as evidenced by the evolution of gas, and the temperature was kept near this point until reaction was completed (30–45 minutes). The temperature was then raised and the solution was actively refluxed for another 30–45 minutes. The mixed acids were then dried in a rotary drier under 3 mm. pressure at 60–80°C. The mixed acids were dissolved in 2.5 ml. of *tert*-amyl alcohol and diluted to 25.0 ml. with chloroform. An aliquot of this solution was chromatographed by a modification (8) of the procedure of Higuchi *et al.* (9). When this procedure was applied to an authentic sample of petroselinic acid, recoveries of adipic acid ranged from 75 to 82%.

Preparation of Petroselinic Acid. In a typical preparation, parsley seed oil (150.0 g.) was saponified by stirring for ½ hour with refluxing alcoholic potassium hydroxide (45 g. of 87% potassium hydroxide dissolved in 38 ml. of distilled water and 375 ml. of ethanol). The saponification mixture was allowed to cool and then was transferred to a separatory funnel and acidified with 66 ml. of concentrated hydrochloric acid in 750 ml. of water. The liberated fatty acids were separated from the aqueous phase, dissolved without further treatment, in 1,500 ml. of 90% ethanol, bleached with 15.0 g. of carbon black and crystallized at −25°C. for 16–20 hours. The white crystals were separated from the mother liquor by filtration, washed with 150 ml. of cold (−25°C.) 90% ethanol, and dried under high vacuum. The petroselinic acid thus obtained (53.2 g.) had a melting point of 28.0–29.8°C. When this acid was subjected to ozonolysis, adipic acid (yield 80%) was the only dibasic acid present in the fission products.

Anal.: Neut. equiv., 284.8; iodine value, 86.6.

A 50.0 g. sample of the crystal fraction was dissolved in 300 ml. of boiling methanol containing 50.0 g. of urea. The urea complex which precipitated during 16–20 hours at 25 ± 2°C. was removed by filtration, and the filtrate was crystallized at −25°C. for 4 hours. The crystal fraction, which had been separated from the mother liquor by filtration, was treated with 50 ml. of 2% hydrochloric acid and extracted with petroleum ether (b.p. 35–60°C.), using a total of 400 ml. of petroleum ether for this and the following operations. The petroleum ether solution was swirled with sodium sulfate, decanted and crystallized at −25°C. for 16–20 hours. The pure white crystals were first separated by filtration then dried under high vacuum in a desiccator containing sodium hydroxide. The purified petroselinic acid (36.6 g.) melted at 29.5–30.1°C. Ozonolysis of this acid yielded 85% of adipic acid, the only dibasic acid present.

Anal. Calcd. for $C_{18}H_{34}O_2$: Neut. equiv., 282.5; iodine value, 89.9. Found: Neut. equiv., 283.2; iodine value, 89.4.

Acknowledgment

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

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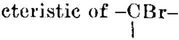
Louise R. Morrow, and E. G. Perkins

• Fats and Oils

Response of the β-ray ionization detector to unesterified lower fatty acids in gas-liquid chromatography. C. J. Böttcher, G. F. G. Clemens, and C. M. Van Gent (Dept. Phy. Chem., Univ. of Leiden, The Netherlands). *J. Chromatography* **3**, 582–4 (1960). Gas-liquid chromatography of C_4–C_{10} unesterified fatty acids with a *beta*-ray ionization detector indicated that the relative peak areas per unit was increased with increasing molecular weight up to 150. There was a tendency to reach a constant value for the higher molecular weights.

Rheology of cocoa butter. I. Effect of contained fat crystals on flow properties. C. Sterling and J. J. Wuhrmann (Dept. of Food Sci. and Tech., Univ. of California, Davis, Calif.). *Food Research* **25**, 460–3 (1960). Purified cocoa butter is characterized by a slight structural viscosity, even in the absence of suspended particles. As fat crystals form in the cocoa butter, the structural viscosity effect is enhanced. Submicroscopic aggregation of fat molecules during standing of the cocoa butter is evident by the augmentation of the viscous "coefficient." This effect is apparent before the formation of microscopically visible fat crystals.

Some observations on the reactions of sterculic acid. R. F. Fawcett and J. C. Smith (The Dyson Perrins Lab., Oxford Univ.). *Chem. & Ind.* **1960**, 871–2. On adding a 1% solution of bromine in chloroform to a 1% solution of sterculic acid, stirred at 0°, exactly one equivalent of bromine was taken up. The resulting (liquid) dibromide shows absorption bands, one of which is characteristic of  $-\underset{|}{C}Br-\underset{|}{C}Br-$. Esterification (with diazomethane) followed by heating under reflux in acetone with sodium iodide rapidly gave methyl sterculate diiodide. It was hoped that these iodine atoms would easily be eliminated with regeneration of the cyclopropene system, but no products with absorption at 1007 cm.$^{-1}$ or 1869 cm.$^{-1}$ were detected.

Labeling fatty acids by exposure to tritium gas. II. Methyl oleate and linoleate. E. Jones, L. Mason, H. Dutton, and R. Nystrom (Northern Regional Research Laboratory and Radiocarbon Laboratory, University of Illinois, Urbana, Illinois). *J. Organic Chem.* **25**, 1413–1417 (1960). Unsaturated fatty acid esters react at room temperature on exposure to gaseous tritium by addition of tritium to a double bond and with little or no substitution of tritium for hydrogen. Evidence for addition to olefinic bonds, rather than substitution for hydrogen, has been obtained from gas-liquid and liquid-partition chromatography of both the tritiated fatty acids and the tritiated products after mild oxidative cleavage. Tritiated fatty acid esters appear on chromatograms at positions of the next less-saturated member of the isologous series. The position of addition of the tritium is deduced from the radioactivity of the monobasic and dibasic acids produced by oxidation.

Gas-liquid chromatography of methyl esters of fatty acid from human and chicken brain lipids. Patricia V. Johnston and F. A. Kummerow (Dept. of Food Technology, University of Illinois, Urbana). *Proc. Soc. Exptl. Biol. Med.* **104**, 201–5 (1960). Gas chromatographic analysis of normal fatty acids according to chain length from C_{10} through C_{24} and even-numbered α-hydroxy acids from C_{18} through C_{24} was reported for samples from human and chicken brain. Separation of 25 resolved peaks representing saturated and unsaturated normal fatty acids was achieved by chromatography of esters on a 10-foot diethylene glycol polyester succinate column. Over half of these peaks were identified, tentative identifications were given for remainder and their relative amounts in human and chicken brain fatty acids were reported.

Analytical techniques for the determination of oxidation products. J. P. Wolff (Inst. Corp Gras, Paris). *Rev. Franc. Corp Gras* Special Number (Journ. Étude Alternation Oxidative Corp Gras), 12–21 (1959). The following methods which are used for the determination of oxidative products in fats are discussed. Determination of peroxides by thiosulfate oxidation, alcohols by periodate oxidation methods, carbonyls by means of phenylhydrazone formation, epoxides by converting them to chlorohydrins or by potentiometric titration with acetic acid. Total oxidation products were determined by ultraviolet or thiobarbituric acid methods.

Chemical aspects of autoxidation. M. Naudet (Fac. Science, Marseille Inst. Corp Gras). *Rev. Franc. Corp Gras* Special Number (Journ. Étude Alternation Oxidative Corp Gras), 7–12 (1959). A review covering the formation, transformation, decomposition, and polymerization of fatty acid and fat peroxides. (6 references)

The presence of C_6–C_{12} fatty acids in palm oil and lard: identification with the help of low-temperature crystallization and chromatographic analysis. A. Purr (Inst. for Food Technology, Munich). *Fette Seifen Anstrichmittel* **61**, 1050–54 (1959). The author discusses the identification of small quantities of fatty acids in palm oil and lard. The fatty acids which were not hydrogenated and not separated from the unsaponifiable substance of raw and refined palm oil were examined, as were those of lard with the aid of crystallization at −25° of the fatty acids in acetone solutions. The fatty acids were analysed chromatographically using paper strips and an undecane/90% acetic acid system.

Paper chromatographic analysis of long-chain fatty acids of human serum. W. H. Haus and G. Krickau (Medical Clinic, Univ. of Münster, Westf.). *Fette Seifen Anstrichmittel* **61**, 1059–64 (1959). The authors carried out a paper chromatographic analysis of the serum of 14 normal and 15 pathological persons. With the help of this method it was possible for the first time to determine the percentage age distribution of serum fatty acids with reference to their chain length and monoenoic acid content. The results obtained from normal and pathologic patients are discussed.

Laboratory methods for the determination of refining losses of fats and oils. H. Pardun and O. Werber (Margarine Union Co., Kleve). *Fette Seifen Anstrichmittel* **61**, 1010–1017 (1959). In view of the importance of a practical laboratory method for the determination of refining losses of raw oils the authors give a critical evaluation of three different methods. Experiments with cotton oil and soybean oil show that the results obtained by the Wesson method and the cup test can only be satisfactorily correlated when oils with the same phosphatide content are compared. The correlation between the experimentally determined refining losses and the actnal industrial losses has been checked in the case of refining several thousand tons of cotton oil.

Investigations on the autoxidative changes in the unsaponifiable matter in butcher's fats. A. Mirna (Inst. for Chemistry and Physics, Federal Animal Husbandry Research Dept., Kulmbach). *Fette Seifen Anstrichmittel* **61**, 1163–69 (1959). Investigations on the unsaponifiable material from slaughterhouse fats showed no selective absorption in the UV region (210–330 mμ) as long as they are fresh. During autoxidation, however, a maximum appears at 230 mμ and another at 270 mμ of lesser intensity. The spectra of the unsaponifiables from rancid butcher's fat indicate the presence of conjugated double bonds. It is thought that this absorption arises from the formation of *alpha* and *beta* carbonyl compounds as a result of autoxidation of the fat. As a result of this the fats with low peroxide numbers but changed UV spectra are not considered to be objectionable.

The fatty acid composition of some conjugated oils. H. P. Kaufmann and R. K. Sud (Deut. Inst. Fettforsch., Münster). *Fette Seifen Anstrichmittel* **62**, 160–164 (1960). The fatty acid composition of Impatiens, Oiticica, and Parinarium annamense oils have been studied with the aid of paper chromatography. The fatty acids shown to be present were: alpha-parinaric, alpha-eleostearic, alpha-licanic, linolenic, linoleic, oleic, and various saturated acids. The compositions for the respective oils in the fatty acid order listed were as follows: 42.5, –, –; –, 14.0, 43.2; –, 58.0, 22.0; 32.6, –, –; 3.1, –, –; 16.1, 18.1, 25.2; 5.7, 9.9, 9.6.

Application of infrared spectrography in fats and oils. III. Autoxidative studies in the case of some synthetic triglycerides. H. P. Kaufmann and H. H. Thomas (Deut. Inst. Fettforsch., Münster). *Fette Seifen Anstrichmittel* **62**, 315–318 (1960). The authors have followed the course of film formation of tri-*alpha*-eleostearin and *alpha*-eleostearo-dilinolein with the aid of infrared spectroscopy. The changes taking place in the characteristic bands of the spectra (2.8 and 10.5 micron regions) during the process of drying and film formation are discussed. The absorption at 2.8 microns increased during autoxidation and represented an increase in hydroxyl groups formed during the oxidation. The decrease of absorption at 10.5 microns represents a decrease in the unsaturation of the triglycerides as the oxidation progressed.

The selective hydrogenation of oleic acid into oleyl alcohol. C. Boelhouwer, J. van Mourik, and H. I. Waterman (Univ. Delft). *Chim. and Ind.* **83**, 875 (1960). Hydrogenation of oleic acid with mixed colloidal copper and cadmium catalyst is studied. Depending on the reaction conditions, it is possible to hydrogenate selectively, without reducing the olefinic bond of oleic acid. At 300° and 250 atm. hydrogen pressure, oleic acid can be hydrogenated using 6.1 mole percent of copper and 2.7 mole percent of cadmium as catalysts, to give a yield of more than 83 percent of oleyl alcohol. The selectivity of the process increases when the reaction temperature is increased or the copper-cadmium ratio is decreased.

Fatty oils of aquatic invertebrates. XXIII. Fatty oils and unsaponifiable components of the molluscs, Dendrodoris rubra var. nigromaculata (I), Littorina brevicula (II), Mya arenaria japonica (III), and Pinna pectinata japonica (IV). Tatsuo Tanaka and Yoshiyuki Toyama (Nagoya Univ). *Nippon Kagaku Zasshi* **81**, 320–22 (1960). Fatty oils from **I–IV** showed, respectively, $n^{40/D}$ 1.4739, 1.4749, 1.4843; –,; sapon. no. 141.7, 174.7 171.0, 169.4; iodine no. 142.6, 155.3, 178.2, 183.6; unsaponifiable matter (%) –, 13.55, 17.50, 18.79. Highly unsaturated fatty acids contents were determined by spectroscopy. The sterols of **II** consisted chiefly of cholesterol and little $\Delta^{5,7}$-sterol. **IV** contained poliferasterol, crionasterol, and cholesterol.

Sterols of 25 species of marine invertebrates in Japanese waters. Minoru Kita and Yoshiyuki Toyama (Nagoya Univ.). *Nippon Kagaku Zasshi* **81**, 485–9 (1960). Lipids were extracted from these 25 species and determinations were made on unsaponifiable matter content, sterol content, presence of 24-methylenecholesterol (from infrared spectra), and $\Delta^{5,7}$-sterol (provitamin D) content (from ultraviolet spectra). Terminal methylene group of the sterol was evident in lipids from *Barbatia obtusoides* and *Pecten yessoensis*, but was absent in lipids from *Liolophura japonica*, *Onithochiton hirasei*, and *Cryptoplax japonica*, which, contrary to previous descriptions, contained $\Delta^{5,7}$-sterols. Crude sterols from *Cynthia karasboja*, *Heliocidaris crassispina*, *Lunella coronata coreensis*, and *Tegula argyrostoma basilirata* showed maximum absorption at 255 mμ. Batyl alcohol was isolated from lipid from *Pentacta doliolum*. Crude 24-methylenecholesterol and crionasterol were separated from lipid from *Pecten yessoensis*. The chief sterol from *Nereis japonica* was cholesterol. Other invertebrates studied were *Pseudocentrotus depressus*, *Comanthus japonica*, *Ophioplocus japonicus*, *Mitella mitella*, *Onchidium verruculatum*, *Chicoreus asianus*, *Cellana toreuma*, *Nerita japonica*, *Monodonta labio*, *Turbo cornutus*, *Tegula pfeifferi*, *Thais bronni*, *T. clavigera*, and *Calliostoma unicum*.

Autoxidation products of cetoleic acid formed during long storage. Tamon Matsuura, Shigejiro Yasuda, and Akitoshi Otawa (Hiroshima Univ.). *Nippon Kagaku Zasshi* **81**, 825–7 (1960). Examination of autoxidized cetoleic acid stored for 18 years was made by solvent extraction, urea-adduct separation, and inverse phase column chromatography. Two types of 11,12-dihydroxybehenic acid were isolated: erythro form, m. 130–131°, and threo form, m. 98–100°.

Purification of glycerol contained in sweet water by ion exchange resins. Masashi Nozaki and Takashi Ishiwata (Japan Organo Co., Ltd., Tokyo). *Yukagaku* **9**, 44–8 (1960). A discussion with 10 references.

Influence of water of fried food materials on the oxidation of oil. Tadaaki Bito and Akemi Yamamoto (Nagoya Inst. Technol.). *Yukagaku* **9**, 41–4 (1960). High water content of the material accelerated the oxidation of frying oil as evidenced by more rapid increase in peroxide value. Cottonseed oil was more stable than soybean oil, and sesame oil was more stable than rapeseed oil. Vegetables rich in vitamin C retarded the oxidation of frying oil. Addition of NaCl was also effective in retarding it. Frying temperatures examined were 120, 150, and 210°.

Gas liquid chromatography of conjugated fatty acids. N. W. R. Daniels and J. Wendy Richmond (Spillers Ltd., Technological Res. Sta., Station Rd., Cambridge). *Nature* **187**, 55–56 (1960). Methyl esters prepared by the reaction of diazomethane with unconjugated and conjugated fatty acids were analyzed with a Pye argon chromatograph using a column packed with 2.3% poly(ethylene glycol adipate) as stationary phase on 60–100 mesh diatomaceous earth. The chromatograms showed that following isomerization there was a change in the position occupied by the esters of linoleic and linolenic acids, the conjugated isomers being retained by the stationary phase to a greater extent than the unconjugated acids. Isomerization also increased the retention of methyl linoleate by 36% and of methyl linolenate by 24%.

Evaluation of a new floor polish ingredient. W. J. Hackett and D. Schoenholz (Foster D. Snell, Inc.) and M. G. Bestul and P. D. Patrick, Jr. (West Virginia Pulp & Paper Co., Charleston, S. C.). *Soap Chem. Specialties* **36**(7), 77–78, 83–84, 174 (1960). The inclusion of a new modified tall oil fatty acid "Indusoil 57-118" in amine soap emulsifier systems for wax dispersions produced dry bright polishes combining economy with high gloss, superior leveling, and wear properties.

Process for tanning skins and furs. R. Heyden and J. Plapper (Böhme Fettchemie G.m.b.H., Dusseldorf). *U. S. 2,913,304.* Leathers with improved pliability and water resistance are produced by impregnating skins with a synthetic resin prepared by condensing cyanamide or its derivatives with a high molecular weight amine derived from fatty acids of 12 to 22 carbon atoms.

Pharmaceutical preparations. J. A. Hill (Olin Mathieson Chemical Corp.). *U. S. 2,918.411.* Preparations for oral administration providing for the release of pharmacologically active materials over a controlled extended period of time consist of a multiplicity of small pellets containing the following components: (1) polyvinylpyrrolidone, 1 to 9%; (2) a water-insoluble agent melting above 45°, e.g., saturated fatty acids or esters, mono- or polyethers of saturated fatty alcohols, pharmacologically acceptable sterols, etc.; (3) a pharmacologically active ingredient in concentrations of not more than 35% of the total weight. The coating may also contain a wax with a melting point higher than 60° such as candelilla, beeswax, carnauba, or castor wax.

Fatty products. H. J. Duin and J. A. Schaap (Lever Bros. Co.). *U. S. 2,919,196.* An oil in water emulsion containing at least 74% by volume of oil is prepared by stirring a fatty oil into an aqueous phase at an elevated temperature at which the oil is liquid (100° maximum) in the presence of a water-soluble emulsifying agent. Cooling causes partial solidification of the dispersed phase and partial phase inversion is effected by mechanical working. The emulsifying agent is sufficiently hydrophilic to allow the preparation of the emulsion and sufficiently lipophilic to stabilize the partially inverted oil in water emulsion.

Dry-mix souffle products and the preparation thereof. R. W. Kline and A. B. Rogers (Armour & Co.). *U. S. 2,939,792.* A dry food product reconstitutable in water to prepare a cheese souffle consists of 20 to 45 parts of flour, 20 to 60 parts of milk solids, and a spray-dried mixture of 15 to 75 parts of edible fat, 15 to 50 parts of egg yolk, and 20 to 50 parts of cheese.

Continuous manufacture of soap. F. T. E. Palmqvist (Aktiebolaget Separator, Stockholm). *U. S. 2,946,813.* Saponifiable material is passed to a saponification stage and there saponified while the electrolyte content of the saponification mass is adjusted in relation to the soap concentration of the mass to maintain the mass within the fitting zone of a McBain diagram and thus form a mixture of neat soap and nigre. The mixture is discharged from the stage and separated.

Hydrogenation of marine oils. M. Zajcew (Engelhard Industries, Inc.). *U. S. 2,948,742.* The oil is treated with hydrogen in the presence of a palladium metal catalyst to produce a product having an iodine number in the range of about 60 to 85.

Bread dusting mixture and method. A. C. Becker. *U. S. 2,949,365.* Small semi-solid particles (0.0002 to 0.0007 inch in diameter) of saturated edible fats or oils are uniformly dispersed throughout a grain flour having discrete particles from about 0.0029 to 0.0070 inch in diameter. The resulting dusting mixture prevents sticking of baking dough to the baking pan.

Pressurized polishing composition. E. R. Kendall and G. W. Meister (Simoniz Co.). *U. S. 2,949,373.* The desired composition consists of about 0.1 to 25 parts of a propellant that is gaseous at ambient temperatures and atmospheric pressures and 99.9 to 75 parts of a polishing composition. The polishing component contains the following: 10–30% finely divided abrasive; 5–16% wax; 2–12% polydialkylsiloxane; 40–75% hydrocarbon solvent; 1–4% ethylene glycol monoalkyl ether having 1 to 7 carbon atoms in the alkyl group, and 1–10% oleophilic amorphous thickener dispersible in the solvent.

Fatty Acid Derivatives

Quantitative analysis of some C_{10} dibasic acids and associated monobasic acids by high temperature gas chromatography. R. C. Bartsch, F. D. Miller, and F. M. Trent (U. S. Industrial Chemicals Co., Division of National Distillers and Chemicals Corp., Cincinnati, Ohio). *Anal. Chem.* **32**, 1101–3 (1960). A rapid method was developed for the quantitative analysis of mixtures of three aliphatic C_{10} dibasic acids and two C_9 monobasic acids by gas chromatography. Samples were quantitatively converted to methyl esters via diazomethane. The esters were resolved at a temperature near 230° on a 12-foot column of specially prepared high vacuum silicone grease or on a 4-foot column of a polyester. Data are given for the accuracy and precision of the method. Retention times are given for a number of aliphatic acids.

Oxidation of ethyl oleate with lead tetraacetate. Yoshiharu Matsubara, Shoii Wakabayashi, and Shigeto Nakamitsu (Saisei Shônô Co., Kobe). *Kôgô Kagaku Zasshi* **63**, 502–5 (1960). Oxidation of ethyl oleate with lead tetraacetate in glacial acetic acid and benzene gave the reaction products in 70% yield, which were di- and monoacetate of ethyl 9.10-dihydroxystearate, ethyl 9,10-diacetoxymethylstearate, ethyl 9-acetoxymethyl-10-hydroxystearate, ethyl 9-acetoxy-10-octadecenoate, and ethyl 9-acetoxy-methyl-10-octadecenoate, and small amounts of ethyl azelaic half aldehyde and nonylaldehyde.

Oxidation of ethyl oleate with lead tetrapropionate. *Ibid.*, 505–8. This oxidation in benzene gave di- and monopropionate of ethyl 9,10-dihydroxystearate, ethyl monopropionoxyoctadecenate, nonyaldehyde, and ethyl azelaic half aldehyde.

Hydrolysis of butyl 9-10-epoxystearate. Koichi Murai, Giichi Akazome, and Shizuo Nishiyama (Sansuiso Fats and Oils Co., Kyoto). *Kôgyô Kagaku Zasshi* **63**, 280–3 (1960). The hydrolysis with unhomogenous acid catalyst proceeded abruptly from about 20%. The reaction was much accelerated by addition of emulsifiers, increase in the concentration of acid catalyst, and raise in temperature, but it was retarded by addition of benzene. The hydrolysis with homogeneous acid catalyst in acetone solution was more speedy than with heterogeneous catalyst; it was not accelerated in later phase. The reaction products contained butyl dihydroxystearate, polymerized epoxy compounds, and additive with sulfuric acid.

Reaction of butyl 9,10-epoxystearate with organic acids. Koichi Murai, Giichi Akazome, and Yasuo Murakami. *Ibid.*, 283–6. Homogeneous reactions with formic, acetic, or butyric acid were studied. The reaction of epoxy groups with large excess of organic acids conformed well with pseudoprimary reaction. The reaction rate was in the order formic $\geqslant$ acetic $>$ butyric acid. As butyl 9,10-epoxystearate was difficultly soluble in formic acid, the experiment was made with dioxane with the solvent. The reaction rate was much influenced by the concentration of formic acid in dioxane.

Properties of epoxidized fatty acid esters as plasticizers. Koichi Murai, Giichi Akazome, Shizuo Nishiyama, and Hirotomo Shimada (Sansuiso Fats and Oils Co., Kyoto). *Kôgyô Kagaku Zasshi* **63**, 807–9 (1960). Plasticizers for poly(vinyl chloride) were prepared from camellia (chiefly oleic) and soybean (chiefly linoleic) fatty acids. In conclusion the latter was superior.

EPOXIDATION OF BUTYL OLEATE BY HYDROGEN PEROXIDE. Koichi Murai, Giichi Akasome, and Yasuto Murakami (Sansuiso Fats and Oils Co., Kyoto). *Kôgyô Kagaku Zasshi* **63**, 803–6 (1960). Reaction rates were studied of the epoxidation of butyl oleate in the presence of acetic or sulfuric acid with 30–60% H_2O_2. The reaction constant of butyl oleate with peracetic acid in homogeneous solution in acetic acid was 1.54×10^{-3} mole^{-1} sec.$^{-1}$ at 24.5 ± 0.5. The reaction with peracetic acid in unhomogeneous system was slower, and direct epoxidation was still slower. The formation of peracetic acid (reaction constant 7.43×10^{-6}) was the slowest, and this was limiting reaction of the epoxidation.

p-CHLORANILIDES OF SATURATED FATTY ACIDS AND OLEIC ACID. Hiromu Kameoka (Kinki Univ., Fuse, Osaka). *Nippon Kagaku Zasshi* **81**, 950–3 (1960). *p*-Chloranilides could be easily prepared from 14 saturated fatty acids and oleic acid by either (1) adding *p*-chloraniline to acid chlorides, or (2) making to react *p*-chloraniline with fatty acids in *p*-cymene. The products showed high m.p. and were suitable for identification of fatty acids. Melting point vs. composition was examined for some pairs of *p*-chloranilides.

FATTY ACID VINYL ESTERS. II. MOLECULAR WEIGHTS AND THEIR DISTRIBUTION OF COPOLYMERS OF FATTY ACID VINYL ESTERS WITH ACRYLONITRILE. Teruzo Asahara and Keiryo Mitsuhashi (Tokyo Univ., Chiba). *Yukagaku* **9**, 33–7 (1960). Fatty acid vinyl esters were copolymerized with acrylonitrile in the presence of benzoyl peroxide and dimethylformamide in N_2. The copolymers contained about 13 mole % of fatty acid vinyl esters. The mol. wt. of copolymers was 57,000–136,000. Fatty acids used were caproic, caprylic, capric, myristic, and palmitic acids.

LIQUID HYDROCARBON GELS AND USES THEREOF. C. S. Steiner and P. Gibson (Swift & Co.). *U. S. 2,946,748.* A gelled liquid hydrocarbon consists of a liquid hydrocarbon and about 0.5 to 3.0% by weight of a gelling agent. This gelling agent is an alkali metal or ammonium soap of aliphatic, monocarboxylic acids of at least 14 carbons of which at least 10% should contain 20 or more carbon atoms.

MANNER OF HANDLING MEAT. T. R. Anderson (Swift & Co.). *U. S. 2,948,623.* To reduce moisture loss, meat is wrapped in an air-permeable, moisture-retarding film of a fatty compound such as ethyl stearate or a fatty material having the formula R—OH, where R is an aliphatic or acryl radical having from 11 to 22 carbon atoms.

PREPARATION OF VINYL STEARATE. A. J. Buselli and T. F. Rutledge (Air Reduction Co., Inc.). *U. S. 2,949,480.* Vinyl stearate is separated from a mixture of vinyl stearate and stearic acid by extraction with a paraffin hydrocarbon solvent having no more than 7 carbon atoms.

SILICONE LUBRICATING OIL COMPOSITION CONTAINING ESTER FOR IMPROVED LUBRICITY AND THERMAL STABILITY. M. Z. Fainman (Standard Oil Co.). *U. S. 2,950,250.* The patent recommends the addition of 5 to 75% of an ester of a straight-chain aliphatic carboxylic acid of 4 to 18 carbon atoms and a polyhydric alcohol free of beta-hydrogen.

METHOD OF PRODUCING A PEARLY LUSTER IN SHAMPOO CONCENTRATES. G. Meinhard and W. Benzel (Dehydag, Deutsche Hydrierwerke G.m.b.H.). *U. S. 2,950,254.* A shampoo concentrate is heated to a temperature between room temperature and 80° and treated with between 2 and 10% (by weight of concentrate) of a high molecular weight organic monocarboxylic acid and an equimolar amount of a water-soluble magnesium or zinc salt. An alkaline agent is added to the resulting dispersion until the pH is between 6.5 and 7.0.

PREPARATION OF FOAMED CASTOR OIL CITRATE-ORGANIC POLYISOCYANATE REACTION PRODUCTS. W. Abbotson, R. Hurd, and H. Jackson (Imperial Chemical Ind., Ltd.). *U. S. 2,950,263.* One mole of castor oil is reacted with 0.6 to 1.2 moles of citric acid until the acid value has fallen to between 45 and 75 mg. KOH per gm. The resulting citrate is then reacted with between 15 and 200% (on weight of citrate) of organic polyisocyanate in the presence of a tertiary amine catalyst and water.

• Biology and Nutrition

EFFECTS OF FATS AND NONIONIC SURFACE-ACTIVE AGENTS ON STARCH PASTES. Elizabeth M. Osman and Marion R. Dix (Dept. of Home Economics, Univ. of Illinois, Urbana, Ill.). *Cereal Chem.* **37**, 464–75 (1960). Studies with a Brabender Amylograph showed that viscosity increased in a 6% corn starch paste at a progressively lower temperature as fat was added. The eleven natural and hydrogenated fats used, although varying widely in degree of unsaturation, showed substantially no differences in their effects on the gelatinization or the cooling curves of the starch paste. Addition of surface-active agents to the starch-water-fat mixture usually resulted in a marked increase in the temperature at which viscosity increased, as well as in the shape of the cooling curve. These effects appeared to be related to the length of the hydrocarbon chain and the number of hydrocarbon chains in the molecule of the surface-active agent. The character of the hydrophilic portion of the molecule also exerted an effect.

THE OXIDATION OF FATTY ACIDS BY A PARTICULATE FRACTION FROM DESERT LOCUST (SCHISTOCERCA GREGARIA) THORAX TISSUES. H. Meyer, B. Preiss, and SH. Bauer (Dept. of Biol. Chem., The Hebrew Univ., Jerusalem, Israel). *Biochem. J.* **76**, 27–35 (1960). The isolation of a particle system from locust-thorax tissue is described; the tissues were derived from insects kept at 35° and at 45° (35° particles and 45° particles). The 35° particles oxidized butyrate completely, but were unable to oxidize higher fatty acids; the 45° particles oxidized both. The 35° particle system required adenosine triphosphate and Mg^{2+} ions; the 45° particle system showed, for the oxidation of butyrate and higher fatty acids, the additional requirements for coenzyme A, and required for the oxidation of higher fatty acids a factor present in sheep-liver extracts. Both systems were partially inhibited by azide, cyanide, arsenite, malonate, fluoride, 2:4-dinitrophenol and ethylenediaminetetra-acetic acid. The oxidation of higher fatty acids and butyrate in the 45° system was inhibited by higher concentrations of the C_8–C_{18} fatty acids. The minimal inhibiting concentration of each fatty acid decreased with increasing chain length. The 35° system when oxidizing butyrate showed oxidative phosphorylation, which could be abolished by 2:4 dinitrophenol and ethylenediaminetetra-acetic acid.

CARBONYLS IN OXIDIZING FAT. III. THE DISTRIBUTION OF VOLATILE AND NON-VOLATILE CARBONYLS. A. M. Gaddis, Rex Ellis, and G. T. Currie (Meat Lab., Eastern Utilization Research and Development Div., Agr. Research Ser., U.S.D.A., Beltsville, Md.). *Food Research* **25**, 495–506 (1960). A study has been made of the distribution of volatile and non-volatile carbonyls in oxidized lard. Most of the carbonyls determinable were non-volatile and/or bound. Results indicated that a large part of the determinable carbonyls do not originally exist in the oxidized fat as carbonyls. They apparently are produced through breakdown of precursors by reaction conditions. Free monocarbonyls were 4.4%, volatile monocarbonyls 1.4%, and volatile dicarbonyls 1.1% of the total determinable carbonyls. Initial reaction with the Girard T reagent isolated an average of 64% of the total carbonyls determinable. In a moderately oxidized fat, carbonyls isolated by the Girard reagent were 33.6% monocarbonyl and 66.4% dicarbonyl, 41.1% volatile carbonyl and 58.9% non-volatile carbonyl, 29.7% volatile monocarbonyl and 11.4% volatile dicarbonyl, and 3.9% non-volatile monocarbonyl and 55.0% non-volatile dicarbonyl.

OXIDATION OF TISSUE LIPIDS IN COOKED PORK. Margaret T. Younathan and Betty M. Watts (Dept. of Food and Nutrition, Florida State Univ., Tallahassee, Fla.). *Food Research* **25**, 538–43 (1960). Comparisons of rancidity on extracted fat versus whole tissue showed that the lipid fraction primarily involved in the rapid oxidative reaction which takes place in cooked meats can be extracted with a mixture of chloroform and methanol but not with neutral fat solvents. TBA tests performed on total lipids fractionated into triglycerides and proteolipids demonstrated that the latter are responsible for the intensive reaction induced by heating muscle tissue.

UNSATURATED TRIGLYCERIDE AND FATTY ACID LIPOXIDASE ACTIVITIES OF NAVY BEANS, SMALL RED BEANS, PEANUTS, GREEN PEAS, AND LIMA BEANS. M. G. Dillard, A. S. Henick, and R. B. Koch (Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.). *Food Research* **25**, 544–53 (1960). Lipoxidase activities of crude extracts of five different legumes were studied using triglyceride and linoleic acid as substrates. Variations in pH optima were noted for the different substrates. The triglyceride activity showed two distinct peaks in the pH curves and an apparent substrate specificity for different triglycerides. Using low level of enzyme activity a lag or induction period was observed with linoleic acid as the substrate for all but one legume tested, while no lag was observed with the trilinolein substrate. The lipoxidase activity for the two types of substrates also showed variations in stability in the legume extracts.

XI. Toxicity of heat-polymerized oil. Noboru Matsuo (Seikei Univ., Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **9**, 37–41 (1960). Highly unsaturated fatty acids separated from cuttle-fish oil were converted to ethyl esters, which were polymerized by heating at 250° for 10 hrs. The polymerized esters were toxic to rats. The urea adduct method was applied to the polymerized esters to separate cyclic esters, which were proved to be highly toxic to rats. Cuttle-fish oil, polymerized by heating in CO_2 at 250° for 10 hrs., was separated by treatment with acetone; the part soluble in acetone was more toxic than the insoluble part. These experiments show that the toxicity of heat-polymerized oil is chiefly due to cyclic monomers.

Sequence of formation of oil in castor seeds. VII. Biosynthesis and fragmentation of C^{14}-labeled ricinoleic acid in castor seed oil. Kazuyuki Mihara (Musashi Kôgyô Univ., Tokyo). *Nippon Kagaku Zasshi* **81**, 954–9 (1960). Aqueous solution of D-glucose-1-C^{14} was absorbed into the stem of growing castor plant, and C^{14}-castor oil was obtained. Fragmentation and analysis of C Nos. 1, 2, 3, 4, 12, and 13 of ricinoleic acid showed that C^{14} was located at C Nos. 2, 4, and 12. Radioactivity was contained in the order unsaturated (chiefly oleic) > ricinoleic > saturated acids.

Glycerol- and acetate-C^{14} incorporation into lipids of tissues undergoing cell division. R. M. Johnson and S. Albert (The Richard Cohn Lab., Detroit Inst. of Cancer Research, and the Dept. of Physio. Chem., Wayne State Univ. Coll. of Med., Detroit, Mich.). *J. Biol. Chem.* **235**, 1299–1302 (1960). Sodium acetate-2-C^{14} or DL-glycerol-1-C^{14} were administered separately to normal and partially heptaectomized rats, and to rats bearing a transplantable adenocarcinoma, and the incorporation of radioactivity into cephalins, inositol phosphatides, lecithins, sphingobyelins, triglycerides, and their fatty acids were measured. The premitotic phase of liver regeneration was associated with an increased uptake of acetate-C^{14} into inositol phosphatides and sphingomyelins, no change in its uptake into cephalins or lecithins, and with an increased incorporation of glycerol-C^{14} into all the phospholipids studied as well as the triglycerides. During the mitotic phase of liver regeneration there was an increased uptake of acetate-C^{14} into the cephalins, lecithins, and triglycerides, an increase in the specific activities of fatty acids of all the lipids, and no further change in the uptake of glycerol-C^{14} into any of the lipids. In tumors there was a decreased uptake of acetate-C^{14} into cephalins and triglycerides, an increased uptake into inositol phosphatides, and no change in that in the sphingomyelins. Specific activities of fatty acids of tumor cephalins and sphingomyelins did not differ from the normal, whereas those of inositol phosphatides and lecithins were increased, and those of the triglycerides were decreased. There was a decreased uptake of glycerol-C^{14} into all the lipids of tumors except sphingomyelins, when compared with normal livers.

The enzymatic synthesis of inositol monophosphatide. H. Paulus and E. P. Kennedy (Dept. of Biochem., Univ. of Chicago, Chicago, Ill.). *J. Biol. Chem.* **235**, 1303–11 (1960). Evidence is presented in support of the following reaction scheme to account for the synthesis of inositol monophosphatide in enzyme preparations derived from liver: L-α-glycerophosphate + 2 RCo–S–CoA → phosphatidic acid: phosphatidic acid + CTP ⇌ CDP-diglyceride + P–P: CDP-diglyceride + inositol ⇌ inositol monophosphatide + CMP.

Isolation of beta-sitosterols from Chufa (Cyperus esculentus L.) tubers. E. A. Abu-Mustafa, M. B. E. Fayez, A. M. Gad, and F. Osman (Res. Units of Natural Prod. and of Fats and Oils, Natl. Res. Center, Dokke, Cairo, Egypt). *J. Org. Chem.* **25**, 1269 (1960). The phytosterol which was isolated by previous investigators from the tubers of *Cyperus esculentus L.* is identified as *beta*-sitosterol.

Lactose diets and cholesterol metabolism. I. Cholesterol absorption, coprostanol formation and bile acid excretion in the rat. W. Wells, S. Anderson, and R. Quan Ma (Biochemistry Dept., Univ. of Pittsburgh, School of Medicine, Pittsburgh, Penn.). *J. Nutrition* **71**, 405–9 (1960). Rats were fed a meal of cholesterol-4-C^{14} and the cholesterol recovered in thoracic duct lymph during the first 24 hours was studied. The sucrose-fed animals adsorbed an average of 7.5% of the isotope whereas rats fed 40% lactose-containing diet adsorbed 19.6% of the cholesterol under identical conditions. The quantity of cholic acid excreted through the bile duct fistulas by a group of rats fed sucrose and lactose was found to be an average of 44.2 mg./24 hours and 75.3 mg./24 hours, respectively. The importance of the intestinal flora and the resulting effect on bile acid and cholesterol metabolism is discussed.

Hourly variation in total serum cholesterol. J. Peterson, A. Wilcox, M. Haley, and R. Keith (School of Medicine, College of Medical Evangelists, Loma Linda, Calif.). *Circulation* **22**, 247–253 (1960). Evidence is presented to indicate that the level of serum cholesterol in certain individuals may vary widely within a matter of hours. The data suggest also that a rapid fluctuation of the serum cholesterol level may be induced in some persons by modifying certain aspects of their environment. Varying lability of the level of serum cholesterol and the differing response of individuals to certain environmental factors require that careful attention be given to the sampling methods used in research.

Metabolism of cholesterol-4-C^{14} in bile duct cannulated chicks and rats. T. Nishida, A. Ueno, and F. A. Kummerow (Dept. of Food Technology, Univ. of Ill., Urbana, Ill.). *Cir. Research* **8**, 742–7 (1960). The level of dietary protein influenced the rate of cholesterol-4-C^{14} catabolism in bile duct cannulated chicks and rats. Animals which had been kept on a high protein diet for 5 weeks excreted cholesterol-4-C^{14} as bile acids at a faster rate than those on a low proten diet. The presence of dietary cholesterol did not change the rate of cholesterol-4-C^{14} catabolism at either high or low dietary protein levels. A species difference in the rate of cholesterol catabolism was also noted. Bile duct cannulated chicks excreted an average of only 8 per cent, while bile duct cannulated rats excreted as much as 46 per cent of injected cholesterol-4-C^{14} in a 72-hour period.

Effect of dietary protein on the metabolism of sodium acetate-1-C^{14} in chicks. T. Nishida, A. Ueno, and F. A. Kummerow (Dept. of Food Technology, Univ. of Ill., Urbana, Ill.). *J. Nutrition* **71**, 379–385 (1960). A low dietary-protein level tended to increase at least initial incorporation of acetate-1-C^{14} into liver cholesterol in chicks. In the presence of dietary cholesterol, the percentage of incorporation of acetate-1-C^{14} into liver cholesterol in birds which had been kept on a low-protein dietary regimen was greater than in those fed a high-protein diet. However, dietary cholesterol depressed significantly the rate of incorporation of acetate into liver cholesterol. The elevating effect of a low-protein diet on the biosynthesis of cholesterol appeared to be independent of the liver cholesterol level.

Studies on the interrelationships between dietary magnesium, quality and quantity of fat, hypercholesterolemia and lipidosis. E. Hellerstein, M. Nakamura, D. Hegsted, and J. Vitale (Dept. of Pathology, Harvard Medical School, Boston). *J. Nutrition* **71**, 339–46 (1960). Young weanling rats were fed one of several diets which varied in the amount of magnesium (24, 96 or 192 mg./100 gm.) and corn oil or a hydrogenated cottonseed oil (HCSO) (5 or 20%) added. The calcium content of the diet was 600 mg./100 gm. When used, cholesterol and cholic acid were added at one and 0.3%, respectively. High dietary magnesium appeared to be "antisudanophilic" only when the serum cholesterol level was elevated and somewhere in the range of 400 mg./100 ml. or above. Thus, no "anti-sudanophilic" effect of magnesium was noted in animals fed corn oil (5 to 20%) and 1% of cholesterol + 0.3% of cholic acid. However, high magnesium was "anti-sudanophilic" with 20% of corn oil when the serum cholesterol level was increased by feeding higher levels of cholesterol and cholic acid.

The effect of dietary magnesium and thyroxine on the progression and regression of cardiovascular lipid deposition in the rat. M. Nakamura, J. Vitale, D. Hegsted, and E. Hellerstein. *Ibid.*, 347–55. Young male rats were fed an "atherogenic" diet (containing cholesterol and cholic acid) and two levels of dietary magnesium. The calcium content of the diet was 600 mg./100 gm. At sacrifice, rats fed low dietary magnesium had a heart valve-aorta score (vascular lipidosis) of 4.8 at 24 days and a slightly higher heart score at the end of 60 days. If at the end of 24 days rats previously fed the low magnesium diets were fed diets high in magnesium (192 mg./100 gm.), there was no increase in the heart score at 60 days. Thus, feeding high dietary magnesium appeared to result in some regression of vascular lipidosis as well as to exert an "anti-sudanophilic" effect. The addition of thyroxine to the diet caused a definited regression in vascular sudanophilia which was probably related in part to decreased serum cholesterol levels.

Nitrogen-free plasmalogen observed in infarcted myocardium of the dog. M. Hack and V. Ferrans (Depts. of Medicine and Anatomy, Tulane University, New Orleans, La.). *Circulation Research* **8**, 738–740 (1960). Heart tissue from dogs in which myocardial infarction was induced experimentally.

was analyzed histochemically and chromatographically for plasmalogens. A new, nitrogen-free plasmalogen was observed that was confined to the infarcted area; marked histochemical alterations in the pattern of distribution of the plasmalogens occurred. The new plasmalogen is believed to be a polymer of phosphatidic acid plasmalogen.

EFFECT OF ETHANOL ON SERUM CHOLESTEROL CONCENTRATION IN THE DOG AND MAN. F. Grande, L. Hay, H. Heupel, and D. Amatuzio (Jay Philips Research Laboratory of Mount Sinai Hospital and the Univ. of Minn., Minneapolis, Minn.). *Circulation Research* **8**, 810–19 (1960). The effect of ethanol on serum cholesterol concentration has been studied in normal male dogs subsisting on diets of low cholesterol content. Daily administration of 1.65 g. ethanol/Kg. of body weight produced significant increases of serum cholesterol in dogs when fed either a low-fat diet (4 per cent of fat calories) or a high-fat (40 per cent) diet. The mean cholesterol increase after 2 weeks of ethanol administration was 52 mg./100 ml. for 8 dogs on the low-fat diet, and 75 (SE, 6.6) for 24 dogs on the high-fat (lard) diet. When 0.45 g. ethanol/Kg./day were given to 59 normal men for 3 weeks, no significant difference of serum cholesterol concentration was observed between the values on syrup and on alcohol. However, the administration of 1.35 g./Kg./day to 14 men produced a mean increase of serum cholesterol concentration of 18 mg./100 ml. within 1 week.

MEDIUM-CHAIN AND LONG-CHAIN SATURATED TRIGLYCERIDES AND LINOLEIC ACID REQUIREMENTS. H. Kaunitz, C. Slanetz, R. Johnson, and V. Babayan (Dept. of Pathology and Institute of Comparative Medicine, Columbia Univ., New York). *J. Nutrition* **71**, 400–4 (1960). Weanling male rats were maintained for 74 days on a purified, fat-free (FF) diet or similar ones containing 20% of saturated medium-chain (C_{8-12}) triglycerides (MCT) or long-chain (C_{12-18}) triglycerides (LCT). The diets were supplemented with zero, 0.1 or 2% of linoleic acid (LA). It was concluded that MCT does not increase LA requirements in comparison with an FF diet and that LCT does.

PLANT PHOSPHOLIPIDS. II. ISOLATION AND STRUCTURE OF GLYCEROPHOSPHORYL INOSITOL. M. Lepage, R. Mumma, and A. Benson (Dept. of Chem., Penn. State Univ., University Park, Penn.). *J. Am. Chem. Soc.* **82**, 3713–15 (1960). The location of the phosphate diester linkage in phosphatidyl inositol of plant origin has been examined. Glycerophosphoryl inositol was isolated from deacylated corn phosphatides by column chromatography on Dowex 2-acetate. Each of the other anionic derivatives of plant lipids was separated using gradient elution technique and labeled compounds for qualitative and quantitative analysis. Proton magnetic resonance spectrometry of glycerophosphoryl inositol heptaacetate revealed acetoxy hydrogen absorption corresponding to one axial acetoxy group. These results and hydrolysis product studies indicate that the plant phosphatide is 1-phosphatidyl-myo-inositol.

AN INVESTIGATION OF THE ESSENTIAL FATTY ACID ACTIVITY OF SOME OF THE GEOMETRICAL ISOMERS OF UNSATURATED FATTY ACIDS. F. H. Mattson (Procter and Gamble Co., Miami Valley Laboratories, Cincinnati, Ohio). *J. Nutrition* **71**, 366–70 (1960). Essential fatty acid (EFA) deficiency was developed in weanling rats by feeding them a diet deficient in essential fatty acids for approximately 12 weeks. The animals were then divided into groups and given supplements of *cis,cis* linoleate, *cis,trans* linoleate, *trans,trans* linoleate, oleate, or elaidate either alone or in addition to *cis,cis* linoleate. On the basis of gain in body weight it is concluded that only *cis,cis* linoleate possesses EFA activity. However, the inactive acids did not interfere with the utilization of dietary *cis,cis* linoleate.

PREPARATION AND CERTAIN PHYSICAL PROPERTIES OF SOME PLANT STERYL ESTERS. A. Kuksis and J. M. R. Beveridge (Dept. of Biochemistry, Queen's Univ., Kingston, Ont.). *J. Organic Chem.* **25**, 1209–19 (1960). The even numbered C_2–C_{22} saturated and some C_{18} unsaturated fatty acid esters of β- and γ-sitosterol, stigmasterol, their saturated analogs, and ergosterol were prepared by treating the corresponding acid chloride or anhydride with the sterol in the presence of pyridine in an inert solvent. Adsorption chromatographic purification of the steryl esters was essential if contamination with free sterols was to be avoided. In all cases the melting points of the esters were relatively sharp and decreased with increasing molecular weight of fatty acid till a minimum was reached in the myristate-palmitate region, after which they increased. The introduction of a double bond into the fatty acid residue produced a 37–45° drop in the melting point when compared with the corresponding saturated ester.

SPECTROPHOTOMETRIC DETERMINATION OF CHLOROPHYLLS AND PHEOPHYTINS IN PLANT EXTRACTS. L. P. Vernon (Department of Chemistry, Brigham Young University, Provo, Utah). *Anal. Chem.* **32**, 1144–50 (1960). A spectrophotometric procedure is described which can be utilized to determine quantitatively chlorophyll a, chlorophyll b, pheophytin a, pheophytin b, total chlorophyll, total pheophytin, and per cent retention of chlorophylls. The method utilizes determined specific absorptivities and changes in specific absorptivity for the four components at appropriate wave lengths in 80% acetone. In addition to these specified wave lengths, the specific absorptivities at absorption maxima for each component in 80% acetone were determined. The equations derived have been tested on artificial mixtures of known composition and have been used to calculate the per cent of chlorophyll retention in several green vegetables.

HYDROXYSTEARIC ACIDS AND THE BIOSYNTHESIS OF UNSATURATED FATTY ACIDS. W. J. Lennarz and K. Bloch (James Bryant Conant Lab., Harvard Univ., Cambridge, Mass.). *J. Biol. Chem.* **235**, PC26 (1960). 10-Hydroxystearic acid was prepared from oleic acid by way of the epoxide. Unlabeled and 11,12-di-T-9-hydroxystearic acid were obtained by catalytic hydrogenation of the naturally occurring Δ^{11-9}hydroxyoctadecenoic acid. The tritium-labeled 9-hydroxy compound was incubated with crude yeast homogenates fortified with adenosine triphosphate, and CoA. Fractionation of the reaction mixture by chromatography on silica gel and treatment with mercuric acetate revealed the presence of labeled olefinic acids in yields ranging from 20 to 60% in four experiments.

FATTY ACID PATTERN OF HUMAN BILE UNDER NORMAL AND PATHOLOGICAL CONDITIONS. R. Blomstrand and P. Ekdahl (Swedish Medical Research Council, Unit for Biochemical Research Related to Atherosclerosis, University of Lund, Sweden). *Proc. Soc. Exptl. Biol. Med.* **104**, 205–9 (1960). Total fatty acids of human gall bladder bile and hepatic bile were analyzed qualitatively and quantitatively by gas-liquid chromatography. The 3 major fatty acids in human bile are palmitic, oleic, and linoleic acid, representing around 80% of total fatty acids. Analysis of composition of total fatty acids in uncomplicated gallstone disease failed to reveal any abnormality in this disease.

THE EFFECT OF TYPE OF DIETARY FAT ON REPRODUCTIVE PERFORMANCE AND BODY COMPOSITION OF THE VITAMIN B_6-DEFICIENT RAT. Myrtle L. Brown (Human Nutrition Research Div., Ag. Research Service, U. S. Dept. Agr., Washington, D. C.). *J. Nutrition* **71**, 235–41 (1960). The effects of two types of fat, corn oil and a hydrogenated shortening, at 15% dietary levels, have been determined in studies of reproductive performance and body composition in vitamin B_6-deficient and control female rats, when the deficiency was initiated at 80 days of age, at least three weeks prior to mating. No significant differences associated with type of dietary fat were observed in body or liver composition of animals at the levels of fat fed in these experiments, but the composition of liver lipids appeared to be altered by the vitamin B_6 deficiency.

THE EFFECT OF DIETARY FAT AND THE REPEATED WITHDRAWAL OF SMALL SAMPLES OF BLOOD ON PLASMA CHOLESTEROL LEVELS IN THE RAT. I. W. Coleman and J. M. R. Beveridge (Dept. of Biochem., Faculty of Med., Queen's Univ., Kingston, Ontario, Canada). *J. Nutrition* **71**, 303–9 (1960). The influence of the nature and level of dietary fat on the plasma cholesterol level of the white rat has been investigated, with emphasis placed on the response to butter fat and corn oil. With diets varying in fat content from 0.6 to 58.5% of total calories, there was essentially *no* effect on plasma cholesterol level. When blood samples amounting to 1 to 1.5% of the total blood volume were taken on alternate days for 6 days, there occurred a highly significant increase in plasma cholesterol in all groups fed rations containing fat.

EFFECT OF BETA-SITOSTEROL ON REGRESSION OF HYPERLIPEMIA AND INCREASED PLASMA COAGULABILITY IN THE CHICKEN. E. R. Diller, C. L. Rose, and O. A. Harvey (Lilly Research Labs., Eli Lilly and Co., Indianapolis, Ind.). *Proc. Soc. Exptl. Biol. Med.* **104**, 173–6 (1960). A cholesterol-induced hyperlipemia was fully counteracted (reduced to normal levels) by feeding *beta*-sitosterol. The decreased plasma clotting times associated with a hyperlipemia returned to control values when a normal lipid level was attained. An inverse relationship was demonstrated between plasma clotting time in presence of Russell's viper venom and degree of lipemia, i.e., a hyperlipemia resulted in decreased plasma clotting time, and vice versa. Addition of 4% *beta*-sitosterol to the diet prevented or reversed an increased lipid and cholesterol concentration in liver and aorta.

THE EFFECT OF 3% ADDED ANIMAL FAT ON LAYING HEN PERFORMANCE. W. E. Donaldson and C. D. Gordon (Poultry Department, University of Rhode Island, Kingston, R. I.). *Poultry Sci.* **39**, 583–7 (1960). The addition of 3% stabilized animal fat in place of 3% corn in a laying ration containing 19% protein and fed over a 350-day test period: 1) did not significantly affect hen-day egg production; 2) significantly depressed hen-housed egg production in birds with initial weight of more than 5 pounds; 3) did not significantly affect hen-housed egg production in birds with initial weights of less than 5 pounds; 4) resulted in higher feed and energy consumption and poorer feed conversion; 5) increased mortality and incidence of internal hemorrhage and obesity in heavy breeds; and 5) did not affect egg quality as measured by egg weight, Haugh units, shell thickness and yolk color.

A RELATIONSHIP BETWEEN COCCIDIOSIS AND VITAMIN A NUTRITION IN CHICKENS. Jan Erasmus, M. L. Scott, and P. P. Levine (Department of Poultry Husbandry, New York State College of Agriculture, Ithaca, N. Y.). *Poultry Sci.* **39**, 565–71 (1960). Several experiments were conducted to determine the effects of increasing levels of vitamin A and *beta*-carotene in the diet upon growth, feed consumption and the storage of vitamin A in the livers of chicks artificially infected with coccidiosis. The results indicated that the ataxia of vitamin A deficiency occurs only when the liver storage of vitamin A is reduced below 0.8–0.9 I. U. per gram of liver, whether this deficiency is brought about by a deficiency of vitamin A in the diet or by the reduction in vitamin A liver storage induced by coccidiosis.

ANTIOXIDANTS AND SURVIVAL TIME OF MICE EXPOSED TO MULTIPLE SUBLETHAL DOSES OF X-IRRADIATION. B. H. Ershoff and C. W. Steers, Jr. (Western Biological Labs., Culver City, California). *Proc. Soc. Exptl. Biol. Med.* **104**, 274–6 (1960). Experiments were conducted to determine effects of antioxidants on survival time of mice exposed to multiple sublethal doses of total body x-irradiation. Mixed tocopherols and Santoquin at 0.25% level in the diet, and DPPD at levels of 0.25% or 0.5% of diet had little if any protective effect. Propyl gallate, DBH and BHT at levels of 0.25% or 0.5% of the diet increased survival over that on basal unsupplemented ration.

EFFECT OF FEEDING 1,2-DIHYDRO-6-ETHOXY-2,2,4-TRIMETHYLQUINOLINE TO CHICKENS. F. X. Gassner, E. G. Buss, M. L. Hopwood, and C. R. Thompson (Colorado State University, Fort Collins, Colorado). *Poultry Sci.* **39**, 524–33 (1960). 1,2-Dihydro-6-ethoxy-2,2,4-trimethylquinoline (EMQ) was fed in graded single doses to chicks both on and off feed in amounts up to 10 gm./kg. body wt. The LD-50 at 24 hours was about 10 gm./kg. body weight off feed and between 8 and 10 gm./kg. body weight on feed.

RELATIVE VALUE OF CAROTENE AND VITAMIN A FED AT MEDIUM LEVELS IN A MILK REPLACER. A. P. Grifo, Jr., J. E. Rousseau, Jr., H. D. Eaton, and D. G. Gosslee (Storrs Agriculture Experiment Station, Conn.). *J. Dairy Sci.* **43**, 1003–6 (1960). The data serve as approximations of the relative value of carotene to vitamin A in milk replaced fed calves, but not as exact estimates, due to the numerous factors influencing the utilization of carotene or vitamin A as recently discussed by Wise *et al.* Also, the superiority of a water-dispersible form of vitamin A over that of the vitamin A-oil confirms studies with the milk fed calf, as well as recent data with steers.

VITAMIN E—EFFECT ON SERUM CHOLESTEROL AND LIPOPROTEINS. D. Harman (University of Nebraska School of Medicine, Omaha, Neb.). *Circulation* **22**, 151–3 (1960). Vitamin E had no significant effect on serum levels of cholesterol or lipoproteins when taken orally by normal working individuals at the level of 300 or 600 mg. per day for a period of 4 weeks.

DEFATTED STARFISH MEAL AS SOURCE OF NUTRIENTS IN POULTRY RATIONS. E. Levin, N. T. Rand, J. D. Mosser, D. S. Varner, and V. K. Collins (VioBin Corporation, Monticello, Illinois). *Poultry Sci.* **39**, 646–54 (1960). Defatted starfish meal made by the VioBin azeotropic process was nutritionally evaluated with growing chicks. Protein concentrates prepared from starfish either by pancreatic digestion or by washing with hydrochloric acid, were found to have high protein quality values, comparable to good quality fish meals. When 20 to 30 percent of starfish meal was incorporated into fish meal, the protein quality of the mixed products was increased. It is concluded that defatted starfish can compete nutritionally and economically with fish meal as a source of protein, calcium and unidentified growth factors in poultry rations.

PROPERTIES AND PURIFICATION OF ADIPOSE TISSUE LIPASE. W. S. Lynn, Jr., and N. C. Perryman (Dept. Biochemistry, Duke University, Durham, North Carolina). *J. Biol. Chem.* **235** 1912–16 (1960). Purification of a pig adipose tissue lipase is reported. The enzyme hydrolyzes most glycerides, except the glycerides of acetate and oleate. All three ester bonds of glycerides are readily attacked by the enzyme. Studies on the substrate specificity of the enzyme under conditions of varying dielectric constant and in the presence of various detergents and surfaces are reported.

THE ETHER EXTRACT OF YOLKS OF EGGS FROM HENS ON FEED CONTAINING DIFFERENT FATS. Joyce G. Ostrandler, Ruth Jordan, W. J. Stadelman, J. C. Rogler, and Gladys E. Vail (Agricultural Experiment Station, Purdue University, Lafayette, Ind.). *Poultry Sci.* **39**, 746–50 (1960). Analyses of individual eggs from hens on the same ration indicated significant variation among eggs of different hens with respect to the ether extractable material in the yolks and in the iodine absorption values of the extracts from the eggs.

RELATION OF DIET TO RUMEN VOLATILE FATTY ACIDS, DIGESTIBILITY, EFFICIENCY OF GAIN AND DEGREE OF UNSATURATION OF BODY FAT IN STEERS. J. C. Shaw, W. L. Ensor, H. F. Tellechea, and S. D. Lee (Dairy Department, University of Maryland, College Park). *J. Nutrition* **71**, 203–8 (1960). A ration differing from the basal ration only in that the hay was ground and pelleted and the corn steamed in the process of flaking, effected the results when fed to steer calves. It increased in the degree of unsaturation of body fat.

ETHANOL-1-C^{14} AND ACETATE-1-C^{14} INCORPORATION INTO LIPID FRACTIONS OF THE MOUSE. Marion Edmonds Smith and H. W. Newman (Dept. Med. Stanford Univ. School of Med., Palo Alto, Calif.). *Proc. Soc. Exptl. Biol. Med.* **104**, 282–4 (1960). Pairs of mice were administered either by mouth or by injection equal amounts of ethanol-1-C^{14} or acetate-1-C^{14}. The phospholipid, non-saponifiable fraction, and fatty acid fractions of liver, gut, brain, and fat were isolated and specific activities of these fractions were compared. Ethanol-1-C^{14} and acetate-1-C^{14} contributed approximately equal labellings to tissues investigated.

THE EFFECT OF LACTOSE FEEDING ON THE BODY FAT OF THE RAT. R. M. Tomarelli, Ruth Hartz, and F. W. Bernhart (Wyeth Institute for Medical Research, Radnor, Penn.). *J. Nutrition* **71**, 221–7 (1960). Young rats fed diets containing lactose consumed less food, grew at a reduced rate, and had 40% less carcass fat than control rats fed diets containing glucose, sucrose, dextrin or a glucose-galactose mixture. The difference in body fat content of rats fed the glucose and lactose diets was still present after 42 weeks when the animals had reached a growth plateau.

CHANGES IN THE FATTY ACID COMPOSITION OF THE DEPOT FAT OF MICE INDUCED BY FEEDING OLEATE AND LINOLEATE. S. B. Tove and F. H. Smith (Animal Nutrition Section of the Dept. of Animal Industry, North Carolina Ag. Exp. Station, Raleigh, N. C.). *J. Nutrition* **71**, 264–72 (1960). When elevated depot fat levels of linoleate or oleate were produced by dietary means, specific patterns of fatty acid replacement were observed. As the linoleate level in the depot fat increased to about 45%, palmitoleic acid was the only acid to decrease relative to the other acids; and there was a relative increase in stearate. As the linoleate level increased above 45%, palmitic, palmitoleic and myristic acids decreased and stearic acid increased.

BIOLOGY OF FATS. X. LIPIDS FROM BLOOD SERUM OF NORMAL AND PATHOLOGIC HUMANS AND FROM TISSUES AFFECTED WITH XANTHOMATOSIS: METHODS AND NORMAL SERUM. H. P. Kaufmann and G. Schmidt (Deut. Inst. Fettforsch., Münster). *Fette Seifen Anstrichmittel* **62**, 164 (1960). The blood lipids of two normal and three other persons suffering from arteriosclerosis, essential hyperlipemia, and xanthomatic hypercholesterolemia, were investigated clinically and with the aid of paper chromatography and spectrophotometry. The following determinations were made: total lipid, iodine value, saponification value, total cholesterol, free sterols, total P lipid, total N lipid, the N/P ratio, total phospholipid as lecithin, carotinoids, periodic acid oxidizables, unsaponifiables, percent fatty acids, and choline, phosphoric acid and glycerol. The latter three determinations were made on the water soluble materials in the fats studied. The fatty acid composition of the serum lipids were also determined; and the following acids were found: lauric, myristic, palmitic, stearic, oleic, palmitoleic, linoleic, linolenic, arachidonic, pentaenoic, and hexaenoic acids.

BASIC FAT FOR FEEDING EXPERIMENTS: FRACTIONATION OF CACAO BUTTER WITH ACETONE. A. Jart (Danish Inst. for Fat Research, Copenhagen). *Fette Seifen Anstrichmittel* **61**, 1084–86 (1959). For feeding experiments of suitable experimental animals, the author prefers to feed the control animals with a food containing a basic fat instead of a fat free diet. The types of basic fats are determined on the basis of individual requirements. Cacao butter, which had been rendered free from glycerides containing linoleic acid by suitable treatment, was selected as the basic food in place of synthetic triglycerides. The fractionation of cacao butter through acetone proved to be such a suitable method.

COMPOSITION OF LYMPH CHOLESTEROL ESTER FATTY ACIDS AFTER FEEDING OF CHOLESTEROL AND OLEIC ACID. L. Swell, M. D. Law, H. Field, Jr., and C. R. Treadwell (Vet. Admin. Center, Martinsburg, W. Va., George Washington Univ., Washington, D. C.). *Proc. Soc. Exptl. Biol. Med.* **104**, 7–8 (1960). Fasting lymph and lymph following feeding of a mixture containing cholesterol and oleic acid were analyzed for their cholesterol ester fatty acid (CEFA) composition by gas-liquid chromatography. The major fatty acids of fasting lymph were palmitic, linoleic and oleic acids, with polyunsaturated fatty acids comprising 36% of total CEFA. After feeding oleic acid only 42.3% of total CEFA was present as oleic acid. Results support the concept that CEFA composition is not determined solely by dietary fatty acid, but by the composition of the fatty acid pool in the mucosa from which fatty acids are drawn for esterification of cholesterol.

FAT METABOLISM IN HIGHER PLANTS. XIII. PHOSPHATIDIC ACID SYNTHESIS AND DIGLYCERIDE PHOSPHOKINASE ACTIVITY IN MITOCHONDRIA FROM PEANUT COTYLEDONS. C. Bradbeer and P. K. Stumpf (Dept. Biochem., Univ. Calif., Davis). *J. Lipid Research* **1**, 214–221 (1960). Studies using P^{32} indicated that phosphatidic acid synthesis in mitochondria from peanut cotyledons is stimulated by the presence of α, β-diglycerides. This supports the view that this synthesis is due to phosphokinase activity in the mitochrondia. Evidence is presented that this enzyme preparation is capable of phosphorylating α-monoglycerides with the formation of monoacylphosphatidic acids.

BIOSYNTHESIS OF POLYUNSATURATED FATTY ACIDS IN HUMAN LIVER. F. Leupold and G. Kremer (Univ. Med. Clinic, Univ. Cologne). *Z. Physiol. Chem.* **318**, 251 (1960). Human liver slices were incubated *in vitro* with acetate-1-C^{14} and the unsaturated fatty acids which were formed were isolated and investigated. After ozonolysis the radioactivity resulting from acetate incorporation was found to be mainly in the succinic, glutaric, and higher dicarboxylic acids formed by degradation; while only slight radioactivity was observed with malonic acid. These results confirmed those obtained from rat experiments and support the theory that C_{20} and C_{22} polyenoic acids are synthesized from C_{18} precursors by elongation of the carbon chain and by introduction of new unsaturation in the divinylmethane pattern at the side of the carboxyl group.

CRYSTALLINE LYSOPLASMALOGEN (LYSOPHOSPHATIDAL CHOLINE): PREPARATION FROM HEART MUSCLE AND ACTION ON ERYTHROCYTES AND SPERMATOZOA. E. F. Hartree and T. Mann (Univ. of Cambridge). *Biochem. J.* **75**, 251–258 (1960). A choline-based lysoplasmalogen has been prepared in crystalline form from an alkaline hydrolysate of the lecithin fraction from ox heart. The ratio, phosphorus : choline : fatty aldehyde, is 1:1:1.

STEROL ANALYSIS BY GAS CHROMATOGRAPHY. R. K. Beerthuis and J. H. Recourt (Unilever Res. Lab., Vlaardingen, Holland). *Nature*, **186**, 372–374 (1960). Successful separation of sterols was achieved on a column (length, 90 cm.; internal diameter, 4 mm.) packed with 20% by weight of silicone oil on Celite. Best results were obtained with Celite having a particle size of 150–178 μ. The column was conditioned at a working temperature (287°) for two days. The gas density balance was used as a detector. Sterols which differ in the total number of carbon atoms can be readily separated and can also be determined quantitatively. The use of the method for the determination of the sterols present in faeces of rats on a fat-free diet is described.

A CARDIOLIPIN-LIKE COMPOUND IN RAT LIVER MITOCHRONDRIA. G. S. Getz and W. Bartley (Dept. of Biochem., Univ. of Oxford). *Nature* **184**, 1229–1230 (1959). In the lipids of rat liver mitochondria (extracted with chloroform-methanol, 2:1) is a fraction which is eluted off a silicic acid column with a chloroform-methanol mixture of ratio 7:1 and which resembles Pangborn's cardiolipin from ox heart. Results of analyses suggest a compound containing 4 glycerols, 3 phosphates, and 4 to 6 fatty acids. Analysis of the methyl esters of the fatty acids by gas liquid chromatography indicated the presence of C_{12} to C_{22} acids of which 97 per cent were unsaturated (mainly oleic and linoleic). Palmitic and stearic were the only saturated acids identified.

INFLUENCE OF DIETARY CARBOHYDRATE AND PROTEIN ON SERUM AND LIVER CHOLESTEROL IN GERM-FREE CHICKENS. D. Kritchevsky, Ruth R. Kolman, R. M. Guttmacher, and M. Forbes (Wistar Inst. of Anatomy and Biology, Philadelphia, Pa.). *Arch. Biochem. Biophys.* **85**, 444–451 (1959). The existence is demonstrated of an interrelationship among the intestinal flora, dietary carbohydrate, and cholesterol metabolism. Conventionally reared and germ-free chickens were given diets containing 3% cholesterol in combination with various carbohydrates (glucose, starch, sucrose) and proteins (casein and soybean protein). In the conventional chickens the serum cholesterol levels were considerably higher in the sucrose group. Absence of intestinal flora did not affect the cholesterol level of the sucrose-cholesterol animals but resulted in increases of 20–40% in cholesterol levels of the birds fed glucose or starch. Serum cholesterol levels of the casein group were higher than those of the soybean protein group. With the germ-free chickens, however, levels rose to about the same degree. In general, liver lipide levels paralleled the serum cholesterol results in all groups.

STUDIES ON THE BIOSYNTHESIS OF CHOLESTEROL. 9. FORMATION OF PHOSPHORYLATED DERIVATIVES OF MEVALONIC ACID IN LIVER-ENZYME PREPARATIONS. A. de Waard and G. Popják (Med. Res. Council, Exptl. Radiopathology Res. Unit, Hammersmith Hospital, London, W. 12). *Biochem. J.* **73**, 410–415 (1959). The formation of two phosphorylated derivatives of mevalonic acid by liver enzymes in the presence of adenosine triphosphate and Mg^{++} ions is described. The two substances were purified by various chromatographic procedures. One of the compounds, MV_1, is thought to be 5-phosphomevalonate; the second, MV_2, contains two atoms of phosphorus per molecule of mevalonate. Both of these substances are converted into cholesterol more efficiently than is dl-mevalonate, but adenosine triphosphate is still needed in the conversion.

DETERMINATION OF NEURAMINIC ACID IN CRUDE BRAIN LIPIDS. C. Long and D. A. Staples (Biochem. Div., Physiol. Dept., Inst. of Basic Medical Sciences, Royal Col. of Surgeons of England, Lincoln's Inn Fields, London, W.C. 2). *Biochem. J.* **73**, 385–389 (1959). Partitioning ox-brain lipids between aqueous methanolic and chloroform-rich phases caused the strandin, a water-soluble lipid containing fatty acid, sphingosine, glucose, galactose, galactosamine, and neuraminic acid, to pass completely into the methanol phase. The neuramic acid content was determined by measuring the "difference" extinction at 570 mμ of the orcinol reaction products (untreated minus acid-treated to destroy the neuraminic acid). Analyses of the lipids of several rat tissues indicated that neuraminic acid, and consequently strandin, was present only in the brain.

SERUM AND LIVER LIPIDS IN RATS TREATED WITH NEOMYCIN. K. Kowalewski (Univ. of Alberta, Edmonton, Canada). *Proc. Soc. Exptl. Biol. Med.* **102**, 448–449 (1959). Since ingestion of neomycin results in hypercholesterolemia in humans, the effect of this antibiotic on lipids of serum and liver has been studied in rats. Basal control diet or cholesterol rich diet, alone or with 0.2% neomycin added, was fed to rats for four months. The prolonged administration of neomycin was not associated with any significant changes in serum or liver levels of cholesterol and phospholipids. The only significant change was the rise of total cholesterol in livers of animals given cholesterol rich diets, with and without neomycin.

INFLUENCE OF EXERCISE, ANDROGEN ADMINISTRATION AND "ATHEROGENIC" DIET ON HEMATOLOGIC CHANGES IN PULLETS. J. E. Anderson, H. Y. C. Wong, A. C. Levy, and Abbie K. Wong (Howard Univ. School of Medicine, Washington, D. C.). *Proc. Soc. Exptl. Biol. Med.* **102**, 419–421 (1959). Pullets receiving testosterone propionate demonstrated a significant increase in red blood cell counts and hemaocrits and a decrease in spleen weights. Addition of cholesterol and cottonseed oil to the diet, submitting the birds to exercise, or a combination of these, did not appear to cause hematologic changes.

NEW INHIBITORS OF IN VITRO CONVERSION OF ACETATE AND MEVALONATE TO CHOLESTEROL. F. M. Singer, J. P. Januszka, and A. Borman (Squibb Inst. for Medical Res., New Brunswick, N. J.). *Proc. Soc. Exptl. Biol. Med.* **102**, 370–373 (1959). The effects of 1-testololactone, 4-androstene 17 -ol-3-one-17-oic acid, and fluoromevalonic acid upon *in vitro* conversion of labeled acetate and labeled mevalonate into cholesterol were studied. All of the compounds inhibited conversion of acetate, while only the latter two inhibited conversion of mevalonate. Fluoromevalonic acid was the most potent inhibitor studied. Fluoroacetate, fluoride ions, and zinc ions had no effect on the mevalonate system; only zinc ions inhibited conversion of acetate to cholesterol.

INFLUENCE OF BILE ACIDS ON CHOLESTEROL METABOLISM IN THE MOUSE. W. T. Beher, A. L. Anthony, and Gizella D. Baker (Edsel B. Ford Inst. for Med. Res., Henry Ford Hospital, Detroit, Mich.). *Proc. Soc. Exptl. Biol. Med.* **102**, 317–319 (1959). Cholic acid increased hepatic and intestinal cholesterol levels, but had no effect on kidney cholesterol. It decreased hepatic cholesterol synthesis rates, but had no effect on intestinal synthesis rates. Hyodeoxycholic and lithocholic acids decreased liver cholesterol levels and effected large increases in hepatic cholesterol synthesis. Deoxycholic acid significantly decreased liver, small intestine and kidney cholesterol levels as well as hepatic cholesterol synthesis.

Neutron activation paper chromatographic analysis of phosphatides in mammalian cell fractions. E. H. Strickland and A. A. Benson (Pennsylvania State Univ.). *Arch. Biochem. Biophys.* **88**, 344–348 (1960). Diphosphatidylglycerol (cardiolipin) was found in the mitochondria of a number of cell fractions. Its concentration was estimated by neutron activation chromatographic analysis of the deacylated derivative, 1,3-diglycerophosphorylglycerol. Microsomes contained little or none of this lipid. The distributions of the other glycerol phosphatides in mitochondria and microsomes were similar. A possible functional role for diphosphatidylglycerol is discussed.

Mechanism of inhibition of gastric secretion by fat in the intestine. Rene Menguy (Dept. of Surgery, Univ. of Oklahoma Med. Center and Vet. Admin. Hospital, Oklahoma City). *Proc. Soc. Exptl. Biol. Med.* **102**, 274–276 (1959). Intraduodenal administration of olive oil suppressed gastric secretion in intact rats. Only moderate inhibition of gastric secretion was observed when the same amount of oil was administered to rats in which bile had been diverted from the small intestine. Addition of bile salts to administered fat resulted in the same degree of inhibition as in the intact animal.

Dyeing solution for coloring citrus fruits and method of dyeing citrus fruits. H. J. Keller (Clearwater, Fla.). *U. S. 2,943,943.* An annatto derivative is dissolved in a hydrocarbon solvent, oleic acid, and an amine (the amine being present in at least equal amounts in relation to the oleic acid). The mixture is emulsified with water, maintained at a pH between 7 and 13, and applied to the skin of citrus fruits to dye them.

Microanalytical separation of steroids by gas chromatography. C. C. Sweeley and E. C. Horning (National Heart Institute, Bethesda, Md.). *Nature* **187**, 144–145 (1960). A synthetic mixture of steroids was separated on an ethylene glycol—isophthalate polyester column. Analyses at temptratures of 220–280°, with argon flow-rates of 50–100 ml./min., showed column efficiencies of 1400–1800 theoretical plates. No separation was observed for cholesterol methyl ether and cholestanol methyl ether, but androstane-3,17-dione and Δ^4-androstene-3,17-dione had widely different retention times. The column cannot be used for quantitative separation of fatty acid esters *because of the failure to separate completely methyl* stearate and methyl oleate. It may be useful for examinations of mixtures of very long chain compounds, however.

Color tests for the detection of sterols and estrogens on filter paper. L. R. Axelrod and J. E. Pulliam (Southwest Foundation for Res. and Education, San Antonio, Tex.). *Arch. Biochem. Biophys.* **89**, 105–109 (1960). Six procedures have been devised for the detection of the estrogens in microquantities on filter paper (2 to 8 μg. of compound/sq. cm. of paper). Three of the tests have also been applied to the detection of the sterols.

Purification of the acid form of phosphatidylserine from beef brain by countercurrent distribution. D. Therriault, T. Nichols, and H. Jensen (U. S. Army Medical Res. Lab., Fort Knox, Ky.). *Arch. Biochem. Biophys.* **89**, 91–96 (1960). A method is described for the isolation of the acid form of phosphatidylserine from beef brain by means of countercurrent distribution. The solvent system consisted of carbon tetrachloride-methanol-water in the ratio of 63:35:4 by volume. Evidence is also presented that phosphatidylserine is one of the phospholipids from brain which, when mixed with lecithin, yields a preparation with procoagulant activity.

An in vitro study of glyceride absorption. H. C. Tidwell and J. M. Johnston (Univ. of Texas, Southwestern Medical School, Dallas). *Arch. Biochem. Biophys.* **89**, 79–82 (1960). A comparative study on the absorption of labeled fatty acids and mono-, di-, and triglycerides was conducted utilizing an *in vitro* procedure with rat intestine. Unesterified fatty acids appeared to have been absorbed with results comparable to those with the intact animal as evidenced by the conversion of fatty acids into triglycerides and the appearance of chylomicron-like particles on the serosal side. Di- and triglycerides were not absorbed to a appreciable extent. Unlike the higher glycerides, the monoglyceride was readily hydrolyzed by an enzyme found in the mucosal solution. The relationship of this enzyme to the absorption of monoglycerides is discussed.

Autoxidation of carotene and vitamin A. Influence of fat and antioxidants. P. Budowski and A. Bondi (Hebrew Univ., Rehovot, Israel). *Arch. Biochem. Biophys.* **89**, 66–73 (1960). The autoxidation of carotene and vitamin A palmitate in paraffin solution was studied, attention being directed to the influence of initial substrate concentration and to the effect of unsaturated fat, antioxidants, and synergists. Decreasing the initial concentration of carotene or vitamin A caused longer induction periods and lower rates of autoxidation. Addition of unsaturated fat (purified glycerides or methyl *esters of cottonseed oil) resulted in shorter induction* periods and higher rates of autoxidation. A relatively large effect was obtained with the addition of small quantities of fat The pro-oxidant effect of fat increased with increasing degree of unsaturation. *N,N′*-diphenyl-*p*-phenylenediamine was the most effective antioxidant, followed by butylated hydroxytoluene; octyl gallate was the least effective. Acid synergism was found to be a nonspecific property in which acid strength and lipid solubility play the main role.

Processing by irradiation. II. Application to food preservation. F. J. Ley and J. R. Hickman (Wantage Radiation Lab., Berkshire). *Research (London)* **13**, 193–197 (1960). The chemical changes induced in food by radiation treatment are considered with regard to effect on quality and on nutritive value and possible toxicity. The peroxide number of fats increases on irradiation, but the peroxide number in irradiated foods rarely exceeds 100 and at this level is not toxic. Large losses in carotenes and preformed vitamin A have been reported in irradiated foods. Poor reproductive performances in rats fed on irradiated semi-synthetic diets may be attributed to vitamin E destruction. No conclusive results have been obtained on the effect of irradiation on vitamin K.

Buccal tablet containing vitamin A. I. B. Wershaw (Dome Chemicals, Inc.). *U. S. 2,949,401.* A buccal tablet having a hardness of at least 15 kg. per square cm., which will not disintegrate when placed in water at 37° in less than one hour, *consists of a thorough admixture of 10–20% by weight of* vitamin A acetate, 0.3–0.4% of an acid such as citric or tartaric, 3–5% of methyl cellulose, 0–0.02% of ascorbic acid, and 74–86% of a filler chemically inert to the other constituents of the tablet.

• Drying Oils and Paints

Polarographic determination of metal driers in a nonaqueous solution. E. J. Kuta (Institute of Marine Resources, Hilgard Hall, University of California, Berkeley, California). *Anal. Chem.* **32**, 1065–8 (1960). A polarographic procedure is given for the rapid determination of metal driers. The solvent is benzene-methanol (1 to 1), and sodium acetate is the supporting electrolyte. Cobalt, copper, iron, lead, manganese, nickel, and zinc driers give a linear relationship between diffusion current and concentration in the range of 1×10^{-4} to 1.5×10^{-3} M. Application of the procedure to the determination of iron in menhaden oil showed that the presence of free fatty acids and peroxides interferes with the determination.

Method of protecting solder-coated articles. H. C. Thayer, Jr. (Western Electric Co., Inc.). *U. S. 2,933,412.* The molten solder on the article is wiped with a fibrous wiper impregnated with graphite and carrying a composition composed of about 65% propylene glycol and the remainder of diester of ethylene glycol and palmitic acid. The solder is smoothed on the article and at the same time is provided with a protective coating which prevents deterioration of the solder for prolonged periods but permits subsequent soldering operations to be performed *without removal of the coating.*

Radiochemical treatment of drying oils. I. Kirshenbaum, A. H. Gleason, and V. L. Hughes (Esso Res. & Eng. Co.). *U. S. 2,936,275.* A polybutadiene drying oil having an oxygen content of about 9 weight percent and a viscosity of about 3.0 poises at 50% *non-volatile matter as measured in xylene at* 77°F., may be bodied by subjecting it in admixture with lead naphthenate (an amount equivalent to 1% lead) to gamma radiation for a total dosage of 1 to 80 megaroentgens.

Interpolymers of ethylenic monomers and ethylenic esters of alcohols from reduction of fatty acids of glyceride oil acids. R. M. Christenson (Pittsburgh Plate Glass Co.). *U. S. 2,946,774.* An interpolymer soluble in aromatic hydrocarbon solvents contains essentially equal parts by weight of vinyl chloride and vinyl acetate and 20% by weight (based on total mixture) of an ester of methacrylic acid and on alcohol derived by selectively reducing the carboxyl of a drying oil acid. The interpolymer, when spread as a film, dries by oxidative cross-linking to a hard, durable, alkali resistant state.

MALEIMIDE-MODIFIED OILS. P. O. Tawney (U. S. Rubber Co.). *U. S. 2,948,693.* An ester of a nonconjugated olefinic nonhydroxylated aliphatic acid (12 to 24 carbon atoms) and a saturated aliphatic alcohol is reacted with maleimide. The resulting liquid reaction product is substantially free of insoluble polymers of the maleimide.

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• Detergents

REVIEWS OF STUDIES ON SURFACE ACTIVE AGENTS IN JAPAN. INTRODUCTION. Bun-ichi Tamamushi. *Yukagaku* **9**, 219 (1960).

ADSORPTION OF SURFACE ACTIVE AGENTS AT THE SURFACE OF SOLUTIONS AND AT THE INTERFACE BETWEEN SOLID AND LIQUID. Ryohei Matsuura (Kyoto Univ.). *Ibid.* 220–3. A review with 31 references.

MONOMOLECULAR LAYERS AND CUMULATIVE LAYERS. Ryohei Matsuura. *Ibid.* 224–31. A review with 73 references.

FOAM. Satiko Okazaki and Tsunetaka Sasaki (Metropol. Univ. Tokyo). *Ibid.* 231–8. A review with 103 references.

THE SOLUTION STATE OF SURFACE ACTIVE AGENTS. Masayuki Nakagaki (Osaka City Univ.). *Ibid.* 238–43. A review with 64 references.

EMULSION AND SOLUBILIZATION. Naoyasu Sata (Osaka Univ.). *Ibid.* 244–6. A review with 36 references.

WETTING AND CONTACT ANGLE. Teruo Tsunoda and Tsunetaka Sasaki (Metropol. Univ., Tokyo). *Ibid.* 246–55. A review with 152 references.

SURFACE ACTIVITY AND SURFACE ELECTRICAL PHENOMENA. Bun-ichi Tamamushi and Keiichi Eda (Gakushûin Univ., Tokyo). *Ibid.* 255–8. A review with 22 references.

SOLID-LIQUID INTERFACE PHENOMENA OF NONAQUEOUS SYSTEMS. Toshio Sakurai (Tokyo Inst. Technol.). *Ibid.* 258–63. A review with 86 references.

SUSPENSION AND SURFACE ACTIVE AGENTS. Kenjiro Meguro and Tamotsu Kondo (Musashi Univ., Tokyo). *Ibid.* 264–7. A review with 17 references.

INTERACTIONS BETWEEN SURFACE ACTIVE AGENTS AND HIGH-MOLECULAR COMPOUNDS. Toshizo Isemura (Osaka Univ.). *Ibid.* 267–71. A review with 20 references.

INTERACTIONS BETWEEN SURFACE ACTIVE AGENTS AND DYES. Rempei Goto (Kyoto Univ.). *Ibid.* 271–5. A review with 26 references.

DETERGENT ACTION OF SURFACE ACTIVE AGENTS. Taro Tachibana (Ochanomizu Univ., Tokyo). *Ibid.* 275–6. A review with 15 references.

INFLUENCE OF COUNTER IONS ON THE PROPERTIES OF SURFACTANTS. Tamotsu Kondo, Kenjiro Meguro (Musashi Univ., Tokyo), and Susumu Sukigara. *Yukagaku* **9**, 63–5 (1960). The surfactants studied were dodecyl sulfates of ammonium, trimethylammonium, triethylammonium, tributylammonium, and 1,6-hexane-N,N′-bis-trimethylammonium. The curves of surface tension *versus* concentration were different for different counter ions, showing minimum surface tension at higher concentrations for smaller counter ions. The smaller the counter ions, the higher the foaming power was and the more stable the foam was. Almost no effect was observed on dispersion of Fe oxide sol.

PROPERTIES OF POLYOXYETHYLENE ALKYL THIOETHERS. Akira Nagata (Tokai Seiyu Kôgyô Co., Nagoya), Yoshio Nemoto, Tatsura Imai, and Takashi Morikawa. *Yukagaku* **9**, 30–3 (1960). Ethylene oxide was added to dodecylmercaptan or hexadecylmercaptan at 200° together with 0.5% NaOH to obtain polyoxyethylene dodecyl thioether (I) containing 10, 20, or 30 moles of ethylene oxide and polyoxyethylene hexadecyl thioether containing 20 or 30 moles of ethylene oxide. Specific gravity, surface activity, wetting power, dyeing velocity, migration test, and dispersing power of naphthol dyes, and antistatic property were compared. In general I with 10 or 20 moles of ethylene oxide was better than others.

QUANTITATIVE ANALYSIS OF ANIONIC SURFACE ACTIVE AGENTS BY THE PHENYLAMINE BACK TITRATION METHOD. Yoshiro Nemoto (Nagoya Munic. Ind. Research Inst., Nagoya). *Yukagaku* **9**, 65–9 (1960). The *p*-toluidine method of Marron and Schiferli [*Ind. Eng. Chem., Anal. Ed.*, **18**, 49 (1946)] was improved so as to back-titrate the excess *p*-toluidine·HCl with 0.5 *N* NaNO$_2$ instead of titrating anionic agent-*p*-toluidine complex with 0.1 *N* NaOH. The end point of titration was clearer, and the determination was possible even for colored sample solutions. The benzidine method of Kling and Püschel [*Melliand Textilber.* **15**, 21 (1934)] was also improved similarly so as to back-titrate the excess benzidine·HCl with 0.5 *N* NaNO$_2$. Na dodecylbenzenesulfonate was determined by these improved methods accurately enough. Activation energy of adsorption of Na dodecylbenzenesulfonate on wool was almost similar to that of dyeing with C. I. Acid Orange 7, both at acidity of acetic acid. The activation energy of adsorption of the agent on wool was much higher at neutrality than at acidity.

ANALYSIS OF SURFACE ACTIVE AGENTS. VII. PRECIPITATION REACTION OF POLYALKYLENE OXIDE TYPE NONIONIC SURFACTANTS. Tetsuya Harada and Wasaburo Kimura (Nagoya Univ.). *Yukagaku* **8**, 523–8 (1959). Qualitative and quantitative studies were made on the precipitation of polyoxyethylene lauryl ether with various alkaloid-precipitating reagents and organic base-precipitating reagents. Bi(NO$_3$)$_3$ plus KI was a good precipitant. Heteropolyphosphates, Bi(NO$_3$)$_3$ plus KI, Bi(NO$_3$)$_3$ plus KSCN, and Na tetraphenylborate were good precipitants in the presence of Ba ions.

VIII. DETERMINATION OF ANIONICS BY THE EPTON AND THE WEATHERBURN METHODS. Yasuji Izawa and Wasaburo Kimura. *Ibid.* **9**, 69–72 (1960). When compared with the value obtained by butanol extraction of anionic agent, the Epton method [*Nature* **160**, 795 (1947)] always gave lower value, and the Weatherburn method [*J. Am. Oil Chemists' Soc.* **28**, 233 (1951)] gave similar value.

IX. SEMIMICRO VOLUMETRIC DETERMINATION OF ANIONICS. METHYLENE BLUE BACK-TITRATION METHOD. *Ibid.* 124–8. The Epton method was improved.

X. EXAMINATION OF TWO-PHASE INDICATORS AND SOLVENTS OF PARTITION BACK-TITRATION METHOD. *Ibid.* 296–9. Among 17 dyes tested, methylene blue, methylene blue NNX, and Fast Blue R were suitable. As a solvent chloroform was more suitable than butanol, nitrobenzene, carbon tetrachloride, benzene, and ethyl acetate.

DISTRIBUTION OF THE DEGREE OF POLYMERIZATION OF THE PRODUCTS OF ADDITION OF ETHYLENE OXIDE TO LAURYL ALCOHOL AND NONYLPHENOL. Kunihiko Nagase and Kahei Sakaguchi (Kao Soap Co., Wakayama). *Kôgyô Kagaku Zasshi* **63**, 588–92 (1960). Distribution of the products in alkaline catalyst was determined by exact distillation; the results conformed better with the Weibull distribution than with the Poisson distribution. The distribution constants, c_i, were determined according to the general formula of Weibull. They were as follows: lauryl alcohol, $c_0 << c_1 < c_2 < c_3 \ldots$; ethylene glycol monolauryl ether, $c_0 < c_1 < c_2 \ldots$; nonylphenol, $c_0 >> c_1$; and ethyleneglycol mononony phenyl ether, $c_0 > c_1 > c_2 \ldots$. This reaction proceeds in alkaline catalyst in anionic mechanism.

SYNTHESIS OF POLYOXYETHYLENE DERIVATIVES OF LONG CHAIN FATTY ACID-SUCROSE DIESTERS. Saburo Komori, Mitsuo Okahara, and Kenzo Okamoto (Osaka Univ.). *Kôgyô Kagaku Zasshi* **63**, 600–4 (1960). The addition of ethylene oxide to sucrose diesters (accompanying the production of monoesters) with or without organic solvents in an autoclave with alkali hydroxide, sodium alcoholate, and tertiary amine as catalyst. One hour of reaction was sufficient at 100–130°. The products were pale-yellow to orange oily or waxy substances. They were water-soluble by adding 20–30 moles of ethylene oxide. They were good surfactant and showed little toxicity.

PREPARATION OF HIGHER ALKYL AND ALKYLPHENYL GLYCIDYL ETHERS. Tsunehiko Kuwamura (Gumma Univ., Kiriu). *Kôgyô Kagaku Zasshi* **63**, 595–600 (1960). Preparations of these compounds were studied as intermediates for new-type surface-active agents. Excess alcohols and epichlorhydrin were added with tin tetrachloride or sulfuric acid to obtain α-alkyl-α′-chlorhydrin ethers (75–95% yield), which were dehydrochlorinated with concentrated alkali to give glycidyl ethers with C$_2$–C$_{18}$ alkyl groups (70–90% yield). Alkyl phenyl ethers were obtained from phenols and epichlorhydrin with concentrated alkali in one step in 60–70% yield.

PREPARATION OF CATIONIC SURFACE-ACTIVE AGENTS FROM HIGHER GLYCIDYL ETHERS. Tsunehiko Kuwamura (Gumma Univ., Kiriu). *Kôgyô Kagaku Zasshi* **63**, 973–9 (1960). Homologous long-chain glycidyl ethers easily adds to secondary amines to form tertiary amines, which are converted to salts or quaternarized with halides of hydrocarbons to obtain 2-hydroxy-3-alkyloxy (or alkylphenoxy)-propylammonium (or amine) salts, ROCH$_2$CH(OH)CH$_2$N$^+$(R′)$_2$R″X$^-$, R = C$_8$–C$_{18}$ straight-chain alkyl groups. Glycerolmonochlorhydrin-α-alkyl ether was made to react with pyridine in the presence of a small amount of water to obtain pyridinium type surfactants. Their surface activities were measured and discussed.

Some properties of cationic surface-active agents prepared from higher glycidyl ethers. *Ibid.*, 980–3. The properties were compared between $ROCH_2CH(OH)CH_2N^+(R')_2R''X^-$ (I) and $RN^+(R')_3X^-$ (II). The critical micelle concentration of I was similar to that of II containing R with 2–3 more methylene groups than I. The jointing group of I, $-OCH_2CH(OH)$-CH_2-, did not act as hydrophile group, but rather was equivalent to polymethylene group of C_2–C_3. I had more bactericidal effect than II, owing to the jointing group. Applications of I for textile processing were examined.

Relation between dispersing ability of aqueous solutions of various nonionic surfactants on the calcium carbonate powder and H.L.B. of these surfactants. Teruo Matsumura and Koichiro Iwasaki (Lion Tooth Paste Co., Sumida-ku, Tokyo). *Kôgyô Kagaku Zasshi* **63**, 970–3 (1960). Among 14 nonionics, those with medium H.L.B. (9–14) showed excellent dispersing ability for $CaCO_3$. Their dispersing ability was similar to that of Na pyrophosphate, dispersing completely the particles of $CaCO_3$. The nonionic surfactants with an H.L.B. greater than 15 showed little dispersing ability for $CaCO_3$.

Structure of adsorbed layers at the interface mercury-surfactant solution. VII. Effects of various cations on the adsorbed layer of alkyl sulfate ions. Keiichi Eda (Gakushûin Univ., Tokyo). *Nippon Kagaku Zasshi* **81**, 689–92 (1960). Interface differential volumes were measured between mercury and aqueous solutions of anionic surfactants (Na octyl, decyl, and dodecylsulfate) containing excess Li, K, Mg, or Al sulfate. The concentration of cations necessary to initiate phase separation in adsorbed layer of decylsulfate ions were in the order $Li^+ > Na^+ > K^+$. Mg^{++} and Al^{+++} did not cause such separation. Octylsulfate did not separate, while dodecylsulfate separated easily.

The problem of counter-ions in ionic surface-active agents. Kenjiro Meguro and Tamotsu Kondo (Musashi Univ., Tokyo). *Yukagaku* **9**, 346–50 (1960). A review with 11 references.

High-molecular surface-active agents. Yuya Yamashita and Shizuyoshi Sakai (Nogoya Univ.). *Yukagaku* **9**, 337–45 (1960). A review with 258 references (chiefly patents).

Adsorption of ionic surface-active agents at the interface of solid and liquid. Kunio Tamaki (Univ. Tokyo). *Yukagaku* **9**, 283–8 (1960). A review with 43 references.

Lanolin derivatives. H. Wagner (Robinson-Wagner Co., Inc.). *Am. Perfumer Aromat.* **75**(7), 23–26 (1960). Various types of lanolin derivatives (lanolin alcohols, lanolin acid compounds, lanolic acid condensates, acylated, ethoxylated, hydrogenated, and transesterified lanolins) are described; their use as emulsifiers, detergents, solubilizers and the like is discussed.

Emulsification of water-insoluble organic solvents. R. C. Hyatt, R. L. Mayhew, and Leslie G. Nunn (General Aniline & Film Corp.). *U. S. 2,946,721.* An emulsifier mixture consists of (a) about 50 to 90 parts by weight of a water soluble synthetic nonionic surface-active polyoxyethylene ether of an alkylated phenol containing 8 to 18 carbon atoms in the alkylated portion and from 7 to 30 oxyethylene groups in the polyoxyethylene portion and (b) 10 to 50 parts by weight of the cyclohexylammonium salt of an alkylbenzene sulfonic acid containing at least one alkyl group of at least 3 carbon atoms.

Composition for conditioning surfaces containing contaminating water and method of using the same. W. H. Kirkpatrick and V. L. Seale (Visco Products Co.). *U. S. 2.946,747.* A surface-active modyifying reagent consists of an oil-soluble amine salt of an alkylated aromatic sulfonic acid and a polyether synergizing component capable of reducing surface tension of water at least 25 dynes per cm.^{2} and having a molecular weight of at least 1200 attributable to oxyalkylene groups having 2 to 4 carbon atoms. The salt should be present in an amount of 3 to 20 times by weight of the synergizing component.

Liquid detergent compositions. R. Coskie (Procter & Gamble Co.). *U. S. 2,947,702.* A liquid detergent which remains clear over the temperature range 40°F. to 80°F. has the following composition: (1) 10–25% sodium dodecylbenzene sulphonate; (2) 1–5% fatty acid monoethanolamide in which the fatty acid moiety contains from 10 to 14 carbon atoms; (3) 2–10% potassium pyrophosphate; (4) 10–12% urea; (5) 5–10% ethyl alcohol; (6) about 1.5–4% of an organic acid such as citric, tartaric, or salicylic; and (7) 34–70.5% water, the pH being adjusted to 5 to 7.

Behavior of nonaqueous dry-cleaning detergents. Ernestine Hirschhorn (R. R. Street & Co., Chicago). *Soap Chem. Specialties* **36**(7), 51–54 (1960). A detergent's ability to carry water in micellar form is shown to be the key to safe and efficient dry-cleaning systems. Part II. Fabrics in nonaqueous detergent systems. *Ibid.*, (8) 62–64, 105–109 Micellar properties of the dry-cleaning bath can be used to control the water content at a constant level for superior soil removal with safety to fabrics.

New developments in surfactants. D. Price. *Soap Chem. Specialties* **36**(7), 47–50, 105–107 (1960). The history, chemical constitution, uses, and recent developments in surfactants are reviewed. 23 references.

Detergents in water and sewage. J. D. Justice (Lever Bros. Co., N. Y.). *Soap Chem. Specialties* **36**(7), 55–57, 174 (1960). This is the fifth annual report on the research program of the Association of American Soap and Glycerine Producers designed to develop factual information related to purported effects of household detergents in sewage treatment and water supplies. Summaries are presented of the results of various research projects dealing with such problems as the analysis of water or sewage for alkyl benzene sulfonate, removal of ABS by induced frothing and its disposal by burning and by digestion, causes and elimination of sewage treatment plant frothing, etc.

Hard-surface cleaners. R. L. Liss and T. B. Hilton (Monsanto Chemical Co., St. Louis). *Soap Chem. Specialties* **36**(8), 51–54 (1960). A simple, convenient method is presented for evaluating hard-surface detergency. The method has been shown to be reproducible, sensitive to the detection of minor formulation changes, and correlates with actual household usage.

Wire-drawing lubricating composition. E. C. Milberger and W. P. Kinneman Jr. (Standard Oil Co.). *U. S. 2,948,681.* The desired composition consists of the following components: (1) 23–77.5% (by weight) mineral oil having a viscosity of 100 SSU at 100°F.; (2) 10–30% lard oil; (3) 5–15% glycerol monolaurate; (4) 5–25% oil-soluble alkali metal petroleum sulfonate; and (5) 2.5–7% ethylene glycol monobutyl ether.

Thixotropic and fast-breaking skin cleaner emulsion and process for producing the same. J. L. Gianladis (G. H. Packwood Mfg. Co., St. Louis). *U. S. 2,948,686.* The described water-in-oil emulsion consists of the following: (1) 20–70% water; (2) 25–70% of a liquid, paraffinic hydrocarbon solvent; (3) less than 10% of a non-ionic hydrophilic organic detergent; (4) up to 10% of a polar organic solvent such as alcohol ketones, nitroparaffins, or fatty acids; and (5) about 2% of an organophilic quaternary ammonium clay complex.

Mixed detergent composition. P. T. Vitale, R. L. Bruns, and R. S. Leonard (Colgate-Palmolive Co.). *U. S. 2,949,425.* A detergent which is characterized by controlled foaming power regulated according to variations in water hardness consists of a ternary combination of water-soluble propylene tetramer benzene sulfonate detergent (average molecular weight 242–250), water-soluble pentamer benzene sulfonate detergent (average molecular weight 260–310), and water-soluble inorganic polyphosphate salt forming water-soluble complexes with hard water salts. The ratio of the pentamer sulfonate detergent to tetramer sulfonate detergent should be from 90:10 to 70:30 by weight; the polyphosphate salt should be present at about 10 to 60% by weight of the composition.

Methods of washing textile fabrics. W. Kling and H. Lange (Bohme Fettchemie G.m.b.H.). *U. S. 2,950,253.* A soiled synthetic textile fabric is washed in an aqueous solution containing from about 0.85 to about 1.5 gm./liter of a cation active washing composition consisting of (1) 23–44% of an organic onium compound, (2) 33–77% of a lower alkanoic acid, and (3) 0–33% of an additive such as aluminum salts of lower alkanoic acids, lower alkoxy celluloses, or polyalkylene oxide waxes. A positive electrostatic charge is imparted to both the fabric and the soil, and the soil is separated from the fabric by electrostatic repulsion and dispersed throughout the washing solution.

Detergent composition. S. R. Goff (Gillette Co.). *U. S. 2,950.255.* A shampoo composition capable of effective cleansing of hair while simultaneously imparting good condition consists of (A) a major proportion of an ampholytic surface agent or a mixture thereof with up to an equal weight of non-ionic surface-active agent and (B) a minor proportion of a mixture of a cationic surface-active agent with an equimolar amount of an anionic non-soap surface-active agent. The ratio of A to B should be from 2:1 to 20:1 by weight.

SURFACE-ACTIVE SUBSTANCES OF ETHER ESTER CLASS. W. H. Kirkpatrick (Visco Products Co.). *U. S. 2,950,299.* The desired product is a monomeric acidic ester of a dimerized higher fatty acid containing from 34 to 36 carbon atoms and a polyoxyalkylene compound having a terminal hydroxy group, the molar ratio of the acid to polyoxyalkylene compound being not less than 1:1 nor more than 2:1. The major proportion of the molecular weight of the polyoxyalkylene compound consists of oxyethylene and oxypropylene groups in a weight ratio not exceeding 4:1. *U. S. 2,950,310.* The desired product is an ester of an organic dicarboxy acid and a polyoxyalkylene compound.

SURFACE-ACTIVE POLYOXYPROPYLENE ESTERS. W. H. Kirkpatrick (Visco Products Co.). *U. S. 2,950,313.* The product described is a polyoxypropylene compound having a terminal hydroxy group which has been esterified with a carboxy acyl group. The ester contains only one oxypropylene chain and has a molecular weight not exceeding 7500.