A B S T R A C T S . . . . R. A. REINERS, Editor

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• Fats and Oils

DETERMINATION OF TRISATURATED GLYCERIDES IN FATS WITH MERCAPTOACETIC ACID. L. R. Eshelman, E. Y. Manzo, S. J. Marcus, A. E. Decoteau, and E. G. Hammond (Dept. Dairy and Food Industry, Iowa State University, Ames). *Anal. Chem.* **32**, 844–7 (1960). A method for the determination of trisaturated glycerides in fats is based on the reaction of the unsaturated glycerides with mercaptoacetic acid. The mercaptoacetic-glycerides that are formed are separated from the neutral trisaturated glycerides by extraction of the ammonium salts and ion exchange treatment. The method has been applied to a number of commercial fats and oils. The results are reproducible and recovery experiments indicate that the recovery of the trisaturated glyceride is nearly quantitative.

CONTRIBUTIONS TO THE ANALYSIS OF MONOGLYCERIDES AND FREE GLYCEROL. L. Hartman (Fats Research Laboratory, Dept. of Scientific and Indust. Research, Wellington). *Fette, Seifen, Anstrichmittel* 62, 271–74 (1960). In contrast to the results given by other authors, 5 to 9 per cent of the *beta*-ester in commercial monoglycerides has been found. The author confirms the difficulties that arise in the determination of the diglycerides with the aid of the hydroxyl value in the presence of known quantities of monoglycerides and free glycerol.

GAS LIQUID CHROMATOGRAPHY OF FATTY ACID METHYL ESTERS: THE CARBON NUMBER AS A PARAMETER FOR THE COMPARISON OF COLUMNS. F. P. Woodford and C. M. vanGent (Dept. of Physical Chemistry, University of Leiden, The Netherlands). *J. Lipid Research* **1**, 188 (1960). It has become common practice to quote components observed in the interpretation of gas chromatographic data as having a relative retention time referred to one known component of the mixture under discussion, e.g., palmitate or stearate. The present authors have presented the elution sequence in a different form as follows: The retention times of the saturated straight chain esters are plotted against chain length on semilogarithmic paper, and the line joining them constructed. A value corresponding to the retention time of any other peak can then be read off the curve, and gives the chain length of the hypothetical saturated straight-chain ester which would be eluted at that point. The figure so obtained is designated the carbon number of the ester on the stationary phase in question. Saturated straight-chain esters have integral carbon numbers, whereas branched-chain and unsaturated esters have non-integral carbon numbers. The carbon number is characteristic of a particular ester on a particular stationary phase.

PREPARATION OF METHYL ESTERS. N. S. Radin, A. K. Hajra, and Y. Akahori (Dept. of Biochemistry, Northwestern University Medical School, Chicago, Ill.). *J. Lipid Research* **1**, 250–51 (1960). The authors have described the use of 2,2-dimethoxypropane (DMP) as a reagent for the methylation of fatty acids, using methanol and hydrochloric acid. After reaction the ester is recovered by evaporation of the solvents. The reaction is relatively fast and is said to give quantitative yields, and can be used on either semimicro or macro-sized samples. The authors have prepared the methyl esters of stearic, *alpha*-hydroxystearic, lignoceric, and other long-chain fatty acids.

APPLICATION OF A NOMAGRAM TO GRADIENT ELUTION CHROMATOGRAPHY. H. R. Warner and W. E. M. Lands (Dept. of Biological Chemistry, University of Michigan, Ann Arbor). *J. Lipid Research* **1**, 248–49 (1960). The authors have presented a general equation describing the solvent composition flowing through a chromatographic column in a constant volume gradient elution system. This equation has been developed and made into a nomagram. This nomagram is shown to be useful in quickly estimating solvent compositions and predicting procedures for separating components in a mixture by stepwise elution chromatography.

STABILIZATION OF POLYESTER STATIONARY PHASES FOR GAS-LIQUID CHROMATOGRAPHY. J. Corse and R. Teranishi (Western Regional Research Laboratory, Albany, Calif.). *J. Lipid Research* **1**, 191 (1960). The authors have stabilized polyester stationary phases for gas-liquid chromatography columns by removal of polymerization catalysts and hydrogen ions from the polyesters by passing the polyester in an ethanolic solution through Duolite A-4 ion exchange resin. Columns which have been treated in this way are reported to have extended lifetimes and showed very little bleeding of the stationary phase.

PAPER CHROMATOGRAPHY OF SATURATED, UNSATURATED, AND HYDROXY FATTY ACIDS. V. P. Skipski, S. M. Arfin, and M. M. Rapport (Sloan-Kettering Inst. for Cancer Res.). *Arch. Biochem. Biophys.* **87**, 259–65 (1960). Methods are presented for separating straight-chain saturated, unsaturated, and 2-hydroxy fatty acids from C_{14} to C_{24} by paper chromatography and for detecting the acids as bismuth sulfides.

THE β-MONOESTER CONTENT OF COMMERCIAL MONOGLYCERIDES AFTER PROLONGED STORAGE. L. Hartman (Fats Res. Lab., Dept. of Scientific and Industrial Res., Wellington, New Zealand). *J. Sci. Food Agric.*. **11**, 191–194 (1960). The technique of determining "total" and β-monoglycerides by isomerization with perchloric acid has been slightly modified to improve the reproducibility of results. The content of β-monoglycerides in commercial monoglyceride preparations stored for 1½–5 years has been found to be in the range of 5–9% of the total monoglycerides. This is contrary to a recent report that β-monoglycerides are present in freshly prepared products only and disappear on prolonged storage.

THE BLEACHABILITY OF NIGERIAN PALM OIL. G. R. Ames, W. D. Raymond, and J. B. Ward (Tropical Products Res. Inst., Gray's Inn Rd., London, W.C. 1). *J. Sci. Food Agri.* **11**, 194–202 (1960). Palm oil of excellent bleachability can be obtained from Nigerian (wild) palm fruit if sufficient care is taken in its processing. Commercial Nigerian African-produced oil has inferior bleachability due to oxidation by lipoxidases while the frequently bruised fruit awaits processing. Atmospheric oxidation catalyzed by iron may also cause deterioration, and palm oil is frequently heated in iron vessels before shipment. Coupled oxidation of the oil and carotenoids results in the formation of degradation pigments less readily absorbed by bleaching earth or less easily heat bleached. The extent of the deterioration depends upon the quantity of carotene present; this is usually higher in Nigerian than in Malayan palm oil.

BROILERS GAIN MORE ON VEGETABLE OILS. *Soybean Dig.* **20** (7), 9 (1960). According to Dr. L. M. Potter of the Storrs Agricultural Experiment Station of the Univ. of Connecticut, vegetable oils will give 4.5% more gain per pound of feed than tallow. Corn oil was found to contain 3,906 metabolizable calories per pound while tallow contains only 3,076 metabolizable calories per pound.

THE INFLUENCE OF OIL CONTENT ON THE SUSCEPTIBILITY OF SEEDS TO FUMIGATION WITH METHYL BROMIDE. R. E. Blackith and O. F. Labatti (Imperial College Field Sta., Sunninghill, Ascot, Berks.). *J. Sci. Food Agr.* **11**, 253–258 (1960). Oils increase the sensitivity of seeds to the fumigant at higher moisture contents by making the water more readily available, probably by blocking sorptive substrates. The oil may also act as a reservoir for methyl bromide, so that oily seeds are subject to more severe delays during germination than are less oily seeds. The amounts of oil in some 18 kinds of seed are reported.

COMPOSITION OF THE SEED FAT OF CEYLON SWEET ORANGE. A. H. Weerakoon (Ceylon Inst. of Sci. & Ind. Res.). *J. Sci. Food Agr.* **11**, 273–276 (1960). A study has been made of the composition of the fatty oil which forms about 33% of the dried whole seed. The principal component fatty acids are palmitic (21.8%), oleic (27.4%), and linoleic (34.2%). Myristic and stearic acids each form about 6–7% and linolenic about 2% of the total fatty acids. Lauric and arachidic acids occur in traces. The fat consists chiefly of monosaturated-diunsaturated (54%) and disaturated-monounsaturated (22%) glycerides. Triunsaturated glycerides form about 18% of the fat and fully saturated glycerides about 6%. The fat conforms to even distribution except for the presence of the small percentage of fully saturated glycerides.

THE COMPONENT FATTY ACIDS OF SPORIDESMIUM BAKERI LIPIDS. L. Hartman, J. C. Hawke, Isobel M. Morice, and F. B. Shorland (Dept. of Sci. and Ind. Res., Wellington, New Zealand). *Biochem. J.* **75**, 274–278 (1960). The component fatty acids of the lipids elaborated by this fungus have been determined by gas-liquid chromatography. The main component acids are linoleic acid (41–59%), palmitic acid (18–30%), oleic acid (8–15%), and stearic acid (6–8%) (molar percentages). In addition, minor amounts of linolenic, palmitoleic, and several straight-chain fatty acids with an odd number of carbon atoms in the molecule, and branched-chain fatty acids ranging from C_9 to C_{17} have been detected.

Dry creaming powder. C. K. Ortman (M & R Dietetic Labs., Inc.). *U. S. 2,933,393.* A rapidly wettable and soluble creaming powder which is readily dispersible in hot liquid consists of coarse dry particles containing in integrated form 15% to 42% edible fat, lacteal non-fat solids having a calcium-to-phosphorus ratio below 0.85, and added lactose equivalent to between 15% and 65% by weight of the total solids in the final product. More than 62% of the total lactose should be in the beta form.

Method of separating fatty acids. R. B. Ruddick (Emery Industries, Inc.). *U. S. 2,934,547.* A mixture of fatty acids and unsaturated acids is dissolved in a polar, substantially anhydrous, normally liquid organic solvent at a concentration not greater than about 30% by weight of the solvent solution. Pressure is gradually reduced to below about 40 mm. of Hg absolute to cause evaporation of a substantial quantity of the solvent under essentially adiabatic conditions. The resulting rapid chilling of the solution causes the normally solid fatty acids to form interlocked agglomerations of crystals. The crystalline acids are removed by filtration, and the solvent is removed from the remaining unsaturated acids.

Manufacture of hard butter. T. J. Weiss (Swift & Co.). *U. S. 2,936,238.* A mixture of hydrogenated non-lauric acid-containing triglyceride with an iodine value less than 15 and an unhydrogenated lauric acid oil is treated, while being maintained in the liquid state, with an effective amount of a rearrangement catalyst until the reaction is essentially complete. The catalyst is inactivated and the rearranged triglycerides are separated.

Transfer sheets for forming thermo-sensitive copies. F. G. Francis and J. A. Seaward (Caribonum Ltd., London). *U. S. 2,936,247.* The transferable coating consists of 12.2 parts by weight of fatty grey carnauba wax, 11.9 parts ceresine wax, 30.7 parts mineral oil. and 27.7 parts Strong Red Lake. The coating also includes 17.5 parts by weight of graphite for rendering the red written copy matter sufficiently heat-absorptive to produce a heat pattern in a thermo-sensitive copy sheet when the latter is irradiated with infrared radiation when in contact with the copy matter.

Stabilized fat-soluble vitamin and method of making same. A. Rosenberg (Forest Hills, N. Y.). *U. S. 2,937,091.* A solution of fat-soluble vitamin in a fat having a melting point of about 35° is mixed with an aqueous solution of a heat coagulable, proteinaceous material at a temperature of about 10° above the melting point of the fat. The mixture is heated to about 65°–85° for about 10–30 minutes and homogenized to form an emulsion with the oil as the finely dispersed internal phase. The heated emulsion is then spray-dried to complete the denaturation.

Process for manufacturing whipped fatty emulsions. W. A. Gorman, R. G. Christie, and G. H. Kraft (National Dairy Products Corp.). *U. S. 2,937,093.* A fatty product emulsion containing about 80% fat which is solid at room temperature is whipped to an overrun in excess of 20% and chilled to below 60°F. with violent agitation. The chilled emulsion is held for a period sufficient to permit setting and transported during the holding period. Working of the emulsion is terminated upon setting to prevent coarseness in the product.

Tall oil fatty acid containing linoleum cement. A. K. Forsythe (Armstrong Cork Co.). *U. S. 2,937,103.* The desired product consists of a mixture of three ingredients: (1) tall oil fatty acids, (2) a polyhydric alcohol containing 3–5 carbon atoms in an amount equivalent to the fatty acids, and (3) sufficient rosin to give the mixture a rosin acid number in the range of 35–48. A vegetable drying oil may also be present. The mixture is heated to a temperature in the range of 160 to 240°F. while air is blown through to cause complete esterification of the fatty acids with the polyol and oxidation of the reaction mixture, thus forming a gel.

Olive oil refining process. Maria E. Alessandrini and F. Palazzo (Fondazione Emmanuele Paterno, Rome). *U. S. 2,937,193.* A process is described for the removal of parathion or its residues from olive oil. The oil is treated with alkali hydrosulphite and sodium hydrate, and the resulting product is decolorized with decolorizing earth and charcoal.

Treatment of glyceride oils and product obtained thereby. B. Clayton (Houston, Tex.). *U. S. 2,939,790.* A glyceride oil containing free fatty acids and gums is mixed with an aqueous solution of ammonia, the weight of water being approximately 30–65% of the combined weight of fatty acids and gums and the weight of ammonia being between 7.5–45% of the weight of the fatty acids plus between 1–6% of the weight of the gums. Continuously centrifuging the resulting mixture separates a purified oil and foots containing a phosphatidic product.

Fabric softener containing urea inclusion compound of hydrogenated tallow quaternary ammonium salt. M. S. Sniegowski (Corn Products Co.). *U. S. 2,940,816.* A dry, free-flowing fabric softener in powdered form which is dispersible in cold water contains a urea inclusion compound of hydrogenated tallow quaternary ammonium salt and a non-ionic wetting agent. The softening agent should be present in from 5 to 20% of the total dry product, the amount of urea should be at least 3.5 times the wight of the softening agent, and the amount of wetting agent should be about 5 to 30% of the softening agent.

Fat-containing dried dairy product and method of manufacture. J. M. McIntire and C. C. Loo (Dairy Foods, Inc.). *U. S. 2,941,886.* A process is described for manufacturing a fat-containing dried dairy product characterized by high wettability and dispersibility in cold water. A homogeneous mixture is prepared from spray-dried fat-containing dairy product and lecithin. The individual particles of the mixture are moistened to an extent sufficient to render them sticky and cause them to adhere together in the form of random-shaped aggregates. The excess moisture is then removed.

• Fatty Acid Derivatives

Gas chromatography of high molecular weight primary amines. J. Nelson and A. Milun (General Mills, Inc., Minneapolis, Minn.). *Chem. and Ind.* **1960**, 663–4. The chain length of high molecular weight fatty primary amines has been successfully determined by gas chromatography. Columns packed either with silicone grease on sodium chloride or with silicone oil on potassium hydroxide treated Chromosorb W have been used at high temperatures to give satisfactory resolution and symmetry.

Dihydrocivetone and exaltone from kamlolenic acid. S. C. Bhattacharyya, K. K. Chakravarti, and V. G. Nayak (Natl. Chem. Lab., Poona, India). *Chem. and Ind.* **1960**, 588. Dihydrocivetone and cyclopentadecanone were obtained from kamlolenic acid, the main constituent of kamala seed oil.

Composition and method for improving frozen confections. A. Miller (Kelco Co.). *U. S. 2,935,406.* A composition particularly suitable for use as a frozen milk product mix additive consists of a commercial glyceryl monostearate and a glyceryl monomyristate (from 3% to 15% on weight of stearate). *U. S. 2,935,410* describes a similar product in which glyceryl monooleate is substituted for the monomyristate.

Alkali refining of epoxy plasticizers. R. J. Gall, F. P. Greenspan, and Mary C. Daly (Food Machinery & Chemical Corp.). *U. S. 2,935,517.* A plasticizer, prepared by sulfuric acid catalyzed *in situ* peracetic acid epoxidation of an ester of a higher unsaturated fatty acid and a saturated aliphatic hydroxy compound, may be stabilized against high temperature degradation by heating at about 30° to 100° in the absence of water and in the presence of a solid particulate alkali such as the hydroxides of sodium, potassium, calcium, or barium.

Preparation of cleavage products from ricinoleic stock. Y. Bourgeois (Soc. des Produits Chimiques de Bezons). *U. S. 2,935,530.* Sebacic acid, 2-octanol, and 2-octanone are produced by reacting ricinoleic stock with caustic alkali in the presence of sodium or potassium nitrate in a proportion of approximately 1 to 10% by weight based on the ricinoleic acid in the stock.

Method of reacting monoesters of fatty acids and pentaerythritol with aromatic diisocyanates and preparing porous resins therefrom. G. O. Orth, Jr. (Minnesota Mining & Mfg. Co.). *U. S. 2,936,293.* An excess of a tolylene diisocyanate is pre-reacted with a monoester of a fatty acid containing 18 carbon atoms and pentaerythritol in the presence of a pentaerythritol dipropional to form a resinous mass with free isocyanate groups still available. A tertiary amine catalyst and a polyhydric alcohol containing at least 3 active hydrogens are added, and the mass is foamed by mixing in the presence of water.

Preparation of halohydroxy fatty materials. B. H. Robin (Swift & Co.). *U. S. 2,936,314.* Halohydroxy fatty acids, esters, amides, and alcohols are prepared by passing chlorine or bromine into a reaction vessel containing an unsaturated fatty material, water, and caustic. The pH of the mixture is measured continuously and the rate of flow of the halogen is reduced when the pH drops to a predetermined value within the range of 8.8 to 11. The rate of addition of halogen is increased when pH goes above the desired value. Adjustments in the rate of halogen flow are continued until the pH of the mixtures remains below the desired value when the addition of the halogen is stopped.

Polyamide-like condensation products and process for preparing the same. H. Delius (Reichhold Chemicals, Inc.). *U. S. 2,939,853.* An epoxidized fatty acid or an ester of an epoxidized fatty acid and a saturated monohydric aliphatic alcohol is reacted with a hydrocarbon dicarboxylic acid at about 200°. When an acid number of not more than 30 above that theoretically obtainable is reached, the reaction product is cooled to about 70–80° and a polyamine is added. The mixture is heated at 200°, and the reaction is terminated while the condensation product is still fusible.

Releasing composition containing metal oleate, method of making and using same. E. Aron (Technical Processing, Inc.). *U. S. 2,939,898.* The desired composition consists of an oleate salt of a metal (zinc, magnesium, lead, or calcium) in an amount that the oleic acid equivalent amounts to about 11 to 16% of the total mixture, 50–60% of a lubricant such as petroleum jelly or paraffin wax, 4–6% of a monohydric fatty alcohol (12 to 20 carbon atoms), 4.5 to 6.7% potassium stearate, and about 14 to 26% of excess stearic acid.

Epoxy esters of long-chain acids. H. A. Newey (Shell Oil Co.). *U. S. 2,940,986.* The described products are unsubstituted polyglycidyl esters of dimers or trimers of long-chain ethylenically unsaturated aliphatic hydrocarbon acids.

Solubilizing of mineral, vegetable, and animal oils for cosmetic, pharmaceutical, and industrial purposes. I. I. Lubowe. *U. S. 2,942,008.* A clear, nonaqueous solubilized liquid composition consists of the following: (1) 20 to 50% of an oil containing 24 to 100 carbon atoms; (2) 20 to 50% of a low molecular weight aliphatic alcohol having 1 to 3 carbons; and (3) 5 to 20% of a high molecular fatty alcohol having 12 to 24 carbon atoms.

• Biology and Nutrition

Titration of free fatty acids of plasma: a study of current methods and a new modification. D. L. Trout, E. H. Estes, Jr., and S. J. Friedberg (Dept. of Medicine, Duke Univ. Medical Center, Durham, N. C.). *J. Lipid Research* **1**, 199–202 (1960). Dole's titrimetric method for determination of the free fatty acids of plasma has been modified to improve its specificity. The fatty acid solution which is to be titrated is first washed with 0.05 per cent H_2SO_4 and thus freed of lactic acid and of an acetone-insoluble material which interferes. With this change, the Dole procedure yields results which agree well with those of Gordon's method.

Estrogen-like activity in vegetable oils and mill by-products. A. N. Booth, W. M. Bickoff, and G. O. Kohler (Western Utilization Research, Research Service, Albany, California). *Science* **131**, 1807–8 (1960). By the immature female mouse bioassay technique, an increased uterine weight was observed when certain vegetable oils were fed or injected. By-products from the milling of cereals were also capable of eliciting a uterine response.

Comparison of cholesterol and estrogen-induced atherosclerosis in cockerels. C. T. Caldwell and D. E. Suydam. (Nutrition and Metabolic Diseases, Upjohn Co., Kalamazoo, Mich.). *Proc. Soc. Exptl. Biol. Med.* **104**, 133–5 (1960). Method is described for inducing atherosclerosis in cockerels by feeding chick growing mash containing .5% commercial cholesterol, Procedures for inducing atherosclerosis in birds by exogenous estrogen have been published. Experimental procedures are presented also for studying atherosclerosis induced in cockerels by combining estrogen and cholesterol treatment. Comparison of artery and blood serum changes associated with this disease as induced by these methods shows that a critical level of estrogen causes more rapid plaque formation than cholesterol, and that degree of hypercholesterolemia does not determine extent of atheromatosis.

Influence of avocados on serum cholesterol. W. C. Grant (Research Dept., Vet. Admin. Hospital and Univ. of Miami School of Medicine, Coral Gables, Fla.). *Proc. Soc. Exptl. Biol. Med.* **104**, 45–7 (1960). Sixteen male patients, aged 27–72 years, were given 0.5 to 1.5 avocados/day. Animal fat equivalent to a portion of added avocado fat was removed from the basal diet. Serum total, free and ester cholesterol and phospholipids were measured twice a week during control and avocado feeding periods. Of 16 patients during avocado feeding period, 8 gave significant decreases in total serum cholesterol from 8.7 to 42.8% and in phospholipids of from 12.5 to 21.0%. Decreases in ester form exceeded those in free cholesterol. In no individual did cholesterol values rise during avocado feeding. Of 8 patients whose cholesterol values were unchanged, 3 were diabetic and one was hypercholesterolemic.

A study on pigment deposition by intravenous fat emulsions. S. W. Thompton II, R. W. Thomassen, D. H. Yost, Mary A. Fox, and R. G. Wiegand (Pathology Div., U. S. Army Med. Research and Nutrition Lab., Fitzsimons General Hospital, Denver, Colo.). *J. Nutrition* **71**, 37–44 (1960). Eleven fat emulsions containing various synthetic or vegetable oils were administered intravenously to rabbits or rats. In addition emulsifying systems without fat were similarly tested. A pigment-lipoid complex was found within the cytoplasm of the splenic reticuloendothelial cells of animals receiving coconut oil-phosphatide, cottonseed oil-non-phosphatide, cottonseed oil-phosphatide, molecularly distilled cottonseed oil-phosphatide, olive oil-phosphatide, corn oil-phosphatide, peanut oil-phosphatide, butyro olein-phosphatide, safflower oil-phosphatide or synthetic oil-nonphosphatide emulsions. No pigment-lipoid complex was observed in animals receiving coconut oil-nonphosphatide emulsion or in the animals receiving the emulsifying mixture without fat.

Biosynthesis of sterols and fatty acids as affected by nicotinic acid and related compounds. R. W. F. Hardy, J. L. Gaylor, and C. A. Baumann (Dept. of Biochemistry, University of Wisconsin, Madison). *J. Nutrition* **71**, 159–67 (1960). The incorporation of acetate-1-C^{14} into sterols and fatty acids was examined with liver slices from rats and chicks fed nicotinic acid, nicotinamide, isonicotinic acid, or benzoic acid; these compounds were also added to liver sliced *in vitro*. Liver from rats or chicks fed nicotinic acid or related compounds showed an increased incorporation of acetate into sterols and a decreased incorporation into fatty acids. This altered incorporation varied with the length of time during which nicotinic acid or related compounds had been fed.

Glycerol- and acetate-C^{14} incorporation into lipids of tissues undergoing cell division. R. M. Johnson and S. Albert (Richard Cohn Laboratory, Detroit Institute of Cancer Research, Detroit, Mich.). *J. Biol. Chem.* **235**, 1299–1302 (1960). Sodium acetate-2-C^{14} or DL-glycerol-1-C^{14} were administered separately to normal and partially hepatectomized rats, and to rats bearing a transplantable adenocarcinoma, and the incorporation of radioactivity into cephalins, inositol phosphatides, lecithins, sphingomyelins, triglycerides, and their fatty acids was measured. In tumors there was a decreased uptake of acetate-C^{14} into cephalins and triglycerides, an increased uptake into inositol phosphatides, and no change in that in the sphingomyelins. Specific activities of fatty acids of tumor cephalins and sphingomyelins did not differ from the normal, whereas those of the triglycerides were decreased.

Effect of long-chain keto acids on encephalomalacia in chicks. M. G. Kokatnur, S. Okui, F. A. Kummerow, and H. M. Scott (Dept. of Food Technology and Animal Science, Univ. of Illinois, Urbana). *Proc. Soc. Exptl. Biol. Med.* **104**, 170–1 (1960). The presence of oxidation products of long-chain unsaturated fatty or "keto" acids, accelerated development of encephalomalacia in chicks kept on a diet containing corn oil. 12-Oxo-*cis*-9-octadecenoic acid was most potent keto acid tested to date and most effective in presence of dietary source of unsaturated fatty acid such as corn oil. With basal diet containing 10% corn oil, clinical symptoms of encephalomalacia could be induced at end of 7 days by supplementing the diet with 0.25% of 12-oxo-*cis*-9-octadecenoic acid.

Relationship of hepatic uptake of free fatty acids to plasma concentration. W. T. McElroy, Jr., W. L. Siefert, and J. J. Spitzer (Dept. Physiology, Hahnemann Medical College and Hospital, Philadelpha, Pa.). *Proc. Soc. Exptl. Biol. Med.* **104**, 20–23 (1960). Behavior of liver to changes in portal concentration of FFA was studied. Rapid infusion of serum containing large amounts of FFA into portal veins of dogs caused increased hepatic uptakes of this metabolite. Uptake of FFA was a function of portal concentration. Liver cells behave in a passive manner to fluctuations in serum FFA concentration, and local hepatic mechanisms are responsible for changing degrees of FFA uptake.

Arterial lesions in the Kenya baboon. H. C. McGill, Jr., J. P. Strong, R. L. Holman, and N. T. Werthessen (Dept. of

Pathology, Louisiana State Univ. School of Medicine, New Orleans, Louisiana). *Circulation Res.* 8, 670–679 (1960). One hundred sixty-three baboons *(Papio doguera)* were sacrificed and autopsied immediately after being trapped in their natural habitat in Kenya, British East Africa. Approximately three-fourths of the 67 adults had some degree of aortic intimal lipid deposition, as indicated by gross Sudan IV staining, and a few animals had extensive fatty streaks. These fatty streaks were more frequent with advancing age, but there was no sex difference. Electron microscopy disclosed most of the intimal lipid droplets to be intracellular. Fibrous plaques were infrequent and had a variable but usually low lipid content. These results indicate that the baboon, like man, is highly susceptible to arterial intimal lipid deposition and that it promises to be an excellent animal for the experimental investigation of arteriosclerosis.

A fat-soluble material in alfalfa that reduces the biological availability of tocopherol. W. J. Pudelkiewicz and L. D. Matterson (Poultry Science Dept., Storrs Agricultural Experiment Station, University of Connecticut, Storrs). *J. Nutrition* 71, 143–8 (1960). The *d,a*-tocopherol in alfalfa is only about one-third available to the chick. It was discovered that a compound or compounds in the hot ethanol extract of alfalfa act antagonistically to tocopherol, increasing its excretion and decreasing its availability. The vitamin E of alfalfa, when separated from the rest of the meal, is fully available. The addition of pure *d,a*-tocopherol to a tocopherol-low lipid extract of alfalfa resulted in an excretion of tocopherol to the same extent as that of the tocopherol excretion when alfalfa was the source of *d,a*-tocopherol.

Chick tissue-storage bioassay of alpha-tocopherol: chemical analytical techniques and relative biopotencies of natural and synthetic alpha-tocopherol. W. J. Pudelkiewicz, L. D. Matterson, L. M. Potter, Lorna Webster, and E. P. Singsen (Poultry Science Department, Storrs Agricultural Experiment Station, University of Connecticut, Storrs). *J. Nutrition* 71, 115-21 (1960). A chick bioassay method is described for comparing the potencies of *d* and *dl,a*-tocopherol with their respective acetate esters. It was found that *d,a*-tocopheryl acetate was 1.34 times more potent than *dl,a*-tocopheryl acetate as measured by liver tocopherol content, and *d* or *dl,a*-tocopherol were utilized equally as well as their respective acetate esters.

Intravascular effect of heparin on plasma nonesterified fatty acid and triglyceride during alimentary lipemia. M. A. Rizack (Rockefeller Institute, N.Y. City). *Proc. Soc. Exptl. Biol. Med.* **104**, 111–3 (1960). Clearance of triglyceride from plasma during alimentary lipemia was not significantly influenced by intravenous injection of heparin. Injection of heparin in lipemic subjects caused a small rise in NEFA concentration of plasma, but quantity of triglyceride hydrolyzed was insignificant in relation to its larger turnover rate.

Accumulation of cholesterol in inositol deficiency. S. Rajalakshmi, V. Srinivasan and P. S. Sarma (Depts. Biochemistry, Madurai Medical College and Indian Inst. of Science, Bangalore). *Proc. Soc. Exptl. Biol. Med.* 104, 97–99 (1960). Tissues of *Corcyra cephalonica* and serum of albino rats fed a diet containing gammexane accumulated more free cholesterol with concomitant decrease in ester fraction. Inositol almost completely counteracted the effect of gammexane. Inositol thus appears to have great influence on esterification of cholesterol.

Effect of insulin in the induction and regression of atherosclerosis in the chick. J. Stamler, Ruth Pick, and L. N. Katz (Cardiovascular Dept., Medical Research Institute, Michael Reese Hospital and Medical Center, Chicago, Illinois). *Circulation Res.* 8, 572–576 (1960). Insulin administration to intact cockerels made atherosclerotic by the feeding of a cholesterol-oil-containing diet prevented regression of coronary atherosclerosis. Insulin administration during the induction of atherosclerosis had no effect on the development of lesions. In some experiments, insulin slightly inhibited estrogen-induced protection of the coronary arteries when the birds were on a high cholesterol-oil diet.

Rapid method for moisture and fat determination in biological materials. H. E. Wistrich, J. E. Thompson, and Endel Karmas (Reliable Packing Co., Research Laboratory, Chicago 9, Ill.). *Anal. Chem.* 32, 1054 (1960). Moisture and fat are routinely determined in many laboratories, by the use of an air oven, vacuum oven, azeotropic distillation, and Soxhlet extraction. This paper describes a method for the simultaneous extraction of moisture and fat from biological materials.

Biology of fats: experiments on the resorption of conjugated oils. H. P. Kaufmann and H. Dransfeld (Deut. Inst. Fettforschung). *Fette, Seifen, Anstrichmittel* 62, 265–71 (1960). The resorption and deposition of Impatiens oil has been studied through ultraviolet spectroscopic investigation of the blood lipids and fats from various organs after administering the emulsified oil to rabbits orally and rectally. In addition, experiments have been carried out on human beings. The results show that small amounts of emulsified fats are resorbed through the large intestine.

The structure of cerebrosides in Gauchers disease. G. V. Marinetti, T. Ford, and E. Stotz (Dept. of Biochemistry, Univ. of Rochester, School of Medicine and Dentistry, Rochester, N.Y.). *J. Lipid Research* 1, 203–207 (1960). Crystalline cerebrosides were isolated from the spleen of a woman with Gauchers disease. The cerebrosides accounted for 38 percent of the total spleen lipids and 0.89 percent of the fresh spleen. The sugar moiety of the cerebrosides was found to be glucose and its position of attachment was established to be on the primary hydroxyl group of sphingosine. The double bond of the sphingosine had the *trans* configuration. The fatty acids of the cerebroside were determined by gas chromatography, and paper chromatography and found to be mainly lignoceric, behenic, and palmitic acid. Small amounts of arachidic and stearic acids were also present.

Castor bean lipase: action on its endogenous substrate. R. L. Ory, A. J. St. Angelo, and A. M. Altschul (Southern Regional Research Laboratory, U.S. Dept. of Agr., New Orleans, La.). *J. Lipid Research* 1, 208–213 (1960). A method is described for obtaining a lipase emulsion from castor beans which rapidly hydrolyzes all of its endogenous substrate at an optimum pH of 4.0 to 4.2. The course of hydrolysis can be described as a first order reaction; no additives are required for activity and the reaction goes to completion in less than one hour. The enzyme emulsion (oil in water) is stable for at least two weeks in a pH 7.0 phosphate buffer containing added cysteine and ethylenediaminetetracetic acid; it is rather heat stable but the activity is lowered by mechanical shaking. Reagents that react with sulfhydril groups inactivate the enzyme; the inhibition of mercuric ion and p-chloromercuribenzoic acid can be reversed with an excess of cysteine. The lipase emulsion is not inhibited by diisopropylfluorophosphate in concentrations lower than 0.01 *M*, nor by protamine sulfate and heparin in relatively high concentrations. It is inhibited by 0.01 *M* fluoride.

Studies on the distribution of tocopherol in human serum lipoproteins. E. C. McCormic, D. G. Cornwall, and J. B. Brown (Dept. of Physiological Chemistry, Ohio State Univ., Columbus, Ohio). *J. Lipid Research* 1, 221–228 (1960). The tocopherol content of human serum proteins, isolated by density gradient and homogenous density procedures, was determined by the Emmerie-Engel and phosphomolybdic acid methods. Serum tocopherol is found primarily in the lipoproteins. The low density lipoproteins, principally the S_f 3–9 lipoproteins, contain a major part of the total serum tocopherol, while the high density proteins contain the remainder. Serum tocopherol increases after oral administration and remains elevated for 24 hours. The increment in serum tocopherol from newly absorbed tocopherol is found first in the chylomicron and S_f 10–400 lipoprotein fractions. A tocopherol peak appears in these fractions 4 hours after oral administration. This peak is followed by an increment in the tocopherol content of the S_f 3–9 and high density lipoprotein fractions which reaches a maximum plateau in from 8–10 hours and remains elevated from 14 to 16 hours. The distribution of newly absorbed tocopherol is discussed in relation to lipid absorption and transport of other lipids by the serum lipoproteins.

Phospholipid and triglyceride metabolism of excised rat diaphragm and the role of these lipids in fatty acid uptake and oxidation. E. M. Neptune Jr., H. C. Sudduth, and F. J. Nash (Naval Medical Research Institute, National Naval medical Center, Bethesda, Maryland). *J. Lipid Research* 1, 229–235 (1960). After a 48-hr. fast the phospholipid fatty acids of rat diaphragm are reduced much more than the triglyceride fatty acids. Phospholipid thus appears to contribute more to the labile fatty acids than triglyceride. Both long and short chain C^{14} labeled fatty acids are incorporated into triglycerides but only the long chain fatty acids are incorporated into phospholipids. After incubation with palmitate-1-C^{14} and transfer to substrate-free Ringer phosphate, triglyceride specific activity decreases but phospholipid specific activity increases. During incubation with palmitate-1-C^{14} the triglyceride specific activity increases, then remains constant. Phospholipid specific activity is initially the same as triglyceride but rises at a nearly linear rate. There is net synthesis of triglyceride but not of phospholipid. Combustion of long chain fatty acids to CO_2 indicates the existence of an endogenous dilution pool. It is proposed that phospholipids and triglycerides participate in the oxidation of saturated fatty acids.

THE TRANSPORT AND DYNAMIC STATE OF EXOGENOUS GLYCEROL AND PALMITIC ACID LABELED TRIPALMITIN. R. Reiser, Mary Williams, and Mary Sorrels (Dept. of Biochem. and Nutrition, Texas Agriculture Experiment Station, College Station, Texas). *J. Lipid Research* **1**, 241–247 (1960). The radioactivities of the glycerol and fatty acid moieties of plasma, liver and adipose tissue lipids were determined at intervals after the ingestion of glycerol and palmitic acid labeled tripalmitin by rats. The changes in the levels of the activities of the glycerol and fatty acids and in the ratios of those activities, demonstrated the following: Only about half of the glycerol is completely hydrolyzed from fatty acid during digestion and absorption. Plasma lecithin originating from dietary fat is synthesized extrahepatically. Plasma triglycerides are removed by the liver without change but are hydrolyzed before incorporation into adipose tissue. Liver lecithins originate from liver triglycerides. Triglycerides are metabolically more active than lecithins and the latter are more active than cephalins. In the postabsorptive period, glycerol disappears from adipose tissue triglycerides more rapidly than do fatty acids, indicating hydrolysis and renewal of glycerol. In the liver, on the other hand, glycerol and fatty acid disappear from both triglycerides and phospholipids at the same rate indicating that they are removed as units.

DETERMINATION OF CHOLESTEROL AND TRIGLYCERIDES IN RAT PLASMA. Amber Cheng and D. B. Zilbersmit (Univ of Tennessee, Dept. of Physiology, Memphis, Tenn.). *J. Lipid Research* **1**, 190 (1960). The authors determined the cholesterol and triglycerides in rat plasma by shaking the plasma with chloroform in the presence of a synthetic zeolite. In this way a phospholipid free extract of cholesterol and triglyceride was obtained. Cholesterol was determined by standard procedures and the triglyceride was determined by determination of glycerol after saponification of the sample.

INFANT NUTRITION AND FATS. H. Wolf (Univ. Children's Clinic, Univ. Gottingen). *Fette, Seifen, Anstrichmittel* **62**, 297–302 (1960). The author discusses the various methods of infant nutrition with special references to the qualitative as well as the quantitative differences in the human and cow's milk. He discusses the function and influence of varying fatty acid composition in the diet on the health of the child and emphasizes the importance of fats as vitamin carriers.

ABSORPTION OF METHYL ω-(TRIMETHYLSILYL) DODECANOATE AND TRIMETHYLHEXADECYLSILANE FROM THE GASTROINTESTINAL TRACT OF RATS. J. Paul and W. F. R. Pover (The University, Birmingham, England). *Arch. Biochem. Biophys.* **87**, 312–317 (1960). The synthesis of methyl ω-(trimethylsilyl) dodecanoate and trimethylhexadecylsilane are described. Both of these organosilicon compounds were absorbed from the gastrointestinal tract when they were fed in a triglyceride vehicle and were extracted as the lipide-soluble organosilicon compounds from the livers of the experimental animals. Although the organosilicon compounds were absorbed, they were not found in the chyle lipides.

CHROMATOGRAPHY OF THE PHOSPHOLIPIDES OF RABBIT SKIN. H. P. Schwarz, L. Dreisbach, R. Stambaugh, A. Kleschick, and M. Barrionuevo (Philadelphia General Hospital, Philadelphia, Pa.). *Arch. Biochem. Biophys.* **87**, 171–178 (1960). Fractionation of lipides was carried out by adsorption chromatography on silicic acid columns. Through use of a gradient elution with a number of chloroform-methanol mixtures and pure methanol, satisfactory separations were obtained in an 8-hour period. Combined chemical, infrared, and paper chromatographic techniques were used for analysis. Lecithin, phosphatidylethanolamine, and phosphatidylserine comprised the major phospholipide components. Polyglycerolphosphatides, lysolecithin, and sphingomyelin occurred in sufficient quantity to be of interest. Small amounts of plasmalogens and traces of two unidentified lipides, one of which appeared to be a "lysocephalin," made up the rest of the skin phosphatides.

THE ROLE OF PHOSPHOLIPIDES IN THE METABOLISM OF AMINO ACIDS. II. THE INCORPORATION OF LEUCINE AND TYROSINE IN LIVER PHOSPHOLIPIDES. W. L. Gaby and R. Silberman (Hahnemann Medical Col. & Hospital, Philadelphia, Pa.). *Arch. Biochem. Biophys.* **87**, 188–192 (1960). Phospholipides extracted from rabbit liver slices which had been exposed to DL-leucine or DL-tyrosine were found to incorporate these amino acids as part of their molecular structure. The amino acids were chemically bound to the phospholipides and could not be separated from the lipide complex by electrophoresis. They could be demonstrated in the aqueous fraction of the acid hydrolysis of the phosphatides by paper chromatography. Phospholipides extracted from liver cells which had been heated at 60° for 45 min. prior to incubation with leucine did not incorporate the radioactive compound, and there was no *in vitro* adsorption of labeled leucine by the purified phospholipides.

OXIDATION OF CHOLESTEROL BY RAT LIVER MITOCHONDRIA: EFFECT OF METAL IONS. M. W. Whitehouse, E. Staple, and D. Kritchevsky (Wistar Inst. of Anatomy & Biol., Philadelphia, Pa.). *Arch. Biochem. Biophys.* **87**, 193–197 (1960). Feeding ferric, nickel, or cobalt chloride to male Wistar rats increased the *in vitro* oxidation of cholesterol by liver mitochondrial preparations fortified with boiled liver supernatant fraction. This effect was considered to be due to enhancement of the stimulatory activity of the supernatant fraction rather than reduction in the circulating bile salts known to control cholesterol oxidation by the liver. Addition of ferric ions specifically activated cholesterol oxidation. Cobalt ions nonspecifically activated oxidation of pyruvate and octanoate as well as cholesterol. Other metal ions (Ni^{++}, Fe^{++}, Mn^{++}, and Cu^{++}) were either without effect or inhibited both cholesterol and pyruvate oxidation.

AN INOSITOL PHOSPHATIDE OF PEAS. L. M. Lewin and A. C. Wagenknecht (N.Y. State Agr. Exp. Sta., Cornell Univ., Geneva, N.Y.). *Arch. Biochem. Biophys.* **87**, 239–246 (1960). Inositol phosphatide has been obtained from raw peas of all stages of maturity, excluding dry seed peas, after the peas were held in frozen storage (−17.8°) for several months. The liberation is believed to be enzymic in nature. Peas which had been heat treated to inactivate enzymes yielded negligible amounts of inositol phosphatide. Silicic acid-impregnated paper chromatography confirmed the presence of inositol phosphatide, and silicic acid chromatography showed its heterogeneity. Inositol content was determined by microbioassay and by oxidation with periodic acid. Vapor phase chromatography of fatty acid methyl esters showed the presence of palmitic, stearic, and oleic acids.

THE EXCRETION OF FORMIMINOGLUTAMIC ACID BY THE RAT. INFLUENCE OF DIETARY ETHIONINE AND FAT. M. Silverman, R. O. Gardiner, and H. A. Bakerman (National Institutes of Health, Bethesda, Md.). *Arch. Biochem. Piophys.* **87**, 306–311 (1960). High concentrations of dietary fat (hydrogenated vegetable oil, Crisco) tended to lower the folic acid and vitamin B_{12} concentrations of the liver. The excretion of formiminoglutamic acid was consequently increased.

A HYDROLYTIC PROCEDURE FOR THE IDENTIFICATION AND ESTIMATION OF INDIVIDUAL PHOSPHOLIPIDS IN BIOLOGICAL SAMPLES. R. M. C. Dawson (Inst. of Animal Physiology, Babraham, Cambridge). *Biochem. J.* **75**, 45–53 (1960). The products of selective hydrolytic degradation are separated by paper chromatography and their phosphorus contents measured. From these, the nature and amounts of the phospholipids originally present are inferred, appropriate, corrections being based upon the hydrolysis of reference compounds. The distribution of lecithin, phosphatidylethanolamine, phosphatidylserine, monophosphoinositide, polyglycerol phospholipid (cardiolipin), phosphatidic acid, choline plasmalogen, ethanolamine plasmalogen, serine plasmalogen, and sphingomyelin has been measured in six tissues of the sheep.

THE TRANSPORT OF VATAMIN A IN RAT SERUM WITH SPECIAL REFERENCE TO THE OCCURRENCE OF UNIDENTIFIED METABOLITES OF VITAMIN A IN THE RAT. C. F. Garbers, J. Gillman, and M. Peisach (So. African Council for Sci. & Ind. Res., Pretoria, South Africa). *Biochem. J.* **75**, 124–132 (1960). With the aid of 2-C^{14} vitamin A it was established that vitamin A alcohol is transported in rat serum in association with the α_1-globulin. The vitamin A alcohol is not associated with the lipoproteins. After oral administration of the labeled vitamin A to vitamin A depleted rats, 7–12% of the radioactivity was excreted in the urine within 48 hours.

THE PHYSICOCHEMICAL REQUIREMENTS FOR THE ACTION OF PENICILLIUM NOTATUM PHOSPHOLIPASE B ON UNIMOLECULAR FILMS OF LECITHIN. A. D. Bangham and R. M. C. Dawson (Inst. of Animal Physiology, Babraham, Cambridge). *Biochem. J.* **75**, 133–138 (1960). The enzymic hydrolysis of unimolecular films of yeast $[P^{32}]$ lecithin by a purified preparation of a phospholipase B from *Penicillium notatum* has been studied. It was tentatively concluded that the enzyme can penetrate into low-pressure films of lecithin, while with high-pressure films a negatively charged surface is required to assist penetration or adsorption or both.

LIPID SYNTHESIS BY HUMAN LEUCOCYTES IN VITRO. A. A. Buchanan (Univ. Col. Hospital Medical School, London, W.C. 1).

Biochem. J. **75**, 315–319 (1960). Synthesis of lipids by human leucocytes *in vitro* has been demonstrated. The amount of synthesis is sufficient to account for all the lipid synthesized by whole blood. The author feels that it is probable that all earlier reports of lipid synthesis by erythrocytes were due to leucocyte contamination.

Treatment of multiple sclerosis with a low-fat diet. R. L. Swank (Univ. of Oregon Medical School, Portland). *J. Am. Dietet. Assoc.* **36**, 322–325 (1960). Patients with multiple sclerosis have been observed on a low-fat diet for a period of nine and a half years. The frequency and severity of exacerbations in all cases were significantly reduced, and the performance of patients first treated in the early phase of the disease was improved or unaltered during this period. In the intermediate- or late-phase patients, the course of the disease was less dramatically improved.

On the antioxidant activities of the tocopherols. II. Influence of substrate, temperature, and level of oxidation. C. H. Lea (Low Temperature Res. Sta., Downing St., Cambridge). *J. Sci. Food Agric.* **11**, 212–218 (1960). The antioxidant activities of the tocopherols have been compared at 60°and at 37° in distilled methyl esters of cottonseed, linseed, and cod liver oil fatty acids containing small additions of oxidized ester as "starter." In the linoleate (cottonseed) system the γ- and δ-compounds were the most and the α-, ζ-, and ε-compounds the least effective in extending the induction period. In the polyunsaturated (linseed and cod liver oil) systems the γ- was still good, but the δ- was at the bottom of the series and the α- and ζ-compounds near the top. The antioxidant activities of the tocopherols are considered in relation to their structure.

Essential fatty acids of normal and atherosclerotic aortas from chickens receiving differently saturated fats for three years. H. Fisher and A. S. Feigenbaum (Dept. of Poultry Sci., Rutgers Univ., New Brunswick, N.J.). *Nature* **186**, 85–86 (1960). There appears to be an inverse relationship between severity of the atherosclerotic involvement and the level of essential fatty acids in the plaque tissue. However, the fact that considerable atherogenic development occurred even in the birds fed with corn oil whose aortas contained a comparatively high essential fatty acid concentration, strongly suggests to the authors that plaque formation does not owe its origin to an essential fatty acid deficiency.

composition containing vitamin A. P. Iacono and S. M. Weisberg (National Dairy Products Corp.). *U. S. 2,933,392.* The desired composition consists essentially of discrete spray-dried particles of natural milk product solids including milk protein having dispersed therein from 15 to 45% by weight of a fatty material stable against oxidation. The fatty substituent consists of a fat-soluble vitamin, from 1 to 3% lecithin on weight of fat, and from 0.1 to 1% antioxidant on weight of fat. Ratio of milk protein to fatty material should be in the range of from 1:3 to 2:1.

Treatment of cottonseed meals to remove residual pigments. W. H. King, V. L. Frampton, and A. M. Altschul (U. S. A., Sec'y of Agriculture). *U. S. 2,934,432.* Cottonseed meal is mixed with an excess of a primary organic amine for at least 5 minutes, thereby converting gossypol and gossypol-like pigments to derivatives soluble in nonpolar organic solvents. The treated meal is then extracted with a nonpolar organic solvent to remove the produced derivatives and any excess amine.

Phosphatide therapeutic composition and method of treatment therewith. R. M. Calder. *U. S. 2,935,448.* An oral therapeutic composition in dosage unit form for relief of the symptoms of osteoarthritis in humans consists of the acetone-insoluble fraction of the phosphatides of corn or maize (0.3 to about 1.0 grams per dosage unit) and a pharmaceutical carrier.

Stabilized vitamin A compositions. A. Bavley and A. E. Timreck (Chas. Pfizer & Co., Inc.). *U. S. 2,935,449.* The desired composition consists of an intimate mixture in gelatin of a vitamin A fatty acid ester having at least 8 carbon atoms in the acyl moiety of the ester grouping, a stabilizer (hydroxycarboxylic acids, ketocarboxylic acids, their alkali metal salts, or aliphatic hydrocarbon carboxylic acid esters), and a synergistic antioxidant mixture comprising 6-ethoxy-2,2,4-trimethyl-1,2-dihydroquinoline together with a phenolic antioxidant. This may be an alkylated or acylated phenol in which the alkyl group has from 1 to 6 carbon atoms and the acyl group from 1 to 5 carbon atoms.

The structure of δ-carotene. T. E. Kargl and F. W. Quackenbush (Purdue Univ., Lafayette, Ind.). *Arch. Biochem. Biophys.* **88**, 59–63 (1960). δ-Carotene, a crystalline, yellow-orange carotene isolated from tomatoes, was shown to have a monocyclic, isoprenic structure whose perhydro derivative was identical to that of perhydro-γ-carotene. Alkaline isomerization of δ-carotene yielded an isolable amount of γ-carotene, and treatment with *N*-bromosuccinimide produced a dehydro-δ-carotene with two additional conjugated bonds. Ozonolysis products, isolated as the 2,4-dinitrophenylhydrazone derivatives, were acetone, levulinic aldehyde, methylglyoxal, and glyoxal. Based on its total physical and chemical properties, δ-carotene's structure is believed to be the α-ionone analog of γ-carotene.

Stimulation of carotene synthesis in submerged cultures of neurospora crassa by surface-active agents and ammonium nitrate. L. F. Krzeminski and F. W. Quackenbush (Purdue Univ., Lafayette, Ind.). *Arch. Biochem. Biophys.* **88**, 64–67 (1960). A submerged "shake-type" procedure was developed for the culture of *Neurospora crassa* which gives high carotene production. The submerged cultures, grown in the presence of Tween 40 on a platform shaker, gave maximal pigmentation of conidia-free mycelia in approximately 5½ days. Stimulation of carotene synthesis was maximal at 0.8% with Tween 40. Other surface agents were tried, and only the Tweens gave good submersion and dispersion of the mycelium. In a 2% sucrose medium, addition of ammonium nitrate produced the highest carotene yield at a carbon-to-nitrogen ratio of 4.

The incorporation of mevalonic acid-2-C^{14} and dimethylacrylic acid-3-C^{14} into carotenes. D. G. Anderson, D. W. Norgard, and J. W. Porter (Univ. of Wisconsin, Madison). *Arch. Biochem. Biophys.* **88**, 68–77 (1960). Dimethylacrylic-3-C^{14} serves as a substrate in the biosynthesis of β-carotene in *Chlorella pyrenoidosa* and *Blakeslea trispora*, but not in ripening tomatoes. Mevalonic acid-2-C^{14} acts as a substrate in *Blakeslea trispora* and ripening tomatoes, but not in *Chlorella pyrenoidosa.* Mevalonic acid is also incorporated into phytoene, phytofluene, ζ-carotene, neurosporene, lycopene, γ-carotene, and β-carotene in ripening tomatoes. In addition it is incorporated into several unknown noncarotene, nonsaponifiable compounds which do not appear to be intermediates in the biosynthesis of squalene or carotenes.

Lipide synthesis in aorta preparations from atherosclerosis-susceptible or resistant pigeons. H. B. Lofland, T. B. Clarkson, and C. Artom (Bowman Gray School of Med., Wake Forest College, Winston-Salem, N. C.). *Arch. Biochem. Biophys.* **88**, 105–109 (1960). Certain breeds of pigeons exhibit a very high incidence of aortic lesions which closely resemble those of human atherosclerosis. The aortas of other breeds almost never show lesions. When minced aortas were incubated with acetate-1-C^{14}, no significant differences between the two breeds were apparent in the amounts of C^{14} incorporated into the digitonin-precipitable substances. Of the C^{14} in the latter fraction, only a portion was actually incorporated into cholesterol. In atherosclerosis-susceptible pigeons lesions are found only, or predominantly, in the distal half of the thoracic aorta. In both susceptible and nonsusceptible breeds, this portion of the aorta is much more active for the incorporation of C^{14} into the lipides than is the proximal portion.

Studies of the mechanism of vitamin E action. IV. Lipide peroxidation in the vitamin E-deficient rabbit. H. Zalkin and A. L. Tappel (Univ. of California, Davis). *Arch. Biochem. Biophys.* **88**, 113–117 (1960). *In vivo* lipide peroxidation was found in tissues of the vitamin E-deficient rabbit. Mitochondria isolated from vitamin E-deficient rabbit livers showed evidence of lipide peroxidation. The esterification of high-energy phosphate coupled to the oxidation of succinate was impaired in the mitochondria from vitamin E-deficient rabbits. These results indicate to the authors that vitamin E functions solely to stabilize cellular unsaturated lipides against oxidative deterioration, thus maintaining structural and functional integrity at the subcellular level.

Nutritive value of diets today and fifty years ago. Kathleen Stitt (Univ. of Alabama, Tuscaloosa). *J. Am. Dietet. Assoc.* **36**, 433–440 (1960). Fifty dietary studies made between 1895 and 1903 by the Office of Experiment Stations, USDA, were calculated for calories, animal and vegetable protein, total fat, saturated fatty acids, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid. When these diets were compared with the 1958 Recommended Dietary Allowances of the National Research Council, more than 30% provided less than two-thirds of the recommended allowances for calcium, vitamin A, riboflavin, and ascorbic acid. The early diets included 131 g. or 38% of the total calories as fat as compared with 155 g. or 44% in 1955. Butter, salt pork, and lard were the fats used most frequently. In 1900, 16% of the calories came from saturated fatty acids and 19% from unsaturated, whereas in 1955, 18% of the total calories were from the saturated fatty acids and 23.6% from oleic and linoleic acid.

Food restriction and cholesterol metabolism. Ruth Okey, Genevieve Scheier, and Marshia Reed (Univ. of California, Berkeley). *J. Am. Dietet. Assoc.* **36**, 441–444 (1960). A study of the effect of time limitation of access to food on weight gains, serum and liver lipids in young rats is reported. Basal diets were uniform and adequate, except that half the rats in each group were given 1% cholesterol. Weight gains were, in general, limited to about the extent that food intakes were limited. Total liver lipids and cholesterol in the restricted groups were disproportionately decreased, especially in the older animals fed cholesterol. Serum lipids and cholesterol were never greatly lowered and, in the case of females fed twice daily, were increased by time restriction of access to food. When time of access to food is limited, storage of liver lipid and cholesterol in the growing rat appears to be decreased to a greater extent than is weight gain.

Lipids of Bacillus stearothermophilus. S. K. Long (Univ. of Florida, Citrus Exp. Sta., Lake Alfred) and O. B. Williams. *J. Bacteriol.* **79**, 629–637 (1960). The presence of significant quantities of lipids on or near the surface of 37 C. and 55 C. spores of *B. stearothermophilus* has been demonstrated. Average quantities of lipid material extractible from intact 37 C. spores ranged from 6.90 to 13.11% and from 55 C. spores, 7.42 to 10.13% of dry spore weight. The average lipid content of vegetative cells of the organism grown at 37 C. was 4.25%, whereas only 2.80% for those produced at 55 C. No sterols were found in the lipids of spores or vegetative cells. Analysis of the phospholipids indicated the absence of cephalin and sphingomyelin.

Lipid synthesis in low protein homogenates of yeast. Effects of mitochondria and ethylenediaminetetraacetate. S. Greenfield and H. P. Klein (Brandeis Univ., Waltham, Mass.). *J. Bacteriol.* **79**, 691–696 (1960). A cell-free system from *Saccharomyces cerevisiae* capable of incorporating acetate into fatty acids and nonsaponifiable lipids has been described. Low concentrations of ethylenediaminetetraacetate and to a lesser extent cysteine, but not salicylaldoxime, *o*-phenanthroline, 8-hydroxyquinoline, kojic acid, citric acid, glutathione, ascorbate, 2-mercaptoethanol, also stimulate lipid synthesis. EDTA exerts its effect even in the presence of the mitochondrial fraction to give an additive effect.

Vitamin A_1 aldehyde in hen's eggs. P. A. Plack (Univ. of Reading). *Nature* **186**, 234–235 (1960). Egg yolks were freeze-dried, ground to a powder and extracted with diethyl ether in a Soxhlet for 4 hours. The residue was then extracted with light petroleum in a Waring Blendor. The diethyl ether extract contained 75–80% of the total lipids, 95% of the total free and esterified vitamin A_1, but no vitamin A_1 aldehyde. The light petroleum extract contained 20–25% of the total lipid, 5% or less of the total free and esterified vitamin A_1 and all the vitamin A_1 aldehyde, in amounts of about 20 μg./egg. No vitamin A in any form was found in egg white.

Vitamin A isomers in the liver of rats and chicks. O. R. Braekkan, H. Myklestad, L. R. Njaa, and F. Utne (Norwegian Fisheries Res. Inst., Bergen). *Nature* **186**, 312 (1960). Concentrations of the "fast" or "slow" reacting isomers (based on rate of reaction with maleic anhydride) in rat and chick livers were determined. Fresh livers contained very little "slow" reacting isomers provided that the animals were not fed appreciable amounts of such isomers. If the homogenized livers from rats were stored at room temperatures appreciable amounts of "slow" reacting isomers appeared in 2–7 days. Storage at 4° and at lower temperatures produced only small amounts. Thus the "fast" reacting isomers appear to be the naturally occurring forms in the liver of rats and chicks.

Heterogeneity of lecithins labelled with phosphorus-32. F. D. Collins (Univ. of Melbourne). *Nature* **186**, 366–367 (1960). A rat was injected intravenously with labelled sodium dihydrogen phosphate and killed after 90 minutes. The liver lipids were extracted, and were found to contain 81% lecithin. The lecithin was distributed (120 transfers) in carbon tetrachloride-methanol-water. The experimental distribution curve was broader and lower than that which would be expected for a pure compound. This skew distribution is probably due to the partial segregation of phospholipids with differing fatty acid compositions, with the saturated fatty acids predominating on the non-polar side of the distribution and the unsaturated ones on the more polar portion.

Process for lowering high blood cholesterol levels. J. Cottet and J. Redel (Chimie et Atomistique, Paris). *U. S. 2,937,117*. A pharmacologically acceptable compound for administration to patients having abnormally high blood cholesterol level has the formula $C_6H_5CHR(CH_2)_mCO\,X$. R is an allyl radical or an alkyl radical having 1 to 7 carbon atoms, *m* is the integer 0 or 1, and X is an anionic group such as —OH, —OMe (where Me is a pharmacologically acceptable alkali metal) or —OB (B is the cation of a pharmacologically acceptable organic base).

Dry vitamin E composition. C. H. Benton, Jr., and L. A. Anderson (Eastman Kodak Co.). *U. S. 2,940,900*. A mixture consisting of 35–60% by weight of water, 10–60% by weight of gum acacia, 0–25% by weight of sugar, and 2–40% by weight of an oleaginous concentrate of vitamin E active material is emulsified so that the oleaginous concentrate is uniformly dispersed in minute globules (less than 2 microns in dimeter). The emulsion is spread in a layer 0.01–0.05 inch in thickness on the evaporating surface of a drum dryer and all of the water removed at a temperature of 240–350°F. for a period of 3–60 seconds to give a dry, porous, frangible sheet. The dried material is then comminuted.

Preparation of ethers of vitamin A alcohol. L. Weisler and J. G. Baxter (Eastman Kodak Co.). *U. S. 2,941,009*. Vitamin A alcohol and a lower alkyl iodide (1 to 4 carbon atoms) are reacted at a temperature of 30–125° in the presence of an alkali metal hydroxide in an inert organic solvent. At least one mole of the alkyl iodide and the alkali metal hydroxide are employed for each mole of vitamin A alcohol.

• Drying Oils and Paints

Determination of chlorendic acid in fire-retardant paint. G. G. Esposito and M. H. Swann (Coating and Chemical Lab., Aberdeen Proving Ground, Md.). *Anal. Chem.* **32**, 680–1 (1960). Conventional methods of separating and measuring dicarboxylic acids in alkyl resins are unsuitable for determining chlorendic acid in alkyds used as vehicles for fire-retardant paints. A procedure is described that involves isolation of chlorendic acid as the dipotassium salt by saponification in isopropyl alcohol, followed by acid treatment and extraction of the chlorendic acid with ethyl ether, washing free of other organic acids with water, and titration in a nonaqueous medium.

Some new ideas on oxidation. F. R. Mayo (Stanford Research Institute, Menlo Park, Calif.). *Ind. Eng. Chem.* **52**, 614–8 (1960). Oxygen reacts so rapidly with most free radicals (which have a free valence on carbon) that other reactions of these radicals are practically excluded when oxygen is present. Under such conditions, carbon-carbon bond formation by a free radical mechanism is largely prevented in vinyl polymerizations, in drying of oils, in cross linking of polymers, and in aging of rubber and gasoline. This article discusses reactions which can occur and how some of them might be studied further.

Alkyd resins modified with impatiens, oiticica, and chinawood oils. H. P. Kaufmann and R. K. Sud (Deut. Inst. Fettforsch., Münster). *Fette, Seifen, Anstrichmittel* **62**, 311–314 (1960). Alkyd resins modified with chinawood, oiticica, and impatiens oil along with increasing amounts of linseed oil gave quick-drying and hard films; in some cases, however, they showed wrinkling. The inferior performance observed in the case of impatiens oil modified alkyd films with respect to water-permeability and soda-resistance tests was probably due to the presence of acetic acid in the oil.

Linoleum. J. W. Ayers (J. W. Ayers & Co.). *U. S. 2,936,243*. The oxidized oil content of the described product consists of an oxidized mixture of a drying oil and tall oil modified through cross-linking by reaction with an aluminum compound selected from the group consisting of hydroxy, R-oxy aluminum acylates, oxo-aluminum acylates and their polymers. The amount of aluminum compound used should be from 0.1% of the weight of the total binder content to approximately 1:1 in relation to the weight of the oil mixture. In *U. S. 2,936,244*, the oxidized oil content of the linoleum consists only of oxidized tall oil chemically modified by the action of an aluminum compound.

Method of removing organic surface coatings. G. L. Leithauser (General Motors Corp.). *U. S. 2,937,111*. The work is immersed in a solution consisting of 93.0 to 98.0 parts (by weight) of phenol or cresol, 1.5 to 5.0 parts of orthophosphoric acid, and 0.5 to 2.0 parts of a wetting agent, and held for a time sufficient to loosen the synthetic resin protective coating.

Olefinically unsaturated adduct and method of preparing same. J. Dazzi (Monsanto Chem. Co.). *U. S. 2,938,044*. The desired product is an adduct in which 2 to 4 moles of an alkyl (1 to 8 carbon atoms) fumarate are individually combined at the acid portion of an alkyl ester (1 to 8 carbon atoms) of a tall oil unsaturated fatty acid fraction. The tall oil fraction should contain at least 90% by weight of unsaturated fatty acids, about 35% to 60% of which should be linoleic acid.

UNSATURATED CARBOXYLIC ACIDS IN INTERPOLYMER RESINS. R. M. Christenson (Pittsburgh Plate Glass Co.). *U. S. 2,939,854.* A method is described for forming a xylene-soluble, ungelled interpolymer resin which is characterized by its ability to dry to a hard, clear film, and which is compatible with amine-aldehyde resins. A mixture containing the following components is dissolved in a nonreactive solvent: (1) an ester of acid number below 15 in which the acid component is an alpha-beta unsaturated dicarboxylic acid and the alcohol is an ester of a polyhydric alcohol (2 to 6 hydroxyls) and a drying oil acid; (2) about 5–80% by weight on the ester component of a monomer such as vinyl toluene, styrene, or methyl methacrylate; (3) about 0.5 to 5% of an ethylenically unsaturated carboxylic acid such as acrylic, crotonic, maleic, etc. The mixture is refluxed in the presence of a catalyst until the reaction is complete.

WATER DISPERSIBLE INTERPOLYMERS. J. F. McKenna (Pittsburgh Plate Glass Co.). *U. S. 2,941,968.* A mixture of glyceride drying oil and 5 to 40% by weight of maleic anhydride is heated to a temperature of 175° to 300° to effect the addition reaction between the two. The anhydride rings are broken by adding water, and the product is hydrolyzed by refluxing the mixture. The hydrolyzed product is neutralized with ammonium hydroxide and then treated with about 20 to 70% by weight of styrene, vinyl toluene, or alpha methyl styrene. The mixture is heated at a temperature of 20° to 100° until a liquid interpolymer is formed. The product is water dispersible and when spread as a film will dry to a hard, water-resistant state.

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• Detergents

SOLID DETERGENT COMPOSITION AND PROCESS FOR PREPARATION THEREOF. D. Shiraeff (General Aniline & Film Corp.). *U. S. 2,927,900.* A solid detergent composition is compared by fusing together a normally liquid polyglycol monoether of a monohydric alkyl phenol in which the alkyl group contains 8 to 9 carbon atoms and in which the polyglycol radical is a chain of 8 to 10 oxyethylene groups with the tetrahydrate of calcium nitrate and urea to form a homogeneous liquid which cools in the form of a solid cake which can also be reduced to a granular powder suitable for household and cosmetic use.

DETERGENT COMPOSITIONS COMPOSED OF ALKYLARYL SULFONATED AND N-ALKYL β-AMINOPROPIONATES. R. G. Freese and H. Wittcoff (General Mills, Inc.). *U. S. 2,929,788.* A novel detergent composition consists of alkylaryl sulfonates in which the alkyl group contains from 8 to 14 C atoms and N-alkyl β-aminopropionates in which the alkyl group contains from 16 to 18 C atoms. These longer chain aminopropionates are substantive to synthetic, cellulosic, and animal fibers, and improve hand or feel of textiles, hair, etc. to an extent comparable to the commercial cationic softening agents, while at the same time being more compatible with anionics.

DETERGENT COMPOSITIONS. E. S. Blake (Monsanto Chemical Co.). *U. S. 2,932,616.* A detergent composition consists essentially of the reaction product of about 10–20 mols of ethylene oxide with 1 mol of a glycerol-1,3-dialkyl ether such as a di(2-ethylhexyl) ether built with tetrasodium pyrophosphate, sodium tripolyphosphate and mixtures thereof, soda ash and carboxymethylcellulose.

PROCESS FOR PRODUCING A DETERGENT MIXTURE. P. L. Kooijman, F. A. Doorman and C. Kortland (Shell Oil Co.). *U. S. 2,933,451.* Alkyl aryl sulfonate detergents are produced by sulfonating alkylation products of aromatic hydrocarbons having a sulfonatability less than that which gives sulfonates satisfactory surface-active properties. Conversion of the products to alkyl aryl sulfonic acid salts and extraction of these salts, in admixture with at least 10% by weight of a secondary alkyl sulfate salt detergent, with a hydrocarbon solvent to remove unsulfonated components, gives a high yield of detergent having desirable surface-active properties.

SURFACE-ACTIVE AGENTS. V. R. Gaertner (Monsanto Chem. Co.). *U. S. 2,934,552.* Amido thiosulfates having excellent surface active properties are prepared by the reaction of an N-(alkyloxyalkyl or alkylthioalkyl)-2-haloalkanecarboxamide with an alkali metal or ammonium thiosulfate.

SPRAY-DRIED, NON-CLOTTING GRANULATED SOAP PRODUCT AND METHOD OF PRODUCING THE SAME. I. Reich and W. A. Kelly (Lever Bros. Co.). *U. S. 2,940,935.* The desired product consists of 6–18% of an alkali metal carbonate or silicate, from 2–18% of an alkali metal xylene sulfonate, and from 64–92% of a mixture of alkali metal coconut oil soap and alkali metal tallow soap. The soap mixture contains from 1–20% of the coconut oil soap and from 99–80% of the tallow soap, and the alkali metal cation of all of the compounds in the formulation may be either sodium or potassium.

PROCESS FOR THE PREPARATION OF FREE-FLOWING DETERGENT COMPOSITIONS. P. J. Schauer (Monsanto Chem. Co.). *U. S. 2,941,947.* An improved process is described for the production of spray-dried detergent compositions which contain an active nonionic organic detergent in the presence of a hydratable alkaline builder. The hot spray-dried detergent composition is introduced directly from the spray tower to a fluidizing tower and suspended under fluidizing conditions for about 10 to 40 minutes. The resultant product is substantially free from caking and blocking.

DETERGENT COMPOSITIONS. J. Blinka and J. E. Henjum (Procter & Gamble Co.). *U. S. 2,941,948.* A mixture of 10 to 50% (by weight of total solids) of an anionic sulfate or sulfonate synthetic detergent and 30 to 70% of sodium sulfate and $Na_xH_{5-x}P_3O_{10}$ (where $x = 4$ or 5, and the molar ratio of sodium sulfate to $Na_xH_{5-x}P_3O_{10}$ is 2:1 or 3:1) is dissolved in water. The mixture is dried until the inorganic constituents have crystallized from solution, thereby promoting co-crystallization of the sodium sulfate and $Na_xH_{5-x}P_3O_{10}$ to form a complex. The mixture is then mechanically worked at an initial water content of 2 to 12% of total product and at a temperature of 50° to 175°F.

CONCENTRATED LIQUID DETERGENT. E. O. Korpi and R. P. Davis (Procter & Gamble Co.). *U. S. 2,941,950.* The described composition consists of a solution of the following: (1) 25 to 40% of a sulfated and neutralized reaction product obtained by condensing 1 to 5 moles of ethylene oxide and 1 mole of monohydric alcohol of 10 to 16 carbon atoms; (2) 6 to 12% of an organic builder substance consisting of an alkylol amide of saturated fatty acids having 10, 12, and 14 carbon atoms and an alkylol amine; (3) 15 to 25% of an alcohol such as ethanol, normad propanol, and isopropanol; (4) not over 5% of extraneous substances such as sulfates and chlorides of the ammonia or substituted ammonia used as neutralizing agents; (5) water to make 100%. The resulting composition is stable against clouding, precipitation of solids, and gelling at temperatures as low as 50°F., and has a freeze recovery of 4 hours or less.

FOAMING DETERGENT COMPOSITIONS. C. F. Jelinek and R. L. Mayhew (General Aniline & Film Corp.). *U. S. 2,941,951.* A foaming non-soap detergent composition consists of (1) 25 to 75 parts by weight of a detersive water-soluble anionic sulfate ester of a polyoxyethylene derivative of an organic compound of at least 10 carbon atoms; (2) 75 to 0 parts of a water-soluble anionic alkyl aryl sulfonate detergent containing 8 to 20 alkyl carbon atoms; (3) about 10 to 90% of the combined weight of the anionic detergents of a non-ionic surface-active polyoxyethylene ether of a multi-branched chain primary aliphatic alcohol of from 8 to 18 carbon atoms.

DRY-CLEANING DETERGENT COMPOSITION. J. T. Lewis and L. E. Weeks (Monsanto Chem. Co.). *U. S. 2,941,952.* The desired composition consists of 93% to 99.75% by weight of a volatile, organic liquid of the dry-cleaning type and from 0.25% to 7% of a detergent combination. This combination is composed of from 70% to 97% of a condensation product of a hydroxyl-containing organic compound having from 8 to 18 carbon atoms condensed with from 2 to 8 moles of an alkylene oxide having from 2 to 3 carbons together with from 3% to 30% of an alkaline salt of the sulfate of a similar condensation product.