ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, Kazuo Fukuzumi, J. Iavicoli, K. Kitsuta, F. A. Kummerow, C. C. Litchfield, Gladys Macy, Louise R. Morrow, E. G. Perkins, and T. H. Smouse

• Fats and Oils

Volatile acids from menhaden oil. J. R. Chipault and Evelyn McMeans (The Hormel Institute, University of Minnesota, Austin, Minn.) *J. Agr. Food Chem.* **13**, 15–17 (1965). The acidic constituents of a highly volatile fraction collected during molecular distillation of menhaden oil have been examined by paper chromatography. Tentatively identified were formic (or acetic), acrylic, propionic, crotonic, butyric, and valeric acids, and an unknown compound with a polarity greater than formic acid but less than pyruvic or lactic acids.

Determination of free urea in ethyl stearate adduct by x-ray diffraction. D. Lutz, J. Hunter and C. Eddy (Eastern Utilization Res. Dev. Div., U.S.D.A., 600 E. Mermaid Lane, Phila., Pa.). *Anal. Chem.* **37**, 274–75 (1965). A method for the direct determination of free urea in urea adducts of ethyl stearate by x-ray diffraction was developed. Known amounts of the urea and urea-free ethyl stearate adducts were mixed as dry powders and pressed into disks. These disks were reground and repressed until random orientation was obtained. The ratio of the height of the 4.0 Å. peak of free-urea to that of the 4.1 Å. peak of the adduct was calculated by statistical methods for each mixture in the series. A graph of these ratios plotted against the per cent free urea was used as a standard curve for the determination of free urea in unknowns. Ethyl stearate was chosen only as a representative guest molecule for this study. In principle, this method should be applicable to any type of inclusion compound when host and adduct are crystalline solids.

Synthesis of amino acid-esters of phosphatidylglycerols. E. Baer and K. V. Jagannadha Rao (Banting and Best Depart. of Med. Res., Univ. Toronto, Toronto, Canada). *J. Am. Chem. Soc.* **87**, 135 (1965). An alanine ester of α-(L-α-phosphatidyl) glycerol was synthesized. In it the amino acid is attached to the terminal hydroxyl of the fatty acid free glycerol moiety.

A re-examination of the polymerization of sterculic acid. II. Ozonolysis of the sterculic acid polymer. H. W. Kircher (Depart. of Agricultural Biochem., The Univ. of Arizona, Tucson, Arizona). *J. Organic Chem.* **29**, 3658–60 (1964). The sterculic acid polymer was ozonized to yield formaldehyde, 2-decanone, 2- keto-1-decanol, azelaic acid, 9-ketodecanoic acid, nonanoic acid, and a mixture of 9-keto-10-hydroxy- and 9-hydroxy-10-ketostearic acids. These products are in accord with the two allyl ester structures in the polymer as well as the enol ester structure.

Some crystal structures of long-chain glycerides. K. Larsson. *6th Internat. Congress and Symposium, Rome*, 1963; *Acta Cryst.* (suppl.) **16**, Pt. 13, A 57 (1963). A terminating methyl group in hydrocarbon chains can often be replaced isotypically by a bromine atom. The crystal structures of the stable forms of simple triglycerides and 2-monoglycerides have been determined using this technique. The racemic 1-mono-glycerides of Br fatty acids have also been studied and, although they are not isotypic with the unsubstituted compounds, much information on the crystal structures of the latter has been obtained. (Rev. Current Lit. Paint Allied Ind., No. 264).

Gas-chromatographic study of tall-oil fatty acids fractionated by counter-current distribution. Y. Aho, O. Harva and S. Nikkalä. *Tehn. Kem. Aikl.* **19**, 390–2 (1962) (in English). Counter-current distribution of a tall-oil fatty acid distillate (between heptane and a 1:1:1 mixture of methanol, acetic acid and formamide) was followed by gas chromatography of the methyl esters of the acids obtained. Seven known acids (including 41% of oleic acid and 38% of linoleic acid) and small amounts of 14 unknown acids of 17–20 C atoms were separated; the latter fraction contained 10% (on total acids) of a trienoic acid shown to be probably *cis*-5,9,12-octadecatrienoic acid (linolenic acid isomer). This gave only diene conjugation after alkali isomerisation. The presence of this acid explains the erroneous results obtained by U.V. spectrophotometric analysis of tall-oil fatty acids. (Rev. Current Lit. Paint Allied Ind., No. 264).

Formation of volatile compounds during the autoxidation of lipids. Volatile carbonyl compounds in autoxidised fatty acids. J. Hrdlička and J. Pokorný. *Sbornik Vys. Skole Chem. Technol. v. Praze. Technol. Alim.* **6**, Pt. 3, 161–9 (1962). Volatile carbonyl compounds formed on oxidation of stearic, oleic, erucic and linoleic acids at 180C were separated by paper chromatography and analysed as 2,4-dinitrophenylhydrozones. The amount of saturated and mono-unsaturated aldehydes was related to the double bond content of the fatty acids and to the temperature of the oxidation. (Rev. Current Lit. Paint Allied Ind., No. 267).

Method of estimating higher unsaturated fatty acids by quantitative paper chromatography. I. G. Borissova and E. V. Boudnitskaya. *Biokh.* **28** (3), 497–500 (1963). The use of paper chromatography is described, using an acetic acid/formic acid/water mixture as solvent and $KMnO_4$ as detector, estimation being by photometric evaluation of the optical density of the spots. (Rev. Current Lit. Paint Allied Ind., No. 267).

Action of oxygen on oleic acid. I. N. Plaksin, V. I. Solnyshkin and E. M. Chaplygina. *Doklady Akad. Nauk.* **153** (6), 1350–2 (1963). Oleic acid was saturated with O_2 and N_2 for various periods of time and the peroxide compounds formed were chemically analysed and the peroxide values tabulated. The absorption bands of the carboxyl groups and the double bonds in the spectra of oleic acid before and after treatment were examined. For this purpose solutions of the acid in a mixture of medicinal vaseline oil and pure paraffin were used and the effect on the spectra of emulsification by addition of water to the solutions before treatment with O_2 was examined. Changes in the spectra indicated the changes taking place on treatment with O_2. New bands appeared corresponding to peroxide groupings. Chemical analysis confirmed that the production of peroxide groupings in connected with epoxy groups, as after treatment with N_2 the peroxide value fell again. This indicates correspondence of the O contents in the formulae for peroxides and epoxides. A model is shown of the structure of the peroxide aggregate found on the surface of the particles. Peroxide groupings knit the molecules together and quasi crystalline layers are formed. This process leads to increase in adsorption of certain flotation reagents when oleic acid is used in flotation of minerals. (Rev. Current Lit. Paint Allied Ind., No. 266).

Vapour/liquid equilibria for the methyl oleate and methyl stearate binary system. A. Rose and V. N. Schrodt. *J. Chem. Eng. Data* **9** (1), 12–16 (1964). The methyl oleate/methyl stearate vapour/liquid equilibrium behaviour deviates only slightly from the ideal. The total pressure technique, using a modified U-tube manometer, gave precise vapour pressure measurements. (Rev. Current Lit. Paint Allied Ind., No. 266).

Mechanism of oxidative polymerisation. Autoxidative decomposition of monoethenoid fatty acid primary oxidation products. J. H. Skellon. *J. Oil Col. Chem. Assoc.* **46** (12), 1001–8 (1963). The catalytic autoxidation of methyl, ethyl, propyl, butyl and glycol esters of C_{18} and C_{22} monoethenoid fatty acids has been carried out at 55, 85 and 120C, the nature of the residue and scission products being examined. It was concluded that the residue consisted essentially of a mixture of condensation chain polymers, linkage occurring through both C—C and C—O—C bonds, some of which occur via an initial ketol formation. The same general mechanism was thought to apply to diethenoid ester chains. (Rev. Current Lit. Paint Allied Ind., No. 265).

Safflower seed received from Kenya. Anon. *Tropical Products Inst. Rept.* No. 33, 3 pp (1962). The oil content of this sample of safflower seed is rather low (22.5%) by comparison with the range normally quoted for the better varieties. The quality of the oil is good, A.V. 0.8, I.V. 145.8 and its relatively high linoleate content would make it suitable for use in the paint and lacquer industry. It may well be that the slightly low oil content of the seed would be economically offset to some extent by the high protein content of the meal (53.1%, compared with 23–37.5% for U.S. varieties). (Rev. Current Lit. Paint Allied Ind., No. 265).

Fat emulsifying properties of prerigor and postrigor pork proteins. J. C. Trautman (Res. Labs., Oscar Mayer & Co., Madison, Wis.). *Food Technol.* **18**(7), 1065–67 (1964). The rate of fat emulsion separation is used to study the relative emulsifying capacity of ham muscle proteins. The salt-soluble proteins were found to be the major emulsifying components in a ham muscle and are greatly influenced by the time of post-mortem. The water-soluble and salt-soluble residues have little emulsifying power.

Flavor studies of solidified water-in-milk fat emulsions. J. B. Mickle, C. V. Patel, Mary V. Malkus, Mary E. Leidigh, Hazel J. Baker and R. D. Morrison (Depts. Dairying, Food Nutr., and Inst. Adm. and Statistics, Oklahoma State Univ., Stillwater, Oklahoma). *Food Technol.* 18(9), 1483–84 (1964). Emulsions were made that contained 40 or 50% milk fat, emulsifier, salt and water. They were partially solidified emulsions and had characteristics of butter. Emulsifiers with HLB numbers of 2 to 5 were the most effective in stabilizing these emulsions. Judges preferred the 80% milk fat emulsions over the low-fat emulsions or margarine. However, few preferences were given between the low-fat emulsions and margarine.

Ultraviolet absorbancy of volatiles as a measure of oxidative flavor deterioration in egg powders. O. S. Privett, O. Romanus, and L. Kline (The Hormel Institute, Univ. of Minn., Austin, Minnesota). *Food Technol.* 18(9), 1485–89 (1964). Studies of the detection of oxidative flavor deterioration in egg yolk powders are presented. The ultraviolet absorbancy method correlated better with organoleptic deterioration over a wider range of conditions than did the following chemical techniques: peroxide values of extracted fat, carbonyl and TBA values of steam distillates of whole powders, and analysis of the volatile composition by GLC. Although differences in the volatile composition of good and off-flavored egg powders occurred, the complexity of the chromatograms discouraged their use as a detection method of rancidity.

Effect of polyphosphates on oxidative deterioration of commercially cooked fryer chickens. J. E. Thompson (Field Crops and Animal Prod. Branch, Market Qual. Res. Div., ARS, USDA, Beltsville, Md.). *Food Technol.* 18(11), 1805–07 (1964). A phosphate mixture was found to be effective in inhibiting oxidative deterioration of frozen, cooked chickens. Phosphate-treated chicken meat showed none, or very slight off-odor and a TBA value of about one when the meat was stored one week at 40F. Untreated control samples had a strong to medium-strong off-odor and a TBA value of about six. The phosphate mixture was primarily sodium tripolyphosphate and some sodium pyrophosphates at a phosphate concentration of 6.5% in clear tap water.

The effect of antioxidants and synergists on the stability of precooked dehydrated sweetpotato flakes. H. J. Deobald, T. A. McLemore, N. R. Bertoniere, and J. A. Martinez (Southern Util. Res. and Dev. Div., ARS, USDA, 1100 R. E. Lee Blvd., New Orleans, La.). *Food Technol.* 18(12), 1970–75 (1964). The following antioxidants and synergists were studied to improve the storage stability of precooked dehydrated sweetpotato flakes: Tenox IV, α-tocopherol, butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), citric acid, and sodium acid pyrophosphate (SAPP). They were evaluated either alone or in various combinations. The following results were found for the samples packaged in air: 1) citric acid was more effective as a synergist than SAPP for the phenolic antioxidants; 2) equal parts of BHA and BHT were more effective than equivalent concentrations of BHA alone when citric acid was used as the synergist; 3) the acceptable period was extended when BHA and BHT were supplemented with citric acid; 4) α-tocopherol and citric acid alone or in combination did not increase the shelf-life of the flakes; and 5) the period of extension under the conditions tested was not of sufficient duration to warrant their inclusion in the product.

Investigations of frying fats. E. Becker and H. E. Rost (Lab. Margarine-Union 6 m5H., Hamburg). *Fette Seifen Anstrichmittel* 66, 123–132 (1964). The changes taking place in various fats and oils during frying of potato chips were investigated. General experiments in the changes in the standard chemical and physical constants, and correlation with organoleptic tests were conducted. Antioxidants were only partially effective in reducing the foaming tendency during frying. Frying under a CO_2 atmosphere for 10 hours caused an appreciable increase in oil viscosity although much less than that encountered on frying in air. The degree of polymerization during frying, as measured by a urea adduct technique, was directly related to the original iodine value of the fat.

Olive oil triglycerides. E. Vioque, M. P. Maza, and M. Calderon (Inst. de la Grassa y sus Derivados, Seville, Spain). *Grasas y Aceites* 15, 173–180 (1964). Olive oil triglycerides were separated according to the number of double bonds per molecule using thin layer chromatography on $AgNO_3$ impregnated silicic acid. The 6 fractions obtained were quantitated by the hydroxamic acid technique and their fatty acid composition analyzed by gas chromatography. Each fraction was also hydrolized by pancreatic lipase and the fatty acid composition at the 2-position determined. The triglyceride composition of the original olive oil was then calculated from these results.

Chemical investigation on Egyptian vegetable fats and oils. VIII. The chemical constitution of Luffa cylindrica seeds. A. M. Gad, F. Osman, Z. E. Shoeb, and M. M. Hassan (Fats and Oils Res. Unit, Nat. Res. Center, Dokki, Cairo, Egypt). *Grasas y Aceites* 15, 185–188 (1964). (In English). The seeds of *Luffa cylindrica* yielded 38.9% of an oil containing 22.6% 16:0, 14.4% 18:0, 8.5% 18:1, and 54.5% 18:2. Both paper chromatography and ultraviolet spectroscopy were used to obtain these results. Three sugars and 13 amino acids were identified in the oilseed meal after extraction.

The organic components of plants in eastern Spain. II. Separation and identification of the components in Centaurea wax by gas-liquid chromatography. J. M. Viguera, J. Sanchez (Lab. de Quimica Organica, Univ. de Valencia, Valencia, Spain) and I. Sanchez. *Grasas y Aceites* 15, 181–184 (1964). The wax obtained by ethanol extraction of Centaurea leaves was characterized by gas-liquid chromatography. Straight chain fatty acids from C_4 through C_{33}, and straight chain alcohols from C_8 through C_{25}, were identified.

Study of the fruit of the evergreen oak (Quercus ilex). I. Oil and meal from the acorn. F. Ramos, F. Mazuelos, and J. A. Fiestas (Inst. de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites* 15, 193–196 (1964). Acorns from the oak tree (*Q. ilex*) yielded 11.8% of an easily refined oil having the following fatty acid composition: 10.5–13.0% 16:0; 0.9–2.0% 18:0; 61.7–72.8% 18:1; 13.1–25.6% 18:2; and tr-2.0% 18:3. The meal after extraction contained 6.8% crude protein and 47.0% starch.

Trace elements in edible fats. X. Influence of the extraction procedures on the metal content and stability of olive oil. A. Vioque, J. M. Martinez-Suarez, and M. A. Albi (Inst. de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites* 15, 189–192 (1964). The effect of processing in two types of olive mills and three types of hydraulic presses on the trace metal content, the peroxide value, and the organoleptic quality of olive oil was investigated. The level of trace metals varied significantly with the equipment used. High trace metal content was accompanied by higher peroxide values and lower organoleptic quality.

Analytical aspects of olive oil. A critical study of analytical methods for differentiating olive oil from other oils. J. Espejo. *Lipidos* 24, 63–69 (1964). Review.

Deodorization of fats and oils. F. Bengoechea. *Lipidos* 24, 1–3 (1964). Review.

The action of heat on fatty materials. III. IV. F. Blasi (Bailen 36, Barcelona 10, Spain). *Lipidos* 24, 4–9, 70–72 (1964). Review.

Bleaching beeswax with sodium hypochlorite. A. Compte. *Lipidos* 24, 10–13 (1964). Treatment of virgin beeswax with a solution of NaOCl at 70C for 60 minutes gave a satisfactory color reduction for commercial purposes. Optimum results were obtained using 7 g NaOCl, per 1000 g beeswax.

Continuous countercurrent deodorization. W. Kehse and K. Mechler. *Rev. Argentina de Grasas y Aceites* (1963). Review.

A rapid method for determining the air content of margarine, shortening, mayonnaise, etc. H. Diaz. *Rev. Argentina de Grasas y Aceites* 5, 84–85 (1963). A sampling container of known volume was filled with the aerated product and weighed. The sample was heated for 1–2 hrs at 60–70C to remove the air and then cooled to room temperature. Additional melted product was added to bring the sample to the original volume and a new weight obtained. The amount of air in the original sample was then calculated from these weights.

Chemical composition of Argentine tea seed. P. J. Martos, G. Karman de Sutton, and P. Cattaneo (Facultad de Ciencias, Univ. de Buenos Aires, Buenos Aires, Argentina). *Rev. Argentina de Grasas y Aceites* 5, 71–75 (1963). Hexane extraction of Argentine tea seeds yielded 26.3% of an oil containing 0.1% myristic, 17.2% palmitic, 3.3% stearic, 0.5% arachidic, 0.9% palmitoleic, 50.1% oleic, and 27.9% linoleic acids. After extraction, the remaining seed contained 11.2% protein and 28.6% carbohydrate.

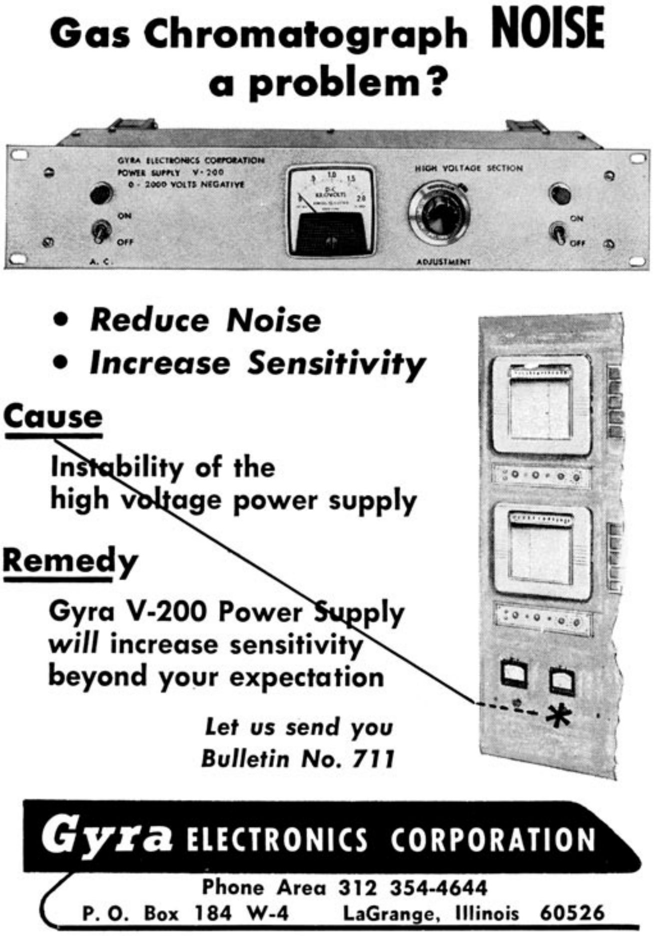
Gums in linseed oil. Anon. *Rev. Argentina de Grasas y Aceites* 5, 76–77 (1963). A standard method for determining the acetone insoluble gums in linseed oil is described.

Presence of 10-hydroxystearic acid in sulfur oil. E. Vioque and M. P. Maza (Inst. de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites* 15, 66–68 (1964). Optically active 10-hydroxystearic acid was isolated from sulfur olive oil (orujo oil) by a combination of liquid-liquid partition between hexane and methanol, urea adduct formation, and silicic acid column chromatography. Its possible origin from *trans*-9,10-epoxystearic acid is suggested.

Separation of fatty acids by thin layer and paper chromatography. Reverse phase chromatography of their p-phenylazophenacyl esters. E. Vioque and M. P. Maza (Inst. de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites* 15, 63–65 (1964). The *p*-phenylazophenacyl esters of formic through capric acids were separated by reverse phase paper chromatography using petroleum ether (bp 150-175F) for the stationary phase and acetic acid/water (73/27) as the mobile phase. Similar separations were obtained by thin layer chromatography using 2-phenoxyethanol as the stationary phase and n-hexane as the mobile phase. The method was used to identify the $KMnO_4$ oxidation products of unsaturated fatty acids.

Chemistry of the olive tree. IIb. Organic components. A. Vazquez (Inst. de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites* 15, 87–92 (1964). A review of the sterols, terpene acids, terpene alcohols, fatty acids, green pigments, and phosphatides found in the olive tree and its fruit.

Studies on the histological structure of the fruit from Olea europaea L. I. Variety Zorzalena. M. Duran and A. Izquierdo (Inst. de Biologia del Tabaco, Seville, Spain). *Grasas y Aceites* 15, 72–86 (1964). A detailed histological study of the fruit coat from *Olea europaea* was made. Results are presented in 39 diagrams and photographs of microscopic histological details. Mesocarp cells contained one large drop of oil occupying almost all the cytoplasm. Mesocarp cells became quite elongated near the kernel.



Hydrogenation of methyl all-conjugated octadecatetraenoate. *Ibid.*, 2074–7. Pure methyl octadecatetraenoate was isolated from mackerel pike oil and methyl all-conjugated octadecatetraenoate was obtained from the isomerized product. Methyl conjugated tetraenoate was hydrogenated at 15C using palladium black as a catalyst and tetrahydrofuran as a solvent. Ultraviolet and infrared spectra of each sample were determined. It was shown that as hydrogenation proceeded, conjugated tetraene decreased but conjugated triene and diene were absent. The mechanism proposed for the hydrogenation of conjugated polyenes requires that the catalysts hold adsorbed conjugated polyenes, until the polyenes become monoenes, which leave the catalyst surface.

Further discussion on centrifugal separators. F. Argente (Touron y Compania, S.A., Madrid, Spain). *Grasas y Aceites* 15, 147–149 (1964). The advantages of various centrifuge designs are discussed.

The distribution of fatty acids in olive oil triglycerides. F. Mazuelos (Inst. de la Grasa y sus Derivados, Seville, Spain). *Grasas y Aceites* 15, 141–142 (1964). Seven Spanish olive oils from different sources were hydrolized with pancreatic lipase. Results indicated that 16:0 and 18:0 were predominantly esterified at the 1,3-positions while 18:1 and 18:2 occupied all three positions.

Physical chemistry studies on ground olive pastes. XIX. Homogeneity of the paste during pressing. J. M. Martinez (Inst. de la Grasa y sus Derivados, Seville, Spain), C. Gomez, C. Janer, J. Pereda, and V. Flores. *Grasas y Aceites* 15, 119–124 (1964). The water and oil content of ground olive pastes at various locations in the press piles during pressing was determined. Results indicated there were three steps in oil expression: (1) homogeneous loss of free liquid; (2) variable loss of oil and water depending on the height of the location in the press pile; and (3) completely heterogeneous composition.

• Fatty Acid Derivatives

Inhibition of tobacco axillary bud growth with fatty acid methyl esters. T. C. Tso, G. L. Steffens, and M. E. Engelhaupt (Crops Research Div., A.R.S., Beltsville, Md.). *J. Agr. Food Chem.* 13, 78–80 (1965). Experiments were conducted employing methyl esters of fatty acids with chain lengths from C_6 to C_{15} for the inhibition of axillary bud growth of tobacco. Results from four tobacco types showed that the methyl esters of fatty acids with 8 to 14 carbon atoms gave a high degree of inhibition. Methyl pelargonate and undecenoic acid were also effective. Generally, the methyl ester of the C_{10} acid was the most effective, effectiveness gradually being reduced with either increased or decreased carbon chain lengths. The exact mode of action of these fatty acid esters is not yet known. Only the meristematic and differentiating cells of axillary buds were destroyed when they came in contact with these fatty acid esters.

Crystal structure of some long-chain esters [e.g. alkyl stearates]. S. Aleby. *6th Internat. Congress and Symposium, Rome,* 1962; *Acta Cryst.* (suppl.) 16, Pt. 13, A 55 (1963). (Rev. Current Lit. Paint Allied Ind., No. 264).

Chemistry of fatty acid epoxides and styrene oxide. H. P. Kaufmann and R. Schickel. *Deutsche Farben-Z.* 17(12), 561–2 (1964). Reactions of fatty acid epoxides and the reaction of styrene oxide with fatty acids to give phenylglycol esters are discussed. (Rev. Current Lit. Paint Allied Ind., No. 267).

Carrageenan and hydroxylated lecithin; a stabilizer for continuous process bread. E. F. Glabe (Food Technol. Inc., Chicago, Ill.). *Bakers Digest* 38(3), 42–44 (1964). The protein complexing ability of carrageenan and hydroxylated lecithin is shown to be useful to the bread baker using the continuous bread-making process. Dough strength, loaf volume, loaf shape and texture are improved by a combination of carrageenan and hydroxylated lecithin (C—HL) which exert a synergistic action on flour proteins in continuously mixed doughs made with average or higher quantities of nonfat dry milk. In most cases with C—HL, potassium bromate and iodate levels may be substantially reduced also.

Suppository base comprising glycerin and a diester of polyethylene glycol. Ruth N. Havemeyer (Olin Mathieson Chemical Corp.). *U.S. 3,163,576.* A suppository base consists of 5 to 7% of glycerin and a diester of polyethylene glycol of a molecular weight of 4100 to 6000 in which the diester is derived from higher alkanoic acids or alkenoic acids having from 12 to 18 carbon atoms.

• Biochemistry and Nutrition

Relative distribution of cholesterol in plasma and liver compartments of chicks fed different fatty acids. G. A. Leveille and H. E. Sauberlich (U.S. Army Med. Res. and Nutr. Lab., Fitzsimons Gen. Hosp., Denver, Colo.). *Proc. Soc. Exp. Biol. Med.* 117, 653-56 (1964). Growing male chicks were fed a fat-free diet supplemented with stearic, oleic or linoleic acid, with or without added cholesterol. In cholesterol-fed chicks, oleic or linoleic acid increased plasma and liver cholesterol levels and plasma lipid phosphorus levels. Oleic acid-fed chicks had lower plasma and higher liver cholesterol levels than did linoleic acid-fed animals. The total liver-plasma cholesterol pool was higher in oleic than in linoleic acid-fed chicks, but there was a significant difference in distribution of cholesterol between these two compartments. Total liver lipids paralleled liver cholesterol levels. The fatty acids fed had relatively little effect on the plasma and liver cholesterol levels of chicks receiving a cholesterol-free diet.

Lecithin fatty acid composition in bile and plasma of man, dogs, rats, and oxen. J. A. Balint, E. C. Kyriakides, H. L. Spitzer, and Ethel S. Morrison (Dept. of Medicine and the Dept. of Pathology, Albany Medical College, Albany, N. Y.). *J. Lipid Res.* 6, 96–99 (1965). The lecithins of bile and plasma from nine patients, three dogs, four rats, and two steers (oxen) were extracted and their fatty acid patterns were determined. In all four species the lecithin of bile had a higher concentration of plamatic acid than did that of plasma. The concentration of stearic and arachidonic acids was higher in plasma lecithin. These differences were statistically significant. The work of others shows that biliary and plasma lecithins are both derived from the liver. Plasma lecithin fatty acid composition was not noticeably changed on passage through the tissues. We conclude, therefore, that the different patterns indicate either the presence of two functionally distinct pools of lecithin in the liver or selection from a single heterogeneous pool.

Separation of glycosyl diglycerides from phosphatides using silicic acid column chromatography. Marie L. Vorbeck and G. V. Marinetti (Dept. of Biochem., Univ. of Rochester, School of Medicine and Dentistry, Rochester, N. Y.). *J. Lipid Res.* 6, 3–6, (1965). A procedure has been developed for the separation of the glycosyl diglycerides from the phosphatides of Gram-positive bacteria on columns of silicic acid. The method utilizes mixtures of acetone in chloroform for elution of the glycosyl diglycerides, followed by increasing amounts of methanol in chloroform for elution of the phosphatides. The course of the fractionation was followed by means of phosphorus and carbohydrate determinations and by paper chromatography. The completeness of the separation of the phosphatides from the sugar-containing lipids was shown also by chromatographing a total lipid extract containing P32-labeled phosphatides.

Isotope effects in gas-liquid chromatography of steroids. M. A. Kirschner and M. B. Lipsett (Endocrinology Branch, Nat'l. Cancer Instit., Bethesda, Maryland). *J. Lipid Res.* 6, 7–9 (1965). When gas-liquid chromatography was performed with steroids containing H^3 and C^{14}, the H^3/C^{14} ratio of the effluent was higher at the beginning and at the tail of the steroid peak. The H^3/C^{14} ratio of the entire peak agreed with that determined by paper and thin-layer chromatography. Thus, gas-liquid chromatography on polar and nonpolar phases commonly used for chromatography of steroid apparently has sufficient resolving power to separate isotopic species whose molecular weights differ by 2% or less.

A stereospecific analysis of triglycerides. H. Brockerhoff (Fisheries Res. Board of Canada, Technological Res. Lab., Halifax, Nova Scotia, Canada). *J. Lipid Res.* 6, 10–14 (1965). A method is presented for the analysis of the fatty acid compositions in each of the three positions of a triglyceride. Diglycerides are obtained from the triglyceride by lipolysis with pancreatic lipase, and converted to a mixture of D- and L-phosphatidyl phenol. The L-phosphatide is then hydrolyzed by phospholipase A leaving a lysophosphatide with the fatty acid in position 1, free fatty acid from position 2, and unhydrolyzed D-phosphatidyl phenol. The fatty acid composition in position 3 of the original triglyceride is obtained by calculation. The method was tested on two triglyceride mixtures with known fatty acid distributions. A natural triglyceride, corn oil, was analyzed. The distribution of the major fatty acids between positions 1 and 3 was found to be nearly random.

Colorimetric determination of free fatty acids in biological fluids. Koichi Itaya and Michio Ui (Dept. of Biol. Chem., Faculty of Pharmaceutical Sciences, Hokkaido Univ. School of Medicine, Sapporo, Japan). *J. Lipid Res.* 6, 16–20 (1965). Following the introduction by Duncombe of a colorimetric micromethod for the determination of free fatty acids (FFA) dissolved in chloroform, the optimum conditions for chloroform extraction of FFA from blood or other biological fluids was studied. A degree and rate of extraction similar to those with Dole's extraction mixture were obtained. Phospholipids are not extracted by the procedure described. As little as 0.2 ml of whole blood, instead of serum or plasma, can serve as a FFA sample in the subsequent colorimetric determination, which has been modified to render it simpler and more sensitive.

Prooxidant action of crystalline serum albumin in lipid peroxidation during incubation of rat adipose tissue in vitro. F. L. Engel, M. F. Ball and W. G. Blackard (Depts. of Med. and Physiol. Div. of Endocrin., Duke Univ., Med. Center, Durham, N. C.). *J. Lipid Res.* 6, 21–26 (1965). During *in vitro* incubation of rat adipose tissue in a medium containing crystalline serum albumin, a thiobarbituric acid-reacting chromogen (presumably malonaldehyde) appears in the medium, reflecting peroxidation of poly-unsaturated fatty acids in the tissue. Albumin which has been dialyzed, treated with EDTA and dialyzed, or subjected to gel filtration shows a markedly decreased ability to support malonaldehyde products. Prooxidant activity is found in the dialysate and in protein-free fractions appearing after albumin in the gel filtration. The prooxidant that contaminates albumin has been identified as iron and citrate, the latter acting by forming a soluble complex with the iron.

UPTAKE AND METABOLISM OF RETINOL (VITAMIN A) IN THE ISOLATED PERFUSED RAT LIVER. R. D. Zachman and J. A. Olson (Dept. of Biochemistry, Univ. of Fla. College of Medicine, Gainesville, Fla.). *J. Lipid Res.* 6, 27–31 (1965). The isolated perfused liver was employed to study various aspects of retinol-C^{14} metabolism. The rate of uptake of retinol, retinal, retinoic acid, and retinol acetate was rapid (first order rate constant $k = 0.12–0.16\ min^{-1}$) during the first 3–10 min of perfusion, and then decreased quickly. After 1 hr of perfusion, 50–60% of perfusate retinal-C^{14} acetate were found in the liver as retinol-C^{14} ester, and about 10% of the original perfusate radio-activity appeared in the bile as a group of water soluble metabolites. The amount of retinol ester formed in the liver during 1 hr was linearly dependent on the concentration of retinol in the perfusate over the range of 3 to 1000 μg 100 ml. Serum, bile salt, or prior injections of India ink had no apparent effect on the formation and storage of retinol ester during perfusion. Only the water-soluble metabolites, but not retinol and its associated derivaties, were released into the perfusate and bile. After 1 hr of perfusion, about 20% of the retinoic acid-C^{14} was found in the liver as free retinoic acid and 5% was present in a nonionic fraction.

BIOSYNTHESIS OF 5α-CHOLESTAN-3β-OL IN RAT AND GUINEA PIG LIVER IN VITRO. Sarah Shefer, Susan Milch and E. H. Mosbach (Dept. of Lab. Diagnosis, Public Health Res. Inst. of the City of New York, Inc.). *J. Lipid Res.* 6, 33–36 (1965). The *in vitro* conversion of DL-mevalonate-2-C^{14} and cholesterol-4-C^{14} to 5α-cholestan-3β-ol was studied in liver homogenates of rats and guinea pigs. On the average 0.01–0.05% of the substrate radioactivity was converted to 5α-cholestan-3β-ol by the livers of both species during the 4 hr incubation period. The biosynthesis of 5α-cholestan-3β-ol by cell-free liver homogenates *in vitro* demonstrates that the presence of this saturated sterol is at least partly due to biosynthesis by mammalian tissues, and cannot be ascribed exclusively to bacterial action upon cholesterol in the intestine.

TISSUE DISTRIBUTION OF CHOLESTEROL AND 24-DEHYDROCHOLESTEROL DURING CHRONIC TRIPARANOL THERAPY. A. V. Chobanian and W. Hollander (Dept. of Medicine, Boston Univ. School of Medicine, Boston Univ. Medical Center, Boston, Mass.). *J. Lipid Res.* 6, 37–41 (1965). The tissues of five patients who died following 4 to 31 months of continuous oral triparanol therapy have been analyzed for sterol content by gas-liquid chromatographic techniques. Desmosterol was present in variable amounts in all tissues examined, with the exception of nervous tissue, but in none of the tissues did desmosterol constitute a larger fraction of total sterols than that observed in the blood. No evidence of marked adrenal cholesterol depletion was apparent. Small but significant amounts of desmosterol were found in both relatively normal and atherosclerotic blood vessels. No preferential accumulation of desmosterol as compared with cholesterol was apparent in either the blood vessels or in any of the body tissues examined.

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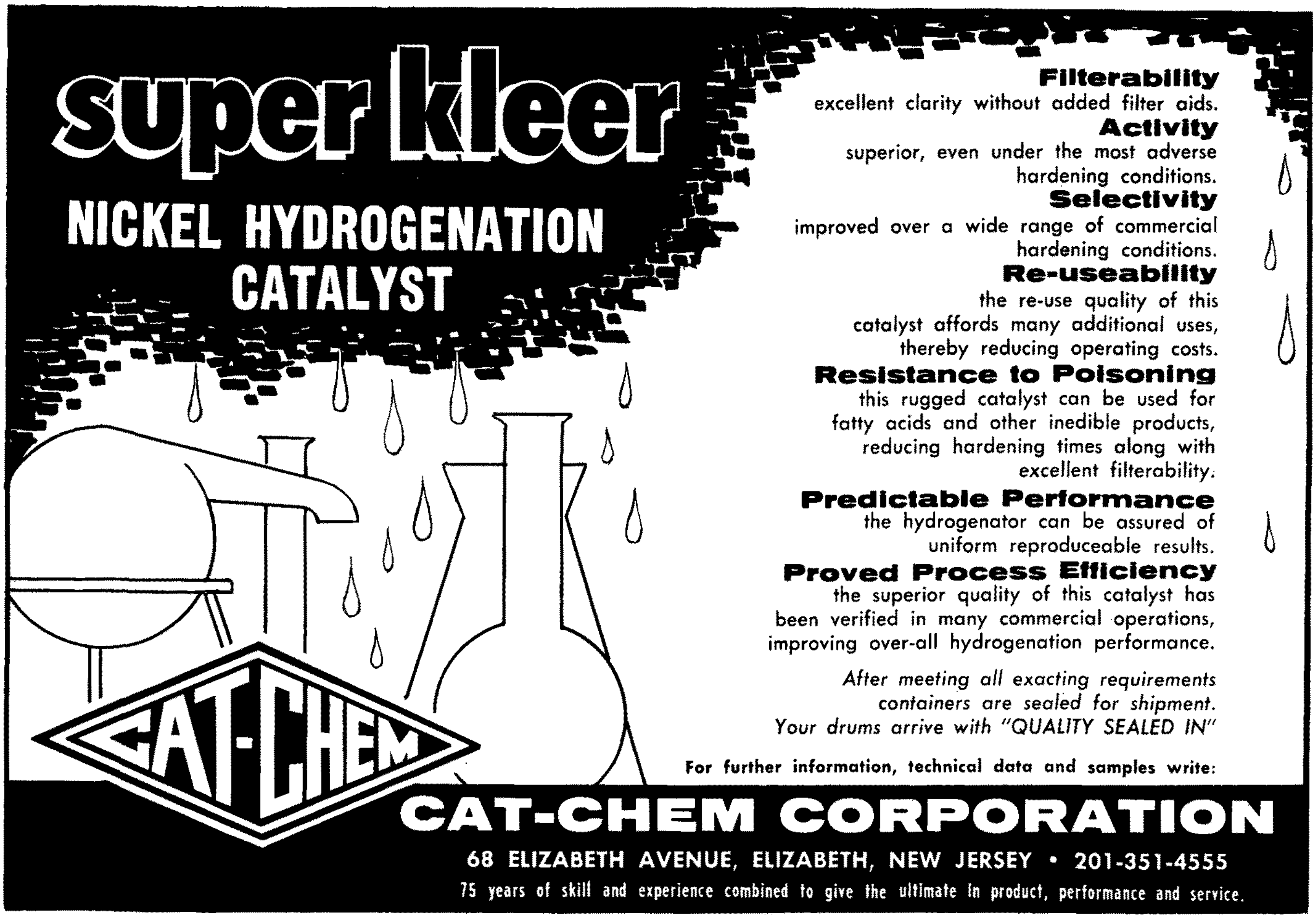

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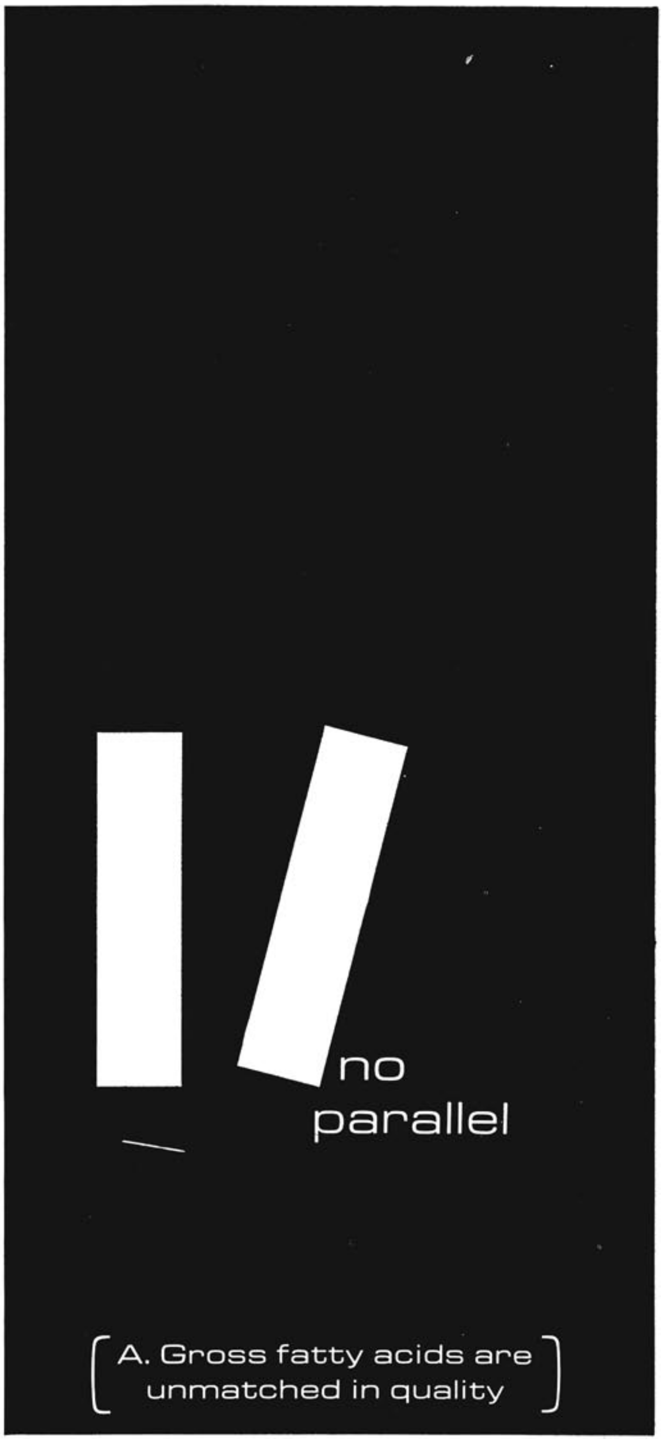
SYNTHESIS OF UNSATURATED FATTY ACIDS IN THE SLIME MOLD PHYSARUM POLYCEPHALUM AND THE ZOOFLAGELLATES LEISHMANIA TARENTOLAE, TRYPANOSOMA LEWISI, AND CRITHIDIA SP.: A COMPARATIVE STUDY. E. D. Korn, C. L. Greenblatt and Ann M. Lees (Nat'l. Inst. of Arthritis and Metabolic Diseases, Nat'l. Institutes of Health, Bethesda, Maryland). *J. Lipid Res.* **6**, 43–51 (1965). On the basis of the unsaturated fatty acids which they synthesize, protists can be grouped in a meaningful way. Thus, the unsaturated fatty acids of the true slime mold are identical with the unsaturated fatty acids of the soil amoebae *Acanthamoeba* and *Hartmannella* but have no resemblance to those of the cellular slime mold *Dictyostelium*. Among the zooflagellates, *Leishmania enriettii* and *Leishmania tarentolae* synthesize unsaturated fatty acids that are very similar to those of the phytoflagellates *Euglena, Ochromonas,* and *Chlamydomonas,* while *Trypanosoma lewisi* and especially *Crithidia* have a different pattern of unsaturated fatty acids which more closely resembles that of the ciliated protazoa. The unsaturated fatty acids of the true slime mold *Physarum polycephalum* include oleate, linoleate, 11-eicosenoate, 11,14-eicosadienoate, 8,11,14-eicosatrienoate, and arachidonate. *L. tarentolae* synthesizes 6,9,12-octadecatrienoate and 9,12,15-octadecatrienoate as well as polyunsaturated 20- and 22-carbon fatty acids derived from both of these 18-carbon acids. *T. lewisi* synthesizes 6,9,12-octadecatrienoate. *Crithidia* synthesizes 6,9,12-octadecatrienoate, 8,11,14-eicosatrienoate, and 4,7,10,13,16-docosapentaenoate but not 9,12,15-octadecatrienoate or any acids derived from it. *Leishmania* and *Trypanosoma* have been known to convert stearate directly to oleate.

METABOLIC PRODUCTS OF α-TOCOPHEROL IN THE LIVERS OF RATS GIVEN INTRAPERITONEAL INJECTIONS OF C^{14}-α-TOCOPHEROL. P. A. Plack and J. G. Bieri (Lab. Nutr. and Endocrinology, Nat'l. Inst. of Arthritis and Metabolic Diseases, Nat'l. Inst. of Health, Bethesda, Md.). *Biochim. Biophys. Acta* **84**, 729–738 (1964). Rats fed a vitamin E-deficient diet for 1 to 5 months were given intraperitoneal injections of 1 mg C^{14}-α-tocopherol. After 48 hr they were killed and their livers removed and analyzed by thin-layer and column chromatography for α-tocopherol and metabolic products. Of the recovered radioactivity, about 80% was in the form of unchanged α-tocopherol and 11% was present as a more polar compound, probably α-tocopherylquinone. No definitive evidence was obtained for the presence of a dimer. Control experiments showed that chromatography of α-tocopherol on thin-layer plates, with aqueous acetonitrile, gave rise to considerable amounts of polar material.

FRACTIONATION AND CHARACTERIZATION OF THE LOW-DENSITY LIPOPROTEINS OF HEN'S EGG YOLK. W. G. Martin, J. Augustyniak and W. H. Cook (Div. Applied Bio., Nat'l. Res. Council, Ottawa, Can.). *Biochim. Biophys. Acta* **84**, 714–720 (1964). The LDF of hen's egg yolk prepared by a modified method was found to be soluble in water. In this low-density solvent it was possible to separate LDF by flotation into fractions (LDF$_1$ and LDF$_2$) owing in part to the maximum effect of the difference in their partial specific volumes. About one fifth of LDF was estimated to consist of LDF$_1$, the remainder being LDF$_2$. Both fractions were polydisperse with molecular weights ranging from $0.5 \cdot 10^6$ to $34 \cdot 10^6$ (mol. wt. $10.3 \cdot 10^6$) for LDF$_1$ and $0.5 \cdot 10^6$ to $14 \cdot 10^6$ (mol. wt. $3.3 \cdot 10^6$) for LDF$_2$. Since LDF$_1$ contained 86.8% and LDF$_2$ 83.2% lipid, the mean size of their protein moieties was about $1.4 \cdot 10^6$ and $0.6 \cdot 10^6$, respectively.

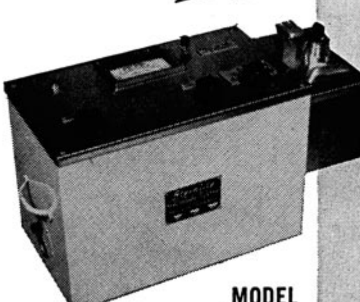
CHARACTERIZATION OF LIPOVITELLENIN COMPONENTS AND THEIR RELATION TO LOW-DENSITY LIPOPROTEIN STRUCTURE. J. Augustyniak, W. G. Martin, and W. H. Cook (Div. Biosciences, Nat'l. Res. Council, Ottawa, Can.). *Biochim. Biophys. Acta* **84**, 721–728 (1964). When aqueous solutions of the LDF of egg yolk and its two fractions LDF$_1$ and LDF$_2$ were extracted with ethyl ether, all yielded five derived components having sedimentation rates of about 4 S, 7 S, 13 S, 15 S, and 17 S. The first three of these were isolated and had molecular weights of $2.9 \cdot 10^5$, $11 \cdot 10^5$, and $13 \cdot 10^5$, and lipid contents of 50, 67, and 44%, respectively. These components were formed sequentially in the order 7 S$\longrightarrow$4 S$\longrightarrow$13 S and hence all contain the same proteins, although different combinations of polypeptide chains may be present. Apparently a reduction in lipid content below 50% causes an aggregation of 4-S particles to form 13 S and other rapidly sedimenting products. The sizes of the protein moities, computed from the molecular weight and lipid content of the native fractions LDF$_1$ and LDF$_2$ and the derived products 7 S and 4 S, are in the order 8, 4, 2, and 1, respectively, with the smallest unit size estimated to be $1.7\ (\pm 0.16) \cdot 10^5$. Evidently the size of the protein moiety decreases stepwise as



the lipid content decreases down to 4 S and this behavior, plus aggregation at low lipid contents, yields detectable and separable components in both the natural and derived form of these lipoproteins.

IDENTIFICATION OF PROSTAGLANDIN F_{3}^{a} IN BOVINE LUNG: PROSTAGLANDINS AND RELATED FACTORS. B. Samuelsson (Dept. Chem., Karolinska Inst., Stockholm, Sweden). *Biochim. Biophys. Acta* **84**, 707–713 (1964). Prostaglandin F_{3}^{a} was isolated from bovine lung by reversed-phase partition chromatography, silicic acid chromatography and thin-layer chromatography. Final identification was achieved by gas-liquid chromatography of a trimethylsilyl ether derivative, infrared spectroscopy, and mass spectrographic analysis. The stereochemistry at C-9 was determined by an isotope technique. Prostaglandin F_{2}^{a}, earlier isolated from lung tissue of other species, was also identified.

MYO-INOSITOL PHOSPHATES IN A PHOSPHOINOSITIDE COMPLEX FROM KIDNEY. F. Andrade and C. G. Huggins (Dept. Biochem., Tulane Univ. Schl. Med., New Orleans, La.). *Biochim. Biophys. Acta* **84**, 681–693 (1964). Chemical studies on the "phosphatido-peptide fraction" from kidney have shown that this material more properly should be called a phosphoinositide complex. Glycerophosphate, inositol mono-, di- and triphosphate were separated from alkaline hydrolysates by means of paper chromatography. Six fractions were obtained by column chromatography from the deacylated phosphoinositide complex and identified as inositol monophosphate, glycerophosphate, inositol diphosphate, glycerylphosphoryl inositol, glycerylphosphoryl inositol phosphate, and glycerylphosphoryl inositol diphosphate. These phosphates, presumably inositides, are believed to be responsible for the high metabolic activity of this fraction as measured by radiophosphorus.



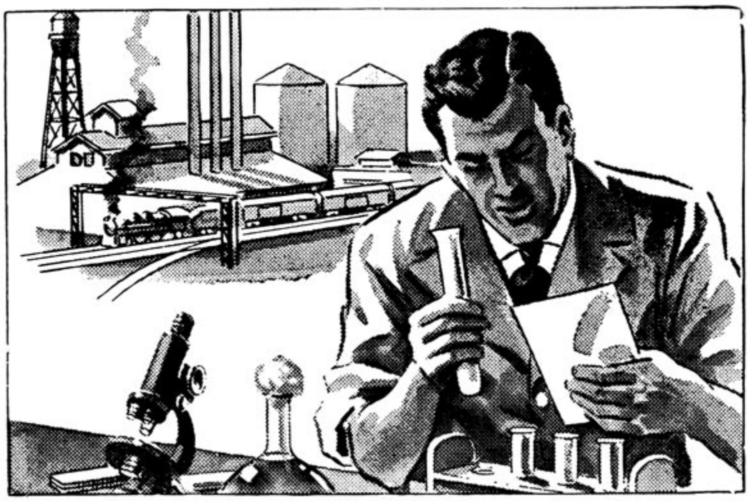
THE REACTION OF DIAZOMETHANE WITH SYNTHETIC PHOSPHATIDES AND WITH INSECT LIPID EXTRACTS. H. D. Crone (Biochem. Dept., Agri. Res. Council, Pest Infestation Lab., Slough, Bucks, Gt. Britain). *Biochim. Biophys. Acta* **84**, 665–680 (1964). The reaction of diazomethane with synthetic phosphatidylethanolamine, *N*-methylphosphatidylethanolamine, phosphatidylcholine and insect-lipid extracts was studied in order to find out if the reaction was specific to one type of phosphatide. The three synthetic phosphatides reacted in essentially the same manner, although with different rates of reaction, forming dimethyl esters of phosphatidic acids and a nitrogenous compound similar to neurine. The results with insect extracts gave evidence of the reaction of diazomethane with many natural phosphatides. *N*-methylation of the intact ethanolamine phosphatides occurred to a limited extent and was increased by the presence of alcohols in the reaction medium. Techniques used included column chromatography on silicic acid, paper chromatography and IR spectroscopy.

EFFECTS OF A NUTRITIONAL DEFICIENCY OF UNSATURATED FATS ON THE DISTRIBUTION OF FATTY ACIDS IN RAT LIVER MITOCHONDRIAL PHOSPHOLIPIDS. R. M. Johnson and Takeru Ito (Inst. Nutr. and Food Tech., The Ohio State Univ., Columbus, Ohio). *J. Lipid Res.* **6**, 75–79 (1965). The fatty acid composition of liver mitochondrial phospholipids from rats rendered deficient in essential unsaturated fatty acids has been determined, and compared with that of rats fed a diet containing corn oil. In addition to marked reductions in the amounts of linoleic and arachidonic acids esterified at the β-position of ethanolamine-, inositol-, and choline glycerophosphatides, the deficiency resulted in extensive changes in the distribution of saturated acids at both the α- and β-positions. Palmitoleic and oleic acids were increased in amount in fat deficiency, and large amounts of docosatrienoic acids appeared in these three phospholipids. The fatty acids of the sphingomyelins were not altered as a result of essential fatty acid deficiency. The data demonstrate that each phospholipid is unique in the way in which its fatty acid moieties change in response to feeding a fat deficient diet.

EFFECTS OF ALKALI-METAL IONS ON PHOSPHOLIPID AND TRIGLYCERIDE SYNTHESIS IN RAT LIVER SLICES. R. S. Leal (Inst. Bento da Rocha Cabral, Lisbon, Portugal). *J. Lipid Res.* **6**, 80–82 (1965). The influence of alkali-metal ions on the incorporation of labeled precursors into phospholipids and triglycerides was studied in rat liver slices. By use of acetate-1-C^{14} as lipid precursors, a comparison was made of the pathway from acetate to phospholipid and the pathway from palmitate to phospholipid. While the rate of incorporation of palmitate to phospholipids and triglycerides was virtually independent of the alkali-metal ion present in the medium, the rate of incorporation of acetate-1-C^{14} into the same compounds was strongly influenced by the alkali-metal ions, the highest incorporations being obtained with potassium and rubidium. Under the same conditions lithium appears to have an inhibitory effect. The effects of the alkali-metal ions on phospholipid and triglyceride synthesis in liver are located on the pathway between acetate and long-chain fatty acids.

FATTY ACID SYNTHESIS DURING EARLY LINOLEIC ACID DEFICIENCY IN THE MOUSE. D. W. Allmann and D. M. Gibson (Dept. of Biochem., Indiana Univ. School of Med., Indianapolis, Indiana). *J. Lipid Res.* **6**, 51–61 (1965). The capacity of liver to synthesize long-chain fatty acids is greatly enhanced during early linoleate deficiency in mice. The enzymes catalyzing the synthesis of fatty acids from acetate or malonyl CoA were measured directly in soluble fractions isolated from liver. The period of dietary restriction of linoletae is also accompanied by a rapid fall in the relative linoleate content of the liver, by marked changes in the composition of the fatty acids in liver, and by an accumulation of liver triglyceride.

FATTY ACID SYNTHESIS DURING FAT-FREE REFEEDING OF STARVED RATS. D. W. Allmann, Dorothy D. Hubbard and D. M. Gibson (Dept. of Biochem., Indiana Univ. School of Med., Indianapolis, Ind.). *J. Lipid Res.* **6**, 63–73 (1965). Refeeding starved rats a fat-free diet over a 48 hr period brings about a marked elevation in the activity of the enzymes in liver cytoplasm which catalyze the synthesis of saturated fatty acids from acetyl CoA and malonyl CoA. Acetate incorporation into palmitoleic and oleic acid is also accelerated during this period. Enhanced capability for the synthesis of these fatty acids is reflected in the net accumulation of saturated and monounsaturated fatty acids, as well as the triglyceride fraction of the liver lipids. Coincident with these events the relative amount of linoleic acid among liver fatty acids rapidly falls. These changes are substantially the same as those observed in early linoleic acid deficiency.



Transfer of fatty acids between triglyceride species in rat adipose tissue. C. H. Hollenberg (McGill Univ. Med. Clinic, Montreal General Hospital, Montreal, Quebec, Canada). *J. Lipid Res.* 6, 84–98 (1965). To study the rate of fatty acid transfer between triglyceride species in adipose tissue, palmitate-1-C^{14} was incorporated into adipose tissue triglyceride by incubation in buffered glucose. Following extraction, the saturated triglycerides were precipitated in cold alcohol-acetone; this fraction contained over 40% of the incorporated label and 15% of the total tissue palmitic acid. Thus the specific activity of palmitic acid in this fraction was over 4 times that in predominantly unsaturated triglycerides. This relationship was unaltered by further incubation of tissue for 3 hr in fresh medium containing glucose-insulin only, or glucose-insulin plus unlabeled oleic acid. Similar experiments using an *in vivo* incubation technique demonstrated that two weeks after incubation the proportion of radioactivity in the saturated fraction had fallen only from 43 to 34%. This fall was apparently not due to greater fractional turnover of saturated triglycerides or to desaturation of palmitic acid, and thus was the result of slow redistribution of palmitate-C^{14} between predominantly saturated and unsaturated triglycerides. The data indicate that intermolecular rearrangement of triglyceride fatty acids in adipose tissue occurs slowly, and thus is more likely a result of hydrolysis of triglyceride and reesterification of fatty acids than rapid, extensive transesterification.

Release of free fatty acids from adipose tissue obtained from newborn infants. M. Novák, V. Melichar, P. Hahn and O. Koldovský (Inst. of Physiology, Czechoslovak Academy of Sciences, Prague, Czechoslovakia). *J. Lipid Res.* 6, 91–95 (1965). The role played by mobilization of free fatty acids (FFA) from adipose tissue in producing the typically high serum FFA levels of human infants has been studied. FFA concentrations in the serum and subcutaneous adipose tissue from the gluteal region were determined during postnatal development. A maximum level was reached within 24 hr after birth, after which there was a gradual fall. In serum the FFA level at the end of 12 months was still higher than that in adults, while the FFA level in adipose tissue was lower at 3 months than in adults. Incubation of small pieces of adipose tissue in Krebs-Ringer phosphate buffer containing 4% albumin led to release of FFA into the medium. This release could be suppressed by the addition of glucose (200 mg/100 ml) for tissue from all age groups except the youngest (0–15 hr after birth).

Composition of the diacyl glyceryl ethers and triglycerides of the flesh and liver of the dogfish (Squalus acanthias). D. C. Malins, J. C. Wekell, and C. R. Houle (Bureau of Commercial Fisheries Technological Laboratory, U. S. Fish and Wildlife Service, Seattle, Wash.). *J. Lipid Res.* 6, 100–105 (1965). The major lipids of the dogfish (*Squalus acanthias*) are the diacyl glyceryl ethers and triglycerides. These classes of compounds in the flesh (dorsal section) and liver were separated by thin-layer chromatography. The glyceryl ethers and/or fatty acids resulting from saponification of each of these fractions were analyzed by gas-liquid chromatography as their isopropylidene and methyl ester derivatives, respectively. Few significant differences were apparent between the ether portions of the diacyl glyceryl ethers of the flesh and liver, but the fatty acids were quite different in composition. Those of the flesh contained high percentages of the C_{20} and C_{22} polyenoic acids that are characteristic of most fish lipids; those of the liver contained little polyenoic acid but high concentrations of C_{20} and C_{22} monoenoic acids. Although the triglycerides of the flesh contained more of the polyenoic acids than the liver, the differences in this fraction between the flesh and liver were less striking. It appears that the over-all unsaturation of the dogfish lipids is largely governed by the relative amounts of monoenoic and polyenoic acids in the C_{20} and C_{22} series.

Glucose-containing phospholipids in Mycoplasma laidlawii, strain B. P. F. Smith and C. V. Henrikson (Dept. of Microbiology, School of Medicine, Univ. of South Dakota, Vermillion, S. D.). *J. Lipid Res.* 6, 106–111 (1965). Three major phospholipid fractions were isolated from *Mycoplasma laidlawii*, strain B, grown in lipid-free medium. Two of these fractions were shown to contain covalently bound glucose, and had molar ratios of P:sugar:glycerol:fatty acid close to 1:1:1:2. They differed somewhat in their fatty acid compositions. Products of mild deacylation and of partial acid hydrolysis indicated both to be salt forms of phosphatidyl glucose. Another major fraction not structurally identified yielded data suggestive of a compound resembling cardiolipin or of a phosphatidyl glycerophosphate. Small amounts of nitrogen-containing phospholipids, but no sulfolipids, were detected.

LIPID METABOLISM IN PIGEON AORTA DURING ATHEROGENESIS. H. B. Lofland, Jr., D. M. Mourly, C. W. Hoffman, and T. B. Clarkson (Depts. of Biochemistry and Laboratory Animal Medicine, Bowman Gray School of Med., Winston-Salem, North Carolina). *J. Lipid Res.* 6, 112–118 (1965). The development of artherosclerosis has been studied in White Carneau and Show Racer pigeons. The results of analytical studies indicate that the disease process is characterized by the accumulation of various lipids, and especially of sterol esters and free sterols. By perfusion of arteries with blood serum or with tissue culture medium containing C^{14}-labeled acetate, significant synthesis of labeled fatty acids has been shown to occur. As the aorta becomes relatively more diseased, the synthesis of fatty acids is enhanced, and the atherosclerotic plaque itself appears to be the site of most of the synthesis. Likewise, as the aorta becomes more diseased, relatively more of the newly synthesized fatty acid becomes esterified to cholesterol. The cholesterol to which the fatty acid is esterified appears to be that which is contained within the arterial wall, and the artery appears to have the necessary enzyme systems for carrying out the esterification.

VALIDATION OF AN INCOMPLETELY COUPLED TWO-COMPARTMENT NONRECYCLING CATENARY MODEL FOR TURNOVER OF LIVER AND PLASMA TRIGLYCERIDE IN MAN. J. W. Farquhar, R. C. Gross, R. M. Wagner and G. M. Reaven (Dept. of Med., Stanford Univ. School of Med., Palo Alto, California). *J. Lipid Res.* 6, 119–133 (1965). Pool sizes and turnover rates of hepatic triglycerides and of lipids of three plasma lipoprotein fractions of human subjects were defined from studies of the rates of incorporation of labeled free glycerol and of labeled plamitate into these lipids, and of distribution and clearance from plasma of intact, endogenously labeled lipoproteins. Incorporation of labeled glycerol and labeled plamitate into plasma lipoproteins was prompt. Triglycerides of the lowest density lipoprotein class ($S_f > 20$) were most highly labeled of all plasma lipoproteins, and turnover was most rapid in this class. The kinetic behavior of radioactive plasma triglyceride was more complex when palmitate was used than when glycerol served as a labeled precursor, probably because glycerol recycled less than did palmitate. An incompletely coupled, two-compartment, nonrecycling catenary (linked in series) model of hepatic triglyceride and of plasma $S_f > 20$ triglyceride was validated. The $S_f > 20$ triglycerides turned over in a volume approximating that of plasma. Apparently unique to man of various species previously reported is the relatively slow turnover and consequent rate-determining role of $S_f > 20$ triglyceride in this two-pool system. The hepatic pool greatly exceeded that in plasma and turned over approximately three times more rapidly.

THE 2-HYDROXY FATTY ACIDS IN WHITE MATTER OF INFANT AND ADULT BRAINS. L. F. Eng, B. Gerstl, R. B. Hayman, Y. L. Lee, R. W. Tietsort and J. K. Smith (Research Lab., Veterans Adm. Hospital, Palo Alto, California). *J. Lipid Res.* 6, 135–139 (1965). White matter from five adults and five infant brains was analyzed for total fatty acids, galactolipids, and 2-hydroxy fatty acids. The distribution of 2-hydroxy fatty acids was determined quantitatively for each sample by gas-liquid chromatography of their methyl esters without masking their hydroxyl groups. The galactolipid values in a case of multiple sclerosis and in the temporal areas of two other cases were about 25% lower than that reported for normal brains by other authors, but the content and composition of the 2-hydroxy fatty acids did not correlate with galactolipids contents and were similar for all adult samples. The total fatty acid, galactolipid, and 2-hydroxy fatty acid concentrations in the infant brains were small compared with those of adults. The composition of the 2-hydroxy fatty acids was also different.

IN VIVO CONVERSIONS OF CEREBROSIDE AND CERAMIDE IN RAT BRAIN. K. C. Kopaczyk and N. S. Radin (Mental Health Res. Inst., Univ. of Michigan, Ann Arbor, Mich.). *J. Lipid Res.* 6, 140–145 (1965). Lignoceric acid-1-C^{14} was used to make lignoceroyl psychosine (kerasin) and stearic acid-1-C^{14} to make stearoyl sphingosine (ceramide). Emulsions of the labeled sphingolipids were injected directly into the brains of young rats and the resultant lipoidal metabolic products were examined for radioactivity. Most of the metabolized C^{14} was found in the ester-linked fatty acids, particularly in the acids corresponding to the ones injected. This shows that the lignocerate and stearate were released from amide linkage and incorporated into other lipids. Activity was found also in other fatty acids and cholesterol, showing that the released fatty

• *New Products*

WATERS ASSOCIATES, INC., Framingham, Mass., has introduced the Differential Refractometer Column Monitor, which is unique in that it is sensitive to changes in refractive index to 10^{-7} and yet is portable, mounted in a small unitized case.

PRO-TECH, INC., Springfield, Pa., has available a new portable battery-operated pH unit that provides continuous recording. An all solid-state electronic circuit has been developed which allows stable calibration.

DISTILLATIONS PRODUCTS INDUSTRIES, Rochester, N. Y., Division of Eastman Kodak Company, has developed the Eastman Chromagram Sheet, a precoated, flexible sheet that does away with the complications associated with the conventional coating of plates.

CENTRICO, INC., Englewood, N. J., distributor of Westfalia centrifuges, has designed Model OSM-15007 for high capacity separation of soapstock from neutralized vegetable oil and water washing and degumming of vegetable oil.

PERKIN-ELMER CORPORATION, Norwalk, Conn., offers Model 450 Spectrophotometer, which provides a scan range of 165 millimicrons in the ultraviolet region to 2700 millimicrons in the new infrared.

AMERICAN INSTRUMENT COMPANY, INC., Silver Spring, Md., has developed the Accumelt, a new melting and boiling point apparatus which performs both determinations in less than one minute.

SELAS CORPORATION OF AMERICA, Dresher, Pa., offers The Flotronics Metal Membrane Filter, a pure silver membrane of uniform porosity, in a kit containing 100 filters of selected porosity grades.

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acids were partially degraded to acetate. Ceramide and sphingomyelin showed relatively high activities, and the fatty acids of these lipids were labeled primarily in the carboxyl group. This suggests that ceramide is formed directly from cerebroside via a galactosidase, and that ceramide is converted to free fatty acids as well as sphingomyelin. Little activity was found in the hydroxy cerebrosides and sulfatides, suggesting that neither of the injected lipids is directly converted to these glycolipids. Ester-linked lignocerate was found to occur naturally in brain.

FATTY ACID COMPOSITION OF HUMAN BRAIN SPHINGOMYELINS: NORMAL VARIATION WITH AGE AND CHANGES DURING MYELIN DISORDERS. S. Stallberg-Stenhagen and L. Svennerholm (Inst. of Med. Biochem., Univ. of Gothenburg, Gothenburg, Sweden). *J. Lipid Res.* 6, 146–155 (1965). Sphingomyelins have been isolated in almost quantitative yield from normal and pathological human nervous tissues, and their fatty acid compositions determined by gas-liquid chromatography. In normal frontal lobe the proportion of stearic acid (18:0) decreases with increasing age from about 80% in the newborn to about 40% in the adult, whereas the C_{22}-C_{26} acids increase from about 10 to about 50%. In malformations of the nervous system the content of C_{22}-C_{26} acids was much smaller than in normal brains of the same age. In normal cortex 18:0 constitutes at least two-thirds of the sphingomyelin fatty acids at all ages. In normal white matter from adults C_{22}-C_{26} acids represent two-thirds of the acids present. We conclude that sphingomyelin of cytoplasm and that from myelin sheath show striking differences in the chain-lengths of their fatty acids. In patients who had died from dysmyelinating and demyelinating diseases the deviation from the normal pattern was much more pronounced in cerebral white matter than in total brain. Sphingomyelins of spinal medulla have a fatty acid pattern similar to that of adult brain but contain relatively higher amounts of 18:0 and 24:1. Sphingomyelins of peripheral nerve have a distinctly different fatty acid pattern with much less 18:0 than in cerebral white matter.

SYNTHESIS OF RACEMIC 1,2-DIOLEIN. L. Krabisch and B. Bergstrom (Dept. of Physiol. Chem., Univ. of Lund, Lund, Sweden). *J. Lipid Res.* 6, 156–157 (1965). 1,2-Diolein has been synthesized by protecting the 3-position of glycerol during acylation and by means of the pyranyl ether linkage. This linkage is easily broken under conditions leading to very limited isomerization of the diglyceride.

METABOLISM IN VITRO OF PALMITIC AND LINOLEIC ACID IN THE HEART AND DIAPHRAGM OF ESSENTIAL FATTY ACID-DEFICIENT RATS. O. Stein and Y. Stein (Hebrew Univ.-Hadassah Med. Schl., Dept. Med. "B" Hadassah Univ. Hosp., Jerusalem, Israel). *Biochim. Biophys. Acta* 84, 621–635 (1964). Rats kept for 75–90 days on an essential fatty acid-deficient diet showed a marked fall in linoleic acid content and rise in the trienoic acid/tetreanoic acid ratio in heart as well as in diaphragm. Electron microscopic study of myocardium showed enlarged mitochondria with marked disorganization of cristae and swelling. Neutral lipid and phospholipid content of heart and diaphragm was not different from that of controls supplemented with 4% soyabean oil. Rat hearts were perfused and hemidiaphgrams were incubated with a medium containing palmitate-1-C^{14} or linoleic-1-C^{14} acids. During 20 min of perfusion both fatty acids were oxidized to CO_2 to a similar extent. The fatty acid composition of the medium affected the mode and rate of incorporation of individual fatty acids in heart as well as in diaphragm. In the presence of an equimolar mixture of palmitic and linoleic acid, more linoleic acid was incorporated into the phospholipids and more palmitic into neutral lipids, than when each fatty acid was the only substrate. In the essential fatty acid-deficient rats the specific activity of the phospholipids in heart as well as in diaphragm was higher than in controls. An increased turnover of certain fatty acids in phospholipids in the essential fatty acid-deficient rat is indicated and the mechanism discussed.

FACTORS AFFECTING OXIDATIVE STABILITY OF CAROTENOID PIGMENTS OF DRUM MILLED PRODUCTS. L. Dahle (Research Lab., Peavey Co. Flour Mills, Minneapolis, Minn.). *J. Agr. Food Chem.* 13, 12–15 (1965). The combined effect of lipoxidase, tocopherols, and free fatty acids on the oxidative stability of the carotenoid pigments of durum milled products was investigated. Free polyunsaturated fatty acids, which increase in concentration on aging of wheat and flour, play a significant role. Tocopherols, if present in sufficient quantity, can increase pigment stability. Lipoxidase concentration alone is an inadequate criterion by which to predict yellow pigment loss during macaroni and spaghetti processing.

STORAGE OF HEPTACHLOR EPOXIDE IN THE BODY FAT AND ITS EXCRETION IN MILK OF DAIRY COWS FED HEPTACHLOR IN THEIR DIET. W. N. Bruce, R. P. Link and G. C. Decker (Univ. of Ill. College of Veterinary Med., Urbana). *J. Agr. Food Chem.* 13, 63–67 (1965). When heptachlor epoxide was fed to Shorthorn dairy cows at levels of 0.2, 0.5, 1.5, 10, and 50 ppm, at the end of 12 weeks it appeared in the butterfat of milk at levels of 4.25, 11.25, 21.7, 119.7, and 460 ppm, and in body fat levels of –, 7.1, 14.7, 83.5, and 293 ppm, respectively. In a subsequent feed-off period, the heptachlor epoxide residue in body fat declined slowly, with detectable residues present 23 months later in the fat and butterfat of the most contaminated animals.

FLUORESCENT DYES AND THIN LAYER CHROMATOGRAPHY APPLIED TO DETECTION OF VITAMIN D AND RELATED STEROLS IN TUNA LIVER OIL. P. S. Chen, Jr. (School of Med. and Dentistry, Univ. of Rochester, Rochester, New York). *Anal. Chem.* **37**, 301–02 (1965). Thin layer chromatography (TLC) methods with their well recognized advantages in resolution, speed and sample capacity have been successfully applied to the separation of vitamin D and related sterols. In this communication we wish to point out certain qualitative advantages in using some fluorescent dyes for the detection of sterol spots and present the successful demonstration of vitamin D in a naturally occurring biological source, tuna liver oil, run directly without extraction or pretreatment on TLC plates.

• Drying Oils and Paints

RAW MATERIALS FOR PAINT OBTAINED FROM FISCHER-TROPSCH PROCESS. A. Brink. *Plastics, Paint, Rubber* **8** (2), 69, (1963). A summary of a talk in which details of the Fischer-Tropsch process were given and the syntheses of raw materials of interest to the paint industry as film formers, plasticisers, solvents and driers, using starting materials such as ethylene, propylene and acetylene, were described. (Rev. Current Lit. Paint Allied Ind., No. 265).

SYNTHESIS OF ALKYD VARNISH RESINS MODIFIED WITH AROMATIC MONO-BASIC ACIDS. V. N. Izyumov and T. L. Koposova. *Lakokras Mat.* **1963**(5), 2–5. A series of new varnish compositions have been prepared on the basis of a pentaerythritol alkyd modified with *di-tert.*-butylbenzoic acid and linseed oil or synthetic fatty acids. The coatings obtained were found to be moisture and weathering resistant, hard and elastic. (Rev. Current Lit. Paint Allied Ind., No. 264).

DETERMINATION OF THE PROTECTIVE PROPERTIES OF VARNISH AND PAINT COATINGS FROM THEIR OHMIC RESISTANCES. P. I. Vasserman and V. V. Chebotarevskii. *Lakokras. Mat.*, **1961**, No. 2,

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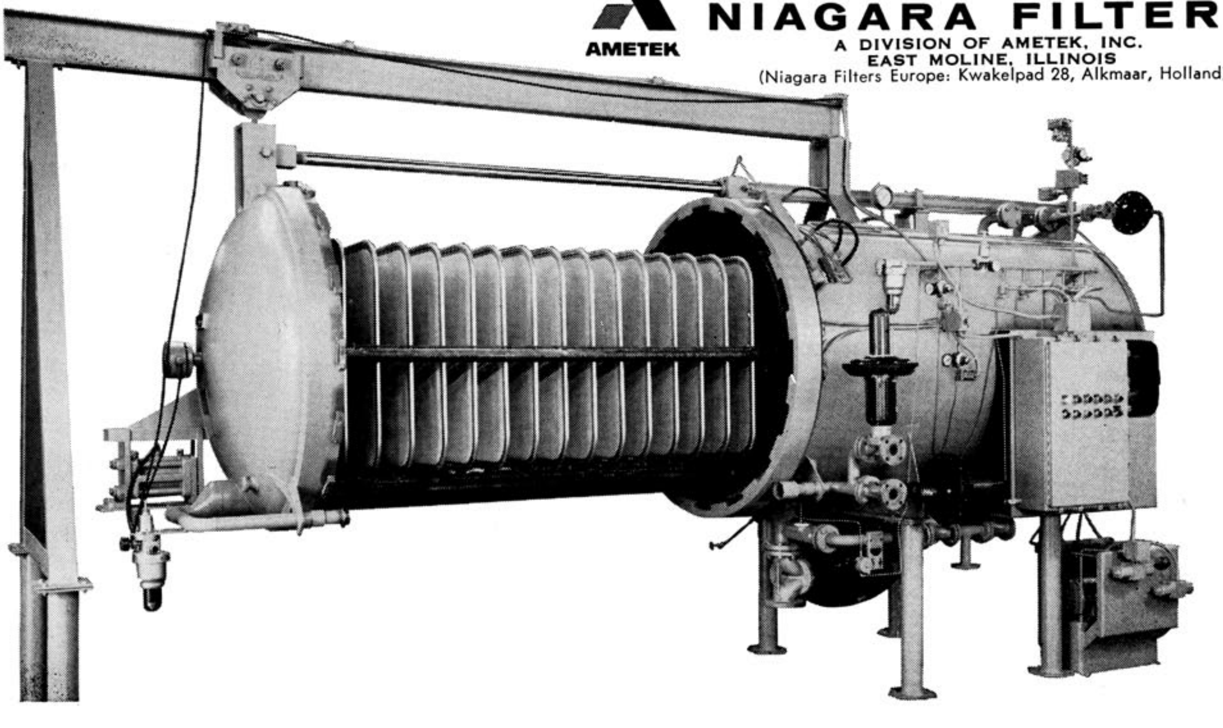

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35–44; Ref. Zh Khim., 1961, No. 24, 572, Abs. 24P352. The authors described an electrochemical method of determining the anticorrosive properties of varnish and paint coatings by measuring the ohmic resistances of free films from the decrease of the circuit voltage which results from the wetting of the films. The data obtained are in good agreement with the results of tests made in a moist chamber and in salt-containing fog as well as with data on vapour permeability and swelling in water. It is noted that the protective effect of the coating depends not only on the type of the film-forming substance (perchlorovinyl, butyl methacrylate, polyvinyl butyral, glyptal and ethyl cellulose binders were tested) but also on the type of pigment, its content in the lacquer, its dispersity, the method of applying the coating, the number of layers and the drying conditions. (Rev. Current Lit. Paint Allied Ind., No. 266).

The Japanese paint industry. H. F. De Jong. *Verfkroniek* **37**(2), 48, (1964). Figures are given for the production of different types of paints during the period 1950–1962 and also export statistics, which are compared with the considerably larger figures for the Netherlands. (Rev. Current Lit. Paint Allied Ind., No. 266).

Synthetic acids from petroleum and their application in the paint and varnish industry. P. Bruin. *Double Liaison* **1964**(102), 95–103. Synthetic acids obtained from olefins, CO and H_2O are branched, unlike natural fatty acids. Their use is considered with reference to the preparation of driers (and the effect of branching on solubility) and the formulation of alkyd resins and polyvinyl ester latex paints (and the resulting modification of mechanical and chemical properties). (Rev. Current Lit. Paint Allied Ind., No. 267).

Trichodesma zeylanicum seed from Tanganyika. Anon. *Tropical Products Inst. Rept. No.* **29**/**61**, 7 pp (1962). The oil extracted from *Trichodesma zeylanicum* seed had the following characteristics: S.G.(20/20C) 0.9224, n_D^{20} 1.4781, sap. val. 192.9, A.V. 0.56, unsap. 1.5%, I.V. 166.2 and dried in 4 days without driers. It is considered to be useful as an extender oil for linseed in linoleum manufacture. (Rev. Current Lit. Paint Allied Ind., No. 267).

Aleurites montana × fordii hybrid seeds from Nyasaland. Anon. *Tropical Products Inst. Rept. No.* **37**, 3 pp (1962). The seeds were obtained from an F_1 hybrid. The oil had the following characteristics: free acids 2.8%, gel time 18¼ mins., elaeostearic acid content 71%. (Rev. Current Lit. Paint Allied Ind., No. 267).

African drying oils. Anon. (Tropical Products Inst.) *Paint Manuf.* **33**(11), 420 (1963). Thin layer chromatography is being used to study the differences between the oils from *Aleurites fordii* and *A. montana*. The seed from *Trichodesma zeylanicum*, a pernicious weed in East Africa, contains 28.8% oil of I.V. 166. The oil is similar to linseed oil in many respects. (Rev. Current Lit. Paint Allied Ind., No. 267).

Use of linseed oil/cyclopentadiene/indene copolymers in anticorrosive paint media. F. Sonntag. *Deutsche Farben-Z.* **17**(12), 562 (1963). The copolymers are prepared from linseed oil (60), dicyclopentadiene (20) and indene (20 pts.). (Rev. Current Lit. Paint Allied Ind., No. 267).

Protective coating of machines against softening in fires. H. H. Reinsch. *Ind.-Lack.-Betrieb.* **31**(8), 272–3 (1963). Fires in industrial plants often lead to a softening or partial melting of machines, apparatus and equipment. The damage can be reduced by special fire-protective lacquers but the price is prohibitive. Only polytetrafluoroethylene has proved completely non-inflammable but less expensive synthetic materials can be rendered flame-proof by certain additions, *e.g.*, polyvinyl chloride with the addition of plasticiser and Sb oxide. Isano oil, which reacts with O_2 with explosive violence when heated, acts as an insulator against flames so that the metal parts do not reach the softening point so readily. Fire protective paints are recommended which contain isano oil, linseed oil, chloroparaffins and polyamide resins or diisocyanates. Br compounds act as fire retardants and a combination of tetrabromophthalic anhydride with alkyd resins is very good. Barrier films forming protective foams on heating and also certain emulsion paints which produce foams on exposure to fire can be used. (Rev. Current Lit. Paint Allied Ind., No. 267).

An accelerated leaching rate technique for cuprous oxide based anti-fouling paints. F. Marson (Australian Defense Sci. Service, Dept. of Supply, Def. Stand. Lab., Maribyinong, Victoria, Australia). *J. Oil Colour Chem. Assoc.* **47**(5), 323–34 (1964). A new technique for obtaining reproducible, accelerated leaching rate-time curves for cuprous oxide based anti-fouling paints is described together with the apparatus used. The technique should be useful for quality control and for predicting the practical performance of these paints.

Paint industry. Anon. *Chem. Eng. News* **43**(5), 86–96; **43**(6) 80–92 (1964). The manufacturing technology and marketing practices of the paint industry in the United States are reviewed.

• Detergents

Comparison of soaps and detergents as insecticides, fungisides, and antibiotics. S. Darnell. *Lipidos* **22** (Jabones section), 37–39 (1963). Potassium laurate, palmitate, or oleate solutions (10% in water) were effective insecticides against adult larva aphids, cinch bugs, and flies. Studies with fungi pathogenic to the olive tree showed fungicidal effects against *Poliporus fulvus*, *Ciclocenium oleaginum*, and *Antennaria olacophilia*. Little or no fungicidal effect was observed with *Gloesporium olivarum*, *Macrophoma dalmatica* and *Rosellena necatrix*.

Rapid method for analysis of toilet soaps. L. Montenegro and A. Prieto (S. A. La Toja, La Toja, Pontevedra, Spain). *Grasas y Aceites* **15**, 69–71 (1964). A rapid method is described for determining the % fatty acid, % chloride, free alkalinity, and saponification number of toilet soaps using EDTA, $AgNO_3$, and H_2SO_4 titrations.

Test shows alcohol ethoxylates biodegradable. Anon. *Chem. Eng. News* **42**(49), 58–60 (1964). Three 11-15 carbon chain, linear secondary alcohol ethoxylate surfactants were tested for biodegradability: a nonionic 9-mole ethylene oxide adduct, an anionic ammonium salt of a sulfated 3-mole adduct, and an anionic sodium salt of a sulfated 3-mole adduct. With efficient aerobic waste treatment, 90–93% biodegradation was observed with no serious foaming problems.

ON THE ADSORPTION OF COUNTERIONS AT THE SURFACE OF DETERGENT MICELLES. D. Stiger (W.R.R.L., Albany, Calif.). *J. Phys. Chem.* **68**, 3603–11 (1964). A model of an ionic micelle is presented in which the electric double layer is divided into a Gouy-Chapman layer outside and a Stern layer inside the shear surface. In the Stern layer the discrete nature and the size of the counterions and of the ionic headgroups are introduced as well as a specific adsorption potential $\Delta\mu^\circ$ of the counterions. The potential $\Delta\mu^\circ$ is calculated as a residue from the equation for the adsorption equilibrium of counterions between the Stern layer and the bulk solution. The theory is applied to micelles of sodium dodecyl sulfate and of dodecyl ammonium chloride, both in aqueous sodium chloride solutions. Using the charge and size of kinetic micelles as determined from various experiments, $\Delta\mu^\circ \approx 0.5kT$. There is no significant trend of $\Delta\mu^\circ$ with ionic strength. The uncertainty in $\Delta\mu^\circ$ is due mainly to uncertainties in the precise location of the shear surface, in the dimensions of ions, and to approximations in the ion distribution inside the Stern layer. The results, although developed for prolate ellipsoidal micelles, are not very sensitive to micelle shape. From the repulsion between the micelle core with low dielectric constant and an ion in water, one expects for the sodium counterion $\Delta\mu^\circ \approx 0.25kT$ and for the chloride counterion $\Delta\mu^\circ \approx 0.4kT$. The present results suggest that dehydration of counterions at the micelle surface is insignificant and that the distribution of small ions is governed almost wholly by electrostatic and dimensional factors.

THE PENETRATION OF WATER AND AQUEOUS SOAP SOLUTIONS INTO FATTY SUBSTANCES CONTAINING ONE OR TWO POLAR GROUPS. A. S. C. Lawrence, A. Bingham, C. B. Capper and K. Hume (Dept. of Chem., Sheffield University, Sheffield, Eng.). *J. Phys. Chem.* **68**, 3470–76 (1964). The minimum temperature of penetration of aqueous soap solutions into amphiphiles has been measured for the permutations of the even number alkyl-

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trimethylammonium bromides from C_8 to C_{18} and fatty acids and alkanols from C_{12} to C_{20}. The penetration of water into amphiphiles has been studied by freezing point, vapor pressure, and X-ray diffraction methods and it has been shown that this considerable solubility of water in polar fatty substances, themselves insoluble in water, is general. Alkanols form a solid solution melting to liquid, fatty acids only liquid; fatty amines form a binary liquid crystalline phase and so do substances containing two OH groups, such as monoglycerides, hexadecane-1,2-diol, and α-hydroxypalmitic acid. Monolaurin forms a shallow eutectic with lauric acid while the T_{pen} minimum into this system forms a very deep one at the same composition which may be important in the intestinal absorption of fat. The monolaurin-water system above T_{pen} is a single liquid crystalline phase up to about 33% water; beyond this and to high dilution, the system is a suspension of 1c spherulites in water. It is pointed out that the phosphatides and cerebrosides are almost certainly similar, each with its T_{pen} dependent upon the fatty acids present.

RESEARCH ON A FAST METHOD FOR WATER DETERMINATION IN SOAPS. A. Prevot (Lab. of the Inst. for Fats and Oils, Paris, Fr.). *Rev. Franc. Corps Gras* 11, 599 (1964). The classic methods for water determination in soap, that is, loss in weight at 105C, azeotropic extraction, Karl Fisher titration, are all too time consuming. More rapid methods were examined such as electrical conductivity, dielectric constant and hyperfrequency absorption. Hyperfrequency absorption seems to be the best suited since it permits continuous measurement.

ALKYLOLAMIDES IN "SOFT" DETERGENTS. Part II. E. A. Knaggs, J. Yeager, H-K Kuo and L. Varenyi (Stepan Chemical Co.). *Soap Chem. Specialties* 41, 64, 66, 68, 73, 75 (1965). Alkylolamides, particularly mono-alkylolamides and their ethoxylates, have been shown to be effective foam boosters. However, each detergent system requires individual evaluation to determine the most effective foam booster system. LIPA has been shown to boost the initial foam of linear C_{12} and C_{13} ABS and to greatly enhance foam stability in the presence of sebum oil and clay. The longer chain monoalkylolamide ethoxylates are excellent nonionic surfactants. The alkylolamides and their ethoxylates are readily biodegradable.

DEGRADATION STUDIES ON BRANCHED CHAIN EO SURFACTANTS. K. A. Booman, K. E. Daugherty, J. Dupre, and A. T. Hagler (Rohm & Haas Co.). *Soap Chem. Specialties* 41, 60–3, 116, 118–20 (1965). The extensive degradation of *p*,t-octylphenoxynonaethoxyethanol (OPE_{10} "Triton" X-100) in activated sludge units, in septic tanks and in the shake test is described in detail. Acceptable reduction of foaming has been observed in bench-scale activated sludge units. Results suggest that OPE_{10} in waste waters will not cause any problem if adequate sewage treatment practices are employed.

REVOLUTION IN DETERGENTS. D. Justice and V. Lamberti (Lever Brothers Co.). *Chem. Eng. Prog.* 60 (12), 35–40 (1964). The detergent industry has had a revolution in providing more biodegradable detergents with the objective of eliminating or minimizing the detergent factors in water pollution. The authors review the background and chemical technology involved in the switchover from so-called hard to soft detergents such as linear alkylate sulfonate.

LAS: MAJOR DEVELOPMENT IN DETERGENTS. R. D. Swisher (Monsanto Co.). *Chem. Eng. Prog.* 60 (12), 41–5 (1964). The detergent industry of the United States is in the process of replacing its most important surfactant base, alkylbenzene sulfonate with the more biodegradable product, linear alkylate sulfonate—LAS for short. The nature, properties, and biodegradation of LAS are reviewed.

STABLE DETERGENT COMPOSITION. W. G. Mizuno and T. M. Oberle (Economics Laboratory, Inc.). *U.S. 3,166,513.* A stable detergent composition consists of: A) builder salts in major amount comprising 1) from 15–60% by weight based on the final composition of at least one alkali metal phosphate in which the ratio of Me_2O to P_2O_5 is from 1 to 3:1, Me being selected from the class consisting of sodium and potassium; 2) from 1–50% of at least one solid, water-soluble alkali metal silicate in which the ratio of SiO_2 to Me_2O is 0.5 to 3.22:1, Me being selected from the class consisting of sodium and potassium; 3) from 0–28% of sodium carbonate; B) from 5–30% of a caustic material selected from the group consisting of NaOH and KOH; and C) from 1–5% of a chlorinating agent consisting of granular potassium dichlorocyanurate having a particle size distribution of at least 60% by weight through U.S. Standard Screen No. 50 and retained on Screen No. 100.

PROCESS FOR PREPARING SOFT CHEESES WITH SUCRESTERS. L. Nobile. *U.S. 3,164,477.* A process for preparing soft cheeses of improved stability and of high nutritive value comprises adding to the milk, during cheese preparation, a product obtained by transesterification of sucrose with a member of the group consisting of edible natural triglycerides and lower alkyl esters of edible aliphatic acids containing from 6 to 30 carbon atoms. The final product is substantially free from unreacted sucrose.

EMULSIFIER FOR CAKE BATTERS. G. Dalby and H. C. Fisher (The H. C. Fisher Co.). *U.S. 3,164,476.* An emulsifier for cake batters comprises the following: glyceryl monostearate, 9–13 lbs.; glycerine, 1.5–3.5 lbs.; sorbitan polyexyethylene monostearate, 11–15 lbs.; sorbitan monostearate, 7–10 lbs.; water, 65–75 lbs.; and sodium propionate, 6–15 oz.