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

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• Fats and Oils

Chromatographic separation of fatty acids based on chlorophenacyl esters. A. C. Kibrick and S. J. Skupp (Biochemistry Section, Laboratory Service, New York Veterans Administration Hospital, New York, N. Y.). *J. Anal. Chem.* **31**, 2057–60 (1959). 4′-*Bromo-2-chloroacetophenone* has been synthesized from acetyl chloride and monochlorobenzene. Esters of decanoic, lauric, myristic, palmitic, stearic, oleic, linoleic, and linolenic acids have been prepared with this reagent, and melting points and absorptivities at 257 mμ are reported. The separation of the eight fatty acid esters by chromatography on a column of polyethylene and celite and elution with various proportions of alcohol are presented.

Determination of hydroxyl value of alcohols by near-infrared spectroscopy. R. O. Crisler and A. M. Burrill (The Procter & Gamble Co., Cincinnati 31, Ohio). *Anal. Chem.* **31**, 2055–2057 (1959). The hydroxyl-stretching overtone band at 1.4 microns in the near-infrared region is used to determine hydroxyl values of aliphatic alcohols. Favorable results are indicated in comparison with the acetic anhydride-pyridine method. The method allows differentiation of hydroxyl types.

Evaluation of a commercial alkyl aryl sulfonate detergent as a column packing for gas chromatography. D. H. Desty and C. L. A. Harbourn (The British Petroleum Co., Ltd., Sunbury-on-Thames, Middlesex, England). *Anal. Chem.* **31**, 1965–1970 (1959). A solid anionic household detergent containing about 17% of an alkyl aryl sulfonate has wide application, especially for analysis at high operating temperatures.

Gas chromatography, guide to better extraction processes. G. W. Warren and R. R. Yarborough (Union Carbide Chemicals Co., South Charleston, W. Va.). *Ind. Eng. Chem.* **51**, 1475–6 (1959). Previous investigators have compared gas chromatographic separations to those obtained by conventional distillations. Gas chromatographic separations can be correlated only with extractive distillation separations. The ratio of partition coefficients obtained from the chromatographic data is compared to relative volatilities obtained from equilibrium still data.

Influence of acids and bases on the efficiency of inhibitors. K. U. Ingold and I. E. Puddington (Division of Applied Chemistry, National Research Council, Ottawa, Canada). *Ind. Eng. Chem.* **51**, 1319–24 (1959). The antioxidant efficiency of 2,4-dimethylaniline in white mineral oil can be increased by addition of the oil-soluble bases *N,N*-dimethylaniline and benzylamine. There is a synergistic effect between the inhibitors 1-naphthol and 2,4-dimethylaniline and *N*-phenyl-2-naphthylamine, the induction period for the mixed inhibitors being greater than the sum of the two individual induction periods at the same concentration. These two synergistic effects suggest new ways by which the antioxidant efficiency of other inhibitors might be improved.

Mass spectrometric analysis. Aromatic acids and esters. F. W. McLafferty and R. S. Gohlke. (Spectroscopy Laboratory, The Dow Chemical Co., Midland, Mich.). *Anal. Chem.* **31**, 2076–82 (1959). Correlation of the spectra of 50 aromatic acids and esters shows usefulness of the mass spectrometer in identification, structure determination, and analysis. A summary of some common major ions facilitates molecular structure determination.

Polarographic determination of aliphatic aldehydes and ketones as imines. M. E. Hall (The Chemstrand Corp., Decatur, Alabama). *Anal. Chem.* **31**, 2007–2009 (1959). Polarographic methods are used to determine aldehydes and ketones as imines. Diamines react with the carbonyl group to form imines. The imino group is reduced at the dropping mercury electrode. The imines of aldehydes and ketones reduce at different voltages.

Solvent effects in the spectrophotometric determination of weak organic acids in alkaline solution. E. Wawicki, T. R. Hauser, and T. W. Stanley. *Anal. Chem.* **31**, 2063–5 (1959). The effect of the solvent on the absorption maximum is studied in relation to the colorimetric determination of weak organic acids in alkaline solution. Certain organic solvents are classified according to wave length characteristic and intensity.

Vapor pressures of fatty oil solutions. Kazuhito Kusano. *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 8–14 (1959). The vapor pressures *(P)* were measured for solutions of soybean oil in *n*-hexane, benzene, or CCl_4 at various concentrations at 20–50° (at intervals of 5°). The results showed that there were negative deviations from the values expected from the Raoult rule on ideal solutions chiefly owing to the differences of molecular volume of soybean oil and that of the solvent (the latter being 1/7 to 1/10). There were straight line relations between log P and $1/T$, where T was absolute temperature.

Entropy of mixing fatty oil with solvents and the physicochemical properties of these systems. The systems of soybean oil-benzene and soybean oil-carbon tetrachloride. Kazuhito Kusano. *Ibid.* 15–21 (1959). The theory of E. A. Guggenheim (1944) was found applicable. When solvents were mixed with soybean oil, the main interaction between molecules of solvent and oil occurred in the alkyl part of oil and the solvent. The changes of energies and volume due to mixing were the functions of the number of contacts of both molecules, and the viscosity coefficients of the solutions could be calculated from the surface area fraction and the viscosity coefficient of the components. When soybean oil was mixed with benzene or CCl_4, about one-third and two-thirds of the alkyl group of oil was dispersed and contacted with the solvent. The free energy by mixing was due to entropy.

Volumes of mixing fatty oil with various solvents. Kazuhito Kusano (Miyazaki Univ.). *Yukagaku* (J. Japan Oil Chemists' Soc.) **7**, 400–6 (1958). Refined soybean oil was mixed with various solvents and the volume change due to mixing was calculated by measuring the densities of the soybean oil, the solvent, and the mixtures accurately. The value of volume change due to mixing was highest at about 1:1 mixture of oil and solvent. The volume increased by mixing in the case of CS_2, CH_2ClCH_2Cl, $CH_3COOC_2H_5$, cyclohexane, and benzene (in decreasing order), while the volume decreased by mixing in the case of acetone, $CHCl_2CHCl_2$, CCl_4, $CHCl:CCl_2$, $CHCl_3$, and *n*-hexane (in increasing order).

Heats of mixing fatty oil with various solvents. Kazuhito Kusano. *Ibid.* 406–14 (1958). The change of heat due to mixing soybean oil with solvents was measured at 30°. In general heat was absorbed in case of solvents where volume due to mixing increased, while heat was evolved in case of solvents where volume due to mixing decreased. Exceptions were *n*-hexane and acetone. The highest or lowest value of heat of the mixing was as follows (cal./g.): $CHCl_3$ +1.57, $CHCl:CCl_2$ +0.81, CCl_4 +0.20, C_6H_6 −0.36, *n*-hexane −0.48, cyclohexane −1.16, $ClCH_2CH_2Cl$ −0.86, $CH_3COOC_2H_5$ −1.04, CH_2 −1.16, and acetone −2.05.

Development of the theory of catalytic hydrogenation. Tominaga Keii (Tokyo Inst. Technol.). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 224–31 1959). A review with 37 references.

The studies on copper-nickel alloy catalysts. Toyosaburo Takeuchi (Toyama Univ.). *Ibid.* 231–6. A review with 31 references.

Production of higher fatty alcohols by the catalytic hydrogenation. Zen-ichi Miyagawa (Kaô Soap Co., Ltd., Tokyo). *Ibid.* 236–40. A review with 30 references.

Reduction of fats, oils, and esters with metallic sodium. Masatoshi Fukushima (Nippon Soda Co., Naka-Kubiki-gun, Niigata). *Ibid.* 240–9. A review with 77 references.

Patents on the hydrogenation catalysts. Shizuo Takumi (Nikki Chem. Co., Niitsu, Niigata). *Ibid.* 262–6. A list of 190 patents.

The relation between petroleum chemistry and fat chemistry. Ryohei Oda (Kyoto Univ.). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 307–10 (1959). A review.

Petroleum chemistry and paints. Saburo Toyota. *Ibid.* 323–7. A review.

Petroleum chemistry and synthetic glycerides. Nobuaki Wada (Ind. Research Inst. Osaka Pref.). *Ibid.* 327–33. A review with 33 references.

Vinyl compounds derived from fats. Teruzo Asahara and Keiryo Mitsuhashi (Univ. Tokyo). *Ibid.* 339–50. A review with 46 references.

Alkylene oxides and surface active agents. Osamu Nakahara (Daiichi Kôgyô Seiyaku Co., Ltd., Kyôto). *Ibid.* 361–8. A review with 20 references.

Alkylbenzenes and alkylphenols and their applications. Koichi Isoda (San-yô Yushi Kôgyô Co., Ltd., Kyôto). *Ibid.* 368–72. A review with 29 references.

Differential thermal analysis. Principles and applications in oil chemistry. Hirotaro Kambe (Univ. Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 267–72 (1959). A review with 16 references.

Radiochemistry of fats. Saburo Komori (Osaka Univ.). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 91–9 (1959). A review with 25 references.

Isolation and Estimation of Partially Hydrogenated Fatty Acids. K. Schilling (Danish Fat Research Inst., Copenhagen). *Fette Seifen Anstrichmittel* **61**, 765–768 (1959). The author describes a method based on countercurrent fractionation to separate sufficient quantities of the test substance for carrying out structural analyses. In order to increase the differences in solubilities of different unsaturated fatty acids they are converted into mercury salt adducts. The method makes it possible to separate the lower unsaturated fatty acids depending upon the degree of unsaturation and chain length. Configuration and positional isomerism seem to have little influence on the partial distribution. The quantitative determination of the fractions is done with the aid of dithizon.

Qualitative and Quantitative Analysis of Fatty Aldehydes with the Aid of Paper Chromatography. H. P. Kaufmann and H. Kirschnek (Deut. Inst. Fettforschung, Munster, Westf.). *Fette Seifen Anstrichmittel* **61**, 750–764 (1959). It has been possible to subject fatty aldehydes to paper chromatographic analysis after their conversion to 2,4-dinitrophenylhydrazones. The selection of stationary and mobile phases depends upon the chain length and the degree of unsaturation. The separation of the critical pairs and the estimation of unsaturated aldehydes is done through the formation of mercury salt adducts. Polarography has been used for the quantitative determination of small amounts of substances separated from paper chromatographically.

A Semi-Micro Method for the Colorimetric Determination of the Phosphorus Content in Lipids. I. Korpaczy (Inst. Food Research, Budapest). *Fette Seifen Anstrichmittel* **61**, 748–750 (1959). The author has improved upon Thaler's method for the determination of phosphorus content of lipids. He extracts the blue colored reaction product (from the reaction of silver molybdate and hydrazine sulphate) from the aqueous medium with *n*-butanol and measures it with the help of a spectrophotometer. The sensitivity of the method makes it possible to determine one microgram of phosphorus in one gram of fat.

Investigation of Fat Adulteration in Cacao Products. XI. A Critical Examination of the Common Methods Used for the Investigation of Cacao Butter and Chocolate Adulterants. A. Purr (Inst. Food Tech., Munich). *Fette Seifen Anstrichmittel* **61**, 675–682 (1959). The author describes five different methods for the analytical detection of adulterant fats in cacao butter. The limitations of the different methods require proper selection. The best methods for the detection of adulterant fats of the cacao fat group, of hydrogenated fats, of vegetable fats, and of fats hardened by physical methods of hardening are suggested.

Determination of Small Amounts of Adulterants of the Cacao Fat Group in Chocolates and Other Confectioneries by Paper Chromatography. E. Pietschmann (Chemical Research Inst., Nurmburg). *Fette Seifen Anstrichmittel* **61**, 682–686 (1959). The author enumerates different fat character stics which are important for the detection of adulterants in chocolates and other confectioneries. He describes in detail a paper chromatographic method based on the conversion of the fats into their corresponding hydroxamic acids and their subsequent separation into component acids.

Study of a Food Antioxidant. C. Pâquot and Mlle J. Mercier (Lab. Lipid Chemistry, C.N.R.S., Bellvue). *Oleagineux* **14**, 591–592 (1959). A study of the antioxidant properties of the tioxans was made using the ethyl esters of linseed oil as a test oil and carrying out the oxidation at 30°. A control consisting of linseed oil-ethyl esters gave a peroxide index (I.P.= millimoles of O_2 absorbed by a kg. of oil) of 20 after 16 hours and 100 at 100 hrs. The following measurements were taken and are respectively: concentration of antioxidant in percent; hours required to reach an I. P. of 20 and 100; organoleptic stability in hours; induction period in hours (using the accelerated stability test of Swift). Tioxan RC8, 0.03, 160, 240, 144, 190; Tioxan RC8, 0.05, 216, 372, 200, 322; Tioxan RC10, 0.03, 200, 320, 183, 270; Tioxan RC10, 0.05, 296, 470, 280, 420; α-tocopherol, 0.05, 160, 610, 144, 560; palmitoyl *d*-ascorbate 0.01, —, —, 1, 6; α-tocopherol 0.01, —, —, 99, 186.

Spreading Properties of Table Margarine. IV. Subjective Measurements of Spreading and Hardness. A. Uzzan and E. Sanbuc (I.T.E.R..G., Marseille). *Rev. Franc. Corps Gras* **6**, 531–537 (1959). Measurements of margarine spreadability and hardness preferences were carried out using the comparison of groups method. Cubes of margarine were held at 12.5, 17.5, and 22.5°, and compared as to hardness and spreadability in group panel tests. From the results obtained a coefficient of correlation between the subjective measurements and the ease of spreading and hardness of margarine has been calculated. The authors indicated that the coefficient so obtained indicated not only a measurement of spreadability and hardness but also that a sufficient distinction between the two properties could not be established. Results of this study are of value for calculation of coefficients of correlation in order to compare physical tests with subjective evaluations.

The polymorphism of di- and tetra-fatty acid esters of pentaerythritols. T. Malkin and A. Gupta (Dept. of Chem., Univ. of Bristol). *Fette Seifen Anstrichmittel* **61**, 868–871 (1959). The authors have investigated the polymorphism in case of the di- and tetra-esters of pentaerythritols by means of capillary melting point, heating and cooling curves, and x-ray diffraction techniques. Both groups of the esters show the monotropic polymorphism which is a type very similar to the 1,3-glycerides. They exist in three forms, α, β, and β′, and show an increase in melting points in the same order. Under specific conditions of cooling the molten tetra-ester gives a solid product which appears blue in reflected light but colorless in transmitted light.

Analytical determination of the stage of oxidation of olefinic fats. K. Taufel and R. Zimmermann (Deut. Akadamie der Wissenschaften). *Fette Seifen Anstrichmittel* **61**, 836–41 (1959). The autoxidation and subsequent reactions taking place simultaneously lead to the formation of hydroperoxides and their secondary products in the first stages of autoxidation. The authors applied the peroxide value on one hand and the benzidine and thiobarbituric acid reactions on the other hand for the analytical examination of the stage of autoxidation reached. During the autoxidation of some mono-unsaturated and saturated acids brought about by the UV-radiations, some products are formed whose absorption maxima correspond to those obtained in the case of some saturated aldehydes and with crotonaldehyde and acrolein. The investigations show that in case of edible fats possessing different acidities, the autoxidation provided by UV-radiations gives a steady increase in peroxide value as well as the intensity of color in case of the benzidine and thiobarbituric acid reactions.

Determination of structure and analysis of the hydroperoxide isomers of autoxidized methyl oleate. O. S. Privett and E. C. Nickell (The Hormel Inst., Univ. of Minn., Austin, Minn.). *Fette Seifen Anstrichmittel* **61**, 842–845 (1959). A procedure is described demonstrating the formation of four hydroperoxide isomers in the autoxidation of methyl oleate in accordance with the free radical chain reaction concept of autoxidation. Experimental proof is also given for the location of the hydroperoxide group in the alpha position relative to the double bond. New methodology is reported in the use of the Lindlar Catalyst for the quantitative estimation of peroxides. The quasi six-membered ring theory of oxidation as applied to the atmospheric oxidation of fats is shown to have no factual basis.

The occurrence of eicosatetraenoic, docosapentaenoic, and docosahexaenoic acids in fish oils. Y. Toyama, Y. Iwata, and K. Fujimura (Nagoya Univ., Nagoya, Japan). *Fette Seifen Anstrichmittel* **61**, 846–49 (1959). The authors have isolated eicosatetraenoic acid from sardine oil and docosapentaenoic acid and docosahexaenoic acid from the saury fish oil, in the form of their methyl esters. On the basis of ozonolysis the authors assign the following configuration to these acids: 5,8,11,14-tetra-eicosanoic acid, 4,7,10,13,16-docosapentaenoic acid, and 4,7,10,13,16,19-docosahexaenoic acid.

Quantitative paper chromatography of fatty acids. II. The photometric method. A. Seher (Deut. Inst. für Fettforschung, Munster, Westf.). *Fette Seifen Anstrichmittel* **61**, 55–59 (1959). The method for the quantitative evaluation of paper chromatograms, described in an earlier publication, has been put to a thorough theoretical and experimental investigation. The attention is drawn to the possible sources of error and the methods are suggested to avoid them.

Detection and quantitative determination of polyunsaturated fatty acids. T. Miyakawa (Osaka Industrial Research Inst., Osaka, Japan). *Fette Seifen Anstrichmittel* **61**, 850-55 (1959). The author has demonstrated that it is possible to determine quantitatively the polyunsaturated fatty acids through photometric evaluation of the paper chromatograms on which the fatty acids have been analyzed, using an undecane/acetonitrile: acetic acid system. The results obtained by this method are in agreement with those obtained through the lithium salt acetone fractionation method. Hydrogenation of the unsaturated fatty acid spots lead to further conclusions.

The influence of biuret on the formation of urea fatty acid adducts. R. Rigamonti and V. Riccio (Inst. Chem. Ind., Torino, Italy). *Fette Seifen Anstrichmittel* **61**, 864-867 (1959). The authors have investigated the various proportions of biuret-urea mixtures for the formation of urea fatty acid adducts. The general conclusions arrived at are that the addition of biuret reduces the yield of the addition compounds and that the crystals are smaller in size. The addition of biuret to urea however results in an increased formation of the adducts in the case of saturated fatty acids. The presence of biuret in the addition products can be proved qualitatively although the quantitative determination has not yet been possible.

Action of ionizing radiations on fat. I. Formation of peroxide during uv-radiation of fats. H. Kühn and H. Lück (Deut. Forschungsinstit. für Lebensmittelchemie, Munich). *Fette Seifen Anstrichmittel* **61**, 860–64 (1959). Ethyl oleate, olive oil, and lard have been exposed to the action of ultraviolet rays in the presence of air. Peroxide, acid, iodine, and hydroxyl values as well as spectroscopic determination of *trans*-isomerism were employed to follow the course of the reaction. The authors have discussed their results exhaustively.

Structure analysis of natural glycerides. P. Desnuelle and P. Savary (I.T.E.R.G., Marseille). *Fette Seifen Anstrichmittel* **61**, 871–76 (1959). The structure analysis of mixed natural glycerides leads to the following conclusions: The structure of animal and vagetable mixed glycerides is not random; the position of fatty acids in the glycerides appears to be dependent on the chain length of the saturated acids as well as the degree of unsaturation of the unsaturated acids. In vegetable oils the saturated acids occur mainly at the 1 and 3 positions and the unsaturated acids at the 2 position in the glyceride molecule. The principle of distribution is however not so rigid in the case of animal fats. The manner in which the location of fatty acid rests in the glyceride molecules affects the biological and physical properties of the glyceride is discussed.

Preparation of long chain fatty acids and 10-keto acids. F. L. Breusch, F. Baykut, and S. Ozeris (Chem. Inst. Univ. Istambul). *Fette Seifen Anstrichmittel* **61**, 891–93 (1959). The 10-keto fatty acids with 24, 25, 26, 27, and 28 carbon atoms have not until now been completely described. They have been prepared through the condensation of sebacyl chloride monomethyl esters with *n*-alkyl iodides in the presence of a Cu-Zn reagent. The *n*-fatty acids which are otherwise difficult to obtain have been prepared by the Clemmensen reduction of the keto acid.

Analysis of lipids with the help of the radio reagent method. L. K. Mangold (Hormel Inst., Univ. of Minn., Austin, Minn.). *Fette Seifen Anstrichmittel* **61**, 877–81 (1959). Mixtures of lipids can be analyzed with the help of a radio reagent method. Fatty acids can be esterified with radioactive diazomethane and lipids containing amino or hydroxy groups can be acetylated with radioactive acetylation mixtures. The author describes in detail the reaction conditions for the separation of the lipid derivatives and gives an example of the application of the radio reagent method and working details of the chromatographic analysis procedure.

Column chromatography of lipids: odd numbered straight chain fatty acids of menhaden oil. Joanne L. Hellerman and H. Schlenk (Hormel Inst., Univ. of Minn.). *Experientia* **15**, 387–388 (1959). The occurrence of normal C_{13}, C_{15}, C_{17}, and C_{19} carboxylic acids in menhaden oil was determined using paper chromatography in an acetic acid/peracetic acid system with silicone treated paper, at 30°. The acids were isolated by column chromatography using silicone treated columns and acetonitrile as the developing agent.

Eighteen carbon polyhydroxy fatty acids and aldehydes. H. P. Kaufmann and H. Jansen (Deut. Inst. für Fettforschung). *Chem. Ber.* **92**, 2789–97 (1959). Polyhydroxy fatty acids were prepared from the corresponding conjugated fatty acids by osmium tetroxide oxidation. These products gave with aldehydes and ketones the corresponding substituted 1,3-dioxolane fatty acids. Simple hydroxylated fat aldehydes were prepared from the diazoketones according to the Grundamann synthesis. If the hydrazide of a polyhydroxy acid is condensed with acetyl acetone, an acetylated 3,5-dimethylpyrazolene results which when hydrogenolyzed yields the polyhydroxy fatty aldehyde.

Alkali fusion of unsaturated fatty acids. A. V. Roncero, F. R. Ayerbe, and M. A. Romero (Fat Inst. Seville, Spain). *Fette Seifen Anstrichmittel* **61**, 900–904 (1959). The alkali fusion of oleic acid gives rise to palmitic acid, acetic acid, and hydrogen as the products of the reaction. The investigations on Varrentrapps Reaction shows that in polyunsaturated fatty acids, alkali fusion gives rise to as many molecules of acetic acid as the number of double bonds in the reacting acids may be. Linoleic and linolenic acids yield two molecules of acetic acid and myristic acid, and three molecules of acetic and lauric acids, respectively. The authors also point out the economic potentialities of the reaction for the manufacture of short chain fatty acids.

Application of molecular distillation to the determination of the fatty acid composition of Crambe Abyssinica seed oil. H. Niewiandomski, B. Drozdowski, and W. Zwierzykowski (Inst. of Fat Technology, Gdansk Technical Institute, Poland) *Fette Seifen Anstrichmittel* **61**, 897–99 (1959). The authors have studied and reported the physical and chemical properties of the Crambe Abyssinica seed oil and its fatty acids. After a preliminary fractionation of the fatty acids with the help of molecular distillation, they were subjected to polarographic-paper-chromatographic analysis in order to determine the fatty acid composition, qualitatively as well as quantitatively. The fatty acid composition was found to be as follows: myristic, 4.7%: palmitic, 9.7%; arachidic, 2.7%; behenic, 0.1%; oleic, 18.7%; linoleic, 12.7%; and erucic, 51.4%.

Isolation and determination methods for brain cerebrosides, hydroxy fatty acids, and unsaturated and saturated fatty acids. Yasuo Kishimoto and Norman S. Radin (Biochem. Dept., Northwestern Univ. Medical School, Chicago). *J. Lipid Research* **I**, 72–78 (1959). A new method is described for the isolation of nearly pure total cerebrosides from the fresh brain. Florisil columns are used to separate the cerebroside hydroxy and normal acids, in the form of their esters, and to separate the saturated and unsaturated esters of each group. The esters within each group are determined by gas chromatography, the hydroxyesters being run as the methyl esters. Yields in the various steps are close to theoretical. The presence of lower homologues in all four classes of rat brain cerebroside acids was discovered. Particularly large amounts of C_{23} and C_{22} saturated acids were found.

Determination of Tocopherols in Plant Oils. V. A. Devyatnin and I. A. Solunina. *Med. Prom. S.S.S.R.* **13**(2), 38–42 (1959). A method of determination of α-tocopherol and self-nitrating tocopherols from the same extracts was developed. The method is given in detail. (*C. A.* **53**, 19412)

The Effect of Air, Temperature, and Storage Time on the Peroxide Content in Unsaturated Fat Acids. C. Pietrzyk. *Rocznidi Technol. i Chem. Zywnosci* **3**, 77–91 (1958). The content of active oxygen in the process of autoxidation is a function of peroxide production and utilization. It depends on the type of fatty acid, air access, temperature, and time of storage. A straight-line relation exists between the logarithms of the time of maximum peroxide content and temperature and also between the logarithm of time of maximum rate of peroxide formation and temperature of storage. (*C. A.* **53**, 19412)

Component Fatty Acids of the Seed Fat of Albizzia Lebbek. A. Sen Gupta and M. M. Chakrabarty (Univ. Calcutta). *Indian J. Appl. Chem.* **21**, 227–9 (1958). The composition of the seed fat of *Albizzia lebbek* grown in the desert area of Rajasthan (saponification equivalent 290.2, iodine value 114.3, unsaponifiable content 1.6%, $n^{40/D}$ 1.4683) was linolenic 1.5, linoleic 57.6, oleic 10.3, and saturated acids 30.6%. (*C. A.* **53**, 19411)

Distillation of Fatty Acids at the Volgodon Combine for Synthetic Fat Substitutes. G. B. Al'terman and M. G. Morkovin. *Masloboĭno-Zhirovaya Prom.* **25**(6), 38–43 (1959). The process for distillation of fatty acids is described, with diagrams. (*C. A.* **53**, 19411)

Recent Work of the Institut des Corps Gras, Paris, on the Recovery of Sterols from Refinery Waste Products. J. P. Sisley and A. Uzzan. *Grasas y aceites* (Seville, Spain) **9**, 310–15 (1958). A review with 7 references. (*C. A.* **53**, 19411)

Mode of Action of Natural Antioxidants of Fats. K. Täufel, Cl. Franzke, and G. Gehlert (Humbolde Univ., Berlin). *Nahrung* **2**, 853–67 (1958). The antioxidant effects of the nonsaponifiable fractions of rapeseed and sunflower oils were probably due to tocopherol. (*C. A.* **53**, 19411)

A New Laboratory Apparatus for the Oil and Fat Industries. G. B. Martinenghi. *Olearia* **13**, 114–17 (1959). An especially designed laboratory-scale apparatus for decolorizing, esterifying, deodorizing, and distilling oils and fats in the process of refining is described. (*C. A.* **53**, 19411)

Saponification Color Value of Animal Fats. A. Mirna (Bundesforschungsanstalt Fleischwirtschaft, Kulmbach, Ger.). *Fleischwortschaft* **11**, 669–712 (1959). The increases in saponification value and peroxide value during saponification of fat are closely related to the unsaturated character of the fat. Mono-unsaturated fatty acids behave differently from multi-unsaturated fatty acids. Treatment with bleaching earths reduces peroxide value more intensely than saponification value. Saponification color values markedly above 0.10 with low peroxide value (below 4.0) indicate unaccepted methods of treatment. (*C. A.* **53**, 19411)

Determination of the Iodine Value of Fats in Aqueous Medium Without Emulsifiers. P. P. Suprun (Control Anal. Lab., Konotop). *Aptechnoe Delo* **7**(3), 48–51 (1958). Place 0.15–0.25 g. of fat of iodine number up to 130, or 0.05–0.08 g. of iodine number over 130, in a glass-stoppered flask of 300–500 cc. capacity; add 100 cc. hot water (80°) and 25 cc. 0.1 normal ICl.HCl, carefully stir for 10–15 minutes, depending on the iodine number; cool, add 15 cc. 10% KI, and titrate the liberated iodine in the usual way. (C. A. **53**, 19411)

Two-Step Neutralization of Peanut Oil. M. Naudet, J. C. Drap, and S. Bonjour. *Grasas y aceites* (Seville, Spain) **9**, 292-5 (1958). (*C. A.* **53**, 19415)

Spectrophotometric Examination of Olive Oils. A. Fabbietti. *Boll. lab. chim. Provinciali* (Bologna) **9**, 287–96 (1958). Extinction coefficients *E* at 8 wave lengths are determined for olive oils subjected to Liebermann's reaction. The quality and purity of the olive oil is determined by the value of E_{460}/E_{365}. (*C. A.* **53**, 19414)

Rhodonation of Oleic and Elaidic Acids and Their Esters. L. A. Zhila. *Pratsi Odes'k. Derzhav. Univ. im. I. I. Mechnikova, Prirodnichi Nauki* **148**(3), 161–6 (1958). The rhodonation rates for oleic acid and its esters were much higher than for elaidic acid and its esters. Rates for esters were lower than for acids. Chain lengthening of alcohol radicals and their branching reduced reaction rates of esters in *cis* forms stronger than in *trans*. (*C. A.* **53**, 18852)

Decomposition of Peroxides in Fats with Particular Reference to Those in Saury Oil. Hisashi Watanabe and Yoshiyuki Toyama. *Mem. Fac. Eng., Nagoya Univ.* **10**, 95–104 (1958). Peroxides in oxidized marine animal oils decompose more readily than do those of vegetable oils. Rate of decomposition of peroxides in vegetable oils is not alike for all samples. Peroxides in a viscous oxidatively polymerized vegetable oil decompose more rapidly than do peroxides in less deteriorated oil. The addition of 10% of a highly unsaturated methyl ester prepared from unoxidized saury oil to oxidized vegetable oils tends to accelerate the decomposition of peroxides. The addition of 0.2% pro-oxidants (copper or iron soaps) to oxidized saury oil markedly accelerates the peroxide's decomposition. The addition of 0.01–0.06% antioxidants, such as nordihydroguaiaretic acid, butylated hydroxyanisole, and propyl gallate to oxidized saury oil does not noticeably affect the decomposition of peroxides. With a combination of pro- and antioxidants in the oxidized saury oil, the accelerating effect of pro-oxidants on the peroxide's decomposition is not suppressed. The over-all decomposition of peroxides in oxidized saury oil is allied to a 1st-order type rather than a 2nd-order type. (*C. A.* **53**, 19409)

Chemical Determination of the Methylamide of O,O-Dimethyl Dithiophosphorylacetic Acid in Olive Oil. B. Bazzi and R. Santi (Ist. Ricerche Agr. Soc. Montecatini, Florence). *Olivicoltura* **1958**(4), 1–4. The title substance is the active principle of a commercial insecticide. It is extracted from the oil by ethanol, chloroform, and saturated aqueous sodium chloride. The colorimetric determination is made from the chloroform solution. The method does not produce a chemical transformation in the insecticide. (*C. A.* **53**, 19414)

Color Determination of Olive Oils. J. M. R. de la Borbolla y Alcalá, R. de Castro Ramos, and R. Vazquez Ladrón (Inst. Grasa y sus Derivados, Seville, Spain). *Grasas y aceites* (Seville, Spain) **9**, 302–5 (1958). A colorimeter using 2 filters having transmittance between 400 and 700 mμ is used to measure the color of olive oil. The 2-filter system characterizes the oils as well as does the complete absorption spectrum determined with a spectrophotometer. Other color methods are discussed. (*C. A.* **53**, 19414)

Fatty Oils Contained in the Seeds of Some Species of Malva. V. M. Shelud'ko and N. G. Goĭkhman (Pharm. Inst., Odessa). *Nekotorye Voprosy Farmatsii, Sbornik Nauch. Trudov Vyssh. Farm Ucheb. Zavedeniĭ Ukr. S. S. R.* **1956**, 190–2. The following constants (density, index of refraction, saponification number, iodine number, Reichert-Meissl number, % unsaponifiable residue) were determined, respectively, for fatty oils of: *Malva sylvestris* 0.992, 1.4722, 181.5, 107.6, 4.4, 0.28: *M. neglecta* 0.929, 1.4728, 182.1, 103.5, 1.9, 0.37; *M. moschata* 0.928, 1.4726, 180.2, 107.8, 3.3, 0.36; *M. meluca* 0.928, 1.4726, 178.3, 108.7, 2.8, 0.28. The last 3 may be classified as drying oils, the first as a semi-drying oil. These may be used like linseed oil in pharmaceutical practice. (*C. A.* **53**, 19414)

Utilization of Cottonseed Oil Refining Foots. K. T. Achaya, B. Bhushan, and S. R. Rao (Regional Research Lab., Hyderabad). *Papers Symposium Cottonseed and By-Products, Hyderabad India*, Sect. VI, **1958**, 40–50. Results are reported on the potential uses of Indian cottonseed oil foots, such as recovery of fatty acids by distillation and urea-adduct methods. Experiments are described on the pyrolysis of foots with the aim of obtaining synthetic liquid fuel. (*C. A.* **53**, 19414)

World Cottonseed and Oil. A. Ferrara. *Olearia* **13**, 73–85 (1959). The origin, world production, and use of cottonseed and oil are discussed. Comparative figures are given for the U. S., South America, Asia, Russia, Africa, Europe, and Oceania. (*C. A.* **53**, 19413)

Solvent Fractionation of Dehydrated Castor Oil. V. R. Ambekar and K. K. Dole (Fergusson Coll., Poona). *Indian J. Appl. Chem.* **21**, 193–8 (1958). Dehydrated castor oil was fractionated by isopropyl alcohol into 3 fractions. Fraction 1 contains polymerized castor oil; fraction 2 contains a mixture of semi-polymerized and monomeric castor oil; both produce tack-free films superior to films obtained from castor oil. Fraction 3 contains partially hydrolyzed glycerides, free fatty acids, undehydrated castor oil, and decomposition products having low molecular weights; its films show after-tack and dry slowly. Dehydration in the presence of 0.2% anthraquinone-1:8-disulfonic acid at 250° for 20 minutes yielded the lowest amount of fraction 3. (*C. A.* **53**, 19413)

Seed Oils. Yoshito Koyama, Tadayoshi Hisatsune, Hisashi Watanabe, and Yoshiyuki Toyama. *Mem. Fac. Eng., Nagoya Univ.* **10**, 88–94 (1958). Seed oils from *Viburnum odoratissimum, Elaeagnus umbellata, Eurya japonica, Cleyera ochnacea, Ampelopsis heterophylla, Cissus japonica, Parthenocissus tricuspidata, Acer ginnale, Acer trifidum, Euphorbia heterophylla, Amelanchier asiatica, Kadsura japonica, Celtis sinensis* variety *Japonica, Alnus firma*, and *Alnus multimervis* were studied. Linoleic acid is present in each of the oils and linolenic acid in *E. umbellata, A. ginnale, A. trifidum*, and *E. heterophylla* oils. The unsaponifiable matter from *K. japonica* was almost completely soluble in cold methanol, without yielding a crystalline solid. (*C. A.* **53**, 19412)

The Hydroxyl Number of Castor Oil. M. Naudet and M. J. Perrot (Natl. Lab. Oils and Fats, Marseille, France). *Peintures, pigments, vernis* **35**, 239–41 (1959). The quality of dehydrated castor oil is a function of the hydroxyl number of the original castor oil. Improper refining methods of the castor oil may lead to low hydroxyl numbers. Laboratory tests indicate that countercurrent extraction with petroleum ether yields the desirable increase in hydroxyl numbers of 8–10 points. (*C. A.* **53**, 19412)

Behavior of Fatty Oils During Sterilization. Cl. Franzke (Humboldt Univ., Berlin). *Deut. Apoth.-Ztg.* **97**, 465–6(1957).

No chemical changes occur during normal sterilizing. Fatty oils are affected only on prolonged heating at 200°. (*C. A.* **53**, 19412)

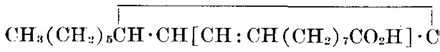
REFINING OF VEGETABLE OILS WITH UREA. T. N. Metha and M. S. Murty (Univ. Nagpur, India). *Grasas y aceites* (Seville, Spain) **9**, 316–17 (1958). Acidic components (fatty acids) and mono- and diglycerides formed during storage of raw oils are removed by treatment with urea moistened with water. More than the theoretical amount of urea is required, and the ratio of urea to water is 2:1. The mixture becomes an emulsion which can be broken by centrifuging. (*C. A.* **53**, 19412)

DEODORIZATION OF OILS IN THE PILOT PLANT OF THE INSTITUTO DE LA GRASA. F. Ramos Ayerbes (Inst. Grasa y sus Derivados, Seville). *Grasas y aceites* (Seville, Spain) **9**, 318–21 (1958). The energy consumption for deodorizing oils in a pilot plant is measured. (*C. A.* **53**, 19412)

CATALYST STUDIES OF VAPOR PHASE ESTERIFICATION OF OCTYL ALCOHOL AND ACETIC ACID. Y. Venkatesham (Ohio State Univ., Columbus). *Univ. Microfilms* (Ann Arbor, Mich.). *L. C. Card* No. **Mic. 59-2330**, 174 pp.; *Dissertation Abstr.* **20**, 240–1 (1959). (C. A. 53, 19857)

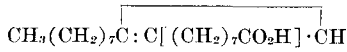
WAX OF THE LEAVES OF PICEA PUNGENS (COLORADO SPRUCE). E. v. Rudloff (Natl. Research Council, Can., Saskatoon). *Can. J. Chem.* **37**, 1038–42 (1959). The chloroform soluble neutral wax isolated from the leaves of *Picea pungens* was shown to contain sabinic, 14-hydroxytetradecanoic, and juniperic acids with minor amounts of nonsaponifiable substances and *n*-fatty acids. Infrared spectra of the neutral wax showed no free hydroxyl groups and it was suggested that the neutral wax was composed mainly of a cyclic polymer of the ω-hydroxy acids and that the seasonal changes in acidity were caused by ring opening or closure. Since the 1,14-tetradecanolide had a musk-like odor, it could be used for production of compounds having such odor. (*C. A.* **53**, 19862)

APPLICATIONS OF PROTON MAGNETIC RESONANCE SPECTRA IN FATTY ACID CHEMISTRY. C. Y. Hopkins and H. J. Bernstein, *Can. J. Phys.* **37**, 775–82 (1959). Introductory study of fatty acids, their esters, and glyceride oils indicates that structural questions can be solved by use of nuclear magnetic resonance (NMR). Spectra obtained for chloroform solutions permit the identification of terminal methyl, CH_2, C:C, OH, divinylmethane, and other groups with characteristic proton configurations. The keto and enol forms of diketones can be differentiated by NMR. On the basis of its NMR spectrum the formula



$$CH_3(CH_2)_5CH\cdot CH[CH:CH(CH_2)_7CO_2H]\cdot CH_2$$

for sterculic acid is judged incorrect, and the formula



$$CH_3(CH_2)_7C:C[(CH_2)_7CO_2H]\cdot CH_2$$

is favored, but not positively proved. (*C. A.* **53**, 19918)

LENTISCUS OIL AS DETECTOR OF OLIVE HUSK OIL. G. Condroelli (Univ. Catania, Sicily). *Boll. informaz. ind. olearia e saponiera* **4**, 119-20 (1958). Lentiscus oil is proposed instead of cottonseed oil as an additive to olive husk oil because of the easy and sensitive chromatographic reaction for determining lentiscus oil in a commercial mixture, and of the similarity between olive oil and lentiscus oil. (*C.A.* **53**, 20605)

DETECTION OF ANTIOXIDANTS IN LARD, ESPECIALLY OF BUTYLHYDROXYANISOLE (BHA). J. B. Roos. *Fleischwirtschaft* **11**, 667–8 (1959). The occurrence of antioxidants is detected either by the phosphomolybdic acid or open-dish test. A more precise test for BHA is achieved by inactivating other antioxidants with active carbon followed by a determination with phosphomolybdic acid. Other methods are mentioned. (*C. A.* **58**, 20604)

CHOLESTEROL IN MILK. F. Kayser and D. Tachkova. *Congr. soc. pharm. France, 9^e^, Clermont-Ferrand* **1957**, 135–8. A liter of cow milk contains about 170 mg. cholesterol of which 119 are found in the cream and 16 in the casein (average content 0.55 mg./g.). (*C. A.* **53**, 20602)

CHEMICAL COMPOSITION OF THE FATTY OIL OF THE FRUIT OF PIMPINELLA ANTISETUM. Yu. G. Borisyuk and G. V. Makarova (Pharm. Inst., Kharkov). *Nekotorye Voprosy Farm., Sbornik Nauch. Trudov Vyssh. Farm. Ucheb. Zavedenii Ukr. S.S.R.* **1956**, 179–84. The fruit of *Pimpinella anisetum* contains 8.2% fatty oil, the glycerides of which contain oleic 61, petroselinic 26, linoleic 9.6, and palmitic acids 3.4%. Except for differences in the amounts of aliphatic acids this oil is similar to coriander oil, and the solid part of the oil may be usable as cacao oil substitute in pharmaceutical practice. (*C. A.* **53**, 20844)

CHROMATOGRAPHIC ISOLATION OF SISTOSTEROL FROM COTTONSEED OIL. A. L. Markman and A. U. Umarov. *Uzbek. Khim. Zhur., Akad. Nauk Uzbek. S.S.R.* **1959**, No. 1, 63–5. Two kg. of cottonseed oil was dissolved in 20 liters of ether and passed through aluminum oxide columns. The unadsorbed fraction was a colorless oil. Elution with ether yielded an orange oily substance from which 9.3 g. (0.47%) of sistosterol was extracted with methanol. Distillation of the methanol-insolubles gave a crystalline solid. (*C. A.* **53**, 20843)

CHEMICAL EXAMINATION OF THE OIL FROM THE SEEDS OF CITRULLUS FISTULOSUS. S. R. Agarwal, D. R. Dhingra, and G. N. Gupta (Muslim Univ., Aligarh). *Indian Soap J.* **24**, 257–60 (1959). Extraction of the powdered seeds 4 times with petroleum ether gave 25.39% of a clear light yellow oil having the following characteristics: d_{20} 0.9146, $n^{20/D}$ 1.4704, acid value 9.2, iodine value 120.15, saponification value 181.4, acetyl value 11.09, diene value 6.55, Hehner value 94.8, and unsaponifiable 1.91%. The fatty acids in the oil were myristic 0.64, palmitic 5.66, stearic 12.50, oleic 33.89, and linolenic 47.31%. The unsaponifiable matter contained sitosterol and a yellowish gummy substance. (*C. A.* **53**, 20843)

INCREASE IN THE STABILITY OF REFINED VEGETABLE OILS BY THE USE OF ANTIOXIDANTS. Z. K. Levedeva. *Masloboino-Zhirovaya Prom.* **25**(7), 24-8 (1959). Sunflower and cottonseed oils were effectively stabilized against oxidative deterioration at 90° by propyl gallate (0.01%), or dibutylmethylphenol (0.01%) and citric acid (0.002%) as a synergist. Other suitable antioxidants are betaine hydrochloride (0.05%) and ascorbyl palmitate (0.02%). In contrast to this, butylated hydroxyanisole (0.02%) and tocopherols (0.05%) caused a slight destabilization of sunflower and cottonseed oils. (*C. A.* **53**, 20842)

SCOPE FOR THE UTILIZATION OF NONEDIBLE OILS IN INDIA. T. V. Subba Rao (Tata Oil Mills Co., Bombay). *Indian Soap J.* **24**, 71–91 (1958). (*C. A.* **53**, 20842)

MICRODETERMINATION OF CITRIC ACID IN OILS AND FATS. Shinroku Masuyama (Municipal Ind. Research Inst., Osaka). *Kagaku to Kôgyô* (Osaka) **33**, 224–6 (1959). A colorimetric method was developed for determining citric acid in oils or fats. (*C. A.* **53**, 20841)

SEPARATION OF FATTY ACIDS WITH FRACTIONAL DISTILLATION. J. Perédi (Növényolaj és Háztartási Vegyipari Kutató Intézet, Budapest). *Élelmezési Ipar* **11**, 189–94 (1957). Relative evaporation, equilibrium curves, number of plates, and reflux ratio for the separation of fatty acids by fractional distillation were determined. A 20-plate laboratory fractionating column was constructed on the basis of these data. Fatty acid mixtures (coconut oil, rice oil, and hardened sunflower oil) were separated and the results are given. (*C. A.* **53**, 20841)

DETERIORATION OF FATS; ANTIOXIDANTS USED IN THE FOOD INDUSTRY. J. Perédi (Növényolaj és Háztartási Vegyipari Kutató Intézet, Budapest). *Élelmezési Ipar* **12**, 97–103 (1958). A review with 34 references. (*C. A.* **53**, 20841)

DEVELOPMENT OF NONEDIBLE FATS FOR EDIBLE PURPOSES. M. Chakrabarty, M. K. Chakarabarty, and N. K. Sen (Univ. Calcutta). *Indian Soap J.* **24**, 283–7 (1959). A review of chemical methods and economics. (*C. A.* **53**, 20841)

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF THE FATTY ACID COMPOSITION IN OIL FROM SEEDS OF ULMUS. Ib Sørensen and P. Søltoft (Dan. tekn. Højskole, Copenhagen). *Acta Chem. Scand.* **12**, 814–22 (1958). The seeds from various Ulmus spp. on crushing and petroleum ether extraction gave a mixture of fatty acids having the composition C_8 3.6, C_{10} 65.2, C_{12} 4.7, C_{14} 3.4, C_{16} 6.4, and C_{18} 16.7%, fully confirming the literature that a high C_{10} fatty acid content is particularly characteristic of elm seed oil. The fatty acid composition was determined by low-pressure gas-liquid chromatography of methyl esters. (*C. A.* **53**, 20845)

ABSOLUTE CONFIGURATION OF C-(24) ETHYL OF STIGMASTEROL. K. Tsuda (Univ. of Tokyo), R. Hayatsu, and Y. Kishida (Sankyo Co., Ltd., Shinagawa, Tokyo). *Chem. & Ind.* **1959**, 1411–2. It is concluded that the C-(24) ethyl group of stigmasterol is of the alpha configuration when it is expressed in Plattner's convention.

FREE-FATTY-ACID CONTENT AND THE SMOKE POINT OF SOME FATS. Belle Lowe, Sarala Pradham, and J. Kastelic (Iowa State Univ., Ames). *J. Home Econ.* **51**, 778–9 (1958). Various fats were used, in 2100-g. amounts, for frying doughnuts at 185°. Following the frying, the heating of the fats was continued until a 540-minute period had elapsed since the heating began. A relation was observed between the initial free fatty acid content and the smoking point of the fat, the fats with higher amounts of free fatty acid having the lower smoking points. (*C. A.* 53, 22587)

Decoloration of rape oil. III. Brown pigments. Etsuji Yuki and Chuta Hata (Hiroshima Food Ind. Expt. Sta.). *Nôsan Kakô Gyûtsu Kenkyû Kaishi* 6, 48–50 (1959). Brown pigments in rape oil were composed of the following components: (1) iron salts of fatty acids, (2) colored oxidized fatty acid, (3) water-insoluble, nitrogen-containing colored substance, (4) water-soluble, nitrogen-containing colored substance. The last seems to be an aldehyde-amine condensed substance. (*C. A.* 53, 22587)

Spectrophotometry of the edible oils. II. F. D. Francesco. *Olii minerali, grassi e saponi, colori e vernici* 36, 73–6 (1959); cf. *Boll lab. chim. provinciali* 9, 76–89 (1958). The fluorescence diagrams obtained in the examination of several oils are discussed. (*C. A.* 53, 22587)

Analytical study of edible oils used in Spain, 1955–56. R. Fuente and R. García Olmedo (Univ. Madrid). *Anales bromatol.* (Madrid) 11, 213–43 (1959). The chemical and physical constants of olive oil of various origins, cottonseed oil, pork fat, and butter are determined. (*C. A.* 53, 22587)

Changes in stability of oil during deep-fat frying. Yoshiko Yamamoto, Futara Ono, and Kimi Tanaka. *Kaseigaku Zasshi* 10, 57–60 (1959). Changes in iodine, peroxide, and acid values were studied during deep-fat frying of fish meats and vegetables. (*C. A.* 53, 22587)

The cause of deterioration and the mechanical protection of fats from environmental factors. A. Purenas, J. Venskevičius, and L. Bernatoniene (Kauno Politech, Inst., Kaurnas, Lithuania). *Kauno Politech. Inst. Darbai* 9, 19–24 (1958) (Russian summary). Under identical packaging and storage conditions, tallow oxidized faster than lard. The oxidation of fats packaged in casein-enamelled wooden boxes proceeded slightly faster than in tin-coated metal cans. (*C. A.* 53, 22586)

Effect of lipides on lipoprotein formation during doughing of flour. Hiromu Kisaki (Doshisha Women's Coll.). *Doshisha Joshidaigaku* 8, 79–92 (1957). The addition of soybean oil to flour made the amount of extractable gluten and also the amount of glutenin increase; this might be due to the formation of lipoprotein with protein and oil, while this effect was only observed by the addition of oil below 10% against flour. The addition of lecithin and some detergent to flour also increased the gluten yield. (*C. A.* 53, 22561)

Phosphatidic acids. IV. Anna Candela and G. Jacini (Staz. sper. olii e grassi, Milan). *Olii minerali, grassi e saponi, colori e vernici* 36, 110–13 (1959). The methods of Baer and of Verkade for the preparation of dipalmitoylphosphatidic acid are modified in order to obtain greater yields. The phosphatidic acids from soybean and linseed oils were extracted, and the antioxidizing power of the phospholipides was determined. (*C. A.* 53, 23009)

Fatty acids components of glycerides in the distillate from the molecular distillation of shark liver oils. Seiichi Ishikawa and Atsuko Kojima (Jissen Women's Coll.). *Jissen Joshidaigaku Kiyo* 5, 1–4 (1958). Myristic, palmitic, and stearic acids, as saturated fatty acid components, and oleic, zoömalic ($C_{16}H_{30}O_2$), and shark oleic acids, as unsaturated acds, were identified in the fatty acids mixture of the distillate of shark liver oil by molecular distillation. (*C. A.* 53, 23008)

Processing sunflower seed and soybeans by a single-stage pressing and an uninterrupted extraction. M. A. Minasyan and E. Z. Plyushkin. *Masloboino Zhirovaya Prom.* 1954(5), 29–31. The kernel (with a husk of 1.7–3.9%) is ground and roasted; the pulp (with a moisture of 4.5–5.5%) is pressed at 100–105° at 12 revolutions per minute. The yield of oil is 83.8%. The oil cake is ground; the ground cake, with a moisture of 5.5–7% and an oil content of 13–14%, is extracted at a rate of 6–7 cu. m./hour; the concentration of ligroine in the outgoing solution is 10–11%. The amount of sediment is small, and the consumption of ligroine is 7.1 kg./ton of seed. The oil content of the residual oil cake is 0.46–0.56%, but the oil content of the first oil cake after pressing is 9.06–9.75%. This method provides better results than the method of a 2-fold pressing and a 1-stage extraction. (*C. A.* 53, 23007)

Chromatography of soybean phospholipides soluble in alcohol. G. De Zotti (Staz. sper. olii e grassi, Milan). *Olii minerali, grassi e saponi, colori e vernici* 36, 114–17 (1959). The mixture of phospholipides obtained from the soybean oil by precipitation with acetone and extraction with absolute ethanol was chromatographed on a column of cellulose powder and eluted with a mixture of ethanol (20)-chloroform (80)-water (2.5) at 22°, or on silicon dioxide using chloroform containing 10% methanol. The lecithins isolated were at purity of about 95%, and the cephalins at 84%. The total yield is about 40% of the weight of starting material. (*C. A.* 53, 23007)

Application of spectrophotometry to the analysis of olive oils. I. The use of the ultraviolet spectrophotometer for the identification of the superfine olive oils. A. Montefredine and L. La Porta (Lab. chim. provinc. Pescara, Italy). *Olii minerali, grassi e saponi, colori e vernici* 36, 31–6 (1959).

Experimental part. *Ibid.* 64–72. After a detailed review, spectrophotometric data of 206 samples of olive oil are tabulated. The ratio between the extinction value at 232 mμ and 270 mμ in the "superfine" olive oils is generally higher than 10 and may reach 20; the average values of olive oils of various ages are discussed. (*C. A.* 53, 23006)

Contribution to the differentiation of b-rectified olive oils. V. Sissi. *Olii minerali, grassi e saponi, colori e vernici* 36, 214–16 (1959). Some analyses are tabulated, and the criteria for the classification of several types of oils are discussed. (*C. A.* 53, 23006)

Identification of olive oil by oleuropein reaction. H. Schmidt-Hebbel (Univ. Chile, Santiago). *Colegio farm.* (Santiago, Chile) 16(190), 2–3 (1959), A colorimetric method for detecting 10% or more of olive oil is described. (*C. A.* 53, 23006)

Current problems in the production of olive oil. M. Th. François. *Bull. soc. pharm. Nancy* 38, 5–11 (1958). Discussed are mechanical and other procedures for preventing putrefactive changes leading to rancidity in the oil. The use of parathion and malathion as insecticides is undesirable, since they contaminate the oil. Methods of disposing of residues after expression of the oil are discussed. Oil which is rancid or otherwise of low quality may be renovated by saponification with alkali, followed by reësterification with glycerol at high temperatures in the presence of a catalyst, but the product obtained does not have the flavor of good quality olive oil. The peroxide index is of limited value in determining quality. (*C. A.* 53, 23006)

The iodine number of the unsaponifiable matter, in the differentiation of olive oil from other oils. II. L. Frontero. *Olii minerali, grassi e saponi, colori e vernici* 36, 154–6 (1959). The determination of the iodine number of the unsaponifiable matter permits differentiation of olive oil from other oils. This value is lower for animal oils than for vegetable oils. The method does not permit differentiation of the esterified olive oil from the esterified oil obtained from the fatty acids of peanut oil. (*C. A.* 53, 23006)

A review of the methods of analysis of olive oils, with special examination of some color reactions. S. Anselmi (Ist, super sanitá, Rome). *Olii minerali, grassi e saponi, colori e vernici* 36, 210–13 (1959). An accurate technique is proposed for the Fitelson reaction for the detection of tea oil in olive oil. The reaction is positive in the presence of 5% tea oil, and the color reaches a maximum within 4 minutes. (*C. A.* 53, 23006)

Research of grape seed oil in olive oil by paper chromatography. G. Petruccioli (Ist. Olivicolt., Spoleto, Italy). *Olii minerali, grassi e saponi, colori e vernici* 36, 260–3 (1959). By analytical methods it is not possible to detect grape seed oil in some B-rectified olive oils. Use of paper chromatography to detect the presence of linolenic acid is recommended. This procedure detects 5% of grape seed oil in olive oil. (*C. A.* 53, 23006)

Preparation of sebacic acid and capryl alcohol from castor oil. Shu-Kung Chu and Wen Hsi Lin (Union Ind. Research Inst., Formosa). *Chemistry* (Taipei) 1959, 69–78. Castor oil was heated 5 hours at 800 lb./sq. in. in a nickel-chromium stainless steel autoclave with the same weight of 50% aqueous sodium hydroxide at 310 ±5° to give sebacic acid in 44.6% yield and capryl alcohol in 28.2% yield. When 3% cadmium oxide was added in the above reaction for 1 hour, it gave 45.6% sebacic acid and 26.7% capryl alcohol. (*C. A.* 53, 23005)

Chemical composition of the oil of Euonymus verrucosa. N. I. Simonova (Inst. Motion Picture Ingrs., Leningrad). *Zhur. Priklad. Khim.* 32, 1637–40 (1959). Ethyl ether extraction of seeds of *Euonymus verrucosa* from the Northern Caucasus and from the Leningrad region yielded 45–7% oil (dry basis). The composition of this oil was as follows: saturated acids 19.3, oleic 55.8, linoleic 19.3, and linolenic 5.6%. (*C. A.* 53, 23005)

Estimation of epoxides in oils and fats. L. Krull (Margarine-Union Akt.-Ges., Hamburg-Bahrenfeld, Ger.). *Farbenchemiker* **61**, 23–7 (1959). A new method for the estimation of epoxides, based on argentometry, has been developed and critically investigated. (*C. A.* 53, 23005)

Detection of small amounts of castor oil in the vegetable or animal oils and fats. S. Anselmi, L. Boniforti, and R. Monacelli (Ist. super. sanità, Rome). *Olii minerali, grassi e saponi, colori e vernici* **36**, 253–5 (1959). A mixture of the oil with paraffin is extracted with 90% alcohol; the alcohol is evaporated, and the residue is dissolved in petroleum ether and ethyl ether (9:1). The fatty acids are eliminated by adsorption on silicic acid; and the castor oil is identified after condensation with *p*-dimethylaminobenzaldehyde. An orange-red color develops and (in chloroform) shows a maximum adsorption at 532 mμ. (*C. A.* 53, 23005)

Preparation of azelaic acid from castor oil by the action of nitric acid. Shigenobu Kawahara. *Nara Gakugei Daigaku Kiyo* **5**, 57–60 (1955). Castor oil was heated with nitric acid and with manganese dioxide as the catalyst. By this about 15% of azelaic acid from castor oil could be obtained. (*C. A.* 53, 23005)

Determination of isoöleic acids in hydrogenated fats. J. Pokorný and B. Kakáč (Vysoká škola chem. technol., Prague). *Prûmsyl potravin* **10**, 19–20 (1959). Determination by means of the lead salts method gives results that are 1–9% lower than those of the spectral method. A calibration curve for the correction of results of the former method is given. (*C. A.* 53, 23004)

Effect of light on autoxidation of fats. I. Bleaching, fluorescence, and yellowing. H. P. Kaufmann and M. Vogelmann (Deut. Inst. Fettforschung, Münster/Westf., Ger.). *Farbenchemiker* **61**, 6–10 (1959). Fluorescent spectra of crude linseed oil and ultraviolet absorption spectra of crude linseed oil and β-carotene in different stages of exposure to sunlight and scattered light are given. Absorption maxima of chlorophyll lie at 660, 614, 576, 532, 529, 410 mμ, of pheophytin a at 665–70, 608–10, 559, 532, 505, 470, 410 mμ, and pheophytin b at 653, 599, 558, 523, 433, 413 mμ. The absorption maximum of β-carotene and pheophytin a are to be found in linseed oil. On exposure to light β-carotene in oil seems to be more stable than in methanol solution (1 mg./100 ml.), whereas the absorption bands of pheophytin a are shifted to those of pheophytin b. (*C. A.* 53, 23004)

Urea complexes—preparation of fatty acids and esters from cottonseed oil. N. A. Khan (East Regional Labs., Dacca). *Pakistan J. Sci. Research* **11**, 9-12 (1959). Formation of the urea complex was utilized for separating oleic and linoleic acids from cottonseed oil acids. (*C. A.* 53, 23003)

Variations in the composition of wool fat. I. Acid number and light refraction. G. Nitschke (Forschungsinst. Textiltech., Karl-Marx-Stadt, Ger.). *Faserforsch. u. Textiltech.* **10**, 380–7 (1959). A review with 25 references. (*C. A.* 53, 23003)

Determining the acetyl value of deeply colored fats. A. R. S. Kartha (Maharaja's Coll., Ernakulam). *J. Sci. & Ind. Research* (India) **18B** 217–19 (1959). A method using acetic anhydride is described. (*C. A.* 53, 23003)

Catalyst in fat chemistry. J. E. W. Coenen (Unilever Research Lab., Vlaardingen, Neth.). *Chem. Weekblad* **54**, 715–18 (1958). An address. (*C. A.* 53, 23001)

Effect of cobalt-60 γ-ray radiation on the fatty constituent of "kamaboko." Chieko Urakami and Hiroko Tanaka. *Kasei-gaku Zassi* **10**, 70–3 (1959). A marked increase in peroxide value was observed when fat extracted from kamaboko and fish meat paste is irradiated in the presence of air, but no increase occurs in the absence of air. (*C. A.* 53, 23001)

Autoreactions of ricinoleic acid. I. Reaction at 180°, 147°, 122–3°, and at room temperature. F. Hawke and E. A. Kohll (African Explosives Chem. Inds., Ltd. Transvaal). *J. S. African Chem. Inst.* **12**, 1–16 (1959). When ricinoleic acid is heated or kept at room temperature in an inert atmosphere, the main reaction is the formation of estolides, this reaction being of the second order. Pure ricinoleic acid is very reactive, there being a marked drop in its hydroxyl value if it is kept at room temperature for more than a few hours. It must be stored as a solid below 4°. The autoreactions of ricinoleic acid are intramolecular dehydration, the hydroxyl group reacting with either neighboring hydrogen atom to give mixture of linoleic acids, and intermolecular dehydration, the hydroxyl group condensing with a free carboxyl group of another molecule to form estolides. The reaction can be repeated, giving long-chain polycondensates.

II. Catalyzed dehydration of ricinoleic acid. *Ibid.* 17–25. Chemical dehydration of ricinoleic acid at 180° in the presence of anhydrous sodium acid sulfate proceeds in two stages. The first stage forms short-chain estolides and diethenoid acids together with some enanthal and 10-undecenoic acid. In the second stage as the hydroxyl value approaches zero, rupture of estolide chains commences, forming further quantities of diethenoid acids, mainly conjugated 9,11-octadecadienoic acid. Chemical dehydration is a first-order reaction with respect to hydroxyl value, while estolide formation is second-order with respect to neutralization and hydroxyl values. (*C. A.* 53, 19863)

Preparation of unsaturated fatty acids from the fatty acids obtained in the oxidation of paraffin. I. V. Nicolescu, P. Vasilescu Em. Angelescu, and P. Antonescu (Univ. C. I. Parhon, București, Romania). *Analele univ. "C. I. Parhon" București, Ser. stiint. nat.* **1958**, No. 18, 57–62. The authors have obtained unsaturated acids with an iodine number 112 from the fraction C_{14}–C_{20} and with an iodine number 82 from the fraction C_7–C_{12}. This latter fraction had not been studied before. The saturated acids were chlorinated up to a chlorine content of 2–2.5/mole. A higher chlorine content produced decomposition and polymerization when dechlorination of the acid was attempted. The dehydrochlorination was achieved in an autoclave in about 5 hours at 170–180° and 13–15 atmospheres in the presence of calcium hydroxide. An excess of about 15% calcium oxide had to be present. The unsaturated acids thus obtained were used in the preparation of unsaturated alcohols and epoxides. (*C. A.* 53, 19856)

Quality evaluation of lard. J. Wurziger and E. Lindemann. *Fleischwirtschaft* **10**, 599–605 (1958). Measurement of quality of lard by acid number, extinction at S47E of sample treated with alkali according to Wurziger and Lindemann, Lea number, and quotient extinction/Lea number (Qp) is studied in regard to effect of storage of raw material before rendering, rendering temperature, and time, and of frying. In general very sound lard has a Qp of about 0.10 or less; a value above 0.15 occurs with excessive rendering temperatures, and poor quality of raw materials. At extinction above 0.45 the lard has poor stability and should be excluded from importation. If extinction is 1.0 or more, *independent of acid number and Lea number*, it should be considered spoiled. With calculated Lea value (multiplying extinction by 10) the warning value should be 3. A study of imported lards show that those from the U. S. A. had very low Qp's (usually below 0.10), those from Holland had Qp 0.15–0.20, while lards from Poland and Sweden were intermediate. (*C. A.* 53, 22586)

Studies on the Kreis test. III. Kreis test for substances related to synthesis of vitamin A. Seiichi Ishikawa, Toseko Asano, and Ikuo Iizuka (Jissen Women's Coll.). *Jissen Joshi Daigaku Kiyo* **3**, 1–3 (1955).

IV. Peroxide values of aldehydes. Seiichi Ishikawa and Luko Horikawa. *Ibid.* 4–8.

V. Comparison among tests of rancidity in fats and oils. Seiichi Ishikawa, Keiko Terasaki, and Nobuko Kanbara. *Ibid.* **4**, 1–4 (1957).

VI. Indole, Kreis, and thiobarbituric acid tests. Seiichi Ishikawa and Akiko Matsunaga. *Ibid.* **5**, 5–9 (1958). The indole test was found to be the most stable one to aldehydes and thiobarbituric acid tests. In the indole test 1 ml. of petroleum ether, 1 drop of aldehydes ($\frac{1}{50}$ ml.) were placed in a test tube, and the mixture was shaken 30 seconds. Then, 1 ml. of 0.05% indole-methanol solution was added, and the tube was shaken for 30 seconds. The lower layer of this mixture was used for colorimetry. (*C. A.* 53, 23009)

The use of hydrogen peroxide for oxidation of bivalent iron in solutions of a nickel catalyst. A. G. Koblyanskiĭ and N. Kh. Kameneva. *Trudy Krasnodar. Inst. Pishchevoĭ Prom.* **1956**, No. 13, 3–7; *Referat. Zhur., Khim.* **1957**, Abstr. No. 33974. Oxidation by hydrogen peroxide of bivalent iron was investigated in "solutions of a nickel catalyst" that contained 8.37 g./liter nickel and 0.72 milliequivalent bivalent iron in the form of sulfates, as well as sulfuric acid and occasionally certain organic materials obtained in the facory in the process of hydrogenation of fats. In this case, owing to the presence of organic material, the quantity of hydrogen peroxide used was 1.5–2.0 times that necessary for the oxidation of bivalent iron. The necessary amount of hydrogen peroxide decreased with increased concentration of sulfuric acid up to a certain limit; it also decreased when sodium carbonate or cupric sulfate was added to the liquid; the amount of hydrogen peroxide increased with increased temperature. The use of hydrogen peroxide for oxidation of bivalent iron can simplify the process and save labor on regeneration of nickel and copper from used catalysts. (*C. A.* **53**, 23004)

HYDROGENATION OF FATS AT LOW TEMPERATURES. B. N. Tyutyunnikov and I. I. Novitskaya. *Trudy Khar'kov Politekh. Inst. im. V. I. Lenina., Ser. Khim.-Tekhnol.* **13**(4), 97–104 (1957). Fats obtained through hydrogenation of oils at 100° have a fairly sharp odor. Lowering of temperature below 100° lessens the odor. The recovery of the catalyst from 100° hydrogenation is many times less than the recovery after 200° hydrogenation. With the increase of the quantity of catalyst at a constant temperature, its recovery decreases. Increasing the hydrogen supply permits increased catalyst recovery. The selectivity of hydrogenation of sunflower and cottonseed oil at 100° with the use of 0.5% nickel is lower than at 200°C. with 0.15% nickel. When the catalyst quantities are further increased the hydrogenation selectivity increases. In the 100° tests, the formation of isoöleic acids is low, especially in the hydrogenation of whale fat. Cottonseed oil develops less isoöleic acids than does sunflower oil. Increases in catalyst induces increasing development of isoöleic acids. The physical property of fats obtained from cottonseed and sunflower oils at 100° are similar. The consistency differs sharply from the consistency of whale fat. (*C. A.* **53**, 23001)

COMPOSITION OF A PARAFFIN WAX FRACTION FROM TOBACCO LEAF AND TOBACCO SMOKE. W. Carruthers and R. A. W. Johnstone (Medical Res. Council Carcinogenic Substances Res. Group, Univ. of Exeter). *Nature* **184**, 1131–1132 (1959). Mass spectroscopic and gas-liquid chromatographic analyses of paraffin wax isolated from green tobacco leaf, from the black fermented tobacco of a variety of Argentinian cigarettes, and from the smoke of these cigarettes indicated that the wax from each was a complex mixture of similar composition. n-Hentriacontane (C_{31}) was the main individual component, but appreciable quantities of the C_{29} and the C_{33} and small amounts of the C_{30} and C_{32} homologues were also present. Relatively high concentrations of the branched isomers of C_{29}–C_{33} alkanes were also found. Analyses of the methyl esters of fatty acids from flue-cured tobacco of a variety of British cigarettes showed the major component to be methyl palmitate accompanied by some stearate and smaller amounts of other higher and lower homologues. Considerable amounts of C_{18} unsaturated esters were also present with methyl linolenate predominating.

PROCESS FOR PREPARING A WATER-DISPERSIBLE ALCOHOL-SOLUBLE PHOSPHATIDE COMPOSITION. P. F. Davis and H. T. Iveson (Glidden Co.). *U. S. 2,910,362.* A liquid triglyceride oil is added to an alcohol-soluble extract (still wet with the extracting alcohol) of whole phosphatides so that the mixture contains 65 to 73% phosphatidic material. The mass is then dried under conditions which will expel most of the residual alcohol without damaging the phosphatide, deodorized, and diluted with 5 to 15% of an edible polyol such as propylene glycol or glycerine.

METHODS FOR THE FRACTIONAL CRYSTALLIZATION OF COTTONSEED OIL. L. J. Rubin, B. F. Teasdale, and W. G. Mertens (Canada Packers, Ltd., Toronto, Ontario, Can.). *U. S. 2,910,363.* A process for winterization of cottonseed oil consists of mixing the oil with 15% or less of a low-molecular weight ketone, acetate, or ether, rapidly chilling the solution to 28°–39°F., holding at that temperature range for not more than 8 hours to crystallize the higher-melting triglycerides, and finally separating the crystallized from the liquid fraction.

PROCESS OF PREPARING STABLE FATTY MONOGLYCERIDES. J. G. Baldinus (Colgate-Palmolive Co.). *U. S. 2,910,491.* An unstable form of a solid polymorphic fatty monoglyceride of a saturated fatty acid containing more than 12 carbon atoms is subjected to mechanical working to bring about a solid-solid transition to the stable polymorphic form. The mechanical process may be extrusion, compression, mastication, kneading, or milling and is performed at a temperature approaching the melting point of the monoglyceride.

PEANUT BUTTER PRODUCT. G. H. Rowland and C. W. Williams, Jr. (Safeway Stores, Inc.). *U. S. 2,911,303.* The preparation of a stabilized peanut butter which is not subject to oil separation, and which has good palatability, smoothness, and spreadability over a wide temperature range is described. The spread consists of particles of peanuts homogeneously mixed with peanut oil together with 10 to 25% of an edible stabilizer which is a blend of 80 to 90% of an unsaturated liquid oil and 20 to 10% of a saturated vegetable fat.

GRINDING AND RENDERING OF FAT-CONTAINING TISSUE. C. Greenfield. *U. S. 2,911,421.* Animal fat-containing proteinaceous tissue is finely ground and then heated at reduced pressure at a temperature sufficient to melt at least a portion of the fat but below the coagulation temperature of the protein. The water is substantially removed as vapor and the liquid fat can then be easily separated from the solids in the resultant slurry.

RECOVERY OF STEARIC AND OLEIC ACIDS. G. Greenfield. *U. S.* 2,911,423. A mixture of stearic and oleic acids is cooled to 75° to 100°F. The cooled mixture is pressed at 250 to 4,000 p.s.i. to separate the crystalline stearic acid. Further cooling of the residual liquid separates liquid oleic acid from the resulting crystals.

TRIGLYCERIDE COMPOSITIONS ESPECIALLY FOR USE IN SALAD OILS. Thomas Hedley & Co. Ltd. *Brit. 816,343.* Glyceride oils consisting of esters of fatty acids containing 8–24 carbon atoms/molecule and normally not suitable for use in mayonnaises and salad oils are made suitable for use by random interesterification with glycerol triesters of acetic, propionic, butyric or caproic acid, or their mixtures. Oils having minimum iodine values of 80, and derived from animal fats, from marine oils or their hydrogenated products, and from oils which are largely esters of oleic, linoleic and linolenic acids, and their hydrogenated products, are interesterified with glycerol triesters in a glycerol triesters:oil mole ratio of 1.0:0.5–4.0. The combined acids in desired product consist of 5–25% by weight of the acids derived from glycerol triesters. Oils consisting largely of esters of lauric acid, and of no specified iodine value, are similarly interesterified with glycerol triesters in a glycerol triesters:oil mole ratio of 1:05.–2.0. The combined acids in the product consist of 25–30% by weight acids derived from glycerol triesters. Typical oils thus used are partially hydrogenated cottonseed and soybean oil and unhydrogenated coconut oil. *Brit. 816,344.* The product is similar with respect to the method of interesterification and the reactants, but a minimum iodine value of 55 is permissible for the first oil. Proportion of glycerol triesters and oils are chosen to obtain a high yield of product containing 2 acid radicals of the glycerol triesters group and 1 acid from the oil groups per glycerol-ester molecule. (*C. A.* **53**, 22610)

RECOVERY OF WOOL WAX. L. F. Evans, W. E. Ewers, and C. Simpson (Commonwealth Scientific and Industrial Research Organization). *Ger. 962,630.* See Australian 160,602. (*C. A.* **53**, 20850)

FRACTIONAL EXTRACTION OF LIPIDES FROM NATURAL PRODUCTS. H. P. Kaufmann. *Ger. 1,000,225.* Lipide fractions with increased iodine number and free of phosphatides are obtained by extracting the crude products at −30° to −60° with hexane, ethyl chloride, or liquefied propane containing 30% butane. (*C. A.* **53**, 23011)

SAPONIFICATION OF WOOL FAT. S. D. Rossouw and E. v. Rudloff (South African Council for Scientific & Industrial Research). *Ger. 1,001,787.* The wool fat is saponified at 80–150° by means of calcium hydroxide and (or) magnesium hydroxide and in the presence of other additives which accelerate the saponification addition. Suitable additives are synthetic detergents, e.g., alkyl sulfates, arylsulfonates, or quaternary ammonium compounds; solvents for wool fat and water, e.g., ethylene glycol monoethyl ether, butyl alcohol, or dipropyl ketone; caustic alkalies; and calcium or magnesium soaps. (*C. A.* **53**, 23010)

OILY BASE FOR LIQUID FOODS. Naoto Nakaoka, Shinji Mitsunaga, Shuji Arai, and Jun Kawai (Nippon Fats & Oils Co.). *Japan. 3733*('59). Sodium palmitate (0.1 kg.) containing 80% water is dissolved in 23 kg. water with heating. A mixture of 0.5 kg. monoglyceride of fatty acid, 0.1 kg. ester of fatty acid with sorbitan, and 50 kg. soybean oil is added gradually, stirred at 50°, and 23 kg. sugar is added to give a product which is stable, has a pleasant taste, and is soluble in water or in liquid foods. (*C. A.* **53**, 20616)

POWDERED FATS AND OILS. Shinshiro Ohtaki. *Japan. 6477*('58). Hydrogenated cottonseed oil, melting at 40°, is heated with

0.02% antioxidant until molten. Then, it is cooled to 35° with agitation. This product is sprayed in a cooling chamber at 5° to obtain the powdered oil. (*C. A.* **53**, 23010)

PREVENTION OF COLORATION AND DEVELOPMENT OF AN ODOROUS SUBSTANCE IN REFINED OIL DURING STORAGE. Mitsui Nakamura and Akiri Suzuki (Sugiyama Industrial Chem. Research Inst., Inc.). *Japan. 6766* ('58). Deodorized soybean oil (4 kg.) is treated with 8 g. of a 30% aqueous solution of $(NaO_2CCH_2)_2NCH_2CH_2N(C_2H_4OH)CH_2CO_2Na$ and stirred for 2 hours in nitrogen. Then the oil is washed with water to obtain a treated oil. Properties of treated and untreated oil are given: acid number 0.03, 0.08; smoking point 238°, 230°; iron content 0.02 p.p.m., 0.38 p.p.m.; odor agreeable, rancid. (*C. A.* **53**, 23010)

PREPARING PREPRESSED OIL CAKE FOR EXTRACTION. A. I. Skipin. *U. S. S. R. 118,933.* The prepressed cake is ground to a flour and then sprayed with atomized water until it contains 7–13% water. (*C. A.* **53**, 23010)

INCREASING THE STABILITY OF FATS. F. Yu. Rachinskiĭ, A. S. Mozzhukhin, N. M. Slavachevskaya, and L. I. Tank. *U. S. S. R. 118,935.* Aliphatic polyamines, and particularly water- and fat-soluble polyethylenepolyamines and fat-soluble derivatives of ethylenediamine and polyethylenepolyamines, are added to fats to arrest oxidation, to lower the peroxide number, and to inactivate the metals within the fat. (*C. A.* **53**, 23010)

• Fatty Acid Derivatives

FATTY AMIDES. I. PREPARATION AND PROPERTIES. H. P. Kaufmann and K. J. Skiba (Deut. Ins. Fettforschung, Münster, Westfalen, Ger.). *Fette, Seifen, Anstrichmittel* **59**, 340–4 (1957). The authors describe the preparation of fatty amides by dehydration of ammonium salts of fatty acids by reaction of glycerides with ammonia and by a Friedel-Crafts reaction with NH_2COCl. (*C. A.* **53**, 19857)

PREPARATION OF CRYSTALLINE TRANS-TRANS METHYL LINOLEATE HYDROPEROXIDE. A. Banks, S. Fazakerley, J. N. Keay, and J. G. M. Smith (Torry Res. Station, Dept. of Sci. and Ind. Res., Aberdeen). *Nature* **184**, 816 (1959). Methyl linoleate, prepared by debromination of tetrabromostearic acid, was oxidized in petroleum ether solution with oxygen gas, the resulting peroxide being continuously extracted from solution by finely dispersed 85% aqueous methanol saturated with petroleum ether. Purification was accomplished by further partition of the peroxide and the unchanged ester between methanol and petroleum ether. Two crystallizations from petroleum ether at −35° and two from ethanol at −76° gave pure conjugated *trans-trans* methyl linoleate hydroperoxide.

ESTERIFICATION METHOD. G. R. Bond, Jr. (Houdry Process Corp.). *U. S. 2,910,489.* A carboxylic acid such as oleic and an alcohol having at least 6 carbon atoms are reacted in the presence of catalytic amounts of titanium dichloride diacetate. The resulting ester has an exceptionally low acid number and a color as light as the original acid.

HEAT-SENSITIVE COPYING PAPER. R. Owen (Minnesota Mining & Mfg. Co.). *U. S. 2,910,377.* The heat-sensitive layer of a copying-paper contains, in intimate association, one mol of silver behenate, about one mol of behenic acid, and about one-half mol of protocatechuic acid. Silver salts of other organic acids such as stearic, oleic, lauric, and hydroxystearate may also be used.

PROCESS FOR PREPARING GLYCOL MONOESTERS OF ORGANIC CARBOXYLIC ACIDS. J. D. Malkemus (Jefferson Chemical Co.). *U. S. 2,910,490.* A glycol monoester of a fatty acid is prepared by the reaction of a carboxylic acid having from 6 to about 24 carbon atoms with an alkalene oxide (ethylene, propylene, or glycidol) at temperatures of about 75° to 175° in the presence of an ammonium halide catalyst. Quaternary ammonium catalysts are particularly effective.

LOW-TEMPERATURE STABILITY OF SYNTHETIC LUBRICANTS. B. T. Fowler, M. F. Hoare, and H. G. Krischai (Esso Res. and Eng. Co.). *U. S. 2,911,368.* A process for improving the low-temperature viscosity of a synthetic lubricating composition is described. The lubricant consists of a complex-ester, di-ester blend prepared from nonyl alcohol, sebacic acid, and polyethylene glycol of molecular weight of about 200. The half ester of the polyglycol and the acid is formed and the acid product is then esterified with the monohydric alcohol to form the complex-ester. The di-ester consists essentially of di-nonyl sebacate. The blend is then heated above 100° with 0.1 to 2.0% of a guanidine carbonate to give the desired lubricant.

ADIPIC ACID DIAMIDE. K. Merkel and A. Palm (Badische Anilin- & Soda-Fabrik Akt.-Ges.). *Ger. 1,014,097.* Adipic acid 1460 parts was melted at 152°, the temperature then raised to 170° and a stream of ammonia introduced during 3 hours, until the formation of the ammonium salt was complete. The mixture was then heated 4 hours at 225° with distilling of aqueous ammonia, the resulting diamide removed from the reaction vessel, and allowed to solidify to give colorless adipic acid diamide 1420 parts. Alternately the reaction can be carried out in the presence of $C_6H_3Cl_3$. (*C. A.* **53**, 19892)

• Biology and Nutrition

ATHEROSCLEROSIS IN THE BANTU. J. P. Strong, J. Wainwright, and H. C. McGill, Jr. (Departments of Pathology, Louisiana State University School of Medicine, New Orleans, La.). *Circulation* **20**, 1118–27 (1959). The natural history of aortic atherosclerosis in the Bantu, of Durban, South Africa, ages 1 to 40 years, is compared to that of the New Orleans Negro and white man in the same age group. Fatty streaks are present universally in all 3 groups to some extent after the first decade. The average surface involvement with fatty streaks is not appreciably different in the 3 groups. The prevalence and quantitative extent of fibrous plaques are much less in the Bantu than in the New Orleans Negro and New Orleans white man. This difference does not appear to be due to sampling bias by selection of autopsies. The degree of aortic fatty streaking in early life is not correlated with reported group differences in dietary fat intake, serum cholesterol levels, and the incidence of clinical manifestations of atherosclerosis in later life. The degree of aortic fibrous plaques in the fourth decade does parallel the reported racial and geographic differences in these factors.

DIETARY FAT AND PROTEIN AND SERUM CHOLESTEROL. I. ADULT SWINE. R. H. Barnes, Eva Kwong, Grace Fiala, M. Rechcigl, Ruth Lutz, and J. Loosli (Graduate School of Nutrition and the Departments of Animal Husbandry and Food and Nutrition, Cornell University, Ithaca, New York). *J. Nutrition* **69**, 261–268 (1959). Adult swine were fed either a human-type diet of mixed foods or a purified diet with changes in the amount and type of fat or the amount of protein. In both types of diet, fat caused the serum cholesterol to rise with the greatest increase resulting from the most saturated fat. The human-type diet consistently gave higher serum cholesterol values, but the response to different fats paralleled the results obtained with the purified diet.

II. YOUNG SWINE. R. H. Barnes, Eva Kwong, W. Pond, R. Lowry, and J. K. Loosli. *Ibid.* 269–273 (1959). Four groups of weanling pigs were fed either high- or low-protein and either high- or low-fat diets for 36 weeks. Evidence of protein malnutrition was most marked in the low-protein, high-fat group. These animals exhibited signs that have been interpreted as resembling the human infant disease, kwashiorkor. Fat in the form of beef tallow in the diet caused a rapid rise in serum cholesterol. Low-protein intakes also resulted in an increase in serum cholesterol.

EFFECTS OF HIGH PROTEIN INTAKES ON CHOLESTEROLEMIA AND ATHEROGENESIS IN GROWING AND MATURE CHICKENS FED HIGH-FAT, HIGH-CHOLESTEROL DIETS. R. Pick, J. Stamler, and L. N. Katz (Cardiovascular Department, Medical Research Institute, Michael Reese Hospital and Medical Center, Chicago, Ill.). *Circulation Research* **7**, 866–9 (1959). High protein intake suppresses hypercholesterolemia and atherogenesis in young cockerels on high-cholesterol, high-fat diets. This happens with supplementation by any nutritionally good protein and is manifest irrespective of source of cholesterol and type of fat. In mature roosters or hens— as in young growing cockerels—low protein intake intensifies, and adequate protein intake suppresses hypercholesterolemia and atherosclerosis occurring with high-cholesterol, high-fat diets. However, inhibition of coronary atherogenesis induced in hens by endogenous estrogen secretion continues to supervene, despite low protein intake. Oviduct ligation prevented intensification of hypercholesterolemia and atherosclerosis with low protein intake.

EXTRACTION METHODS AND AN INVESTIGATION OF DROSOPHILA LIPIDS. J. J. Wren and H. K. Mitchell (Kerckhoff Laboratories of the Biological Sciences, California Institute of Technology, Pasadena, California). *J. Biol. Chem.* **234**, 2823–27 (1959). The general problem of extractions of lipids without degradation is discussed and details of a satisfactory procedure are presented. Among lipids obtained from *Drosophila* were hydrocarbon, wax ester, cholesterol ester, triglyceride, cholesterol, glycerophosphatidic acid, phosphatidylglycerol, inositol phospholipids, phosphatidylethanolamine, ethanolamine plasmalogen, phosphatidylserine, cerebroside, lysophosphatidylethanolamine, lysophosphatidylserine, phosphatidylcholine, choline plasmalogen, and lipids containing bound amino acids. Twelve different bound amino acids and perhaps peptides were found in lipid fractions, but no fraction contained more than 0.1 mole of amino acid per kg. of lipid.

FATTY ACID DISTRIBUTION IN EGG YOLK AS INFLUENCED BY TYPE AND LEVEL OF DIETARY FAT. Pricilla Wheeler, D. W. Peterson, and G. D. Michaels (Institute for Metabolic Research, Highland-Alameda County Hospital, Oakland, California). *J. Nutrition* **69**, 259–60 (1959). Hens were fed diets containing 5, 10, 15, 22.2, or 30% of safflower oil; 22.2 or 30% linseed oil; and 10% of cottonseed, corn, or soybean oil. The total fatty acids of the yolk fat were determined by alkaline isomerization and by gas-liquid chromatography and their distribution compared with that of eggs produced on a stock diet or on a low-fat diet. In eggs from hens fed diets containing linolenic acid, linoleic acid was not deposited as efficiently as in those from hens fed safflower oil or cottonseed oil suggesting an antagonistic or inhibitory effect of linolenic acid toward incorporation of linoleic acid into yolk fat.

HYPOCHOLESTEREMIC EFFECT OF BENZMALACENE. I. H. Page and R. E. Schneckloth. (Research Division, Cleveland Clinic Foundation, Cleveland, Ohio). *Circulation* **20**, 1075–8 (1959). Benzmalacene [N-(1-methyl-2,3-di-p-chloro-phenylpropyl-maleamic acid)] effectively lowers blood cholesterol levels in most hypertensive patients but with some weight loss. Cholesterol was lowered in some hypercholesteremic patients but not in all and this occurred without weight loss. In 2 hypercholesteremic patients a sharp rise in triglycerides occurred while the cholesterol: phospholipid ratio fell and the free: total cholesterol ratio rose. Liver function as measured by bromsulfalein after 4 months' treatment had deteriorated in 8 of the 12 patients studied. Nausea, epigastric discomfort, and diarrhea were on occasion sufficiently discomforting to require discontinuing the drug. Drugs that interfere with cholesterol hynthesis should be studied with great care for long periods before their widespread use in an attempt to prevent atherosclerosis.

INFLUENCE OF HIGH LEVELS OF DIETARY FATS AND CHOLESTEROL ON ATHEROSCLEROSIS AND LIPID DISTRIBUTION IN SWINE. R. Reiser, Mary F. Sorrels, and Mary C. Williams (Department of Biochemistry and Nutrition, Texas Agricultural Experiment Station, College Station, Texas). *Circulation Research* **7**, 833–45 (1959). The degree of incorporation of injected 1-C^{14}-acetate into tissue cholesterol on cholesterol free diets was much higher in the liver and plasma of swine ingesting saturated than unsaturated fat. The levels of cholesterol in all tissues increased with the presence of fat or cholesterol in the diet. The levels of cholesterol in all tissues increased with the presence of cholesterol, and cholesterol levels were highest in the presence of unsaturated fat. The combination of unsaturated fat with cholesterol in the diet produced the greatest degree of typical atheromatosis and the highest levels of cholesterol in the tissues, while saturated fat with cholesterol produced diffuse atypical lesions.

INTERMEDIATES IN THE CONVERSION OF MEVALONIC ACID TO SQUALENE BY A RAT LIVER ENZYME SYSTEM. L. A. Witting and J. W. Porter (Radioisotope Unit, Veterans Administration Hospital, Madison, Wisconsin). *J. Biol. Chem.* **234**, 2841–46 (1959). An ammonium sulfate precipitated fraction of the water-soluble, supernatant enzyme system from rat liver, has been found to form at least nine intermediates between mevalonic acid and squalene. Three of these have been identified as 5-phosphomevalonic acid, 5-pyrophosphomevalonic acid, and isopentenyl pyrophosphate (pyrophospho-3-methyl-but-3-ene-1-ol). The other six are water-soluble, acid-labile derivatives of higher terpenoid compounds. Farnesol has been identified as a component of one of these compounds.

LIPOPROTEINS, CHOLESTEROL AND SERUM PROTEINS AS PREDICTORS OF MYOCARDIAL INFARCTION. I. H. Page and Lena A. Lewis (Research Division, Cleveland Clinic Foundation, Cleveland, Ohio). *Circulation* **20**, 1011–27 (1959). The normal variability of lipoprotein and cholesterol levels was established for 6 women over a period of 5 months for comparison with levels in people who develop myocardial infarction. We have studied 107 normal men for 7 years. Among these 11 developed infarction and 6 angina pectoris. Little change in lipid levels was associated with these events. Electrophoretic patterns early after infarction showed certain relatively characteristic changes, especially, increase in α-2 and β-globulins and fibrinogen. Low-density lipoprotein also increased. While α-2 globulin was usually greatest in patients with the most extensive myocardial damage, there was little over-all correlation between lipoprotein pattern and severity of infarction. The "coronary profile" can be more sharply delineated by repeated lipid measurements because as a group those with atherosclerosis and infarction exhibit slightly elevated values.

RELATION BETWEEN DIETARY FAT, FAT CONTENT OF MILK AND CONCENTRATION OF CERTAIN ENZYMES IN HUMAN MILK. M. G. Karmarkar and C. V. Ramakrishnan (Biochemistry Department, Faculty of Science, Maharaja Sayajirao University of Baroda, Baroda, India). *J. Nutrition* **69**, 274–6 (1959). Dietary fat, milk fat and the lipase, esterase, acid and alkaline phosphatase contents of milk of 60 lactating women were estimated and it was found that up to a certain limit increases in dietary fat were accompanied by increases in milk fat as well as in lipase, esterase, and alkaline phosphatase contents of milk.

THE INFLUENCE OF SELECTED VEGETABLE FATS ON PLASMA LIPID CONCENTRATIONS AND AORTIC ATHEROMATOSIS IN CHOLESTEROL-FED AND DIETHYLSTIBESTROL-IMPLANTED COCKERELS. D. M. Tennent, Mary E. Zanetti, H. Siegel, G. W. Kuron, and W. H. Ott (Merck Institute for Therapeutic Research, Rahway, New Jersey). *J. Nutrition* **69**, 283–8 (1959). In cockerels fed diets containing 8.2% of vegetable fat and 2% of cholesterol, there was a close connection between plasma lipid pattern and the composition of the fat fed. Plasma cholesterol concentrations were inversely proportional to the percentage of polyenoic acids in the fat (or directly proportional to saturated plus monoenoic). Plasma lipid phosphorus concentrations were inversely proportional to the total amount of unsaturation. Aortic lesion scores were not closely related to the composition of the fat fed. It appears that a given plasma cholesterol concentration in birds fed some fats may not be so injurious as the concentration would be in birds fed other fats.

VITAMIN-A CONTENT OF THE FROG EYE DURING LIGHT AND DARK ADAPTATION. Ruth Hubbard and A. D. Colman (Biological Laboratories at Harvard University, Cambridge, Mass.). *Science* **130**, 977–8 (1959). Rhodopsin is synthesized from 11-*cis* retinene (vitamin A aldehyde), but releases all-*trans* retinene when bleached in light. In the frog, both isomers of vitamin A are stored in the eye. Total ocular vitamin A, including that bound as retinene in rhodopsin, remains constant during light and dark adaptation. Stores of 11-*cis* vitamin A, however, diminish in the light and are replenished in darkness.

COMPOSITION OF CEREBROSIDE ACIDS AS A FUNCTION OF AGE. Yasuo Kishimoto and N. S. Radin (Biochem. Dept., Northwestern Univ., Medical School, Chicago). *J. Lipid Research* **1**, 79–82 (1959). The brains of from 11 to 30 rats of various age groups (23 to 418 days old) were pooled and analyzed for total lipids, total cerebrosides, and the individual cerebroside acids. Cerebroside deposition is evident over the range of ages studied, and its contribution to the total depostion becomes increasingly important with increasing age. Cerebronic acid is by far the major cerebroside acid, but appreciable amounts of the alpha hydroxy C_{23} and C_{22} acids are also present. The unsaturated acids constitute a minor element, and the contribution of the hydroxy unsaturated acids is least. The odd numbered acids show the greatest increases with age, compared to the other acids, while the hydroxy unsaturated acids show little accumulation except during the earliest period studied. Degradation experiments with the saturated hydroxy acids show that the hydroxyl groups are in the alpha position.

OXIDATION OF CHOLESTEROL BY RAT LIVER MITOCHONDRIA: EFFECT OF DIETARY FAT. D. Kritchevsky, Ruth R. Kolman, M. W. Whitehouse, Martha C. Cottrell, and E. Staple (The Wistar Inst. of Anatomy and Biology, Philadelphia, Penn.). *J. Lipid Research* **1**, 83–89 (1959). Rats were maintained on normal diets or on diets containing 20% corn oil or on commercial shortening for 40 days. The liver mitochondria of the rats fed saturated fat oxidized cholesterol-26-C^{14} to $C^{14}O_2$ to a much greater extent than did liver mitochondria from rats fed unsaturated fat. In general, liver mitochondria from control rats also oxidized more cholesterol-26-C^{14} than did mitochondria from rats fed unsaturated fat, but this difference was not as consistent. The results were the same with rats of either sex. Oxidation of sodium pyruvate-2-C^{14} did not vary with diet. The results could not be attributed to differences in liver lipid or cholesterol content. It has been shown that the homologous combination of liver mitochondria and boiled supernatant from the livers of the unsaturated fat fed rats greatly impairs cholesterol oxidation. Addition of boiled supernate from the livers of the other dietary groups to liver mitochondria from the rats fed unsaturated fat restores the cholesterol oxidation to normal levels as does substitution of a 10% sucrose solution for the boiled supernate. Addition of the boiled liver supernate from the animals fed unsaturated fat to liver mitochondria from the normal or saturated fat fed rats has no appreciable inhibitory effect.

Independence of arterial phospholipid synthesis from alterations in blood lipids. D. B. Zilversmit and E. L. McCandless (Dept. of Physiology, Univ. of Tenn., Memphis 3, Tenn.). *J. Lipid Research* 1, 118–124 (1959). Rabbits fed cholesterol for 1 to 5 months showed gradually increasing amounts of aortic phospholipid preceded by increases in plasma phospholipid concentration. Cholesterol feeding appeared to increase the turnover of plasma as well as aortic phospholipid. Curtailment of plasma phospholipid synthesis to one-tenth of normal by evisceration did not diminish the incorporation of P^{32} into aortic lipids. In these animals the aortic phospholipid specific activity was 15 to 90 times as great as that of plasma, so that practically all of the labeled aortic phospholipid must have been synthesized *in situ*. Lowering the plasma lipid levels by removal of cholesterol from the diet did not diminish the choleserol content of the aortic lesion or alter its phospholipogenesis.

The isolation and identification of lysolecithin from lipid extracts of normal human serum. E. Gjone, J. F. Berry and D. A. Turner (Dept. of Medicine, Johns Hopkins Univ. School of Medicine). *J. Lipid Research* I, 66–71 (1959). Chromatography on silicic acid was employed for the separation of phospholipid components of human serum, using diethyl ether, and chloroform-methanol solutions as eluting agents. The components identified by paper chromatography were cephalins, lecithin, sphingomyelin, and lysolecithin. Chemical analyses and infrared spectra were employed to confirm the identification of the compounds isolated. The quantities of the phospholipid component were also determined.

Fatty acid oxidation by carp liver mitochondria. W. D. Brown (Inst. of Marine Resources, Univ. of Calif. Berkeley, Calif.) and A. L. Tappel. *Arch. Biochem. Biophys.* **85**, 149–158 (1959). The nature of the fatty acid-oxidizing system in fish is similar to that in mammals. Carp liver mitochondria were shown to contain an enzyme system that will oxidize fatty acids in the presence of adenosine triphosphate, cytochrome c, and Mg^{++}. Butyric, octanoic, palmitic, oleic, linoleic, linolenic arachidonic, eicosapentaenoic, and docosahexaenoic acids were readily oxodized.

Tracer studies on the biosynthesis of cholesterol from C_2 precursors in active bullfrog sciatic nerve. J. F. Saunders (Dept. of Chem., Georgetown Univ., Washington, D. C.) and S. L. Friess. *Arch. Biochem. Biophys.* **85**, 234–244 (1959). The levels of assayable total cholesterol in sheathed and desheathed preparations of bullfrog sciatic nerve have been found to be unaffected by incubation with high concentrations of unlabeled acetylcholine ion. However, incubation with tracer amounts of choline or acetate ions labeled with C^{14} results in incorporation of isotope into cholesterol without increasing total endogenous cholesterol levels of the tissue. These data have been interpreted in terms of possible processes leading to the synthesis of cholesterol in the nerve.

Specific inhibition of cholesterol biosynthesis by a synthetic compound (MER-29). T. R. Blohm and R. D. MacKenzie (Dept. of Biochemistry, Scientific Div., The Wm. S. Merrell Co., Cincinnati, Ohio). *Arch. Biochem. Biophys.* **85**, 245–249 (1959). MER-29 is 1-[(4-diethylaminoethoxy)phenyl]-1-(*p*-tolyl)-2-(*p*-chlorophenyl)ethanol. In preliminary tests this compound was found to produce a profound lowering of blood cholesterol in rats. Further studies indicated that it inhibited the biosynthesis of cholesterol in liver and intestine of the intact rat. The inhibition is specific for cholesterol and occurs at a late stage in the synthetic pathway, since incorporation of acetate-1-C^{14} into total digitonin-precipitate matter of rat liver is not affected, but incorporation into cholesterol purified via the dibromide is reduced.

Effects of MER-29, a cholesterol synthesis inhibitor, on mammalian tissue lipides. T. R. Blohm, T. Kariya, and Marie W. Laughlin (Dept. of Biochemistry, Scientific Div., The Wm. S. Merrell Co., Cincinnati, Ohio). *Arch. Biochem. Biophys.* **85**, 250–263 (1959). The effects of MER-29 on the blood and tissue lipides of the rat and monkey were studied. Chronic administration significantly reduced the cholesterol levels of the following tissues in the rat: plasma, erythrocytes, liver, skeletal muscle, lung, adrenal, and aorta. The cholesterol of brain and adipose tissue was not reduced. Liver total lipide was unchanged, and liver and plasma unsaponifiable matter were reduced. Plasma phospholipide was also reduced, but less than cholesterol. A linear relationship exists between the logarithm of the dose and the reduction of plasm cholesterol and phospholipide in the rat. In monkeys, oral administration of MER-29 over a 6-month period reduced plasma total and α- and β-lipoprotein cholesterol, erythrocyte cholesterol, and plasma uunsaponifiable matter. It had no effect on plasma phospholipide or α- and β-lipoproteins stainable with Oil Red O.

Involvement of methionine in bacterial lipid synthesis. W. M. O'Leary (Div. of Biological and Medical Res., Argonne Natl. Lab., Lamont, Ill.). *J. Bacteriol.* **78**, 709–713 (1959). The possible involvement of methionine in bacterial fatty acid synthesis was investigated. *Lactobacillus arabinosus* and a methionine-stimulated mutant of *Escherichia coli* were shown to incorporate appreciable amounts of methyl carbon from exogenous methionine-methyl-C^{14}. In each species, 20 to 25% of the total radioactivity in the cells was contained in the mixed cellular fatty acids. Chromatographic analysis showed there was a selective accumulation of methionine methyl carbon in the $C_{18\text{-}19}$ fraction of *L. arabinosus* and in the chromatographic fraction of *E. coli* acids that is usually found to contain palmitic acid. The possible involvement of one-carbon transfers in the bacterial synthesis of certain unusual fatty acids is discussed.

Bacterial hydrocarbon oxidation. II. Ester formation from alkanes. J. E. Stewart and R. E. Kallio (Dept. of Bacteriol., State Univ. of Iowa, Iowa City, Iowa). *J. Bacteriol.* **78**, 726–730 (1959). Oxidation of paraffins by a gram-negative coccus resulted in the accumulation of relatively high molecular weight esters (waxes). Octadecane yielded a 1:1 mixture of octadecyl stearate and octadecyl palmitate. Tetradecane yielded tetradecyl (myristyl) palmitate. The ester produced from the dodecane was not completely identified but was shown to possess a palmityl moiety. The waxes produced always had an alcohol with the same carbon skeleton as the paraffin from which it was derived, while the acid moiety was palmitic except in the case of octadecane where half of the total ester was made up of octadecyl stearate.

A concave concentration gradient of methanol in chloroform employed in elution of lipids from silicic acid. J. J. Wren (Lyons Labs., Hammersmith Road, London, W. 14). *Nature* **184**, 816–817 (1959). An apparatus permitting continuous concave gradient elution of lipids from a silicic acid column is described. Elution curves showed that continuous gradient elution gave sharper peaks and less tailing, avoided the spurious peaks produced by the abrupt changes of eluent in discontinuous gradient elution, and improved resolution of the constituent lipids.

Presence of behenic acid in sphingomyelin from horse spinal cord. Y. Fujino and T. Negishi (Dept. of Dairy Sci., Obihiro Zootechnical Col., Obihiro, Hokkaido, Japan). *Nature* **184**, 817–818 (1959). Crude sphingomyelin was purified by treatment with dilute alkali, column chromatography on alumina, and several recrystallizations from ethyl acetate. After refluxing with sulfuric acid in methanol, three fractions of methyl esters were isolated. The fatty acid of fraction 1 (0.5 g.) was identified as nervonic, fraction 2 (0.7 g.) as a mixture of stearic and palmitic acids, and fraction 3 (1.4 g.) as behenic acid.

Hydrogenation of lipids by rumen protozoa. D. E. Wright (Plant Chem. Div., Dept. of Sci. and Ind. Res., Palmerston North, New Zealand). *Nature* **184**, 875–876 (1959). The ability of protozoa from cow rumen to hydrogenate various dietary unsaturated fats was studied. Incubation with a suspension of rumen protozoa caused hydrogenation of both linoleic acid and linseed oil. A suspension of chloroplasts prepared by grinding freshly picked red clover leaves was also incubated. There was considerable conversion of the C_{18} triene acid to diene and the monoene to stearic acid; only slight conversion of diene to monoene appeared to have occurred. The non-saponifiable material exhibited a spectrum typical of a carotene-xanthophyll mixture. Little hydrogenation of the highly-unsaturated pigments had occurred, however.

Dietary protein and serum cholesterol in rats. A. P. de Groot (Central Institute for Nutrition & Food Research, T.N.O., Utrecht). *Nature* **184**, 903–904 (1959). Newly weaned male and female rats were fed a hypercholesterolemic diet with supplements of different protein concentrates or amino acids (at 5% of ration). Lowest levels of serum cholesterol were obtained with dried whole egg, wheat gluten, fish meal, and meat meal. Casein, gelatin, and soybean protein were less active. Low cholesterol levels were also obtained when a mixture of amino acids based on the composition of wheat gluten was substituted for the intact protein. The addition of different combinations of 3 amino acids (at concentrations of 0.2, 0.4, and 0.6% respectively) lowered the cholesterol level if methionine was one of the acids.

Effect of dietary fat and extent of blood sampling on the level of plasma cholesterol in the rat. I. Coleman (Defense Research Board, Kingston Labs., Barriefield, Ontario, Canada) and J. M. R. Beveridge. *Nature* **184**, 1041–1042 (1959). Rats were fed high fat diets (58.5% of calories supplied by corn oil), moderate fat diets (28.4% of calories supplied by oil), a stock diet of "Purina" fox chow, and fat free diets. The hypercholesterolemia produced was a product of both dietary fat and the degree of hemorrhage to which the animals were subjected. Under conditions of low bleeding stress a high fat diet caused no change in plasma cholesterol. When bleeding was increased to 1 to 1.5% of total blood on alternate days for 6 days, a high corn oil diet produced a significant increase in plasma cholesterol although animals on a fat free diet showed no change. When bleeding was increased to 2.5 to 4% of blood volume, highly significant increases in plasma cholesterol occurred in both the high-fat and the fat-free groups. The authors suggest the effect of hemorrhage as a possible explanation for some of the conflicting reports on the effect of dietary fats on the plasma cholesterol level of rats.

Sterol glycosides in oilseed phospholipids. F. Aylward and B. W. Nichols (Dept. of Chemistry and Food Technology, Borough Polytechnic, London, S.E. 1). *Nature* **184**, 1319–1320 (1959). Acetone precipitation of an ethereal solution of commercial rapeseed lecithin yielded a crude phospholipid which contained 2.1% of a sterol glycoside. A similar substance isolated from linseed phospholipid contained 2.9% of a sterol glycoside. It is probable that in each case β-sitosterol is the major sterol component, but minor proportions of other phytosterols may also be present.

Tocopherols in micro-organisms. J. Green, S. A. Price, and L. Gare (Walton Oaks Exptl. Station, Res. Labs. of Vitamins, Ltd., Dorking Rd., Tadworth, Surrey). *Nature* **184**, 1339 (1959). The occurrence of tocopherols in the lipid fraction of a range of micro-organisms was investigated. Of some 11 organisms studied, α-tocopherol was detected in *Chlorobium thiosulphatophilum*, *Ochromonas malhamensis*, and *Euglena gracilis*. When grown in the daylight *Ochromonas* contained about six times as much tocopherol as did the same organism grown in the dark. The results together with the observation that tocopherol occurred only in organisms containing chlorophyll support the suggestion that there is a close relationship between tocopherol and chlorophyll synthesis and that tocopherol might be formed from the same phytol precursor as chlorophyll.

Isomers of vitamin A in fish liver oils. Patricia S. Brown, W. P. Blum, and M. H. Stern (Biol. Labs., Harvard Univ., Cambridge, and the Res. Labs. of Distillation Products Industries, Div. of Eastman Kodak Co.). *Nature* **184**, 1377–1379 (1959). The occurrence of *iso-a* and *iso-b*, the 6-*cis* and the 2,6-di-*cis* isomers of vitamin A, in a number of fish liver oils has been investigated by means of reaction with the retinal protein, opsin. These isomers were found to constitute about 20% of the vitamin A in the cod, shark, and mixed fish liver oils examined. As measured by rat bioassay, the isomers have only about one-fourth the growth-promoting activity of all-*trans* vitamin A. The possibility of the isomers originating from *in vivo* isomerization of all-*trans* or neovitamin A to form an equilibrium mixture is discussed.

Effect of "amino-acid imbalance" on growth and vitamin A storage in the white rat. M. Rechcigal, Jr. (Lab. of Biochim., National Cancer Inst., National Institutes of Health, Bethesda, Md.), S. Berger, J. K. Loosli, and H. H. Williams. *Nature* **184**, 1404 (1959). When the intake of vitamin A is controlled, rats are able to store an ample amount of vitamin A in the liver despite amino-acid imbalance or in complete absence of dietary protein. If the vitamin intake is not controlled, however, the lack of or imbalance in the dietary protein may result in a lower storage of vitamin A because under these conditions the animals usually lose appetite which will result in lowered consumption of vitamin A.

Electrophoretic migration of serum lipoproteins in starch gel. H. Kutt, F. McDowell, and J. H. Pert (Neurological Service, Cornell Med. Div., Bellevue Hospital and Dept. of Med., Cornell Univ. Medical Col., N. Y.). *Proc. Soc. Exptl. Biol. Med.* **102**, 38–40 (1959). Human serum lipoproteins were fractionated by starch granule electrophoresis and by sedimentation in the preparative ultracentrifuge, and the isolated fractions submitted to electrophoresis in starch gel. Alpha-2 and beta lipoproteins migrated close to the origin, whereas alpha-1 lipoproteins migrated in the postalbumin region.

Experiments on cholesterol atherosclerosis in rabbits. E. Schwenk, D. F. Stevens, and R. Altschul (Worcester Fn. for Exptl. Biol., Shrewsbury, Mass., and Lab. of Gerontology, Univ. of Saskatchewan, Saskatoon, Canada). *Proc. Soc. Exptl. Biol. Med.* **102**, 42–45 (1959). The feeding of highly purified cholesterol to rabbits for 12 weeks resulted in high serum cholesterol and atherosclerotic lesions which appeared more severe than those obtained with commercial cholesterol. Impurities isolated from mother liquors after treatment of commercial cholesterol with anhydrous oxalic acid in organic solvents did not produce atherosclerotic lesions, but when given together with cholesterol caused less extensive lesions than those obtained with pure or commercial cholesterol.

Changes in human lung collagen and lipids with age. A. M. Briscoe, W. E. Loring, and J. H. McClement (Depts. of Biochem. and Med., Columbia Univ., College of Physicians and Surgeons, Chest Service, Bellevue Hospital, and Dept. of Pathology, N. Y. Univ. Col. of Medicine, N. Y.). *Proc. Soc. Expt. Biol. Med.* **102**, 71–74 (1959). The lipid content of the human lung decreases with age. It is apparently not a function of body size or nutritional state.

Serum lipid analyses in rats fed natural and hydrogenated cottonseed oil with cholesterol and cholate. C. R. Seskind, V. R. Wheatley, R. A. Rasmussen, and R. W. Wissler (Depts. of Pathology and Medicine, Univ. of Chicago School of Medicine, Chicago, Ill.). *Proc. Soc. Exptl. Biol. Med.* **102**, 90–95 (1959). Dietary cholate with cholesterol added to natural and hydrogenated cottonseed oil raised serum cholesterol and phospholipid. This effect was augmented with saturated fat. Dietary lipid saturation or cholate alone had no effect on serum cholesterol. The serum cholesterol/phospholipid ratio was elevated only when both dietary cholate and cholesterol were added to hydrogenated fat. In the rat, highly saturated fat (Iodine No. 43) fed with cholesterol reversed the alpha to beta lipoprotein ratio with beta becoming dominant. Combination of dietary cholate with cholesterol permitted reversal of alpha to beta lipoprotein with moderate (Iodine No. 78) or no hydrogenation (Iodine No. 107) of dietary fat. The serum cholesterol ester fatty acid composition changed with greater saturation of dietary fat and added cholate and cholesterol. High oleic acid levels were noted in serum cholesterol ester fraction of rats fed saturated fat (Iodine No. 78) with cholate and cholesterol. The authors conclude that not only serum cholesterol level but also qualitative and quantitative composition of cholesterol esters, as influenced by dietary factors, is likely to be significant in understanding elevation of serum lipids and deposition of lipids in arteries.

Effect of dietary fat on excretion and deposition of C^{14} from cholesterol-4-C^{14} in rats. J. E. Anderson, Jr. (Dept. of Med., Vanderbilt Univ. School of Med., Nashville, Tenn.), J. G. Coniglio, and Frank R. Blood. *Proc. Soc. Exptl. Biol. Med.* **102**, 155–157 (1959). The influence of a purified diet containing 20% fat as hydrogenated cottonseed oil (Crisco, iodine no. 73), corn oil (Mazola, iodine no. 123), or coconut oil (iodine no. 10) on fecal excretion and tissue deposition of C^{14} has been studied in rats injected with cholesterol-4-C^{14}. There was no significant difference between the three groups in amount of C^{14} excreted from feces or deposited in liver and in pooled internal organs (heart, lungs, aorta, and kidneys).

Effect of neomycin, para-aminosalicylic-acid and other antibacterial drugs on serum cholesterol level of man. P. Samuel (Dept. of Med., N. Y. Univ.—Bellevue Medical Center, Post-Graduate Medical School, N. Y. City). *Proc. Soc. Exptl. Biol. Med.* **102**, 194–196 (1959). Neomycin was given orally to 18 patients at daily dose of 1.5 to 2 g. for 4 to 20 weeks. Mean serum cholesterol levels were decreased significantly in each patient by 17 to 29%, and were maintained low for duration of administration of neomycin. Intramuscular administration to 5 patients for 3 weeks failed to alter serum cholesterol levels. Oral administration of 12 g. of para-aminosalicylic acid to 2 patients lowered serum cholesterol concentrations significantly, while doses of 6 g. had no effect. No appreciable changes in serum cholesterol resulted when phthalylsulfathiazole, isoniazid, dihydrostreptomycin, oxytetracycline, polymyxin B sulfate, bacitracin, and novobiocin were given orally.

EXTENT OF TOTAL HYDROLYSIS OF DIETARY GLYCERIDES DURING DIGESTION AND ABSORPTION IN THE HUMAN. R. Blomstrand, B. Borgström, and O. Dahlback (Depts. of Clinical Chem., Physiol. Chem., and Thoracic Surgery, Univ. of Lund, Sweden). *Proc. Soc. Exptl. Biol. Med.* **102**, 204–206 (1959). Subjects were fed a doubly labeled triglyceride synthesized from linoleic acid-1-C^{14} and glycerol-1-C^{14}. Analysis of thoracic duct lymph lipids indicated that when dietary glycerides reach the thoracic duct lymph in man ⅕ to ½ have been completely hydrolyzed. Within this range, the extent of hydrolysis varies considerably with a tendency to lower hydrolysis during the early period of digestion and absorption.

INTRACELLULAR DISTRIBUTION OF GLYCERIDE SYNTHESIZING SYSTEMS. B. Shapiro and Y. Stein (Hebrew Univ.–Hadassah Med. School, Jerusalem, Israel). *Radioisotopes Sci. Research, Proc. Intern. Conf., Paris,* **1957 III**, 185–91 (Pub. 1958). By the use of 1-C^{14}-palmitic acid in rat, glyceride synthesis was shown to occur concurrently in microsomes and mitochondria, and that the turnover of glycerides at these sites is much more rapid than over-all turnover in the liver. (*C. A.* **53**, 20361)

CHYLOMICRONS AND LIPIDE TRANSPORT. J. H. Bragdon (Natl. Heart Inst., Bethesda, Md.). *Ann. N. Y. Acad. Sci.* **72**, 845–50 (1959). The chylomicron consists of triglycerides with small amounts of cholesterol, phospholipides, and protein. Cholesterol content can be increased in the chylomicron of rat chyle by feeding increased amounts, but phospholipide content cannot. Total lipide content is the same after feeding lecithin as after olive oil, which shows that lecithin is hydrolyzed in the intestine and the fatty acid is incorporated into chylomicron triglycerides and phosphorus-moiety absorbed via the portal vein. Chylomicron protein is synthesized, at least in part, in the intestinal wall. The rate of clearance of chylomicron is independent of nutritional state. However, the $C^{14}O_2$ excretion during 90 minutes after injection of chylomicron containing C_{14} in palmitic acid, is 45% in carbohydrate fed and only 5% in fasting rats. (*C. A.* **53**, 20379)

THE MECHANISM OF CHOLESTEROL ABSORPTION. L. Swell, E. C. Trout, Jr., J. R. Hopper, H. Field, Jr., and C. R. Treadwell (Veterans Admin. Center, Martinsburg, W. Va.). *Ann. N. Y. Acad. Sci.* **72**, 813–25 (1959). The present results suggested that the free cholesterol pool of mucosa in rats expands with large amounts of fed cholesterol. It is approximately 5 to 6 mg., and turns over once in 24 hours in the fasting animal. Examination of the data indicated that a complex of cholesterol and bile salts is formed in the lumen and enters the intestinal wall. A tentative scheme for the mechanism of cholesterol absorption is presented. (*C. A.* **53**, 20378)

EFFECT OF FAT INFUSIONS ON EXPERIMENTAL RABBIT ATHEROSCLEROSIS (WITH REFERENCE TO THE MECHANISM OF GLUCOCORTICOID ACTION ON EXPERIMENTAL ATHEROSCLEROSIS). V. Felt, D. Reichl, S. Roehling, and S. Vohnout (Inst. Cardiovascular Research, Prague). *Gerontologia* **2**, 247–52 (1958). Blood-lipide changes resembling those induced by glucocorticoids were elicited by intravenous infusions of neutral fat and phospholipides. Retrogression of experimental atherosclerosis was effected by infusions of phospholipide emulsions. (*C. A.* **53**, 20352)

THE CHOLESTEROL CONTENT OF RAT LIVER AFTER NUTRITION ON COMMERCIAL FATS. H. Schön and E. L. Kröber (Univ. Erlangen, Ger.). *Naturwissenschaften* **44**, 43 (1957). The following values were obtained from rats fed a hypolipotropic diet containing 20% test fat for the fasts (dietary fat, liver fat content in % of wet weight, total cholesterol in mg./100 g. liver): control, 3.9, 130.3; butter, 10.2, 147.9; olive oil, 9.4, 273.3; cod-liver oil, 4.3, 150.6; cocoa butter, 6.8, 136.7; sunflower seed oil, 6.5, 177.0. (*C. A.* **53**, 20352)

RELATION OF DIETARY FAT AND CHOLESTEROL TO TISSUE AND SERUM CHOLESTEROL AND POLYUNSATURATED FATTY ACIDS IN RATS. V. S. Patil and N. G. Magar (Inst. Sci., Bombay). *Indian J. Med. Research* **47**, 448–55 (1959). Feeding of cholesterol to rats was shown to have a general adverse effect on the metabolism of polyunsaturated fatty acids. (*C. A.* **53**, 20349)

DIETARY FATS AND THE DIABETIC PATIENT. L. W. Kinsell, G. Walker, G. D. Michaels, and Florence Olson (Highland Alameda County Hosp., Oakland, Calif.). *New Engl. J. Med.* **261**, 431–4 (1959). Recent observations indicate that substitution of poly-unsaturated fat for saturated-monosaturated fat is also associated with better diabetic management in terms of blood sugar levels. When a synthetic triglyceride containing 50% each of palmitic and oleic acid was substituted for a calorically equivalent amount of ethyl linoleate, there was a striking rise in blood lipides and in blood sugar, and increased amounts of insulin were needed to control the diabetes in the patient tested. With substitution of safflower oil for the synthetic triglyceride, there was a fall in lipides and a decreased insulin requirement. (*C. A.* **53**, 20348)

ESSENTIAL FATTY ACIDS IN THE ALIMENTATION IN EARLY CHILDHOOD. A. Sinios, G. Nass, and W. Schlüter (Allgem. Krankenhaus St. Georg, Hamburg, Ger.). *Monatsschr. Kinderheilk.* **107**, 309–13 (1959). The fasting lipide content of the serum of very young infants is almost the same as in older children. The post-prandial lipemia after a meal enriched with unsaturated fatty acids was approximately the same as after pure butter fat alimentation. In premature and very young nurslings, who have a relative intolerance to cow's milk fat, the fat absorption was improved by the addition of essential unsaturated fatty acids. (*C. A.* **53**, 20347)

MILK, CHOLESTEROL, AND ARTERIOSCLEROSIS. W. Holden (Univ. Gatz, Austria). *Intern. Dairy Congr., Proc., 15th Congr., London* **1**, 27–33 (1959). Milk contains 12 mg./liter of cholesterol, the lowest of all foodstuffs of animal origin. The body synthesizes 10–20 times the intake of cholesterol on a normal milk diet. Lecithin, and vitamin A inhibit to some extent the deposition of cholesterol on the arterial walls. The lecithin content of milk is 20 times that of cholesterol. The essential amino acids and vitamins of milk contribute to the resistance of the arterial wall to degenerative diseases. Milk fat (50 g.) in a balanced diet leads to a significant decrease of cholesterol in the blood of humans. The metabolism of cholesterol is established by equilibrium of saturated and certain unsaturated acids in the presence of sufficient amounts of lecithin. Milk with its essential nutrients, is helpful in the prevention of arteriosclerosis. (*C. A.* **53**, 20342)

INFLUENCE OF DIETARY FAT ON ENERGY CONSUMPTION AND DIGESTION UTILIZATION OF WEANLING RATS. J. P. Bowland, I. R. Sibbald, R. T. Berg, and N. Hussar (Univ. Alberta, Edmonton). *Can. J. Animal Sci.* **38**, 187–93 (1958). Fat addition to the diet resulted in a significant improvement in nitrogen digestibility and gross nitrogen retention. Nitrogen levels *pe se* did not influence digestible energy consumption, but an interaction existed between fat and nitrogen levels in the diet in relation to digestible energy intake. Efficiency of food utilization improved as either fat or nitrogen levels in the diet increased. (*C. A.* **53**, 20339)

SERUM-CHOLESTEROL LEVELS AND ATHEROSCLEROSIS: EFFECTS OF COMPOSITION OF DIET AND TRIIODOTHYRONINE ON THE RAT. W. F. J. Cuthbertson, P. V. Elcoate, D. M. Ireland, D. C. B. Mills, and Patricia Shearley (Glaxo Labs., Ltd., Greenford, Engl.). *Brit. J. Nutrition* **13**, 227–42 (1959). The addition of cholesterol to a stock diet increased the concentration of cholesterol in the serum by ⅓ and in the liver 2–5 times. Addition of peanut oil to the stock diet greatly increased serum and liver cholesterol. In a high fat diet containing cholesterol, cholic acid, choline chloride, and peanut oil, cholic acid and choline chloride were both necessary to produce maximum concentrations of cholesterol in the serum and liver. Hydrogenated peanut oil was more effective than the raw oil in producing hypercholesterolemia; peanut oil was likewise more effective than corn oil. (*C. A.* **53**, 20446)

SERUM LIPIDES AND LIPOPROTEINS IN HYPERTENSION. Eliel Waris (Univ. Turku, Finland). *Acta Med. Scand.* **161**, Suppl. No. 337, 7–79 (1958). The lipide and lipoprotein levels were determined in the serums of 101 patients suffering from hypertensive disease and of 60 healthy controls. The results were discussed. (*C. A.* **53**, 20436)

NUTRITIVE VALUE OF CRUDE, REFINED, AND HYDROGENATED COTTONSEED OIL. M. Narayana Rao, S. Kuppuswamy, M. Swaminathan, D. S. Bhatia, and V. Subrahmanyan (Central Food Technol. Research Inst., Mysore). *Papers Symposium Cottonseed and By-Products, Hyderabad, India.* Sect. VII, **1958**, 8–15. No significant difference was observed between the growth-promoting value of diets containing 10% of crude, refined, and hydrogenated cottonseed oil or refined peanut oil or cow's ghee in rat metabolism studies. The cottonseed oils were digestible to the extent of 95–8% in the rat. About 70–5% of calcium and 65–70% of phosphorus was untilized by rats fed diets containing 10% of the cottonseed oils. (*C. A.* **53**, 20605)

The biological activities of ε- and ζ-tocopherols. R. J. Ward (Univ. Cambridge, Engl.). *Brit. J. Nutrition* **12**, 226–31 (1958). Natural ε-tocopherol had less than 7.5% of the activity of α-tocopherol, while ζ-tocopherol had about 45%. (*C. A.* **53**, 20337)

Fat content in the diet. L. Krzhikava and K. Oshantsova (Inst. People's Nutrition, Prague). *Voprosy Pitaniya* **17**(6), 12–18 (1958). Fat consumption in Czechoslovakia was investigated in relation to the cholesterol content in blood serum. The results indicated that men consuming meals with fat contents over 30% of the total calories were overweight. Fat consumption in amounts equaling 30% of the total calories is considered good for women up to 40 years old; fat consumption by women over 40 years old should be decreased to 25% of the total calories. The serum cholesterol depends on sex and age. In women from 10–80 years old, the serum cholesterol increased continuously with age from 149 to 212 mg. %. In men from 10–40 years old, serum cholesterol increased from 146 to about 200, then dropped continuously with the age (from 40 to 80 years) to about 146 mg. %. Obese persons and persons doing mental work had a somewhat higher serum cholesterol. (*C. A.* **53**, 20355)

Structure and homogeneity of the low-density serum lipoproteins. F. T. Lindgren, A. V. Nichols, T. L. Hayes, N. K. Freeman, and J. W. Gofman (Univ. of California, Berkeley). *Ann. N. Y. Acad. Sci.* **72**, 826–44 (1959). The average lipide composition of the 3 broad lipoprotein classes in the serum of 9 fasting adults was determined. Great variations were found in glyceride, free cholesterol, and cholesteryl esters due to differences in lipoprotein distribution. In the S_f 20–400 band the dominant lipide was glyceride. Analysis of narrow band S_f 6–7 lipoprotein fractions showed greater uniformity of composition although considerable variability remained. Lipoproteins of high S_f (400–75,000) are apparently converted to those of lower S_f values by glyceride hydrolysis and fatty acid removal. A low density lipoprotein model with a simple glyceride core containing small amounts of cholesterol, cholesteryl ester, and phospholipides is proposed. Electron microscope studies indicate that these lipoproteins (S_f 6–8) are composed of 2 or 3 asymmetrical subunits approximately 350 A. in length with molecular weights from 2.8 to 3.1×10^6. Calculations from dissymmetry data yield prolate ellipsoids approximately 160 × 360 A. rather than the spherical shape given for chemically isolated lipoprotein (S_f 2–10). (*C. A.* **53**, 20379)

Supplementary value of low-fat cottonseed flour to poor vegetarian diets based on certain cereals. K. Krishnamurthy, A. J. Pantula, M. Narayana Rao, M. Swaminathan, Y. K. Raghunada Rao, and V. Subrahmanyan (Central Food Technol. Research Inst., Mysore). *Papers Symposium Cottonseed and By-Products, Hyderabad, India* **1958**, Sect. VI, 51–7. The supplementary value of alcohol-extracted cottonseed flour to poor vegetable diets based on wheat, ragi, rice, and jowar as determined by the rat-growth method showed that cottonseed flour, when incorporated at a 10% level in the diet, had a marked value to diets based on ragi and jowar and only a moderate value to rice and wheat diets. The protein efficiency ratio of the proteins of alcohol-extracted cottonseed flour at a 10% level was found to be slightly superior to those of expeller pressed meal. The proteins of cottonseed flour supplemented to a marked extent the proteins of wheat and jowar as measured by rat growth. (*C. A.* **53**, 20325)

Dietary fat and cholesterol metabolism: effects of unsaturation of dietary fats on liver and serum lipides. Ruth Okey, M. M. Lyman, Anne G. Harris, Betty Einset, and W. Hain (Univ. of California, Berkeley). *Metabolism, Clin. and Exptl.* **8**, 241–55 (1959). The following fats were fed 7 weeks to weanling rats at a concentration of 10% in an adequate synthetic diet: menhaden, safflower, corn, soy, straight and hardened cottonseed, peanut, olive, lard, coconut, and butter oils, butterfat, and shortening. Each fat was given to 2 groups of 10 males and 10 females; in addition, one group also received 1% cholesterol in the diet. No significant effects on growth were noted among these fats. In general lower liver cholesterol contents were found in rats fed fats of low iodine number, and vice versa. Females fed cholesterol tended to have higher serum cholesterol levels and lower liver cholesterol concentrations than did males. Very high serum cholesterols were seen only in females fed safflower, cottonseed, olive, and coconut oils. The fatty acid moiety of the liver cholesterol esters reflected the composition of the dietary fat, though the % of cholesterol linoleate was always lower than that of linoleate in the diet; oleic acid was always an important constituent of the ester. (*C. A.* **53**, 20351)

Rapeseed oil meal as a protein supplement for swine and rats. I. Rate of gain, efficiency of food utilization, carcass characteristics, and thyroid activity. N. Hussar and J. P. Bowland (Univ. Alberta, Edmonton, Can.). *Can J. Animal Sci.* **39**, 84–93 (1959). Diets containing 0, 2, and 10% expeller-extracted Argentine-type rapeseed oil meal were fed to swine from 3 weeks of age to market weight of 195 lb. and to rats from 3 weeks to 6 months of age. The 10% level depressed the rate of weight gain and, in some cases, the efficiency of feed utilization in both species. Total weight, histological sectioning, and I^{131} turnover rate of the thyroid gland indicated hypertrophy and other abnormalities on animals fed the 10% rapeseed oil meal ration. Animals fed the 2% rapeseed oil meal showed no clear-cut toxic effects.

II. Energy and nitrogen digestibility and nitrogen retention. *Ibid.* 94–101. The 10% rapeseed oil meal depressed apparent digestibility of the dry matter, energy, and nitrogen with significant effects occurring only in rats. The 2% level did not affect digestibility. Retention of digestible nitrogen was not altered by the level of rapeseed of oil meal in diet. Female rats are more susceptible to toxic symptoms of rapeseed oil meal than males. (*C. A.* **53**, 20340)

• Paints and Drying Oils

Tobacco oil in the production of varnishes. G. Balbi. *Olearia* **13**, 118–27 (1959). A monograph reviewing and discussing the distribution of *Nicotiana tabacum*, chemical and physical properties of the oil, and the oil's use as a standoil and in the manufacture of varnishes, alkyd resins, and inks. (*C. A.* **53**, 20833)

Synthetic resin paints. Teikichi Yamada (Cashew Co., Ltd., Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 435–41 (1959). A review.

Glyceride oil gel paints. J. Rinse (J. W. Ayers & Co.). *U. S. 2,911,316.* Thixotropic paint and varnish bases are produced by gelling a hydroxylated glyceride drying oil by reacting it with a small amount of aluminum compound. Bodied linseed oil, for example, is heated with 3% of hydroxy isopropoxy aluminum stearate solution in mineral spirits.

Reacting phenylalkoxy siloxanes with higher fatty alcohols. M. M. Olson and R. M. Christenson (Pittsburgh Plate Glass Co.). *U. S. 2,911,386.* Liquid coating material suitable for baked finishes is prepared by heating a liquid phenylalkoxypolysiloxane (alkoxy group containing 3 to 6 carbon atoms) with a high molecular weight alcohol (11 to 18 carbon atoms) until ester interchange is complete. The material may also be used as a modifier for an alkyd resin.

Preparation of drying oil by modification and copolymerization of soybean oil with a vinyl monomer. A. Schwarcman (Spencer Kellogg and Sons, Inc.). *U. S. 2,912,396.* The film forming characteristics of soybean oil are improved by first heating the oil with pentaerythritol (1% to 7% on weight of oil) at a temperature of 400° to 500°F. When alcoholysis is complete, a like amount of maleic anhydride is added and heating is continued until an oil of low acid number and a Gardner-Holdt viscosity in the range of H to Z2 is produced. The modified oil (40 to 60 parts by weight) is then heated with 60 to 40 parts by weight of vinyl toluene at temperatures of 300° to 600°F. in the presence of a catalytic amount of an organic peroxide until copolymerization is effected and a fast drying oil is produced.

• Detergents

Surface-active substances in food processing—some biochemical and pharmacological aspects. F. Aylward (Borough Polytech., London). *Chem. & Ind.* (London) **1959**, 524–30. A review with 40 references. (*C. A.* **53**, 14363)

Wetting of low-energy solids by aqueous solutions of highly fluorinated acids and salts. Marianne K. Bernett and W. A. Zisman (U. S. Naval Research Lab., Washington, D. C.). *J. Phys. Chem.* **63**, 1911–16 (1959). Wettability studies of aqueous solutions of several series of pure, highly fluorinated, aliphatic acids and salts were carried out on two low-energy organic solids, polyethylene and Teflon. As anticipated, the fluorinated compounds were able to depress the surface tension of water below the critical surface tension of

Teflon, and were therefore capable of completely wetting it. In contrast, conventional hydrocarbon wetting agents do not depress the surface tension of water to this extent.

DETERMINATION OF LAUNDERING PROPERTIES OF DETERGENTS BY COLLOIDAL-CHEMICAL METHODS. P. A. Demchenko. *Masloboino-Zhirovaya Prom.* 25(7), 36–9 (1959). A comprehensive review of literature and some of the experimental data are presented to show the interrelationship between the critical micelle concentration (CMC), solubilization, and laundering properties of Na soaps of natural and synthetic fatty acids, alkyl sulfates, alkylarenesulfonates, and nonionic detergents. There is a direct relationship between the solubilization properties of a detergent and its activity as an emulsifying and thickening agent. 16 references. (*C. A.* **53**, 20848)

APPLICATION OF P-TOLUIDINE METHOD FOR THE DETERMINATION OF SODIUM SALTS OF ALKYL SULFATES IN SYNTHETIC LAUNDERING AGENTS. I. K. Getmanskii. *Masloboino-Zhirovaya Prom.* 25(7), 29–31 (1959). Application is described of *p*-toluidine titration method of Stupel and Segesser to the determination in synthetic pastes and powders of alkyl sulfate salts of secondary synthetic alcohol fractionated from synthol at 275–320°, or sperm whale fat. (*C. A.* **53**, 20848)

THE USE OF ION-EXCHANGE RESINS FOR THE SEPARATION OF SURFACE-ACTIVE SUBSTANCES WITH SPECIAL REFERENCE TO CATIONIC AND NONIONIC COMPOUNDS. H. Hempel and H. Kirschnek. *Fette, Seifen, Anstrichmittel* **61**, 369–74 (1959). The new porous cation-exchange resins Lewatit CN 206, based on polyacrylic acid, can be used for the quantitative separation of cation-active and nonionic compounds. It can also be used to separate some anionic and nonionic compounds. (*C. A.* **53**, 20846)

MECHANISM OF DETERGENCY. A. S. C. Lawrence (Univ. Sheffield, Engl.). *Nature* **183**, 1491–4 (1959). The author suggests that detergency is not brought about by free surface-energy phenomena but by cryoscopic forces only. This is interpreted by means of phase diagrams of soap-water-amphiphile systems, microphotographs, etc. (*C. A.* **53**, 20848)

SODIUM ALKYLARENESULFONATES AS STANDARD SUBSTANCES IN DETERGENT CHEMISTRY. E. Q. Laws and W. Hancock (Gov't Lab., London). *Nature* **183**, 1473–4 (1959). To establish standards for detergent testing, Na sulfonates of straight-chain substituted benzene hydrocarbons from butylbenzene to tetradecylbenzene were synthesized from the fatty acids with even number of C atoms. The branched-chain α-dimethyldecylbenzenesulfate was also prepared. Their behavior in solutions was studied by using the methylene blue method and by paper chromatography. Optical density multiplied by molecular weight gave a result of approximately 346, in the series from *n*-octylbenzene upwards. Values of R_f for paper chromatography of the octyl, decyl, dodecyl, and tetradecyl derivatives in various alcohol-water mixtures are tabulated. (*C. A.* **53**, 20848)

SILICATES IN DETERGENTS. W. L. Schleyer (Philadelphia Quartz Co., Philadelphia, Pa.). *Soap Chem. Specialties* **35**(11), 51–4; (12) 66–7, 146 (1959). Alkali silicates are effective detergents by virtue of their surface activity and their high negative electric charge. This can be demonstrated by testing their soil suspending power, their capacity to remove soil from test swatches, their ability to prevent deposition and redeposition, their emulsifying and wetting action, and other specific functions encountered in the washing process. Alkali silicates are also detergent builders because, in addition, they provide alkalinity, buffer capacity, and corrosion protection. Although silicates do not form soluble complexes with water hardness, they may be used in major portion as builders of spray-dried household detergent products to furnish equal detergency at lower cost. Spray-dried products containing sodium tripolyphosphate are said to be more easily produced in acceptable form in the presence of silicate. In both liquid and spray-dried heavy duty detergents, stability is improved by more nearly equalizing silicate solids and phosphate contents. 25 references.

THE CORROSION OF ZINC CAUSED BY MODERN DETERGENTS. H. Stupel (Dutch Shell, Hague, Holland). *Soap, Perfumery, Cosmetics* **32**, 1111–18 (1959). The corrosive effect on zinc of various detergents has been studied. In hard water the corrosion of zinc is less than in soft water, since calcium clearly counteracts corrosion. The effects of the various detergent components also vary. Silicates are protective substances; sulfates, carbonates and orthophosphates, inert; chlorides and chlorites mildly corrosive; while polymeric phosphates and perborates are actively corrosive and the active detergent component itself has little corrosive action.

DETERMINATION OF ALKYLARENESULFONATES BY PHOTOMETRIC TURBIDITY TITRATION. R. Wickbold. *Seifen-Ole-Fette-Wachse* **85**, 415–16 (1959). When a dilute solution of a cationic surface-active agent is added to a similar solution of an anionic surface-active agent, a turbidity appears which, in case of alkylarenesulfonates (I) and sulfosuccinic acid esters (II), reaches a maximum at the equivalent point. In titration of I or II with a cationic surface-active agent, photometric determination of the turbidity maximum offers a means for end-point detection. Thus, I was determined by placing the titration vessel, containing from 25–30 mg. I in 70–100 ml. H_2O, in a specially designed titration photometer, and titrating with 0.04 *N* hexadecylpyridinium chloride solution with an ultramicro piston-type buret of 3 ml. capacity. The method is accurate within ± 0.2% and very fast. It is limited to I and II because fatty alcohol sulfates do not show a turbidity maximum, and with alkyl sulfonates no turbidity develops. Organic solvents and nonionic surface-active agents interfere. Inorganic salts cause low results (addition of 100 mg. Na_2SO_4/30 mg. I. resulted in a 3% negative error). (*C. A.* **53**, 20846)

THE INTERACTION BETWEEN COLORS AND SURFACTANTS. Tamotsu Kondo (Musashi Univ., Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 181–5 (1959). A review with 11 references.

THE EFFECT OF SURFACTANTS ON LUBRICATION. Yasukatsu Tamai (Aeronautical Research Inst., Univ. Tokyo). *Yukagaku* (J. Japan Oil Chemists' Soc.) **8**, 2–7 (1959). A review with 28 references.

LIQUID SOAP COMPOSITION. Lillian L. Golub and H. S. Sylvester (Colgate-Palmolive Co.). *U. S. 2,912,385.* 2-Mercaptobenzothiazole or an alkali metal salt thereof is incorporated in potassium liquid soaps to render them non-corrosive to copper and copper base alloys.

LIQUID DETERGENT COMPOSITION. M. N. Fineman and C. G. Gebelein (Rohm & Haas Co.). *U. S. 2,913,416.* A liquid dishwashing detergent that has a high cloud point and that exhibits excellent detergency on glass, metal and plastic, with little or no foam consists of about 10% of the benzyl ether of octylphenoxypolyethoxyethanol containing sixteen ethoxy units, about 15% of the sodium salt of a fatty acid containing twelve to eighteen carbon atoms, about 7% tetrapotassium pyrophosphate, and water to make up to 100%.

DETERGENCY COMPOSITION. L. E. Weeks (Monsanto Chem. Co.). *U. S. 2,913,417.* A surprising synergistic effect has been produced in the detersive efficiency of detergent compositions consisting of the combination of alkylolamides of tall oil fatty acids and the condensation products of ethylene oxide and an alcohol produced by the Oxo process, particularly tridecyl alcohol.

HEAVY DUTY DETERGENT. M. Kopp (General Aniline & Film Corp.). *U. S. 2,914,482.* The combination of a nonionic surfactant together with appropriate quantities of carboxymethyl cellulose and an alkanolamine produces a heavy duty liquid detergent which yields a small amount of suds to prevent overflow from a dishwashing machine and at the same time a more powerful cleansing effect.

SURFACE-ACTIVE AMPHOTERIC COMPOUNDS. K. Frank (Farbwerke Hoechst Akt.-Ges. vorm. Meister Lucius & Bruning). *Ger. 1,013,289.* The condensation products of 3–30 moles ethylene oxide (I) with alcohols or phenols containing at least 6 C atoms are treated with aminocarboxylic acids after substitution of the terminal OH groups of the condensate with halogen, thus preparing amphoteric surface-active compounds. Thus, 1 mole of the ω-chlorocompounds of the condensation product of iso-AmOH with 5 moles I was treated with 1 mole N-methyltaurine and heated to 150–5° until 1 mole Cl was removed from the waxlike reaction product, which is a good deemulsifying agent. Similar products were obtained with sarcosine as the amino acid and a chlorinated polycondensate of triisobutylphenol and I. (*C. A.* **53**, 20850)