mixture was held at 180°C. for 1 hr. then allowed to cool to 120° to 130°C., and filtered through a diatomaceous earth bed to remove carbon. This method of decolorization is not as suitable for larger-scale preparation as the hydrogen peroxide method outlined below. The quantity of carbon required tends to clog the filters, slowing down the filtration rate.

With Aqueous Hydrogen Peroxide. After the desired degree of esterification was achieved, the reaction mixture was cooled to 80°C. whereupon 3% of aqueous (50%) hydrogen peroxide on the weight of the ester was added slowly with stirring. The mixture was held about an hour to bleach, then the water, added with the peroxide, was removed *in vacuo.* In the litharge-catalyzed reactions bleaching with hydrogen peroxide was done as described above after the addition of adipic acid on the cooling cycle at 150°C. The insoluble lead adipate did not interfere with the bleaching operation and was subsequently removed by filtration.

Characterization of Diesters. Summarized in Table I are the experimental conditions used in the preparation of the various methyl glucoside diesters, together with some of the properties of these products. Surface-tension measurements were made by the Du Noüy aqueous surface-tension procedure at concentrations of 1.0, 0.1, and 0.01% of ester in water. The results of these measurements show that the surface tension of water was appreciably reduced by the addition of as little as 0.01% of the methyl glucoside diesters (Esters 1, 2, and 3). The diesters of the higher saturated fatty acids (Esters 4, 5, and 6) were not dispersible in water, hence no significant surface-tension data could be obtained.

Summary and Conclusion

Procedures are described for the preparation of methyl glucoside diesters by direct esterification, using a ratio of one mole of methyl glucoside with two moles of fatty acids. Rate studies indicated that lead or stannous soaps are more effective catalysts than the sodium soaps for speeding up this esterification. With equal molar quantities of methyl glucoside and fatty acid, the lead and the sodium soap catalysts give products containing predominantly diester and half the methyl glucoside remaining unreacted. Under the same conditions stannous soap catalysis gives high yields of monoesters containing only very small percentages of unreacted methyl glucoside. From the standpoint of speed of reaction, color of the final products, ease of removal of catalyst from the ester products, and catalyst cost, litharge is the preferred catalyst for the preparation of methyl glucoside diesters.

Properties of various methyl glucoside fatty acid diesters, prepared on a laboratory scale, are given. Du Noüy surface-tension measurements indicate that small quantities of the methyl glucoside dilaurate, dicaprate, or dioleate are quite effective in lowering the surface tension of water.

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

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• Fats and Oils

THE AUTOXIDATION OF UNSATURATED COMPOUNDS. X. ISOLATION OF METHYL LINOLEATE HYDROPEROXIDES AND POLYMERIC AUTOXIDATION PRODUCTS OF METHYL LINOLEATE. W. Kern and H. W. Schnecko (Organic Chemistry Institute of the Univ. Mainz). *Die Makromolekulare Chemie* 32, 184–190 (1959). It is possible to isolate pure methyl linoleate hydroperoxide from autoxidized methyl linoleate by countercurrent distribution. Application of the method to highly autoxidized oils (up to 200 mol % oxygen) yields secondary products; the content of hydroperoxide decreases rapidly. The autocatalytic character of the autoxidation can be observed up to a conversion of 100 mol %.

XI. THE CATALYSIS OF THE AUTOXIDATION OF METHYL LINOLEATE WITH METHYL LINOLEATE HYDROPEROXIDE. W. Kern, L. Dulog, and G. Selz. *Ibid.,* 191–196 (1959). Methyl linoleate hydroperoxide was isolated from autoxidized methyl linoleate by countercurrent distribution and was added to pure methyl linoleate as a catalyst for its autoxidation. The identical effect of added methyl linoleate hydroperoxide with the autocatalyst of the autoxidation reaction is demonstrated by the results of a kinetic experiment.

THE CULTIVATION OF PERILLA OCIMOIDES AND PERILLA NANKINENSIS AND STUDIES OF THEIR OILS. P. Mazhdrakov and As. Popov. *Compt. rend acad. bulgare sci.* 11, 197–200 (1958) (in German). Of the two plants, *Perilla nankinensis* is the better suited for growing in Bulgaria because of the shorter growing season, but hardier strains should be sought. The oil of *Perilla nankinensis* has a lower iodine number (173 *versus* 178–81) but shows superior drying properties. It contains 42.6% linoleic acid and 22.4% linolenic acid. Other usual characteristics are reported. (*C. A.* 53, 15593)

THE COLOR OF MILK FAT. L. Radema. *Offic. Orgaan. Koninkl. Ned. Zuivelbond* 50, 216–17 (1958); *Dairy Sci. Abstr.* 20, Abstr. No. 1448. The color of milk fat was determined spectrophotometrically over a one-year period in the mixed milk received at the experimental dairy of the Netherlands Institute for Dairy Research. Converted to carotene, the lowest and highest butterfat values recorded were 2.4 in early April and 7.8 mg./kg. at the end of May. (*C. A.* 53, 15400)

FATTY ACID COMPOSITION OF FOOD FATS AND OILS. L. R. Dugan, Jr. *Am. Meat Inst. Foundation, Circ.* No. 36, 15 pp. (1957); *Dairy Sci. Abstr.* 20, Abstr. No. 433 (1958). The fatty acid composition of various fats and oils was investigated. Butter contained 57% saturated fatty acids, of which 40% were short-chain acids of less than 16 carbons. The effects of hydrogenation are also given. (*C. A.* 53, 15410)

THE EFFECT OF WRAPPING PAPER ON FAT STABILITY. Z. Kwapniewski, A. Rutkowski, and B. Kubik. *Przemysł Spożywczy* 12, 412–15 (1958). Acid parchment, parchment, half-parchment, and white and gray cardboard accelerated the autoöxidation of fat. Porosity of the paper and its content of iron and copper had the greatest effect on deterioration of fat. Impregnation of the paper with 0.01% octyl gallate increased considerably the stability of the fat. (*C. A.* 53, 15410)

Usefulness of Some Polish Vegetable Oils. H. Niewiadomski, B. Drozdowski, and W. Zwierzykowdki (Politech. Inst., Gdańsk, Poland). *Przemysł Spożywczy* 12, 311–16 (1958). Hydrogenated oils from *Camelina sativa*, *Helianthus annus*, and *Crambe abyssinica* could be useful for production of margarine. *Helianthus annus* oil, especially, has good organoleptic properties. (*C. A.* **53**, 15410)

Chemical Constants of Vegetable Oils, Vanaspatis, and Lard. N. D. Kehar, T. S. Krishnan, S. N. Ray, B. C. Joshi, and B. C. Raisarkar. *Studies Fats, Oils and Vanaspatis* **1956**, 23–30; *Dairy Sci. Abstr.* **19**, 768 (1957). The chemical constants of vegetable oils, vanaspatis, and lard were determined and compared with those of cow ghee. The difficulty of determining whether ghee samples were adulterated with vanaspatis or lard is discussed. The effect of heating on various chemical constants and vitamin A potency of cow ghee, bazaar ghee, crude peanut oil, and vanaspatis is given. The destruction of vitamin A was generally greatest in the ghee samples. (*C. A.* **53**, 15416)

Fatty Oils of the Fruits of Caraway (Carum Carvi) and Anise (Pimpinella Anisum). E. N. Zaraĭskaya and Yu. G. Broisyuk. *Nekotorye Voprosy Farmatsii* (Kiev: Gosudarst. Med. Izdatel. Ukr. S.S.R.). *Sbornik* **1956**, 185–9; *Referat Zhur., Khim.* **1958**, Abstr. No. 2689. Ether extraction of comminuted and preliminarily essential oil-freed seed of caraway and anise (oil content 19.73 and 10.76%, respectively) has the following characteristics: $n^{20/D}$ 1.4695, 1.4718; d^{20} 0.9140, 0.9224; acid value 4.15, 3.8; saponification value 189.3, 181.4; iodine value 101.3, 98.42; thiocyanate value 84.12, 83.55; % of unsaponifiables 1.2, 2.4, respectively. The mixture of fatty acids of caraway and anise oil contains the following acids, respectively: palmitic 3.59, 3.25; petroselinic 17.0, 23.56; oleic 60.7, 56.0; linoleic 19.6, 17.16%. The oil can be utilized in soap-making, analogously to the coriander oil. Caraway oil contains 15.7% of a hard fraction, melting point 29–31.5°, solidification point 25–6°, and the anise oil 20.4% of hard fraction melting point 28.5-31°, solidification point 24.5–25°. The hard fractions of the oil can be utilized in the confectionary and pharmaceutical industries as substitutes for cacao butter. (*C. A.* **53**, 14548)

Component Fatty Acids of the Oil from the Seed of Cassia Tora. Ram Das Tiwari and Purna Chandra Gupta (Univ. Allahabad). *J. Proc. Oil Technologists' Assoc. India, Kanpur* **10**, 111–16 (1954) (Pub. 1955). The seed of *Cassia tora* yielded 5.5% of a nondrying, yellow oil having d_{30} 0.9843, $n^{3/D}$ 1.4678, acid number 7.5, saponification number 173.8, acetyl number 5.4, Hehner number 88.6, Reichert-Meissl number 0.2, unsaponifiable matter 4.6%, iodine number 92.8, and thiocyanate number 62.0. The component fatty acids of the oil were linoleic 37.1, oleic 38.4, palmitic 7.5, stearic 7.3, and lignoceric 9.7%. The unsaponifiable matter consists of phytosterol and sitosterol. (*C. A.* **53**, 12710)

Carbonyls in Oxidizing Fat. II. The Identity and Amounts of Steam Volatile Monocarbonyls in a Rancid Freezer-Stored Pork Fat. A. M. Gaddis and R. Ellis (Eastern Utilization Research and Development Div., U.S.D.A., Beltsville, Maryland). *Food Res.* **24**, 392–400(1959). Trace amounts of acetone and methyl ethyl ketone found in more oxidized pork fat were not observed in freezer-stored pork fat in the early stages of rancidity. *n*-Alkanals C_1, C_2, C_3, C_6, C_9, three unknown carbonyls, alk-2-enals C_7, C_8, C_9, C_{10}, C_{11}, and alk 2,4-dienals C_7, C_9, C_{10}, C_{11} were found in unheated fat. In the 165° heated fat, *n*-alkanals C_6, C_8, C_9, alk-2-enals C_7, C_8, C_9, C_{10}, C_{11}, and alk-2,4-dienals C_7, C_{10}, C_{11} were observed. Hexanal and deca-2,4-dienals were the dominant compounds present.

Lard. R. Grau and A. Mirna (Bundesforschungsanstalt Fleischwirtschaft, Kulnbach, Ger.). *Fleischwirtschaft* 11, 23–5 (1959). The procedure of Kaufman, *et al.* for ultraviolet spectrophotometric analysis of lard treated with bleaching earth was studied in detail. Suggestions were made for improving sensitivity. (*C. A.* **53**, 12514)

Olive-Oil Technology. The Westphalia-Enfida Process. P. Renaudet, E. Buchmann, and Y. Bagot. *Oléagineux* **14**, 95–104 (1959). The Westphalia-Enfida process for olive oil is a continuous procedure in which the olives are washed, dried, and the kernels removed; the pulp is crushed, salted, kneaded to the accompaniment of a slight increase in temperature, diluted with water, and then sieved and centrifuged to yield an oil of "estra" quality. (*C. A.* **53**, 12518)

Stabilization of Pitted Fruit Oils During Storage. E. V. Shevlyagina, A. L. Voitsekhovskaya, and E. I. Pashinina. *Trudy Vsesoyuz. Nauch.-Issledovatel. Inst. Sintet. i Natural. Dushistykh Veshchestv* **1958**, No. 4, 119–25. Butylhydroxyanisole and diisoeugenol have been observed to possess high antioxidative properties, thus retarding the process of self-oxidation of oils. (*C. A.* **53**, 12517)

Transesterification and Its Importance in the Reprocessing of Fats. M. K. Yakubov (V. I. Lenin Polytech. Inst., Kharkov). *Masloboino-Zhirovaya Prom.* **25**(3), 19–22 (1959). Transesterification of fats, its limitations and uses for practical purposes, is discussed. 9 references. (*C. A.* **53**, 12709)

On Tropical Vegetable and Animal Fat Substances. S. Husain Zaheer and K. T. Achaya (Regional Research Lab., Hyderabad, India). *Nahrung* **2**, 710–18 (1958). The composition and characteristics of animal and vegetable fats as influenced by species, climate, nutrition or fertilization, etc., are reviewed. (*C. A.* **53**, 12709)

Ultrasonic Dispersion in Palmitic Acid. C. Raghupati Rao (Ist. naz. ultracaustica, Rome). *Ricerca sci.* **28**, 2106–11 (1958). The dispersion of ultrasonic velocities in palmitic acid was investigated in the intensity range 0.8×10^{-2} to 8×10^{-2} watts per square centimeter at 2 and 4 megacycle per second between 60 and 85°. Contrary to previously reported results, Rao finds no detectable ultrasonic dispersion in palmitic acid with either frequency or intensity of the ultrasonic beam. The determined temperature coefficient of velocity $\Delta V/\Delta T = -3.35$ meters per second degree agrees very well with other data. (*C. A.* **53**, 12709)

Nature of Active Oxygen Determined Iodometrically in the Products of Autoxidative Deterioration of Fatty Acids and Fats. N. S. Drozdov and N. P. Materanskaya (N. I. Pirogov 2nd State Med. Inst., Moscow). *Khim. Nauka i Prom.* 4, 133–4 (1959). Oxygen determined in the presence of mineral acids was 1.5–2 times higher than the peroxide content determined by the acetic acid method. Apparently, iodine ion, in the presence of mineral acids, reacts with the epoxy compounds formed in autoxidative deterioration. (*C. A.* **53**, 12710)

Some Recent Advances in the Chemistry of the D Vitamins. B. Lythgoe (Univ. Leeds. England). *Proc. Chem. Soc.* **1959**, 141–9. A review with 56 references. (*C. A.* **53**, 15238)

Quantum Aspects of Catalysis. The Drying of Linseed Oil. R. R. Myers (Lehigh Univ., Bethlehem, Pa.). *Ann. N. Y. Acad. Sci.* **79**, 1–8 (1959). The oxidative mechanism is studied in the light of Pauling's concept of resonance polymerization of linseed oil and similar organic coatings, stabilization of the free radical intermediates, and in terms of a recent vibration hypothesis. In order to explain the mechanism, the potent vibrational mode of the alpha methylene is selected as the one which leads from the tetrahedral sp^3 hybrid to the pyramidal p^3 radical. The role of transition metal drier catalysts is explained on the basis of synchronization of the molecular orbital stretching frequency with the potent (ν_4) vibrational mode of the tetrahedron which is centered on the C alpha to a double bond. (*C. A.* **53**, 15594)

Oxidation and Activation of Unsaturated Fatty Acids. W. S. Lynn, Jr., and Rose H. Brown (Duke Univ., Durham, N. C.). *Arch. Biochem. Biophys.* **81**, 353–62 (1959). Small amounts of unsaturated fatty acids are oxidized to carbon dioxide, both *in vivo* and *in vitro*, at a rate greater than that of the corresponding saturated fatty acids. Fat feeding to rats stimulates the rate of oxidation of unsaturated fatty acids. Cholesterol feeding to rabbits, but not to rats, stimulates the oxidation of all fatty acids by mitochondria, especially unsaturated fatty acids. Long-chain unsaturated fatty acids are more readily activated by mitochondrial enzymes than are most saturated acids. Unsaturated fatty acids are more metabolically active than are saturated fatty acids. (*C. A.* **53**, 15280)

Complex Salts of Higher Fatty Acids I, II, III, IV. S. Fisel. *Acad. rep. populare Romîne, Filiala Iasi, Studii cercetări stiint.*, Ser. **I**, **6**, 295–327 (1955). Details are given for the preparation of 72 complex salts of palmitic and stearic acids with M^{II} (M^{II} = Mn, Ni, Co, Cu, Zn, and Cd). The salts are of the type $(M^{II}X_m)M^{I}_{m-2}$ or $(M^{II}Y_n)X_2$, where $X = C_{15}H_{31}CO_2^-(R^1)$ or $C_{17}H_{35}CO_2^-(R^2)$; M^I = Na or K; $m = 3, 4, 6$; $Y = NH_3(R^3)$, $MeNH_2(R^4)$, $C_2H_5NH_2(R^5)$, $PrNH_2(R^6)$, and $C_5H_5N(R^7)$; $n = ½, 1, 2, 3$, and 4. It was found that the complex salts of formula $(M^{II}R^1{}_3)M^I$ have double the molecular weight and therefore their structure is suggested to be $(M^{II}R^1{}_6)$-$M^I{}_2M^{II}$. The complexes of type $(M^{II}X_m)M^{I}_{m-2}$ are supposed to have the known coordinative-type bond between the doubly-bonded carboxyl oxygen and the central metal. The reaction of

NaOAc with the palmitates and stearates of Mn, Ni, Co, Cu, Zn, and Cd takes place according to the scheme: $m/2\ R^1{}_2M^{II} + (m - 2)\ AcOM^I = (M^{II}R^1{}_m)M^I{}_{m-2} + (m - 2)/2(AcO)_2M^{II}$. Experimental evidence suggests that R^1 or R^2 derivatives of Na or K react with the R^1 or R^2 derivatives of Co and Zn to form the complex of type $(M^{II}R^1{}_6)M^I{}_2M^{II}$ and not a mixture of $2R^1{}_2M^{II} \pm 2R^1M^I$. The long chains of the higher fatty acids have no effect on the number of acid molecules which coördinate with the metal in complexes of type $(M^{II}X_m)M^I{}_{m-2}$. The effect of the metal upon the number of the aliphatic amine molecules which add to form the complexes of the R^1 and R^2 derivatives is expressed in general by Ni, Co > Cu, Cd, Zn > Mn. The length of the aliphatic chain of the amine has no effect upon the number of amine molecules forming the complex. The greater the number of amine molecules in complexes of Type $(M^{II}Y_n)X_2$, the lower the stability of the complex. For type $(M^{II}Y_n)X_2$ complexes the stability increases with increased length of the aliphatic chain of the amine, and there is a tendency for a decrease in the number of amine molecules added, with increased chain length of the aliphatic acids. (*C. A.* 53, 14928)

Quantitative Determination of α,β-Unsaturated Fatty Acids. A. A. Bugorkova, L. N. Petrova, K. S. Polyakova and G. V. Meleshkina. *Trudy Vsesoyuz. Nauch.-Issledovatel. Inst. Sintet, i Natural. Dushistykh Veshchestv* **1958**, No. 4, 73–6. Bromination of α,β-unsaturated acids was achieved with 0.2 *N* bromine solution in methyl alcohol saturated with sodium bromide in 24 hours. β,γ-Unsaturated acids brominate quantitatively in 5–10 minutes with 0.1 *N* bromine in methyl alcohol saturated with sodium bromide. This differentiation provides a method of determining an α,β-unsaturated in the presence of a β,γ-unsaturated acid. (*C. A.* 53, 14929)

Characteristic of α,β-Unsaturated Fatty Acids. N. E. Kologrivova and V. N. Belov. *Trudy Vsesoyuz. Nauch.-Issledovatel. Inst. Sintet. i Natural. Dushistykh Veshchestv* **1958**, No. 4, 70–3. The reaction of $CH_3(CH_2)_nCH{:}CHCOOH$ where n = 5, 6, 7, and 9, with NH_2OH in aqueous alcohol solution has been studied. Formation of respectively $CH_3(CH_2)_nCH(NHOH)\text{-}CH_2CO_2H$ in 50–60% yield has been noted. It has been shown that there are concurrently formed ketoximes having 1 carbon atom less than the starting acids. Heating the aqueous alcohol solution of the $CH_3(CH_2)_nCH(NHOH)CH_2CO_2H$ leads to complete decomposition. Because of the incomplete addition of the NH_2OH to α,β-unsaturated acids, the Posner reaction for the quantitative determination of α,β-isomers in a mixture of unsaturated fatty acids cannot be applied. (*C. A.* 53, 14929)

Synthesis of Triacid Triglycerides. W. H. Watson (Emory Univ., Emory University, Ga.). *Univ. Microfilms* (Ann Arbor, Mich.), *L. C. Card No.* **Mic 58-5186**, 72 pp.; *Dissertation Abstr.* **19**, 2484 (1959). (*C. A.* 53, 14932)

Synergistic Action of α-Amino Acids on Antioxidant Properties of α-Tocopherol. J. Janicki and M. Gogolewski. *Przemysł Spożywczy* **12**, 417–20 (1958). Serine, isoleucine, alanine, lysine, histidine, phenylalanine, arginine, glycine, and glutamic acid increase antioxidant properties of α-tocopherol. Cysteine, valine, proline, and tryptophan have proöxidant properties. (*C. A.* 53, 15602)

The Cultivation of Eruca Sativa and Lepidium Sativum, and Characteristics of Their Oils. A. Popov and P. Mazhdrakov (Bulgarian Acad. Sci., Sofia). *Compt. rend acad. bulgare sci.* **11**, 279–82 (1958) (in German). The oil obtained from the seed of *Eruca sativa*, as grown in Bulgaria, has an iodine number of 102, and the fatty acid components comprise: oleic 35.7, erucic 40.5, linoleic 12.2, and linolenic 6.3%. The oil obtained from the seeds of *Lepidium sativum*, as grown in Bulgaria, has an iodine number of 119.8 and the fatty acid components comprise: oleic 32.3, erucic 26.4, linoleic 29.0, and linolenic 6.8%. The first has characteristics like beet- and rapeseed oils. The latter is like the oils of crucifers that contain little erucic acid and, accordingly, may be useful in making soap. (*C. A.* 53, 15602)

Substances Controlling the Odor of Synthetic Fatty Acids. N. K. Man'kovskaya, I. V. Bersegyan, N. I. Solodova. *Masloboino-Zhirovaya Prom* **25**(4), 13–15 (1959). It is shown that two groups of substances are largely responsible for the presence of repulsive odors in synthetic fatty acids. One is represented by the readily oxidizable unsaturated organic compound containing carbonyl groups with penetrating, buring odor, and the other is made up mostly of iso-acids with persistent, heavy, unpleasant specific odor. The latter can be separated from normal acids by treatment with urea. (*C. A.* 53, 15602)

Controlled Interesterification of Lard. C. Placek and G. W. Holman. *Chim. et Ind.* (Paris) **81**, 526–34 (1959). Interesterification of hydrogenated vegetable fats in shortening increases the triglyceride/diglyceride ratio and reduces granulation. A controlled process has been developed in which chemical equilibrium is displaced by initiating crystallization of triglycerides as soon as they form. A highly reactive sodium-potassium catalyst is utilized, and a continuous process is operated. (*C. A.* 53, 15601)

Clay from Lebrija as a Decolorant of Vegetable Oils. A. Peiró Callizo and G. García. *Anales edafol. y fisiol. vegetal* (Madrid) **17**, 935–72 (1958). All the clays studied had good bleaching power on the samples of olive oil treated. The fractions rich in attapulgite were the most active. (*C. A.* 53, 15601)

Gas-Liquid Chromatographic Analysis of Higher Fatty Acids and Fatty-Acid Methyl Esters. R. K. Beerthuis, G. Dijkstra, J. G. Keppler, and J. H. Recourt (Unilever Research Lab., Vlaardingen, Neth.). *Ann. N. Y. Acad. Sci.* **72**, 616–32 (1959). The even numbered free fatty acids C_{12} to C_{22} and their methyl esters were determined in menhaden oil and in *Ximenia caffra* oil. The alkaline isomerization of linoleic acid was studied by this method. (*C. A.* 53, 15601)

Colorimetric Determination of the Rancidity of Fats. B. A. J. Sedláček and R. Rybin. *Fette, Seifen, Anstrichmittel* **61**, 134–8 (1959). A solution, 5 ml. of 0.5 g. diphenylcarbazide, suspended in 100 ml. carbon tetrachloride, and 5 ml. fat is agitated and heated to boiling, cooled, made up with carbon tetrachloride, filtered in the dark, and the red color of the filtrate is measured colorimetrically 15 minutes after completion of the heating. For lard and talcum samples, owing to their lower solubility in carbon tetrachloride, more reagent is required. The color intensity increases with rancidity. Samples of butter rated in rancidity from 0–0.5, 1, 2–4, 4–5, and >6, showed extinction of 0.04, 0.08, 0.2–0.3, 0.3–0.5, and >0.6. Scales for lard and oil are also given. (*C. A.* 53, 15601)

Measurement of Oxidation on Cacao Butter, Edible Fats, and Products Containing Fats. J. Kleinert (Lindt und Spruengli Akt.-Ges., Kilchberg, Zurinch). *Rev. intern. chocolat.* **14**, 9–11, 69–77, 114–21, 164–72 (1959). The following methods for the detection of spoilage were investigated: The Kreis test, the thiobarituric acid test, Lea's method, in which the peroxides are measured iodometrically, the indirect measure of the peroxides based on the spectrophotometric estimation of the conjugated double bonds, a test with the leuco base of 2,6-dichloroindophenol, and the ferrithiocyanate method. The last-named is the preferred method; it is described in detail. Measurement of oxidation in fats and fatty products is fully described. (*C. A.* 53, 15601)

Mechanism of Acid Hydrolysis of Fat. M. P. Bespyatov (V. I. Lenin Polytech. Inst., Kharkov). *Masloboino-Zhirovaya Prom.* **25**(4), 9–12 (1959). Tabulated data are given concerning distribution of sulfacid prepared by Petrov's contact method, sulfuric acid, soluble fat and its acid number, and of water in the fat intermediate, and water layers of settled acid-hydrolyzed fat. (*C. A.* 53, 15601)

Hydrogenation and Dehydrogenation. J. T. Bradbury, W. M. Keely, F. J. O'Hara, and R. F. Vance (Girdler Co., Louisville, Kentucky). *Ind. Eng. Chem.* **51**, 1111-1120 (1959). Hydrogenations with nickel catalysts have been reported for castor, corn, cottonseed, herring, sunflower, tall, tallow, train, and whale oils or fatty acids. Hydrogenolysis with copper catalysts has been described for cottonseed oil, mixed fatty acids, ethyl stearate, and synthetic spice oils.

Fractionation of Sorghum Grain Wax. J. L. Dalton and H. L. Mitchell (Kansas Ag. Experiment Station, Manhattan, Kan.). *J. Agr. Food Chem.* **7**, 570–3 (1959). Crude sorghum grain wax was also isolated by extracting the grain with Skellysolve B and precipitating the wax with acetone. The crude wax was fractionated by adsorption on columns of tricalcium phosphate and silicic acid. A weakly adsorbed paraffin fraction was eluted from the silicic acid column with a small quantity of Skellysolve B. A more strongly adsorbed fraction, obtained by additional elution with Skellysolve B, was identified as esters. A third fraction was eluted with 2% acetone in Skellysolve B and shown to consist of alcohols. Melting points with x-ray diffraction studies indicated that each fraction was a mixture of homologs, rather than a single compound. Of the material recovered, approximately 5% was paraffins, 49% was esters, and 46% was free alcohols.

ESTERIFICATION. M. L. Peterson and J. W. Way (Explosives Dept., E. I. du Pont de Nemours & Co., Wilmington, Delaware). *Ind. Eng. Chem.*, **51**, 1081–1085 (1959). Two problems of permanent interest in esterification technology are methods of catalysis to increase reaction rate and methods of overcoming unfavorable equilibria to carry a reaction to completion. The fats and oils industries have had much interest in recent years in the preparation of tailor-made fatty acid glycerides suitable for a variety of uses. A considerable volume of literature was noted on esterification and transesterification techniques for the preparation of specific glycerides and of fatty glycerides of desired properties.

BUTTERFAT OXIDATION, EVALUATION OF LEA'S ADLEHYDE DETERMINATION METHOD. A. Tamsma and R. D. Powell. (Dairy Industry Sec., Iowa Ag. Exper. Station, Ames, Iowa). *J. Agr. Food Chem.* **7**, 643–6 (1959). Lea's method for determination of aldehyde in fats is excellent for *n*-heptanal. For normal aldehydes with more than seven carbon atoms, recovery decreased with increasing chain length and limiting values were reached with the C_9 and C_{10} aldehydes. For "aldehydes" from autoxidized milk fat the value found by Lea's method is arbitrary, because these carbonylic compounds do not behave like heptanal. Incomplete recovery can be caused by low solubility in water and low reactivity to bisulfite. Too high recovery may be obtained with unsaturated carbonyl compounds as a result of the double bonds. Reaction products and yields were examined by isolation of the aldehyde by solvent extraction after decomposition of the bisulfite complex. "Milk-fat aldehyde" was of ketonic character; the yield was about $\frac{1}{3}$ to $\frac{1}{10}$ as compared to synthetic aldehyde.

FOREIGN MARKET DEVELOPMENT AND U. S. OILSEEDS AND PRODUCTS. R. J. Hudson (Fats and Oils Div., Foreign Agr. Service). *Soybean Digest* **19**(11), 28, 30, 32 (1959). Prospects for the expansion of foreign markets for soybeans and soybean oil are discussed.

METHOD OF FRACTIONATING TALL OIL INTO FATTY ACIDS AND ROSIN ACID PRODUCTS. E. F. Sisson, R. F. Cole, and J. P. Krumbein (Heyden Newport Chemical Corp.). *U. S. 2,894,880.* A method is described for the fractionation of tall oil by partial vaporization under reduced pressure.

REMOVAL OR ODOR AND COLOR BODIES IN FAT SPLITTING. A. M. Ives and R. F. Thompson (Swift & Co.). *U. S. 2,895,975.* In a continuous process, fat is hydrolyzed with water under pressure and the reaction products are immediately passed through a high vacuum-distillation zone where water and color- and odor-causing bodies are flashed off. The resultant fatty acids have improved color, odor, and stability.

PROCESS FOR FRACTIONATION OF FATTY ACID MIXTURES. S. Kairys, E. M. Meade, W. O. Munns, and D. A. Walder (Canada Packers Ltd.). *U. S. 2,895,976.* In a process for the separation of saturated and unsaturated fatty acid fractions, an aqueous solution of the acid soaps is aged at a temperature below 30° to separate a solid fraction containing the soaps of the more saturated acids.

METHOD OF MAKING HARD BUTTER. G. Barsky, V. K. Babayan, and B. J. Bahoshy (E. F. Drew & Co.). *U. S. 2,898,211.* In a process for making a hard butter from an unsaturated glyceride oil, the oil is hydrogenated to an iodine value of 40 to 60 whereby linoleates are transformed to oleates and some isoöleates. The product is dissolved in a volatile solvent. The solution is cooled to precipitate the highest melting constituents. The supernatant liquid is removed and further cooled to precipitate a hard butter. This butter is removed. The first precipitate and the glycerides from the second mother liquor are combined, interesterified, and returned to the process for recycling.

SALAD OIL AND METHOD OF OILING TIN PLATE. J. E. Farbak and E. J. Kasmen (Swift & Co.). *U. S. 2,899,328.* Electrolytically produced tin plate is oiled with a mixture of an antioxidant, salad oil, and partial glycerides derived from cottonseed oil.

PHOSPHATIDYL CHOLINE COMPOUNDS. A. Debay and O. Sackur (Soc. Francaise de Recherches Biochimiques H. Besson & Cie.). *U. S. 2,899,449.* A process is described for the production of a complex compound of magnesium sulphate and phosphatidyl choline.

METALLIC FOIL FOOD COOKING WRAPPER. M. Shorr. *U. S. 2,902,371.* A metallic foil sheet is coated on one side with a shortening which is pliable at room temperature and has a melting point above 140°F., and used for wrapping foods before cooking.

SOLVENT FRACTIONATION OF WINTERIZED COTTONSEED OIL BOTTOMS. G. W. Farr. *U. S. 2,903,363.* A process is described for the preparation of a hard butter from winterized cottonseed oil bottoms as the sole fat source. A solution of the winterized cottonseed oil bottoms is cooled to crystallize out a solid containing at least 75% of monounsaturated, disaturated triglycerides. These are separated and hydrogenated at 160° at atmospheric pressure. A solution of the hydrogenation product is chilled and the precipitated material is separated. Material remaining in solution is the desired product and has an iodine value of about 36.

PROCESS FOR IMPROVING THE TASTE AND FLAVOR OF MARGARINE AND OTHER FOODS AND EDIBLE SUBSTANCES. N. G. Wode and U. Holm (Margarinbolaget Akt.). *U. S. 2,903,364.* Lactones for flavoring fat-containing foods are described.

STABILIZATION OF ORGANIC COMPOUNDS. R. B. Thompson (Universal Oil Products Co.). *U. S. 2,903,368.* Hydrocarbon distillates and fatty materials normally subject to oxidative deterioration are stabilized by the addition of a 1,4-dihydroxy-5,8-ethano-hydronaphthalene or a mono-ether thereof.

EDIBLE OIL. G. C. Hampson and I. P. Freeman (Lever Brothers Co.). *U. S. 2,903,369.* Properties of coconut and palm kernel oils are improved by the addition of a small amount of a C_{12} to C_{18} primary amine.

PROCESS OF HYDROGENATING GLYCERIDES. D. R. Merker (Swift & Co.). *U. S. 2,903,468.* Plasticity and flavor stability of a partially hydrogenated fat are improved by the addition of at least 0.05% of a naturally occurring vegetable phospholipid to the refined fat prior to hydrogenation.

RECOVERY OF WOOL GREASE. J. Raoul, Marie Bovy, and Establissements Albert V. Bovy (ETALBO), S. A. *Belg. 526,672.* During the process of the recovery of wool grease, the wash water which contains at least one surface active ionic or anionic agent is agitated slightly before the final scavenging operation. After scavenging, it is submitted at 70–80° to centrifugation. (*C. A.* **53**, 15603)

MIXED GLYCEROL ESTER COMPOSITIONS. N. D. Embree and G. Y. Brokow (Eastman Kodak Co.). *Brit. 808,634.* Addition to Brit. 745,566. The compositions are prepared by reaction of a higher acylated triglyceride with an OH-containing reactant. The latter consists of glycerol with a lower acylated triglyceride, or a lower acylated glycerol partial ester comprising glycerol and a mixture of lower acylated glycerols. The reaction takes place in the presence of a basic transesterification catalyst. The reaction mixture is then vacuum distilled in order to separate the remaining portion of the OH-containing reactant, and then the residue of this first distillation is subjected to thin-film vacuum distillation in order to separate a composition containing a substantial amount of the mixed glycerol ester. The residue from the second distillation and the separated remaining portions of the OH-containing reactant are combined with additional portions of the starting material and the above is repeated. The glyceride containing the lower acyl radicals may be triacetin or tributyrin. The products are useful as coatings or plasticizers for foods, in cosmetics, in plastics, and as lubricants and release agents. (*C. A.* **53**, 15603)

REFINED SHARK-LIVER OIL AND VITAMIN A CONCENTRATES. S. Mahdihassan, Mohammad Moinuddin, Syed M. Ali and Syed A. Haq. *Brit. 810,643.* A process is described for the simultaneous production of refined shark-liver oil and vitamin A concentrates as well as recovery of calcium salts of fatty acids. (*C. A.* **53**, 15604)

INTERCHANGE OF ESTER RADICALS IN TRIGLYCERIDES. E. Becker and W. Clemens (Margarine-Union Akt.-Ges.). *Ger. 1,009,611.* Triglycerides (particularly a mixture of 20% cottonseed oil, 40% coconut oil, 30% hardened whale oil, and 10% [all by weight] hardened palm oil) were submitted to ester exchange at about 120° in the presence of $NaOCH_3$. The latter was prepared by spray drying of an alcoholic $NaOCH_3$ solution. A drawing is given. (*C. A.* **53**, 14943)

NEUTRALIZATION OF VEGETABLE OILS. J. Weiss ("Shamnon" Spivak & Silberstein, Oil and Soap Industry). *Israeli 10,995.* The complete neutralization and utilization of coconut, palm kernel, and other vegetable oils are obtained by treating the oil with an amount of an alkali hydroxide not exceeding the proportion stoichiometrically equivalent to the acidity and admixing of at least 4% by weight of the acid contained in the oil of mono-, di-, or triethanolamine and an aqueous sodium chloride solution. (*C. A.* **53**, 15604)

• Fatty Acid Derivatives

Diethylene Glycol Fatty Acid Ester. R. Schneider. *Fette Seifen Anstrichmittel* **59**(10), 876–7 (1957). A review with 60 references. (*C. A.* **53**, 15601)

Hydroboration of Fats. I. Positional Isomerism in the Methyl Oleate Hydroboration Reaction. Sara P. Fore and W. G. Bickford (Southern Regional Research Laboratory, New Orleans, La.). *J. Organic Chem.* **24** (1959). It has been found that addition of deborane to the ethylenic bond of methyl oleate proceeds smoothly without significant reduction of the carbomethoxy group. Alkaline hydrogen peroxide oxidation of the tris (carbomethoxyalkyl) borane resulted in the formation of an equimolar mixture of 9- and 10-hydroxyoctadecanoic acids, establishing that the hydroboration reaction proceeded nonselectively. Little or no isomerization occurred on heat treatment of these substituted trialkyl boranes.

Polymeric Fats from Stearic, Oleic, and Short-Chain Dibasic Acids. R. O. Feuge and Audrey Gros (Southern Utilization Research and Development Div., U. S. Dept. of Agriculture, New Orleans 19, La.). *Ind Eng. Chem.* **51**, 1019–1022 (1959). Mixtures of fatty acids, short-chain dibasic acids and glycerol when combined in such proportions that the mole ratio of fatty acid to dibasic acid is one or more yield on esterification polyesters which are much more viscous than are edible oils and fats. On crystallization of the melt, the polyesters containing stearic acid form a fine-grained crystal structure and possess a hardness at 30°C. which ranges from that of beeswax to that of completely hydrogenated cottonseed oil.

Oxidation of Monoethenoid Fatty Acids and Esters: Catalytic Autoxidation of Methyl n-Propyl and n-Butyl Petroselinate. Mrs. J. Gold and J. H. Skellon (Brunel College of Technology, London, W. 3). *J. Applied Chem.* **9**, 389–95 (1959). Esters of *cis*-octadec-6-enoates (petroselinates) were oxidized by gaseous oxygen at various temperatures in the presence of uranium petroselinate. During the autoxidation, hydroperoxides formed initially at the 5, 6, 7, and 8 positions and subsequently decomposed. The greatest hydroperoxide concentration was obtained with the methyl esters. However, the nature of the ester group exerted little influence on the structure of the final products which included α-ketols, isomers of 6:7-dihydroxystearic acid, dicarboxylic acids and resinous or polymeric materials derived from semialdehydes. The mechanism of this autoxidation is apparently comparable to that of oleic or elaidic acid.

Process for Upgrading Polymerized Fatty Acid Mixtures. B. L. Hampton (Glidden Co.). *U. S. 2,894,939.* Halogen containing substances are removed from a crude polymerized fatty acid mixture by treatment with zinc.

9,12-Diketo-10-Hydroxystearic Acid. J. Nichols and E. S. Schipper (Ethicon, Inc.). *U. S. 2,894,964.* This acid is prepared by the oxidation of 12-ketoelaidic acid with either potassium permanganate in basic solution or hydrogen peroxide in the presence of osmium tetroxide.

Acetoacetic Acid Esters of Castor Oil. A. R. Bader and H. A. Vogel (Pittsburgh Plate Glass Co.). *U. S. 2,895,844.* Nitrocellulose is plasticized with the acetoacetic acid ester of castor oil.

Gelled Glycerol Fatty Acid Partial Ester Pharmaceutical Carrier. G. Y. Brokaw and W. C. Lyman, Jr. (Eastman Kodak Co.). *U. S. 2,895,879.* A firm clear gel is formed from a mixture of 10 to 90% water, up to 15% of a medicament, and the remainder a partial glyceride containing less than 10% of glycerides with saturated fatty acid radicals of more than 11 carbon atoms and at least 75% of the monoglycerides of C_{16} or higher fatty acids.

Monoglyceride Diacetates. W. C. Ault and R. O. Feuge (U. S. A. Secy. Agr.). *U. S. 2,895,966.* The preparation is described of epoxidized monoglyceride diacetates from cottonseed, soybean, olive, corn, fish, or tall oil.

Hydroxy Acids. E. N. Case (Sinclair Refining Co.). *U. S. 2,895,974.* Oleic acid and formaldehyde are reacted in the presence of sulfuric acid at 30 to 60°.

Method for the Recovery of Azelaic Acid from a Mixture of Oxidized Acids. S. J. Niegowski and A. Maggiolo (The Welsbach Corp.). *U. S. 2,897,231.* Oleic acid, linoleic acid or their mixtures are ozonized and cleaved to a mixture of dicarboxylic acids. The oxidized acids are esterified and the azelate is separated by fractional distillation.

Di- and Polycarboxylic Acids. W. Reppe, N. v. Kutepow, and H. Detzer (Badische Anilin- & Soda-Fabrik Akt.-Ges.). *Ger. 1,006,849.* Oleic acid was reacted with carbon monoxide at 270° in the presence of a nickel catalyst to obtain isomeric heptadecane dicarboxylic acids in 80% yield based on oleic acid. (*C. A.* **53**, 14945)

Diamide of Adipic Acid and δ-Cyanovaleramide. E. N. Zil'berman and A. E. Kulikova. *U. S. S. R. 115,895.* Adipic di-iminochloride-2HCl or the corresponding cyanovaleric iminochloride-HCl is treated with an equivalent amount of water and the resulting imonium chlorohydrin hydrolyzed with excess water in the presence of a base. (*C. A.* **53**, 14945)

• Biology and Nutrition

Biochemistry of Hypoglycine A. II. The Influence of Hypoglycines on the Oxidation of Glucose and Fatty Acids. C. v. Holt and I. Benedict (Physiological-Chemical Institute of the Univ. Hamburg). *Biochem. Z.* **331**, 430–435 (1959). β-Methylenecyclopropyl-α-amino-propionic acid (hypoglycine A) causes an increase in oxidation of uniformly labeled C^{14}-glucose to $C^{14}O_2$ in normal and alloxan diabetic rats to about twice the values observed in untreated animals. At the same time the oxidation of 1-C^{14}-labeled palmitate is decreased to about one half, while that of 1-C^{14}-capronate remains unchanged.

Calcium Phosphate Fatty Acid Salts Occurring in Fecal Lipides. J. F. Richards and K. K. Carroll (Univ. Western Ontario). *Can. J. Biochem. and Physiol.* **37**, 725–30 (1959). The presence of unsaturated fatty acids such as oleic, linoleic, eicosenoic, and erucic acid in the diet of rats causes a marked increase in lipide soluble calcium and phosphorus in the feces. A proposed structure of a calcium phosphate fatty acid complex salt for this material (Swell, *et al.*, *C. A.* **51**, 5246*h*) was confirmed by chemical synthesis and characterization by paper chromatography. (*C. A.* **53**, 15288)

Linoleic Acid Retention by the Rat Organism. H. Wagner, Esther Seelig, and K. Bernhard (Univ. Basel, Switz.). *Z. physiol. Chem.* **313**, 235–43 (1958). Young male rats received a normal diet enriched with sunflower oil. They showed an increase of up to 40% in linoleic acid content of organ and fat deposits. When these animals were put on a fat-free diet, a gradual decrease of linoleic acid occurred. Of the remaining polyenic acids, tetraenic (arachidonic) acid increased, but not pentaenic and hexaenic acids. Only very small amounts of the latter were present in organs and they were barely detectable in the fat deposits. Rats on fat-free diets contained only small amounts of linoleic acid, but a moderate addition of sunflower oil to the diet caused a large increase in the linoleic acid content of organ lipides. Increases in arachidonic acid could also be determined, and the amounts found were in agreement with their possible origin from linoleic acid. (*C. A.* **53**, 15249)

Linoleic Acid and Cholesterol Metabolism in the Rat. II. Effects of Dietary Cholesterol on Plasma and Liver Ester Composition. P. D. Klein (Argonne Natl. Lab., Lemont, Ill.). *Arch. Biochem. Biophys.* **81**, 382–9 (1959). In rats, addition of 0.5% cholesterol to the diets containing various levels of linoleic acid resulted in accumulation of liver cholesterol ester; the magnitude of the accumulation was not related in an apparent manner to the amount of linoleic acid. There was little or no increase in plasma cholesterol except in animals on a fat-free diet. The multiunsaturated fatty acid content of the plasma esters decreased markedly, and cholesterol arachidonate largely disappeared. The influx of cholesterol in the liver was accompanied by increases in the amounts of dienoic and trienoic ester, but tetraenoic and pentaenoic esters did not change. The fact that feeding a diet containing 2% cholesterol for 28 days decreased incorporation of acetate into the octabromide fraction of liver lipides suggests that the formation of arachidonic acid from linoleic acid was impaired. (*C. A.* **53**, 15280)

Comparative Lymphatic Absorption of β-Sitosterol and Cholesterol by the Rat. L. W. Dunham, R. E. Fortner, R. D. Moore, H. W. Culp, and C. N. Rice (Lilly Research Labs., Indianapolis, Indiana). *Arch. Biochem. Biophys.* **82**, 50–61 (1959). β-Sitosterol reduces the absorption of cholesterol via the thoracic lymph (Hernández, *et al.*, *Am. J. Physiol.* **181**, 523 [1955]). The percentage of β-sitosterol absorbed is about 1⁄10 that for cholesterol. β-Sitosterol delays the absorption of that cholesterol which is absorbed. Under the conditions of these experiments, the total amount of β-sitosterol, rather than the ratio of the 2 sterols administered, determines the effectiveness of the β-sitosterol. In 4 groups of animals given different amounts of β-sitosterol and cholesterol, lymphatic cholesterol was about 70% esterified, whereas lymphatic β-sitosterol was only about 25% esterified. (*C. A.* **53**, 15280)

Influence of Age and Race on Lipide Levels in Israel. D. Brunner, G. Manilis, and K. Loebl. *Lancet* **1959-I**, 1071–3. Total cholesterol, α- and β-cholesterol, and other lipide fractions were estimated by paper electrophoresis in healthy young adult Yemenitis and Ashkenazi Jews. Contrary to the view that cholesterol levels rise with age from the early twenties to middle age, no such trend was found in Yemenite Jews. Young Ashkenazi Jews from the upper middle social classes have higher total cholesterol levels than the Yemenites, but these are lower than those of the middle-aged Ashkenazi group of mixed social classes. With regard to low average values of β-cholesterol and the high percentage of α-cholesterol, the young Ashkenazis, unlike the middle-aged Ashkenazis, are identical with Yemenites of all ages. (*C. A.* **53**, 15279)

Effect of Erucic Acid on Incorporation of Acetate-1-C^{14} into Cholesterol and Fatty Acids. K. K. Carroll (Univ. Western Ontario, London). *Can. J. Biochem. and Physiol.*, **37**, 803–10 (1959). Young male rats were fed synthetic diets containing either no fat or various individual fatty acids for 3–4 weeks. They were then killed and the incorporation of acetate-1-C^{14} into cholesterol and fatty acids was measured in liver slices and in scrapings of intestinal mucosa. Acetate incorporation into cholesterol by liver slices was much greater in animals fed erucic acid than in those fed no fat, palmitic, stearic, oleic, or linoleic acid. A marked differential was not observed in fatty acid incorporation, but values tended to be higher on the fat-free and erucic acid diet. Erucic acid did not stimulate acetate incorporation into cholesterol by mucosa and, in general, mucosa seemed to be less sensitive to changes in diet. (*C. A.* **53**, 15288)

Blood Lipides During Exercise. I. Arterial and Venous Plasma Concentration of Unesterified Fatty Acids. L. A. Carlson and B. Pernow (Karolinska Inst., Stockholm). *J. Lab. Clin. Med.* **53**, 833–41 (1959). Plasma concentration of unesterified fatty acids in the arterial blood and in the femoral veins was determined at rest and during exercise in 6 healthy human subjects. During exercise the arterial unesterified fatty acids concentration decreased. The exercising leg extracted unesterified fatty acids from plasma. (*C. A.* **53**, 15278)

Transport of Fatty Acids. D. S. Fredrickson and R. S. Gordon, Jr. (Natl. Heart Inst., Bethesda, Md.). *Physiol. Revs.* **38**, 585–630 (1958). A review is given of recent investigations into the problems of the transport of fatty acids in mammals, covering the physical state and chemical composition of the fatty acids in extracellular fluids and also the turnover and metabolism of esterified and unesterified fatty acids in extracellular fluids. 370 references. (*C. A.* **53**, 15274)

Metabolism Studies with a Mixed Glyceride of Fatty Acids of Medium Chain Length. II. Investigation of the Changes of Ketone Bodies of Blood and Urine After Treatment with the Mixed Glyceride. H. Schön, Inge Lipach, and W. Gelpke (Med. Univ., Erlangen, Ger.). *Gastroenterologia* **91**, 199–213 (1959). Replacing fats in the normal diet with a triglyceride of capric, caprylic, and lauric acids results in significantly increased excretion of acetone and β-hydroxybutyric acid in the blood. The significance of these findings in relation to the therapy of obesity is discussed. (*C. A.* **53**, 15271)

Serum Cholesterol Levels in American Indians. S. Abraham and D. C. Miller (U. S. Public Health Service, Washington, D. C.). *Public Health Repts.* (U. S.) **74**, 392–8 (1959). The serum cholesterol level of 5 tribes of American Indians who were examined during the Indian Health Survey was significantly lower than that of the Cleveland clinic group, whose mean level is similar to that found in other surveys of American non-Indian populations. The findings of a higher serum cholesterol level among one subgroup of the Navajos and a significantly lower mean level among another subgroup suggests important environmental factors at work among this ethnic group. (*C. A.* **53**, 15269)

Diet and Cholesteremia: Effect of Nutritional Factors on Serum Cholesterol Concentration. Narindar Nath (Univ. of Wisconsin, Madison). *Univ. Microfilms* (Ann Arbor, Mich.), *L. C. Card No.* **Mic 59-1420**, 140 pp.; *Dissertation Abstr.* **19**, 2741 (1959). (*C. A.* **53**, 15251)

The Nutritional Value of Fatty Acids Isomers. O. K. Palladina, K. S. Stepanova, and N. D. Bukhman. *Trudy Vsesoyuz. Nauch.-Issledovatel. Inst. Zhirov* **1957**, No. 17, 76–82; *Referat. Zhur. Khim., Biol. Khim.* **1959**, Abstr. No. 781. Results of nutritional experiments with humans indicated that hydrogenated fats containing not less than 30% of isoöleic acid were equivalent in their nutritional value to butter fat and sunflower seed oil. The addition of food phosphatides to hydrogenated oils containing 38.5% of isoöleic acids increased their nutritional value over butterfat. (*C. A.* **53**, 15245)

Effect of Reduction of Dietary Fat and Additional Ingestion of Corn Oil on Hypercholesterolemia. D. V. Rhoads and N. W. Barker (Mayo Clinic, Rochester, Minn.). *Proc. Staff Meetings Mayo Clinic* **34**, 225–9 (1959). Nine patients in a mental hospital with control plasma cholesterol values between 247 and 331 mg./100 ml. were given during successive periods a low fat diet (57 ± 10 g. daily), the low fat diet plus 90 ml. corn oil daily, the routine hospital diet plus 90 ml. corn oil and the routine hospital diet without corn oil. In all subjects, plasma cholesterol values decreased with the low fat diet, decreased further with the low fat diet plus corn oil, increased but not to control levels with the routine diet plus corn oil, and returned to pretreatment levels when the routine diet without corn oil was resumed. The subjects lost weight on the low fat diet but regained this weight when the corn oil was added. (*C. A.* **53**, 15246)

Dietary Linoleic Acid and Linoleate. L. W. Kinsell, G. D. Michaels, G. Walker, P. Wheeler, S. Splitter, and P. F. Flynn (Highland-Alameda County Hosp., Oakland, Calif.). *Diabetes* **8**, 179–88 (1959). Linoleic acid appears to be the responsible constituent of those vegetable fats which, when taken in the diet, lower plasma levels of cholesterol and other lipides. Marked improvement has been noted in certain diabetic and nondiabetic patients with vascular disease when administered large amounts of linoleic acid in their food. The fatty acid composition of the diet specifically influenced the composition of the plasma cholesterol esters. High linoleate intake resulted in markedly increased plasma cholesterol linoleate, and high oleate intake resulted in markedly increased plasma cholesterol oleate. (*C. A.* **53**, 15246)

Biological Utilization of Carotene from Indian Edible Oils on Frying. Y. B. Rangnekar (M. G. M. Med. Coll., Indore, India). *Sci. and Culture (Calcutta)* **24**, 330–1 (1959). An important factor in the differential utilization of carotene in oils is vitamin E. Another factor is hydrogenation. In most Indian diets the edible oils are used for frying at a high temperature for the preparation of vegetable diets. It was found that frying markedly reduced the utilization of carotene subsequently added to the fried oils. Frying evidently caused the development of compounds which interfered with the proper utilization of vitamin A. Coconut oil, which is devoid of vitamin E, gave the best response. (*C. A.* **53**, 15243)

The Control of Fat Metabolism. A. L. Greenbaum (Univ. Coll., London, Engl.). *Lectures Sci. Basis Med.* **6**, 277–96 (1956–57). A review with 26 references. (*C. A.* **53**, 15238)

Essential Fatty Acids in Nutrition and Their Relation to Vitamins. H. M. Sinclair (Univ. Oxford, Engl.). *Lectures Sci. Basis Med.* **6**, 260–76 (1956–57). A review with 39 references. (*C. A.* **53**, 15238)

Vitamin A. R. A. Morton (Univ. Liverpool, Engl.). *Lectures Sci. Basis Med.* **5**, 143–64 (1955–56). A review with 45 references. (*C. A.* **53**, 15238)

Fat Metabolism. A. C. Frazer (Univ. of Birmingham, Engl.). *Lectures Sci. Basis Med.* **4**, 311–31 (1945–55). A review with 67 references. (*C. A.* **53**, 15238)

Influence of Fats on Absorption of Calcium and Phosphorus. N. D. Kehar, T. S. Krishnan, and R. Chanda. *Studies Fats, Oils and Vanaspatis* **1956**, 85–90; *Dairy Sci. Abstr.* **19**, 747 (1957). The effect of calcium and phosphorus metabolism of ghee, vegetable oils, vanaspatis, and lard was determined. Cow ghee caused 45% calcium and 57% phosphorus to be retained. The other fats gave a percentage absorption of 22.6–40.7 for calcium. The vanaspatis were less efficient in promoting calcium absorption than the vegetable oils. Phosphorus absorption was lower when the oils, lard, or vanaspatis formed the dietary fat than when ghee was used. (*C. A.* **53**, 15240)

Absorption of Carotene and Liver Storage of Vitamin A. N. D. Kehar, S. N. Ray, T. S. Krishnan, B. S. Joshi, and A. K. Pal. *Studies Fats, Oils and Vanaspatis* **1956**, 9–100; *Dairy Sci. Abstr.* **19**, 751–2 (1957). Liver storage of vitamin A was highest with ghee-fed animals and lowest in those receiving the Dalda (vanaspati). The digestibility of carotene was increased by the presence of refined fats, vanispatis, and ghee. (*C. A.* **53**, 15240)

Effect of Fats and Oils on the Requirements of the B Vitamins. N. D. Kehar, T. S. Krishnan, and B. C. Joshi. *Studies Fats, Oils and Vanaspatis* **1956**, 101–6; *Dairy Sci. Abstr.* **19**, 747 (1957). Rats fed ghee showed better weight gains than those fed crude or refined peanut oil, or Dalda (vanaspati); hydrogenated peanut oil gave better results. Riboflavin-deficient rats showed better growth when cow ghee was the dietary fat, except at high intake levels, i.e. 8γ/day. (*C. A.* **53**, 15240)

The Effect of Different Fats and Oils on Protein Metabolism. N. D. Kehar, T. S. Krishnan, and R. Chanda. *Studies Fats, Oils and Vanaspatis* **1956**, 79–83; *Dairy Sci. Abstr.* **19**, 746–7 (1957). When fat was added to a diet suboptimal for vitamin A, the digestibility and biological value of the protein was increased. Cow ghee improved digestibility by 36% and biological value by 62%. Supplementation with B vitamins did not affect the digestibility of the protein but did improve the biological value by 13–14% when peanut oil or Dalda was the dietary fat. (*C. A.* **53**, 15239)

Some Effects of Feeding Various Filled Milks to Dairy Calves. I. Physical Condition and Weight Gains, with Special Reference to Low-Fat Rations. R. S. Adams, T. W. Gullickson, J. E. Gander, and J. H. Sautter (Dept. of Dairy Husbandry, Univ. of Minnesota, St. Paul). *J. Dairy Sci.* **42**, 1552–61 (1959). Various filled milks and low-fat rations were studied in an attempt to determine some of the factors responsible for the unsatisfactory gains, poor physical condition, and deaths which have been reported as occurring in calves fed rations containing highly unsaturated vegetable fat. Under the conditions of the experiment, the results of feeding corn oil filled milk to dairy calves were as follows: (a) animals appeared emaciated and unthrifty, (b) a marked diarrhea was observed, (c) an increased susceptibility to pneumonia and a high mortality rate occurred when infection was not rigidly controlled, (d) symptoms of anorexia and muscular involvement were noted, (e) poor feed utilization and unsatisfactory weight gains were obtained.

II. Fecal Characteristics and Digestibility Data. *Ibid.*, 1562–68 (1959). Young dairy calves were fed low-fat rations or filled milks containing various fats. One group received a corn oil filled milk which was prepared daily rather than weekly, to study effects of storage. All other diets were prepared once each week. Differences in the color of feces were observed among the various rations. Abnormally large amounts of feces were voided by animals fed the corn oil filled milk prepared weekly. Daily preparation of the corn oil filled milk diet or the feeding of hydrogenated corn oil greatly reduced the amounts of feces excreted.

III. Blood Plasma Tocopherol and Vitamin A Levels, Diet Storage, Effects, and Evidence of Toxicity. *Ibid.*, 1569–79 (1959). Low blood plasma tocopherol levels were found in calves fed corn oil filled milk, despite a relatively high tocopherol intake. Both plasma tocopherol and vitamin A values declined progressively during the experimental period in the corn oil filled milk group. Low blood plasma tocopherol levels also occurred in animals fed lard filled milk and a ration containing butter oil, which was prepared from oxidized butter. Oral supplementation of the corn oil and lard filled milk diets with 500 mg. of DL-*alpha* tocopherol or *alpha* tocopheryl acetate daily resulted in high plasma tocopherol values.

IV. Necropsy Findings, Electrocardiographic Studies, and Creatinuria Ratios. *Ibid.*, 1580–91 (1959). Gross and microscopic lesions were demonstrated in the cardiac and skeletal muscles of calves fed corn oil or lard filled milk. Such lesions were also found in animals receiving a similar ration containing butter oil, which had been prepared from oxidized butter. Both oral and intramuscular supplementation of the corn oil and lard filled milk diets with high levels of tocopherol prevented the development of muscular involvement during the course of the experiment. No evidence of muscular involvement was encountered in calves fed a low-fat, tocopherol-poor ration for periods as long as 5.6 mo. The influence of certain fats in the diet on the production of so-called vitamin E deficiency lesions in cattle is discussed.

Bile Acids and Steroids. LXXXII. On the Mechanism of Deoxycholic Acid Formation in the Rabbit. S. Bergstrom, S. Lindstedt, and B. Samuelsson (Dept. of Physiological Chemistry, Univ. of Lund, Sweden). *J. Biol. Chem.* **234**, 2022–5 (1959). The preparation of cholic acid-7-B-H^3,24-C^{14} is described. During the conversion of this acid to deoxycholic acid in the rabbit intestine the tritium remains in the molecule. Evidence is presented that the tritium is located in the 7-position in the deoxycholic acid formed. 7-Ketodeoxycholic acid can be transformed into deoxycholic in the rabbit intestine, but remains unchanged after one passage through the liver.

10-Hydroxy-Δ^2-Decenoic Acid, an Antibiotic Found in Royal Jelly. M. S. Blum (Entomology Research Dept., Louisiana State Univ., Baton Rouge, Louisiana), A. F. Novak and S. Taber, III. *Science* **130**, 452–453 (1959). 10-Hydroxy-Δ^2-decenoic acid, the major component of the lipide fraction of royal jelly, exhibits antibiotic activity against many bacteria and fungi. This fatty acid is less than one-fourth as active as penicillin against *Micrococcus pyogenes* and less than one-fifth as active as chlortetracycline against *Escherichia coli*. It also slows the growth rate of *Neurospora sitophilia* and some unidentified molds. The salt of this compound is considerably less active than the free acid.

Biochemistry of Long Chain Fatty Acids. I. General Observations. J. C. Dittmer and D. J. Hanahan (Dept. of Biochem., Univ. of Washington, Seattle, Wash.). *J. Biol. Chem.* **234**, 1976–82 (1959). The fatty acid composition of the various individual neutral and phospholipide components of rat liver is presented. Over a period of 4 to 18 hours after feeding a single dose of corn or olive oil to adult rats, the fatty acid distribution in these different lipides was reasonably constant. In a general study of the influence of corn and olive oil on the distribution of C^{14} from carboxy-labeled palmitic, oleic, stearic, and linoleic acids in the liver lipides, there seemed to be no appreciable dependence on the relative distribution of these long chain acids between phospholipides and neutral lipides.

II. Metabolic Studies. *Ibid.*, 1983–9 (1959). After oral feeding of palmitic acid-1-C^{14}, oleic acid-1-C^{14}, linoleic acid-1-C^{14}, and stearic acid-1-C^{14} in corn oil to adult rats, a study was made of the incorporation and distribution of these individual fatty acids at 4, 6, 10, and 18 hours into the major lipide components of the liver. The conversion of these fatty acids to other fatty acids has been observed and related to the general metabolic pathways of the ingested fatty acids. The pathway of the individual fatty acids was found to be complex and, although similar, not necessarily the same.

Passage of Labeled Cholesterol into the Aortic Wall of the Normal Dog. L. E. Duncan and Katherin Buck (Section of Clinical Endocrinology, National Heart Inst., N.I.H., Bethesda, Md.). *Circulation Res.* **7**, 765–70 (1959). In the normal dog the rate of movement of cholesterol from the serum into the inner layer of the aortic wall is greatest at the proximal end of the aorta and decreases progressively along the length of the aorta until in the terminal aorta the rate is only about one-sixth that in the proximal aorta. A similar gradient of rates was previously demonstrated for albumin which enters the aortic wall about three times as fast as cholesterol. The similarity of the gradients and the relative magnitude of the rates for cholesterol and albumin support the concept that cholesterol is carried into the aortic wall of the normal dog by the passage of the lipoproteins of which it is a part.

Toxity of Amine-Extracted Soybean Meal. J. Greenbueg, D. J. Taylor, H. W. Bond, and J. F. Sherman (National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md.). *J. Agr. Food Chem.* **7**, 573–6 (1959). Residues of soybean meal, after extraction with primary, secondary, or tertiary organic amines, were toxic for the chick when incorporated, at levels of 20 to 40%, in an otherwise adequate diet. Approximately 80% of chicks fed amine-extracted residues of soybean meal died within 10 days. Chicks fed residues after extraction with acetone, ethyl alcohol, or trichloroethylene survived and appeared normal. Those fed the extracts (except the butylamine extract) were normal. Triethylamine-extracted cottonseed meal, black-eyed peas, soybean protein, zein, and Cerelose were toxic in varying degrees. Triethylamine-extracted gelatin and casein were well tolerated. Twelve amino acids failed to react with triethylamine when refluxed in the solvent for 24 hours; L-lysine monohydrochloride under the same conditions showed evidence of change in composition.

The Natural Occurrence of Coenzyme Q and Related Compounds. R. L. Lester and F. L. Crane (Inst. for Enzyme Research, Univ. of Wisconsin, Madison, Wis.). *J. Biol. Chem.* **234**, 2169–2175 (1959). Many species of animals, plants, and microorganisms have been examined for the presence of coenzyme Q and related lipides. It was found that coenzyme Q is widespread in nature but not ubiquitous. As a rule, in highly aerobic tissues, there occur large amounts of coenzyme Q. It is suggested that in those tissues which are apparent exceptions to this rule, a different electron transport mechanism, possibly utilizing other quinones such as vitamin K, is operative.

Bile Acids and Steroids. LXXXIII. On the Interconversion of Cholic and Deoxycholic Acid in the Rat. S. Lindstedt and B. Samuelsson. (Dept. of Physiological Chem., Univ. of Lund, Lund, Sweden). *J. Biol. Chem.* **234**, 2026–30 (1959). The tritium label in cholic acid 7β-H^3,24-C^{14} was almost completely retained in the molecule during the conversion to deoxycholic acid by the microorganisms in the large intestine. The tritium label in the isolated deoxycholic acid was lost in the 7α-hydroxylation to cholic acid in the liver; this suggests a shift of the H^3-label from the 7β- to the 7α-position.

Alteration of Cholesterol Metabolism in the Rat with Linoleic Acid. J. M. Merrill (Veterans Administration Hospital, Nashville, Tenn.). *Circulation Res.* **7**, 709–11 (1959). When linoleic acid is added to the diet of the rat, there is an average increase in incorporation of radiocarbon into liver cholesterol of 259 per cent. By contrast, the addition of coconut oil to the diet does not increase the incorporation of radiocarbon into liver cholesterol. The addition of linoleic acid to a stock diet is associated with an increased fecal excretion of Liberman-Burchard chromogens, 3-β-hydroxy sterols and bile acids.

Studies on the Biosynthesis of Glycolipides and Other Lipides of the Brain. H. W. Moser and M. L. Karnovsky (Dept. of Biological Chem. and the Biophysical Lab., Harvard Medical School, Boston, Mass.). *J. Biol. Chem.*, **234**, 1990–7 (1959). C^{14}-labeled glucose or galactose was administered intraperitoneally to Swiss Albino mice ranging in age from 3 days to 6 months. After 1 hour the animals were killed by decapitation and the brain lipides isolated. The activity present in cerebroside galactose exhibited the greatest variations with age. Maximal synthesis of this component occurred in animals 22 days old. When the administered glucose was labeled in carbon-6, almost all of the activity of the cerebroside was found in that carbon.

Growth of Certain Lipolytic Microorganisms at 4° and Their Influence on Free Fat Acidity and Flavor of Pasteurized Milk. W. W. Overcast and J. D. Skean (Dept. of Dairying, Tenn. Agr. Experiment Station, Knoxville). *J. Dairy Sci.* **42**, 1479–85 (1959). Twenty-five pure cultures of lipolytic microörganisms sometimes found in market-milk were inoculated into samples of high-quality pasteurized whole milk subsequently held at 4° ± 1° for a period of 12 days. At four-day intervals during the holding period the samples were examined for microbial content, free fat acidity, and developed flavors. Eighteen cultures grew reasonably well and brought about increases in free fat acidity. Seventeen of these produced a rancid flavor sometimes accompanied and/or followed by bitterness, whereas one caused the milk to be criticized as sour and unclean.

Synthetic Studies on Sphingolipids. IV. The Synthesis of Sphingomyelin. D. Shapiro, H. M. Flowers, and S. Spector-Shefer (Daniel Sieff Research Institute, Weizmann Institute of Science, Rehovoth, Israel). *Jour. Am. Chem. Soc.* **81**, 4360–4 (1959). The synthesis of palmitoyl-, stearoyl-, and lignoceroyl-sphingomyelin is described. *cis*-2-Phenyl-4-hydroxymethyl-5-(1-pentadecenyl)-2-oxazoline is phosphorylated with β-chloroethylphosphoryl dichloride. Hydrolysis, followed by acylation of the amino ester, leads to the amide. Quaternization of the latter with trimethylamine followed by treatment with alkali affords the sphingomyelins.

Analysis of Milk Phospholipids by Chromatography and Infrared Spectrophotometry. L. M. Smith and N. K. Freeman (Dept. of Dairy Industry, Univ. of Calif., Davis). *J. Dairy Sci.* **42**, 1450–62 (1959). Milk phospholipids were fractionated into the major phospholipid classes by successive elution from a silicic acid column with chloroform, acetone, methanol (20% and 40%) in chloroform, and methanol. Each fraction was analyzed by infrared spectrophotometry as well as by chemical methods. Potassium bromide disk spectra of milk cerebrosides, cephalins, lecithins, and sphingomyelins are presented and compared with pure reference compounds. Concentrations of each class were calculated from specific band measured either in chloroform or in carbon disulfide solutions. Respective weight percentages of cerebrosides, cephalins, lecithins, and sphingomyelins were: 6, 35, 32, and 24. Evidence is given for the presence of minor amounts of other constituents, including carbohydrate-containing phospholipids, lysolecithins, and unidentified lipids. Advantages and limitations of the method at its present state of development are discussed.

Fat in the Diets of Older Women—Body Weight and Blood Pressure Levels. Lida M. Burrill, Cecilia Schuck, and Alice Biester (S. Dakota Agr. Expt. Station, Brookings and Minn. Agr. Expt. Station, St. Paul). *J. Am. Dietet. Assoc.* **35**, 935–7 (1959). For this group of women, aged 30–97 yr., fat calories represented 35 to 41% of total calories and were supplied chiefly by butter, dairy products, meats, and gravies. There was no apparent relationship between diastolic blood pressures and fat contents of the diets. Data are reported on blood pressures and body weights.

Regulation of Cholesterol Oxidation by Liver in Vitro. M. W. Whitehouse and E. Staple (School of Medicine, Univ. Penna., Philadelphia). *Proc. Soc. Exptl. Biol. Med.*. **101**, 439–41 (1959). By *in vitro* studies with liver tissue, cholic acid conjugates were found to depress oxidation of cholesterol but not of sodium pyruvate or 3α, 7α, 12α-trihydrocoprostane. Preparations of liver mitochondria from livers of rats which had been deprived of bile salts by interruption of enterohepatic circulation oxidized cholesterol to a greater extent than controls. The mechanism is discussed briefly.

Lipemia-Induced Acceleration of Intravascular Clotting. H. C. Roth, W. Rosenthal, and E. E. Mandel (Chicago Medical School and Mt. Sinai Hospital of Chicago). *Proc. Soc. Exptl. Biol. Med.* **101**, 516–19 (1959). Intravenous administration of a cottonseed oil emulsion has been found to accelerate the formation of a fibrin clot in isolated venous segments of anesthetized dogs.

Labeling of Intestinal and Lymph Cholesterol After Administration of Tracer Doses of Cholesterol-4-C^{14} L. Swell, E. C. Trout, Jr., H. Field, Jr., and C. R. Treadwell (Vet. Admin. Center, Martinsburg, W. Va., and Geo. Washington Univ., Washington, D. C.). *Proc. Soc. Exptl. Biol. Med.* **101**, 519–21 (1959). In studies with lymph fistula rats, small doses of fed cholesterol-4-C^{14} led to labeling of cholesterol fractions of mucosa and lymph without increase in level or turnover rate of the free cholesterol pool of the mucosa or in the amount of cholesterol in lymph. Simultaneous feeding of sodium taurocholate and oleic acid increased the amount of both labeled and unlabeled cholesterol in lymph.

Uptake of Radiosulphate by Mucopolysaccharides of Aorta in Cholesterol Fed Cockerels. K. Kowalewski (Univ. Alberta, Edmonton, Alberta). *Proc. Soc. Exptl. Biol. Med.* **101**, 536–7 (1959). During an 8-wk. period, cockerels were fed diets enriched with cholesterol (2%) and cottonseed oil (5%). Parallel to increased levels of serum and liver lipides and in cholesterol/phospholipid ratios, there was a significant increase in the S^{35} uptake by sulphated mucopolysaccharides in aorta but not in bones.

Comparative Effects of Bile Acids on Intestinal Absorption of Cholesterol. G. V. Vahouny, H. M. Gregorian, and C. R. Treadwell (Geo. Washington Univ. School of Medicine, Washington, D. C.). *Proc. Soc. Exptl. Biol. Med.* **101**, 538–40 (1959). In lymph fistula rats, cholic acid with 3 free hydroxyl groups and an unconjugated carboxyl radical was the most effective bile acid in promoting cholesterol absorption from the intestine. Conjugated bile salts, glycocholate, and taurocholate were less effective. Cholanic, lithocholic and deoxycholic acids, with 0, 1, or 2 hydroxyl radicals, respectively, produced no increase in lymph cholesterol over the control group.

The Relation Between the Activity of a Lecithinase and the Electrophoretic Charge of the Substrate. A. D. Bangham and R. M. C. Dawson (Agr. Research Council Inst. of Animal Physiology, Babraham, Cambridge). *Biochem. J.* **72**, 486–92 (1959). Electrophoretic measurements of aqueous emulsions of various lecithin preparations indicated that pure lecithin particles have a net positive charge at the optimum pH for lecithinase action. Activating lipids (monophosphoinositide, cardiolipin) and anionic amphipathic molecules which activate the enzyme systems were found to confer a net negative surface to the enzyme. Cationic materials caused complete inhibition of the enzyme when their concentration was sufficient to reduce the mobility of the emulsion particles below the critical activation value. Electrophoresis of *Penicillium notatum* phospholipase B indicated that lysolecithinase and lecithinase activity resided in the same protein band and that these enzymes are identical.

The Activation of Surface Films of Lecithin by Amphipathic *Molecules*. R. M. C. Dawson and A. D. Bangham (Agr. Research Council Inst. of Animal Physiology, Babraham, Cambridge). *Biochem. J.* 72, 493–6 (1959). P^{32}-Lecithin of high specific activity was prepared biosynthetically with baker's yeast. Activities of *Penicillium notatum* phospholipase were estimated from the rate of transfer of counts from a surface film of this lecithin to a supporting aqueous phase. The enzyme had no effect on a film of the pure lecithin but did hydrolyze films containing dicetylphosphoric acid. It is concluded that a net surplus of negative groups on a lecithin surface is prerequisite for lecithinase attack.

Studies on Phospholipids. 6. A Complex Phospholipid from Sheep Brain. F. D. Collins (Australian National Univ., Canberra, Australia). *Biochem. J.* 72, 532–7 (1959). Sheep brain lipids were treated with 1-fluoro-2,4-dinitrobenzene and then with diazomethane. Products were fractionated by countercurrent distribution between aqueous ethanol and petroleum ether. A derivative of a complex phospholipid was obtained in a yield of 28% of the total phospholipids. It had a molecular weight of 2030 and contained 2 moles of glycerol 1-phosphate, 1 mole each of dinitrophenylethanolamine, choline, a sugar, a fatty alcohol, 2 moles of fatty acids and two unidentified nitrogen-containing materials.

Compositions Containing Stabilized Vitamin A Materials. R. W. Lehman (Eastman Kodak Co.). *U. S. 2,895,878.* A vitamin A composition is stabilized by the addition of tocopherol and 2,6-di-*tert.*-butyl-4-methylphenol.

Stable Vitamin A Compositions. J. E. Allegretti (Merck & Co., Inc.). *U. S. 2,897,118.* An ester of vitamin A and antioxidants are uniformly dispersed in the reaction product of one part of formaldehyde with 10 to 100 parts of partially hydrolyzed casein.

Stable Powdered Oil Soluble Vitamin. H. J. Dunn (Van Camp Sea Food Co., Inc.). *U. S. 2,897,119.* The desired vitamin oil concentrate is homogenized in an aqueous solution of lactose and gum arabic or gum ghatti. The mixture is spray dried so as to form microbeads in which the vitamin particles are encapsulated in gum and lactose.

Dry Stable Feed Supplement. A. L. Wilson (Corn Products Co.). *U. S. 2,899,307.* A dry feed supplement having a high level of fat which is stable against oxidative deterioration is prepared by mixing 10 to 35% alkaline soapstock, 10 to 30% acidic fermentation liquor, and a fibrous carrier.

Poultry Feed. C. M. Ely and J. R. Foy (Nopco Chemical Co.). *U. S. 2,899,308.* Rate of growth and feed efficiency of poultry is improved by the addition of 0.5 to 2.0% by wt. of sodium and potassium soaps of C_{12} to C_{22} fatty acids to the feed.

Method of Preserving the Red Color of Red Meat. J. E. Snyder and G. W. Ferner (The Goodyear Tire & Rubber Co.). *U. S. 2,900,260.* The color of red meat is preserved by packaging the meat in a rubber hydrochloride film plasticized with butoxyethyl laurate, butoxyethyl epoxystearate or butoxyethoxyethyl pelargonate. *U. S. 2,900,261.* The plasticizer is a liquid dialkyl adipate.

• Paints and Drying Oils

Examination of Safflower Oil from Indigenous Sources with Reference to Its Use in the Manufacture of Paints and Varnishes. Mohammad Aslam (Pakistan Council Sci. and Ind. Research, Karachi). *Pakistan J. Sci. Ind. Research* 1, 312–15 (1958). Oils obtained from four varieties of seeds were investigated for film drying properties. Only the two oils of high iodine number (140 and 142) gave satisfactory tack-free films with 0.5% lead and 0.1% cobalt. Oleoresinous varnishes of 15, 25, and 35 gallons oil lengths were compared to corresponding linseed oil varnishes. In water resistance and scratch resistance tests all the safflower oil varnishes appeared to be slightly superior. (*C. A.* 53, 15593)

Preparation of Drying Oils from Semidrying Oils by Isomerization. G. L. Yukhnovskiĭ and R. R. Popenker. *Trudy Khar'kov. Politekh. Inst.* 4, 159–68 (1954); *Referat. Zhur., Khim.* 1956, Abstr. No. 52651. The effect of various catalysts (PbO, nickel on activated carbon, anthraquinone, iodine, bentonite, clay) on isomerization of sunflower oil was studied. Anthraquinone and iodine were the best catalysts. (*C. A.* 53, 15593)

Fatty Acid Esters Modified by Ethylenically Unsaturated Silane Compounds. M. M. Olson and R. M. Christenson (Pittsburgh Plate Glass Co.). *U. S. 2,894,922.* A coating material is prepared by heating at 150° to 350° in the absence of oxygen a mixture of an aliphatic ester of a drying oil acid and a hydrolyzable compound such as vinyl trihalosilane or vinyl trialkoxy silane. The product is a polymer soluble in xylene and toluene and can be cured to a hard durable film.

Polymerizable Epoxide Group-Containing Modified Alkyd Resins. M. Yusem (Bradley & Vrooman Co.). *U. S. 2,895,929.* A composition which can be cured in the presence of an epoxy catalyst is prepared from a polymerizable polyether polyepoxide oil modified alkyd resin and a monomeric compound containing at least one $CH_2 = C =$ grouping but no conjugated double bonds.

Water Emulsion of Polymerizable Epoxide Group Containing Oil Modified Alkyd and Formaldehyde Condensation Resins. M. Yusem (Bradley & Vrooman Co.). *U. S. 2,895,930.* An aqueous emulsion coating composition is prepared from compositions of the type described in U. S. 2,895,-929 and an etherified melamine- or urea-formaldehyde resin.

Certain Isophthalic and Orthophthalic Acid Alkyd Resins. M. J. Schlatter and F. G. Lum (California Research Corp.). *U. S. 2,895,932.* Oil modified alkyd resins are prepared from a fatty acid partial ester of a polyhydric alcohol and 5-*tert*-butyl isophthalic acid or 4-*tert*-butyl orthophthalic acid.

Rubber-Reactive Pigment and Drying Oil Protective Coating Compositions. W. E. Lox (Forman, Ford & Co.). *U. S. 2,901,447.* Natural or butadiene-styrene or butadiene-acrylonitrile rubber is mixed with a drying oil and a reactive pigment. The mixture is milled and cut back with mineral spirits and xylene.

Film-Forming and Drying Compositions. H. H. Beacham (National Lead Co.). *U. S. 2,901,450.* A paint is formulated from a conjugated drying oil, a titanium ester (a lower alkyl titanate or alkoxytitanium alkanoate) and an oil soluble resin (phenol-formaldehyde resin or dehydrated castor oil modified alkyd resin).

Coating Compositions. J. C. Cowan and H. M. Teeter (Secy. Agr., U.S.A.). *U. S. 2,901,469.* The film forming ingredients in a protective coating composition are homopolymers of the vinyl ethers of linolenyl alcohol, linoleyl alcohol, or the mixed polyunsaturated fatty alcohols obtained by the reduction of drying and semidrying vegetable oils.

Manufacturing Process for Synthetic Drying Oils. C. J. Marsel and J. Happel. *U. S. 2,902,457.* A drying oil composition of improved impact resistance is prepared by heating at 50° to 200° a mixture of a polymerizable acetylenic monomer (such as methyl divinyl acetylene or 2-methyl-5-hexene-3-yne-2-ol) with at least one naturally occurring drying oil or unsaturated fatty acids from such an oil.

• Detergents

What Detergent Marketers Should Know About Trends in Household Laundering. J. Alaback (Whirlpool Corp., St. Joseph, Mich.). *Soap, Chem. Specialties* 35(7), 54–5, 170–1 (1959). The need for detergent manufacturers to keep up to date on trends in appliance manufacture such as tumble-type washer-dryer combinations, automatic dispensing of washing additives, dishwashers, etc., is pointed out so they can plan products in line with these developments.

Electrical Conductivity of the System Soap-Water-Electrolyte in the Transition Area from Sol to Gel, and in the Reverse Process. I. Sodium Stearate-Water-Sodium Chloride. E. Angelescu and M. Radu. *Acad. rep. populare Romine, Studii cercetari chim.* 6, 403–15 (1958). The micellar structure of Na stearate in the presence of electrolyte and water was studied. The transition from sol to gel is characterized by a hysteresis of the electrical conductivity, as well as by the deviation from additive conductivity. Large negative values of the deviation were observed in the temperature ranges corresponding, respectively, to gel and to sol formation. The hysteresis values and the deviations from additive conductivity lead to the conclusion that the primary effect of the NaCl is to reduce the degree of dispersion of the systems by a diminution of the specific charge of the micelles. The effect of the electrolyte is minor at high temperatures but it is very pronounced in the sol-gel transition area. At low temperatures, when the stearate solution containing NaCl becomes a gel, the contribution of the soap to the electrical conductivity of the system approaches zero with increasing electrolyte concentration. Five tables, 16 references. (*C. A.* **53**, 13733)

BEHAVIOR OF BACTERIAL CELLS IN THE PRESENCE OF DETERGENTS, PARTICULARLY SODIUM DODECYL SULFATE. A. Bolle and E. Kellenberger (Univ. Geneva, Switz.). *Pharm. Acta Helv.* **33**, 379–90 (1958). A review of the action of detergents on bacterial cells is offered. The study indicates that gram-positive and gram-negative cells are killed by sodium dodecyl sulfate only in the presence of respiratory poison, i.e., 0.01 *M* KCN in the case of *Bacillus subtilis, Staphylococcus aureus, E. coli,* and *B. megaterium.* The dodecyl sulfate solution extracts the lipoproteins from the cell walls of *E. coli,* whereas the mucocomplexes of gram-positive and gram-negative organisms remain unaffected; cell walls of *B. megaterium* are completely lysed while those of *B. subtilis* remain intact. 40 references. (*C. A.* **53**, 12392)

SYNTHETIC DETERGENTS AND ECZEMATOUS HAND ERUPTIONS. E. H. Ferguson and S. Rothman (Univ. of Chicago). *A.M.A. Arch. Dermatol.* **80**, 300–10 (1959). An increase in eczematous dermatitis of the hands in females has been noted. At the present time, as a result of clinical studies, it is impossible to say whether the every day use of the new synthetic wash-day products is harmful to the hands or whether or not the new products are any worse or as bad as the old strong soaps. The synthetic detergent preparations as well as soap and water appear clinically to aggravate hand eczema, but so do many other factors.

RELATION OF WETTABILITY BY AQUEOUS SOLUTIONS TO THE SURFACE CONSTITUTION OF LOW-ENERGY SOLIDS. M. K. Gernett and W. A. Zisman (U. S. Naval Research Laboratory, Washington, D. C.). *J. Phys. Chem.* **63**, 1241–6 (1959). Contact angles of a variety of pure anionic, cationic, and nonionic surface-active agents in aqueous solutions of various concentrations were measured on smooth, clean surfaces of two low-energy solids, polyethylene and Teflon. Wettability curves were obtained for each solid surface by plotting the cosine of the contact angle versus the surface tension of each solution. The critical surface tension of each solid thus obtained agrees well with previous values established from studies with various pure organic liquids. Aqueous solutions whose surface tensions are lower than 30 dynes/cm. were found to spread on polyethylene, whereas no solution had a surface tension low enough to spread on Teflon. It is concluded that the minimum concentrations of the polar solute required to cause spreading on polyethylene and on Teflon are excellent indices of the effectiveness of the solute to function as a wetting agent. A reference standard for rating wetting effectiveness, which is less demanding than polyethylene, would be polystyrene or polyvinyl chloride.

SULFONATION WITH SULFUR TRIOXIDE: DERIVATIVES OF ACETALDEHYDE DISULFONATE. E. E. Gilbert, Catherine J. McGouch, and J. A. Otto (Allied Chem. Corp., Morristown, N. J.). *Ind. Eng. Chem.* **51**, 925–8 (1959). Acetaldehyde disulfonic acid (ADS), made from acetylene and sulfur trioxide, was converted to new derivatives. Various alkylbenzenes reacted at 1:2 mole ratio to yield surface-active agents. Phenols with one reactive position condensed at 1:2 molar ratio; others reacted at a lower maximum ratio forming polymers. Alkylated phenols gave surface-active compounds and chlorinated phenols formed materials with mothproofing and fungicidal activity. Ethanoldisulfonate resulted from treatment with formaldehyde in a crossed Canizzaro reaction.

COLORIMETRIC DETERMINATION OF SODIUM LAURYL SULFATE. H. D. Graham and R. McL. Whitney (Univ. of Ill., Urbana, Ill.). *Anal. Chem.* **31**, 1673–6 (1959). A quantitative method for the determination of sodium lauryl sulfate, capable of detecting as little as 4 p.p.m., involves the development of a color produced by the action of sodium lauryl sulfate upon the haloquinone of *o*-tolidine in a buffered system. The factors affecting the test, influence of the available chlorine level, concentration of *o*-tolidine, normality of the phosphate buffer, stability of the color developed, and time intervals between additions of ingredients have been thoroughly investigated. A general process for recovery of sodium lauryl sulfate from complexing systems has been suggested.

SOLUBILIZATION. R. Ruyssen (State Univ., Ghent, Belg.). *Chem. Weekblad* **54**, 681–6 (1958). A review with 26 references. (*C. A.* **53**, 10902)

ELECTRON MICROSCOPY OF SODIUM LAURATE. T. H. Shuttleworth and M. Camp. *Nature.* **183**, 535–6 (1959). The fine structure of Na laurate was investigated by high-resolution electron microscopy and electron diffraction. The structure of soap fibers seems to be different from that of soap crystals and agrees generally with that proposed by Bondi. (*C. A.* **53**, 16561)

THE COOLING OF HOUSEHOLD SOAPS. E. T. Webb. *Soap, Perfumery, Cosmetics.* 22, 477–81, 611–14, 705–7 (1959). Recently several new household soap cooling plants have been developed and marketed. They are capable of converting hot liquid neat soap as received from the soap pan into hard soap in the space of 30 minutes or so. These processes are the Lever Plodded Bar Process, the Mazzoni and the Meccaniche Moderne Processes and they are described and compared in detail.

PROCESS FOR WASHING AND BLEACHING COMPOSITIONS. K. Dithmar and U. Hoffmann (Deutsche Gold- und Silber- Scheideanstalt vormals Roessler). *U. S. 2,898,181.* It was found that the addition of amides such as acetamide, formamide or acrylamides to washing compositions containing organic surface active compounds and perborate bleaching agents improved these compositions so that they have good cleaning action and good bleaching action at lower temperatures than normal bleaching actions require.

SURFACE-ACTIVE SULFONATED PRODUCT. A. I. Rachlin (Allied Chemical Corp.). *U. S. 2,898,370.* The undesirable free sulfuric acid present in a higher alkylbenzene sulfonic acid which often causes detergent bars to become "frosty" or prevents preparation of highly concentrated aqueous solutions due to "salting-out" effect can be prevented by converting this excess to another organic sulfonic acid which is compatible with the higher alkylbenzene sulfonic acid instead of attempting to remove as inorganic sulfate.

METHOD OF CAUSTIC RECOVERY IN SOAP MANUFACTURE. R. V. Owen and N. A. Hurt (Lever Brothers Co.). *U. S. 2,899,450.* A process of neutralizing the free caustic alkali in spent lye from a soapmaking process is described in which a stream of the spent lye is mixed with a stream of fatty oil containing free fatty acid, if any, in an amount insufficient to neutralize all the free caustic alkali in the lye, and the resultant mixture is vigorously agitated, and the agitation is continued until all the free alkali has reacted with the glycerides in the fatty oil. Suitable amounts of soap may be added to aid the saponification by promoting more intimate contact between the reactants.

FOAMING DETERGENT COMPOSITIONS. F. M. Fowkes, W. M. Sawyer, and M. J. Schick (Shell Development Co.). *U. S. 2,900,346.* The foam stability of organic sulfate and sulfonated detergents of all kinds is improved by the addition of the monoethers of glycerol and monohydric aliphatic saturated alcohols having a linear hydrocarbon chain of eight to sixteen carbon atoms such as dodecyl glycerol monoethers having primary alkyl or secondary 2-alkyl groups attached to the ether oxygen atom.

IMPROVEMENTS IN AQUEOUS DETERGENT COMPOSITIONS. T. S. Massie (Chemical Developments of Canada, Ltd.). *Brit. 808,805.* The combination in certain proportions of sulfonated and sulfated detergents with a condensation product of a higher fatty alcohol with an alkylene oxide, preferably ethylene oxide, exhibits enhanced properties of detergency and foaming, shows a better balance of detersive and foaming properties than most known liquid detergent compositions.

DETERGENT COMPOSITION. Thomas Hedley & Co., Ltd. *Brit. 808,945.* A laundering agent possessing heavy-duty cleansing power with depressed sudsing action consists of anionic surface active agents and alkyl metal polyphosphate, and as a suds depressant, a synergistic mixture of fatty acids and/or their alkali metal soaps as "Hyfac 431," and a nonionic compound prepared from alkylphenol and polypropylene oxide and ethylene diamine such as "Pluronic F68."

DETERGENT COMPOSITIONS. Thomas Hedley & Co., Ltd. *Brit. 809,060.* The sudsing characteristics of detergent compositions containing sulfated and sulfonated anionic detergents when used at washing temperatures below 100°F. may be improved by the addition of various amides such as N-[3-bis(2-hydroxyethyl)-aminopropyl] lauramide, N-lauroyl-N-methyl glucamine or N-keryl-D-gluconamide.