use of acetals and trityl groups the number, type, and positions of the fatty acid groups in the glycerol moiety were varied systematically. The reaction products were purified, their purities were established, and their melting points, viscosities, densities, and refractive indices were determined.

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ABSTRACTS . . . . R. A. REINERS, Editor

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• Fats and Oils

NEPHELOMETRIC DETECTION OF LIPIDES IN CHROMATOGRAPHIC COLUMN EFFLUENTS. A. C. Arcus (Nutrition Research Dept., Medical School, Dunedin, New Zealand). *Anal. Chem.* 31, 1618–1620 (1959). A relatively nonspecific method of roughly estimating lipides in chromatographic column effluents is based on the light-scattering power of the suspension formed when the lipide is precipitated from methanolic solution containing 0 to 1 mg. per ml. by the addition of water. The method is applicable only to substances soluble in pure methanol and insoluble in a mixture of 1 part of methanol with 2 parts of water, but suggestions are made for its extension to other substances. The smallest detectable concentration is of the order of 2 to 20 γ per ml., depending on the substance. Application to chromatography is illustrated.

PAPER CHROMATOGRAPHY OF THE SATURATED FATTY ACIDS. M. A. Buchanan (The Inst. of Paper Chemistry, Appleton, Wis.). *Anal. Chem.* 31, 1616–1618 (1959). In a new procedure for the paper chromatography of the saturated fatty acids, the developer reacts with the unsaturated acids to form products which readily separate from the saturated acids. Hydrogen peroxide and formic acid are added to the usual acetic acid-water developers used for reverse-phase chromatography of the fatty acids. The new procedure permits the separation of small amounts of saturated acids from large amounts of the unsaturated acids, and is suitable for tentative identification of the even-numbered straight-chain acids from lauric acid to lignoceric acid.

DESIGN CONSIDERATIONS OF A GAS CHROMATOGRAPHY SYSTEM EMPLOYING HIGH EFFICIENCY GOLAY COLUMNS. R. D. Condon (The Perkin-Elmer Corp., Norwalk, Conn.). *Anal. Chem.* 31, 1717–22 (1959). The application of Golay columns, using highly sensitive ionization detectors, to gas chromatography is described. Samples with a wide boiling point range, as well as those with close range boiling points, can be separated in a relatively short time with high efficiencies. Samples with low vapor pressures can also be analyzed. Low concentration analysis should also benefit from these disclosures. Gas chromatography as an analytical tool may be extended to new areas not heretofore possible with current instrumentation.

DETERMINATION OF HYDROXYL NUMBERS BY NEAR-INFRARED ABSORPTION. C. L. Hilton (Research Center, U. S. Rubber Co., Wayne, N.J.). *Anal. Chem.* 31, 1610–12 (1959). Duplicate analyses by the acetylation procedure for hydroxyl number require 1.5 man-hours and 3 hours of elapsed time. A faster method of analysis was desired. Duplicate determinations of hydroxyl numbers of certain polyesters and polyethers by near-infrared absorption analysis in the region from 2.0 to 3.2 microns can be accomplished in 0.5 hour using a Beckman Model DK-2 spectrophotometer. This represents a saving of 1 man-hour and 2.4 elapsed hours per duplicate determination. Results with samples thus far analyzed show an average difference of less than 1.0% relative between the chemical and the near-infrared methods.

BUTTERFAT OXIDATION. EVALUATION OF LEA'S ALDEHYDE DETERMINATION METHOD. A. Tamsma and R. D. Powell (Dairy Industry Section, Iowa Agr. Exptl. Sta., Ames, Iowa). *J. Agr. Food Chem.* 7, 643–6 (1959). Lea's method for determination of aldehyde in fats in excellent for *n*-heptanal. For normal aldehydes with more than seven carbon atoms, recovery decreased with increasing chain length and limiting values were reached with C_9 and C_{10} aldehydes. For ''aldehydes'' from autoxidized milk fat the value found by Lea's method is arbitrary, because these carbonylic compounds do not behave like heptanal. Incomplete recovery can be caused by low solubility in water and low reactivity with bisulfite. Too high recovery may be obtained with unsaturated carbonyl compounds as a result of reaction of the double bonds. Reaction products and yields were examined by isolation of the aldehyde by solvent extraction after decomposition of the bisulfite complex. ''Milk-fat aldehyde'' was of ketonic character; the yield was about one-third to one-tenth as compared to synthetic aldehyde.

CONTINUOUS RECTIFICATION OF SYNTHETIC FATTY ACIDS. A. Ya. Koldovkin. *Khim. i Tekhnol. Topliv i Masel* 4(6), 67–9 (1959). A critical discussion of the paper by Levin (*C. A.* 52, 5856). (*C. A.* 53, 17573)

IDENTIFICATION OF OLEUROPEIN IN OLIVE OIL AND ITS APPLICATION IN ANALYSIS OF MIXTURES OF EDIBLE OILS. R. Diaz Blasco and L. N. Pizzorno. *Anales direc. nacl. quim.* (Buenos Aires) 10(19), 13–6 (1957). Oleuropein, a glucoside, is present to the extent of 1% in olives and 0.3% in olive leaves. Principal method of analysis is Hoepfner's reaction (*C. A.* 53, 9112) which can be used in paper chromatography after ascending development with 80 parts of 1.25% sodium chloride and 20 parts of 95% ethanol for 8 hours. Sensitivity of the test allows identification of 2 parts per million or 10 micrograms of oleuropein. A method for detection of adulteration with olive oil based upon these tests is proposed. As rancidity increases, oleuropein concentration decreases. The possibility that oleuropein is a natural antioxidant is being investigated. (*C. A.* 53, 17539)

SOME LIMITATIONS TO THE KINETIC STUDIES ON AUTOXIDATION OF FATTY-ACID ESTERS OF DIFFERENT UNSATURATION. N. A. Khan (East Regional Labs., Dacca, India). *Pakistan J. Sci. Research* 10(4), 149–54 (1958). Reduction of the oxygenated products which are formed by autoxidation of methyl oleate at 24–6°, 45°, and 350° to 5% peroxide content yielded no polymer. Reduction of the oxygenated products formed by autoxidation of methyl oleate at 60°, 75°, and 100° for 3 weeks, 3 days and 30 hours, respectively, yield 60, 9, and 26% of polymers, respectively. Methyl linoleate was autoxidized to 5% peroxide content in the dark at 0°. The peroxides were concentrated by countercurrent extraction. Reduction gave monohydroxystearic acids. Analysis indicated the production of almost 100% methyl *cis, trans*-conjugated-monohydroxylinoleate. Thus methyl linoleate forms monomeric monohydroperoxide with the conjugation of the double bonds during the initial stages of autoxidation. Under somewhat more drastic conditions, the hydroperoxides formed by autoxidation of methyl linoleate decomposed without initiating any polymer formation. When methyl linoleate was autoxidized at 24–6°, the reduced peroxide concentrate gave 16–26% polymer content. Methyl linolenate behaved similarly to methyl linoleate, except that changes in rates of reaction were more rapid for methyl linolenate. Polymer content for methyl linolenate autoxidized at 24–26° was 31.0–38.0%. (*C. A.* **53**, 16943)

The Presence of C_{20} Unsaturated Fatty Acids in Tall Oil. B. L. Hampton and D. Leavens (The Glidden Co., Org. Chem. Div., Port St. Joe, Fla.). *J. Org. Chem.* **24**, 1174 (1959). C_{20} unsaturated fatty acids of vegetable origin were shown to occur in tall oil from the southern pine.

The Decomposition of Egg Lecithin. Angela Vercillo. *Rend. ist super. sn. sanità* 22, 23–31 (1959). The effect of various foods on the lecithin content of egg yolk mixed with them, was studied. Olive oil, either alone or with vinegar, lemon juice, or salt, did not affect the lecithin content. Milk and yeast reduced it slightly. Malt extract had a mild effect, but corn (maize) flour had a pronounced lecithinase activity. A mixture of egg yolk and wheat flour, held at 40°, showed a lecithinase activity which increased proportionally with the ash content of the flour. Malt extract had no effect on the activity of the flour, but the action of yeast was pronounced. Acids (sulfuric, hydrochloric, citric, acetic, and ascorbic) acted as inhibitors; sodium hydroxide, sodium sulfate, and magnesium salts were activators. (*C. A.* **53**, 16238)

The Nonsaponifiable Fraction of Menhaden Oil. W. A. Mosher, W. H. Daniels, J. R. Celeste, and W. H. Kelley (Univ. of Delaware, Newark). *Comm. Fisheries Rev.* 20(11a), 1–6 (1958). An average yield of 1.68% of nonsaponifiable fraction was fractionated into cholesterol and other sterols, squalene, and a remainder that consisted of pigments. These three fractions accounted for nearly 75% of the total nonsaponifiable fraction in the oil. Squalene was fractionated from petroleum ether on a column of alumina by the formation of three hydrochloride isomers that were found to be identical with squalene. The quantity of squalene in the nonsaponifiable fraction was about 5%. About 30% of the nonsaponifiable fraction was steroids. Of the steroid fraction 90% was cholesterol. The pigment fraction, a complex mixture of substances of fairly high molecular weight, contained carotenes tentatively identified as α-, and γ-carotene, zeaxanthin, violaxanthin, xanthophyll, and two oxygenated carotenes of undetermined structure. The carotene pigments contribute to the color in menhaden oil, and they are responsible for the poor stability of that color. (*C. A.* **53**, 17538)

Hydrolysis of Fats and Oils. I. The Use of Cation-Exchange Resin for Twitchell Splitting of Chrysalis Oil. Katsuya Koga. *Kagoshima Daigaku Nôgakubu Gakujutsu Hôkoku* 7, 149–55 (1958). Sodium salt of dibutylnaphthalenesulfonic acid caused the hydrolysis of a chrysalis oil in the presence of cation-exchange resin, Dowex-50, but could not hydrolyze it in the absence of Dowex-50. Dibutylnaphthalenesulfonic acid could cause a considerable hydrolysis of the oil in the absence of the resin, and the addition of the resin showed no influence on the hydrolysis of the oil in this case. Therefore, the effect of the resin seemed to be due not to its catalytic action but to liberation of free dibutylnaphthalenesulfonic acid. The hydrolysis of the oil by dibutylnaphthalenesulfonic acid was increased catalytically by sulfuric acid.

II. Saponification Velocity of Chrysalis Oil in the Organic Solvent System. *Ibid.* 156–62. Saponification velocity was influenced by solvent for potassium hydroxide, decreasing with carbon number of alcohol (butyl alcohol > ethyl alcohol > methyl alcohol). Saponification was accelerated by the increasing concentration of potassium hydroxide at about the same ratio in different solvent systems. (*C. A.* **53**, 17538)

Effect of Oxidation of Oil on the Formation of a Protein Membrane Around Oil Droplet. Kaichiro Kuroda, Yukihiko Mishiro, and Mimeko Oshima (Univ. Tokushima). *Tokushima J. Exptl. Med.* 5, 1–7 (1958). Droplets of raw vegetable oil dispersed in egg-white solution are spherical. If the oils are oxidized, protein membranes appear around the surfaces of the oil droplets, and they become disk shaped. Appearance of protein membranes increases with acid value of the oxidized oil. Formation of protein membranes is attributed mainly to formation of free fatty acids and other decomposition products. (*C. A.* **53**, 16246)

Marine Edible Fishes. I. Distribution of Oil and Vitamin A in the Skin, Flesh, and Liver of Edible Fishes of Karachi Waters. A. Hameed Khan and S. Abdul Haq (Pakistan Council Sci. and Ind. Research, Karachi). *Pakistan J. Sci. Ind. Research* **1**, 309–11 (1958). Distribution of vitamin A in liver, flesh and skin oil was determined in fishes from the Karachi (Pakistan) coast. Generally, liver oil of carnivorous fish was high in vitamin A, and that of plankton eaters was low in vitamin A. Differences in vitamin A of flesh and skin between different species are discussed. (*C. A.* **53**, 16408).

Influence of Additions of Pure Carotene and Carrot Lipide Fractions on the Stability of Cooking Fats During Storage. E. A. Arisheva (Inst. Food Ind., Krasnodar). *Izvest. Vysshikh Ucheb. Zavedenii, Pishchevaya Tekhnol.* **1959**, No. 1, 104–8. Two mg. % of carotene and lipide fraction of carrots were added to fat mixtures (80% hydrogenated sunflower oil and 20% purified sunflower oil). Introduction of carotene into the fats increased the storage stability and improved the organoleptic properties. Carotene from carrots increased the stability to a greater degree than crystalline carotene. (*C. A.* **53**, 16407)

Determination of the Acidity of Olive Oils. A. Teissier. *Ann. fals. et fraudes* **52**, 207–14 (1959). The water contained in oils from Morocco is usually acidic. This acidity, apparently not significant, is removed by prolonged and repeated washing. It is more convenient, however, to filter the warmed oil through paper, which removes the water completely without loss of the fatty acids dissolved in the oil. (*C. A.* **53**, 16407)

Gallates as Antioxidation Ingredients in Melted Hog Fat in Tins. V. Pokorný (Meat Research Inst., Brno, Czech.). *Sborník Ceskoslov akad. zeměděl. věd. Vet. Med.* **4**, 235–44 (1959). Gallates (propylgallate, octylgallate, dodecylgallate, Synoctant, Syndodant, and Antracine) were found to be suitable antioxidants in melted hog fat stored at an air temperature of 6-12° in tins. (*C. A.* **53**, 16407)

The Detection of the Refining of Lard. I. The Aniline Point. H. P. Kaufmann and J. G. Thieme. *Fette, Seifen, Anstrichmettel* **58**, 585–92 (1956). Review with 15 references.

II. The Ultraviolet-Absorption Spectrum. H. P. Kaufmann, J. G. Thieme and F. Volbert. *Ibid.* 995–6. (*C. A.* **53**, 16407)

Preservation of Sunflower Seed Grist in Silo-Type Warehouses. F. G. Kirillov, V. A. Kukhlevskaya (Central Control Lab. Oil and Fat Ind., Council of Natl. Econ., Krasnodar), and T. I. Yuskevich. *Masloboino-Zhirovaya Prom.* 25(4), 5–7 (1959). The data show that the temperature of solvent-extracted sunflower seed grist at the time of storage in the silo should not exceed 30–40°, and its moisture content should be maintained at a 5–6% level. During 43 days of storage, the acid number and the peroxide number of the residual oil in solvent-extracted sunflower seed grist increased from 12.64 to 15.44 and 0.03 to 0.6, respectively. During this time, the total protein content of solvent-extracted sunflower seed grist remained practically unchanged. The nitrogen content of the water-soluble protein fraction decreased, however, from 5.73 to 4.51; that of the water insoluble fraction increased from 1.91 to 2%. (*C. A.* **53**, 16559)

Grain Wax Components. Fractionation of Sorghum Grain Wax. J. L. Dalton and H. L. Mitchell (Kansas Agr. Exptl. Sta., Manhattan, Kan.). *J. Agr. Food Chem.* **7**, 570–73 (1959). Crude sorghum grain wax was isolated by extracting the grain with Skellysolve B and precipitating the wax with acetone. The crude wax was fractionated by adsorption on columns of tricalcium phosphate and silicic acid. A weakly adsorbed paraffin fraction was eluted from the silicic acid column with a small quantity of Skellysolve B. A more strongly adsorbed fraction, obtained by additional elution with Skellysolve B, was identified as esters. A third fraction was eluted with 2% acetone in Skellysolve B and shown to consist of alcohols. Melting points with x-ray diffraction studies indicated that each fraction was a mixture of homologs, rather than a single compound. Of the material recovered, approximately 5% was paraffins, 49% was esters, and 46% was free alcohols.

The Phosphatidyl Inositol of Peas. A. C. Wagenknecht, L. M. Lewin, and H. E. Carter (Dept. of Food Sci. and Tech., New York State Agr. Exptl. Sta., Geneva, N.Y., and Div. of Biochem. Noyes Lab. of Chem., Univ. of Illinois, Urbana, Ill.). *J. Biol. Chem.* **234**, 2265–68 (1959). The mixed calcium-magnesium salt of phosphatidyl inositol was obtained, by a relatively simple solvent fractionation procedure, from lyophilized frozen peas which were stored at −17.8° for 1 month before lyophilization. Methods for preparing the soluble sodium and potassium salts are reported. Elementary analyses and data on the hydrolysis products show that the parent compound is a monophosphoinositide which probably possesses a phophatidyl inositol structure. The fatty acids were shown to possess C_{16} and C_{18} chain lengths.

Complexity of the Mixture of Fatty Acids from Tubercle Bacillus. Acids with Less Than Twenty Carbon Atoms. C. L. Agre and J. Cason (Chem. Labs. of the Univ. of California, Berkeley, Calif.). *J. Biol. Chem.* **234**, 2555–59 (1959). All normal fatty acids from C_{14} through C_{19}, also a branched isomer at each molecular weight above C_{14} were present in acids in the C_{14} to C_{19} range isolated from tubercle bacillus. One-third of the total distillable acids was palmitic acid; an additional one-third was at the C_{18} and C_{19} range. The only branched acid present in amount greater than about 1% was the branched C_{19} acid, present in about 10% quantity. 10-Methyloctadecanoic acid was identified in the branched C_{19} acid fraction. 10-Methyl-heptadecanoic acid was identified in the branched C_{18} acid fraction.

The Application of Infrared Spectroscopy to Fats. I. The Literature. H. P. Kaufmann, F. Volbert, and G. Mankel (German Inst. for Fat Research, Münster, Westf.). *Fette, Seifen, Anstrichmittel* **61**, 547–559 (1959). The authors have reviewed the literature concerning the applications of infrared spectroscopy to fat chemistry. The following subdivisions were made: fatty acids, fatty acid derivatives, glycerides, autoxidation of fats and oils, co-polymers, and phospholipids. Two hundred forty-nine literature references are listed.

Effect of Light Radiation on the Autoxidation of Fats. II. Oxidation Products and Characteristics. H. P. Kaufmann and M. Vogelmann (German Inst. for Fat Research, Münster, Westf.). *Fette, Seifen, Anstrichmittel* **61**, 561–565 (1959). The products arising from the autoxidation of linseed oil were investigated with the aid of paper chromatography and infrared spectroscopy. In order to study the course of autoxidation the characteristics of the oil were determined at various time intervals. Hexanal and heptanal were isolated and identified as autoxidation products. The peroxide and saponification numbers increased and the iodine value decreased with the time of oxidation. The index of refraction also increased during the autoxidation.

The C_{16}-Polyunsaturated Acids of Herring Oil. E. Klenk and H. Steinbach (Inst. Biological Chemistry, Univ. Cologne). *Z. Physiol. Chem.* **316**, 31–44 (1959). The C_{16}-polyunsaturated ester mixture was separated from esterified herring oil by vacuum distillation. This mixture was further fractionated by countercurrent distribution into tetraene-, triene-, diene-, and monoene-acid fractions. By oxidative and reductive degradation of the ozonides the following isomer mixtures were shown to be present: $\Delta^{6,9,12,15}$- and $\Delta^{4,7,10,13}$-hexadecatetraene acid; $\Delta^{6,9,12}$-, $\Delta^{4,7,10}$-, $\Delta^{7,10,13}$-, $\Delta^{9,12,15}$-hexadecatriene acid; $\Delta^{9,12}$-, $\Delta^{6,9}$-, and $\Delta^{7,10}$- hexadecadiene acid; Δ^{9}-, Δ^{6}-, and Δ^{7}-hexadecenoic acid. In each of the four isomer mixtures, the first-named acid of the group was preponderant and the others were present in smaller amounts (5–20%).

U. S. Soybean Oil in World Markets. D. J. Bunnell (Lever Brothers Co.). *Soybean Digest* 19(12), 6–9 (1959). Export markets for surplus soybean oil are discussed.

Recent Progress in Soybean Utilization Research. J. C. Cowan and W. C. Witham (Northern Regional Research Lab., Peoria, Ill.). *Soybean Digest* **19**(12), 14–15 (1959). Recent research is discussed under the following headings: flavor stability of soybean oil, vinyl copolymers from soybean fatty alcohols, aldehyde oils, and soybean oil meal.

Countercurrent Extraction of Sterols. G. A. Fevig, J. W. Greiner, and K. W. Riebe (The Upjohn Co.). *U. S. 2,905,677.* A process is described for the separation and purification of stigmasterol and sitosterols from a solid phytosterol mixture.

Preparation of Pure Myristic Alcohol. M. Roussos and Y. Bourgeois (Soc. des Produits Chimiques de Bezons). *U. S. 2,897,243.* Castor oil is reduced with alkali. Octanol-2 and octanone-2 are distilled from the reaction mixture. Myristyl alcohol is recovered from the residue by steam distillation.

Epoxidized Diacetoglycerides. D. Swern and H. B. Knight (U. S. A. Secy. Agr.). *U. S. 2,898,348.* The desired product consists of the epoxidized diacetoglycerides from lard and/or tallow fatty acids.

Sizing Compositions Containing Fatty Acid. H. G. Arlt, Jr. (American Cyanamid Co.). *U. S. 2,901,371.* A self-emulsifying size for paper is a blend of a higher aliphatic ketene dimer with less than 5% by wt. of a higher fatty acid as emulsifying agent and emulsion stabilizer.

Additional Products of Fatty Acids and Unsaturated Nitro Compounds. H. M. Teeter, M. J. Danzig, and J. C. Cowan (Secy. Agr., U. S. A.). *U. S. 2,901,495.* A long chain, conjugated polyolefinic monocarboxylic fatty acid is reacted with a compound having the radical $-CH{=}CH-NO_2$.

New Chemical Compounds for Addition to Mineral Oils. R. I. Gottshall and R. T. Kern (Gulf Oil Corp.). *U. S. 2,902,499.* The desired products are (1) condensation products of a dimeric acid derived from a di- or tri-unsaturated fatty acid with maleic acid or anhydride; and (2) fatty acid amine salts, amides or esters of the condensation product.

Production of Mono-Esters. M. K. Smith (The Baker Castor Oil Co.). *U. S. 2,902,500.* A process is described for the production of mono-esters by the reaction of a triglyceride of a C_{11} to C_{22} hydroxy fatty acid with a polyhydric alcohol containing no more than one primary hydroxyl group and at least one secondary hydroxyl group under anhydrous conditions at 20° to 50° in the presence of an alkali metal hydroxide or alcoholate. Under the reaction conditions, only the primary hydroxyl group of the alcohol is esterified.

Monoacyl Derivatives of Disubstituted Carbamides. L. I. Osipow and W. C. York (W. R. Grace & Co.). *U. S. 2,903,445.* A process is described for the preparation of fatty acid monoesters of diglucose ureide.

Monoacyl Derivatives of Substituted Carbamides. L. I. Osipow and W. C. York (W. R. Grace & Co.). *U. S. 2,903,446.* A process is described for the preparation of fatty acid monoesters of N-urea glucoside.

Alkanolaminobis (Fatty Acid Amides). W. F. Bruce, R. S. Hanslick, J. Seifter, and M. E. Freed (American Home Products Corp.). *Brit. 802,995.* Local anesthetic agents were prepared, the simpler type having the general formula $(R_2NCOCH_2)_2NC_2H_4OH$. Reactions generally involved the condensation of an aliphatic diamine with $ClCH_2COCl$ to form chlorine-containing nitrogen-substituted fatty acid amides, and further reaction with alkanolamines. (*C. A.* **53**, 14941)

Hydrogenation of Aliphatic Mono- and Dicarboxylic Acids. Vereinigte Glanzstoff-Fabriken Akt.-Ges. *Brit. 800,847.* This process is improved by the use of an alloy catalyst containing zinc 5–40% and aluminum and copper 30–60% each. This alloy is prepared by melting the components together in an inert atmosphere and crushing the solidified alloy. The latter is used as the catalyst for continuous hydrogenation of monocarboxylic and dicarboxylic acids or their esters to the corresponding alcohols. (*C. A.* **53**, 15985)

Wax Esters. Dehydag Deutsche Hydrierwerke G.m.b.H. *Brit. 806,814.* Esters of organic acids are prepared by treating the acids in the liquid phase with CO at an elevated temperature in the presence of a hydrogenation catalyst. (*C. A.* **53**, 15983)

Ozonolysis of Unsaturated Acids. R. L. Blackmore and W. Szatlowski (A. Boake Roberts and Co. Ltd.). *Brit. 810,571.* Ozonized air was passed into an aqueous emulsion of an unsaturated acid to give an ozonide. This was decomposed to yield mono- and dicarboxylic acids. (*C. A.* **53**, 15991)

Recovery of Fatty Acids by Distillation. General Mills Inc. *Brit. 813,305.* The color and color stability of fatty acids obtained by the distillation of natural fats and oils is improved by addition of 0.1–1.0% by weight of an alkali metal hypophosphite, e.g., 0.5% $Na(H_2PO_2)$. (*C. A.* **53**, 17542)

Stirring Column as Reaction Vessel for the Continuous Deacidification of Fats and Oils. F. E. Schwartzkopff and H. Eger (Noblee & Thörl G.m.b.H.). *Ger. 955,411.* (*C. A.* **53**, 16562)

Separation of Isanic Acid from Vegetable Oils. E. de Vries (Union chimique belge S. A.) *Ger. 959,908.* See Belg. 525,263. (*C. A.* **53**, 16562)

Water-Free Polishes Containing Partially Neutralized Wax-Acid Paraffin. H. Kolling and F. Rappen (Ruhrchemie Akt.-Ges.). *Ger. 1,007,911.* See U. S. 2,871,210. (*C. A.* **53**, 16563)

Chlorofluorocarbon Oils and Waxes. H. H. Frey and K. H. Kahrs (Farbwerke Hoechst Akt.-Ges. vorm. Meister Lucius & Brüning). *Ger. 1,008,280.* See Brit. 761,963. (*C. A.* **53**, 16563)

Waxes Suitable for Self-Polishing Aqueous Emulsions. H. Kolling and F. Rappen (Ruhrchemie Akt.-Ges.). *Ger. 1,009,612.* See U. S. 2,874,061. (*C. A.* **53**, 16563)

Adipic Acid. A. Karl (Heinrich Koppers G.m.b.H.). *Ger. 1,012,296.* NO_2 (6.55% based on cyclohexane) was introduced at 50° for 44 hours into cyclohexane in the presence of air. Crude adipic acid, some unreacted cyclohexane, and water were withdrawn, and the cyclohexane recycled to give 5.14% adipic acid. This oxidation carried out continuously with the cyclohexane consumed replaced by fresh cyclohexane gave after 60 hours an 80% conversion of cyclohexane. (*C. A.* **53**, 15991)

Esters. N. v. Kutepow and W. Himmele (Badische Anilin- & Soda-Fabrik Akt.-Ges.). *Ger. 1,014,979.* Adipic acid (166), 1,4-butanediol (90), and boric acid (6 parts) was heated 16 hours at 120–40° with nitrogen bubbling through the solution. A yellowish waxy polyester (230 parts) which melted at 41–4° was obtained. Similarly adipic acid was esterified with 2,5-cyclohexanediol, or 1,4-pentanediol. Similarly suberic acid, maleic anhydride, or acrylic acid were esterified with 1,4-butanediol and (or) 2,5-cyclohexanediol. (*C. A.* **53**, 15986)

Desolventizer for Cottonseed Meal. R. P. Hutchins (French Oil Mill Machinery Co.). *Ger. 1,016,238.* See U. S. 2,806,459. (*C. A.* **53**, 17542)

Antioxidants. C. T. Y. Cowie and D. G. Jones (Imperial Chemical Industries Ltd.). *Ger. 1,016,264.* (*C. A.* **53**, 17535)

Wax Acids. E. R. Sauter (South African Coal, Oil and Gas Corp. Ltd.). *Ger. 1,018,046.* See Brit. 787,921. (*C. A.* **53**, 17542)

Purification of Lanolin. A. Fayaud (Esperis Société anon.). *Ger. 1,018,175.* See Ital. 520,525. (*C. A.* **53**, 17541)

Porous Polymers from Cashew Nutshell Oil. K. P. Govindan, R. N. Pandya, and N. R. Krishnaswamy (Council of Scientific and Industrial Research). *Indian 59,497.* Commercial cashew nutshell oil (300 g.) is heated in the presence of 15 cc. commercial hydrochloric acid, and 100 cc. formalin is added when the temperature is 120–140°. The porous polymer thus obtained is cured at 100–140° for 18–24 hours to give a highly porous, neutral, stable polymer, useful for preparing *cation-exchange resins.* (*C. A.* **53**, 17586)

Separation of Fatty Acids from Tallow. S. H. Zaheer, V. V. R. Subrahmanyam, and K. T. Achaya (Council of Scientific and Industrial Research). *Indian 62,263.* Fatty acids from tallow are dissolved in 80–5% by weight aqueous ethanol and crystallized at −5° to −12.5° to obtain saturated acid and a fraction containing oleic acid. The crystallization is effected at a solvent:acid ratio of 5:10. (*C. A.* **53**, 16563)

Antioxidant for Fish. Eitaro Tsuboi and Takayuki Tsuboi. *Japan. 2832('59).* 2-Butyl-4-hydroxyanisole and (or) 3,5-dibutyl-4-hydroxytoluene (100 g.) are (is) mixed with 100 g. dried sodium lauryl sulfate under heating and stirring and cooled. The obtained mass is powdered to give the desired product. When water or water-glycerol is added in this process, a sirupy or liquid product is obtained. (*C. A.* **53**, 16413)

Automatic Removal of an Unsaponifiable Layer. Ya. I. Chepchurov and I. F. Morozov. *U. S. S. R. 116,228.* The automatic arrangement comprises a membrane mechanism, a relay, and an electrode installed at the interphase of soap and the unsaponifiable layer. (*C. A.* **53**, 17541)

Treating Oxidation Products of Paraffinic Hydrocarbons in the Production of Fatty Acids. P. A. Moshkin. *U.S.S.R. 116,947.* The oxidation products are treated with water at an elevated temperature and pressure in the presence of emulsifiers to facilitate the decomposition of lactone-type compounds. (*C. A.* **53**, 17541)

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• Fatty Acid Derivatives

Reaction of Ammonia with the Oxide of Petroselinic Acid. G. V. Pigulevskiĭ, I. L. Kuranova, and E. V. Sokolov. *Zhur. Priklad. Khim.* **32**, 937–9 (1959). Experimental results suggested the structure of $CH_3(CH_2)_{10}CH(OH)CH(NH_2)(CH_2)_4CO_2H$ as 6 amino-7-hydroxyoctadecanoic acid. (*C. A.* **53**, 16947)

Reactions of Long-Chain Acids with Thiolacetates. R. Sasin, G. S. Binns, R. M. Haff, and G. S. Sasin (Dept. of Chem., Drexel Inst. of Tech., Philadelphia 4, Pa.). *J. Org. Chem.* **24**, 1143 (1959). *n*-Decyl and *n*-dodecyl thiol esters of myristic, palmitic, and stearic acids as well as *n*-dodecyl thiollaurate, *n*-butyl thiolstearate, phenyl thiolpalmitate and diphenyl dithiolsebacate were prepared by acidolysis of thiolacetates with long-chain acids in 46–61% yield.

α-Chlorinated Fatty Acids. G. Steinbrunn (Badische Anilin- & Soda-Fabrik Akt.-Ges.). *Ger. 1,014,092.* Fatty acids were chlorinated with SO_2Cl_2 at elevated temperatures in the presence of $HCON(CH_3)_2$ to give the title compounds. (*C. A.* **53**, 15981)

Unsaturated Aliphatic Alcohols. Dehydag Deutsche Hydrierwerke G.m.b.H. *Brit. 806,619.* Monounsaturated alcohols were prepared catalytically (by a more economical procedure than sodium reduction) by continuous reduction of the appropriate unsaturated fatty acid or ester over pellets of a zinc-containing catalyst which also contained vanadium or chromium. Large amounts of catalysts and hydrogen were required. Polyunsaturated acids or their esters were partially solidified prior to reduction to prevent damage to the catalyst. (*C. A.* **53**, 15975)

Fatty Acid Amides. M. Seletzky. *Fr. 1,132,247.* Amides were prepared below 130° by treating the dialkylamine with an ester of the fatty acid in the presence of 3–1.2% alkali metal dissolved in a primary alcohol, the alcohol distilled, the mixture cooled to 50–60°, the metal alcoholate destroyed with mineral acid, and the residual alcohol removed by vacuum distillation to leave 100% amide. (*C. A.* **53**, 16969)

Condensation Products of Epoxidized Fatty Esters with Amines. A. R. H. Tawn (Coates Brothers & Co. Ltd.). *Brit. 811,797.* A condensation product is prepared from an epoxidized fatty acid having $\geqq 1$ C_{10}–C_{22} epoxy fatty acid residue in the molecule and a polyamine having primary and (or) secondary amino groups, or an amino alcohol containing $\geqq 1$ primary or secondary amino group and $\geqq$ 1 primary or secondary alcohol group. (*C. A.* **53**, 17581)

Preparation of Fatty Acids and Alcohols from Olefins Through Ozonolysis. H. Bertsch, Anneliese Greiner, and G. Wagner (German Acad. Sci., Berlin). *Chem. Tech.* (Berlin) **10**, 690–2 (1958). Kogasin, boiling at 210–20° and 220–35°, an olefinic product of VEB Synthesewerk Schwarzheide, was ozonolyzed in containers cooled by water to 10–12°. The products were fatty acids, alcohols, and aldehydes. The mixture could be hydrogenated with Raney nickel; the aldehydes were converted to alcohols while the acids were unchanged. Separation of the alcohols and acids proceeded in the usual way. The original material contained 32–6% olefins; the recovery of olefins as acids and alcohols was nearly quantitative, with chain lengths of C_{11}–C_{13}. (*C. A.* **53**, 16941)

Determination of Small Amounts of Secondary Amine in High Molecular Weight Fatty Primary Amines. A. J. Milun and J. P. Nelson (Chemical Laboratories, General Mills, Inc., Minneapolis 13, Minn.). *Anal. Chem.* **31**, 1655–7 (1959). A rapid, simple, colorimetric method is presented for determining secondary amine in high molecular weight fatty primary amines in the 0 to 1% range. After reaction of the primary amine with salicylaldehyde in isopropyl alcohol, the color formed by the reaction between secondary amine and bromocresol green is measured spectrophotometrically at 627 mμ. Per cent secondary amine is obtained from a calibration curve previously prepared with known mixtures of primary and secondary amines.

Epoxylation Products of Unsaturated Fatty Acid Amides. L. Orthner and E. G. Fuchs (Farbwerke Hoechst Aktg.). *U. S. 2,905,702.* A process is described for the reaction of peracetic acid or a mixture of formic acid and hydrogen peroxide with a diamide of the general formula $R_1NHR_2NHR_3$ wherein R_1 and R_3 are radicals of oleic, linoleic or soy oil fatty acids, and R_2 is a divalent unsaturated hydrocarbon group.

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• Biology and Nutrition

Characteristics of High-Melting Triglyceride Fractions from the Fat-Globule Membrane and Butter Oil of Bovine Milk. M. P. Thompson, J. R. Brunner, and C. M. Stine (Department of Dairy-Food Technology Program, Michigan Agricultural Experiment Station, East Lansing). *J. Dairy Sci.* **42**, 1651–8 (1959). A high-melting triglyceride fraction (HMGF) was isolated from an alcohol-ether extract of the fat-globule membrane and from an ethanol extract of butter oil. The HMGF was characterized by its iodine value (4.8–5.0), saponification equivalent (200–202), and melting range (50.0–52.5°), and by its ultraviolet (220–340 mμ), near-infrared (1.6–3.1μ), and infrared (2–14μ) spectra. The fatty acid composition of the fraction was determined by converting the glyceride to its constituent fatty acid methyl esters which were resolved by gas chromatography.

Substances in Plants of the Order Malvale Causing Pink Whites in Stored Eggs. F. S. Shenstone and J. R. Vickery (Division of Food Preservation, Commonwealth Scientific and Industrial Research Organization, Homebush, N.S.W., Australia). *Poultry Sci.* 38, 1055–70 (1959). Two fatty acids, malvalic and sterculic, which occur in plants in the order *Malvale* have been shown to produce the typical symptoms of the pink-white condition in eggs. The effects are produced by feeding daily doses of 25 mg., or probably less, to laying hens. About 20–25 percent of the ingested acids were incorporated in the yolks.

Broiler Pigmentation as Influenced by Dietary Modifications. R. G. Ratcliff, E. J. Day, and J. E. Hill (Mississippi Agricultural Experiment Station, State College, Miss.). *Poultry Sci.* 38, 1039–1048 (1959). Four trials were conducted using 1090 broiler type chicks maintained in batteries to determine the effect of certain dietary modifications on pigmentation. Yellow corn, dehydrated alfalfa meal (20% protein) and corn gluten meal, which contained by analysis 6.7, 260.0, and 82.2 milligrams of xanthophyll per pound, respectively, were found to have relative biological value of 100.0, 46.5, and 30.7, respectively, when used to provide comparable dietary xanthophyll levels. Modification of broiler rations with a commercial pigmenter had no significant influence on carotenoid deposition.

Factors Affecting the Vitamin K Requirement of the Chick. T. S. Nelson and L. C. Norris (Dept. of Poultry Husbandry and Graduate School of Nutrition, Cornell University, Ithaca, New York). *Poultry Sci.* 38, 1094–1101 (1959). Experiments were conducted on factors affecting the vitamin K requirement of chicks 30 to 34 days of age. The onset of prolonged blood clotting time was advanced and the time required for clotting increased by supplying excessive quantities of sulfaquinoxaline (0.1% to 0.125%) as a stress factor. The number of hemorrhages was greater, the mortality was increased, and the weight gains were reduced in the presence of the drug.

Vitamin K Deficiency in Rats Induced by the Feeding of Irradiated Beef. V. C. Metta, M. S. Mameesh, and B. C. Johnson (Division of Animal Nutrition, University of Illinois, Urbana). *J. Nutrition* 69, 18–22 (1959). Comsumption of diets containing gamma-ray irradiated (2.79 or 5.58 x 10^6 rad) beef resulted in internal hemorrhages and prolonged prothrombin time in growing male rats. Generally the female rat did not show this syndrome. The lesion was induced by freshly irradiated beef as well as irradiated beef which has been stored for over 6 months at room temperature. Supplementation with vitamin K prevented the hemorrhagic diathesis in rats consuming irradiated beef.

Fractionation of Soybean Oil Meal for Growth and Antiperotic Factors. 1. Nonphospholipid Nature of the Factors. F. H. Kratzer, Pran Vohra, R. L. Atkinson, P. N. Davis, B. J. Marshall and J. B. Allred (Dept. of Poultry Husbandry, University of California, Davis, Calif.). *Poultry Sci.* 38, 1049–55 (1959). There is an organic growth promoting and antiperotic factor(s) present in soybean oil meal which can be extracted with methanol but is insoluble in acetone, and is not similar to lecithin or cephalin in nature. The growth-promoting activity of brain powders and egg yolks is concentrated in their solvent-extracted residues.

Variability of the Blood Plasma Cholesterol of Laying Chickens. D. Johnson, Jr., A. L. Mehring, Jr. and H. W. Titus (Lime Crest Research Laboratory, Limestone Products Corporation of America, Newton, New Jersey). *Poultry Sci.* 38, 1109–13 (1959). The cholesterol content of the blood plasma of 194 laying chickens was determined. One hundred forty-four of the chickens were kept in cages and fed six different isonitrogenous, isocaloric diets that contained, respectively, 3.64, 5.81, 7.98, 10.16, 12.33, and 14.50 percent of tallow. Fifty of the chicks were kept on good grass range and fed a diet that contained no added fat of any kind. No statistically significant difference in average cholesterol content of the blood plasma, was found among the six lots of birds kept in cages and fed the different fat-containing diets, among the five lots of birds kept on range and fed the same diet (a diet that contained no added fat), nor between the birds kept in cages and those kept on range.

Electrophoretic Behavior of Lipoproteins. H. T. Cardoso and Ismélia A. A. Venâncio (Inst. Oswaldo Cruz, Rio de Janeiro). *Rev. brasil. biol.* 19, 43–8 (1959). In electrophoresis on paper of human serum in barbital buffer of pH 8.6, the α_1- and β-lipoproteins are reduced to only one line (stained by Sudan Black B) when 0.2% of Sterox SE (a nonionic detergent) is added to the buffer solution. This decrease of the α_1-lipoprotein and the disappearance of the α_1-globulin, as previously shown by Downs, *et al.* (*C. A.* 52, 6474*d*), seem to be related. Sodium oleate in place of Sterox did not produce the effect. (*C. A.* 53, 16236)

Safflower Oil-Pyridoxine and Corn Oil-Pyridoxine Emulsions. Their Effect on Serum Cholesterol Levels in Young Adult Males When Used as Supplements to Normal Diet. R. Perkins, I. S. Wright, and Barbara W. Gatje (New York Hosp., New York, N.Y.). *J. Am. Med. Assoc.* 169, 1731–4 (1959). Significant lowering of the serum cholesterol level can be brought about only when safflower and corn oil are used as replacements for and not as supplements to saturated fats of the diet. (*C. A.* 53, 16311)

Utilization of Rapeseed Oil and Corn Oil by the Rat. Joyce L. Beare, T. K. Murray, H. C. Grice, and J. A. Campbell (Food & Drug Labs., Ottawa). *Can. J. Biochem. and Physiol.* 37, 613–21 (1959). The effects of Golden rapeseed oil and corn oil on weekly weight gains, food consumptions, liver storage of vitamin A, plasma and adrenal cholesterol concentrations, organ weights, and testes histology were determined in Wistar rats for five weeks after weaning. The absorption of corn and rapeseed oil fed *ad libitum* was 95 and 92%, respectively. The two oils were not utilized very differently. (*C. A.* 53, 16308)

Effect of a Practical Dietary Regimen on Serum Cholesterol Level. P. A. Boyer, Jr., J. T. Lowe, R. W. Gardier, and J. D. Ralston (Pitman-Moore Co., Indianapolis, Indiana). *J. Am. Med. Assoc.* 170, 257–61 (1959). The diet was modified essentially by substituting a margarine containing 64.2% of nonhydrogenated corn oil for the ordinary solid fats. Over a period of 9 months reduced blood cholesterol levels were maintained in 301 institutionalized patients. (*C. A.* 53, 16299)

Nutritional Survey on Essential Hypertension in Tohuku (Northeast) Area. II. Survey Conducted in 1956. Shinjiro Suzuki, Tomomichi Tezuka, Sumiko Oshima, Tatsuro Kuga, Kikue Yamakawa, and Shinkichi Nagamine. *Ann. Rept. Natl. Inst. Nutrition* (Tokyo) 1959, 5. A survey of 76 farmers showed deficiencies in animal protein, vitamins A and C, and fat, with excesses of carbohydrate and salt. Relative fatness and high serum cholesterol with deficiencies in serum vitamin C and serum cholinesterase were noted. (*C. A.* 53, 16298)

Biochemistry of Long Chain Fatty Acids. II. Metabolic Studies. J. C. Dittmer and D. J. Hanahan (Dept. of Biochem., Univ. of Washington, Seattle, Washington). *J. Biol. Chem.* 234, 1983–89 (1959). After oral feeding of palmitic acid-1-C^{14}, oleic acid-1-C^{14}, linoleic acid-1-C^{14}, and stearic acid-1-C^{14} in corn oil to adult rats, a study was made of the incorporation and distribution of these individual fatty acids at 4, 6, 10, and 18 hours into the major lipide components of the liver. The conversion of these fatty acids to other fatty acids has been observed and related to the general metabolic pathways of the ingested fatty acids. The pathway of the individual fatty acids was found to be complex and, although similar, not necessarily the same. The relation of these results to the occurrence of species of lipides of different metabolic reactivity is discussed.

The Fractionation of Cholesterol Esters by Silicic Acid Chromatography. P. D. Klein and E. T. Janssen (Div. of Biol. and Med. Research, Argonne National Lab., Lemont, Ill.). *J. Biol. Chem.* 234, 1417–20 (1959). A method of separating biological mixtures of cholesterol esters into four fractions, saturated, oleate, linoleate, and arachidonate esters, by silicic acid chromatography has been presented. The method compares favorably with other methods of analysis involving hydrolysis of the esters and provides a means of isolating individual esters as intact compounds.

Metabolism of Essential Fatty Acids. VIII. Origin of 5,8,11-Eicosatrienoic Acid in the Fat-Deficient Rat. A. J. Fulco and J. F. Mead (Dept. and Labs. of Nuclear Med. and Radiation Biology, School of Med., Univ. of California, Los Angeles, California). *J. Biol. Chem.* 234, 1411–16 (1959). Oleic acid was shown to be the precursor for 5,8,11-eicosatrienoic acid in the fat-deficient rat. A probable intermediate in this transformation, 8,11-eicosadienoic acid, was also found as well as a small amount of a second triene, 7,10,13-eicosatrienoic acid, which presumably is formed from palmitoleic acid.

Incorporation of the Butyryl Unit of Butyryl Coenzyme A into Palmitic Acid by the Pigeon Liver System. R. W. Long and J. W. Porter (Radioisotope Unit, Veterans Administration Hosp., and Dept. of Physiol. Chem., Univ. of Wisconsin, Madison, Wis.). *J. Biol. Chem.* **234**, 1406–10 (1959). Incorporation of C^{14} from 1-C^{14}-butyryl CoA into long chain fatty acids by the pigeon liver system has been demonstrated, and labeled palmitic acid has been identified as the chief product of synthesis. Evidence is presented that some butyryl CoA is cleaved to acetyl CoA before incorporation into palmitic acid. The results reported are suggestive, but not conclusive, that butyryl CoA is a true intermediate in the biosynthesis of fatty acids.

Separation of Fatty Acids from Tubercle Bacillus by Gas Chromatography: Identification of Oleic Acid. J. Cason and P. Tavs (Chem. Labs. of the Univ. of California, Berkeley, Calif.). *J. Biol. Chem.* **234**, 1401–05 (1959). The fraction of esters previously termed the C_{18}-C_{19} fraction, from four lots of tubercle bacillus, has been examined by use of gas phase chromatography. In each, similar components were found, although in varying ratios. In addition to palmitic, stearic, and tuberculostearic acids, there were also present smaller amounts of three other acids whose esters had retention times between palmitic and stearic esters. These components are probably a branched C_{17} acid, the normal C_{17} acid, and a branched C_{18} acid. Ozonolysis of the C_{18} fraction showed that the unsaturated C_{18} acid is oleic acid in each instance, not vaccenic acid as found in other microorganisms.

Isolation of Lipopolysaccharide Endotoxin. H. Tauber and W. Garson (School of Public Health, Univ. of North Carolina, Chapel Hill, North Carolina). *J. Biol. Chem.* **234**, 1391–93 (1959). The isolation and chemical properties of lipopolysaccharide phosphoric acid ester endotoxin from *N. gonorrhoeae* have been described. The high toxicity and other properties of the preparation indicate that indotoxic activity resides in the lipopolysaccharide phosphoric acid ester molecule.

Polyunsaturated Fatty Acids in Beef Heart Mitochondria and Derived Enzymically Active Lipoprotein Fractions. R. T. Holman and C. Widmer (Hormel Institute, Univ. of Minnesota, Austin, Minn., and Institute for Enzyme Research, Univ. of Wisconsin, Madison, Wis.). *J. Biol. Chem.* **234**, 2269–71 (1959). The polyunsaturated acid contents of the total fatty acids of particulate enzyme preparations have been determined by alkaline isomerization. The polyunsaturated fatty acids vary from one-third to two-thirds of the total fatty acids. In one case, the polyunsaturated acids were found to be 34.9 per cent by weight. Fractionation of mitochondria into separate submitochondrial particulate fractions possessing different enzyme activities did not fractionate the polyenoic acids. Analyses for the fatty acids from cytochrome oxidase and interchain lipoprotein are given.

Fat Metabolism in Higher Plants. XII. α-Oxidation of Long Chain Fatty Acids. R. O. Martin and P. K. Stumpf (Dept. of Biochem., Univ. of California, Davis, Calif.). *J. Biol. Chem.* **234**, 2548–54 (1959). An α-oxidation pathway has been postulated to explain long chain fatty acids undergoing a succession of carbon 1 cleavages, in contrast to the carbon 2 cleavage of the conventional β-oxidation pathway.

Influence of Aureomycin, Tween 60, and Vitamin A, E, and B_{12} on Nucleic Acid Metabolism of the Rat. K. H. Niesar (Inst. Physiologie, Munich, Ger.). *Naturwissenschaften* **44**, 117–18 (1957). In table form the percentage increase of deoxyribonucleic acid and ribonucleic acid in various tissues after infusion with solutions containing vitamin A, vitamin E, Aureomycin, vitamin B_{12} and Tween 60 are presented. Tissues examined are brain, skin, lung, testes, spermatic cord, intestine, liver, spleen, kidney, adrenal, heart, and muscle. Whereas all the material examined gave specifically high values, vitamin A consistently resulted in increases in almost all tissues. (*C. A.* **53**, 17286)

Absorption of β-Sitosterol. H. Schön and P. Engelhardt (Univ. Erlangen, Ger.). *Naturwissenschaften* **44**, 116 (1957). Two groups of five animals were fed a diet containing 1085 and 2804 mg. of β-sitosterol over 21 days. Analysis of the feces showed that 56 and 78% of β-sitosterol was absorbed. (*C. A.* **53**, 17286)

Fat Balance Studies in Premature Infants. H. W. Ocklitz and B. Reinmuth (Städt. Krankenhaus, Berlin-Buch). *Z. Kinderheilk.* **82**, 321–7 (1959). Fat in human milk is more completely utilized by premature infants than fat in cow's milk. Enrichment of human milk does not increase fat utilization. (*C. A.* **53**, 17260)

New Findings on the Role of Fat in Poultry Nutrition. L. C. Norris, R. Dam, T. S. Nelson, and E. T. Hopkins (Cornell Univ., Ithaca, N.Y.). *Proc. Distillers Feed Conf., 14th Conf.* (Cincinnati) **1959**, 52–61. Growth was approximately the same for chicks fed diets containing 10% peanut oil, cottonseed oil, soybean oil or corn oil. The growth of chicks fed hydrogenated vegetable fat was significantly less than that of chicks fed an equal quantity of non-hydrogenated vegetable fat. Improved growth appeared to be caused by an unknown substance in vegetable fats or by unrecognized characteristics of the known components of the fats. The lowest feed cost per pound of gain was obtained by feeding the practical diets supplemented with soybean oil. (*C. A.* **53**, 17259)

Cholesterogenic Dietary Factors in Milk and Milk Fat Yields in Dairy Cows. P. Saarinen (Univ. Helsinki). *Maataloustieteellinen Aikakauskirja* **31**, 1–10 (1959). In 27 feeding experiments the caloric intake was varied from 75 to 135% of that in normal diets and protein intake varied from 65 to 170%. With excessive caloric intake the milk and milk fat yields were virtually unchanged, or lower, with no change in plasma cholesterol levels. The effects of increased protein intake were negative only in the case of well-conditioned obese cows. Increasing the proportion of crude fiber in the food ration in some cases raised the yield of milk and milk fat with no corresponding rise in blood cholesterol levels. The dietary fat requirement seems to vary with the different stages of production (i.e., days since calving, etc.), being higher in the stages of high milk yield. (*C. A.* **53**, 17258)

Data on the Relation Between Diet and Cholesterolemia in the Province of Ferrara. C. Canella (Div. Med. Arcispedale S. Anna, Ferrara, Italy). *Minerva med.* **1959**, 1308. Caloric intake varied from 2500 to 3400, average 3000: 450 g. carbohydrate, 70 g. protein, 90 g. fat (60% of animal origin). Blood cholesterol above average was found in 30% of the men and 44% of the women. The average life span is 70 years. (*C. A.* **53**, 17257)

The Nutritional Composition of Back Fat as Depending on Sex, Feeding, and Grades. L. Schön, M. Stosiek, and O. Fleischmann (Inst. Bundesforschungsanstalt Fleischwirtschaft, Kulmbach, Ger.). *Fleischwirtschaft* **11**, 467–8 (1959). Back fat of castrated male pigs is lower in water but higher in fat than that of noncastrated females. Feeding has little effect on such differences. Fat content increased and moisture decreased with increased finish weight of animals. (*C. A.* **53**, 17355)

Electron Transport System. XX. Chemical and Physical Properties of the Coenzyme Q Family of Compounds. R. L. Lester, Y. Hatefi, C. Widmer, F. L. Crane, Elizabeth M. Welch, and Wanda F. Fechner (Univ. of Wisconsin, Madison). *Biochim. et Biophys. Acta* **33**, 169–85 (1959).

XXI. Properties of a Soluble Lipoprotein Dissociated from the Succinic Dehydrogenase Complex. R. E. Basford and D. E. Green. *Ibid.* 185–94.

XXII. Lipide Composition of Coenzyme Q Lipoprotein. R. E. Basford. *Ibid.* 195–201. (*C. A.* **53**, 16257)

Studies on the Biosynthesis of Glycolipides and Other Lipides of the Brain. H. W. Moser and M. L. Karnovsky (Dept. of Biol. Chem. and Biophys. Lab., Harvard Med. School, Boston, Mass.). *J. Biol. Chem.* **234**, 1990–97 (1959). C^{14}-labeled glucose or galactose was administered intraperitoneally to Swiss Albino mice ranging in age from 3 days to 6 months. After 1 hour the animals were killed by decapitation and the brain lipides isolated. The activity present in cerebroside galactose exhibited the greatest variations with age. Maximal synthesis of this component occurred in animals 22 days old. When the administered glucose was labeled in carbon-6, almost all of the activity of the cerebroside galactose was found in that carbon. The patterns of labeling of other sugar components of brain lipides were determined and compared with those of liver glycogen and blood glucose. Glucose carbon was incorporated into all brain lipide components more readily than was galactose carbon, except in the case of gangliosides.

Vegetable Oil Extraction. Toxicity of Amine-Extracted Soybean Meal. J. Greenberg, D. J. Taylor, H. W. Bond, and J. F. Sherman (Natl. Inst. of Allergy and Infectious Diseases, Natl. Inst. of Health, Bethesda, Md.). *J. Agr. Food Chem.* **7**, 573–76 (1959). Residues of soybean meal, after extraction with primary, secondary, or tertiary organic amines, were toxic for the chick when incorporated, at levels of 20 to 40%, in an otherwise adequate diet. Approximately 80% of chicks fed amine-extracted residues of soybean meal died within 10 days. Chicks fed residues after extraction with acetone, ethyl alcohol, or trichloroethylene survived and appeared normal. Those fed the extracts (except the butylamine extract) were normal. Triethylamine-extracted cottonseed meal, black-eyed peas, soybean protein, zein, and Cerelose were toxic in varying degrees. Triethylamine-extracted gelatin and casein were well tolerated. Twelve amino acids failed to react with triethylamine when refluxed in the solvent for 24 hours; L-lysine monohydrochloride under the same conditions showed evidence of change in composition.

Biochemistry of Long Chain Fatty Acids. I. General Observations. J. C. Dittmer and D. J. Hanahan (Dept. of Biochem., Univ. of Washington, Seattle, Washington). *J. Biol. Chem.* 234, 1976–82 (1959). The fatty acid composition of the various individual neutral and phospholipide components of rat liver is presented. Over a period of 4 to 18 hours after feeding a single dose of corn or olive oil to adult rats, the fatty acid distribution in these different lipides was reasonably constant. In a general study of the influence of corn and olive oil on the distribution of C^{14} from a carboxyl-labeled palmitic, oleic, stearic, and linoleic acids in the liver lipides, there seemed to be no appreciable dependence on the relative distribution of these long chain acids between phospholipides and neutral lipides. Similarly, in the relative distribution of these fatty acids in the individual lipides of the liver, this same independence of the vehicle oil, with the exception of palmitic acid, was maintained. The asymmetric or specific positioning of the long chain fatty acids in the lecithin molecule was essentially independent of the vehicle oil. However, again an exception was the palmitic acid, and in this case it was considered to be due to its apparent conversion to oleic acid.

Serum Phospholipide Analysis by Chromatography and Infrared Spectrophotometry. G. J. Nelson and N. K. Freeman (Donner Lab. of Biophysics and Med. Physics, Univ. of California, Berkeley, Calif.). *J. Biol. Chem.* 234, 1375–80 (1959). A semimicro method has been developed for the analysis of serum phospholipides by the use of chromatography and infrared spectrophotometry. The extracted total lipides are separated into five fractions by successive elution from a silicic acid–Celite column with methylene chloride, acetone, 35 per cent methanol–65 per cent methylene chloride (two fractions), and methanol. The phospholipides are contained in the last three fractions. By suitable infrared absorption measurements of these latter three fractions, the amounts of lecithin, and sphingomyelin, and a mixed fraction containing phosphatidylethanolamine and phosphatidylserines can be determined. In general, the probable error is with 10 per cent for lecithin and sphingomyelin, and slightly greater for the mixed fraction of minor constituents.

Fatty Acid Oxidation in the Livers of Rats Receiving DL-Ethionine. C. Artom (Wake Forest College, Winston-Salem, North Carolina). *J. Biol. Chem.* 234, 2259–64 (1959). In the livers of female rats injected with large doses of DL-ethionine, the increases in neutral fat were not accompanied by any decrease in the levels of choline-containing or total phospholipides. Likewise, in such animals the rates of synthesis of liver phospholipides, were not significantly different from the rates measured in rats not receiving ethionine, or receiving both ethionine and methionine. Besides the fat infiltration, homogenates of the livers of ethionine-treated female rats exhibited very considerable decreases in the ability to oxidize stearate-1-C^{14} added *in vitro*. Similar results were obtained for the production of isotopic carbon dioxide and acetoacetate from shorter chain fatty acids, from acetate, and from pyruvate. The ethionine effect was completely prevented by administration of methionine along with ethionine, injections of choline chloride were ineffective. Addition *in vitro* of adenosine triphosphate, with or without diphosphopyridine nucleotide or coenzyme A, did not restore the ability of the tissue to oxidize the added fatty acid at a high rate. No impairment of fatty acid oxidation was apparent when ethionine was added *in vitro* to liver homogenates of untreated female rats. Neither the inhibition of fatty acid oxidation nor the fat infiltration of the liver was observed in the livers of male mature rats receiving ethionine. Under the conditions of these experiments, identical effects were observed when, instead of DL-ethionine, L-ethionine was injected in female mature rats.

Assimilation and Dissimilation of Fatty Acids by the Rat Liver. Y. Stein and B. Shapiro (Hebrew Univ.–Hadassah Med. School, Jerusalem, Israel). *Am. J. Physiol.* 196, 1238–41 (1959). As much as 60% of intravenously injected palmitic acid-1-C^{14} was found in the liver 15 minutes after injection, two thirds in the form of triglycerides and the rest as phospholipides. Almost no radioactive unsaturated fatty acids were found in the liver or in blood plasma. Thereafter, the activity in the triglyceride fraction fell rapidly, only 50% remained after 1 hour. At the same time the phospholipide activity increased. With linoleic acid-1-C^{14} a similar pattern was found, except that the percentage retained in the liver was lower and maximum retention was found after 5 minutes. Fifteen minutes after injection of palmitate-1-C^{14} most of the radioactive glycerides in the liver were found in the microsomes and mitochondria, with very little in the floating fat. Equilibration between these particles occurred only after 2 hours. Perfusion of the liver with blood or blood substitutes, after various periods following palmitic acid-1-C^{14} injection, caused a release of about 5–20% of the liver triglycerides and 0.5–2% of liver phospholipides per hour. (*C. A.* 53, 17302)

Essential Fatty Acids. I. Behavior of Polyunsaturated Fatty Acids on Gas-Liquid Chromatogram. A. T. James and J. Webb (Natl. Inst. Med. Research, London). *Proc. Intern. Conf. Biochem. Problems of Lipids, Oxford* 1957, 3–8 (Pub. 1958).

II. Analysis of Unsaturated Fatty Acids. R. T. Holman, H. Hayes, and P. R. Edmondson (Hormel Inst., Austin, Minn.). *Ibid.* 9–15.

III. The Determination of cis,cis-Linoleic Acid in the Presence of Its Geometric Isomers. G. J. van Beers, S. Sparreboom, and J. G. Kippler (Unilever Research Lab., Vlaardingen, Neth.). *Ibid.* 16–20.

IV. Applications of an Enzymic Method for Determining Polyunsaturated Fatty Acids. J. MacGee, F. H. Matson, and L. W. Beck (Procter & Gamble Co., Cincinnati, O.). *Ibid.* 21–9.

V. The Mechanism of the Oxidation of Linoleic Acid with Particular Reference to Metal Catalysts. N. Uri (Ministry Agr., Aberdeen, Scot.). *Ibid.* 30–35.

VI. Some Natural Hydroxy and Epoxy Acids. F. D. Gunstone (Univ. St. Andrews, Fife, Scot.). *Ibid.* 36–9.

VII. Isolation of Phospholipides by Dialysis through a Rubber Membrane. G. J. van Beers, H. deIongh, and J. Boldingh (Unilever Research Lab., Vlaardingen, Neth.). *Ibid.* 43–7.

VIII. The Fatty Acids of the Acetalphospholipides. H. Debuch (Univ. Cologne, Ger.). *Ibid.* 48–52.

IX. South African Pilchard Oil. D. A. Sutton. *Ibid.* 53–6.

X. The Polyenoic Acids of Fish Oils. E. Klenk (Univ. Cologne, Ger.). *Ibid.* 57–9.

XI. A Study of the Component Fatty Acids of Different Swedish Diets. Ula Rosenqvist-Bergqvist and J. Holmberg (Forskningslaboratoriet LKB, Appelviken, Swed.). *Ibid.* 60–4.

XII. Interconversions of the Unsaturated Fatty Acids. J. F. Mead and D. R. Howton (Univ. of California, Los Angeles). *Ibid.* 65–71.

XIII. The Biosynthesis of Fatty Acids by the Human Red Blood Cell. A. T. James, J. E. Lovelock, and Joan Webb (Natl. Inst. Med. Research, London). *Ibid.* 72–9.

XIV. Phospholipides of Intestines and Feces as a Function of the Diet of Normal Rats and Those Having Biliary Fistulas. J. R. Clement and J. Raulin. *Ibid.* 83–9.

XV. Intestinal Fat Absorption in the Frog, Formation of Unsaturated Fatty Acids and of Phospholipides. H. Dominas, J. Karolczyk, and W. Niemierko (Nencki Inst. Exptl. Biol., Warsaw). *Ibid.* 90–6.

XVI. The Fate of Dietary Unsaturated Fatty Acids in Ruminants. A. K. Lough and G. A. Garton. *Ibid.* 97–100.

XVII. Composition of the Fatty Acids of the Human Blood Serum after Loading with Emulsions of Different Types of Fat. N. A. Pikaar, F. E. Reevers, and J. D. C. Rijsbosch (Univ. Hosp., Utrecht, Neth.). *Ibid.* 101–4.

XVIII. The Nature of Cholesteryl Esters in the Higher Fatty Acids in Human Blood Serum. C. Michaleč (Univ. Hosp., Prague). *Ibid.* 105–10.

XIX. The Effect of Feeding Various Fats on the Level of Blood Lipides. M. Eggstein and G. Schettler (Med. Univ. Klinik, Marburg/Lahn, Ger.). *Ibid.* 111–21.

XX. Essential Fatty Acids, Lipide Metabolism, and Vascular Disease. L. W. Kinsell, G. D. Michaels, R. W. Friskey, and S. Splitter (Inst. Metabolic Research, Oakland, Calif.). *Ibid.* 125–46.

XXI. The Effect of Diet on the Serum Lipides of Trappist and Benedictine Monks. J. J. Groen (Wilhelmina-Gasthuis, Amsterdam). *Ibid.* 147–9.

XXII. The Effect of Dietary Fats on Serum Cholesterol. H. Malmros (Univ. Lund, Swed.). *Ibid.* 150–5.

XXIII. Relations Between Polyunsaturated Fatty Acids and Circulating Cholesterol. R. T. Holman and E. Aaes-Jørgensen (Hormel Inst., Austin, Minn.). *Ibid.* 156–7.

XXIV. Preliminary Studies on Serum Fatty Acids and Their Relation to Diet. A. Antonis (S. African Inst. Med. Research, Johannesburg). *Ibid.* 158–67.

XXV. Effects of Maternal Diet on the Fatty Acid Composition of Human Milk. W. Insull, Jr., J. Hirsch, A. T. James and E. H. Ahrens, Jr. (Natl. Inst. Med. Research, London). *Ibid.* 168–79.

XXVI. The Effect of Corn Oil on Lipide Clearance in Patients with Ischemic Heart Disease. B. Bronte-Stewart and H. Blackburn (Radcliffe Infirmary, Oxford, Engl.). *Ibid.* 180–5.

XXVIII. Investigations on Prealbumin Lipoprotein Fractions. J. Lewin, E. Azerad, and J. Ghata (Hosp. Beaujohn, Paris). *Ibid.* 190–4.

XXIX. Metabolism of Albumin-Bound Labeled Fatty Acids in Man. D. S. Frederickson and R. S. Gordon, Jr. (Natl. Heart Inst., Bethesda, Md.). *Ibid.* 195–204.

XXX. Metabolic Studies in Fat Deficiency. T. C. Panos, J. C. Finerty, G. F. Klein, and R. L. Wall (Univ. of Texas, Galveston). *Ibid.* 205–7.

XXXI. The Structural Function of Essential Fatty Acids. A. L. MacMillan and H. M. Sinclair (Magdalen Coll., Oxford, Engl.). *Ibid.* 208–15.

XXXII. Essential Fatty Acid Deficiency in Infants. A. E. Hanson, Doris J. D. Adam, Hilda F. Wiese, Arr N. Boelsche, and Mary E. Haggard (Univ. of Texas, Galveston). *Ibid.* 216–20.

XXXIII. Early Lesions of Experimental In Vitro Atherosclerosis. S. M. Evans, K. D. Brown, and H. K. Ihrig (Marquette Univ., Milwaukee, Wis.). *Ibid.* 221–3.

XXXIV. Plasma Surface Activity: Fatty Acids as Surface-Active Agents. D. F. Davies (Wrexham War Mem. Hosp., Wales). *Ibid.* 224–31. (*C. A.* **53**, 17277)

Studies on the Administration of Iodine-131-Labeled Lipides Into Animals. II. Intragastric Administration of I^{131}-Phospholipides. Akinao Sakuma and Kyuta Kato (Sapporo Med. Coll.). *Sapporo Igaku Zasshi* 12, 263–5 (1957). An emulsion of I^{131}-phospholipide was administered into the gastric cavities of rats. After 3 hours the rats were sacrificed and the I^{131}-phospholipide incorporation into various tissues was studied. The highest incorporation was found in intestine and stomach and next in brown adipose tissue. A lower value was noted in the liver. Approximately half of I^{131}-phospholipide was changed into a form of neutral fat (or cholesterol ester) in the intestine and almost all in brown adipose tissue.

III. Exchange of Fatty Acids Between Neutral Fat, Cholesterol Ester, and Phospholipide in Animal Tissues. Further Study of the Silica Column Chromatographic Fraction of Acetone-Soluble Lipide from Rat Tissue After I^{131}-Phospholipide Administration. Kyuta Kato. *Ibid.* 266–9. I^{131}-labeled olive oil, methyl oleate, and phospholipide were emulsifiel and administered to rats intravenously and gastrically. Active exchanges of fatty acids among the neutral fat, esterified cholesterol, and phospholipid in animal bodies are indicated. (*C. A.* **53**, 17292)

Effect of a High-Fat Diet in the Development of Arthrosis Deformans in Castrated Mice. Ruth Silberberg and M. Silberberg (Washington Univ. School of Med., St. Louis, Mo.). *Schweiz. Z. allgem. Pathol. u. Bakteriol.* 22, 447–58 (1959). Male mice of the C57B1 strain on the high-fat diet had a higher incidence of arthrosis deformans than those on the stock diet, but the castration had no significant effect on the results. (*C. A.* **53**, 17258)

A Study of Serum Cholesterol Levels in Relation to Diet and Some Physical and Biological Variables in the Armed Forces of the Philippines. Solita F. Camara-Besa (Univ. Philippines, Manila). *J. Philippine Med. Assoc.* **35**, 137–52 (1959). Serum cholesterol levels were run on 403 persons picked at random, 19–58 years of age, average 30, and found to vary from 73–353 mg./100 ml., mean 171 ± 35. Dietary fat intake of the subjects was low compared to the U. S., so a correlation was not possible. Serum cholesterol increased 0.812 mg. % per year of age and was significant at the 1% level. (*C. A.* **53**, 16307)

Corpuscular Resorption of Milk Fat and Fine Fat Emulsions. H. Haubold (Munich). *Fette, Seifen Anstrichmittel* **61**, 669–672 (1959). A series of experiments has been carried out to study the resorption of various edible fats. The microscopic picture taken during the passage of the fat dyed with Sudan III through the walls of the small intestinal villus shows that the resorption passage of the natural emulsion of butter is predominately corpuscular over the lymphatic system. The fats which are not taken in the form of emulsions are emulsified in the small intestine under the influence of gall and the pancreas and partially destroyed by enzymatic action. Parallel experiments with vitamin A emulsions show that their behavior in histological resorption is the same as that of the milk fats. The author establishes further that the resorption of fat emulsion starts in the mouth through the mucous membrane. It is shown that resorption during early childhood takes place only in the lymphatic system.

Effect of Single and Chronic Thyroxine Injection of Fatty Acid and Cholesterol Synthesis in Mice. Paola Marchi and J. Mayer (Dept. of Nutrition, Harvard School of Public Health, Boston, Mass.). *Experientia* **15**, 359–361 (1959). The effect of a subcutaneous injection of 1-thyroxine on the fasting mouse consisted of a progressive augmentation of hepatic lipogenesis and cholesterol synthesis. This increase reached 70% for lipogenesis after 24 hours and gave a 3–5 fold increase in cholesterol synthesis after 24, 36, and 48 hours' incorporation. Chronic treatment caused a four-fold increase in lipogenesis but no change occurred in cholesterol synthesis. The effects of thyroxine on extra-hepatic lipogenesis and cholesterol synthesis was not as definite.

Factors Influencing Prices of Soybean Meal. *Soybean Digest* **19**(12), 18–19 (1959). Agricultural marketing service statistics for the period 1946–1957 are summarized.

Use of Lecithin in Production of Bread Containing Defatted Soya-Flour as a Protein Supplement. L. Adler and Y. Pomeranz (Ministry of Commerce & Industry, Food Testing Lab., Haifa, Israel). *J. Sci. Food Agr.* **10**, 449–56 (1959). The use of increased amounts of oxidizing agent and the addition of lecithin were found to improve the loaf volume and baking quality of bread made from a mixture of wheat flour and up to 10% defatted soya-flour without added sugar or fat.

Hyperlipemia and Hemolysis. III. Acceleration of Oleate Lysis of Human Erythrocytes by Homologous Plasma. S. E. Greisman (Univ. Maryland School of Med., Baltimore). *Proc. Soc. Exptl. Biol. Med.* **101**, 725–31 (1959). Pretreatment of fatty acid with human plasma, plasma albumin or globulin, cholesterol, or cyanide was found to retard or prevent hemolytic activity. Once lytic quantities of fatty acid were bound by human erythrocytes, the above substances no longer had protective activity and, instead, accelerated hemolysis. A hypothesis is suggested for linking increases in mammalian plasma unesterified fatty acid with *in vivo* hemolysis.

Linoleic and Linolenic Acids: Their Oxidation by Normal and Diabetic Rats. W. J. Lossow and I. L. Chaikoff (Univ. California, Berkeley). *Proc. Soc. Exptl. Biol. Med.* **101**, 857–60 (1959). Oxidation of linoleic and linolenic acids, both randomly labeled with C^{14}, to CO_2 was compared in (a) fasted and glucose-fed normal rats, (b) normal and diabetic glucose-fed rats, and (c) insulin-treated and untreated, fed diabetic rats. Glucose spared oxidation of both acids. Oxidation of linoleic acid by *ad lib.*-fed diabetic rats exceeded that by similarly fed normal rats. In the diabetic rats, insulin spared oxidation of the polyunsaturated fatty acids.