ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, J. Iavicoli, K. Kitsuta, F. A. Kummerow, C. C. Litchfield, Louise R. Morrow, E. G. Perkins, and T. H. Smouse

• Fats and Oils

Filling of analytical and preparative columns for gas chromatography. E. Bayer, K. P. Hupe, and H. Mack (Chemisches Institut der Universität Tübingen, Germany). *Anal. Chem.* 35, 492–496 (1963). Reproducibility of column packing has been investigated. Using the described experimental conditions, plate height and statistical irregularity are easy to reproduce. Filling of columns with unimpregnated carrier and following impregnation with liquid phase leads to equal results. A theory explaining the loss of efficiency of columns with greater diameter is mentioned, assuming a porosity gradient across the column diameter. Experiments have shown that columns of 5 to 10 cm. can be made as efficient as 1.0-cm. columns. Component mixtures of as much as 500 grams were separated in a single run.

Quantitative thin layer chromatography. Technique and application to assay of a steroid: 6-chloro-17α-hydroxy-pregna-4,6-diene-3,20-dione acetate. H. L. Bird, Jr., H. F. Brickley, J. P. Comer, P. E. Hartsaw, and M. L. Johnson (Control Division, Eli Lilly and Co., Indianapolis, Ind). *Anal. Chem.* 35, 346–347 (1963). Steroid samples and standards were chromatographed on thin layers of silica gel using a mixture of chloroform and ether. The steroid spots were located by ultraviolet light and a water spray. A technique is described for removing the adsorbent by vacuum, eluting the steriod, and filtering the eluate using a simple bent glass tube with a cotton plug. Absorbance at 283 mμ was used to quantitate the steroid. Studies of precision, accuracy, and linearity of the method, using the work of several analysts, showed quantitative thin layer chromatography to be sufficiently precise and accurate for practical quality control.

Studies on the efficiencies of packed gas chromatographic columns. D. D. DeFord (Dept. of Chem., Northwestern Univ., Evanston, Ill.), R. J. Loyd and B. O. Ayers. *Anal. Chem.* 35, 426–429 (1963). A three-parameter equation involving one term for axial diffusion in the gas phase, one term for nonequilibrium in the gas phase, and one term for nonequilibrium in the liquid phase is shown to be adequate to describe the variation of plate height with carrier gas velocity and outlet pressure. Corrections for the effects of pressure gradients in the column must be applied. Values of the three parameters have been determined for several different sample components on columns with liquid loadings between 5 and 30%. The values are generally in good agreement with theory.

Modified spectrophotometric reaction for detecting organic peroxide. P. R. Dugan and R. D. O'Neill (Microbiological and Biochem. Center, Syracuse Univ. Research Corp., Syracuse, N.Y.). *Anal. Chem.* 35, 414–415 (1963). Organic peroxides can be detected in the presence of high concentrations of aldehydes by adding an alkaline buffer to the reagent to yield a final pH of 7.5 to 9.1. Aldehydes do not form Schiff bases under the alkaline conditions. The peroxide will not react if strong acid (6N H_2SO_4) is added to the reagent. Undoubtedly the peroxide is destroyed in the acid. Strong base (1N NaOH) also destroys the ability of peroxide to react.

Microdetermination of long-chain carboxylic acids by transesterification with boron trifluoride. O. S. Duron and A. Nowotny (Dept. of Experimental Pathology, City of Hope Medical Center, Duarte, Calif.). *Anal. Chem.* 35, 370–372 (1963). A quantitative micromethod has been developed which is specific for the determination of long-chain carboxylic acids in materials containing acetyl groups. The method is based on quantitative transesterification with boron trifluoride dissolved in methanol. From the hexane extract of the methyl-esters the methyl acetate can be removed at 67C, a treatment which does not influence the amount of C_8 or higher fatty acid esters. For the quantitative determination of the methyl-esters the hydroxylamine-ferric perchlorate method of Snyder and Stephens was used. The lowest amount of long-chain carboxylic acids that can be determined accurately by this method is 0.1 μg.

Advances in the theory of plate height in gas chromatography. J. C. Giddings (Dept. of Chem., Univ. of Utah, Salt Lake City 12, Utah). *Anal. Chem.* 35, 439–449 (1963). The performance of a chromatographic column, packed or capillary, depends on the detailed structure of the internal solid surface and of the liquid partitioning phase. These column structural factors, usually complex, are converted into exact plate height expressions by means of the generalized nonequilibrium theory. The recent development of this structure-nonequilibrium approach has provided the first instance in which structural details can be accounted for and translated realistically into plate height performance. Consequently, it has been possible, using independent data, to predict the plate height of simple packed columns (glass beads) within the 20 to 50% range, and it should be possible to extend such independent calculations to more complex supports, including those yet untried. In this paper recent advances in the structure-nonequilibrium approach have been summarized, and new evidence, equations, and proposals are outlined which should be useful in further narrowing the gap between calculated and experimental plate heights.

Open tube columns with impregnated thin layer support for gas chromatography. I. Halász and C. Horváth (Institut für Physikalische Chemie der Universität Frankfurt am Main, Germany). *Anal. Chem.* 35, 499–505 (1963). It is shown that open tube columns with impregnated thin layer support can be produced, and that they are superior to conventional capillary columns for certain separation problems. Permeability of those columns is similar to, and their charging capacity is greater than, that of the well known open tube columns. A variety of stationary phases can be produced with active supports.

Quantitative aspects of gas chromatographic separations in biological studies. E. C. Horning, K. C. Maddock, K. V. Anthony, and W. J. A. Vandenheuvel (Lipid Research Center, Baylor Univ. College of Med., Houston, Texas). *Anal. Chem.* 35, 526–532 (1963). This study was carried out to define the nature of several problems involved in establishing procedures for the determination of steroids and long-chain fatty acid methyl esters. Column packings which show very little adsorption of solutes are required for best results. It is necessary to use appropriate derivatives in some instances, and the sample size should be appropriate for the specific application. Questions relating to matters of instrument design, preparation of column packings, temperature-programmed operation, and choice of detection systems have been studied.

Measurement of tritium in the effluent of a gas chromatography column. A. Karmen, I. McCaffrey, J. W. Winkelman, and R. L. Bowman (Lab. of Technical Development, Nat'l Heart Inst., Bethesda 14, Md.). *Anal. Chem.* 35, 536–542 (1963). Two methods for assaying tritium in compounds analyzed by gas chromatography are described. When the tritium in each component is sufficient for accurate assay in less than 10 seconds, the assay is performed during the analysis. The column effluent is passed through a combustion train consisting of a heated tube containing copper oxide in which organic materials are converted to carbon dioxide and water; a tube containing heated iron, maintained in the reduced state by a stream of hydrogen gas, in which the water reacts to liberate tritium-labeled hydrogen gas; a magnesium perchlorate water trap; and an ionization chamber or a transparent tube filled with anthracene crystals for scintillation counting. When the samples contain insufficient tritium, the effluent is passed through cartridges containing p-terphenyl crystals coated with silicone oil. High boiling materials are trapped and retained. Each cartridge is transferred to a vial containing diphenyloxazole-toluene for radioassay by liquid scintillation counting for the time required for statistically accurate results.

The spreading of air peaks in capillary and packed gas chromatographic columns. J. H. Knox and L. McLaren (Dept. of Chemistry, Univ. of Edinburgh, Scotland). *Anal. Chem.* 35, 449–454 (1963). Current theories for the spreading of packets of unsorbed substances in gas chromatographic columns are considered. It is shown that the usual HETP equations can be cast into reduced forms and that various column parameters, in particular the geometrical parameters A and A′, can be found by curve fitting. The method is applied to the data from a capillary and a packed column. It is shown that within experimental error the Golay equation is obeyed quantitatively. The diffusion coefficient for ethylene in nitrogen is found to be 0.16 cm.^{2} sec.$^{-1}$. Comparison of the HETP's for the capillary and packed column show that the tortuosity factor for glass beads is about 0.8. There is little evidence for eddy diffusion or coupled eddy diffusion as envisaged by Giddings. The eddy diffusion parameter λ is less than 0.15. The gas phase mass transfer coefficient is $C_g = 0.3 \times d_p^2/D_g = 0.0045$ second.

Sensitive ionization cross-section detector for gas chromatography. J. E. Lovelock, G. R. Shoemake, and A. Zlatkis (Dept. of Chemistry, Univ. of Houston, Houston, Texas). *Anal. Chem.* **35**, 460–465 (1963). The ionization cross-section detector is recognized as the only catholic ionization detector which is precise, reliable, robust, and linear in its response. The only drawbacks are lack of sensitivity to smallest quantities and a weak signal to unit mass of detectable substance. The sensitivity of this detector has been increased more than 100-fold by the simple expedient of reducing the sensing volume of the detector. The improved small volume ionization cross-section detector retains all of the good qualities of the method and is potentially valuable in all applications of gas chromatography where reliability and precision at moderate sensitivity are required.

Electron absorption detectors and technique for use in quantitative and qualitative analysis by gas chromatography. J. E. Lovelock (Baylor Univ. College of Medicine, Houston, Texas). *Anal. Chem.* **35**, 474–481 (1963). The electron absorption detector is by far the most sensitive detection device available for use in gas chromatography; furthermore, its selectivity permits the realization of extreme sensitivities in the face of a high level of extraneous material. These desirable properties have encouraged its widespread use in such otherwise intractable problems as pesticide trace analysis. It is not commonly realized, however, that the simpler and frequently used versions of this device are readily capable of generating erroneous and even totally false responses. This paper describes the basis of operation of electron absorption detectors and the nature and cause of the erroneous and anomalous responses it may generate. An alternative method of analysis by electron absorption is the pulse sampling technique; this retains the sensitivity and selectivity of the simple low potential ion chamber method, but is substantially free of errors and anomalous responses. The basis of this improved method is described and an account is given of the technique for its use in quantitative and qualitative analysis.

Contribution of diffusion and mass transfer processes to efficiency of gas liquid chromatography columns. R. H. Perrett and J. H. Purnell (Dept. of Physical Chem., Lensfield, Cambridge, England). *Anal. Chem.* **35**, 430–439 (1963). A detailed study of the dependence of gas phase and liquid phase mass transfer contributions to theoretical plate height, H, upon capacity ratio, k, has been made. Evidence shows the velocity profile effect in single capillaries to be of negligible magnitude in packed columns and that gas phase resistance to mass transfer arises from inhomogeneities, not only of flow but possibly also of solvent distribution. The dependence of liquid phase mass transfer resistance on k is found to be less than theory predicts, and it is suggested that simple models of solvent distribution are inadequate at high solvent/support ratios ($\geqslant$5% w./w.). Study of longitudinal and eddy diffusion (flow dispersion) contributions leads to the view that an apparent eddy diffusion contribution to H of about d_p occurs and that the concept of a labyrinth constant, ν, is superfluous when interstitial velocity is used for calculation.

Hydrogenation of linolenate. Fractionation of isomeric esters by countercurrent distribution with an argentation system. C. R. Scholfield, E. P. Jones, R. O. Butterfield, and H. J. Dutton (Northern Regional Res. Lab, U. S. Dept. of Agr., Peoria, Ill.). *Anal. Chem.* **35**, 386–389 (1963). Methyl linolenate was hydrogenated to an iodine value of 153.5 with 0.5% nickel catalyst at 140C and atmospheric pressure. The product was separated into monoenoic, dienoic, and trienoic esters by countercurrent distribution using acetonitrile and petroleum ether. Each of these fractions was countercurrently distributed between 0.2N silver nitrate in 90% methanol and petroleum ether. *cis*-Monoenes were well separated from *trans* monoenes. In the diene fraction, separation was less complete because there were differences in both configuration and relative position of double bonds. Analysis of the fractions by such methods as infrared absorption, alkali and lipoxidase isomerization, and oxidative cleavage, followed by dibasic acid analysis, gave additional information about the products formed during hydrogenation of linolenate.

Sol-coated capillary adsorption columns for gas chromatography. R. D. Schwartz, D. J. Brasseaux, and G. R. Shoemake (Exploration and Prod. Res. Div., Shell Dev. Co. (division of Shell Oil Co.), Houston, Texas). *Anal. Chem.* **35**, 496–499 (1963). Capillary adsorption columns can be prepared by wetting the insides of capillary tubes with a colloidal sol containing an adsorbent in a volatile liquid and then evaporating the liquid. This type of capillary column appears to be particularly suitable for hydrocarbon separations utilizing ultrasensitive detectors, because difficulties due to bleeding of liquid phases are eliminated.

Use of differential reaction rates to analyze mixture of organic materials containing same functional group. Application to mixtures of unsaturated compounds. S. Siggia, J. Gordon Hanna, and N. M. Serencha (Olin Research Center, Olin Mathieson Chemical Corp., New Haven 4, Conn.). *Anal. Chem.* **35**, 362–365 (1963). The rate approach for the analysis of mixtures of organic materials containing the same functional group has been applied to unsaturated compounds. Both bromination and hydrogenation are used. The usual second-order rate plots are used in the case of brominations. Hydrogenation is treated as a pseudo-first-order reaction by maintaining a relatively large excess of hydrogen present during the reaction. Standard reaction-rate plots show linear portions for each component in mixtures.

Processing of safflower seed. I. Dehulling. S. A. Ahmed, B. A. Rao, M. Allabaksh, S. D. Thirumala Rao and K. S. Murti (Oil Tech. Res. Inst., Anantapur, India). *Indian Oil Seeds J.* **15**, No. 5, 6–14 (1962). Single pair, smooth rolls and Bauer type 18 inch disc dehullers have been used for the dehulling of safflower seeds successfully. The smooth rolls are preferable to the Bauer type disc huller. Rolls had double the capacity of the disc huller. At a moisture level of 6±1%, dehulling of the seed is satisfactory. At higher moisture levels larger proportions of meats adhere to hulls and at lower levels of moisture both hulls are thoroughly powdered and subsequent separation becomes difficult. After dehulling the seed, proper separation of hulls and meats can be achieved by suitable screen arrangement coupled with the application of suction.

Cashew nut germ oil. J. A. Barve and J. G. Kane (Dept. of Chem. Tech., Univ. of Bombay, Bombay 19, India). *Indian Oil Soap J.* **28**, 34–39 (1962). Cashew nut germs contain between 19-24% of a non-drying oil which is almost half the oil content of cashew nuts themselves. The fatty acid composition of the oil is similar to peanut oil. It is poor in vitamin E. The oil-free cake is rich in carbohydrates and proteins.

Determination of fatty acids in blood. A. Glaser, G. Grimmer, E. Jantzen and H. Oertel (State Univ., Hamberg, Ger.) *Biochem. Z.* **336**, 274-280 (1962). A method is described for the quantitative analysis of the fatty acid mixture in blood. A synchronous double registration allows an exact determination of secondary components. Several methyl-branched fatty acids were detected besides the homologous series of saturated and unsaturated odd-numbered fatty acids. Four unknown compounds could not be classified and were characterized by their relative retention volumes.

The proximate analysis of the seed fats of five species belonging to different botanical families. A. Sen Gupta (Dept. of Pharm., Banaras Hindu Univ., Varanasi, India) and K. K. Kapur (Dept. of Pharm., Punjab Univ., Chandigarh, India). *Indian Oil Soap J.* **28**, No. 4, 83–95 (1962). Constitutive studies of proximate nature have been made of the seed fats of five species belonging to different botanical families using spectrophotometric techniques. All of the seeds were collected from the wild growth of Pilani, Rajasthan, a place which belongs to the arid zone of the Indian desert area. The seed fats studied were *Acacia arabica, Citrullus vulgaris, var., Fistulosus, Sida cordifolia, Sesamum undicum,* and *Ricinus communis.* The results of the present investigation indicate that the fatty acid composition of the seed fat reflects the specificity of its genetic origin. A change in the environmental factors produces a change in the composition of the seed fats of a particular species but this limited change is subjected to the control of the genetic factors.

Chemical composition and utilization of passion fruit seed, seed oil and seed meal. J. S. Pruthi (Cent. Food Tech. Res. Inst., Mysore-2). *Indian Oil Soap J.* **28**, No. 3, 55–62 (1962). Purple passion fruit (*Passiflora edulis,* Sims) comprises peels, 49.6%, juice 36.8%, and residue (mostly fresh seeds), 13.6%. Passion fruit seeds are a fair source of semi-drying oils (23.8%) and protein (11.1%). The remainder is crude fiber (53.7%). The oil recovery by cold pressing was 17.8%, and by solvent extraction, 23.8%. Refining losses were 3.2 to 5.0%. The stability of the oil was 5.5 hours (A. O. M. value). The oil can be used for technical purposes such as soapmaking and paints.

Examination of unsaturated glyceride oils by gas chromatography. L. A. O'Neill and S. M. Rybicka (Paint Research Sta., Teddington). *Chem. & Ind. (London)* **1963**, 390–2 (Techniques for the determination of the fatty acid composition of

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natural oils by gas chromatography are described as well as modifications of the methods required for the analysis of partially hydrogenated and polymerized oils.

SEASONAL VARIATIONS IN COD LIVER OIL. K. W. DeWitt (British Cod Liver Oils, Ltd.). *J. Sci. Food Agr.* 14, 92–8 (1963). The iodine value of cod liver oil varies regularly in an annual cycle over a range of 20–30 units. Maximum values occur in winter, an abrupt fall takes place in March, when the cod spawns, and the unsaturation slowly increases again during the summer period of intensive feeding. These changes in iodine value correspond to complementary changes in the total polyunsaturated fatty acids and the total monoenoic acids. The saturated fatty acids of the oil remain virtually constant throughout the cycle.

PROCESS FOR OLEAGINOUS SEED. R. A. Johnson and Patricia T. Anderson (Food Techniques, Inc.) *U. S. 3,084,046.* A method is described for treating oleaginous seeds to remove the toxic effect of gossypol from the seed meat. The seed meat is heated in aqueous NaOH at a pH above 10 and at a temperature of 160–190F, then treated with sufficient hydrogen peroxide to reduce the pH to 7.0–8.5 by heating at 160–190F. The gossypol content is thus substantially eliminated from the seed meat.

PROCESS FOR THE PREPARATION OF A COCOA BUTTER SUBSTITUTE AS WELL AS FOR THE PREPARATION OF CHOCOLATE AND THE SHAPED PRODUCTS THUS OBTAINED. Y. A. Sinnema (N. V. Twincon, Koog-Zaandijk, North Holland). *U. S. 3,084,049.* The described material comprises 40–75% of a mono-unsaturated triglyceride fraction (A) of Mowrah fat; and the remaining 25–60% of the substitute being comprised of 0–30% of monosaturated triglyceride fraction (B) and 0-15% of a di-unsaturated tri-glyceride fraction (C) of at least one fat from the class consisting of Shea butter, Dumori butter, Njave butter and Baku butter; and 0–25% of a mono-unsaturated triglyceride (D) of at least one fat from the class consisting of palm oil, Kepayan oil and Phulwara butter. The fractions are obtained by fractionation of its respective fat with 2–20 liters of acetone/kg of fat at a temperature in the range of 12–35C to form an extract containing the mono-unsaturated triglyceride fraction.

RECOVERY OF 10-HYDROXYDECANOIC ACID. G. I. Fray, R. H. Jaeger, and E. D. Morgan (Shell Oil Co.). *U. S. 3,084,178.* Ricinoleic acid is reacted with alkali metal hydroxide and the lower boiling components are distilled from the resulting reaction mixture. The distillation residue is acidified and extracted with hot water. The improvement comprises acetylating the oily 10-hydroxydecanoic acid containing residue, separating 10-acetoxydecanoic acid from the resulting acetylation products, hydrolyzing the separated 10-acetoxy-decanoic acid to 10-hydroxydecanoic acid, and separating 10-hydroxydecanoic acid from the resulting hydrolysis products.

PROCESS FOR MAKING OIL-CONTAINING COMPOSITIONS. C. J. Schram (Lever Bros. Co.). *U. S. 3,085,015.* Described is a process for preparing a solid composition containing a major proportion of an oil selected from the group consisting of animal, vegetable and mineral oils, fats, greases and waxes, the composition being in the form of filaments, ribbons, or sheets. An aqueous emulsion which, apart from water and dispersing agent, consists of an oil and a water-dispersible polyuronide, the oil being present in a greater proportion than the polyuronide. The emulsion is extruded into a precipitating bath for the polyuronide to form the product in the desired form. The product is dried to remove solvents, including residual water, whereby a substantially dehydrated product is obtained.

PROCESS FOR THE PURIFICATION OF HARD FATS. H. Eger and F. E. Schwartzhopff (Noblee & Thőrl G.m.b.h.). *U. S. 3,085,101.* A process for refining solid oils and fats by deacidification comprises gently stirring a molten mass of a solid fat having a solidification point of 18 to 20C, introducing at a temperature between 30 and 100C drops of a NaOH solution having a minimum diameter of 0.2 mm and a maximum diameter of 5 mm through the surface and into the interior of the molten solid fat in at least the stoichiometric quantity based on the free fatty acid content in the fat, controlling the rate of stirring to effect intimate mixing, regulating the quantity of water in the NaOH solution so that the total amount of water present following the deacidification does not exceed 1.5-fold weight of the soap formed, and centrifugally separating coarsely granular, single-phase structure soap stock from the molten fat.

NOVEL CONFECTIONERS FAT. C. M. Gooding and C. A. Cravens (Corn Products Co.). *U. S. 3,085,882.* An edible fat composition having an iodine value of at least 15 comprises a component having an iodine value less than 15 comprising an ester-interchanged lauric-type fat and C_{18}-type fat, blended with at least 15% of a selectively partially hydrogenated fat component of a C_{18}-type fat having an iodine value of not less than 60.

• Fatty Acid Derivatives

METHOD FOR PRODUCING MONOESTERS OF POLYUNSATURATED FATTY ACIDS. L. H. Sutherland (Escambia Chemical Corp.). *U. S. 3,082,228.* A process for producing a product comprising at least 60% of monoesters of polyunsaturated fatty acids having at least 20 carbon atoms consists of subjecting a mixture of monoesters selected from the group consisting of lower alkyl esters and monoglycerides of substantially unconjugated fatty acids from natural glyceride oils to distillation in a short-path molecular still under a vacuum at least as high as 1 mm. of mercury at a temperature below 100C.

PROCESS FOR THE PREPARATION OF HIGHER FATTY ACID MONOGLYCERIDES. W. G. Alsop and I. J. Krems (Colgate-Palmolive Co.). *U. S. 3,083,216.* An acylating agent containing a fatty acid radical having 16 to 18 carbon atoms is mixed with glycerine at a temperature of at least 270C. The glycerine is present in excess of the amount required both to form stoichiometrically the monoester and to dissolve completely the stoichiometric amount of the glyceryl monoester. The resulting glycerine solution of the monoglyceride is cooled to a temperature below 100C within about 3 minutes to form 2 liquid phases, one phase containing principally higher fatty acid monoglyceride and glycerine and the other liquid phase consisting of glycerine. The layers are separated and the monoglyceride recovered.

• Biology and Nutrition

FACTORS RELATED TO THE FLAVOR STABILITY DURING STORAGE OF FOAM-DRIED WHOLE MILK. III. EFFECT OF ANTIOXIDANTS. A. Tamsma, T. J. Mucha, and M. J. Pallansch (Dairy Products Lab., Eastern Utilization Res., and Dev. Div., USDA, Washington, D. C.). *J. Dairy Sci.* 46, 114–119 (1963). The storage stability of vacuum foam-dried whole milk powder containing antioxidants was studied organoleptically. The relative effectiveness of antioxidants in reducing flavor deterioration in stored samples was found to decrease in the following order: lauryl gallate, propyl gallate, nordihydroguaiaretic acid, ascorbyl palmitate, butylated hydroxy anisole, ascorbic acid, dihydroquercetin, sodium diethyldithiocarbamate, thiodipropionic acid, quercetin, and dilaurylthiodipropionate. Largest flavor stabilizing effects in samples stored at 80F for six months were observed in air packs. Statistical analysis of the data showed that only dihydroquercetin, ascorbic acid, ascorbyl palmitate, or sodium diethyldithiocarbamate produced significant improvement of the flavor scores of powders packed in nitrogen containing 0.1 or 10% oxygen. None of the antioxidants tested allowed the production of powders with greater stability than those obtained by drying milk heated at 165F for 30 min.

COMPARATIVE PROTECTIVE ACTION OF UNSATURATED FATTY ACIDS FOR MICE AGAINST EXOTOXIN, ENDOTOXIN AND SNAKE VENOM. W. W. Spink and C. K. Su (Dept. of Med., Univ of Minnesota School of Med., Minneapolis). *Proc. Soc. Exp. Biol. Med.* 112, 463–466 (1963). Swiss-Webster mice were protected against lethal amounts of exotoxins prepared from *Staphylococcus*, *Cl. perfringens*, and *Cl. tetani* when the toxins were mixed with oleic or linoleic unsaturated fatty acids prior to intravenous injection. Injection of a toxin and unsaturated fatty acid separately also gave protection. Unsaturated fatty acid also protected against *Crotalus terrificus* snake venom. No protection was obtained with oleic acid against *E. coli* or *Br. melitensis* endotoxin. It is not known in what manner the fatty acids protect against the exotoxins and snake venom. However, the phenomenon may be related to the fact that the toxic substances act directly on vascular smooth muscles, possibly through enzymatic activity. The action of endotoxin, on the other hand, is mediated through a labile component in serum, possibly complement, with the liberation of histamine, and possibly other vasoactive substances. The unsaturated fatty acids in the form of soaps may denature the proteins of the exotoxins, thus altering their lethal activity, but the lethal property of endotoxins remains because of their polysaccharide nature.

SERUM LIPIDS AND DIET: A COMPARISON BETWEEN THREE POPULATION GROUPS WITH LOW, MEDIUM AND HIGH FAT INTAKE. O. A. Roels, D. M. Roels-Broadhurst and M. Trout (Biochem.

Dept., Vanderbilt Univ., Nashville, Tenn., and Nutrition Lab., Institut pour la Recherche Scientifique en Afrique Centrale (I.R.S.A.C.), Lwiro Bukavu, Congo). *J. Nutr.* **79**, 211–219 (1963). Serum cholesterol, serum total and polyunsaturated fatty acids and diet of three populations were compared. Of two groups of African negroes examined, one took 6.8 and the other 37.8% of its calories as lipids, almost exclusively of vegetable origin. The third group (negroes from Nashville) consumed 48.3% of its dietary calories as fats, mainly of animal origin. Their dietary linoleic acid represented, respectively, less than 1, 2 and 6% of their total caloric intake. The Nashville group had the highest serum cholesterol level, but there was little difference in the serum cholesterol of the other two groups.

BIOSYNTHESIS OF FATTY ACIDS. III. UTILIZATION OF SUBSTITUTED ACYL COENZYME A DERIVATIVES AS INTERMEDIATES. J. D. Robinson, R. M. Bradley, and R. O. Brady (Lab. of Neurochem., Nat'l Inst. of Neurological Diseases and Blindness, Nat'l Inst. of Health, Bethesda 14, Md.). *J. Biol. Chem.* **238**, 528–532 (1963). The reduction of acetoacetyl coenzyme A, D(-)-β-hydroxybutyryl coenzyme A, and crotonyl coenzyme A to butyrate is catalyzed by a partially purified fatty acid-synthesizing enzyme preparation from rat brain tissue in the presence of reduced triphosphopyridine nucleotide. Labeled acetoacetyl coenzyme A, D(-)-β-hydroxybutyryl coenzyme A, and crotonyl coenzyme A are also incorporated into palmitate by this preparation on the addition of unlabeled malonyl coenzyme A. The experimental data indicate that these substrates must first be reduced to a saturated derivative before condensing with malonyl coenzyme A. Degradation studies of the fatty acids obtained with acetoacetyl coenzyme A-1-C^{14} and malonyl coenzyme A indicated that acetoacetyl coenzyme A was converted as an intact 4 carbon unit into carbon atoms 13 to 16 of the palmitic acid molecule.

PHYSICO-CHEMICAL CHARACTERISTICS OF CANADIAN MILK FAT. UNSATURATED FATTY ACIDS. R. R. Riel (Food Res. Inst. (Dairy Section), Res. Branch, Canada Dept. of Agr., Ottawa). *J. Dairy Sci.* **46**, 102–106 (1963). Seasonal and regional variations in ethenoid acids of Canadian milk fat have been established from 327 authentic samples, representative of every month of the year and of 29 creameries across Canada. About 30% of the fatty acids in milk fat were unsaturated; 12% of these were polyunsaturated acids, with one-third being of the conjugated type. The average values were as follows: conjugated dienes 1.13%, conjugated trienes 0.021%, conjugated tetraenes 0.002%, nonconjugated dienes 1.31%, nonconjugated trienes 0.89%, nonconjugated tetraenes 0.19%, nonconjugated pentaenes 0.12%, nonconjugated hexaenes 0.042%, total polyethenoid acids 3.71%, monoethenoid acids 26.1%, ethanoid acids 65.8%.

THE EFFECTS OF COTTONSEED OIL AND COTTONSEED OIL DERIVATIVES ON THE QUALITY OF EGGS STORED AT 30 AND 60F FOR VARYING PERIOD OF TIME. W. F. Pepper, E. S. Snyder, I. R. Sibbald and S. J. Slinger (Dept. of Poultry Sci. and Nutr., Ontario Agr. College, Guelph, Ontario, Canada). *Poultry Sci.* **41**, 1943–1946 (1962). An experiment was conducted to study the effects of the dietary inclusion of cottonseed oil, acidulated cottonsed soapstocks and cottonseed still bottoms on the interior quality of eggs stored at either 30 or 60F. Eight diets were formulated each of which was fed to 4 replicated pens of 10 pullets for a period of 20 days. During the latter 10 days eggs were collected, marked according to treatment and replicate, and placed in storage. Eggs were broken after 1, 8, 15, 29, 57 and 113 days of storage. A number of criteria of egg quality deterioration were observed. On the basis of the data collected it would seem unwise, at the present time, to incorporate any of the three products studied into diets for laying hens.

EFFECT OF EGG YOLK SIZE ON YOLK CHOLESTEROL CONCENTRATION. E. L. Nichols, W. W. Marion and S. L. Balloun (Dept. of Poultry Sci., Iowa State Univ. of Science and Tech., Ames). *Proc. Soc. Exp. Biol. Med.* **112**, 378–380 (1963). Within a line of birds there was an inverse relation between size of the yolk and cholesterol concentration of the yolk. On a dry weight basis that was a difference between the regression coefficients for 2 strains with respect to yolk cholesterol. A differential rate of cholesterol transfer into the follicle existed between strains. While a negative relationship existed between ovum size and cholesterol concentration, a positive relationship existed between ovum size and solids content. The solids content of developing ovum increased rapidly until the ovum reached 3 g, after which the solids content increased slowly as the ovum size increased.

BIOCHEMICAL AND MORPHOLOGICAL OBSERVATIONS ON CHOLINE-DEFICIENT RATS. EFFECTS OF VARIOUS LEVELS OF BEEF FAT AND CHOLESTEROL, AND OF INJECTIONS OF SULFAMERAZINE AND PARATHYROID HORMONE. P. M. Newberne and W. D. Salmon (Dept. of Animal Sci., Agr. Expt. Sta., Auburn Univ., Auburn, Alabama). *J. Nutr.* **79**, 179–186 (1963). The effects choline deficiency in young rats fed diets containing various levels of beef fat with or without added cholesterol for 7 or 8 days were studied. Liver lipid levels always decreased and plasma lipid levels generally increased following choline supplementation. Serum-protein levels increased with choline supplementation. Injury to the kidney, coronary vessels, myocardium and aorta were produced by this short period of choline deprivation; the injury and the level of choline required for protection were increased by the substitution of 5% of cholesterol for 5% of fat in the diet. Injections of sodium sulfamerazine over a period of 7 weeks resulted in kidney damage and hyperplasia of the parathyroids but in no appreciable cardiovascular injury. Injections of a total of 4,000 IU of parathyroid hormone/rat over a period of 8 weeks induced minimal damage to the coronary vessels and myocardium. Injections of a total of 1,200 IU/rat over a period of 4 weeks produced no detectable damage. All rats receiving injections were fed diets containing adequate amounts of choline.

INCORPORATION OF 1-^{14}C-PALMITATE INTO LIVER AND SERUM TRIGLYCERIDES OF CHOLINE DEFICIENT RATS. B. Lombardi and M. C. Schotz (Dept. of Pathology, Univ. of Pittsburgh, School of Med., Pitts. Pa.). *Proc. Soc. Exp. Biol. Med.* **112**, 400–401 (1963). The *in vivo* incorporation of C^{14}-palmitate into liver and plasma triglycerides of rats fed a choline deficient diet has been studied. The results show that the accumulation of triglycerides occurring in the liver of these rats, unlike that which follows administration of carbon tetrachloride, ethionine and other hepatotoxic agents, is not due to an impairment of the movement of triglycerides from the liver to the plasma. Choline-deficiency fatty liver has thus a pathogenetic mechanism different from that of fatty livers due to toxic agents.

LIPID CHANGES IN PLASMA, ALPHA LIPOPROTEINS, LIVER AND AORTA OF CHICKS FED DIFFERENT FATS. G. A. Leveille and H. E. Sauberlich (U. S. Army Med. Res. and Nutr. Lab., Fitzsimons General Hosp., Denver, Colo.). *Proc Soc. Exp. Biol. Med.* **112**, 300–303 (1963). Growing chicks were fed either a low-fat diet or this diet supplemented with coconut, olive or corn oil, with and without added cholesterol. In the absence of dietary cholesterol, the fats fed produced higher plasma cholesterol levels than did the low-fat control diet; no significant differences between fats were observed. The percentage of plasma cholesterol and lipid phosphorus bound to the plasma α-lipoproteins decreased with increasing plasma cholesterol levels. The absolute amount of cholesterol bound to the α-lipoproteins remained essentially unchanged, demonstrating that the increase in cholesterol occurs exclusively in the β-lipoprotein fraction.

STUDIES ON THE METABOLISM OF ADIPOSE TISSUE. XII. THE EFFECTS OF INSULIN AND EPINEPHRINE ON FREE FATTY ACID AND GLYCEROL PRODUCTION IN THE PRESENCE AND ABSENCE OF GLUCOSE. R. L. Jungas and E. G. Ball (Dept. of Biol. Chem., Harvard Med. School, Boston, Mass.). *Biochemistry* **2**, 383–388 (1963). Rat epididymal adipose tissue was incubated for 2 hours in a Krebs-Ringer phosphate medium containing glucose, 3 mg per ml, but no albumin. Measurements were made of the oxygen consumption, of the tissue content of free (unesterified) fatty acids, and of the amount of glycerol released into the medium. The addition of epinephrine, 0.1 µg per ml, to the medium resulted in an increased accumulation of tissue free fatty acids and medium glycerol. The rate of oxygen consumption was first increased but then gradually declined to a value below that of untreated tissue. When both epinephrine and insulin (1000 µunits per ml) were added, glycerol release was nearly tripled while tissue free fatty acid levels were reduced to very low values.

EFFECT OF HYPOCHOLESTEROLEMIC AGENTS ON INTESTINAL CHOLESTEROL ABSORPTION. S. A. Hyun, G. V. Vahouny and C. R. Treadwell (Dept. of Biochem., George Washington Univ. School of Med., Washington, D. C.). *Proc. Soc. Exp. Biol. Med.* **112**, 496–501 (1963). The direct effect of several blood cholesterol-lowering agents on intestinal absorption of cholesterol-4-C^{14} was studied in the lymph-fistula rats. MK-135 (cholestyramine) and pectin caused significant reductions in lymph total cholesterol and absorption of cholesterol-4-C^{14}. With MK-135, the larger of 2 doses studied also reduced absorption of endogenous cholesterol from the intestine. Cholesterol trimethylacetate, nicotinuric acid and pyridine-3-acetic acid has no effect on cholesterol absorption or lymph cholesterol levels. In all groups where significant cholesterol absorption occurred, the percentage esterification of absorbed cholesterol

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was constant (88–93%), irrespective of the extent of absorption.

Studies on egg yolk cholesterol. I. Genetic variation and some phenotypic correlations in a random bred population. P. C. Harris and F. H. Wilcox (Dept. of Poultry Husbandry, Univ. of Maryland, College Park). *Poultry Sci.* **42**, 178–182 (1963). Genetic variation of egg yolk cholesterol and the relationship between yolk cholesterol and a number of physiological traits have been studied in a random-bred strain of White Leghorns. Yolk cholesterol, expressed as mg. cholesterol/gm. yolk on a wet basis, was found to differ significantly among individual hens wherein two eggs per hen were measured in November and again in March. Sire families failed to show a significant difference and dam families within sires were significant only at the 10% level of probability. November yolk cholesterol was found to be significantly correlated with March yolk cholesterol in eggs laid by the same hens. Yolk cholesterol was negatively correlated with yolk weight. Based on the data collected from two consecutive populations, significant phenotypic correlations were found between November yolk cholesterol and November egg weight and specific gravity. All significant correlations were of a lower order. Yolk cholesterol did not appear to be correlated with any of the following measurements: serum cholesterol measured at 6 and 25 weeks of age, age at first egg, egg production, March body weight or albumen quality.

II. Influence of season. *Ibid.* 182–185. Egg yolk cholesterol was determined throughout the laying year at bi-monthly intervals on two consecutively-laid eggs from each of 24 hens of a random-bred strain of White Leghorns. The concentration of yolk cholesterol increased from August to February after which it decreased in April and June. The seasonal differences were significant at the 1% level of probability. The differences in yolk cholesterol of the 24 hens were also highly significant. The increase in concentration of yolk cholesterol was found to coincide with the normal increase in yolk size as the season progressed. However, a highly significant negative correlation between the concentration of yolk cholesterol and yolk size was observed for hens within any one bi-monthly period throughout the laying year. The correction of yolk cholesterol for yolk size by analysis of covariance did not alter the significance of the differences between yolk cholesterol for either season or hens.

III. Effect of dietary cholesterol. *Ibid.*, 186–189. Egg yolk and serum cholesterol levels were determined before and after 11 days of feeding crystalline cholesterol to 20 S. C. White Leghorns of a commercial strain divided into 4 groups of 5 pullets each. The addition of 1, 2 and 4% dietary cholesterol resulted in increases of 49, 42 and 50% yolk cholesterol, respectively. Serum cholesterol was increased 30, 38 and 35%, respectively. Although the increases in yolk cholesterol were highly significant, the increases in serum cholesterol were not statistically significant when the levels were corrected for serum cholesterol levels measured before treatment. Evidence suggesting that laying hens are able to prevent a marked hypercholesterolemia through excretion in the yolk and that individuals may vary in their ability to suppress a hypercholesterolemic condition is discussed.

Feeding value of beta-Carotene following treatment with N_2O_4. R. J. Emerick and V. F. Lievan (Station Biochem. Dept., South Dakota Ag. Expt. Sta., Brookings, S. Dakota). *J. Nutr.* **79**, 168–170 (1963). To clarify further the relationship between feeds of high nitrate content and the vitamin A status of animals, β-carotene treated with N_2O_4 was fed under various dietary conditions to albino rats to determine whether this material retained any vitamin A activity or was toxic. Weight gains and liver vitamin A storage indicate that the material was neither toxic nor had any vitamin A activity.

Vitamin B_6 and cholesterol metabolism in the chick. N. J. Daghir and S. L. Balloun (Dept. of Poultry Sci., Iowa State Univ., Ames). *Poultry Sci.* **41**, 1868–1879 (1962). Serum cholesterol was significantly higher in chicks fed vitamin B_6-deficient diets than in those receiving diets with adequate vitamin B_6. Aortas of chicks fed vitamin B_6-deficient diets weighed significantly more, expressed in mg. per 100 g. of body weight, than those from chicks fed adequate vitamin B_6.

Sterol utilization in the hide beetle, dermestes vulpinus. R. B. Clayton and K. Bloch (James Bryant Conant Lab., Harvard Univ., Cambridge 38, Mass.). *J. Biol. Chem.* **238**, 586–591 (1963). The capacity of sterols of different structural types to spare the normal dietary cholesterol requirement of *Dermestes vulpinus* has been studied. Correlations have been made between structure and cholesterol-sparing efficiency of the compounds tested, and an attempt has been made to interpret the results on the basis of the assumption that these sterols are incorporated unchanged into functional spaces normally occupied by cholesterol.

Influence of hair growth cycle on the triglyceride fatty acid composition of mouse epidermis. C. Carruthers and A. Heining (Dept. of Biochem. Research, Roswell Park Memorial Inst., N. Y. State Dept. of Health, Buffalo). *Proc. Soc. Exp. Biol. Med.* **112**, 278–280 (1963). The fatty acid content of 2, 4, 12 and 22 day post-plucking male and 2 and 4 day post-plucking female epidermal triglycerides is quite similar. Oleic and linoleic acids are present in about equal amounts and represent some 70% of total fatty acid content whereas palmitic acid is some 18% of total fatty acid level. Triglycerides of post-plucking days of 12 and 22 of female epidermis have more oleic and much less linoleic acids than do the triglycerides of the other samples. At the time of most rapid cell division in the epidermis (2-4 days post-plucking), there appears to be no significant change in triglyceride fatty acid composition.

Biochemistry of the sphingolipids. XV. Structure of phytosphingosine and dehydrophytosphingosine. H. E. Carter and H. S. Hendrickson (Div. of Biochem., Noyes Laboratory of Chemistry, Univ. of Illinois, Urbana). *Biochemistry* **2**, 389–393 (1963). Mixtures of phytosphingosine and dehydrophytosphingosine have been prepared from phytoglycolipids of a number of seeds. Analysis of these mixtures gave the following ratios of saturated to unsaturated base: flax, 15:85; soybean, 20:80; peanut, 50:50; corn, 90:10. Oxidative cleavage of the double bond in dehydrophytosphingosine showed it to be in the C 8, 9 position. Studies on the stereochemistry of phytosphingosine established the structure as D-*ribo*-1,3,4-trihydroxy-2-amino-octadecane. Dehydrophytosphingosine, therefore, has the structure D-*ribo*-1,3,4-trihydroxy-2-amino-8-*trans*-octadecene.

The influence of age of chicks on their sensitivity to raw soybean oil meal. S. Bornstein and B. Lipstein (Div. of Poultry Husbandry, Nat'l and Univ. Inst. of Ag., Rehovot, Israel). *Poultry Sci.* **42**, 61–70 (1963). The effect of age of chicks on their sensitivity to raw and underprocessed soybean oil meals was studied by a re-evaluation of 2 previous trials with young chicks, and in 4 trials with 7- to 8-week-old chicks. In chicks 2 to 12 days of age, weekly growth rate is adversely affected by improperly processed soybean oil meals for a period of 4 to 6 weeks, depending on the criterion employed. Nevertheless their absolute body weights remain significantly lower up to 12 weeks of age than of those receiving properly toasted soybean oil meal. Chicks 7 to 8 weeks old appear as sensitive to the growth inhibitor of improperly processed meals as do young chicks, however, this growth inhibition lasts only 2 to 3 weeks. Nevertheless, lower body weight, as compared to birds fed proper meals, is sustained for as long as 4 weeks. Under the conditions of this study it seems that age has no effect on the degree of sensitivity to the inhibitory properties of raw soybean meals, but favors a more rapid process of adaptation. Growth inhibition produced by raw soybean meal in 7- to 8-week-old chicks was not found to be due to decreased feed intake.

Plasma lipids in scurvy: effect of ascorbic ac'd supplement and insulin treatment. S. Banerjee and A. Bandyopadhyay (Dept. of Physiology, Sardar Patel Med. College, Bikaner, India). *Proc. Soc. Exp. Biol. Med.* **112**, 372–374 (1963). The different fractions of plasma lipids were estimated in normal, scorbutic, insulin treated scorbutic and ascorbic acid supplemented scorbutic guinea pigs. Beta lipoprotein: alpha lipoprotein ratio, beta lipoprotein cholesterol, phospholipids and NEFA of plasma were increased and plasma triglycerides diminished in scorbutic animals. While insulin treatment of the scorbutic animals corrected only the plasma NEFA and triglyceride values, ascorbic acid supplementation brought back all these values to normal levels. Total plasma cholesterol did not change in scurvy. Ascorbic acid supplementation lowered the plasma cholesterol value below the value seen in normal guinea pigs, indicating hypocholesteremic effect of ascorbic acid. Neither insulin nor ascorbic acid seem to have specific roles in the metabolism of phospholipids.

The condensation reaction of fatty acid synthesis. I. Separation and properties of the enzymes. A. W. Alberts, P. Goldman, and R. Vagelos (Enzyme Section, Laboratory of Cellular Physiology, Nat'l Heart Inst., NIH, Bethesda 14, Md.). *J. Biol. Chem.* **238**, 557–565 (1963). Two sulfhydryl sites have been shown to be involved in the condensation reaction, as measured by the malonyl-CoA-CO_2 exchange reaction. One site is associated with Enzyme I activity and is

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characterized by great sensitivity to alkylating agents. This site can be partially protected against inhibition by these agents by incubation of the enzyme with fatty acyl-CoA compounds. The other sulfhydryl site is associated with Enzyme II. Inhibition of this enzyme by alkylating agents requires prior reduction by 2-mercaptoethanol and cannot be prevented by incubtaion with either fatty acyl-CoA compounds or malonyl-CoA.

On some ferulates. T. Tamura, M. Takeda, K. Murakami, A. Yoshida, and T. Matsumoto (Faculty of Science and Engineering, Nihon Univ.). *Yukagaku* 11, 454–8 (1962). Eicosanyl ferulate, m.p. 53–4C, and dihydro-β-sitosterol ferulate, m.p. 156–7C, were prepared by the condensation of ferulic acid with eicosanol and dihydro-β-sitosterol, respectively. The former was identical with the naturally occurring ferulate isolated from linseed oil and rapeseed oil, and the latter was identical to that from corn-germ oil. Ethyl-, m.p. 41–2C and 57C, lauryl-, m.p. 45C, cholesteryl-, m.p. 165–6C, β-sitosteryl-, m.p. 123C, stigmasteryl ferulate, m.p. 147–8C, and some acyl derivatives were also prepared. One hundred days-old mice, fed a diet containing cholesterol ferulate or ferulic acid plus $NaHCO_3$ gained more weight than those fed the standard diet.

Component fatty acids of lipids of fish from the La Plata river. R. R. Brenner, M. E. De Thomas, O. F. Mercuri, and R. O. Peluffo (Facultad de Ciencias Medicas, Universidad Nacional de La Plata, La Plata, Arg.). *Rev. Arg. Grasas y Aceites* 3, 65–75 (1961). The component fatty acids of the depot lipid of several fresh water fish from the La Plata river were studied: *Pimelodus maculatus, Prochilodus lineatus, Salminus maxillosus,* and *Pseudoagenius brivifiliswere.* Gas-liquid chromatography on both polar and non-polar liquid phases and oxidative ozonolysis were used to qualitatively identify the fatty acids present.

Cholesterol synthesis in rat brain: differential incorporation of mevalonolactone-2-C^{14} and potassium mevalonate-2-C^{14}. R. Fumagalli, E. Grossi, M. Poggi, P. Paoletti and S. Garattini (University of Milan). *Arch. Biochem. Biophys.* **99**, 529–33 (1962). Brain slices were shown to incorporate potassium mevalonate to a greater extent than mevalonolactone into unsaponifiable and digitonin-precipitable material. Similar data were observed in brain homogenates. In liver this effect was not observed.

Biochemical studies on the developing avian embryo. V. Ubiquinone and some other unsaponifiable lipids. J. F. Pennock, Gertrude Neiss, and H. R. Mahler (Indiana University). *Biochem. J.* **85**, 530–7 (1962). The yolks of unincubated eggs and the residual yolks and developing embryos from eggs incubated for 11 to 21 days have been examined for unsaponifiable lipid constituents. Ubiquinone, α- and γ-tocopherol, vitamin A, cholestra-3,5-dien-7-one and ergosterol are reported in egg yolk. Ubiquinone is synthesized by the developing chick embryo. The majority of the tocopherol, vitamin A, sterol and ergosterol is transferred from the yolk to the embryo in the last few days of incubation.

Ubiquinone and vitamin K in bacteria. V. Intracellular distribution in Escherichia coli and Micrococcus lysodeikticus. D. H. L. Bishop and H. K. King (University of Liverpool). *Biochem. J.* **85**, 550–4 (1962). Both the vitamin K and the ubiquinone of *E. coli* were found exclusively in the insoluble cell residues, representing the cell walls plus the plasma membranes. The entire vitamin K content of *M. lysodeikticus* was recovered from the membranes. This organism does not contain ubiquinone.

The effect of "Essential fatty acid" deficiency on the fatty acid composition of the total lipid of the intestine. M. Enser and W. Bartley (University of Oxford). *Biochem. J.* **85**, 607–14 (1962). Compared with supplemented animals (linseed oil) the EFA-deficient rats contained 1% of linoleic acid, 10% of the arachidonic acid, 20% docosahexaenoic acid, and 8% of docosapentaenoic acid. They also contained eicosadienoic acid and docosatetraenoic acid, which were not detected in starved or fed rats. Both EFA-deficient and supplemented rats had 50% more palmitoleic acid than rats on a normal diet of rat cubes. EFA were lost more readily from the colon in deficient animals and replaced to a lesser extent in the supplemented animals. The EFA-deficient and supplemented animals had 35% less fat in the intestine than the normal and starved rats.

The lipid composition of tumor cells. G. M. Gray (Lister Institute of Preventive Medicine, London). *Biochem. J.* **86**, 350–7 (1963). The lipid was extracted from freeze-dried Landschutz ascites-carcinoma cells and BP8/C3H ascites-sarcoma cells and fractionated on silicic acid columns. The distribution of lipid phosphorus was not significantly different from that in the majority of normal tissues. Gas chromatographic analysis showed a far less selective distribution of fatty acids in the phospholipids and glycerides than was usurated acid as compared with C-16 saturated acid was found in ally found in normal tissues. A preponderance of C-18 saturated acid was found in most phospholipids. Small amounts of two chromatographically-distinct carbohydrate-containing lipids were found in the phospholipid fractions from the tumor cells.

A new oxidation product of γ-tocopherol. G. Shone (Tropical Products Institute, London). *Chem. & Ind. (London)* **1963**, 335–6. The author recently isolated from tung oil an artifact of γ-tocopherol, probably produced by oxidation during the extraction and/or storage of the oil, by interaction with oxidized glycerides rather than by direct atmospheric oxidation. The structure of the material is obscure, but it appears to contain the basic chroman ether ring structure with alkyl, hydroxyl and carbonyl substituents. The chromatographic behavior of the material indicates a molecule of low polarity. Infrared and ultraviolet absorption bands and R_F values are given.

Dietary fat and carbohydrate in experimental atherosis of rabbits. J. H. Moore and S. K. Kon (National Institute for Research in Dairying). *Chem. & Ind. (London)* **1963**, 165–6. Rabbits were fed diets containing (1) 20% maize oil, (2) 24% butter, (3) 20% butter fat, or (4) 1% maize oil and 42% wheat starch. Cholesterol was not added to any of the diets. After 9 months, the diets containing butter, butter fat, or high wheat starch gave rise to hypercholesterolemia and atheromatous lesions of the aortas. The animals on the diet containing maize oil had a low plasma cholesterol and lesions were completely absent. Thus, in the rabbit, marked atheromatous lesions may arise on diets containing no saturated fat.

Process for preparation of iodized lecithin. S. Hayashi (Dai-Ichi Yakuhin Sangyo, Kabushiki Kaisha, Tokyo-to, Japan). *U.S. 3,072,689.* Lecithin is dissolved in an organic solvent and treated with iodine in the presence of the periodide of iron, tin, or antimony as a catalyst.

Carbonyl compounds associated with the off-flavor in spontaneously oxidized milk. O. W. Parks, M. Keeney, and D. P. Schwartz (Dairy Products Lab., Eastern Utilization Res. and Development Div., USDA, Washington, D.C.). *J. Dairy Sci.* **46**, 295–301 (1963). Studies on the carbonyl compounds in the butteroil of spontaneously oxidized whole milk indicate that the mechanism involved is typical of classic lipid autoxidation. The C_5 through C_{16} saturated aldehydes, C_6 to C_{11} alk-2-enals, and C_8 to C_{12} alk-2, 4-dienals were tentatively identified in this product as their 2,4-dinitrophenylhydrazones, on the basis of their behavior on magnesia, ultraviolet spectra, column partition chromatographic retention volumes, paper chromatographic properties, or gas chromatographic characteristics of the regenerated compounds. Flavor studies in conjunction with quantitative carbonyl analyses of 14 samples of butteroil from nonoxidized and spontaneously oxidized milks indicate that alk-2,4-dienals, especially 2,4-decadienal, play a significant role in the off-flavor of this product, whereas the saturated aldehydes are of little significance in this respect. It is suggested that the C_{11} to C_{16} saturated aldehydes are present in fluid milk not as products of autoxidation, but rather as the result of either milk lipid synthesis or hydrolysis of plasmalogens or neutral plasmalogens during pasteurization.

Response of rural Guatemalan Indian children with hypocholesterolemia to increased crystalline cholesterol intake. J. Mendez, A. Acosta and R. Funes (Inst. of Nutr. of Central America and Panama (INCAP), Guatemala, Central America). *J. Nutr.* 79, 200–204 (1963). In the rural village of Magdalena, Guatemala, 60 school-age Mayan Indian children, consuming diets low in fat and cholesterol, were divided into two groups: Group 1 received a 600-mg crystalline cholesterol and 15-ml cottonseed oil supplement daily in a glass of Incaparina for 30 days. The cholesterol intake was then increased to 1200 mg and given for another 30 days. Group 2, the control group, received daily a glass of Incaparina with only 15 ml of cottonseed oil for the same two periods. The results showed that exogenous cholesterol did not increase the low serum lipid and cholesterol levels of the children.

Studies in choline deficiency. Fate of injected 1-C^{14}-palmitic acid and fatty acid spectra in fasting and refed rats. G. Arvidson and B. Borgström (Dept. of Physiological Chem., Univ. of Lund, Lund, Sweden). *Proc. Soc. Exp. Biol. Med.* **112**, 676–679 (1963). The hypothesis of an impaired transport of neutral fat from the liver of fasting choline deficient animals is sustained by the isotopic data showing a persistently high activity in the liver neutral fat and low plasma triglyceride activity.

PURIFICATION AND CHARACTERIZATION OF MILK LIPASE. I. PURIFICATION. R. C. Chandan and K. M. Shahani (Dept. of Dairy Husbandry, Univ. of Nebraska, Lincoln). *J. Dairy Sci.* **46**, 275–283 (1963). Milk lipase was isolated successfully from clarifier sediment. The purification was 250-fold on the basis of milk solids and 2,600-fold on the basis of milk. The purified enzyme gave a typical protein ultraviolet absorption spectrum with maximum absorption at 277 mμ and minimum at 251 mμ, with A_{277}/A_{251} ratio being 2.34. Chemical analysis showed that the enzyme contained 49.63% carbon, 7.51% hydrogen, 14.33% nitrogen, 1.04% sulfur, and 0.26% phosphorus. The purified enzyme seems to be distinctly different in its characteristics from other known milk proteins and enzymes. In milk it probably exists as a physically adsorbed unit on casein particles.

VITAMIN A ESTER AND ALCOHOL OF RAT LIVER DURING PREGNANCY. W. N. Dannenburg, D. S. Dixon and R. L. Burt (Dept. of Obstetrics and Gynecology, Bowman Gray School of Med., Wake Forest College and N. Carolina Baptist Hosp., Winston-Salem, N.C.). *Proc. Soc. Exp. Biol. Med.* **113**, 605–608 (1963). During pregnancy plasma vitamin A decreased and liver vitamin A alcohol increased but both returned to prepregnant values by the second postpartum day. The data indicate that an inverse relationship exists in pregnancy between plasma vitamin A and liver vitamin A alcohol that is unrelated to esterified vitamin A, body weight, and liver hypertrophy. It was suggested that changes in plasma vitamin A levels were related to transport and secondarily to the hyperlipidemia of pregnancy. A possible mechanism involved is discussed.

AUTOXIDATION OF MILK LIPIDS. III. EFFECT ON FLAVOR OF THE ADDITIVE INTERACTIONS OF CARBONYL COMPOUNDS AT SUBTHRESHOLD CONCENTRATIONS. E. A. Day, D. A. Lillard, and M. W. Montgomery (Dept. of Food Science and Tech., Oregon State Univ., Corvallis). *J. Dairy Sci.* **46**, 291–294 (1963). Flavor threshold values were determined for carbonyl compounds in homogenized milk. Values obtained in parts per million were: propanal, 0.43; *n*-butanal, 0.19; *n*-pentanal, 0.13; *n*-hexanal, 0.049; *n*-heptanal, 0.12; *n*-octanal, 0.46; *n*-nonanal, 0.22; *n*-decanal, 0.24; *n*-hex-2-enal, 0.067; *n*-hept-2-enal,, 0.077; *n*-non-2-enal, 0.004; *n*-dec-2-enal, 0.092; *n*-hept-2,4-dienal, 0.049. An additive interaction, defined as the interaction of subthreshold concentrations of carbonyl compounds to give a detectable flavor, was observed in a mixture of the C_9 and C_{10} alkanals and of the C_8 and C_{10} alkanals. The implications of the additive interaction in flavor of foods are discussed.

• Drying Oils and Paints

ZINC DUST PAINTS. K. A. Van Oeteren. *Deutsche Farben-Z.* **16**, No. 3, 99–102 (1962). The mechanism of the protective action of Zn dust pigmented paints, the preparation of the pigment and the formulation, application and properties of the paint are discussed. (Rev. Cur. Lit. Paint Allied Ind.)

OLEORESINOUS AND ALKYD ENAMELS. D. T. Long. *Irish Painter & Decorator* 1, No. 4, 9, 21–3 (1962). The article outlines the composition, preparation, pigmentation and properties of these materials. The ease of application, superior properties and versatility of the alkyd resin finishes are emphasized. (Rev. Cur. Lit. Paint Allied Ind.)

INHIBITION OF GLYCERIDE OIL MODIFIED VINYL TOLUENE ALKYL VARNISH GELLING. F. J. Lowes, Jr. (Dow Chemical Co.). *U. S. 3,075,933.* The alkyl varnish resins are treated with from 0.1 to 1.0% by weight of a gelation inhibitor of the group consisting of triethylamine; N,N-diisopropyl propargyl amine; N,N-dimethyl-1-ethynylcyclohexamine; N-(1-ethynylcyclohexyl)piperidine; dipropylamine triphenyl borane complex; triphenyl borane; triethylaminotriphenyl borane; and diisopropanol amine.

EPOXY RESIN ESTERS CONTAINING TUNG OIL FATTY ACIDS. L. A. Goldblatt and L. L. Hopper, Jr. (U.S.A., Sec'y. of Agriculture). *U. S. 3,079,354.* Equivalent weights of a vic-epoxy resin and a mixture comprising a member of the group consisting of dehydrated castor oil fatty acids and tall oil fatty acids and a member of the group consisting of tung oil fatty acids and their methyl esters are heated together with from trace amounts to 1% zinc resinate and sufficient xylene to maintain the temperature at about 220–225C. Heating is continued until the viscosity of the product when cooled to room temperature and diluted to 50% solids in xylene is within the range of 2.6 to 12 poises.

ACID CATALYZED NITROCELLULOSE COATINGS. I. A. Kraus (Lacktechnischen Lab. of Nitrochemie, Aschau, Ger.). *Farbe Lack* **69**, 171–174 (1963). Over a very wide range, systems made up of nitrocellulose + epoxy plasticizers + amine resin form coatings which, with the addition of acid catalysts, will not even dissolve in solvents at room temperature but which require the application of heat in order to make them scratchproof. Catalyzing is effected quicker with A then with E nitrocellulose. Acid catalyzed coatings of this nature, even when using low viscosity nitrocellulose types, show outstanding cold check resistance. With regard to hardening, systems composed of nitrocellulose + epoxy resin + amine resin behave exactly the same way but they require careful composition of the coating in order to have faultless films.

THE ECONOMIC SITUATION OF THE COATINGS INDUSTRY IN 1962. W. Durholt (Frankfurt/Main, Ger.). *Farbe Lack* **69**, 159–170 (1963). In 1962 West German coatings production showed an increase of about 7% over 1961. A drop in economic efficiency can be seen from the general trade trend. Finally, a report is given on the training of capable recruits in the trade.

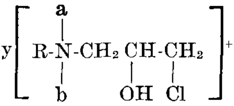
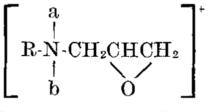
FUNGUS DAMAGE TO COATINGS AND ITS PREVENTION. H. Hirschfeld (Seelze/Hannover, Ger.), *Farbe Lack* **69**, 174–181 (1963). On the basis of several examples, descriptions are given of damage to indoor and outdoor coatings which is clearly traceable to fungus. Information is also given on how the causes of this damage can be combatted by suitable composition of coatings and the addition of fungicides and bactericides. In addition, details are given on methods for quick laboratory checks on the effectiveness of fungus resistant coatings.

NEW SATURATED ALKYD RESINS, THEIR SYNTHESIS, PROPERTIES AND APPLICATION. M. Goppel, P. Bruin and J. J. Zonsveld (Delft, Netherlands). *Farbe Lack* **69**, 181–192 (1963). A new route to prepare non-drying alkyds using the glycidylester of synthetic saturated fatty acids offers considerable advantages. A new series of alkyd resins has resulted and the first of these with synthetic acid content of 40% is shown to be of interest as a stoving lacquer component. Particular advantages of baked finishes are outstanding resistance toward water, aqueous acidic and alkaline solutions, hardness, adhesion and the absence of yellowing upon overbake.

METHOD OF REACTING CASTOR OIL AND AN ORGANIC POLYISOCYANATE IN THE PRESENCE OF AN ORGANOMETALLIC TIN CATALYST. F. Hostettler and E. F. Cox (Union Carbide Corp.). *U. S. 3,084,177.* Castor oil is reacted with an organic polyisocyanate in the presence of a catalytic amount of organotin compound having at least one carbon to tin bond. Any remaining bonds from tin are to a member of the group consisting of halogen, hydrogen, oxygen, sulfur, nitrogen, and phosphorus atoms.

• Detergents

SYNTHESIS AND PROPERTIES OF SURFACE ACTIVE AGENTS. VI. THE SURFACE ACTIVE PROPERTIES AND THE ABSORPTION OF CATIONIC SURFACTANTS BY TEXTILE FIBERS. Takashi Yamamoto, Seizi Sumida, and Yoshiro Nanba (Nippon Fat & Oil Co., Amagasaki). *Yukagaku* 11, 646–50 (1962). Quaternary ammonium salts containing various anions, such as F^-, Cl^-, Br^-, ½ SO_4^{--}, NO_3^-, $H_2PO_4^-$, ClO_4^-, CH_3COO^-, CCl_3COO^-, $CH_3(CH_2)_{10}COO^-$, ½ $(COO^-)_2$, $C_6H_5COO^-$, and *p*-$CH_3C_6H_4SO_3^-$, were obtained by the reaction of the corresponding amine salt with ethylene oxide. Their properties of surface tension, wettability, antistatic effect and the adsorption by cotton, rayon, nylon, orlon, tetron, and wool were tested. By arranging the quaternary ammonium salts of the hydrogen halides in the order of increasing absorption, the following result was obtained: F^-, Cl^-, Br^-, and I^-. This ordering supports Sexsmith's absorption mechanism (*J. Colloid Sci.* **14**, 598 (1959)) of cationic surfactants by cellulosic materials.

V. SYNTHESIS OF QUATERNARY AMMONIUM COMPOUNDS WITH HIGHER ALKYL AMINE AND EPICHLOROHYDRINI. *Ibid.* **12**, 29–36 1963). Reaction of tertiary amine and epichlorohydrin gave a product indicated by  $\left[\mathrm{R\text{-}N(a)(b)\text{-}CH_2CH(OH)\text{-}CH_2Cl}\right]^+Cl^-$ (**I**). The presence of oxirane was not detected. The product as indicated by the formula  $\left[\mathrm{R\text{-}N(a)(b)\text{-}CH_2CHCH_2O}\right]^+$ Cl^- (**II**) was obtained by the reaction of **I** with NaOH. **I** was obtained by the reaction of tertiary amine-HCl and epichlorohydrin. **II** was substantive to cotton and imparted dyeability for acid dye to this fabric. I could be also be used for the same purpose by treating with alkali-cellulose.

Studies on polymer surfactants. XII. Some properties of alkylated polyvinyl alcohols for textile applications. Hikaru Konishi, Yasumasa Hamuro, Kazuhiro Tozuka, and Nobuo Hiyama (Dai-ichi Kogyo Seiyaku Co., Kyoto). *Yukagaku* 12, 37–43 (1963). Some properties of purified alkylated polyvinyl alcohols (APVA), which were obtained by solution polymerization of vinyl acetate with C_8, C_{12}, C_{16} and C_{18}-alcohols, were investigated in relation to application for textiles. APVA showed no antistatic effect for nylon. Cotton fabrics treated with APVA were generally softer than that with PVA. APVA was compatible with the thermo-setting amino resins used for resin finishing, but did not prevent decreases in tearing strength and flex abrasion resistance of resin-treated fabrics. The restraining and the migration effects of APVA were observed in acid, premetalized acid, disperse, vat and sulfide dyebaths. The restraining effect for vat color and the migration effect for the sulfide color were excellent.

Oil-based surface active agents 1. Sulphated vegetable oils. Part I. R. Kasiviswanadham and K. S. Murti (Oil Tech. Res. Inst., Anantapur, India). *Indian Oil Soap J.* 28, No. 4, 115–124 (1962). The present work is mainly connected with the preparation on a laboratory scale of sulphated products from the minor seed oils [niger *(Guizatia abyssinica)*, safflower *(Carthamus tinctorius)*, tobacco *(Nicotiana tabacum)*, mowrah *(Bassia longifolia)*, latifolia, pongam *(ponganis glabra)*, ponna *(Calophyllum inophyllum)*, maroti *(Hydnocarpus wightiana)* and neem *(Mihia azadirachta)*] and the major seed oils [castor, peanut, coconut, sesame and cottonseed] as well as mixtures of some of these oils. Wetting and emulsifying properties were evaluated. Mixtures of castor oil with either coconut, tobacco seed, niger seed or sesame oils when sulphated gave better wetting and emulsifying products than when these oils were individually sulphated. Similar results were obtained when these oils were mixed with safflower oil and sulphated. The wetting and emulsification properties of stored sulphated oils were superior to those freshly prepared.

Dentifrice. G. E. Morris. *U. S. 3,081,235.* The described dentifrice consists of 5 to 90% of a finely divided absorbent solid abrading and polishing agent; up to 10% glycerine; and the balance a blend of 0.5 to 1.5 parts by weight of sulfonated nondrying glyceride fatty oil having 14–26 carbon atoms, 0.25 to 1.0 parts of a sulfonated compound having 12–26 carbon atoms and selected from the group consisting of a sulfonated fatty alcohol and fatty acid having a hydroxy group on the hydrocarbon radical of the fatty acid, 0.1 to 0.5 parts of a sulfonated drying oil having 12–26 carbon atoms, and up to 1.5 parts of a lower alkyl ester of a nondrying fatty acid having 12–26 carbon atoms.

Antiseptic detergent compositions. D. R. Noel and R. E. Casely (Armour & Co.). *U. S. 3,081,266.* The described composition consists of from 0.1 to 3.0% (by weight based on the water-soluble soap) of 2,2′-dihydroxy-3,5,6,3′,5′,6′-hexachlorodiphenyl methane and from 3.0 to 0.1% of 2,2′-dihydroxy-3,3′-dimethyl-5,5′-dichlorodiphenyl sulfide.

Detergent tablet and process for making same. R. P. Laskey (Procter & Gamble Co.). *U. S. 3,081,267.* The process consists of the following steps: (1) Forming a particulate mixture comprising sodium tripolyphosphate and a water soluble, non-soap organic synthetic detergent, selected from the group consisting of anionic and non-ionic detergents in which the weight ratio of phosphate to detergent is in the range of about 9:1 to 3:1, in which the average density of the particles is from 0.5 to 1.5 and in which no more than about 20% of the particles are smaller than about 0.2 mm.; (2) pressing from about 2.5 to 1.5 unit volumes of the mixture into a tablet of 1 unit volume using a compression pressure of about 150–350 p.s.i. thereby obtaining a tablet having a network of void space of about 40–60% of the tablet volume; (3) treating the surface of the resulting tablet with water in an amount in the range of 0.5–5% by weight of the tablet, thus hydrating sodium tripolyphosphate on the surface to form a non-chalky, abrasion resistant surface.

Defoaming rinse composition. N. S. Temple and A. T. Martin (Economics Lab. Inc.). *U. S. 3,082,172.* A rinse additive composition useful in machine dishwashing consists of a low-foaming, synthetic organic polyethenoxy nonionic surface active agent otherwise useful as a machine dishwashing rinse additive at concentrations throughout the range of 50 to 250 p.p.m. of rinse water and a small amount sufficient to maintain wash pressure during the succeeding wash cycle of a polyoxyalkylene glycol mixture. The glycol mixture consists of a product which statistically represented has a plurality of alternating hydrophobic and hydrophilic polyoxyalkylene chains, the hydrophilic chains consisting of oxyethylene radicals linked one to the other and the hydrophobic chains consisting of oxypropylene radicals. The product has 5 such chains, 3 hydrophobic chains linked by 2 hydrophilic chains, the central hydrophobic chain constituting 30–34% by weight of the product, the terminal hydrophobic chains together constituting 31–35%, and the linking hydrophilic chains together constituting 31–35%. The intrinsic viscosity of the product is from about 0.06 to 0.09 and the molecular weight of the product is from 3000 to 5000.

Detergent composition. A. J. I. Harding (Deering Milliken Research Corp.). *U. S. 3,083,166.* The described composition consists of (1) 14.5–45% of a synthetic organic non-soap anionic or nonionic detergent; (2) 4–25% of a compound selected from the group consisting of a water soluble condensation product of formaldehyde and a carbocyclic aryl sulfonic acid, and a water soluble salt thereof; and (3) from 10–45% of a hydroxy organic acid (citric, lactic or tartaric), an amount sufficient to render a 0.5% aqueous solution of the detergent composition initially acidic at a pH of between 2 and 5. The proportion of (2) to (3) is from 1:100 to 6:1.

Detergent polyesters. F. A. Stuart, W. T. Stewart, W. Lowe, and F. W. Kavanagh (California Research Corp.). *U. S. 3,083,187.* A polyethylene glycol substituted polyester consists of the following reactants: (A) a dibasic acid (oxalic, malonic, glutaric, adipic, sebacic, azelaic, phthalic, isophthalic, terephthalic, succinic, dilinoleic, dioleic, or fully saturated hydrogenated dilinoleic acid); (B) a diol (ethylene glycol, 1,3-propylene diol, octylene glycol or cyclehexane diol); and (C) a polyethylene glycol monoether selected from the group consisting of polyethylene glycol ethers of tartronic, malic, tartaric,α,β,γ-trihydroxy glutaric, mucic, mesoxalic and citramalic acid. The polyethylene glycol ether groups have at least 5 ethylene oxide units each and a molecular weight between about 220 and 30,000. The proportions of the reactants provide from about 40 to 96% by weight of the linear polyester as oil solubilizing aliphatic hydrocarbon groups and from 4 to 60% of linear polyester as polyethylene glycol ether groups. The polyester has a total molecular weight of at least 5,000 as measured by the light scattering method and a solubility in petroleum lubricating oil of at least 0.5% by weight.

Detergent condensation polymers. F. A. Stuart, W. T. Stewart, W. Lowe, F. W. Kavanagh (California Research Corp.). *U. S. 3,083,188.* Described are polyglycol substituted linear polyamides of (A) a polyethylene glycol ether of a dibasic acid such as tartronic, malic, tartaric, α,β,γ-trihydroxy glutaric, mucic, mesoxalic, or citramalic; (B) a dibasic acid (oxalic, malonic, glutaric, adipic, sebacic, azelaic, phthalic, isophthalic, terephthalic, succinic, dilinoleic, dioleic, hydrogenated dilinoleic, or alkyl, alkenyl and alkoxy succinic and malonic acids in which the alkyl and alkenyl groups have 8 to 300 carbon atoms); and (C) a polyamine selected from the group consisting of ethylene diamine, 1,3-propylene diamine, 1,6-diaminohexane, N,N′-dioctyl-1,6-diaminohexane, phenylene diamine and 1,2-butane diamine. The polyamides contain from 40 to 96% by weight of aliphatic hydrocarbon oil-solubilizing groups and from 4 to 60% of polyglycol groups. The polyethylene glycol has a molecular weight between 220 and 30,000, and the polyamides have a total molecular weight of at least 5,000 as measured by the light scattering method and a solubility in oil of at least 0.5% by weight.

Sarcosinate shampoo. J. A. Anderson (Procter & Gamble Co.). *U. S. 3,085,067.* A clear homogeneous liquid shampoo which will produce copious stable lather having good texture, effectively clean the hair, and leave the hair in a soft lustrous, easily manageable condition even when used in hard water, consists of an aqueous solution of (a) about 6–15% of an N-acyl sarcosinate; (b) from 2 to 8% of a non-soap detergent such as an alkyl sulfate or alkyl ethoxylated ether sulfates containing 1 to 5 ethylene oxide units per molecule; (c) about 3 to 8% of a mixture of an acyl monoethanolamide and an acyl diethanolamide, the ratio of the amides being from 2:1 to 1:2; (d) 3–12% of a solvent such as ethanol, glycerin or propylene glycol. The ratio of (a) to (b) is from 3:2 to 3:1, the acyl and alkyl groups in the ingredients ranging from 10 to 18 carbon atoms in chain length with at least 45% of the groups in each ingredient being 12 carbons in chain length. The cations of the sarcosinate and the detergent are selected from the group consisting of sodium, potassium, ammonium and triethanolammonium. The pH of the solution is from about 6 to 7.5.