

TABLE II
Iodine Number of Tung Oil by Various Procedures

Method	Iodine number
Wijs.....	162.0
Woburn.....	239.8
Benham-Klee.....	249.3
Plank-Pack-Goldblatt.....	241.8
Hypochlorous acid.....	242.1
Clorox.....	241.9
Catalytic hydrogenation.....	241.6

TABLE III
Iodine Number of Fatty Acids with Conjugated Double Bonds

Acid	Theoret-ical	HO Cl	Clorox	Hydro-genation method
Beta-eleostearic acid.....	273.8	273.7	273.5	272.3
9:10, 11:12 Linoleic acid.....	181.03	181.3	181.6	181.6

The iodine numbers of β -eleostearic acid and isomerized 9:10, 11:12 linoleic acid were determined by the hydrogenation method, by the hypochlorous acid method, and

by using Clorox. β -Eleostearic acid was prepared by the method of Thomas *et al.* (4), and linoleic acid was isomerized with 7.5% KOH in glycerine by heating in a constant temperature isomerization bath at 180°C. for 1 hr. The isomerized acid was extracted with ether from the acidified reaction product, the ethereal layer was washed and dried, the solvent was evaporated off in a current of nitrogen, and the iodine number was determined by the above-mentioned method. Results are shown in Table III.

The results indicate that the present method of using Clorox for the determination of unsaturation of fats and oils is a very satisfactory one.

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4. Thomas, A. W., and Thompson, J. C., J. Am. Chem. Soc., **56**, 898 (1934).

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ABSTRACTS R. A. REINERS, Editor

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• Fats and Oils

DEHYDRATION OF CASTOR OIL WITH CATALYSTS CONTAINING MORE REACTIVE GROUPS. V. A. Saraf and K. K. Dole (Ferguson Coll., Poona). *Indian J. Appl. Chem.* **22**, 1-5 (1959). The rate of dehydration of castor oil increases with the number of acidic groups in the catalyst, the order of increase being: benzene-, phenol-, and naphthalene-monosulfonic<disulfonic<trisulfonic<heteropoly acids. A lower temperature of dehydration (200-230°) and a reduction of side reactions occurred with increase in reactive groups. The introduction of hydroxyl in 1,3,5-benzenetrisulfonic acid mitigated hydrolysis and decomposition of the oil, while the naphthalene nucleus decreased the activity of the catalyst. Of the three heteropoly acids studied, phosphomolybdic was the least active. (*C. A.* **54**, 1897)

HEAT TRANSFER IN HOT FAT COOKING. H. L. Smith, Jr. (Horace L. Smith, Jr., Inc., Richmond, Va.). *Food Tech.* **14**, 84-8 (1960). An indirect method of hot fat cooking substantially reduces heat damage to the cooking fat and rate of increase of free fatty acids. It also offers precise temperature control, fuel savings, safety, and comfort. Where more than one cooker is required in the same plant, one heat generator can be used to supply as many cookers as may be needed and each cooker can be operated at its own temperature.

ESSENTIAL FATTY ACID RETENTION IN FLOUR TREATMENT. J. B. M. Coppock, N. W. R. Daniels, and P. W. Russell Eggitt (Spillers Ltd. Technological Research Sta., Cambridge). *Chem. & Ind.* **1960**, 17-8. Normal treatments of flour with chlorine dioxide alone or containing up to 30% chlorine (3.5 g. per sack) have no effect on the essential fatty acid content of the flour. At the higher levels (35.0 g. per sack) of chlorine dioxide treatment, although little change was observed in the essential fatty acid content of freshly treated flour, considerable destruction of all unsaturated fatty acid was found in the aged flour. High levels of chlorine treatment (175 g. per sack) caused some essential fatty acid destruction and may produce dichlorostearic acid.

LACTONES FORMED DURING THE OXIDATION OF PARAFFIN. N. I. Ladyzhnikova and T. I. Sudarikova. *Masloboi'no-Zhivotovaya Prom.* **25**(7), 39-40 (1959). The lactones in the synthetic fatty acids from oxidized paraffin fraction, boiling at 360-460°, were determined. Fractional distillation of the lactone concentrate yielded two fractions, one contains γ -lactone 91% and β -lactone 8%, the other mostly γ -lactone. (*C. A.* **54**, 1281)

REACTION FOR DETECTION OF PURE COMPONENTS IN NATURAL OLIVE OIL. E. Sinodinos and Zis. E. Konstans. *Prakt. Akad. Athenon* **32**, 493-503 (1957) (in Greek). Color reactions for

olive seeds, kernels, and refined olive oils are described. (*C. A.* **54**, 771)

PHYSICAL TESTS FOR EVALUATING THE CONSISTENCY OF MARGARINES. M. Naudet and E. Sambuc (Lab. natl. matières grasses, Marseilles, France). *Grasas y aceites* (Seville, Spain) **10**, 20-3 (1959). Rheological tests of margarines are evaluated for reproducibility and correlation with ease of spreading. The tests (micropenetration, cone penetration, extrusion, and resistance to cutting) show good reproducibility. Extrusion is considered best for evaluation of ease of spreading. (*C. A.* **54**, 771)

USE OF GAS CHROMATOGRAPHY AND MASS SPECTROSCOPY IN THE ANALYSIS OF THE FATTY ACIDS FOUND IN BUTTER AND MARGARINE. B. Hallgren, S. Steinhagen, and R. Ryhage (Univ. Göteborg, Swed.). *Acta Chem. Scand.* **12**, 1351 (1958). Although under standardized operational conditions in gas chromatography the retention volume or retention time is characteristic of a certain component, when investigating mixtures of several components it is necessary to use additional identification methods. By collecting fractions coming from the gas chromatography columns and identifying their components by mass spectrometry, complex mixtures of fatty acids present in butter and margarine can be analyzed. (*C. A.* **54**, 770)

STEROL FROM THE SEEDS OF PSORALEA CORYLIFOLIA. H. N. Khastgir, P. C. Datta Gupta, and P. Sengupta (East India Pharm. Works Ltd., Calcutta). *Indian J. Appl. Chem.* **22**, 35-6 (1959). From the seed fat of *Psoralea corylifolia* a crystalline sterol identified as stigmasterol has been isolated. The sterol's identity was confirmed by conversion to the acetate and benzoate. (*C. A.* **54**, 928)

APPLICATION OF CAPILLARY ANALYSIS TO THE STUDY OF OLIVE AND OTHER VEGETABLE OILS. S. Servent Martinez (Eseuele Oleiculture, Barcelona). *Grasas y aceites* (Seville, Spain) **10**, 14-9 (1959). Size of drops of alkaline solutions when allowed to run into benzene solution of vegetable oils is dependent upon the composition of the oils. The method can detect the presence of a small amount of one oil in the presence of a large amount of another. (*C. A.* **54**, 928)

A NEW PROCEDURE FOR SEPARATING β -LINOLEIC ACID FROM OTHER UNSATURATED FATTY ACIDS. Chinese Academy of Medicine, Shanghai First Medical College. *Hua Hsieh Shih Chieh* **1959**, 286-7. The tetrabromide of β -linoleic acid is separated from the dibromide of oleic in a mixture by evaporating the solvent, petroleum ether, and crystallizing at 5-8°. The brominated β -linoleic acid is recrystallized in 95% ethanol, resulting in colorless, lustrous crystals, melting at 54-7°. (*C. A.* **54**, 928)

UNSATURATED FATTY ACIDS AND THEIR IMPORTANCE IN OLIVE OIL ANALYSIS. Lys Ninnis and Maria Birbili-Ninnis. *Prakt. Akad. Athēnōn* 33, 103-11 (1958) (in Greek). Spectrophotometric analysis of 46 samples of native olive oils gave values in the range 1.63-13.6 and 0.09-1.04%, respectively, for linoleic acid and linolenic acid in 99.7% of the cases. Two absorption units of 233 and 270 $m\mu$ were established as minimum and maximum, respectively, for alkali isomerized samples. The specific absorption coefficients expressed as $E^{1\%}_{1\text{cm}}$ at these wave lengths were determined from measurements on 0.2 g. of the oil in 5 ml. of circulating solution. These values were, respectively, 0.30-0.302 at 270 $m\mu$, and 1.30-4.50 at 233 $m\mu$. Adulteration with other oils may be suspected if linoleic acid is $>11.6\%$, and the coefficient of absorption is >0.257 . (C. A. 54, 927)

MODE OF FRACTIONATION OF CHAULMOOGRA OIL FATTY ACIDS WITH UREA. T. N. Mehta and S. B. Dabhadre (Univ. Nagpur). *Grasas y aceites* (Seville, Spain) 10, 24-6 (1959). Chaulmoogra oil (iodine number 100.5) is separated into five fractions by the use of urea. Iodine numbers of the fractions are, respectively, 74.4, 90.8, 98.9, 116.1, and 135.2. Increasing unsaturation and chain length interferes with complex formation. One double bond decreases effectiveness of complex formation as much as five carbon atoms. (C. A. 54, 927)

POTENTIOMETRIC SEMI-MICRO-DETERMINATION OF SAPONIFICATION NUMBER. P. A. Gutiérrez Amo and D. Martín (Inst. L. Torres Quevedo, Madrid). *Grasas y aceites* (Seville, Spain) 10, 12-3 (1959). Saponification number of fat samples, as small as 0.4 g., is determined by using 0.5N hydrochloric acid in 96% alcohol for titration. (C. A. 54, 925)

FAT DETERMINATION IN MAYONNAISE. W. Diemair and M. Salvisberg (Univ.-Inst. Lebensmittelchemie, Frankfurt and am Main, Ger.). *Z. Lebensm.-Untersuch. u.-Forsch.* 110, 366-71 (1959). The method of Hadorn and Jungkuntz (C. A. 46, 1175c) gives a high average value with small deviations from any single value, and practically all the lecithin is extracted. This method is recommended with drying the extract at 50° in *vacuo* for 1 hour. (C. A. 54, 1764)

STORAGE AND PRESERVATION OF FATTY FOODS. N. S. Kapur and H. C. Srivastava. *Food Sci.* (Mysore) 8, 257-62 (1959). A review with 68 references. (C. A. 54, 1762)

REFINING AND HYDROGENATION. THEIR ROLE IN THE ECONOMY OF ALIMENTARY FATS. R. Feron. *Inds. aliments et agr.* (Paris) 76, 435-40 (1959). The effect of microorganisms on crude oil from grains is discussed. The process of refining, products obtained during the refining process, and hydrogenation after the refining has been completed are described. (C. A. 54, 1762)

MOLECULAR FRACTIONAL DISTILLATION OF COCONUT OIL AND HYDROGENATED COCONUT. M. Naudet, E. Sambue, J. Pasero, and P. Desnuelle (Lab. Nat. Matières Grasses, Marseille). *Bull. soc. chim. France* 1959, 713-21. Molecular distillation of coconut oil and hydrogenated coconut oil at 0.002 mm. pressure yielded mixed triglycerides which can be distilled over completely below 220°; the residue does not decompose appreciably. Each fraction is a mixture of glycerides containing carbon chains of different lengths forming mixed crystals, as is evidenced by the narrow melting point range of each fraction; the acids range from C₈ to C₁₈, with lauric the predominant acid. (C. A. 54, 1898)

APPLE SEED OIL. Seiji Wakayama, Satoshi Namba, and Masami Takahashi (Hokkaido Gakugei Univ.). *J. Hokkaido Gakugei Univ.* 7, 98-100 (1956). Apple seed contains 13-15% semi-drying oil chiefly composed of C₁₈ acids. The solid acids (14%) are principally palmitic and stearic acids. The liquid acids (86%) comprise oleic, linoleic, and a small amount of C₂₀-acids. The latter contain 1 and 2 double bonds. (C. A. 54, 1897)

CONJUGATED FATTY ACIDS. IV. EFFECT OF ULTRAVIOLET IRRADIATION ON THE CONJUGATED FATTY ACIDS. Mitsuo Kayama and Yasuhiko Tsuchiya. (Tohoku Univ., Sendai). *Tohoku J. Agr. Research* 9, 251-62 (1959). Diene, triene, tetraene, pentaene, and hexaene conjugated fatty acids obtained by alkali-isomerization of cod liver oil, tung oil, and ethyl α -eleostearate were irradiated with ultraviolet rays. After 3 hours' irradiation, the conjugated structure was destroyed, except for the diene. Compounds derived from the ultraviolet irradiated fatty acids are not completely known. (C. A. 54, 1897)

THE CHEMICAL CHANGES OF LINSEED OIL FATTY ACID ETHYL ESTER DURING PYROLYSIS. J. Axt (Inst. Medizin Biol., Berlin-Buch, Ger.). *Nahrung* 3, 18-41 (1959). If heated with the exclusion of oxygen to 360° in mixtures with or without iron, linseed oil fatty acid ethyl esters are subject to different reactions. The polymerizates formed are predominantly dimeric or

trimeric. The cleavage products originating from the reactions are rich in double bonds and volatile, containing acids, alcohols, aldehydes, and ketones. The gaseous cleavage products consist primarily of C₂H₄ and CO₂, small quantities of CO, H₂, CH₄, C₂H₆, propylene, butylene, and butadiene. The reaction affects mostly unsaturated fatty acids, especially linoleic acid. The newly formed substances contain only isolated double bonds. The *cis* olefins change into the *trans* form during heating. The infrared spectrogram suggests the possibility of a formation of a cyclic monomer of the cyclohexane type; the addition of iron is antagonistic to this process. The formation of a ketone from 2 moles of fatty acid with a splitting off of CO₂ and water is catalyzed by iron. The addition of iron inhibits the loss of double bonds during heating, and promotes the polymerization processes, the formation of the constituent parts of the pyrolysis fraction which cannot be distilled, and the cleavage of CO₂, and thus ketone formation. (C. A. 54, 1280)

A MODIFIED PRILL AND HAMMER METHOD FOR THE DETERMINATION OF DIACETYL IN BUTTER. J. C. de Man and E. Brandl (Netherlands Inst. Dairy Research, Ede). *Neth. Milk Dairy J.* 13, 199-205 (1959). The modified method had a standard deviation of 2.1 γ diacetyl/25 g. butter. The recovery was 95.7% (C. A. 54, 1762)

DETERMINATION OF DIACETYL IN BUTTER. E. Brandl and J. C. de Man (Netherlands Inst. Dairy Research, Ede). *Neth. Milk Dairy J.* 13, 206-11 (1959). The standard deviation of the Pien-Brandl method was 1.9 γ diacetyl/25 g. butter. The recovery was 95.8%. (C. A. 54, 1762)

INFLUENCE OF MILK PHOSPHOLIPIDES ON AUTOXIDATION OF BUTTERFAT. W. Haab (Milchtech. Inst. Hochschule, Zurich, Switz.). *Milchwissenschaft* 14, 16-18 (1959). Butteroil unbleached and bleached without the unsaponifiable materials (α -tocopherol, β -carotene, and cholesterol) served as substrates for the study of the effect of the unsaponifiable materials and milk phospholipides on the initial rate of oxidation of milk fat as measured by the ferrithiocyanate method at 50°. α -Tocopherol (36 γ /g.) increased the induction period of bleached butteroil without unsaponifiables 15%, whereas β -carotene (7.1 γ /g.) decreased it 12%. Both cholesterol (7.1 γ /g.), which decreased the induction period 3%, and carotene diminished the anti-oxidant effect of tocopherol in proportion to their prooxidant activity. Of the milk phospholipides, 0.1% cephalin, which increased the induction period of bleached butteroil without unsaponifiables 103%, exerted the strongest effect. Lecithin had only a slight antioxidant action. Cephalin (0.1%) in combination with tocopherol (36 γ /g.) produced the strongest retardation, corresponding to an increase in the induction period from 91 to 310 hours. Sphingomyelin was without influence on the rate of oxidation. Cholesterol and carotene weakened the action of both cephalin and the combination cephalin and tocopherol. The retarding effect of cephalin increased as the concentration was increased from 0 to 0.80%; then as the concentration was increased to 2.00%, the effectiveness was gradually lost. L- α -Dimyristoylphosphatidylethanolamine (0.80%) increased the induction period of bleached butteroil without unsaponifiables 339%; 1.60% increased it 289%; and 2.00% decreased the induction period 2%. (C. A. 54, 1761)

THE DEFINITION AND CLASSIFICATION OF WAXES. C. Ludecke (Dervio, Italy). *Fette Seifen Anstrichmittel* 61, 999-1001 (1959). The author deals with the modern definition of waxes which has been published in the Official Methods of the DGF. This definition takes into consideration their technological properties only but does not take their origin and chemical constitution into account. To supplement his postulations on the classifications he draws from the work of F. Gieser. The allotment of the waxes of berries and fruits in the classification is explained.

SULPHURISED OILS III: SULPHURISING OF LINSEED OIL WITH S₂CL₂ AND SULPHUR. G. Schiemann, H. Düring, and F. Volwinkel (Inst. Tech. Chem., Hannover). *Fette Seifen Anstrichmittel* 61, 913-917 (1959). In continuation of the series of publications on the subject, the authors give the details of manufacturing conditions and application characteristics of sulphurised oils, which are prepared with the aid of S₂CL₂ and elementary sulphur. The oils obtained are compared with one another, specially concerning the change brought about in their properties through the replacement of S₂CL₂ by sulphur. The swellability and the resistance of the sulphurised products to alkali and ultraviolet radiation is also discussed.

STUDIES ON THE SPREADING TEST OF SKIN TALLOW. G. Hopf and A. Winkler (General Hospital, Heidelberg). *Fette Seifen Anstrichmittel* 61, 974-77 (1959). Measurements of the skin

fats in the region of the capillitium with the aid of the spreading test gave different values in different age groups. Surface active free fatty acids were responsible for the workability of the spreading test. The conclusions reached were based on the observations of the unchanged tallow, which has not been acted upon by esterases, e.g., in tallow cysts and in the deeper regions of the comedones possess very low spreading values. On the other hand, the spreading values are higher in the upper parts of comedones because of the presence of free fatty acids.

A STUDY OF ONGOKEA OIL. F. Pouliquen (I.T.E.R.G., Marseille). *Oleagineux* 14, 453-59 (1959). Methyl esters of ongokea oil were prepared and were separated into groups according to unsaturation and degree of hydroxylation. Silica gel columns were used and benzene, methanol, and ethanol were employed as eluting agents. Only 2.5% of saturated esters and 8.8% of ethylenic esters were found. The remaining esters were 40-50% hydroxylated acetylenic esters and about 30-40% of non-hydroxylated acetylenic esters. The presence of isanolic and isanic acids were confirmed.

NEW TYPES OF FATTY SUBSTANCES AS OINTMENT BASES IN PHARMACEUTICALS. A. W. Awe (Inst. for Pharmaceutical Tech., of the Tech. Inst., Brunswick). *Fette Seifen Anstrichmittel* 61, 978-85 (1959). The author gives a short survey of the application of new types of fatty substances and ointment bases for the pharmaceutical industry in the light of the third supplement of the German Pharmacopoeia. The possibilities of processing of new types of ointment bases are discussed and summarized in tabular form.

THE INFLUENCE OF PRESSING ON THE QUALITY OF VEGETABLE MARROW OIL. G. Gorbach and P. Stranger-Johannessen (Inst. for Biochemical Tech., Graz). *Fette Seifen Anstrichmittel* 61, 1001-05 (1959). As model experiments under the customary conditions of oil expelling show, the greater power of adhesion of vegetable marrow oil on salads, cannot be explained by the fact that it is due to low pressure pressing. The investigations show that the iodine value, surface tension, and the viscosity of the oil do not undergo a change with the change in the method of roasting and pressing. The authors have tried roasting up to 230° and found that the oil extracted does not appreciably differ in taste from the common oil. Use of higher temperatures facilitates the oil extraction; the amount of turbidity in the oil is reduced. This is considered to be an important factor as this edible oil is not refined.

THE INFLUENCE OF INTERESTERIFICATION ON THE CRYSTALLIZATION OF FATS. E. Becker (Margarine Union Co., Hamburg). *Fette Seifen Anstrichmittel* 61, 1040-46 (1959). Because of random interesterification the redistribution of the fatty acids within a triglycerides molecule leads to a change in its melting point and crystallization behaviour. The melting characteristics have been followed by means of dilatometric determinations, colorimetric differential analysis, and fractional crystallizations. The crystallographic studies, which were first carried out with pure triglycerides as model substances, show that the interesterification of fats results in the growth of smaller crystals, which also show changed habits as compared to the original mixtures. Further studies which give results of practical importance show the properties of single fats and fatty mixtures before and after interesterification.

PAPER CHROMATOGRAPHY OF STEROLS. G. de Zotti, P. Capella, and G. Jacini. (Stazione Sperimentale Olii e Grassi, Mailand). *Fette Seifen Anstrichmittel* 61, 1114-19 (1959). The authors have determined the partition coefficients and the R_f values of some of the sterols and their derivatives in various systems. The working systems which have been found for the sterols and their derivatives, were applied for the separation of the sterols of certain vegetable oils. An exhaustive treatment of the experimental procedure is given.

THE AUTOXIDATION OF EMULSIFIED FATS. M. Loncin, D. Jacquemain, J. Labarrere, and J. Lefebvre (C.E.R.I.A., Brussels). *Fette Seifen Anstrichmittel* 61, 1055-58 (1959). The authors report that the autoxidation of emulsified fats is greatly influenced by the heavy metal concentration, especially copper, in the oil phase. The transference of copper from the oil to the water phase leads to the stabilization of the fat and is brought about by complex formation with the help of alanine. This process is claimed to be commercially feasible. The authors' experiments show that the storage life of dry milk can be enhanced three or four times in this way. The stability of butter, however, it not affected.

THE DETERMINATION OF LARD IN GOOSE FAT. J. Wurziger (Chemical and Food Research Dept., Health Inst., Hamburg). *Fette*

Seifen Anstrichmittel 61, 1046-50 (1959). Due to the different arachidonic acid content in the case of lard and goose fat the author has found it possible to determine the degree of purity of goose fat and the amount of lard adulterant present. Arachidonic acid was determined by the alkali isomerization method. The method described by the author claims to give more exact results as compared to the commonly used methods for distinguishing these fats.

DETERMINATION OF PHOSPHORUS AND NEUTRAL GLYCERIDES DURING REFINING OF PEANUT OIL. R. Carlotti (I.T.E.R.G., Marseille). *Rev. Franç. Corp. Gras*, 6, 341-53 (1959). The author has carried out a study of the methods of degumming peanut oil during refining and their effects on neutral triglyceride and phosphatide yields. It was found that heat treatment and pressure during oil extraction influence the content of phosphatides in the oil. It was also shown that the content of phosphatides had a direct relationship to the amount of discoloration present in the oil.

THE PROBLEM OF TASTE REVERSION OF SOYBEAN OIL. H. von Pezold (The Margarine Union, Hamburg). *Fette Seifen Anstrichmittel* 61, 1018-24 (1959). Oils like soybean oil which contain polyunsaturated fatty acids develop taste reversion during storage before the autoxidation chain reactions set in. According to the author 2,4-heptadienal and/or 1,4-octadienal which arise from the autoxidation of linolenic acid play a decisive part in causing taste reversal. The primary autoxidation products of linolenic acid decompose very easily and the resulting aldehydes contribute to the marked changes in taste and smell.

10-HYDROXY-2-DECENOIC ACID IN THE HONEYBEE. R. K. Callow, N. C. Johnston, and J. Simpson (Nat. Inst. for Medical Research, Mill Hill, London). *Experientia* 15, 421-22 (1959). The mandibular glands of the worker honeybee was shown to contain 10-hydroxy-2-decenoic acid. It was assumed that these glands were the source of the acid in the honeybee worker and the queen bee. The acid was isolated by separation with paper chromatography using a reversed phase system. The paper was soaked in a 30% kerosene/aqueous n-propanol system and partitioned between ethanol and light petroleum ether. The acid was identified by X-ray powder photographs and infrared spectra.

THE LIQUID RESIN OF SOUTH EAST FRANCE: ORIGIN AND COMPOSITION. L. Desalbres, Louise Marie Dupaya, and R. Dubearnes (Vielle Saint Girons, Landes). *Rev. Franc Corp Gras* 6, 681-94 (1959). The liquid resin examined by the authors was found to consist of fatty acids, resin acids, and neutral products. The fatty acids amounted to 33-40% of the total composition, and were as follows: palmitic acid 5-6%, tetra and hexacosanoic acids 1-2%, oleic acid 35-40%, and limoleic acid 40-50%. The remainder of the material consisted of 40-60% of resin acids of the abietic acid group and 8-12% of mostly sitosterols and provitamins.

THE ALCOHOLYSIS OF FATS. J. Pore (Univ. of Paris). *Oleagineux* 15, 13-19 (1960). The author has studied the preparation of fatty acid esters by alcoholysis of fats. The effects of time, catalyst type, and temperature on the yield of methyl esters from palm oil was studied using a theoretical amount of alcohol. The greatest yield of methyl esters was obtained using *p*-toluene sulfonic acid as catalyst and two hours reaction time. The greatest yield of ethyl esters was also obtained using these conditions. The preparation of pure methyl esters of fatty acids from their corresponding fatty acids was also investigated, as was the preparation of the esters from the corresponding triglycerides, using diethyl formamide and dioxane as solvents.

THE UNSATURATED FATTY ACIDS OF MENHADEN BODY OIL: THE C_{18} , C_{20} , AND C_{22} SERIES. W. Stoffel and E. H. Ahrens, Jr. (Rockefeller Institute, New York 21 N. Y.). *J. Lipid Research* 1, 139-46 (1960). Complete structural characterization of the C_{18} , C_{20} , and C_{22} series of unsaturated fatty acids of menhaden body oil is described. The present report brings to 23 the number of chemically defined unsaturated fatty acids in this oil, accounting for 95% of the total weight of unsaturated acids. Of these 23 acids, 7 have not been previously reported. Pure acids or mixtures of positional isomers, were isolated by fractional crystallization, fractional distillation, countercurrent distribution, rubber column chromatography, and preparative gas liquid chromatography. Acids which were homogeneous with regard to chain length and number of double bonds were degraded by oxidative and reductive ozonolysis; fragments were identified by gas liquid chromatography of the carboxylic acids and as addition products of the aldehydes.

GAS CHROMATOGRAPHIC SEPARATION OF LONG-CHAIN FATTY ACID METHYL ESTERS ON POLYVINYL ACETATE. I. Hornstein, L. E. Elliott, and P. F. Crowe (Meat Lab., Eastern Utilization Res. and Dev. Div., USDA, Beltsville, Md.). *Nature* **184**, 1710-1711 (1959). A method is described for the separation of the methyl esters of stearic, oleic, linoleic, and linolenic acids. Packing for an 8-ft. coiled copper column was prepared by slurring "Chromosorp," 30-60 mesh, with a 10% solution of Vinylite AYAC in acetone. The acetone was evaporated at room temperature and stray volatile materials removed by heating in a vacuum oven at 130°. The gas chromatograph was a Beckman GS-2 provided with a 1-mV., 1-sec. full-scale strip-chart recorder; the detector was a 4-filament thermal conductivity unit. Helium flow rate was 83 ml./min. measured at the column exit at room temperature. The column and cell temperature was 205°; the pressure drop across the column was 30 p.s.i.g. Quantitative estimation of the fatty acid esters within $\pm 5\%$ could be made by measuring the peak areas and comparing with values obtained from known amounts of the pure methyl esters.

CHROMATOGRAPHIC IDENTIFICATION OF THE ANTILIPEMIC X FACTOR OF THE UNSAPONIFIABLE FRACTION OF CRUDE VEGETABLE OILS. M. C. Nath, A. Saikia, and B. I. Uppin (Dept. of Biochem., Univ., Nagpur). *Nature* **184**, 1635-1636 (1959). The unsaponifiable fractions of corn, groundnut, linseed, and hydrogenated groundnut oils were extracted and purified by treatment with Norite and fuller's earth. The purified unsaponifiables were subjected to circular paper chromatography using butanol/acetic acid/water (4:1:5) and the color developed with phosphomolybdic acid reagent. The corn and groundnut oils exhibited a spot with the same R_F value as 1:2 dieneol glucose, previously reported by the authors as preventing and curing experimental atherosclerosis of various types.

QUANTITATIVE ESTIMATION OF THE FATTY ACIDS OF OLIVE OIL. J. Gracián, E. Vieque, and M^a Pilar de la Maza (Instituto de la Grasa, Seville, Spain). *Nature* **184**, 1941 (1959). Results of analysis of the component fatty acids of olive oil by a technique involving spectrophotometry of the unsaturated acids (A.O.C.S. method) and quantitative paper chromatography of the saturated acids agree with results on the same oil obtained by the traditional ester fractionation, from thiocyanogen values, and by gas chromatography. The suggested technique requires a very small sample and is rapid and accurate. Found were: palmitic (7.7%), stearic (2.5%), arachidic (0.7%), behenic (0.8%), oleic (76.8%), linoleic (10.9%), linolenic (0.6%).

LOOK FOR RECORD '60 EXPORTS. *Soybean Dig.* **20**(1), 19 (1959). Statistics concerning world production of edible fats, oils, and oilseeds in 1959 and estimates for 1960 production are presented.

EFFECT OF pH ON THE ANTIFUNGAL ACTIVITY OF UNDECYLENIC ACID AND ITS CALCIUM SALT. H. N. Prince (Microbiological Labs., Res. Dept., Wallace & Tiernan, Inc., Belleville, N. J.). *J. Bacteriol.* **78**, 788-791 (1959). The antifungal activities of undecylenic acid and its calcium salt were similar when tested against a variety of pathogenic fungi at pH 4.5 to 6.0. Above pH 6.0 the calcium salt was inactivated to a greater extent than the free acid. The minimum inhibitory concentration of undissociated undecylenic acid remained constant over the range pH 4.5 to 6.0. From pH 6.5 to 9.0, however, with *Trichophyton mentagrophytes* as the test organism, the antifungal activity did not bear a simple relation to the concentration of undissociated acid.

PROCESS FOR CORROSION INHIBITION. D. L. Anderson (General Mills, Inc.). *U. S.* **2,913,305**. Organic acid salts of polymeric fat amines are claimed as exceptionally good corrosion inhibitors. Basic raw materials for the preparation of the polymeric fat amines are fatty acids such as soybean, linseed, corn, safflower, tall oil, etc., the fatty acids having sufficient double bond functionality to form the polymeric material. The organic acid employed to form salts of the amines should have at least four carbon atoms.

POWDERED FAT COMPOSITION AND PROCESS. D. E. Cameron, W. H. Chilson, C. C. Elsesser, and R. Windmuller (General Foods Corp.). *U. S.* **2,913,342**. A powdered fat composition suitable for use as a topping or shortening consists of a dried emulsion of a fat such as hydrogenated cottonseed or coconut oil and the partial ester of an edible glycol and a high molecular weight saturated fatty acid (12 to 22 carbon atoms) in a matrix of edible encapsulating substance such as casein or sucrose.

COAL SPRAY COMPOSITION. J. D. Neesley (Standard Oil Co.). *U. S.* **2,913,349**. The inclusion of 0.25 to about 5% of a polymeric linoleic acid, having a molecular weight of above 300 and

from 30 to 60 carbon atoms, in a coal spraying composition gives improved dust allaying and weathering properties as well as increased coverage.

THERMAL DEGRADATION OF RICINOLEATES. W. Stein (Henkel & Cie, G.m.b.H., Dusseldorf-Holthausen). *U. S.* **2,913,490**. A process for the continuous thermal degradation of ricinoleates to give sebacic and oxydecanoic acids is described. An aqueous alkali salt of ricinoleic acid is heated within the range of 150-300° under a pressure at least equal to the vapor pressure of water at the temperature at which the reaction is occurring. Before the pressure is reduced, the hot reaction mixture is diluted with sufficient water to maintain the mixture readily flowable at temperature of about 20 to 100°.

CHROMATOGRAPHIC PURIFICATION OF HIGHER FATTY ALCOHOLS. J. J. Cahill, Jr. (Colgate-Palmolive Co.). *U. S.* **2,913,501**. Crude fatty alcohols containing hydrocarbons, ethers, or higher fatty esters (fatty alkyl radicals of 9 to 18 carbon atoms) may be separated by selective adsorption and elution from activated alumina columns.

COMBINATION POLYGLYCOL AND FATTY ACID DEFOAMER COMPOSITION. J. T. Stephan. *U. S.* **2,914,412**. A material useful in controlling foam in aqueous adhesive solutions consists of a physical mixture of an ethylene glycol-insoluble alkylene-oxide polymer in combination with a long chain saturated fatty acid or a polyvalent metal salt of a fatty acid. The fatty acid should have a molecular equal to or greater than that of myristic acid.

INTERESTERIFIED MIXED GLYCERYL ESTERS. G. Barsky and V. K. Babayan (E. F. Drew & Co., Inc.). *U. S.* **2,914,546**. Coconut oil is reacted with capric-caprylic triglyceride in the presence of sodium methylate as a catalyst. The mixture is agitated and heated to a temperature of 55-57° for about one and one-half hours under a blanket of nitrogen. The amount of the fatty acid glyceride used varies in accordance with the desired characteristics of the final product. Oils containing 10 to 20% of the fatty acid glycerides are excellent margarine oils, and those containing 44 to 55% are excellent medicinal oils.

PROCESS FOR MAKING MARGARINE. R. Knollenberg and C. G. Hahn (Schroder & Co., Lubeck, Germany). *U. S.* **2,915,401**. An emulsified mixture of margarine material at an initial temperature of about 32° is passed through a chilled cylinder at a rate of from 1200 to 1600 liters per hour per square meter of cylinder wall surface. The mixture is stirred and the solidified material is discharged at a temperature of about 16°. The margarine thus prepared has a consistency suitable for immediate packing after a single pass of the material through the cylinder.

LECITHIN PACKAGE. E. H. Tessmer and E. T. Wilhelm (Glidden Co.). *U. S.* **2,915,404**. A closure for conventional containers is described which has a structure permitting effective amounts of solid odor-adsorbing material to be placed in the closure and held by a perforated liner. The size of the adsorbent is controlled so that none will fall through the perforations. Such closures are suitable for use with edible products such as lecithin, mayonnaise, and salad oil.

SEPARATION OF OLEFINIC FATTY ACIDS. E. M. Meade. *U. S.* **2,915,537**. A process is described for separating mixtures of olefinic fatty compounds which is inexpensive and is suitable for commercial operations. Mixtures of tall oil, cottonseed oil, soybean oil, or other vegetable or animal oil fatty acids were dissolved in a low molecular weight solvent such as acetone and treated with alkali. The mixture was cooled to about -55 to 25°. The acid soaps of the mono-olefinic acids precipitated and could be removed by filtration.

DEGRADATION OF UNSATURATED FAT ACIDS. W. Stein and H. Henning (Henkel & Cie. G.m.b.H., Dusseldorf-Holthausen, Germany). *U. S.* **2,921,084**. In the described method for degrading unsaturated fatty acids in which an alkali salt of an unsaturated fatty acid, free from alcoholic hydroxyl groups, is heated in the presence of an alkali hydroxide, the improvement involves effecting the heating at a temperature of about 300° in the presence of at least 0.05% catalyst selected from the group consisting of lead, bismuth, thallium, or mixtures, alloys, or compounds of these metals.

A HIGHLY NUTRITIONAL MARGARINE. D. Melnick and C. M. Gooding (Corn Products Co.). *U. S.* **2,921,855**. The desired product consists of a milk phase and not less than 80% of a glyceridic fat containing about 15 to 60% of an essential fatty acid, not more than about 10% *trans* fatty acid, an SCI at 70°F. of about 4 to 15, and SCI at 50°F. of about 2 to 8 times that at 92°F., and having fatty acid radicals in random distribution.

USE OF METAL DEACTIVATOR IN FATTY MATERIALS. R. H. Rosenwald (Universal Oil Products Co.). *U. S. 2,921,856*. Fatty material containing a metal constituent is stabilized against deterioration by the addition of butylated hydroxyanisole and a metal deactivator, an ester of phosphoric acid which contains at least 8 carbon atoms in the ester group. The ester should be present in sufficient amount to deactivate the catalytic effect of the metal constituent.

NOVEL COATING MATERIAL FOR MEDICAMENTS. D. R. Reese, M. Station, and J. V. Swintosky (Smith, Kline & French Labs.). *U. S. 2,921,883*. A coating material designed to prolong the release of the medicament in the gastrointestinal tract consists of an intimate mixture of a nontoxic, solid hydroxylated lipid material and a nontoxic, solid cellulose derivative in ratios of about 1:1 to 9:1. Suggested lipid materials are fatty alcohols having 12 to 31 carbon atoms; glycols or glycerol partially esterified with a fatty acid of 12 to 22 carbons; a solid ester of a fatty hydroxy acid with a lower aliphatic alcohol, the total carbon content of which is 12 to 62 carbon atoms; and the like. The cellulose derivative may be represented by cellulose-R in which R is an aliphatic alkyl group of 1 to 5 carbons or an acyl group of 2 to 22 carbon atoms.

DEODORANT COMPOSITION. J. J. Scanlan (American Chicle Co.). *U. S. 2,922,747*. A solid deodorant tablet for oral use consists of a sweetening agent and a masticatory gum material capable of stimulating the taste buds of the oral cavity, and a nontoxic lipid having a particle size of from about 0.1 μ to about 2.0 μ in an amount sufficient to have substantial deodorant power in the mouth (not less than 1.54 mg.).

SYNTHETIC MILK. H. L. Otto. *U. S. 2,923,628*. A synthetic unsaturated fatty acid milk has the following composition: approximately 60 to 80% water, 5 to 10% whey proteins, 5 to 10% fat, 5 to 10% lactose, and 5 to 10% salts. The fat is in the form of fatty acids containing approximately 48 to 52% of linoleic acid.

ANTIFOAM COMPOSITIONS AND USES THEREOF. M. J. Jurisch (Nalco Chemical Co.). *U. S. 2,923,687*. An antifoam composition consists of the following: fatty acids of more than 11 carbons, 3-11 parts; lecithin, 10 to 30 parts; polar esters of polyhydric alcohols and long chain fatty acids, 0-9 parts. Sufficient fatty acids must be present in the form of an alkali soap to provide at least 0.25% by weight of the antifoam composition.

COMPOSITION OF MATTER FOR THE CONTROL OF FOAM. S. A. Szumski and M. A. Petty (American Cyanamid Co.). *U. S. 2,923,688*. The development of foam over aqueous liquids may be controlled by adding a small quantity of a glyceride oil to which has been added 0.5 to 10% by weight of rice oil sludge.

FATTY ACID CONDENSATION PRODUCTS AND PROCESS OF PREPARATION. J. D. von Mikusch-Buehbert (Lever Bros. Co.). *U. S. 2,923,718*. An acid of the formula RCOOH, where R is an unsubstituted long chain hydrocarbon radical, is heated at a temperature of 220 to 330° in the presence of a catalyst (boric acid, boric oxide, ammonium pentaborate, trimethyl or triethyl borate, mannitol borate, etc.) until the reaction mixture contains at least 32% by weight of unsaponifiable matter having a mean molecular weight at least 3 times that of the acid. Liberated water is removed from the reaction zone as it is formed, but loss of the major part of the acid is avoided. *U. S. 2,923,719* by the same inventor describes the preparation of condensation products of acid anhydrides.

EDIBLE FATS. R. V. Crawford and H. Jaspersen (J. Bibby & Sons Ltd.). *Brit. 816,514*. Edible fats, to be used as substitutes for palm kernel or coconut oil stearins and cocoa butter, are produced by subjecting palm kernel oil or a mixture of palm kernel oil with $\leq 10\%$ palm oil or other oil rich in acids containing 16-18 carbon atoms to hydrogenation followed by molecular rearrangement. (*C. A. 54, 776*)

CONTINUOUS BUCKET CHAIN EXTRACTOR FOR OILS. W. Depmer (Metallgesellschaft Akt.-Ges.). *Ger. 890,940*. The oil separating efficiency of bucket chain extractors is increased by 50% by certain structural modifications. (*C. A. 54, 929*)

DISTILLATION OF CRUDE ESTERS OF LONG-CHAIN FATTY ACIDS FOR PURIFICATION WITHOUT LOSSES. K. Pileh (Badische Anilin- & Soda-Fabrik Akt.-Ges.). *Ger. 1,003,709*. Crude esters of fatty acids with 2-20 carbons and alcohols with 3-5 carbons are distilled in the presence of 0.2-1.0% magnesium oxide, calcium oxide, or aluminum oxide. For example, sperm oil fatty acid (acid number 215) 115, *p*-toluenesulfonic acid 1, and benzene 2-3 parts were refluxed at 160° with a water sep-

arator and isopropyl alcohol 25 parts added slowly within 24 hours. The formed water was removed. The crude ester 100 (acid number 6) was treated with magnesium oxide 0.6 and distilled *in vacuo* to give pure, almost colorless ester 93 parts (acid number 0.1). (*C. A. 54, 1307*)

SEPARATION OF ALIPHATIC DICARBOXYLIC ACIDS. B. Blaser and W. Stein (Henkel & Cid. G.m.b.H.). *Ger. 1,020,618*. Mixtures of aliphatic dicarboxylic acids (containing at least 10 carbon atoms) and monocarboxylic acids or other water insoluble organic compounds were extracted with water not below 115° under elevated pressure to give the dicarboxylic acids. (*C. A. 54, 1323*)

ALIPHATIC DICARBOXYLIC ACIDS. H. Oberrauch (Farbwerke Hoechst Akt.-Ges. vorm Meister Lucius & Brüning). *Ger. 1,021,347*. α -Trichloro- ω -monochloroalkanes were treated with an alkali cyanide in the presence of a glycol ether and the resulting α -trichloro- ω -cyanoalkanes saponified with sulfuric acid to give the title compounds. (*C. A. 54, 1322*)

FAT LIQUORS FROM NONEDIBLE OIL. V. Radhanandakishore and Y. Nayudamma (Indian Council of Agricultural Research). *Indian 62,566*. Sardine fish oil is sulfonated and mixed with fatty oils and (or) mineral oils to obtain the liquor in the form of a stable emulsion. (*C. A. 54, 930*)

• Fatty Acid Derivatives

SYNTHESIS OF POLYAMIDES BY OZONOLYSIS OF OLEIC ACID. Hiroshi Otsuki and Hideya Funahashi. *Advances in Chem. Series No. 21, 205-8* (1959). Ozonolysis of oleic acid gives good yields of nonyl aldehyde, nonanoic acid, and azelaic acid. An intermediate product, azelaic hemialdehyde, is usually obtained by decomposition of oleic acid ozonide. Reduction of oleic acid ozonide with sodium sulfite gives azelaic hemialdehyde which gives with hydroxyl amine hemialdehyde oxime. Neutral reduction of oxime gives ω -aminononanoic acid. It is easily dehydrated and polymerized by heating and its ethyl ester gives polynonanamide by heating under reduced pressure followed by removal of alcoholic hemialdehyde, ammonia, and hydrogen catalytically give ω -aminononanoic acid. (*C. A. 54, 1282*)

THE SYNTHESIS OF LONG-CHAIN FATTY ACIDS AND THEIR DERIVATIVES. I. THE REACTION OF FATTY ACID CHLORIDES WITH ACETYLENE. H. P. Kaufmann and W. Stamm (Univ. Münster, Ger.). *Fette Seifen Anstrichmittel 59, 946-53* (1957). Reactions of fatty acids to yield chlorides and also the reaction of their derivatives with C_2H_2 are reviewed. (*C. A. 54, 1288*)

CONTINUOUS METHOD FOR THE MANUFACTURE OF SOLID ESTERS. C. F. Montross, F. E. Woodward, and F. Wuerth (General Aniline & Film Corp.). *U. S. 2,920,088*. A mixture of a fatty acid halide (chloride or bromide) and a hydroxy compound is introduced into a closed vessel at a temperature sufficient for the esterification reaction to occur, the volume of the mixture being substantially equal to the volume of the vessel. The mixture is maintained at a constant volume with agitation and under the pressure of the hydrogen halide gas evolved in the reaction. The gas and the stirring act together to keep the mixture and the resultant solid ester in a fluid state and facilitate completion of the esterification. A diagram of the reaction vessel and process is included.

NON-STALLING GASOLINE FUEL COMPOSITION. T. L. Cantrell and J. G. Peters (Gulf Oil Corp.). *U. S. 2,920,944*. The addition of a small amount of a salt of morpholine and oleic acid to a hydrocarbon mixture boiling in the gasoline range reduces the stalling tendencies of the motor fuel.

GREASE COMPOSITION CONTAINING METAL SALT OF REACTION PRODUCT OF ALKYLPHENOL, FATTY ACID AND ALDEHYDE. B. W. Hotten (California Res. Corp.). *U. S. 2,921,904*. A grease composition consists of a lubricating oil and, as a thickener, a metal salt of a product obtained by reacting for a period of 1 to 4 hours at temperatures ranging from 120°F. to 500°F., an alkylphenol (1 to 36 carbons in alkyl radical) and, for each mole of the phenol, 0.5 to 1.0 mole of a fatty acid containing 2 to 22 carbon atoms, and from 1 to 3 moles of an aldehyde.

TWISTER RING LUBRICANT. A. J. Morway (Esso Res. and Eng. Co.). *U. S. 2,922,762*. A twister ring lubricant consists of petrolatum and 5 to 30 weight per cent of a hydrous mixture of metal salts of low molecular weight carboxylic acids (1 to 3 carbons) and intermediate molecular weight acids (7 to 10

carbons). The molar ratio of low to intermediate molecular weight acid salts should be about 2:1 to about 40:1.

TWO-STREAM PROCESS OF PREPARING HYDROCARBON OIL THICKENING SOAP. F. N. Baumgartner (Esso Res. & Eng. Co.). *U. S. 2,922,799*. A basic aluminum di-soap of an aliphatic carboxylic acid having 2-36 carbon atoms is prepared by simultaneously adding to a neutral aqueous solution of a sodium, potassium, or ammonium soap of the desired acid, a solution of a water soluble aluminum salt and an aqueous solution of sodium, potassium, or ammonium hydroxide. The pH of the admixed solution is maintained between 6 and 8. A variation in procedure is described in *U. S. 2,922,800*.

STARCH ETHERS. H. Wolff (A. E. Staley Mfg. Co.). *U. S. 2,923,707*. Starch is reacted with an epoxide containing an aliphatic chain of at least 12 carbon atoms. This may be an epoxy fatty acid, an epoxy fatty acid amide, or an epoxy aliphatic alcohol.

CATALYST FOR PRODUCING DINITRILES FROM DIBASIC ACIDS. Ichiro Miwa, Kisaburo Ueno, and Takashi Fujibayashi (Tokyo Katsui Industries, Inc.). *Brit. 797,945*. A solution of 4 g. ammonium metavanadate was prepared in 200 ml. water, 37.6 g. potassium hydroxide was added, and the solution heated to evolve ammonia. Then, 52 g. 89% phosphoric acid and sufficient water to give 1000 ml. were added. The pH was adjusted to 1.0-6.0. Silicon dioxide gel (100 g.) was immersed in this solution for 30 minutes, then dried and heated at 300° for 3 hours to produce the desired catalyst. An 83.2% yield of azelaic dinitrile from azelaic acid was obtained at optimum temperatures over this catalyst as compared with a 67.8% yield over silicon dioxide gel. No decline of efficiency was noted in the disclosed catalyst, while silicon dioxide gel showed a 5% decline in 12 hours of use. (*C. A. 54, 1322*)

PREPARATION OF AMINES FROM FATTY ACIDS. Armour & Co. *Brit. 815,934*. Fatty acids from tallow, coconut or soybean oil are converted to amides by ammonia, then to nitriles by further ammonia and dehydration over activated alumina, and finally to the amines by hydrogenation over a cobalt-molybdate composition. Amide production is conducted in the liquid phase with 2-5 moles ammonia per mole acid at 170° and 80 lb./sq. in. for 45-120 minutes. Further reaction of the amides with ammonia is at 300° and 90 lb./sq. in. for 45 to 90 minutes. The resulting mixture of nitrile and fatty acid with 5-25 moles ammonia is dehydrated in the vapor phase over alumina in 2-20 seconds at 340° and 5 lb./sq. in. Final hydrogenation requires 2-20 seconds at 250° and 12 lb./sq. in. with 5-10 moles hydrogen and 2.5-5 moles ammonia per mole nitrile. (*C. A. 54, 1301*)

SEBACIC AND ETHYLSUBERIC ACIDS AND THEIR DIAMINE DERIVATIVES. G. Boffa and A. Quilico ("Montecatini" Società generale per l'industria mineraria e chimica). *Ital. 568,323*. The known process involving conversion of 1-chloro-4-cyano-2-butene to dicyanoöctadiene isomers and further hydrogenation to sebacic acid and 3-ethylsuberic acid, or further reduction to decamethylenediamine and ethylhexamethylenediamine, is improved by effecting the first stage in the presence of metallic iron, with or without addition of activators, such as nickel cobalt, etc. (*C. A. 54, 1323*)

• Biology and Nutrition

THE ENZYMATIC SYNTHESIS OF TRIGLYCERIDES. S. B. Weiss, E. P. Kennedy, and J. Y. Kiyusa (Dept. of Biochem., Univ. of Chicago). *J. Biol. Chem.* 235, 40-41 (1960). An enzyme has been found in chicken liver which catalyzes the net synthesis of triglyceride according to the equation $RCO-S-CoA + \alpha, \beta$ -diglyceride \rightarrow triglyceride + CoASH. Evidence that L- α -glycerophosphate, phosphatidic acid, and α, β -diglycerides are obligate intermediates in the synthesis of triglyceride is discussed.

THE SUPERIOR FOOD VALUE OF VIRGIN OLIVE OIL. L. Matarese (Lab. Dogane, Bologna, Italy). *Ross. chim.* 11(2), 23-6 (1959). Virgin olive oil is a source of fat soluble vitamins, lecithin, sitosterol, and biologically important unsaturated acids. These are destroyed, removed, or altered in the refining process. Rigid standards are suggested for the differentiation between refined (pure) and the more valuable virgin oil. (*C. A. 54, 771*)

STUDIES ON THE METABOLISM OF LIPIDES. I. INFLUENCE OF FAT DEFICIENCY ON BODY FAT. Kazuo Mori and Yukihiko Nakamura (Univ. Hokkaido). *Bull. Agr. Chem. Soc. Japan* 23, 78-82 (1959). The normal increase of the body weight in weanling

rats was inhibited by a fat deficient diet. The content of lipides and carbohydrate in the liver of the rats fed with fat deficient diet were slightly less than those of the controls. The iodine value of the body fat of rats fed with fat deficient diet was considerably lower than that of the controls. The amounts of linoleate, linolenate, and arachidonate in the body fat of rats fed with fat deficient diet and the controls were: 1.39, 0.57, and 0.21%; and 9.42, 1.48, and 0.44%, respectively. (*C. A. 54, 1675*)

MICRODETERMINATION OF SERUM CHOLESTEROL BY REACTION WITH FERRIC CHLORIDE. M. Pierfite and J. Barrier (Univ. Nancy, France). *Bull. soc. pharm. Nancy* No. 40, 31-9 (1959). The method of Zlatkis *et al.* gives results which are about 7% too high. Accordingly, the method was modified to obtain more accurate results.

STATISTICAL STUDY OF TWO METHODS OF DETERMINING SERUM CHOLESTEROL. *Ibid.* 41-8. When subjected to detailed statistical study (quantitative data given) the new method shows good agreement with results obtained by the Liebermann-Burchard method. (*C. A. 54, 1648*)

SERUM LIPIDE RESPONSES OF YOUNG MEN, YOUNG WOMEN, PREGNANT WOMEN, AND MIDDLE-AGED WOMEN AFTER INGESTION OF HIGH-FAT AND HIGH-CARBOHYDRATE TEST MEALS. A. Saturnino (State Univ. of Iowa, Iowa City). *Univ. Microfilms* (Ann Arbor, Mich.), *L. C. Card* No. *Mic 59-3817*, 131 pp.; *Dissertation Abstr.* 20, 1000 (1959). (*C. A. 54, 1674*)

THE TOXICITY OF THE ANTIOXIDANTS PROPYL-, OCTYL-, AND DODECYLGALLATE. G. J. van Esch (Natl. Inst. Public Health, Utrecht, Neth.). *Voeding* 16, 683-6 (1955) (in English). In acute studies the oral L.D.₅₀ of the three antioxidants in rats was 5 to 7 g./kg. The chief toxic effects were observed in the kidney. In pigs, dosages of 2 to 6 g./kg. produced no harmful effects. In subacute and long-term feeding tests, the compounds were mixed in the dry food at concentrations of 0.035, 0.2, and 0.5 for rats and 0.2% for pigs. With the exception of 0.5% dodecylgallate which produced a significant growth depression, particularly in the second generation, no growth depression was noted. The litters of some of the rats in the second generation receiving 0.5% of dodecylgallate were lost due to insufficient feeding of the young by their mothers. It was proposed that the use of gallates as antioxidants should not exceed the level of 0.01% in fats. (*C. A. 54, 1764*)

STUDIES ON BLOOD PLATELET PHOSPHOLIPIDS. A. J. Marcus, H. L. Ullman, and M. Wolfman (Hematology Section, New York Veterans Hospital, New York 10, N. Y.). *J. Lipid Research* 1, 179-87 (1960). Column chromatography on silicic acid was carried out on phospholipids from acetone-dried, chloroform-extracted human blood platelets. Fractions recovered had the following components: Phosphatidylethanolamine (PE) plus phosphatidylserine (PS) plus inositol phosphatide, PE plus PS, lecithin plus sphingomyelin, and PS alone. Eluates containing only PE and PS were rechromatographed to obtain more complete separation. The resulting fractions appeared to contain one component but on hydrolysis of these components it was found that each was still contaminated with small amounts of the other. However, on high dilution each of these mixtures promoted blood thromboplastin formation; this suggested that both PE and PS could act as platelet thromboplastic factor *in vitro*. Inhibitory activity was not noted. The presence of choline phosphatides in the fractions resulted in loss of activity. Plasmalogens were identified and estimated to comprise 23 per cent of total platelet cephalins. They were more closely associated with PE and PS. Lysolecithin could not be detected in the mixed platelet extract or the separated fractions.

EFFECT OF CEREBROSIDE PREPARATIONS ON THE STEROL EXCRETION IN THE RAT. K. K. Carroll (Collip Medical Research Laboratory, Univ. of Western Ontario, Canada). *J. Lipid Research* 1, 171-78 (1960). The addition of cerebrosides to synthetic diets fed to rats caused an increased excretion of sterol in the feces as measured by the Liebermann-Burchard reaction. The mixed fatty acids obtained by hydrolysing the cerebrosides had a similar but less marked effect. Both cerebrosides and fatty acid esters increased the concentration of sterols in the feces. The amounts of sterol in the diet were insufficient to contribute significantly to the fecal sterol and no component of the cerebroside preparations other than the fatty acids was found to affect sterol excretion. The activity displayed by the fatty acid fraction did not seem to be restricted to any particular fatty acid. Cholesterol was found to be the main chromagenic sterol in the feces during the first week of cerebroside feeding. Possible mechanisms for this response to the feeding of cerebrosides are discussed.

THE FATTY ACID COMPOSITION OF CHYLOMICRONS OF CHYLE AND SERUM FOLLOWING THE INGESTION OF DIFFERENT OILS. J. H. Bragdon and A. Karmen (Metabolism Section, Natl. Heart Inst., Natl. Insts. of Health, Bethesda, Md.). *J. Lipid Research* 1, 167-71 (1960). Chylomicrons were isolated from the thoracic duct chyle and from the blood serum of rats, and from the serum of human subjects following the ingestion of different natural oils. The fatty acid composition of the chylomicrons was compared with that of the dietary fat by gas chromatography and was found to be very similar.

LACK OF NICOTINIC ACID EFFECT ON CHOLESTEROL METABOLISM OF THE RAT. C. H. Duncan and M. M. Best (Dept. of Medicine, Univ. of Louisville, School of Medicine, Louisville, Ky.). *J. Lipid Research* 1, 159-63 (1960). The effect of the addition of 1% nicotinic acid to the diet of the rat on serum, liver, and carcass cholesterol, and on the incorporation of acetate- C^{14} into cholesterol by the intact animal was studied. The effect on nicotinic acid on absorption of cholesterol- $4-C^{14}$ and on the elimination of labeled cholesterol from serum and liver were also studied. No significant effect of nicotinic acid fed for either 8 or 42 days on the incorporation of acetate- $1-C^{14}$ into serum and liver cholesterol was observed. When weight gain of the control animals was limited to that of the nicotinic acid fed rats by pair feeding, nicotinic acid had no significant effect on serum or liver cholesterol concentrations, nor on total carcass cholesterol. Absorption of cholesterol- $4-C^{14}$ and the disappearance of labeled cholesterol from serum and liver were not influenced by nicotinic acid administration by stomach tube.

QUALITATIVE PHOSPHATIDE ANALYSIS OF A LIPID EXTRACT AND ISOLATION OF PHOSPHATIDYL SERINE FROM BEEF HEART MUSCLE. L. Horhammer and G. Richter (Inst. Pharm. Arzneimittellehre, Univ. Munich). *Biochem. Z.* 332, 186-94 (1959). An extract of lipids from beef heart muscle was examined for its constituents. A multiplicative distribution of over 100 steps yielded sufficient separation of the various lipids. Single fractions were examined by paper chromatography, using formaldehyde-impregnated paper, and an ether modification of the usual butanol-acetic acid-water system. Appropriate reference compounds were used. Three hitherto unknown polar lipids were determined. Phosphatidyl serine was also isolated in small amounts. A new distribution system was also employed to separate the later from non-polar inosides. The course of isolation was followed by paper chromatography.

OXIDATION OF CHOLESTEROL- $26-C^{14}$ BY RAT LIVER MITOCHONDRIA: EFFECT OF NICOTINIC ACID. D. Kritechevsky, M. W. Whitehouse, and E. Staple (Wistar Inst. of Anatomy and Biology, Philadelphia 4, Pa.). *J. Lipid Research* 1, 154-58 (1960). The effect of nicotinic acid upon the oxidation of the terminal carbon atoms of labeled cholesterol by rat liver mitochondrial preparations has been studied. Addition of nicotinic acid as the potassium salt to the incubation mixtures containing normal rat liver mitochondria enhances the oxidation of cholesterol- $26-C^{14}$. Liver mitochondrial preparations from rats administered nicotinic acid in drinking water or diet also oxidize labeled cholesterol to a greater extent than do similar preparations from control rats. The mitochondrial preparations from nicotinic acid fed rats, in the absence of boiled supernatant, exhibit a greater oxidative capacity than do control preparations. This heightened oxidative capacity is further enhanced by the addition of the boiled supernatant fraction from these preparations. Addition of the boiled supernatant fraction from control preparations had no enhancing effect. Nicotinic acid exerts little effect on the oxidation of sodium pyruvate- C^{14} , and may have a slightly inhibitory effect upon the oxidation of sodium octanoate- C^{14} . No significant differences were observed between serum cholesterol levels of rats ingesting nicotinic acid for three weeks and controls.

THE LIPIDS OF THE MYOCARDIUM, CONDUCTING BUNDLE, AND VALVES OF BEEF HEART. J. Koehen, G. V. Marinetti, and E. Stotz (Dept. of Biochem., Univ. of Rochester, School of Medicine, Rochester 20, N. Y.). *J. Lipid Research* 1, 147-149 (1960). The lipids of myocardium, conducting bundle, and valves of beef heart were investigated. The atrioventricular valves contained the highest content of total lipid, most of which was triglyceride. The lipids of myocardium and semilunar valves contained the highest amount of phosphatides and cholesterol. The plasmalogens were localized predominately in the phosphatide fraction of the myocardium and conducting bundle. An analysis of the individual phosphatides showed that with respect to the total lipid phosphorus, the polyglycerolphosphatide was localized in the myocardium and conducting bundle, and lecithin occurred in highest amount in the valves.

EFFECT OF INTRAVENOUS HEPARIN ON OXIDATION OF FAT. A. Michajlik and J. H. Bragdon (Section on Metabolism, Natl. Heart Inst., Natl. Insts. of Health, Bethesda, Md.). *J. Lipid Research* 1, 164-66 (1960). The intravenous injection of heparin to carbohydrate-fed rats results in an elevation of plasma free fatty acid levels and in a lowering of the respiratory quotient from 1.0 to 0.9. The injection of heparin simultaneously with palmitic acid- C^{14} labeled chylomicrons results in an elevation of the specific radioactivity of the expired CO_2 . These observations suggest that heparin causes an obligatory oxidation of fat, presumably through the release of free fatty acid from triglyceride.

TIME OF OCCURRENCE OF CHANGES IN THE LIVER'S CAPACITY TO UTILIZE ACETATE FOR FATTY ACID AND CHOLESTEROL SYNTHESIS AFTER FAT FEEDING. R. Hill, W. W. Webster, J. M. Linzasoro, and I. L. Chaikoff (Dept. of Physiol., Univ. of Calif., Berkeley 4, Calif.). *J. Lipid Research* 1, 150-53 (1960). The time relationships in the hepatic lipogenesis and cholesterologenesis induced by the feeding of corn oil and lard have been studied. A pronounced decrease in the capacity of the liver to convert the acetate carbon to fatty acids was observed as early as one hour after fat administration. The increase in the liver's capacity to incorporate acetate into cholesterol developed slowly after fat feeding; the earliest change was observed in 12 hours. The restoration of lipogenesis to normal following the withdrawal of fat was more rapid than that of cholesterologenesis. The time changes in hepatic lipogenesis and cholesterologenesis induced by fat feeding were correlated with the time of appearance of exogenous fat in the liver.

THE INFLUENCE OF PANCREATIC SECRETIONS ON THE FAT TOLERANCE OF HUMANS. N. W. Tietz, T. A. Borden, J. C. Hamilton, and Norma L. Murphy (Research Dept., Reid Memorial Hospital Laboratory, Richmond, Ind.). *Circulation Research* 8, 284-222 (1960). A high-fat meal was given to 78 volunteers. Total esterified fatty acid, cholesterol, and lipase levels were determined in a fasting blood specimen and in specimens obtained 3 and 6 hours after the meal. Attempts were made to correlate the fat tolerance of the individual with the level of fat-splitting enzymes in the various serum specimens. The influence of pancreatic hormone, whole pancreatic preparations, secretin, and heparin of the fat tolerance as well as on the lipase level was determined. Attempts were made to correlate the results of fat tolerance and glucose tolerance tests done on the same individuals.

BLOOD PRESSURE, LIPOPROTEINS, AND CORONARY ARTERY DISEASE. A. R. Tamplin and R. K. Tandy (Donner Lab., Div. of Medical Physics, Lawrence Radiation Lab., Univ. of Calif., Berkeley). *J. Gerontology* 15, 52-57 (1960). Evidence was presented which demonstrates that a combination of lipoproteins and diastolic blood pressure account for 80% of the predictive capability with respect to coronary artery disease. The implications of this finding were discussed.

EFFECT OF MILKING INTERVALS ON THE RATE OF MILK AND FAT SECRETION. G. H. Schmidt (Dept. of Animal Husbandry, Cornell Univ., Ithaca, N. Y.). *J. Dairy Sci.* 43, 213-219 (1960). Fifteen high-producing Holstein and Brown Swiss cows in early lactation were milked at 4-, 8-, 12-, 16-, and 20-hr. intervals. Ten I.U. of oxytocin were injected at the beginning and end of each interval to obtain residual milk. Each interval was repeated three times and each series of intervals was separated by a 12-hr. interval. The rates of milk, fat, and solids-not-fat secretion were linear for intervals up to and including 12 hr. Significant reductions in rates of secretion of these components were found at 16- and 20-hr. intervals between milkings as compared to the 4-, 8-, and 12-hr. intervals. The butterfat percentages for the different intervals were nearly the same, except for the 4-hr. interval, where an unexplainable increase took place. The solids-not-fat content was the same for all intervals. Preceding long intervals caused a depression of milk secretion during the 12-hr. intervals, but caused a marked increase in butterfat percentages.

EXPERIMENTAL ATHEROMATOSIS: ACID MUCOPOLYSACCHARIDE CONTENT OF THE AORTA. A. J. Bollet, C. Wang, and D. Adlersberg (Department of Medicine, Wayne State University, College of Medicine, Detroit, Mich.). *Circulation Research* 8, 88-92 (1960). Histochemical and chemical studies of the acid mucopolysaccharide content of the aorta were made in rabbits fed cholesterol for up to seven months. Colloidal iron staining suggested an increase in acid mucopolysaccharide content of the aortas with mild atheromatous lesions but not when severe lesions were present. Chemical determination, however, revealed no increase in the concentration of acid mucopolysaccharide in

early lesions, but did reveal a significant increase in the more severely atheromatous aortas of rabbits fed cholesterol for 6 months or more.

RETENTION OF FLUORIDE IN SOFT TISSUES OF CHICKENS RECEIVING DIFFERENT FAT DIETS. D. Bixler and J. C. Muhler (Dept. of Biochemistry, Indiana Univ. Medical Center, Indiana Univ., Indianapolis). *J. Nutrition* 70, 26-30 (1960). Day-old White Leghorn chickens were divided into 5 experimental series. One series received a fat free diet and the other 4 were fed different fats at a 20% dietary level. Each series was divided into three groups, one receiving no added fluoride, another, 2 mg. of NaF/day by stomach tube and the remaining group of 0.5 mg. of NaF/day by injection. After 8 weeks the animals were killed and the following observations made: increased skeletal retention of fluoride by the fat supplemented animals when the fluoride was administered either by injection or stomach tube; and increased retention of fluoride in heart and kidney of animals on the fat supplemented diets.

NORMAL GROWTH AND DEVELOPMENT OF FEMALE CHICKENS WITHOUT DIETARY VITAMIN E OR OTHER ANTIOXIDANTS. J. G. Bieri, G. M. Briggs, C. J. Pollard, and M. R. Spivey Fox (Lab. of Nutrition and Endocrinology, Natl. Institutes of Health, U. S. Dept. of Health, Education and Welfare, Bethesda, Md.). *J. Nutrition* 70, 47-52 (1960). Two studies are reported in which chicks were fed from hatching, purified, vitamin E-free diets containing no added antioxidants for 6 to 12 months. Chemical analyses indicated that α -tocopherol disappeared from the tissues of the chicks after 5 weeks. When compared with control chicks receiving vitamin E, the depleted chicks appeared normal, grew at the same rate and laid eggs at the same time. The possible tocopherol content of the diet, and the implications of these results on nutritional and biochemical functions of vitamin E, are discussed.

SERUM LIPOPROTEINS IN ATHEROSCLEROSIS-SUSCEPTIBLE AND RESISTANT PIGEONS. H. B. Lofland and T. B. Clarkson (Dept. of Biochem. and Vivarium, Bowman Gray School of Med., Wake Forest Col., Winston-Salem, N. C.) *Proc. Soc. Exptl. Biol. Med.*, 103, 238-241 (1960). Using the agar precipitation method and low temperature fractionation for determination of β -lipoproteins, amounts of β -lipoproteins, total lipids, phospholipids, and cholesterol in serum of atherosclerosis-susceptible and resistant breeds of pigeons were compared. No significant differences were seen when male birds of 2 breeds were compared. Lipoprotein levels of females varied within wide limits, probably due to phospholipemia associated with egg-laying activity. Such activity is accompanied by increased proportion of cholesterol in β -lipoproteins. At time of egg-laying, total lipids and total phospholipids (but not total cholesterol) are increased in the serum. Thus, such cyclic changes appear to produce a more "favorable" (i.e., lowered) cholesterol/phospholipid ratio. In contrast to cholesterol-fat fed chicks, female pigeons of susceptible breed are not protected against aortic or coronary atherosclerosis.

EFFECT OF ENVIRONMENTAL TEMPERATURE UPON CHOLESTEROL INDUCED AORTIC ATHEROSCLEROSIS IN THE RABBIT. W. A. Sode-man and J. T. Logue (Jefferson Medical College, Philadelphia, Pa.). *Proc. Soc. Exptl. Biol. Med.* 103, 255-256 (1960). Findings indicated that heat stress in rabbits raised under conditions studied, produced a profound effect upon extent and distribution of aortic atherosclerosis plaque formation. A remarkable reduction in plaque formation occurred in animals kept at higher temperature levels in spite of higher total cholesterol and ester values in this group.

PROCESSES FOR PREPARING HUMAN PLASMINOGEN FROM HUMAN PLACENTA SOURCES. J. J. Hagan, R. E. Clarke, and F. B. Ablondi (American Cyanamid Co.). *U. S. 2,923,665*. Material from the group consisting of fraction III₂ and the euglobulin fraction is suspended in alkaline water at a pH of between 8 and 11.5. The suspension is acidified to a pH of 1 to 4 and the ionic concentration adjusted to between 0.15-0.70 so as to flocculate the impurities. The flocculated impurities are removed and the pH of the solution is adjusted to between 6 to 9.

TISSUE LIPIDE RELATIONSHIPS FROM THEIR COMPOSITION AND ACETATE INCORPORATION. R. Reiser, Mary C. Williams, and Mary F. Sorrels (Dept. of Biochem. and Nutr., Texas Agri. Experiment Sta., College Station, Tex.). *Arch. Biochem. Biophys.* 86, 42-52 (1960). Groups of male "miniature" swine were reared on diets very low in fat or containing 20% myristoyllaurin or 20% cottonseed oil. After approximately 11 months they were injected intraperitoneally with acetate-1-C¹⁴. Twenty-four hours later they were sacrificed and blood plasma, liver, and adipose tissue fatty acids were examined for composition and C¹⁴ in-

corporation. The degree of incorporation of labeled acetate into lipide fatty acids was highest on low-fat diet, intermediate on saturated fats, and least on cottonseed oil diets. In the presence of readily available carbohydrate, saturated fatty acids were utilized for energy to a greater degree than unsaturated and stored to a lesser degree. The relationships between plasma, liver, and depot fat triglycerides, between plasma and liver lecithins and cephalins, and between plasma and liver cholesterol esters are discussed.

THE EFFECT OF DIETARY PROTEIN, FAT, AND CHOLESTEROL ON PLASMA CHOLESTEROL AND SERUM PROTEIN COMPONENTS OF THE GROWING CHICK. G. A. Leveille, A. S. Feigenbaum, and H. Fisher (Dept. of Poultry Sci., Rutgers Univ., New Brunswick, N. J.). *Arch. Biochem. Biophys.* 86, 67-70 (1960). Feeding a low protein diet results in an elevated plasma cholesterol level and decreased total serum protein and serum albumin levels. Chicks fed coconut oil had higher plasma cholesterol levels than those receiving similar diets supplemented with corn oil. The body weights of chicks on balanced diets but receiving coconut oil were significantly less than those of chicks fed corn oil. Serum protein fractions separated by paper electrophoresis were unaltered as the result of dietary fats. The addition of cholesterol to the diets resulted in an increase in the alpha 2 + 3 globulin fraction of serum. The amount of lipide bound to the β -lipoprotein was significantly increased by feeding cholesterol and to an even greater extent by feeding a low protein-cholesterol combination regardless of the type of dietary fat.

PHOSPHOLIPID METABOLISM IN NERVOUS TISSUE. I. A RECONSIDERATION OF BRAIN AND PERIPHERAL-NERVE PHOSPHOLIPID METABOLISM IN VIVO. A. N. Davison and J. Dobbing (Dept. of Pathology, Guy's Hospital Medical School, London, S. E. 1). *Biochem. J.* 73, 701-706 (1959). The fate of injected P³² has been followed in the phospholipids of the brain, sciatic nerve, liver, and kidneys of developing rats for a period of 70 days. The degree of stability of the phospholipids as a whole in both central and peripheral nervous tissue contrasted markedly with their more rapid turnover in other tissues. The relative stability demonstrated *in vivo* is discussed in the light of currently conflicting view of phospholipid turnover in brain, and some aspects of the blood-brain barrier for phosphorus have been reconsidered. The authors suggest that the stability of these phospholipids may reflect their structural role in the myelin sheath.

THE CHOLESTEROL ESTERS CIRCULATING IN HUMAN BLOOD IN HEALTH. C. Riley and R. F. Nunn (Stephen Ralli Memorial Lab., The Royal Essex County Hospital, Brighton, and St. Francis Hospital, Haywards Heath, Sussex). *Biochem. J.*, 74, 56-61 (1960). The cholesterol esters of human serum and human plasma were separated from other lipids by chromatography on silicic acid, and their component acids were characterized by reversed-phase partition chromatography. Results indicated that over 70% of the acid were unsaturated and more than half of these were polyethenoid. The relationship between the patterns of the dietary fatty acids and the plasma-cholesterol ester fatty acids is discussed.

THE DISTRIBUTION OF PHOSPHOLIPASE B IN MAMMALIAN TISSUES. Elizabeth A. Marples and R. H. S. Thompson (Dept. of Chem. Pathology, Guy's Hospital Medical School, London, S.E. 1). *Biochem. J.* 74, 123-127 (1960). A study was made of the distribution of phospholipase B in certain mammalian tissues by using the whole homogenates of the different tissues. Enzymic activity was estimated by determining the rate of release of both free fatty acids and glycerylphosphorylcholine. High levels of activity were found in ileum, lung, spleen, liver, and pancreas. Activity was low in skeletal muscle, heart muscle, kidney, testis, brain, and blood. The grey matter of the central nervous system contained considerably more activity than the white matter.

THE LIPIDS OF WHOLE BLOOD. 2. THE EXCHANGE OF LIPIDS BETWEEN THE CELLULAR CONSTITUENTS AND THE LIPOPROTEINS OF HUMAN BLOOD. J. E. Lovelock, A. T. James, and C. E. Rowe (National Institute for Medical Res., Mill Hill, London, N.W. 7). *Biochem. J.* 74, 137-140 (1960). The incorporations *in vitro* of radioactivity from labeled sodium acetate into the lipids of whole blood were measured. Lipids from the cells, plasma β -lipoprotein and the α -lipoproteins were fractionated into unsaponifiable lipid, saponifiable lipid, and phospholipid. Exchanges of both unsaponifiable lipid and phospholipid between cells and plasma α - and β -lipoprotein were observed. There was no exchange of saponifiable lipid between the cells and β -lipoprotein. Exchange was observed between the cells and

the other plasma lipids. Approximate exchange rates were calculated for saponifiable lipid and phospholipid.

METABOLISM OF LABELED CEREBRAL LIPIDS IN DEVELOPING AND MATURE RATS AFTER INJECTION OF [1-C¹⁴] GLYCEROL. A. N. Davison (Pathology Dept., Guy's Hospital Medical School, London, S.E. 1). *Biochem. J.* **74**, 1P (1960). Labeled glycerol was injected into 13-day-old and adult rats. The animals were killed at intervals up to 110 days after injection, brain lipids were extracted and fractionated, and radioactivity determined. In young animals loss of radioactivity of total brain lipid was much slower ($t_{0.5}$ = about 135 days) than in adults ($t_{0.5}$ = about 40 days). In the developing rats, glycerol was incorporated rapidly into the myelin lipids, sphingomyelin, cholesterol and cerebroside, and also into cephalin and lecithin of the brain. At 110 days there was little loss of radioactivity incorporated into brain cholesterol and cerebroside, although less than half the initial radioactivity was present in the sphingomyelin, cephalin, and lecithin. In adult animals much less radioactive glycerol was incorporated into the myelin lipids, and turnover of all the cerebral lipids was more rapid.

THE PRESENCE OF LECITHIN IN WHOLE RAM SEMEN. G. M. Gray (Lister Institute of Preventive Medicine, London, S.W. 1). *Biochem. J.* **74**, 1P-2P (1960). Phospholipid isolated from ram semen was found to possess the molar ratio P:total N:amino N:fatty aldehyde:acyl ester of 1.00:0.94:0.19:0.40:1.51. Fractionation of the phospholipid by chromatography on silicic acid using chloroform with increasing portions of methanol for elution, gave cephalin (25%), lecithin (35-36%), choline plasmalogen (37-36%), and sphingomyelin (3%).

TOTAL LIPID OF TRICHOPHYTON MENTAGROPHYTES. H. N. Prince (Res. Dept., Wallace & Tiernan, Inc., Belleville, N. J.). *J. Bacteriol.* **79**, 154 (1960). The dermatophyte *T. mentagrophytes* was found to contain 15.3% total lipid, 10.1% free and 5.2% bound. The phospholipid fraction amounted to 0.3%, unsaponifiables 0.7%, and glycerides about 14%. Fatty acids comprised 95% of the glyceride fraction, indicating a preponderance of long chain types. The total unfractionated fat showed mild fungicidal activity at pH 6.0; such activity was abolished at pH 8, suggesting the presence of unesterified fatty acids.

INACTIVITY OF THE CAROTENE-OXIDIZING SYSTEM IN IRIS LEAF. V. H. Booth (Dunn Nutritional Lab., Univ. of Cambridge, Milton Road, Cambridge). *J. Sci. Food Agr.* **11**, 8-13 (1960). When green leaves were severely damaged by grinding to pulp, one-fourth of the carotene was lost by enzymic activity in about 13 minutes at room temperature. The enzyme was found in 20 species of leaves and also in pods, green fruits, stems, and other chlorophyll-containing parts of plants. The enzyme was not found in most of the chlorophyll-free materials that were tested. Carotene was stable in macerated leaf of iris. The iris was the only exception found to the rule that chlorophyll in higher plants is accompanied by the carotene-destroying enzymic system.

PRODUCTION OF ODD-NUMBERED CARBON FATTY ACIDS FROM PROPIONATE BY MICE. S. B. Tove (North Carolina State Col., Raleigh). *Nature* **184**, 1647-1648 (1959). Adult female mice were fed a casein-sucrose purified diet to which was added tripropionin at the expense of sucrose. The initial level of tripropionin was 10%, and this was increased 10% each week until a 40% dietary level was reached. After an additional 2 weeks at this level, the animals were killed and the depot fat isolated. Determination of the fatty acid composition by gas chromatography of the methyl esters on a column of celite-succinate polyglycol esters indicated the presence of palmitic (20%), oleic (50%), linoleic (13%), palmitoleic (10%), myristic (2%), stearic (3%), and C₁₅ and C₁₇ acids (1 and 2%). Depot fats of mice fed diets not containing tripropionin contained barely detectable amounts of odd-numbered carbon fatty acids.

PHOSPHOLIPID PHOSPHORIC ESTERS IN THE HUMAN PLACENTA. G. Porcellati, B. Curti, and S. Luciani (Dept. of Biochem., Univ. of Perugia, Perugia, Italy). *Nature* **184**, 1870-1871 (1959). An ion-exchange chromatographic technique was employed for the separation, identification, and determination of the phospholipid phosphoric esters in human placenta. No phosphorylserine was found. Concentrations of glycerylphosphoryl-ethanolamine, phosphorylcholine, and phosphorylethanolamine were lower in placenta than in brain tissue. Glycerylphosphorylcholine was present in an approximately equal amount in both tissues.

STEROL-BALANCE EXPERIMENTS IN HUMANS. H. Schön (Medizinische Universitäts-Klinik, Erlangen). *Nature* **184**, 1872-

1873 (1959). The apparent absorptions in humans of β -sitosterol, mixed soya sterols, stigmastanol acetate, sitosterol stearate, and cholesterol were determined. The sterols were given to subjects in the form of a 20% emulsion in 3% carboxymethylcellulose. Apparent absorption of soya sterols was 48%, that of sitosterol and cholesterol 55% each. When sitosterol in crystalline form was fed, practically all the sterol was recovered in the feces. However, an increased apparent absorption was observed after feeding sitosterol stearate.

SERUM, BILE AND LIVER TOTAL CHOLESTEROL OF LABORATORY ANIMALS, TOADS AND FROGS. Cheng-Chun Lee, R. G. Herrmann, and R. O. Froman (Lilly Res. Labs., Eli Lilly & Co., Indianapolis, Ind.). *Proc. Soc. Exptl. Biol. Med.* **102**, 542-544 (1959). Dogs, monkeys, hamsters, and mice have relatively higher serum total cholesterol concentration than cats, rats, rabbits, and guinea pigs. Total cholesterol concentration in liver varies only slightly among these species. Gall-bladder bile of monkeys contains large amounts of cholesterol, while guinea pigs excrete very small amounts in the bile. Serum and liver total cholesterol concentrations of the pigeon are very high. Total cholesterol in liver varies slightly among 4 species of amphibians studied. Frogs secrete significant amounts of cholesterol in bile. Serum cholesterol concentrations of both species of toads are higher than both species of frogs.

PLASMA CHOLESTEROL LEVELS IN RATS FED "INFARCT-PRODUCING DIETS." Minoru Suzuki (Dept. of Pathology, Washington Univ. School of Med., St. Louis, Mo.). *Proc. Soc. Exptl. Biol. Med.* **102**, 544-547 (1959). Levels of total cholesterol in plasma of rats fed several variations of a basal infarct-producing diet containing 40% butter, butter-oil, or lard were higher than in rats of other groups fed vegetable fat (corn oil or Crisco). Levels of rats in the group offered a diet not containing exogenous cholesterol were far lower than those of the control group. A significantly high level was observed when the amount of salt mix in the diet was increased 3-fold to 12%. In a group of 30 rats fed the basal diet, cholesterol in plasma of those that developed infarcts rose neither more rapidly nor to significantly higher levels than in rats in the same group that did not develop infarcts within 4 months.

PREVENTION OF RESPIRATORY DECLINE IN NECROTIC LIVER DEGENERATION BY ANTIOXIDANTS IN VITRO. W. Mertz and K. Schwarz (Nat. Inst. of Arthritis and Metabolic Diseases, N. I. H., Bethesda, Md.). *Proc. Soc. Exptl. Biol. Med.* **102**, 561-566 (1959). The effect of 13 antioxidants on liver slices during the latent phase of necrotic liver degeneration, was studied *in vitro*. The characteristic respiratory decline, *i.e.*, breakdown of O₂ consumption in the Warburg apparatus, was prevented by addition of most compounds at catalytic dose levels. The scale of relative potencies *in vitro* followed closely that previously established *in vivo* with the exception of vitamin E and methylene blue. Tocopherol and its esters were completely inactive *in vitro*, while the tocopherol metabolite showed high potency in preventing metabolic lesion.

DIET AND CHOLESTEREMIA. IV. EFFECTS OF CARBOHYDRATE AND NICOTINIC ACID. N. Nath, A. E. Harper, and C. A. Elvehjem (Dept. of Biochem., Univ. of Wisconsin, Madison). *Proc. Soc. Exptl. Biol. Med.* **102**, 571-574 (1959). When rats were fed a diet containing 25% of hydrogenated coconut oil, 1% cholesterol, and 0.5% cholic acid, substitution of wheat flour for sucrose caused a reduction in serum cholesterol concentration. Diets containing sucrose, dextrin, and anhydrous glucose produced the same degree of hypercholesteremia. When sucrose was replaced in part with lactose or sorbitol, hypercholesteremia was enhanced. Nicotinic acid at high levels and inositolhexanicotinate at 0.57% level in the diet failed to lower serum cholesterol concentration.

EFFECT OF VITAMIN E ON MYOGLOBIN CONTENT OF GUINEA PIG SKELETAL MUSCLE. B. A. Schottelius, D. D. Schottelius, and A. D. Bender (Dept. of Physiol., Col. of Medicine, State Univ. of Iowa, Iowa City). *Proc. Soc. Exptl. Biol. Med.* **102**, 581-583 (1959). A marked decline in myoglobin concentration has been demonstrated in gastrocnemius and masseter muscles of guinea pigs maintained longer than 15 days on a vitamin E deficient diet. Supplementation with vitamin E after 14 days reduces the magnitude of concentration change and stabilizes pigment concentration at control levels. No significant difference between control and experimental animals in regard to water content, muscle weight, or body weight was evident from 21- and 30-day dietary regimen studies. Noncollagen nitrogen was significantly depleted only in the gastrocnemii of the 21-day deficient animals.

PLASMA UNESTERIFIED FATTY ACID CONCENTRATION IN FETAL AND NEONATAL LIFE. C. M. Van Duyne and R. J. Havel (Univ. of California School of Medicine, San Francisco). *Proc. Soc. Exptl. Biol. Med.* **102**, 599-602 (1959). The concentration of unesterified fatty acids (UFA) in blood plasma of fetal sheep and newborn man was consistently much lower than in plasma obtained simultaneously from their mothers. Levels were comparable to those found in man after administration of glucose or insulin. In both species the plasma level of UFA rose rapidly within two hours of birth with an associated hypoglycemia. These findings support previous studies which suggested the occurrence of a rapid shift from carbohydrate to fat catabolism in the neonatal period.

METABOLISM OF PROPIONATE-1-C-14 IN THE INTACT MOUSE. D. D. Feller (Radioisotope Service, Vet. Admin. Hospital, and Dept. of Medicine, Univ. of Washington, Seattle). *Proc. Soc. Exptl. Biol. Med.* **102**, 605-607 (1959). Twenty-four normal and 16 obese mice were injected with radioactive propionate and the tag was followed into CO₂, nonsaponifiable lipids, fatty acids, glycogen, urine, and feces. Propionate was found to be a precursor for body fat synthesis in the whole animal. Conversion of propionate to lipids was greater in obese than in lean mice.

DIGESTION, ABSORPTION, AND METABOLISM OF CHIMYL ALCOHOL FED AS FREE ALCOHOL OR AS ALKOXYDIGLYCERIDE. R. Blomstrand (Dept. of Clin. Chem., Univ. of Lund, Lund, Sweden). *Proc. Soc. Exptl. Biol. Med.* **102**, 662-665 (1959). C¹⁴-labelled chimyl alcohol (α -1-C¹⁴-hexadecylglyceryl ether) was fed as free chimyl alcohol or as chimyl dioleate to rats. Intestinal contents and thoracic duct lymph lipids were analyzed. Mixed ether-glycerides were isolated from the intestinal contents after feeding free chimyl alcohol dissolved in olive oil, indicating a synthesis of new glyceride ester bonds. Free labelled chimyl alcohol was isolated after feeding labelled chimyl dioleate indicating an exchange and release of fatty acids in both 1- and 2-position in the mixed ether-glyceride. In lymph lipids more than half the radioactivity was associated with palmitic acid, indicating a splitting of the ether bond in mucosa cells. It was concluded that chimyl alcohol can be absorbed unchanged but that it is extensively metabolized in the mucosa cells, whether it is fed as free alcohol or as an alkoxydiglyceride.

EFFECT OF AN ANION EXCHANGE RESIN ON SERUM CHOLESTEROL IN MAN. S. S. Bergen, Jr., T. B. Van Itallie, D. M. Tennent, and W. H. Sebrell (Dept. of Medicine, St. Luke's Hospital and Inst. of Nutrition Sciences, Columbia Univ., New York). *Proc. Soc. Exptl. Biol. Med.* **102**, 676-679 (1959). Preliminary results of administering MK 135, a resin with bile acid sequestering properties, are reported. The preparation was given to 26 patients for periods of 2 to 34 weeks. Serum total cholesterol levels were lowered by more than 10% in 23 of the 26 patients. Average decrease in serum total cholesterol for all subjects was 20%. No systemic side-effects were observed.

ABSORPTION OF CHOLESTERYL METHYL ETHER AND ITS EFFECT ON CHOLESTEROL ABSORPTION. S. Gordon and W. P. Ceklaniak (Biochem. Dept., Lederle Labs., Am. Cyanamid Co., Pearl River, N. Y.). *Proc. Soc. Exptl. Biol. Med.* **102**, 679-682 (1959). Oral administration of the methyl ether of cholesterol-4-C¹⁴ to lymph duct cannulated rats resulted in approximately 20% recovery of C¹⁴ activity in a 24-hour lymph collection as compared to 35% recovery in cholesterol-4-C¹⁴. Simultaneous administration of the methyl ether with cholesterol-4-C¹⁴ had no effect on cholesterol absorption in the rat. In the rabbit, dietary cholesteryl methyl ether had negligible effect on sterol levels when given alone or in conjunction with cholesterol. These results indicate that esterification is not indispensable for sterol absorption although it probably speeds absorption.

EFFECTS OF STORAGE ON SERUM NONESTERIFIED FATTY ACID CONCENTRATIONS. A. L. Forbes and Jane A. Camlin (Veterans Administration Hospital, Richmond, Va.). *Proc. Soc. Exptl. Biol. Med.* **102**, 709-710 (1959). The effects of storage of serum at various temperatures on NEFA concentrations were studied. Appreciable increases in NEFA occurred with 24 hours even in frozen sera. Refrigerated heptane extracts of sera for NEFA analysis were stable for several days. Thus, sera for NEFA analyses should be extracted promptly after collection.

HYPOCHOLESTEREMIC EFFECT IN MAN OF BENZMALECENE: AN INHIBITOR OF CHOLESTEROL BIOSYNTHESIS. S. S. Bergen, Jr., T. B. Van Itallie, and W. H. Sebrell (Dept. of Medicine, St. Luke's Hospital and Inst. of Nutrition Sciences, Columbia Univ., New York). *Proc. Soc. Exptl. Biol. Med.* **103**, 39-40 (1960). Benzmalecene in amounts of 0.5 to 1.0 g./day of the free acid or sodium salt was studied in 6 patients for 10 to 53 days. Serum total cholesterol levels were decreased by an

average of 18%. Thus, this drug shows promise as serum cholesterol depressant. However, treatment was associated with decreases in serum alkaline phosphatase and a drop in cholesterol ester levels in disproportion to decrease of serum total cholesterol. These changes, as well as occurrence of eosinophilia in 2 subjects, suggest that benzmalecene in amounts used in this study may prove to be too toxic for clinical use.

BENZMALECENE: INHIBITION OF CHOLESTEROL BIOSYNTHESIS AND HYPOCHOLESTEREMIC EFFECT IN RATS. J. W. Huff and J. L. Gilfillan (Merck Inst. for Therapeutic Res., Rahway, N. J.). *Proc. Soc. Exptl. Biol. Med.* **103**, 41-43 (1960). Benzmalecene inhibited *in vitro* incorporation of 2-C¹⁴-mevalonic acid into cholesterol by rat liver homogenates. The inhibition proved to be noncompetitive. Oral administration of this compound to normal rats (in a chow diet containing lard) resulted in a significant reduction in plasma cholesterol.

NICARBAZIN INDUCED HYPERCHOLESTEROLEMIA IN THE HEN. H. S. Weiss (Dept. of Poultry Science, Rutgers, State Univ., New Brunswick, N. J.). *Proc. Soc. Exptl. Biol. Med.* **103**, 49-53 (1960). The coccidiostat Nicarbazin (Merck), an equimolecular complex of 4,4'-dinitrocarbanilide and 2-hydroxy-4,6-dimethylpyrimidine, when fed at 0.04% of a low-fat, low-cholesterol diet to 6-8-month-old laying hens, doubled plasma cholesterol within 2 weeks and tripled it within 4 weeks. Thereafter the hypercholesterolemia was maintained at levels between 600 and 900 mg.% for as long as 32 weeks. The author feels that the hypercholesterolemia is induced and sustained by continuous resorption of yolk from partially developed ova, while yolk material continues to be deposited in other ova just beginning the growth cycle.

THROMBOPLASTIN. I. PHOSPHOLIPID MOIETY OF THROMBOPLASTIN. K. T. Slotta (Depts. of Biochem. & Med., Univ. of Miami Medical School, Miami, Fla.). *Proc. Soc. Exptl. Biol. Med.* **103**, 53-56 (1960). Phosphatidyl ethanalamine and phosphatidyl choline prepared from calf brain were inactive in the Thromboplastin Generation Test, but they became highly active when present with about 10% phosphatidyl serine. Phospholipids from fresh eggs were inactive, because they contain no phosphatidyl serine.

EFFECT OF METHYL LINOLEATE ON TISSUE CHOLESTEROL OF NORMAL AND VITAMIN E DEFICIENT RABBITS. L. C. Smith, Y. S. Shin, and D. T. Freier (Dept. of Biochem., School of Med., State Univ. of S. Dak., Vermillion). *Proc. Soc. Exptl. Biol. Med.* **103**, 56-58 (1960). The distribution of cholesterol in 7 tissues of normal and dystrophic rabbits was determined. Significant decreases in serum, liver, heart, kidney, and spleen cholesterol occurred in animals receiving dystrophic diet plus 10% methyl linoleate as compared to those receiving dystrophic diet alone. Vitamin E also caused a lowering of cholesterol in serum, muscle, and heart tissue. The methyl linoleate did not significantly lower tissue cholesterol of normal animals. The authors conclude that vitamin is a more important factor than methyl linoleate in maintaining normal tissue cholesterol metabolism, but that methyl linoleate may aid in reducing tissue cholesterol, muscle excepted, when vitamin E stores are inadequate.

ENHANCEMENT OF EXPERIMENTAL ATHEROSCLEROSIS BY ACTH IN THE DOG. S. Rosenfeld, J. Marmorston, H. Sobel, and A. E. White (Inst. for Medical Res., Cedars of Lebanon Hosp., Los Angeles, and Depts. of Med. and Biochem., Univ. of So. Calif.). *Proc. Soc. Exptl. Biol. Med.* **103**, 83-86 (1960). One to 3 injections of 40 units of ACTH-gel significantly enhanced the elevated serum cholesterol and phospholipid levels produced by subsequent thiouracil and cholesterol feeding in the dog. This effect was associated with paralytic strokes in 4 of 10 dogs. Autopsies revealed markedly more widespread and more severe atherosclerosis in the dogs pretreated with ACTH.

INTIMAL LESIONS IN ARTERIES OF VITAMIN E DEFICIENT RATS. N. M. Sulkin and Dorothy F. Sulkin (Dept. of Anatomy, Bowman Gray School of Med., Wake Forest College). *Proc. Soc. Exptl. Biol. Med.* **103**, 111-115 (1960). The aorta and carotid arteries of rats maintained on a vitamin E deficient diet for 280 to 450 days were characterized by presence of intimal changes. Addition of 15-20% vitamin E-free hydrogenated fat accelerated formation of lesions. A daily supplement of pure alpha-tocopherol inhibited formation of intimal changes. Addition of cholesterol to the diet had no effect on incidence or severity of the lesions. Intimal alterations varied from a simple thickening of endothelium to large well formed plaques with fibrotic subendothelial tissue.

EFFECT OF INHIBITORS OF OXIDATIVE PHOSPHORYLATION ON BIOSYNTHESIS OF CHOLESTEROL AND PRECURSORS BY LIVER HOMO-

ENATES. L. D. Wright and Marcia Loeb (Graduate School of Nutrition, Cornell Univ., Ithaca, N. Y.). *Proc. Soc. Exptl. Biol. Med.* **103**, 183-185 (1960). Classical inhibitors of oxidative phosphorylation, particularly 2,4-dinitrophenol, inhibit the biosynthesis of non-saponifiable material and cholesterol from mevalonic acid by rat liver homogenates. Presumably in the presence of inhibitors, a level of ATP is not maintained for the phosphorylations and the concerted decarboxylation and dehydration essential in utilization of mevalonic acid.

• Paints and Drying Oils

DISPERSING AGENTS FOR NONAQUEOUS SYSTEMS. W. J. Maxey (General Aniline & Film Corp.). *U. S.* **2,919,993**. Anhydrous sodium-N-palmitoyl taurate is recommended as an aid in dispersing pigment in a suspending liquid such as liquid waxes, stearic acid, and drying oils.

METHOD OF TREATING DRYING OIL IMPREGNATED GRAPHITE ELECTRODE. W. W. Carlin (Columbia-Southern Chem. Corp.). *U. S.* **2,920,004**. A graphite electrode having a drying oil present in its pores is treated with a liquid mixture of elemental chlorine and bromine for a period of time between about 30 minutes to about 24 hours.

COATING COMPOSITION COMPRISING NITROCELLULOSE AND ALKYD RESIN AND ARTICLE COATED THEREWITH. A. N. Walus (E. I. du Pont de Nemours & Co.). *U. S.* **2,920,054**. A light colored coating composition which, when dry, exhibits resistance to discoloration from contact with oil, grease, tar, and the like, consists of a pigment, a volatile organic solvent, and a film-forming material. The film-former consists of lacquer grade nitrocellulose (1 part by weight), a hydrogenated castor-oil modified phthalic alkyd (0.5 to 1.5 parts), and a plasticizer (up to 0.6 part).

EPOXIDE RESIN COMPOSITION. C. A. May (Shell Development Co.). *U. S.* **2,921,040**. A hard cured product is obtained by reacting a mixture consisting of (1) glycidyl polyether of 2,2-bis(4-hydroxyphenyl)propane having 1,2-epoxy equivalency of about 1.8 (2), an oil such as castor oil, air blown castor oil, or castor oil which has been acetylated to the extent of 51.5% to 79% of the theoretical, and (3) an amine epoxy curing agent.

COATED POLYMERIC THERMOPLASTIC DIELECTRIC FILM. R. T. McBride (E. I. du Pont de Nemours & Co.). *U. S.* **2,921,869**. A process for coating nonfibrous polyethylene terephthalate film is described. The film is treated with a dispersion of a mixture of a resinous compound such as a long chain fatty acid-modified alkyd resin or a phenol-formaldehyde resin (95% to 40% by weight of solids) and amorphous silica or esters (5% to 60%). The solvent is driven off and the coated film is cured.

CASTOR OIL, DIGLYCOLLIC ACID-ORGANIC DIISOCYANATE PREPOLYMERS AND CELLULAR PRODUCTS PREPARED THEREFROM. G. C. Harrison and H. C. Briuker (Minnesota Mining & Mfg. Co.). *U. S.* **2,921,916**. An aromatic polyisocyanate and a polyhydroxylated polyester having an acid number no higher than about 35 and comprising primarily glycerides of normally hydroxylated liquid long chain aliphatic carboxylic acids and diglycollic acid are combined in a ratio of isocyanate to hydroxyl groups in the range of about 1.5:1 to about 2.5:1. About 100 parts of this product are reacted with 4 to 15 parts of a foaming agent consisting of water and a tertiary amine catalyst to give a flexible cellular plastic.

PROCESS FOR PREPARING ETHERS OF EPOXIDIZED COPOLYMER DRYING OILS, AND RESULTING PRODUCTS. R. L. Millar and S. B. Radlove (Glidden Co.). *U. S.* **2,921,947**. A monocarboxylic hydrocarbon acid of 7-20 carbon atoms is reacted with an epoxidized hydrocarbon copolymer drying oil (styrene, methyl or ethyl ring-alkylated homologues) until an acid number below 40 is obtained. Sufficient acid is present to provide between about one and two mols per mol of oxirane oxygen in the epoxidized oil.

COATING COMPOSITIONS AND LIQUID VEHICLES CONTAINING ESTERS OF POLYMERIZED FATTY ACIDS AND DRIERS. W. P. Cody (Reichhold Chemicals, Inc.). *U. S.* **2,922,769**. The vehicle of a thixotropic pigmented coating consists essentially of a volatile solvent and a resinous base of oil-modified alkyd resin. Also present is a small amount of a combination of a polyester and a calcium drier salt of an organic acid which imparts increased thixotropic viscosity to the composition. The polyester has an acid number of 2 to 30 and is the condensation product of a polyhydric alcohol with a polymerized unsaturated 18-carbon fatty acid.

AUTOMATIC PAINT MANUFACTURING MACHINE. J. E. Logan, A. G. Russell, and G. N. Willis (Martin Senour Co.). *U. S.* **2,923,433**. A description and a diagram are given of a liquid formulating machine adapted to receive and act upon coded numerical intelligence fed into it.

• Detergents

FATTY ACIDS AND FATTY ALCOHOLS IN SOAPS AND COSMETICS. Anon. *Soap, Perfumery & Cosmetics* **33**, 47-9 (1960). This publication describes the functions of fatty acids and fatty alcohols in the manufacture of soaps, toiletries and cosmetic products. General principles and practical methods are discussed, and the wide use of these versatile raw materials is illustrated by a number of formulations.

MONOETHANOLAMIDES AS ADDITIVES TO TOILET SOAPS. Anon. *Soap, Perfumery & Cosmetics* **32**, 1246-48 (1959). Monoethanolamides in soap would be expected to improve the foaming characteristics of the soap and to act as lime soap dispersants in hard water. Lauric and myristic monoethanolamides intensify the odor of perfumes used in soap, without having any appreciable effect on the character of the odor. Palmitic and stearic monoethanolamides have more of an emollient effect than the lower members of the series, because of their greater substantivity.

DYNAMIC STRUCTURE IN DETERGENT FOAMS. G. F. Dasher and A. J. Mabis (Procter & Gamble Co., Cincinnati, Ohio). *J. Phys. Chem.* **64**, 77-83 (1960). Measurements of the quantity of surface active material adsorbed at an air-water boundary, when coupled with analysis of the X-ray diffraction patterns obtained from that same surface, give strong evidence that a hydrous gel structure makes up the surface film in a soap or detergent foam. Detailed data are given for the system sodium alkyl sulfate and fatty alcohol in water solution, and a tentative model for the gel structure is proposed. In systems where the surface-active materials are readily dispersible in water, there appears to be no close packing of hydrocarbon chains. It would seem that close packing of hydrocarbon chains in a surface film is a special case, associated only with very insoluble monolayers spread carefully on the surface of the water.

THE ABSORPTION OF CATIONIC SURFACTANTS BY CELLULOSIC MATERIALS. F. H. Sexsmith and H. J. White, Jr. (Textile Research Inst., Princeton, N. J.). *J. Colloid Sci.* **14**, 630-9 (1959). A theoretical model is proposed to account for the results observed when cationic surfactants are absorbed by cellulose substrates. The model consists of the absorption of cations by an exchange process followed by a clustering of ion pairs on the exchange cations. When this model is combined with a mass action treatment of the surfactant solution, absorption isotherms, similar to those found experimentally, are obtained. In particular, there are maxima in the absorption isotherms. A discussion of the factors which lead to maxima is given, and a model to account for the maxima observed with anionic surfactants is proposed.

DEGERMING ACTIVITY OF TOILET BARS—INTERPRETATION OF BACTERIOLOGICAL DATA FROM HAND WASHING TESTS. J. J. Travers, A. C. Rohloff, E. L. Ambye, and L. J. Vinson (Lever Brothers Co., Edgewater, N. J.). *J. Soc. Cosmetic Chemists* **10**, 410-21 (1959). The *in vitro* effectiveness of deodorant bars can be measured by the Price Serial Basin Wash procedure which is generally used today. An alternative method of analysis is the regression analysis of logarithm of final count on logarithm of initial count, and calculation of per cent reduction from the regression line for a standard initial count representing the mean of the population. This method allows realistic evaluation of a deodorant bar on small groups of subjects regardless of the level of initial counts.

THE ABSORPTION OF CATIONIC SURFACTANTS BY CELLULOSIC MATERIALS. I. THE UPTAKE OF CATION AND ANIONIC BY A VARIETY OF SUBSTRATES. F. H. Sexsmith and H. J. White, Jr. (Princeton Univ., Princeton, N. J.). *J. Colloid Sci.* **14**, 598-618 (1959). The interaction between cationic surfactants and cellulose fibers has been studied. Most of the work involves cetyltrimethylammonium bromide (CTAB) and four substrates: kieran cotton, a medium-high-tenacity viscose rayon, a viscose rayon monofil, and oxycellulose. Absorption isotherms for the cation and anion of the surfactant were measured and some attention was given to rates of absorption and to the effects of temperature, added electrolyte, and solubilized dyes. Two major

absorption processes occur in the concentration range studied: cation exchange and ion-pair absorption. The cation exchange is dependent on the exchange capacity of the substrate. The ion-pair absorption begins to become important in the vicinity of the critical micelle concentration of the surfactant and also seems to depend on the cation-exchange capacity of the substrate. If the ion-pair absorption is assumed to consist of a clustering of ions on exchanged long-chain cations, the results for all but very high ionic strengths can be explained. In the presence of large amounts of added electrolyte an additional ion-pair absorption seems to occur.

THE EFFECT OF ESTERIFICATION OF THE CARBOXYL GROUPS IN THE CELLULOSIC SUBSTRATES. Y. Gotshal, I. Rebenfeld, H. J. White, Jr. (Textile Res. Inst., Princeton, N.J.). *Ibid.* 619-29. Viscose, rayon and oxycellulose containing a high concentration of carboxyl groups have been esterified at the carboxyl group using ethylene oxide. This reagent was chosen to minimize changes in accessibility caused by the esterification reaction. Measurements were made of the carboxyl contents, of the capacities of the sample to absorb water, and of their capacities to absorb the cation and anion from the solutions of cetyltrimethylammonium bromide. These last measurements were made to test the hypothesis advanced by Sexsmith and White that absorption of ion pairs from the surfactant solution was a clustering process dependent on the presence of exchanged cations which served as nuclei. The marked decrease in ion-pair absorption found after esterification was in agreement with this hypothesis.

MECHANISM OF DETERGENCY. I. ADSORPTION OF DETERGENT ON FIBER AND SOIL. G. G. Jayson. *J. Appl. Chem.* (London) 9, 422-9 (1959). The adsorption of S^{35} -labeled Na dodecylbenzenesulfonate on clean and soiled cotton has been studied. The influence of detergent concentration, particulate soil, detergent adjuncts, and water hardness were also determined.

II. ROLE OF POLYPHOSPHATE BUILDER IN DETERGENCY. *Ibid.* 429-35. The interaction of P^{32} -labeled $Na_5P_3O_7$ with soiled cotton cloth in the wash solution is studied, and the function of the polyphosphate builder in the soil removal mechanism is discussed. (*C. A.* 54, 928)

SOME PHYSICO-CHEMICAL ASPECTS OF PHENOLIC PRESERVATIVES IN THE PRESENCE OF MACROMOLECULES. II. B. Kostenbauder (Temple Univ. School of Pharmacy, Philadelphia, Pa.). *Am. Perfumer Aromat.* 75(1), 28-9, 32-3 (1960). This article surveys some of the factors contributing to the interactions of phenols with surfactants or other macromolecules and the accompanying decrease in the efficiency of the phenols as preservatives. Recognition of the factors contributing to preservative-macromolecule interactions might not only make possible the avoidance of some potential incompatibilities but should also aid in the selection of the most efficient preservative for a given system. The formation of a relatively insoluble complex might be taken into consideration in these preservative-macromolecule interactions. Such a situation would not only inactivate the preservative but would also influence the emulsifying or suspending properties of the macromolecule. 19 references.

AMPHOLYTIC SURFACE ACTIVE AGENTS. C. D. Moore (Glovers [Chemicals] Ltd., Leeds, Yorks, England). *J. Soc. Cosmetic Chemists* 11, 13-25 (1960). The general characteristics of surface active ampholytes are discussed with particular reference to their similarities and dissimilarities to the better-known types of surface active agents. Commercial ampholytes are of two types—long-chain N-substituted amino acids and long chain betaines. The various physical and chemical properties of the amino acid type are described. However, on the basis of various physical properties of the betaines, the author has concluded that betaines, as a class, do not exhibit amphoteric properties and would appear to be best classified as members of the cation-active type. However, since these betaines are internal quaternary ammonium compounds and differ from ordinary quaternaries, it has been suggested that they be called Intronium Surface Active Agents.

THE PROBLEM OF CUTANEOUS AND CAPILLARY HYGIENE: IS IT SOLVED? J. Morelle. *Perfumery Essent. Oil Record* 50, 959-65 (1959). A new high-foaming lipo-protein detergent for skin cleaning developed in France, is said to have a remarkable acidifying effect on the skin (tests showed that skin pH 6.8 before washing, fell to 6.0 after use), to have high buffer action, to have medium detergency, and to be able to fix amino-

acids or short peptides on the epidermis or keratin fiber. The properties of this lipo-protein complex product are compared with those of other detergent products, with emphasis on their effects on the physiology of the skin.

ANTIBACTERIAL SYNERGISM BETWEEN THE HALOGENATED BISPHENOLS AND THE HALOGENATED AROMATIC ANILIDES AND CARBANILIDES. D. R. Noel, R. E. Casely, W. M. Linfield, and L. A. Harriman (Armour & Co., Chicago, Ill.). *Appl. Microbiol.* 8, 1-4 (1960). It has been demonstrated that some of the halogenated bisphenols show antibacterial synergism when combined with some halogenated aromatic anilides and carbanilides by tests *in vitro*. This synergism was found to exist for the chemicals, *per se*, and to be independent of the carrier used, whether water, soap, nonionic or anionic (other than soap) synthetic detergent. The most active synergism was found for the higher halogenated bisphenols, that is, the hexachloro- and tetrachloro-compounds, with the trichlorocarbanilides and the chlorinated salicylanilides.

DETERGENT COMPOSITIONS. A. J. Stirton, J. K. Weil, and E. W. Maurer (Secretary of Agriculture). *U. S.* 2,915,473. An improved detergent composition having high detergency and adequate solubility in water consists of a synergistic mixture of salts of long-chain alkyl sulfates and α -sulfonated fatty acids having 16 to 24 C atoms, which can be prepared from the fatty acids present in lard, tallow, grease, and fish oils.

HEAVY DUTY LIQUID DETERGENT COMPOSITIONS. W. R. Hearn, A. N. MacLean, and F. W. Trusler (Colgate-Palmolive Co.). *U. S.* 2,920,045. A heavy duty liquid detergent composition in the form of a stable, free-flowing suspension having thixotropic properties comprises a water-soluble organic synthetic detergent and water-soluble inorganic alkaline builder salt, particularly polyphosphate salt, in an aqueous alcoholic medium, the amount of salt being in excess of its normal solubility in the amount of water present and maintained in a permanently noncaking suspension in the presence of minor proportions of a nonsoluble wax, a substantially water-insoluble colloidal material, and a water-soluble nitrogen compound such as urea or thiourea.

SYNTHETIC DETERGENT FORMULATIONS CONTAINING N-ACYL TAURATES. R. D. Stayner and H. Y. Løw (California Research Corp.). *U. S.* 2,921,030. An anionic synthetic detergent capable of producing good quality, stable and persistent foam upon being dissolved in water in concentrations usually employed in household and commercial laundry practice consists of a water soluble N-acylaminoalkane sulfonate detergent derived from C_{10} - C_{18} hydrogenated tallow fatty acids, a water-soluble C_6 - C_{18} monoalkyl benzene sulfonate detergent, and, as a foam-improving agent, from about 1 to 5% of *para*-n-dodecyl phenol.

SOAP STABILIZATION. J. G. Kleyn (Monsanto Chem. Co.). *U. S.* 2,921,907. The light stability of a soap containing phenolic compounds such as thiobis-(chlorophenol) antiseptics is improved by incorporating an ultraviolet light absorber such as isobutyl *p*-amino benzoate and a mild reducing agent such as sodium sulfite.

SUBSTITUTED CARBAMIDE DETERGENT COMPOSITION. L. I. Osipov and W. C. York (W. R. Grace & Co.). *U. S.* 2,921,909. The incorporation of a major portion of inorganic water soluble phosphates to a synthetic detergent composition consisting of from about 2 to 50% of an N-urea glucoside mono fatty ester and alkali metal sulfates and an alkali metal carboxymethylcellulose produces novel detergents which represent a marked improvement in the field of nonionic built detergents.

BOTTLE WASHING COMPOSITIONS. Geo. J. Meyer Manufacturing Co., *Brit.* 819,837. An improved composition for washing bottles in a brush-type bottle washing machine which removes all traces of residual materials consists of 50% water-soluble alkyl aryl sulfonate, 49% of a complex sodium phosphate and 1% of ethylene glycol.

IMPROVEMENTS IN THE PREPARATION OF DETERGENT COMPOSITIONS. P. J. Pengilly (Thomas Hedley & Co., Ltd.). *Brit.* 820,340. A detergent composition of low inorganic salt content is prepared in which the acid reaction mixture obtained by sulfonation of an aromatic organic material having an alkyl group of from 8 to 20 carbon atoms, after preliminary removal of free sulfuric acid such as by centrifuging, is mixed with 20% of a C_1 to C_4 aliphatic alcohol to react with free sulfuric acid to form a crystallizable sulfate and then precipitate out the material so obtained.