECHNIQUE. A. M. J. Perl, A. D. Ince and P. H. Wiggall (Cadbury Schweppes Ltd., Bournville, Birmingham, England). *Analyst* 95, 809–16 (1970). The rapid determination of fat for process control purposes in cocoa powders, extrusion cakes and chocolate liquors has been accomplished by rapid extraction of the fat with tetrachloroethylene, followed by indirect determination of the density of the resulting solution by using a differential

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density technique. The method is simple to operate and produces results at 10-minute intervals, although 20 minutes are required to complete each determination. For cocoa powders, 95% of the results obtained for the fat content by the differential density technique were within ±0.46% w/w of those obtained by a Soxhlet extraction method, but for extrusion cakes and chocolate liquors the confidence limits were slightly wider.

ANALYSIS OF LACTIC ACID AND VOLATILE FATTY ACIDS EXTRACTED FROM BACTERIAL FERMENTATIONS. D. B. Drucker (Dental School, Heath, Cardiff, United Kingdom). *J. Chromat. Sci.* 8, 489–90 (1970). A technique is described which permits the isothermal separation, simultaneously, of formic, acetic, (and other volatile fatty acids) and lactic acids produced during microbial fermentation by methylation of the sodium salts of the acids and subsequent separation on 10% DEGA, 2% phosphoric acid on 100/120 mesh diatomite C.

REGENERATION OF AN ANALYTICAL COLUMN FOR FATTY ACID METHYL ESTER ANALYSIS. A. Christophe (Lab. of Gerontology, Dietetics and Nutr., State Univ. of Ghent, Belgium). *J. Chromat. Sci.* 8, 614–5 (1970). Two easy methods for the regeneration of an analytical column for fatty acid methyl ester analysis are described. The first method consists in reversing the gas flow through the column after a certain amount of use, the second in removing about 1% of the packing at the inlet of the column and replacing it by new packing. Both methods have proven to be especially useful in extending the lifetime of columns used for routine determination of the fatty acid pattern of blood lipid classes.

PHOSPHOLIPIDS OF STREPTOCOCCUS FAECALIS. J. M. dos Santos Mota, J. A. F. Op den Kamp, H. M. Verheij and L. L. M. Van Deenen (Lab. of Biochem., Rijksuniversiteit te Utrecht, Vondellaan 26, Utrecht, The Netherlands). *J. Bacteriol.* 104, 611–19 (1970). Autoradiograms of total lipid extracts from *S. faecalis* harvested in the stationary phase from a medium containing ^{32}P-orthophosphate, showed six major spots. The corresponding compounds were identified as diphosphatidylglycerol (possibly with a penta-acyl structure); phosphatidylglycerol; a provisionally identified mixture of alanylphosphatidylglycerol and of 2′-lysyl-derivative of phosphatidylglycerol; the 3′-lysyl-derivative of phosphatidylglycerol, probably together with some arginylphospatidylglycerol; a diglucosyl derivative of phosphatidylglycerol; and a compound which was tentatively identified as the 2′,3′-dilysyl derivative of phosphatidylglycerol.

LIPIDS OF STEROL-NONREQUIRING MYCOPLASMA. P. Plackett, P. F. Smith and W. R. Mayberry (Dept. Microbiol., Univ. So. Dakota, Vermillion, S.D. 57069). *J. Bacteriol.* 104, 798–807 (1970). The lipids of the sterol nonrequiring *Mycoplasma* were found to include both ester glycerophosphatides (phosphatidylglycerol, acylphosphatidylglycerol, and diphosphatidylglycerol) and ceramide glycerophosphate compounds containing N-hydroxyacyl groups. The major phosphosphingolipid was tentatively identified as a hydroxyceramidephosphorylglycerol containing an 0-acylgroup. These compounds became labeled during growth in the presence of ^{32}P-orthophosphate, ^{14}C-glycerol or ^{14}C-palmitate. The lipid fraction also contained free long chain base. ^{14}C-palmitate was converted to labeled sphinganine. The long-chain base composition of the lipids was modified by growing the organisms in media containing different fatty acids, which were converted to bases containing two more C atoms per molecule. Ninety percent of the long-chain base from cells grown in medium supplemented with elaidic acid consisted of monounsaturated C_{20} base.

ROLE OF HYDRODYNAMIC INTERACTION IN THE DIFFUSION OF FATTY ACIDS IN N-DECANE. R. K. Dewan, K. K. Tewari and Singh Baldev. *Indian J. Chem.* 8, No 3, 261–3 (1970). Diffusion coefficients of a series of even-numbered fatty acids from C_6 to C_{18} have been calculated in *n*-decane at 30C, using Einstein-Stokes equation. Kirkwood's equation, which takes into account the hydrodynamic interaction of the monomer units in the chain, has been used to compute the values of the frictional coefficients. The calculated values of the diffusion coefficients are in good agreement with the experimental values. (World Surface Coatings Abs. No. 340)

TRANSESTERIFICATION OF OILS. I. N. Gula and N. I. Gelperin. *Lakokras. Mat.* 1969, No 4, 62–3. The conditions for metering reactants into a column reactor used for the transesterification of oils are described. (World Surface Coatings Abs. No. 340)

DIELECTRIC PROPERTIES OF SOME VEGETABLE OILS IN THE RADIO FREQUENCY REGION. R. N. Mukherjea. *Indian J. Pure & Appl. Phys.* 8, No 3, 176–7 (1970). The dipole moment and relaxation time (τ) of *Ricinus communis* L. (castor), *Pongamia pinneta* Pierre (*karanj*) and *Cocos nucifera* L. (coconut) oils in benzene (as a nonpolar solvent) have been determined at 15 Mc/s, using Gopalakrishna's method (*Trans. Faraday Soc.* 1957, 53 767). The critical frequencies (f_c) have also been calculated for these oils (from the author's present data) as well as for *Sesamum indicum* L. (*til*), *Linum usitatissimum* L. (linseed) and *Brassica* spp. (mustard) oils (from the dielectric loss data reported earlier in literature). The values of f_c evaluated using τ values obtained from Gopalakrishna's method are more realistic. (World Surface Coatings Abs. No. 340)

MECHANISM OF HYDROGENATION OF FATTY OILS—A REVIEW. K. T. Achaya and D. S. Raju. *J. Sci. & Ind. Res.* 29, No 2, 68–75 (1970). (World Surface Coatings Abs. No. 340)

QUANTITATIVE ANALYSIS OF TRIGLYCERIDE MIXTURES BY MASS SPECTROMETRY. R. A. Hites (Northern Reg. Res. Lab., Peoria, Ill. 61604). *Anal. Chem.* 42, 1736–40 (1970). A rapid and sensitive method has been developed for determining the molecular weight distribution of triglyceride mixtures that occur naturally as fats and oils. The mass spectrum of the fat is measured by placing the sample directly into the ion source, and the consequent fractionation of the sample, caused by molecular distillation, is corrected. Triglyceride compositions have been measured for kokum and cocoa butters, olive, peanut, cottonseed, corn, soybean, sunflower, safflower and linseed oils. When observed values were compared to theoretical values, they had a high overall correlation. Several potential applications of this mass spectral technique to problems of lipid research have been tested.

AUTOMATIC DATA RECORDING OF UNSATURATION BY QUANTITATIVE HYDROGENATION. J. J. Szakasits (Houston Res. Lab., Shell Oil Co., P. O. Box 100, Deer Park, Texas 77536). *Anal. Chem.* 42, 1708–11 (1970). The measurement of titrant uptake during hydrogenation of olefinic materials using the Brown catalytic hydrogenation technique has been automated. A highly sensitive pressure transducer with linear output (0–10 volts) in the range of interest is coupled to the buret of the analytical hydrogenator. Hydrostatic pressure in the buret is converted to a corresponding electrical signal through the pressure transducer, and displayed on a chart recorder. Usefulness of this apparatus is eminent when olefinic materials possessing different hydrogenation rates are analyzed routinely. Other advantages include the capability of detecting small amounts of easy-to-hydrogenate olefinic components, a reduction in operator time, and the attainment of a permanent record. The apparatus is sturdy and easily constructed.

LOW CALORIE LIPIDS. H. L. Merten (Monsanto Co., St. Louis, Mo. 63166). *J. Agr. Food Chem.* 18, 1002–04 (1970). To effect the caloric intake significantly, the fats or fatty foods consumed should supply no more than 4 to 5 kcal of available energy per g. The importance of functional requirements and metabolic considerations, *e.g.*, heat of combustion, absorptivity, digestibility, and nontoxicity of metabolites is described. Reference is made to marketed products based on dilution of regular fats with water and/or air, and to potential fat-like products by the synthetic chemical approach. The cost involved to prove safety of new products is identified as the major hurdle.

SYNTHETIC FLAVORS FOR FATTY FOODS. J. G. Keppler (Unilever Res. Labs., Vlaardingen/Duiven, The Netherlands). *J. Agr. Food Chem.*, 18, 988–91 (1970). Flavorings for fatty foods have to be largely fat-soluble. Butter or cream flavor can be imitated by using lower fatty acids, carbonyls, alcohols, esters, lactones or aromatic compounds. Other ingredients of fatty foods may interact with added flavor components. Natural flavors of, *e.g.*, virgin oils, oil nuts and seeds, and fresh oil

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fruits have been investigated extensively. Also flavors of roasted products can be imitated, although less sophisticatedly. In several flavoring problems, local demands may play a predominant role. In the near future, combinations of new available synthetic flavors with fatty foods will yield new products.

• Biochemistry and Nutrition

FATTY ACID COMPOSITION OF ADIPOSE TISSUE IN NORMAL, ATHEROSCLEROTIC AND DIABETIC SUBJECTS. F. M. Antonini, A. Bucalossi, E. Petruzzi, R. Simoni, P. L. Morini and A. D'Alessandro (Dept. of Gerontology, Univ. of Florence, Florence, Italy). *Atherosclerosis,* 11, 265–78 (1970). The fatty acid composition of adipose tissue from normal, atherosclerotic and diabetic men and women was studied. We found a difference in the fatty acid composition between sexes. A decrease in linoleic acid and an increase in palmitic and stearic acids in adipose tissue from atherosclerotic men was shown, while there was an increase in palmitic acid in adipose tissue from atherosclerotic women. An increase in oleic acid was found in diabetic men. This alteration in the fatty acid content of adipose tissue may be related to some modification in the metabolism of this tissue due either to atherosclerosis or to diabetes which cause an alteration of lipid metabolism.

THE EFFECT OF STEROIDS AND NUCLEOTIDES ON SOLUBILIZED BILIRUBIN URIDINE DIPHOSPHATE-GLUCURONYLTRANSFERASE. B. Adlard and G. H. Lathe (Dept. of Chem. Pathol., Univ. Leeds, Leeds LS2 9NL, U.K.). *Biochem. J.* 119, 437–45 (1970). It was confirmed that bilirubin glucuronyltransferase can be obtained in solubilized form from rat liver microsomes. Michaelis-Menten kinetics were not followed by the enzyme with bilirubin as substrate when the bilirubin/albumin ratio was varied. High concentrations of bilirubin were inhibitory. The K_m for UDP-glucuronic acid at the optimum bilirubin concentration was 0.46mM. Low concentrations of Ca^{2+} were inhibitory in the absence of Mg^{2+} but stimulatory in its presence; the converse applied for EDTA. UDP-N-acetylglucosamine and UDP-glucose enhanced conjugation by untreated, but not by solubilized microsomes. The apparent 9.5-fold increase in activity after solubilization was probably due to the absence of UDP-glucuronic acid pyrophosphatase activity in the solubilized preparation. The activation of solubilized enzyme activity by ATP was considered to be a result of chelation of inhibitory metal ions. The solubilized enzyme activity was inhibited by UMP and UDP. The effect of UMP was not competitive with respect to UDP-glucuronic acid. A number of steroids inhibited the solubilized enzyme activity. The competitive effects of stilbestrol, oestrone sulphate and 3β-hydroxyandrost-5-en-17-one, with respect to UDP-glucuronic acid, may be explained on an allosteric basis.

FATTY ACID DISTRIBUTION IN TISSUES FROM HENS FED STERCULIA FOETIDA OIL. A. M. Abou-Ashous and H. M. Edwards, Jr. (Dept. of Poultry Sci., Univ. of Georgia, Athens, Georgia 30601). *Poultry Sci.* 49, 1188–96 (1970). *Sterculia foetida* oil (SFO), a rich source of cyclopropene fatty acids, was fed to Single Comb White Leghorn hens to study its influence on the fatty acid metabolism. Fatty acid distribution in lipids from various hen tissues was determined. Dietary SFO markedly altered the fatty acid distribution in egg yolk, ovary, blood, liver and heart lipids. These tissues had significantly higher ($P \leqslant 0.05$) concentrations of the saturated fatty acids and lower concentrations of the monoenoic acids. There was a significant increase ($P \leqslant 0.05$) in the content of arachidonic acid in heart lipids. Feeding SFO had little effect on the distribution of fatty acids in the lipids of pancreas, spleen, pectoral and femoral muscles and tissue lipids. Lung, kidney, thyroid and adrenal tissue lipids contained more stearic acid and less oleic acid. The effect of SFO on the fatty acid distribution in pituitary lipids did not follow a definite pattern. Pituitary lipids from hens fed SFO contained more myristic (14:0), palmitic (16.0), and palmitoleic (16:1) and less oleic (18:1) and linoleic (18:2) acids than those from hens fed the basal diet. Adipose tissue lipids contained more saturated and less monoenoic acids. Feeding studies, however, suggest that the adipose tissue has a very slow turnover rate.

EXTRUDER-PROCESSING TO IMPROVE NUTRITIONAL QUALITY, FLAVOR, AND KEEPING QUALITY OF FULL-FAT SOY FLOUR. G. C. Mustakas, W. J. Albrecht, G. N. Bookwalter, J. E. McGhee, W. F. Kwolek and E. L. Griffin, Jr. (USDA, Northern Util. R&D Div., ARS, Peoria, Ill. 61604). *Food Technol.* 24, 102–108 (1970). Extrusion-cooking, a recent process development for cooking soybeans, holds promise for converting them to a high-quality food product. The short cooking time in an extruder minimizes damage to nutritional properties but still adequately removes growth inhibitors. However, the quality of the final product depends on the process conditions used. A series of 24 extrusion-cooking experiments was carried out under various combinations of time, temperature and moisture content to determine optimum cooking conditions in the preparation of high-quality soy flour. Flour of high nutritive value, flavor and good stability was prepared by dehulling and preheating unextracted soybean meats to inactivate lipoxidase, premixing with water to add moisture, extruding, cooling, drying and grinding. Product tests showed that heat-labile nutritional factors, such as thiamine and available lysine, were maintained during processing. Inactivation of growth inhibitors was indicated by the low urease activity, low trypsin inhibitor (TI) activity and high nitrogen solubility index of the product. Protein efficiency ratios (PER) established in 4-week rat feeding tests confirmed chemical results. PER values progressively improved up to 89% inactivation of TI. A method was developed for optimizing the extruder process variables to give good nutritive value, flavor score and oxidative stability.

ACCUMULATION AND RELEASE OF TRIGLYCERIDES BY RAT LIVER FOLLOWING PARTIAL HEPATECTOMY. T. J. Delahunty and D. Rubinstein (Dept. of Biochem., McGill Univ., Montreal, Canada). *J. Lipid Res.* 11, 536–43 (1970). Regenerating liver accumulates lipid for about 20 hr following partial hepatectomy. During this time incorporation of intravenously administered palmitate-9,10-^{3}H into β-lipoprotein increased. About 13 hr after partial hepatectomy, there was no change in the level of serum β-lipoproteins, but the specific activities of the triglycerides in the liver and β-lipoproteins were significantly diminished. Extension of these studies to the isolated perfused liver system demonstrated that 13 hr after partial hepatectomy the regenerating liver is capable of secreting greater quantities of the lipid moiety, but not the protein moiety, of the β-lipoproteins in comparison with liver taken immediately from a partially hepatectomized animal, although there was no difference between the weights of the livers.

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However following addition of palmitate-^{3}H and ^{14}C-labeled amino acids to the perfusate, the specific activity of the hepatic and β-lipoprotein triglycerides of the liver excised 13 hr after partial hepatectomy was diminished, but that of the protein was not affected.

THIN-LAYER CHROMATOGRAPHY OF THE LIPIDS FROM THE SUBCELLULAR COMPONENTS OF SUNFLOWER SEEDS. V. G. Scerbakov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* **1970**(4), 16–20. The mitochondria, the plastids, and the cell nucleii at all stages of maturation, during post-harvest treatment, and during storage of the seeds, differ in their relative content of one or more essential lipids for a given composition of the cell. The relative content of the principal groups of lipids, the phospholipids, triglycerides, and free fatty acids, varies considerably as the temperature of drying is increased. During storage, the most marked variation is that of the mitochondrial lipids where the content of triglycerides decreases considerably. (Rev. Franc. Corps Gras)

CHOLESTEROL ABSORPTION WITH DIFFERENT FATS FOLLOWING THORACIC DUCT CANNULATION OF THE RAT. H. C. Klauda, and F. W. Quackenbush (Dept. of Biochem., Purdue Univ., Lafayette, Ind. 47907). *Lipids* **5**, 142–4 (1970). Radioactive cholesterol in three unsaturated fats was absorbed into the lymph to the same extent as cholesterol in three saturated fats or fats which had been stripped of sterols. Absorption on the first day following cannulation was less than half that on subsequent days.

THE INCORPORATION OF GLYCEROL INTO THE GLYCERIDE-GLYCEROL OF FAT CELLS ISOLATED FROM CHRONICALLY COLD-EXPOSED RATS. R. W. Hubbard, H. P. Voorheis, and D. G. Therriault (Biochem. & Pharmacology Lab., U.S. Army Res. Inst. of Environmental Medicine, Natick, Mass. 01760). *Lipids* **5**, 114–20 (1970). The rate of 2-^{14}C-glycerol incorporation into the glyceride-glycerol moiety was measured in isolated fat cells from control rats maintained at 25C and from animals chonically exposed to cold (5C) for six to eight weeks. The rate of glycerol conversion was less in the cold-exposed rats, than in comparable controls. Very little glycerol was oxidized to CO_2 or converted to fatty acids. In both groups of animals, the glyceride-glycerol formation was apparently stimulated by noradrenaline in the presence of glucose, but this incorporation does not significantly bias the estimation of lipolysis based upon glycerol release.

LONG-TERM RESPONSES OF RATS TO HEAT-TREATED DIETARY FATS: IV. WEIGHT GAINS, FOOD AND ENERGY EFFICIENCES, LONGEVITY AND HISTOPATHOLOGY. C. E. Poling (Swift & Co., Oak Brook, Ill. 60521), E. Eagle, E. E. Rice, A. M. A. Durand and M. Fisher. *Lipids* **5**, 128–36 (1970). Representative cottonseed salad oils, corn oils, lards and hydrogenated vegetable shortenings, and portions of the same fats heated at 182C for 120 hours were fed as 20% of nutritionally adequate diets to weanling albino rats in longevity studies. Differences in the responses of rats fed diets containing the unheated and heated fats were generally small with respect to rates of gain, 12th week and adult weights, efficiencies of utilization of absorbed energy, incidences of grossly detectable diseases and longevities. There were no indications that the feeding of the heated fats had shortened survival times in comparison with the comparable unheated fats.

CARDIOLIPIN-SPECIFIC PHOSPHOLIPASE D OF HAEMOPHILUS PARAINFLUENZAE. Y. Ono and D. C. White (Dept. Biochem., A. B. Chandler Med. Center, Univ. of Kentucky, Lexington Ky. 40506). *J. Bacteriol.* **104**, 712–18 (1970). A phospholipase specific for cardiolipin (CL) was found in the membrane of *H. parainfluenzae.* The enzyme hydrolyzed CL to phosphatidic acid (PA) and phosphatidylglycerol (PG), indicating that it was a phospholipase D. In addition to its substrate specificity, this enzyme was unusual in its requirement for Mg^{++} and its inhibition by cheating agents, heavy metals, some detergents and organic solvents. When inhibitors of phospholipase activity were added to the growth medium, CL accumulated and PG disappeared in the membrane suggesting that the phospholipase D activity was active in vivo. The high activity of the CL-specific phospholipase D suggests there might be a very active degradation of CL to PG and PA and an active resynthesis of CL from the hydrolysis products.

METABOLISM OF PHOSPHATIDYLGLYCEROL AND LYSYL-PHOSPHATIDYLGLYCEROL IN STAPHYLOCOCCUS AUREUS. R. M. Gould and W. J. Lennarz (Dept. Physiol. Chem., Johns Hopkins Univ. School of Med., Baltimore, Md. 21205). *J. Bacteriol.* **104**, 1135–44 (1970). The metabolism of phosphatidylglycerol (PG) and lysyl phosphatidylglycerol (L-PG) was studied in *Staphylococcus aureus* under four conditions: growing at pH 7.0 and 5.2, and not growing (resting) at pH 7.0 and 5.2. Measurements of the amounts of PG and L-PG, as well as labeling and pulse-chase experiments, revealed that the phosphate group of PG and the lysyl group of L-PG were in a state of active turnover. A marked decline in the cellular level of PG observed when cells were resting at pH 5.2 was found to be caused by both a decrease in synthesis and an increase in catabolism. The level of L-PG was found to be relatively constant under the four incubation conditions, although the lysyl moiety was in a state of turnover. Experiments designed to test the possible role of L-PG as a lysyl group donor in biosynthetic processes or in lysine transport were negative; no evidence to support the hypothesis that L-PG serves as an intermediate was obtained.

THE SPECIFIC ACYLATION OF GLYCEROL 3-PHOSPHATE TO MONOACYLGLYCEROL 3-PHOSPHATE IN ESCHERICHIA COLI. EVIDENCE FOR A SINGLE ENZYME CONFERRING THIS SPECIFICITY. T. K. Ray, J. E. Cronan, Jr., R. D. Mavis and P. R. Vagellos (Dept. of Biol. Chem., Washington Univ. Sch. of Med. St. Louis, Mo. 63110). *J. Biol. Chem.* **245**, 6442–48 (1970). Pronounced positional specificity during the acylation of glycerol 3-phosphate to form monoacylglycerol 3-phosphate has been shown with a particulate enzyme preparation from *Escherichia coli.* Palmitic acid is found to be esterified exclusively to position 1 while unsaturated fatty acids are predominantly esterified to position 2. Evidence for a single enzyme being involved in this specific acylation is presented. This evidence is based on studies of single site mutants of *E. coli* possessing a glycerol 3-phosphate acyltransferase of greatly increased thermolability and on chemical modification of the enzyme. Additional experiments show that the acylation of 1-acylglycerol-3-P involves an enzyme activity or activities separate from that which acylates glycerol-3-P.

DIETARY OROTIC ACID AND LIPOGENESIS IN THE RAT. G. J. Klain, F. J. Sullivan and A. W. Meikle (Physiol. Div., U.S. Army Med. Res. and Nutr. Lab., Fitzsimons Gen. Hosp., Denver, Col. 80240). *J. Nutr.* **100**, 1431–35 (1970). Compared to the controls, activities of hepatic enzymes involved in fatty acid synthesis were decreased in rats ingesting orotic acid for 6 days or longer. In contrast, activities of these enzymes were markedly enhanced in adipose tissue. Fatty acid synthesis and $^{14}CO_2$ production from glucose-U-^{14}C were depressed in liver and stimulated in white or brown adipose tissue. The data obtained in an in vivo study follow a pattern similar to those observed with in vitro preparations. The results suggest that orotic acid increases fatty acid turnover in adipose tissue.

HEPATIC FATTY ACID SYNTHESIS AND PLASMA FREE FATTY ACID LEVELS IN CHICKS SUBJECTED TO SHORT PERIODS OF FOOD RESTRICTION AND REFEEDING. Y. Yeh and G. A. Leveille (Lab. of Nutr. Biochem., Dept. of Animal Sci., Univ. of Ill., Urbana, Ill.). *J. Nutr.* **100**, 1389–97 (1970). The effects of short-term fasting and refeeding on hepatic fatty acid synthesis, on the activities of related enzymes and on plasma levels of free fatty acids were studied in the chick. The results of these experiments demonstrate that fatty acid synthesis from acetate-1-^{14}C or from glucose-U-^{14}C, measured in vitro or in vivo, decreases within 30 minutes of food withdrawal and is depressed by about 90% after 2 hours of food deprivation. Fatty acid synthesis returned to normal after 30 to 60 minutes of refeeding following a 2-hour fast. An "overshoot" in hepatic lipogenesis appeared to be induced by longer periods of refeeding. The specific activities of malic enzyme and citrate cleavage enzyme were not altered by the short periods of fasting or refeeding studied. The marked depression in hepatic lipogenesis resulting from a short period of fast was closely related to increased levels of plasma free fatty acids. The level of circulating free fatty acids increased with time of fasting and returned to normal upon refeeding. It was noted that the free fatty acid level reached a maximum before the rate of lipogenesis was minimized and started to decline after the maximal depression of lipogenesis. Possible mechanisms responsible for these rapid alterations in hepatic lipogenic capacity are discussed.

EFFECT OF OVARIAN STEROIDS ON MAINTENANCE OF PREGNANCY IN RATS FED DIETS DEVOID OF ONE ESSENTIAL AMINO ACID. Y. Niyama, K. Kishi and G. Inoue (Dept. of Nutr., Sch. of

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Med., Tokushima Univ., Tokushima, Japan). *J. Nutr.* 100, 1461–69 (1970). Pregnancy maintenance in rats fed various diets lacking one essential amino acid was examined. In groups where fetal resorption was observed, the effect of ovarian steroids on maintenance was also investigated. Fetal wastage occurred in pregnant rats by feeding diets devoid of any one essential amino acid other than lysine: the rats fed a lysine-free diet showed food intake comparable to control animals and maintained pregnancy. In valine or isoleucine deficiency, complete loss of the fetuses was observed. Daily administration of 0.5 μg of estrone and 4 mg of progesterone prevented fetal losses due to these diets. Uterine total RNA, DNA and the RNA/DNA ratio in rats in which pregnancy was maintained were higher than in those in which it was not, while the DNA concentration in the rats failing to maintain pregnancy was significantly higher than in the animals maintaining pregnancy. The hepatic RNA/DNA ratio was increased by steroid injection, while that in muscle was decreased. The placental RNA/DNA ratios in deficient rats were comparable with those in control animals. The concentrations of all essential amino acids, except lysine and threonine, in liver, muscle, plasma and placenta of all deficient rats were maintained at control levels, although the diets lacked one essential amino acid. Mechanisms involved in maintenance of pregnancy are discussed.

SUPRAMOLECULAR STRUCTURE OF THE RIGID LAYER OF THE CELL WALL OF SALMONELLA, SERRATIA, PROTEUS, AND PSEUDOMONAS FLUORESCENS. NUMBER OF LIPOPROTEIN MOLECULES IN A MEMBRANE LAYER. V. Braun, K. Rehn and H. Wolff (Max-Planck-Institut fur Biologie, 74 Tubingen, W. Ger.). *Biochemistry* 9, 5041–49 (1970). The rigid layer of *Salmonella typhimurium* LT2 and *Serratia marcescens* consists of murein to which depending upon the size of the cell between 75,000 and 240,000 lipoprotein molecules are covalently bound. After digestion of the rigid layer of *Salmonella typhimurium* with tripsin, thermolysin, papain and pronase, only lysine and arginine remained covalently bound on the murein. By analogy to *Escherichia coli* it is concluded that lysine at the N-terminal end of the lipoprotein constitutes the link between the lipoprotein molecules and the murein. On average, 1 lipoprotein molecule is bound to every tenth repeating disaccharide unit of the murein from which an average distance of about 100 A between individual lipoprotein molecules along the polysaccharide chains is deduced.

ENZYME SPECIFICITY AS A FACTOR IN REGULATION OF FATTY ACID CHAIN LENGTH IN ESCHERICHIA COLI. M. D. Greenspan, C. H. Birge, G. Powell, W. S. Hancock and P. R. Vagelos (Dept. of Biol. Chem., Washington Univ. School of Med., St. Louis, Mo. 63110). *Science* 170, 1203–04 (1970). Various acyl-acyl carrier protein intermediates in saturated and unsaturated fatty acid biosynthesis were tested as substrates for β-ketoacyl-acyl carrier protein synthetase. With both classes of substrates the condensing enzyme in fatty biosynthesis demonstrates specificities which indicate that it might be an important factor in determining fatty acid chain length in *Escherichia coli.*

BINDING OF THE PROTEIN COMPONENT OF TISSUE FACTOR TO PHOSPHOLIPIDS. F. A. Pitlick and Y. Namerson (Dept. of Internal Med., Yale Univ. School of Med., New Haven, Conn. 06510). *Biochemistry* 9, 5105–13 (1970). The coagulant activity of tissue factor, a particle-bound lipoprotein, is lipid dependent. Phosphatidylethanolamine and phosphatidylcholine restore activity to delipidated tissue factor protein if lipid and protein are combined in the presence of deoxycholate, then dialyzed. After this recombination procedure, tissue factor activity, protein and phospholipid band isopynically as a complex in a 5–30% sucrose gradient. If deoxycholate is omitted during the recombination, lipid does not bind to tissue factor nor is activity restored. The complex incorporates increasing amounts of phosphatidylethanolamine from 2.5 to at least 7.4 mg of lipid per mg of protein, although the optimal ratio for restoration of activity for these preparations is 5.0 mg of lipid per mg of protein. Phosphatidylcholine, which does not restore activity as effectively as phosphatidylethanolamine, nevertheless, is bound as well.

A POSSIBLE PHYSIOLOGICAL ROLE FOR GLYCERONEOGENESIS IN RAT ADIPOSE TISSUE. L. Reshef, R. W. Hanson (Dept. of Biochem., Temple Univ. Sch. of Med., Philadelphia, Penn. 19140) and F. J. Ballard. *J. Biol. Chem.* 245, 5979–84 (1970). Pyruvate decreased the rate of free fatty acid release from rat epididymal adipose tissue incubated in vitro by increasing free fatty acid esterification. The magnitude of the pyruvate effect, tested in tissues from fasted, adrenalectomized, or diabetic rats, closely correlated both with the rate of glyceride-glycerol labeling from radioactive pyruvate and with the activity of P-enolpyruvate carboxykinase. The addition of 25 mM pyruvate to adipose tissue from 24-hour fasted rats produced a 2-fold increase in free fatty acid esterification. At a lower concentration (0.25 mM) pyruvate had no effect on free fatty acid esterification but butyrate added in equimolar concentrations caused a 50% increase in esterification of free fatty acids in tissue from fasted animals. These findings support the role of P-enolpyruvate carboxykinase as a regulatory enzyme in the glyceroneogenic sequence and suggest that glyceroneogenesis is important in adipose tissue for the maintenance of free fatty acid esterification. The role of the adrenals and of insulin in regulating the activity of rat adipose tissue P-enolpyruvate carboxykinase is also presented. Diabetes increased the activity of this enzyme in adipose tissue and liver but adrenalectomy superimposed upon diabetes caused a further increase in adipose tissue P-enolpyruvate carboxykinase activity and a reduction in the activity of the hepatic enzyme. Both insulin and triamcinolone reduced the activity of adipose tissue P-enolpyruvate carboxykinase in adipose tissue from diabetic-adrenalectomized rats but only when the two hormones were administered simultaneously was the level of the enzyme reduced to normal.

CITRATE AND THE CONVERSION OF CARBOHYDRATE INTO FAT. FATTY ACID SYNTHESIS BY A COMBINATION OF CYTOPLASM AND MITOCHONDRIA. J. A. Watson and J. M. Lowenstein (Grad. Dept. of Biochem., Brandeis Univ., Waltham, Mass. 02154). *J. Biol. Chem.* 245, 5993–6002 (1970). A cell-free system, consisting of particle-free cytoplasm and mitochondria prepared from rat liver, has been used to study the transfer of acetyl groups from the intramitochondrial to the extramitochondrial space during fatty acid synthesis. ^{14}C-Pyruvate, generated from ^{14}C-alanine, was used to generate intramitochondrial ^{14}C-acetyl-CoA. Fatty acid synthesis was followed by measuring the incorporation of $^{3}H_2O$ and ^{14}C. Pool dilution

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experiments showed that the acetyl group of intramitochondrial acetyl-CoA leaves the mitochondria in the form of citrate, or of a closely related tricarboxylate. (−)-Hydroxycitrate, an inhibitor of citrate cleavage enzyme, strongly inhibits fatty acid synthesis from ^{14}C-alanine. On the other hand, (−)-hydroxycitrate has little or no effect on respiration, phosphorylation and citrate accumulation during the course of the experiments. n-Butylmalonate, an inhibitor of malate permease, also inhibits fatty acid synthesis. This inhibition is reversed by malate. n-Butylmalonate probably exerts its effect by preventing the activation of α-ketoglutarate and tricarboxylate permeases by malate. It is concluded that citrate is the major carrier in the transfer of acetyl groups from the mitochondrial matrix to the cytoplasm.

THE COMPOSITION OF TRIGLYCERIDES FROM LIVER, EGG YOLK AND ADIPOSE TISSUE OF THE LAYING HEN. D. R. Husbands (Unilever Res. Lab., Colworth House, Sharnbrook, Beds., U.K.). *Biochem. J.* 120, 365–71 (1970). The composition of the triglycerides of liver, egg yolk and adipose tissue of laying hens fed on a standard diet were investigated by using argentation thin-layer chromatography to separate the triglycerides according to their degree of unsaturation. About 40% of liver triglycerides consisted of one saturated and two monoenoic fatty acids. Triglycerides containing linoleate were more abundant in adipose tissue than in either yolk or liver. Hydrolysis by pancreatic lipase of the tissue triglycerides and fractions obtained from these triglycerides showed that the triglycerides of adipose tissue had a less ordered arrangement of fatty acids at the 2-position than did either yolk or liver triglycerides. The labelling patterns of triglycerides formed in liver slices incubated in the presence of glycerol-1-^{14}C indicated that triglycerides containing four or more double bonds are formed to a greater extent than are other triglyceride fractions. This is evidence for the concept that the type of triglyceride formed depends on the availability of fatty acids to the liver cells.

EFFECT OF STREPTOMYCIN ON LIPID COMPOSITION WITH PARTICULAR REFERENCE TO CYCLIC DEPSIPEPTIDE BIOSYNTHESIS IN SERRATIA MARCESCENS AND OTHER MICRO-ORGANISMS. M. A. C. Bermingham, B. S. Deol and J. L. Still (Dept. of Biochem., Univ. of Sydney, Sydney, N.S.W. 2006, Australia). *Biochem. J.* 119, 861–69 (1970). The addition of low concentrations of streptomycin (5–10 μg/ml of medium) to *Serratia marcescens* caused significant alterations in the lipid composition of this organism, but neither growth nor pigmentation was affected. The acetone soluble cyclic depsipeptides, which comprise an average 15% of the total lipid, were decreased almost to zero and the total lipid phosphorus was more than doubled in the presence of streptomycin. Most of the phospholipid increase was due to an increase in phosphatidylethanolamine. Cyclic depsipeptides were not leached from the cell in the presence of streptomycin, indicating a definite inhibition of the biosynthetic pathway. The effect of streptomycin on the reported peptidolipids of *Rhodopseudomonas spheroides, Halobacterium halobium, Nocardia asteroides* and *Pseudomonas tabaci* was investigated. In the case of the only strictly comparable cellular cyclic depsipeptide (that of *N. asteroides*) the biosynthesis was strongly inhibited by streptomycin, but cell weight was maintained or even slightly increased. A possible mode and site of action of low concentrations of streptomycin on bacterial lipids is discussed.

FACTORS AFFECTING SOUND VELOCITY (TRIGGERING FREQUENCY) IN FATS AND OILS. G. O. Hustad, T. Richardson, W. C. Winder and M. P. Dean (Dept. of Food Sci., Univ. of Wis., Madison, Wisc. 53706). *J. Dairy Sci.* 53, 1525–31 (1970). Triggering frequency (cps), an indirect and highly accurate indicator of sound velocity, was measured at 65C in animal and vegetable oils. Each measurement was made after about 5 minutes of temperature equilibration with an instrument known as the Solution Analyzer, manufactured by Chesapeake Instrument Corporation, Shadyside, Maryland. Oils containing more unsaturated fatty acids, as determined by iodine values, revealed higher frequencies. Lipids containing large percentages of longer-chained fatty acids also revealed higher frequencies. Butter oil, being highly saturated and containing large quantities of short chain fatty acids, revealed a frequency that was approximately 262 to 363 cps less than those of corn, soybean, cottonseed, peanut, safflower or olive oils. Frequencies from partly saturated margarine and shortening oils were slightly less than those in the vegetable oils, but at least 189 cps above butter oil. Coconut oil was the only oil that revealed a value lower than butter oil. The effect on the frequency of several added or naturally occurring constituents in fats and oils was also determined. In addition the greatest possible frequency range (53 cps) for 126 butter oil samples from selected sections of Wisconsin over 13 months was determined. A linear relationship existed between ratios of individual animal or vegetable oils to butter oil and the corresponding frequency at 65C. This relationship may be useful in detecting adulteration of butter oil with other fats and oils, and in analyzing products containing mixtures of butter oil and other oils.

EFFECTS OF DIETARY PROTEIN ON BLOOD LIPIDS OF THE CALF WITH SPECIAL REFERENCE TO CHOLESTEROL. G. D. Coccodrilli, Jr., P. T. Chandler and C. E. Polan (Dept. of Dairy Sci., Virginia Polytechnic Inst., Blacksburg, Va. 24061). *J. Dairy Sci.* 53, 1627–31 (1970). Two rations containing 9 and 25% of crude protein were used to determine the effects of protein on blood lipid constituents of growing calves. Blood lipids from calves consuming the high-protein ration (240 mg/100 ml) were lower than those of the low protein fed calves (306 mg/100 ml) at 22 weeks of age ($P < 0.05$). Calves consuming low protein had more DL-mevalonic acid-2-(^{3}H)-lactone incorporated into blood lipids and cholesterol. Urinary excretion rate of ^{3}H labeled compounds was greatest during the first 10 hours post dosing, and cumulative excretion was 29.6 and 17.7% of administered dose for low and high protein. Calves on high-protein consumed more feed and gained faster than low-protein calves ($P < 0.05$).

EFFECT OF AMINO ACID DIETS UPON SERUM LIPIDS IN MAN. R. E. Olson, M. Z. Nichaman, J. Nittka and J. A. Eagles (Dept. of Biochem. and Nutr. Grad. Sch. of Public Health, Dept. of Med., Sch. of Med., Presbyterian-Univ. Hosp., Univ. of Pittsburgh, Pittsburgh, Penn.). *Am. J. Clin. Nutr.* 23, 1614–25 (1970). Formula diets containing the eight essential amino acids required by man in adequate amounts plus glutamate as a source of nonessential nitrogen to provide a nitrogen intake total of 16.0 g caused a marked fall in serum cholesterol and phospholipids and an indifferent effect upon serum triglycerides in human subjects. The β-lipoprotein fraction most affected is the LDL $S_{f\,0\text{-}12}$ family. The hypolipidemic effects of glutamate and of polyunsaturated fatty acids in the diet were not additive. It is possible that these two dissimilar agents affect a final common pathway in the metabolism or distribution of serum lipids.

CHANGES IN PLASMA FREE AMINO ACID CONCENTRATIONS IN HUMAN SUBJECTS ON HYPOCHOLESTEREMIC DIETS. J. D. Garlich, G. Bazzano and R. E. Olson (Dept. Biochem., St. Louis Univ. Sch. Med., St. Louis, Mo.). *Am. J. Clin. Nutr.* 23, 1626–38 (1970). The effects of several isofatty hypocholesteremic diets, differing in amino acid composition from control diets were explored in four studies on three human subjects. The results indicate that both the low protein and the amino acid-formula diets alter the plasma free amino acid concentration. Both diets produce an increase in the ratio of nonessential to essential amino acids in the plasma. However, this change alone does not explain the hypocholesteremic action of these diets. The plasma aminograms suggest that none of the LDL and cholesterol-lowering diets exert their effects by altering the availability of amino acids to the liver for apopeptide biosynthesis.

STIMULATION OF YIELD IN THE CULTIVATED MUSHROOM BY VEGETABLE OILS. EFFECTS OF STEROLS AND ETHYL LINOLEATE. L. C. Schisler and T. G. Patton, Jr. (Dept. of Plant Pathol., The Penn. State Univ., University Park, Pa. 16802). *J. Agr. Food Chem.* 18, 1102–03 (1970). Supplementation of mushroom compost at casing with sterols and a sterol precursor failed to increase mushroom yield. Ethyl linoleate additions stimulated mushroom yield. Ethyl linoleate and safflower oil additions with equivalent linoleic acid concentration resulted in similarly increased yields. This fatty acid can be responsible for the stimulation of yield in *Agaricus bisporus* caused by vegetable oils.

MASS SPECTROMETRY OF PERDEUTERATED MOLECULES OF BIOLOGICAL ORIGIN. FATTY ACID ESTERS FROM SCENEDESMUS OBLIQUUS. G. Wendt and J. A. McCloskey (Inst. for Lipid Res., Dept. of Biochem., Baylor Col. of Med., Houston, Tex. 77025). *Biochemistry* 9, 4854–66 (1970). To define the role of mass spectrometry for dealing with structural problems of highly deuterated natural products, the gas chromatographic and mass spectral properties of perdeuterated fatty acid esters

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Enzymes and Their Use in Analysis and Clinical Diagnosis

A Massachusetts Institute of Technology Summer School Program has been scheduled for July 12 through July 16, 1971.

The objective of the program is to prepare the participants for the use of enzymes as analytical reagents and for the measurement of enzyme activities in biological materials. A comprehensive theoretical background will be presented covering enzyme synthesis and its regulation, enzyme purification, kinetics of enzyme catalyzed reactions, distribution of enzymes and isoenzymes in tissues. The methodology for enzyme assays will be considered in detail and illustrated by various demonstrations in the laboratory.

For further information, please write to: Director of the Summer Session, Room E19-356, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

Food Protein Council Formed

A Food Protein Council has been formed by the nation's soy protein processors. The Council will headquarter in Washington, D.C., and operate as an autonomous organization within the by-laws of the National Soybean Processors Association.

Goal of the Food Protein Council will be to centralize promotion of edible vegetable protein for use in human food products. Council members will conduct special programs of information and marketing, as well as represent the vegetable protein industry to government, the food trade and consumers.

Members of the Council include processors and manufacturers of soy protein, food manufacturers and allied trade associations. The Council operates under specific policy guidelines, established at its initial Board Meeting.

W. E. Mann, Vice-President of the Chemurgy Division, Central Soya Company, Inc., was elected Council Chairman. He will be served by a three-man Executive Committee, with authority to represent members on official Council matters.

• *Detergent Short Course . . .*

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new nature of this phase of the business, it is expected that a paper will be added to discuss the impact of some of the new builders which are becoming available to replace Phosphates and NTA.

Session V: Safety and the Environment

Several topics of general importance to the soap and detergent industry will be the subject of this session to be chaired by Eric Jungermann, Armour-Dial, Inc. The impact of new government regulations and the great concern by consumers in the environment and associated ecological problems will be discussed. The session will be led off by Joe Calandra, President of Bio-Test, who will discuss consumer protection, safety testing and FDA regulations. Dr. Kuntzel, Wyandotte, of "We hung Phosphates without a Fair Trial" fame, will talk on Phosphates, their relation to the environment. Additional speakers discussing the safety of the new phosphate-free detergents are expected.

Detailed Program in April Issue

A full program for the Short Course will be announced in the April issue of JAOCS and registration forms will be mailed to members. For further information, address your inquiries to Mr. Carl Hauber, AOCS, 35 East Wacker Drive, Chicago, Illinois 60601.

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from *Scenedesmus obliquus* which had been grown in D_2O have been studied. Of the 20 esters which were characterized, deuterium distribution was essentially random, and ranged from 96.9 to 98.6% of maximum possible incorporation. Structures of unsaturated esters were determined after conversion into trimethylsilyloxy or 0-isopropylidene derivatives. Principal modification required for conventional computer programs used for high-resolution mass spectrometry was partial deletion of the high fractional mass test for doubly charged ions, due to the high positive mass defect of ions containing large numbers of deuterium atoms.

SPECIFICITIES OF ALKALINE AND ACID PHOSPHATASES IN THE DEPHOSPHORYLATION OF PHOSPHOLIPIDS. M. L. Blank and F. Snyder (Med. Div., Oak Ridge Associated Univ., Oak Ridge, Tenn. 37830). *Biochemistry* 9, 5034–36 (1970). The data in this paper describe the specificities of alkaline (EC 3.1.3.1) and acid (EC 3.1.3.2) phosphatases for lipid substrates with free phosphate moieties, i.e., 1-acylglycerol-3-phosphate, diacylglycerol-3-phosphate, 1-0-alkylglycerol-3-phosphate, 1-0-alkyl-2-acylglycerol-3-phosphate and 1-0-alkyldihydroxyacetone-phosphate. Bacterial alkaline phosphatase removed the phosphate moiety from the acyl to 0-alkyl substrates that do not contain aliphatic moieties in the 2 position. In contrast, the acid phosphatase from wheat germ showed no specificity in the removal of free phosphate groups from the lipid substrates. Substrates containing ether bonds reacted to a lesser extent than the corresponding analogs containing ester bonds. We have shown that alkaline phosphatase is an effective analytical tool in the lipid field.

25,26-DIHYDROXYCHOLECALCIFEROL, A METABOLITE OF VITAMIN D_3 WITH INTESTINAL CALCIUM TRANSPORT ACTIVITY. T. Suda, J. F. DeLuca, H. K. Schnoes, Y. Tanaka and M. F. Holick (Dept. of Biochem., Univ. of Wisconsin, Madison, Wis. 53706). *Biochemistry* 9, 4776–80 (1970). A metabolite of vitamin D_3 (40 μg) has been isolated in pure form from the plasma of eight pigs given 250,000 IU of vitamin D_3/day for 28 days. It has been unequivocally identified as 25,26-dihydroxycholecalciferol by means of mass spectrometry and ultraviolet absorption spectra. This metabolite has some activity in intestinal calcium transport, but is virtually inactive in the cure of rickets and in the mobilization of bone mineral in rats.

FURTHER STUDIES ON THE FATTY ACID SPECIFICITY OF RAT LIVER STEROL-ESTER HYDROLASE. H. J. Goller and D. S. Sgoutas (Dept. of Pathol., Sch. of Med., Emory Univ., Atlanta, Ga. 30322). *Biochemistry* 9, 4801–06 (1970). The specificity of rat liver cholesterol ester hydrolase activity (EC 3.1.1.13) was further investigated. Cholesterol esters of unsaturated fatty acids differing in the proximal or terminal position of the double bond were synthesized and their rate of hydrolysis indicated that a proximal portion of 9 carbon atoms for the fatty acid constituent is a requirement for an optimal hydrolysis of the corresponding cholesterol ester. In addition, the enzymatic activity was shown to depend upon the chain length of the fatty acid moiety. When a series of saturated fatty acid cholesterol esters were studied, the activity increased from hexanoic to decanoic and then decreased gradually through the eicosanoic acid cholesterol ester. These observations are discussed in terms of a close matching of specially shaped acyl chains to a specially shaped complementary surface in the enzyme active site.

FATE OF PHOSPHOLIPIDS IN LIPOSOMAL MODEL MEMBRANES DAMAGED BY ANTIBODY AND COMPLEMENT. K. Inoue and S. C. Kinsky (Dept. of Pharm., Washington Univ. Sch. of Med., St. Louis, Mo. 63110). *Biochemistry* 9, 4767–76 (1970). Liposomes, containing either Forssman antigen or globoside I, have been prepared with radioactive sphingomyelin-^{32}P and lecithin-^{32}P isolated from rat liver. These liposomes release 50 to 80% of their trapped glucose marker when incubated with the appropriate antiserum and a source of complement. Analysis of the reaction mixtures did not reveal the appearance of any phospholipid degradation product from liposomes which had undergone "immune damage," and approximately 98% of the total radioactivity recovered from thin-layer plates was in the form in which it had been originally incorporated into the liposomal membrane (i.e., as either lecithin or sphingomyelin). The methods employed would have detected a 1% degradation of phospholipid if the radioactive products had behaved chromatographically similar to phosphatidic acid, phosphorylcholine, lysolecithin, glycerylphos-

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phorylcholine or sphingosylphosphorylcholine. In control experiments, lecithin liposomes were incubated with phospholipase C. Approximately 40–50% of the lipids was degraded when 50% of the trapped marker had been released indicating that measurable amounts of radioactive product (phosphorylcholine) should have been formed if activation of the terminal complement components had led to the generation of an enzymatic activity with properties analogous to exogenous phospholipase C. Subject to the limitations characteristic of all "negative" experiments, the available data are consistent with the hypothesis that complement-dependent membrane damage may not occur by the enzymatic rupture of covalent bonds in phospholipids.

ACETYL COENZYME A CARBOXYLASE. THE EFFECTS OF BIOTIN DEFICIENCY ON ENZYME IN RAT LIVER AND ADIPOSE TISSUE. R. Jacobs, E. Kilburn, and P. W. Majerus (Dept. of Internal Med. and Biochem., Washington Univ. Sch. of Med., St. Louis, Mo. 63110). *J. Biol. Chem.* 245, 6462–67 (1970). Feeding a low fat, biotin-deficient diet to young rats for 1 to 2 weeks leads to a decrease in acetyl coenzyme A carboxylase levels in epididymal adipose tissue with accumulation of the apoenzyme. These changes occur prior to changes in hepatic propionyl coenzyme A carboxylase levels. Acetyl coenzyme A carboxylase levels in liver decrease minimally with biotin deficiency, and little apoenzyme accumulates. The presence of apoenzyme in adipose tissue of deficient rats was initially suggested by the rapid rise in acetyl coenzyme A carboxylase activity which occurred within minutes of biotin injection. Further evidence for the presence of apoenzyme in deficient adipose tissue came from equivalence point determinations with the use of an antibody against acetyl coenzyme A carboxylase. These experiments indicated that adipose tissue from deficient rats contains immunologically reactive but catalytically inactive protein which is presumably acetyl coenzyme A apocarboxylase. Biotin-deficient and control rats were injected with ^{3}H-biotin, and subsequently acetyl coenzyme A carboxylase was isolated from liver and adipose tissue by immunological precipitation. There was increased ^{3}H-biotin incorporation into deficient adipose tissue enzyme compared with control adipose tissue enzyme but only minimally increased incorporation into liver enzyme, again demonstrating the marked difference in the metabolism of the enzyme in these tissues. The conversion of acetyl coenzyme A apocarboxylase to holoenzyme was demonstrated in vitro with the use of a 105,000 × g supernatant fraction from adipose tissue of deficient animals.

STUDIES ON THE ENZYMATIC CONVERSION OF 5α-CHOLESTA-8,14-DIEN-3β-OL TO CHOLESTEROL. B. N. Lutsky and G. J. Schroepfer, Jr. (Div. of Biochem., Dept. of Chem. and Chem. Eng., Univ. of Ill., Urbana, Ill. 61801). *J. Biol. Chem.* 245, 6449–55 (1970). Cholesta-8,14-dien-3β-ol-3α-^{3}H has been prepared by chemical synthesis and incubated with rat liver homogenate preparations. Under aerobic conditions, the incorporation of label into cholesterol and cholest-7-en-3β-ol was shown. Under anaerobic conditions, labeled cholest-8-en-3β-ol, cholest-8(14)-en-3β-ol, and cholest-7-en-3β-ol were formed.

LIVER STORES OF α-TOCOPHEROL IN A NORMAL POPULATION DYING SUDDENLY AND RAPIDLY FROM UNNATURAL CAUSES IN NEW YORK CITY. B. A. Underwood, H. Siegel, M. Dolinski and R. C. Weisell (Inst. of Human Nutr., Sch. of Public Health and Admin. Med., Columbia Univ., New York, N.Y. 10032). *Am. J. Clin. Nutr.* 23, 1314–21 (1970). Concentrations of α-tocopherol, vitamin A and total lipids were determined in the livers from 102 victims of sudden or rapid deaths from unnatural causes in New York City. Serum concentrations of vitamins E and A were determined from 50 of these same subjects. The complete data for vitamin A levels in serum and liver are reported elsewhere and correlations with α-tocopherol only are considered in this report. A correlation between blood concentrations and liver stores of tocopherol per gram of tissue was found. The ratio of liver to serum tocopherol was constant over the range of 4–12 μl/ml serum. No correlation was found between the serum or the liver concentrations of vitamins A and E.

LIPID ABSORPTION AND LIPID-REESTERIFYING ENZYME ACTIVITY IN SMALL BOWEL OF THE PROTEIN-DEFICIENT RAT. J. B. Rodgers, Jr. (Dept. of Med., Albany Med. Col. Albany, N.Y. 12208). *Am. J. Clin. Nutr.* 23, 1331–38 (1970). Rats were made protein deficient by offering a protein-free diet for 4 weeks. The specific and total activities of fatty acid-CoA ligase and acyl-CoA-monoglyceride acyltransferase were determined on microsomal fractions of jejunal mucosa in fasting experimental and control animals. The activity of acyl-CoA-monoglyceride acyltransferase was also measured in non-fasting rats. In vivo studies of lipid absorption using both radioactive triglyceride and free fatty acid were also performed. Results of the in vivo studies from protein-deficient rats were compared with two sets of controls, one of the same age and one of the same size. Specific activities of the enzymes were similar in experimental and control animals both in the fasting and nonfasting state. Total activities of these enzymes were significantly lower in experimental animals, but these differences were no longer apparent when total activities were expressed per gram wet weight of mucosa. In vivo studies of lipid absorption showed no gross evidence of malabsorption of either triglyceride or free fatty acid in protein-deficient rats.

• Drying Oils and Paints

PERFORMANCE OF VARIOUS PRIMER PAINTS EXPOSED AT MANDAPAN CAMP. S. Guruviah and K. S. Rajagopalan (Central Electrochemical Res. Inst., Karaikudi). *Paintindia* 20(8), 23–30 (1970). Corrosion inhibition tests on various primers and vehicles are described. Primers included zinc chromate, red oxide, zinc oxide and barium potassium chromate, alone and in combinations. Vehicles tested were long oil linseed penta alkyd, linseed stand oil, rosin modified long oil alkyd, modified phenolic stand oil, double boiled linseed oil, linseed alkyd, phenolic hardener, and cashew nut shell liquid, alone and mixed. Of all the combinations tested, zinc chromate in epoxy ester performed the best.

POLYURETHANES FROM KAMALA SEED OIL AND ITS DERIVATIVES. J. Misra, M. A. Sivasamban, and J. S. Aggarwal (Regional Research Lab., Hyderabad-9). *Paintindia* 20(9), 27–30 (1970). The film properties of kamala seed oil, its derivatives, and dehydrated castor oil improved considerably on modification with toluene diisocyanate. Marked improvement in film properties also occurred when the alkyds derived from the same oils were modified with toluene diisocyanate. Outdoor exposure of the primers formulated from these polyurethanes did not result in chalking, checking, or corrosion for up to one year.

A NOTE ON SCRUB RESISTANCE OF WATER BASED PAINTS. S. M. Singh (Central Building Research Inst., Roorkee). *Paintindia* 20(8), 31, 34 (1970). The scrub resistance of a few proprietary brands of washable distempers and synthetic emulsion paints was evaluated. The distempers had a solid binder ratio varying between 7:1 and 8:1 and the emulsion paints between 3:1 and 5:1.

BY-PRODUCTS OF THE SULPHATE PULP INDUSTRY AS RAW MATERIALS FOR THE PAINT INDUSTRY. L.-H. Norlin. *Färg och Lack* 16, No. 4, 67–76 (1970). The two principal commercial by-products of the sulphate pulp industry are crude tall oil and crude sulphate turpentine. Of special interest for the paint and varnish industry is the content of fatty and rosin acids in the tall oil for making alkyds and hard resins. Besides the paper industry—which uses tall oil rosin in paper size—the paint and lacquer industry is the main consumer of the refined products. Highly refined tall oil fatty acids are available. The fatty acids of Scandinavian origin differ from those of the U.S.A. in that they contain less oleic acid and more linoleic acid and 5,9,12-octadecatrienoic acid, a non-yellowing isomer of linolenic acid. The properties of alkyds prepared from Scandinavian type tall oil fatty acids are similar to those of soyabean or safflower oils. The liberty to choose polyols of different types should, however, be an advantage. (World Surface Coatings Abs. No. 340)

PREPARATION OF ESTERS OF ADDUCTS OF α-ELAEOSTEARIC ACID AND MALEIC ANHYDRIDE WITH POLYETHYLENE GLYCOLS. R. A. Macchi. *Rev. Arg. S. Grasas y Aceites 1969*, 11, No. 1, 1–16 (1969). The esters, which are potentially useful as emulsifying agents, have been prepared and characterized. (World Surface Coatings Abs. No. 340)

ALKYD RESINS WITH KAMALA SEED OIL AND KAMLOLENIC ACID. J. P. Misra, S. P. Gulati, M. A. Siva Samban and J. S. Aggarwal. *Paintindia* 20, No. 3, 21–2 32 (1970). Alkyd resins of 60% oil length from kamala seed oil, butylated kamala seed oil, mixed fatty acids of kamala seed oil and kamlolenic acid (of different grades of purity) have been prepared and compared with alkyds from tung oil. The use of linseed oil in mixture with these oils in various proportions has been

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found to be useful in avoiding gelation during alkyd preparation. The films of alkyd resins obtained had a scratch hardness of 400–500 g. and satisfactory resistance to water, dilute Na_2CO_3 and H_2SO_4 solns. Their resistance to 2% NaOH soln. was, however, poor. (World Surface Coatings Abs. No. 340)

INDIAN TUNG CHARACTERISTICS AND PROCESSING. T. Lakshminarayana, R. Yousuf Ali Khan, R. K. Viswanadham and S. D. Thirumala. *Tropical Sci.* (1969). 11, No. 4, 319–23 (1969). The processing of tung fruit was studied. The average kernel, hull (outer and inner) and shell contents of the tung fruit are found to be 31, 47 and 22% respectively. Tung kernels contain about 67% oil. Crushing of tung kernels, containing 15–20% of hulls, gives an oil yield of about 17% on the weight of fruit. Storage of fruit had a decisive effect on oil yield but, up to 100 days, there was no adverse effect. After 160 days, the oil yield dropped to 12.4% and after 250 days to 4.8%. Storage studies show that the fruit cannot be stored beyond 100 days and the cake for more than one month without appreciably reducing their oil contents. Tung cake also has a tendency towards spontaneous combustion under certain conditions. As storage progresses, white kernels begin to turn brown. While the characteristics of tung oils are normal, the iodine values of oils obtained by crushing kernels of stored tung oils are normal, the iodine values of oils obtained by crushing kernels of stored tung fruit are considerably lower. (World Surface Coatings Abs. No. 340)

• Detergents

CLEANSER BARS. L. B. Withers. *U.S. 3,532,633.* A stack of breakaway soap bars includes a start bar and a number of cupped bars. The bars fit together in nesting relationship and are joined around adjacent edges so as to permit their easy separation. The start bar can be used until it is partly worn away, then melded with one of the cupped bars to form a composite bar of approximately the same size as the start bar, and the procedure repeated until the cupped bars are exhausted.

ANTI-CAKING COMPOSITION FOR LINEAR ALKYL ARYL SULFONATE DETERGENTS. S. Y. Yuan (Chevron Res. Co.). *U.S. 3,533,944.* A process for producing an alkali sulfosuccinate solution useful in providing anti-caking properties to detergents consists in reacting an approximately stoichiometric amount of sulfur dioxide with a concentrated solution of a disodium or dipotassium maleate while maintaining the pH of the solution within limits of 4 to 11 and heating the solution between 150F and 250F for a time sufficient to essentially complete the reaction.

DETERGENT COMPOSITION. T. D. Davies (Lever Bros. Co.). *U.S. 3,533,954.* A washing powder containing a 3:1 to 1:3, by wt., mixture of soap and non-soap detergent is obtained with surprisingly good and stable lather if the non-soap detergent is a water soluble C_{10}-C_{20} substantially straight chain aliphatic alpha sulfonate and if there is included in the composition from 1.5% to 6% of an unsubstituted amide of a C_{10}-C_{16} straight chain aliphatic acid.

TWO PHASE LIQUID DETERGENT COMPOSITION. M. Pader and D. J. Martin (Lever Bros. Co.). *U.S. 3,533,955.* High foaming, two-phase liquid detergent compositions are described, such as composite shampoo/hair conditioning compositions and composite bubble bath/bath oil compositions, having an upper oily layer made up of a water-immiscible oily material and having a lower aqueous layer made up of an organic detergent system, an emulsion destabilizer and water, which compositions form temporary oil-in-water emulsions when shaken.

FAT PROCESSING IN THE INDUSTRY. M. Rigot. *Rev. Franc. Corps Gras* 17, 521–8 (1970). After reviewing market development and recent new products, including deodorant and superfatted bars, the authors discusses the choice of oils, handling and storage conditions, autoxidation phenomena and raw material specifications. The processing steps covered include bleaching and filtration with emphasis on quality retention and yield.

RESPONSE OF THE FRENCH ANIMAL FAT INDUSTRY TO THE NEEDS OF THE TOILET SOAP INDUSTRY. A. Moulin (Soc. of Animal Fat Ind.). *Rev. Franc. Corps Gras* 17, 517–20 (1970). The use of tallow by the soap industry is decreasing, but significant quantities of higher grade product are still required. Processing modifications have been necessary in order to satisfy this demand. Changed slaughterhouse procedures have improved and automated the collection and rendering steps.

MECHANICAL, CHEMICAL AND BACTERIOLOGICAL DEFECTS IN TOILET SOAPS. A. Prevot (Labs. of the Inst. des Corps Gras, Paris). *Rev. Franc. Corps Gras* 17, 601–17 (1970). The following defects are covered, both as to causes and also to remedies: cracking, blistering, sweating, which occurs with glycerine soaps, dried out areas, blooming and autoxidation. Chemical defects include poor quality raw materials, excess free alkali, and excess sodium chloride. Generally, microbial growth is not a problem with soap but molds can grow on soap stored under conditions of high humidity. Careful handling and use of antiseptics can overcome the problem.

STRUCTURE OF SOAPS. M. Naudet (ITERG, Marseille). *Rev. Franc. Corps Gras* 17, 591–9 (1970). The properties of soaps are reviewed and certain defects noted which occur during storage and during use in terms of the crystal structure. Principal investigations dealing with the structure of soap, especially the curd form, neat and cogel structures are reviewed.

FATTY ACIDS AS RAW MATERIALS FOR SOAP MAKING: FACTORS DETERMINING THEIR SELECTION. H. Debrus (Ste. Henkel, Dusseldorf). *Rev. Franc. Corps Gras* 17, 587–90 (1970). The author prefers distilled fatty acids over those obtained by saponification for use in soap. By distillation, acids from poor quality sources can be upgraded and used for good quality toilet soap. In addition, low boiling, odorous fractions are easily removed, especially in the case of tallow, cocoanut oil and palm oil. Finally, the quality of the glycerine is higher since there are no sodium salts present.

RAPESEED OIL AND ITS BY-PRODUCTS AS RAW MATERIALS FOR THE PRODUCTION OF DETERGENTS. D. Nowak *et al.* (Inst. of Heavy Organic Synthesis, Blachownia Slaska) *Przemysl Chem.* 49(6), 335–7 (1970). Research into the reduction of unsaturated fatty acids to unsaturated alcohols has led to the possibility of using the acids from rapeseed soapstock, without fractionation, for the production of alkylsulfates. Selective reduction of the acids gives a 98% yield while preserving 90% of the double bonds. The alcohols obtained are a clear yellow liquid with a solidification point of about 5C. Gaseous sulfuric anhydride is used for the sulfation. The alkylsulfates can be used in liquid, paste, or powdered detergents. (Rev. Franc. Corps Gras)