ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

Field ionization mass spectrometry of heavy petroleum fractions. W. Mead (British Petroleum Co., BP Research Centre, Chersey Road, Sunbury-on-Thames, Middlesex, England). *Anal. Chem.* 40, 743–47 (1968). Field ionization mass spectrometry has been applied to the examination of paraffin waxes in the 300 to 550C boiling range. Using a razor blade as emitter adequate sensitivity has been obtained with a spectral reproducibility of the order of ±5%. Calibration data for the main hydrocarbon types, *n*-paraffins, isoparaffins, cycloparaffins, and alkylbenzenes, have been derived. Relative sensitivities of the parent peaks of the *n*-paraffins in the carbon number range 20 to 40 have been determined and found to be equal to each other. The data have been applied to the analysis of two reference waxes.

Coconut processing in the tropics. Anon. *Food Technol.* 21, 255 (1967). Coconut kernel meat resists penetration by chemicals applied in water solution as dips or sprays. This discovery has led to an easy low-cost treatment of coconuts in the field that decreases loss through spoilage. The treatment consists of momentary dipping in a 25% solution of sodium carbonate, or in a mixture of 7% acetic acid and 5% sulfuric acid. The food value of treated coconut is not impaired, and the quality of copra cake and oil is improved.

Functional bread-making properties of wheat flour lipids. I. Reconsititution studies and properties of defatted flours. Y. Pomeranz, M. Shogren and K. Finney (Dept. Grain Sci. Ind., Kansas St. Univ., Manhattan, Ka. 65502). *Food Technol. 22,* 324–27 (1968). Adding shortening to original flours improved loaf volume and crumb grain substantially and consistently. Adding shortening impaired crumb grain of bread baked from defatted flours. Loaf volumes of bread baked from defatted strong flours were decreased, and from defatted poor flours were increased, by adding shortening to the dough formula. The shortening response of strong flours was completely restored by reconstitution with free lipids from any of the 6 flours tested. It was established by reconstitution techniques that the amount of free lipids required to give the original loaf volume was at least half the amount of the original flour.

II. The role of flour lipid fractions in bread-making. R. Daftary, Y. Pomeranz, M. Shogren and K. Finney. *Ibid.* 327–30. Free polar lipids increased loaf volume substantially; the increase was smaller when bound polar lipids were added. Lipid fractions isolated from various flours indicated no varietal differences. Total free lipids containing a mixture of nonpolar and polar components (in a ratio of 3:1) improved bread quality less than polar lipids alone. Nonpolar lipids decreased loaf volume and impaired crumb grain of bread baked from petroleum-ether-extracted flours; the deleterious effects were counteracted by polar lipids. The effects on bread depended on the levels and ratios of the nonpolar to polar lipids.

Polycyclic aromatic hydrocarbons in solvents used in extraction of edible oils. J. Howard, T. Fazio, and R. White (Div. of Food Chem., Bureau of Science, Food and Drug Admin., Washington, D. C. 20204). *J. Agr. Food Chem.* 16, 72–6 (1968). A method has been developed for the isolation and determination of polycyclic aromatic hydrocarbons in commercial hexanes used in the solvent extraction of edible oils. The hydrocarbons are isolated by partition, column, and thin-layer chromatographic techniques and measured by ultraviolet and spectrophotofluorometric procedures. Average recoveries of benzo(*a*)pyrene, dibenz(*a,h*)anthracene, benz(*a*)-anthracene, and benzo(*g,h,i*)perylene added to 500 grams of hexane solvents at levels of 2 p.p.b. ranged from 86 to 95%. Trace quantities of pyrene, fluoranthene, anthracene, phenanthrene, and various substituted phenanthrenes were isolated from 9 of the 15 solvents analyzed in this study. No known carcinogenic hydrocarbons were detected.

Rapid method for the gas-chromatographic determination of volatile fatty acids in rumen fluid. B. Cottyn and C. Boucque (National Inst. for Animal Nutr., Gontrode (Ghent), Belgium). *J. Agr. Food Chem.* 16, 105–7 (1968). A rapid method for the gas-chromatographic determination of volatile fatty acids (VFA, C_2 to C_5) in rumen fluid with the aid of flame ionization detection is based on the direct analysis of the rumen fluid without previous extraction. After filtration of the rumen fluid, metaphosphoric acid is added to precipitate proteins, and formic acid (5%) is used to eliminate the disturbing "ghosting" effect. The clear supernatant obtained after centrifugation is injected directly into the column. The analysis of one rumen sample requires about 8 minutes. For the quantitative determination, a nonautomatic integrator is used. The individual VFA are calculated by comparing with a standard. The recovery and precision of the gas-chromatographic techniques are discussed.

Apparatus combining gas chromatography with spectrophotofluorometry by means of a flowing liquid interface. M. Bowman and M. Beroza (Entomology Res. Div., Agr. Res. Service, U.S. Dept. of Agr., Tifton, Ga. 31794). *Anal. Chem.* 40, 535–540 (1968). An apparatus has been devised to combine the high separative powers of the gas chromatograph with the high sensitivity and selective response of the spectrophotofluorometer. The solute in the effluent of the gas chromatograph is picked up by a slowly flowing stream of alcohol, and the alcohol solution is monitored in a flow cell at the desired excitation and emission wavelengths. The combination has been used to analyze compounds. Analyses in the manogram range were possible, and sensitivity frequently exceeded that of the flame ionization detector.

Organoleptic identification of roasted beef, veal, lamb and pork as affected by fat. A. Wasserman and Florence Talley (Eastern Util. Res. and Devel. Div., Agr. Res. Serv., U.S. Dept. Agr., Philadelphia, Pa. 19118). *J. Food Sci.* 33, 219–223 (1968). A taste panel was used to study the identification of roasted beef, pork, lamb and veal by flavor alone and the effect of fat on identification. Only about one-third of the panel could identify correctly all four meats by memory of the flavors. There was an increase in the total number of correct identifications made by comparison of the unknown roasted meat samples with known standards but this was not significantly greater than the total correct responses by memory of the flavor alone. Beef and lamb, but not pork and veal, were identified significantly less often when lean ground roasts were tested than when normal ground roasts (containing fat) were used. Texture, color, mouth feel, and other factors may be important in the identification of meat. Beef, lamb and pork fat, as well as these fats after extraction with chloroform:methanol, were added to lean veal prior to roasting. Addition of beef fat did not increase recognition of veal as beef. Pork fat contained a factor increasing identification of veal as pork, but this factor was water-soluble and could be removed. Lamb fat contained a component, or a fat-soluble component that significantly increased the identification of veal as lamb.

The non-saponifiable constituents of lettuce. F. Knapp, R. Aexel and H. Nicholas (Inst. Med. Educ. and Res., St. Louis Univ. School of Med., St. Louis, Mo.). *J. Food Sci.* 33, 159–62 (1968). By means of thin-layer chromatography, gas-liquid chromatography and chemical analyses the following substances were identified in dried Iceberg lettuce (*Lactuca sativa L.*):ceryl alcohol, β-sitosterol, stigmasterol, campesterol and the glycosides of the latter three sterols. An unidentified substance, probably a sterol, was detected by gas-liquid chromatography. A mixture of triterpenes identified as containing β-amyrin, α-amyrin and ψ-taraxasterol was also found.

Effect of temperature on rate of autoxidation of milk fat. D. Hamm, E. Hammond and D. Hotchkiss (Dept. of Dairy and Food Ind., Iowa State Univ., Ames, Iowa). *J. Dairy Sci.* 51, 483–91 (1968). Milk fat was autoxidized at 50, 35, 21, 4, −10, and −27C, and the reaction monitored by peroxide and thiobarbituric acid (TBA) values and organoleptic examination. The season of production and addition of 0.1 ppm of copper as copper palmitate had little effect on the flavor response, and the same character and sequence of flavors were observed at all temperatures. Equations were fitted statistically to the pooled organoleptic data to predict the effect of time and temperature on the flavor responses. Peroxide and TBA values showed significant correlation with the flavors at higher temperatures, but at lower temperatures no increases in peroxide and TBA values could be observed. Autoxidation flavors were observed at all temperatures and were actually more intense at −27 than at −10C. Apparent heats of activations were calculated for the peroxide, TBA, and flavor reactions. The heat of activation of the TBA reaction was significantly higher than the others. The TBA and peroxide values were significantly stimulated by addition of copper, but copper did not affect the apparent heats of activation of the reactions.

The sterols of Ochronomas danica and Ochronomas malhamensis. M. Gershengorn, A. Smith, G. Goulston, L. Goad, T. Goodwin and T. Haines. (Dept. Chem., The City Coll. of the City Univ. of N.Y., N.Y., N.Y. 10031). *Biochemistry* 7, 1698–1706 (1968). The sterols of *Ochromonas danica* have been identified as ergosterol, brassicasterol, 22-dihydrobrassicasterol, clionasterol, poriferasterol, and probably 7-dehydroporiferasterol. By contrast *Ochromonas malhamensis* contains only poriferasterol as the major sterol component. In addition, evidence has been obtained for the occurrence of cycloartenol and 24-methyl-enecycloartanol in *O. danica* and *O. malhamensis.*

Multi-dimensional chromatography using different developing methods. IV. Rational identification of fatty acid esters by means of programmed distribution of fractions in two-dimensional (GC-TLC) chromatograms. N. Ruseva-Atanasova and J. Janak (Lab for Gas Anal, Czechoslovakia Acad. of Sci., Bino, Czechoslovakia). *J. Chromatog.* 21(2), 207–12 (1966). An identification method for complex fatty acid mixtures has been developed by using a new two-dimensional chromatographic technique. The first dimension is gas chromatography with the effluent being eluted upon a logarithmically travelling start line of a thin-layer, the second dimension by the thin-layer chromatogram (silica gel coated with silver nitrate). By using 2 to 4 standards, the pattern of the chromatographic bands can be interpreted due to the simple and characteristic distances traveled by the components.

Gas-liquid chromatography of volatile fatty acids from formic acid to valeric acid. III. Analysis of dilute ethereal solutions using a thermal conductivity detector. R. B. Jackson (Fodder Conservation Sec., CSIRO, Highett, Victoria, Australia). *J. Chromatog.* 22(2), 261–65 (1966). A new stationary phase which adequately separates the acids from water and up to 0.5 ml. of ether is described. It consists of a 122 cm × 4 mm I.D. stainless steel column packed with a mixture of Ucon LB-550-X, sebacic acid and acid-washed Chromosorb W, 80–100 mesh (1:1:10). A procedure is also described for the estimation of C_1 to C_5 fatty acids isolated from biological material.

Gas-liquid chromatography and lipid chemistry. X. Analysis of triglyceride mixtures. D. Lefort, R. Perron, A. Ponrchez, C. Madelmont and J. Petit (Lab. de Lipochime du CNRS, Bellevue, France). *J. Chromatog.* 22(2), 266–73 (1966). By means of gas chromatography it is possible to identify and verify the purity of various mixed glycerides of myristic, palmitic and stearic acid. Positional isomers can, however, not be differentiated. It is shown that a mixed glyceride does not undergo transformation during the procedure.

Free and esterified cholesterol content of animal muscles and meat products. C. Tu, W. D. Powrie and O. Fennema (Dept. of Food Sci. and Ind., Univ. of Wisc., Madison, Wisc.). *J. Food Sci.* 32, 30–34 (1967). A method was perfected for the precise, accurate measurement of total and free cholesterol in lipid extracts of raw beef and pork muscle and of meat products. The average total cholesterol content of beef and pork muscles was estimated to be, respectively, 58 and 65 mg per 100 g. Both beef and pork muscles had an average cholesterol ester concentration of about 6% of the total cholesterol. Regression equations indicated that the total cholesterol content of muscle increased very slightly as the percent lipid value rose. During the broiling of ground chuck samples, up to 15% of the total cholesterol in raw meat was lost in the cook drip.

Changes in fatty acid composition of porcine muscle lipid associated with sex and weight. E. Allen, R. G. Cassens and R. W. Bray (Univ. of Wisc., Madison, Wisc.) *J. Food Sci.* 32, 26–29 (1967). The fatty acid composition of porcine *Longissimus dorsi* muscle lipid was determined for 30 animals slaughtered at two live weights and consisting of an equal number of boars, barrows and gilts. The lipid was separated into the neutral lipid and phospholipid fractions prior to analysis. Odd numbered fatty acids (C_{11}, C_{13}, C_{15} and C_{17}) were significantly higher in the phospholipid fraction; the C_{17} fatty acid was never detected in the neutral lipid fraction. Both weight and sex effects were restricted to the neutral lipid fraction. Weight had a significant effect on amount of C_{10}, C_{11}, C_{12}, C_{14}, C_{16} and C_{18} fatty acids of one or more of the sexes.

Gas-liquid chromatographic method for the determination of fat-soluble vitamins. IV. Application to vitamin K_1. D. A. Libby, A. R. Prosser and A. J. Sheppard (Div. of Nutr., Food and Drug Admin., Washington, D. C. 20204). *J. Assoc. Offic. Anal. Chem.* 50, 806–9 (1967). The parameters for the detection and quantitative measurement of vitamin K_1 by gas-liquid chromatography are reported. On SE-30, the most satisfactory immobile phase, the vitamin K_1 peak was completely resolved from tocopherols included in test materials. Quantitatively, 0.5 and 2 μg can be effectively measured with the hydrogen flame ionization and the beta-ionization detectors, respectively. Both detectors gave a linear response to increasing quantities of vitamin K_1.

The sterols of seafood. D. Kritchevsky, S. A. Tepper, N. W. Ditullio and W. L. Holmes (The Wistar Inst. of Anatomy and Biology, Philadelphia, Pa. 19104). *J. Food Sci.* 32, 64–66 (1967). Gas chromatography showed that the sterol fraction of all seafood examined is predominantly cholesterol (over 90% in haddock, pollock, salmon, shrimp and lobster; 41% in oysters, 57% in crab, 26% in scallop and 37% in clam). Oyster sterols also included 24-methylene-cholesterol (26%), and a crab sterol component was brassicasterol (37%). Sterols other than cholesterol give different chromogens in the colorimetric analysis for sterols, which may account, in part, for the variability in "cholesterol" values reported in the literature.

Changes in lipid composition of chicken muscle during frozen storage. E. Davidkova and A. W. Khan (Div. of Biosci., Nat. Res. Council, Ottawa 2, Canada). *J. Food Sci.* 32, 35–37 (1967). Fresh chicken muscle contained about 1.1% lipids, of which more than half was phospholipid, and about 30% triglyceride; small amounts of cholesterol, cholesterol esters and free fatty acids were present. During storage at −10C, the phospholipid content of the muscle decreased owing to loss of lecithins and cephalins, the free fatty acid and triglyceride contents increased, the sphingomyelin content remained unchanged, and the lysolecithin content increased. The results suggest that lipolysis occurred during frozen storage, and that lipid hydrolysis and protein denaturation may be interdependent phenomena.

The loss of methyl esters of polyunsaturated acids during gas chromatography. T. Gerson, F. B. Shorland and J. E. A. McIntosh (Fats Res. Div., Dept. of Sci. and Ind. Res., Wellington, New Zealand). *J. Chromatog.* 23(1), 61–66 (1966). Using Celite as a solid support it was found that the recovery of methyl esters of polyunsaturated acid during gas chromatographic analysis decreased with increasing unsaturation. Greatest losses were sustained with DEGA and limited tests with BDS, EGS, PEG indicated they were unsatisfactory. With linolenate, EGA on siliconized Celite proved satisfactory. Similarly, precoating the solid support with Epicote resin improved the results with 20% EGA. The loss of eicosapentaenoate was lowered from 42% to 22% on the Epicote treated columns. Glass microbeads proved to be a more inert support but lacked resolving power due to low surface area.

Fatty acid composition of palm kernel, illipe, and shea nut oils by urea fractionation and programmed temperature gas chromatography. L. Iverson and G. Harrill (Div. of Food Stand. and Additives, Washington, D. C. 20204). *J. Assoc. Offic. Anal. Chem.* 50(6), 1335–38 (1967). The detection of C_6 to C_{28} fatty acids is possible when their methyl esters are concentrated by urea fractionation so that esters with similar gas chromatographic retention times are in different fractions. By modified programmed temperature gas chromatographic techniques, it is possible to detect and estimate fatty acids present in trace amounts (0.1 to 0.001%) in palm kernel, shea nut and illipe oils. The odd and even chain length saturated fatty acids from C_6 to C_{28} were detected. The odd and even chain length monounsaturates from C_{14} to C_{24} and the even chain length dienes from C_{14} to C_{24} were detected.

Determination of carotene in fresh forages and silages following freeze-drying and grinding. J. T. Gillingham (Agricultural Chemical Services, Clemson Univ., Clemson, S. C. 29631). *J. Assoc. Offic. Anal. Chem.* 50, 828–31 (1967). The carotene content of fresh forages and silages was analyzed by two methods: AOCS method 39.015 (a) and the Bickoff *et al.* method modified to include freeze-drying and grinding of the sample and chromatographing only an aliquot after extraction. Data on orchardgrass, fescue, clover-grass mixtures, and silage samples indicated that the method described is accurate and reproducible. The average variation is ±8 µg/g and identical values in duplicate determinations are recorded in 16 out of 34 values.

GAS CHROMATOGRAPHIC DETERMINATION OF BUTYLATED HYDROXYANISOLE AND BUTYLATED HYDROXYTOLUENE IN BREAKFAST CEREALS. D. M. Takahashi (Food and Drug Administration, 50 Fulton St., San Francisco, Calif. 94102). *J. Assoc. Offic. Anal. Chem.* **50**(4), 880–84 (1967). The gas chromatographic method for BHA and BHT in rice and corn ready-to-eat cereals was revised to include CS_2 elution of the antioxidants and gas-liquid chromatography, using a hydrogen flame ionization detection system for the determination. Different gas chromatographic columns were found to be more suitable: 5% Apiezon L on 80/100 mesh Gas Chrom Q (4′ column), and 10% QF-1 silicone oil on 80/100 mesh Gas Chrom Q (6′ column). The elution order of the antioxidants is reversed on the two columns. 3,5-Di-tert-butyl-4-hydroxyanisole is used as the internal standard. Recoveries of the two antioxidants added at 5, 10, 25, and 50 ppm levels, were 96–106% with the QF-1 column and 96–104% with the Apiezon L column.

A COMPLEMENTARY THIN-LAYER AND GAS-LIQUID CHROMATOGRAPHIC PROCEDURE FOR FATTY ACID ANALYSIS. H. B. White, Jr. (Dept. of Biochem., Univ. of Miss. Sch. of Med., Jackson, Miss.). *J. Chromatog.* **21**(2), 213–22 (1966). A procedure is described for the analysis of methyl esters of fatty acids on the basis of number of double bonds and chain length. After conversion of the unsaturates to their methoxy, bromomercuri-adducts, separation of the saturated, monoenoic, dienoic, trienoic tetraenoic, and combined pentaenoic and hexaenoic classes was accomplished by thin-layer chromatography. Following adduct decomposition, chain lengths within each class were determined by gas chromatography.

GAS-LIQUID CHROMATOGRAPHY OF VOLATILE FATTY ACIDS FROM FORMIC ACID TO VALERIC ACID. II. THE INSTABILITY OF SILICONE OIL-FATTY ACID STATIONARY PHASES. R. B. Jackson (Fodder Conservation Sec., CSIRO, Highett, Victoria, Australia). *J. Chromatog.* **22**(2), 251–60 (1966). The stability of silicone DC 550-stearic acid and silicone DC 550-behenic acid stationary phases was investigated. Columns of these liquid phases rapidly lost their resolving power for volatile fatty acids when operated with a dry carrier gas. Resolving power could be restored by using wet carrier gas for 24 hours. Deterioration could be prevented by using wet carrier gas or by incorporating *o*-phosphoric acid in the liquid phase; the latter did cause some formic acid decomposition with dry carrier gases.

VOLATILE FATTY ACIDS IN SOME BRANDS OF WHISKY, COGNAC AND RUM. L. Nykanen, E. Puputti and H. Suomalainen (Res. Lab. of the State Alc. Monopoly (Alko), Helsinki, Finland). *J. Food Sci.* **33**, 88–92 (1968). Gas chromatography has been applied to eight different types of whisky, two of cognac, one of brandy, and four of rum, for determination of the relative proportions of volatile fatty acids, with the lower molecular acids as free acids, but upwards from caprylic acid as methyl esters. Rum contained the largest amount of volatile acids, 600 mg/L, while one of the brands of Scotch whisky contained the least, 90 mg/L. Acetic acid represented 40–95% of the total amount of volatile acids in the whisky; in cognac and brandy, the value was 50–75%, and in rum 75–90%.

CHANGES IN LIPID COMPOSITION OF SWEET POTATOES AS AFFECTED BY CONTROLLED STORAGE. T. S. Boggess Jr., J. E. Marion, J. G. Woodroof and A. H. Dempsey (Food Sci. Dept., Univ. of Ga., Experiment, Ga. 30212). *J. Food Sci.* **32**, 554–58 (1967). Lipids were extracted from Georgia Red and Centennial varieties of sweet potatoes and studied to determine changes during storage at 15.5, 10, and 4.5C. The two varieties did not differ initially in the relative proportions of fatty acids. However, the short chain saturated acids, including palmitic, decreased during cure and storage, while linoleic, linolenic and tetracosaenoic acids increased. The Centennial variety contained higher levels of total lipids.

DIRECT SPECTROPHOTOMETRIC DETERMINATION OF FAT AND MOISTURE IN MEAT PRODUCTS. I. Ben-Gera and K. H. Norris (Inst. Res. Lab., Market Quality Res. Div., ARS, USDA, Beltsville, Md. 20705). *J. Food Sci.* **33**, 64–68 (1968). The near infra-red spectral absorption properties of 2-mm-thick samples of meat emulsions were measured by direct spectrophotometric techniques. The difference in optical density between 1.80 and 1.725 µ gave a high correlation with moisture content and the difference between 1.725 and 1.65 µ gave a high correlation with fat content. Direct spectrophotometric analysis predicted fat content within a standard error of ±2.1% and moisture content within ±1.4%.

ACTION OF MICROORGANISMS ON THE PEROXIDES AND CARBONYLS OF RANCID FAT. J. L. Smith and J. A. Alford (Eastern Util. Res. and Devel. Div., ARS, USDA, Beltsville, Md. 20705). *J. Food Sci.* **33**, 93–7 (1968). The effects of 26 species of bacteria, molds, and yeasts on the hydroperoxides and monocarbonyls in rancid fat have been determined. All of the cultures were capable of decomposing the hydroperoxides. The activity of microorganisms on the monocarbonyl content of the rancid fat was quite varied and could be divided into: 1) microorganisms which produced large increases in at least two monocarbonyl classes; 2) microorganisms which removed 2,4-dienals; 3) microorganisms which removed 2,4-dienals and 2-enals, and 4) microorganisms which caused decreases in at least two classes of monocarbonyls (without destroying completely any class).

A COMPARISON OF SOLVENT AND THERMAL TECHNIQUES FOR DETERMINING THE FAT CONTENT OF GROUND BEEF. D. R. Bellis, J. L. Secrist and M. J. Linskey (Food Lab., U. S. Army Natick Lab., Natick, Mass.). *J. Food Sci.* **32**, 521–24 (1967). Results correlated significantly (1% level) with results obtained by the official AOAC solvent extraction procedure. The fat levels investigated ranged between 14 and 29%. As the amount of sample grinding increased, the fat variation within thermal extraction replications decreased, while the differences between the thermal and solvent extracted fat became larger. Linear regression between the two methods contained significant error in certain areas of the fat range tested.

DIELECTRIC PROPERTIES OF COMMERCIAL COOKING OILS. W. E. Pace, W. B. Westphal and S. A. Goldblith (Mass. Inst. of Technol., Cambridge, Mass. 02139). *J. Food Sci.* **33**, 30–36 (1968). The differences in dielectric properties among fats and oils appear to be attributable to the phase (solid vs. liquid) of the material and generally correspond to the degree of unsaturation as evidenced by iodine values. The differences in loss factors among these fats and oils at any given temperature and frequency (within the range at which the measurements were made) are too small to be of any practical importance in selecting any one of them for use in heating processes using microwaves.

FATTY ACID COMPOSITIONS OF BOVINE SUBCUTANEOUS FAT DEPOTS DETERMINED BY GAS-LIQUID CHROMATOGRAPHY. R. N. Terrell, R. W. Lewis, R. G. Cassens and R. W. Bray (Dept. of Meat and Animal Sci., Univ. of Wisc., Madison, Wisc. 53706). *J. Food Sci.* **32**, 516–20 (1967). Among sites and acids analyzed, the outer subcutaneous fat over the triceps brachii (OSTB) had a larger percentage of C14:1 (5% level) and C16:1 (1% level) than the seam fat samples between the semimembranosus and biceps femoris (SEAM). The SEAM had a larger percentage of C14 than the inner subcutaneous fat over the semitendinosus (NST) (5% level). The SEAM also had a larger percentage of C14 than the NST (5% level).

CHANGES IN THE POLYUNSATURATED FATTY ACID CONTENT OF POTATO TUBERS DURING GROWTH, MATURATION AND STORAGE. J. H. Schwartz, R. E. Lade and W. L. Porter (Eastern Regional Res. Lab., ARS, USDA, Phil., Pa. 19118). *J. Food Sci.* **33**, 115–18 (1968). During storage linoleic and linolenic were almost the only polyunsaturated acids present, but during growth and maturation considerable amounts of unidentified polyunsaturated acids were found. The percentage of polyunsaturated acids in the dry weight of tuber decreased to a low value near harvest time and remained *near* this value throughout the 6.3-month storage period, except that the value in Pontiacs stored 19 days was somewhat high. The percent of polyunsaturates in the total fatty acid fraction also dropped to a low value during growth and maturation but increased somewhat during storage.

ATYPICAL INTRAFASICULAR ACCUMULATION OF FAT IN STRIATED PORCINE MUSCLE. E. Allen, R. G. Cassens and R. W. Bray (Dept. of Meat and Animal Sci., Univ. of Wisc., Madison, Wisc. 53706). *J. Food Sci.* **32**, 146–47 (1967). Post-mortem

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muscle appeared normal in color, texture, and visible fat, but Sudan IV staining revealed that certain intrafascicular cells did contain fat.

Lipids in flour from gamma irradiated wheat. O. Chung, K. F. Finney and Y. Pomeranz (Crops Res. Div. USDA, Kansas State Univ., Manhattan, Kansas 66502). *J. Food Sci.* 32, 315–17 (1967). Lipids were extracted with petroleum ether and with water-saturated butanol from flours milled from wheat aliquots gamma-irradiated by 0, 1, 2, 3, 5 and 10×10^6 rep doses. The water-saturated butanol extract was fractionated by silicic acid column chromatography into polar and nonpolar lipids. The fractions were studied for phosphorus content and by thin-layer chromatography. Profound changes in rheological properties and bread-making characteristics of the flours were accompanied by a small decrease in the ratio of nonpolar to polar lipids and by an increase in the phosphorus content of the polar fraction.

Nature of the residual lipids in fish protein concentrate (FPC). B. F. Medwadowski, J. Van Der Veen and H. S. Olcott (Inst. of Marine Resources, Dept. of Nutr. Sci., Univ. of Calif., Berkeley, Calif. 94720). *J. Food Sci.* 32, 361–65 (1967). Isopropanol-extracted samples had 0.1–0.2% residual lipid and an ethylene dichloride-extracted sample had approximately 0.5% residual lipid. The lipids contained 50–60% neutral lipid, 20–25% phospholipids, 5–10% acidic lipids and the remainder uncharacterized. Fatty acid analysis of the total lipids showed that the saturated fatty acids were mainly palmitic and stearic and the unsaturated fatty acids were mainly oleic and palmitoleic.

Fatty acid composition of the inner and outer layers of porcine backfat as affected by energy level, sex and sire. D. E. Koch, A. F. Parr and R. A. Merkel (Dept. of Animal Husbandry and Food Sci., Michigan State Univ., East Lansing, Mich. 48823). *J. Food Sci.* 33, 176–80 (1968). In two experiments, the inner layer of backfat consistently contained more saturated fatty acids, primarily accounted for by stearic acid, and contained less palmitoleic, oleic and linoleic acids than the outer layer. None of the variables in either experiment significantly affected the differences between layers. In Experiment 1, energy levels below 80% of full feed significantly decreased stearic acid content and increased linoleic acid content. In Experiment 2 the fatty acid composition of backfat from pigs fed 80% of full feed did not differ significantly from full-fed pigs.

The lipids of raw and cooked ground beef and pork. A. M. Campbell and P. R. Turkki (Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn. 37916). *J. Food Sci.* 32, 143–46 (1967). Lipids were fractionated into phospholipids and neutral lipids. The fatty acid composition of the total extracted lipid and of the lipid fractions was determined. Phospholipid concentration was higher in cooked than in raw meat, whether expressed as percent of fat or as percent of meat. Fatty acid patterns of the lipid were similar in raw and cooked meat, except that the concentration of linoleate in the phospholipid fatty acids was higher in cooked pork than in raw pork.

Lipids in wheat kernels of varying size. C-M. Chiu and Y. Pomeranz (Dept. of Grain Sci. and Ind., Kansas State Univ., Manhattan, Kansas 66502). *J. Food Sci.* 32, 422–25 (1967). The hard red spring kernels had, generally, more free lipids than hard red winter kernels; differences in bound lipids were small. Total lipid content per kernel depended primarily on kernel size, and was affected little by wheat class or variety. Thin-layer chromatography showed triglycerides as the major nonpolar component, and digalactosyl glyceride and phosphatidyl choline as the major polar components. Concentrations of individual nonpolar or polar components were not affected significantly by kernel size.

Composition of lipids in some beef muscles. I. Hornstein, P. F. Crowe and R. Hiner (Market Quality Res. Div., ARS, USDA, Beltsville, Md.). *J. Food Sci.* 32, 650–55 (1967). The lipids extracted from five different muscles of four Angus steers were separated into phospholipids, free fatty acids and a fraction containing the triglycerides. The phospholipid concentration for a given muscle was relatively constant in all four animals. The concentration of total lipids varied considerably more than that of phospholipids. The diaphragm had the highest total lipid and phospholipid content. The diaphragm also differed from the other muscles studied in the palmitic and stearic acid concentration of the phospholipids.

Lipid composition of normal and pale, soft, exudative porcine muscle. J. D. Sink, R. W. Bray, W. G. Hoekstra and E. J. Briskey (Dept. of Meat and Animal Sci., Univ. of Wisc., Madison, Wisc.). *J. Food Sci.* 32, 258–60 (1967). No significant differences, between normal and pale, soft, exudative muscles were noted in total lipid or fatty acid composition. Likewise, neither lipid content nor composition appeared to be related to the post-mortem extractability of myofibrillar and sarcoplasmic proteins.

Deterioration of frying oils in automatic test fryer. I. Protection of fat surface. Etsuji Yuki (Food Ind. Expl. Sta., Hiroshima Pref.). *Yukagaku* 17, 232–6 (1968). Thermal oxidative deterioration was prevented effectively by means of metal float or hood but hydrolytic deterioration could not be prevented. The development of coloration and lowering of stability of frying oil were caused by hydrolytic deterioration. The addition of 10% refined kapok seed oil containing 11.4% cyclopentenoid fatty acid was effective for maintenance of stability of soybean oil as a frying oil.

Detection of glycerides of esterified olive oil fatty acids. H. P. Kaufmann and H. Wessels (Inst. for Fat. Res., Munster (Westf.). Ger.). *Fette Seifen Anstrichmittel* 68, 338–343 (1967). Natural olive oil and a synthetic oil having the same fatty acid composition as olive oil contained approximately the same amount of dipalmitoolein (ca. 4%) and palmito-diolein (ca. 20%). The positional isomers of these glycerides, which contain palmitic acid in the 2-position, occur in very small amounts in the olive oil, but are present in considerably larger amounts in the synthetic oil. The same is also true for the corresponding stearic acid containing glycerides. The dipalmito-olein and palmitodiolein containing fractions were isolated by silver nitrate chromatography. The characteristic ratios of the positional isomers (POP/PPO and POO/OPO) in both oils was also determined indirectly by enzymatic hydrolysis of the fatty acids in the 1,3 position and then analyzing the 2-monoglyceride fatty acids by gas chromatography.

Investigations on the structure of dimeric fatty acids, Part III: Preparation and structure determination of Diels-Alder dimers from methyl-9-trans,11-trans-octadecadienoate. A. K. Sen Gupta and H. Scharmann (Unilever Res. Lab., Hamburg, Ger.). *Fette Seifen Anstrichmittel* 70, 86–90 (1968). From the reaction product resulting from 6 hours of treatment of methyl-9-trans,11-trans-octadecadienoate at 250C under argon about 35% by weight of dimers were obtained. Thin-layer chromatography of the dimers showed the presence of four compounds. These compounds were isolated as colorless liquids by the use of preparative TLC. All these compounds exhibited a refractive index $N_D^{20} = 1.4762 \pm 0.0002$, iodine value 86 ± 1 and molecular weight 588. The mass spectra corresponded to those of tetrasubstituted cyclohexane derivatives. The product is a mixture of various positional isomers. Complete hydrogenation of the dimers was accomplished only after the addition of a small quantity of perchloric acid. This behavior appears to be typical for cyclohexenoic dimers with long side chain.

Studies on the UV spectra of autoxidized fats. B. A. J. Sedlacek (Inst. for Nutr., Prag., Czech.). *Fette Seifen Anstrichmittel* 70, 80–86 (1968). The course of autoxidation of several fats during long periods of storage at room and refrigerator temperatures was investigated. A relationship was found between the first maximum in the direct spectrophotometric UV method and the content of primary and secondary autoxidation products. The quotients and differences of extinctions at the maxima in the UV spectra of autoxidized fats are suitable for the evaluation of the UV spectra.

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• Fatty Acid Derivatives

Polymerization of unsaturated fatty acids. H. G. Arlt, Jr. (Arizona Chem. Co.). *U.S. 3,367,952.* A process for polymerizing unsaturated higher fatty acids in the presence of small quantities of water comprises the steps of (a) subjecting an unsaturated higher fatty acid under autogenous pressure for 1–6 hrs. to the action of a sulfonic acid-styrene-divinyl-benzene copolymer in particulate form of from about 20 to about 200 mesh size and present in amounts of 1–15% in an aqueous menstruum at 180–300C, (b) cooling the resultant reaction mixture, (c) rapidly separating within about one hour the sulfonated resin catalyst, (d) recovering a mixture comprising monomeric and polymeric higher fatty acids, and (e) separating the polymeric higher fatty acids from the mixture.

Kinetics of epoxidation I. General information and the kinetics of primary reaction. W. Schneider (Inst. for Technol. Chem., Polytechnic Inst., Hannover, Ger.). *Fette Seifen Anstrichmittel* 69, 421–425 (1967). A number of unsaturated substances were epoxidized with water-free peracetic acid and the influence of the reaction conditions on the yield of epoxide was investigated. It can be shown that the epoxidation with peracetic acid in presence of acetic acid proceeds nearly like a two-step consecutive reaction. With knowledge of the velocity constants of the ring-forming (primary) and ring-splitting (secondary) reactions, it was possible to calculate the reaction stage at a given time and the optimum yield of epoxide. In most cases, the deviation of the experimentally found values from the calculated ones was under 10%.

Determination of traces of dimethylsulfoxide in fatty acid esters of sucrose. J. Zajic and M. Bares (Polytechnic Acad. Prague, Czech.). *Fette Seifen Anstrichmittel* 69, 393–395 (1967). An IR-spectroscopic method for the determination of dimethylsulfoxide in the fatty acid esters of sucrose was developed. The sensitivity of the method in a quantitative determination is 0.2% and in a qualitative determination is 0.08%.

The analyses of fatty amines. P. Voogt (Unilever Res. Lab., Vlaardingen, Holland). *Fette Seifen Anstrichmittel* 68, 825–830 (1966). Fatty amines (primary, secondary, and tertiary) were separated from the non-cation-active components with the help of ion exchangers and the average equivalent weight and the content of non-cation-active components of the total amines was determined. The equivalent weight determination of mixed amines as well as primary, secondary and tertiary amines was carried out titrimetrically. The amines could be separated by thin-layer chromatography.

Polymerization and polycondensation in the oleic series. S. m. A. Ghodssi (Lab. of Macromolecular Chem. of C.N.R.S., Thiais, Val-de-Marne, Fr.). *Rev. Franc. Corps Gras* 15, 149–155 (1968). Methyl oleate, oleic alcohol and oleylamine were prepared from carefully purified oleic acid. Polymerization of such products at nearly ambient temperature by boron trifluoride gave two kinds of dimers: one has a cyclobutane structure and is saturated, the other is unsaturated. When excess boron trifluoride is used, the saturated form predominates. The oleic alcohol dimer and the oleylamine dimer can be prepared from methyl oleate in the same manner as for the monomer.

Tetramethyl cyclobutanediol diesters of linseed-derived C_{18} saturated vicinally substituted cyclic monocarboxylic acid isomer mixture. J. P. Friedrich (U.S. Sec'y of Agr.). *U.S. 3,373,176.* The diesters formed by reacting de-aromatized cyclized linolenic acid isomer mixture with two equivalents of tetramethyl cyclobutanediol exhibit low pour points coupled with a high degree of resistance to thermal oxidation. The product meets current military specifications for aviation lubricants.

Preparation of isocyanates from linseed, safflower and tall oil fatty acids: I. A. E. Rheineck and S. Schulman (North Dakota State Univ., Fargo, North Dakota). *Fette Seifen Anstrichmittel* 70, 75–79 (1968). Fatty acids from linseed, safflower and tall oils were converted to the corresponding isocyanates by two methods. In the first method, linseed and safflower fatty acids were converted to the acid chloride either with thionyl chloride or oxalyl chloride, the acid chlorides converted to the azide and finally decomposed into the isocyanate. Oxalyl chloride gave the highest yield of isocyanate. Loss of unsaturation from acid to isocyanate is slight. The tall oil isocyanates were prepared in high yields via the phosgene method, i.e. fatty acid to nitriles to amines to the amine hydrochlorides which are then reacted with phosgene. Isocyanates prepared using this technique contain one more CH_2 group than the other methods described. The infrared spectra of all isocyanates were essentially the same.

Methods of gas chromatographic analysis for fatty alcohols and other hydroxy functional groups. A. Prevot and C. Barbati (Inst. for Fats and Oils, Paris, Fr.). *Rev. Franc. Corps Gras* 15, 157–165 (1968). Two methods for blocking the OH functional group are described. For fatty alcohols, both methods are applicable. These methods use trimethylsilyl ethers (TMS) or acetylation using dinitrobenzenesulfonic acid (DNBS) as catalysts. For methyl esters of hydroxy fatty acids, sterols, tocopherols, TMS preparation is very fast and handy. Methods and conditions for gas chromatographic analysis as well as some examples are given.

A method for improving color and the color and odor stability of fatty amides. E. S. Hammerberg and S. H. Shapiro (Armour and Co.). *U.S. 3,373,174.* An improvement in color and color and odor stability of fatty amides is accomplished by admixing an alkaline-type borohydride with the fatty amide.

• Biochemistry and Nutrition

Effects of methyltestosterone and a new anabolic steroid, 7α-ethylthio-17β-hydroxy-17α-methyl-5α-androstano-(3,2C) pyrazole (PS-179), on experimental atherosclerosis in rabbits. K. Nakamura, A. Toyota, Y. Masuda and H. Nakamura (Pharmacological Div., Res. Lab., Dai Nippon Pharmaceutical Co., Fukushima-Ku, Osaka (Japan)). *J. Atheroscl. Res.* 7, 783–796 (1967). The hypocholesterolaemic and anti-atherosclerotic effects of methyltestosterone (MT) and 7α-ethylthio-17β-hydroxy-17α-methyl-5α-androstano-(3,2-C) pyrazole (PS-179), a protein anabolic steroid, have been compared in male rabbits fed on cholesterol-coconut oil. MT has no effect on hypercholesterolaemia, tissue lipid deposits and aortic atherosclerosis, reduced tissue lipid deposits, was hypocholesterolaemic and improved the plasma NEFA composition. This compound slightly reduced the incidence of coronary atherosclerosis. In regression experiments on atherosclerotic male rabbits, neither MT nor PS-179—when administered after stopping the cholesterol-coconut oil diet—ameliorated aortic, carotid and coronary atherosclerosis. Likewise, these drugs did not reduce tissue lipids, but PS-179 did accelerate regression of hypercholesterolaemia.

Respiration and lipid peroxidation in tocopherol deficient rat hearts. A. Kitabchi, D. Challoner and R. Williams (Div. of Endocrinology and Metabolism, Dept. Med., Univ. Washington, Seattle, Wash. 98105). *Proc. Soc. Expt. Biol. Med.* 127, 647–50 (1968). Respiration in the perfused hearts of vitamin E-deficient and -sufficient rats was studied and compared in the control, oligomycin, and cyanide treated hearts. No effect of vitamin E deficiency was noted in the total qO_2, phosphorylated respiration or nonmitochondrial oxygen fixation. Studies of lipid peroxidation, as tested by the thiobarbituric acid (TBA) method, demonstrated high *in vitro* lipid peroxidation in the homogenates of hearts and livers of the vitamin E-deficient rats compared to the control. The TBA test in the heart perfusate of the two groups was the same.

Biosynthesis of long-chain hydrocarbons. II. Studies on the biosynthetic pathways in tobacco. T. Kaneda. *Biochemistry* 7, 1194–1202 (1968). Two classes of long-chain hydrocarbons (C_{25}–C_{35}), branched (mainly iso and anteiso) and normal, occur in tobacco in almost equal proportions. The biosynthetic pathway for hydrocarbons has been studied through measurements of the incorporation of radioactive fatty acid substrates into the branched-chain hydrocarbons by the excised leaf. Acetate is the best precursor and its incorporation into the alkane fraction is independent of light. Carboxyl-labeled butyrate, valerate, caproate and caprylate are all incorporated into the extent of 0.01–0.05% of the added activity into long-chain hydrocarbons. The amount incorporated into branched hydrocarbons was 40–90% of that incorporated into normal hydrocarbons. Furthermore, about 80% of the radioactivity of the branched-chain hydrocarbons isolated from the experiment with (8-^{14}C) caprylate is found in the methyl carbon. These results, together with previous findings that the terminal branched portions of the branched-chain hydrocarbons are derived from the amino acids valine, leucine and isoleucine, suggest that the hydrocarbons very likely are produced from the precursors resulting from a condensation of two long-chain fatty acids, at least one being a normal fatty acid. This mechanism is consistent with the observed relative distributions of long-chain fatty acids and of hydrocarbons in tobacco.

Serum tocopherol levels of normal preschool children and children with protein-calorie malnutrition in South India. A. Begum (Dept. Nutr. Res., The Christian Med. Coll. and Hospital, Vellore, S. India). *Proc. Soc. Expt. Biol. Med.* 127, 91–5 (1968). Serum tocopherol levels of 90 normal children, aged 2–5 years, and of 42 children with kwashiorkor were estimated. Of the 99 children, 57 from an orphanage had an average serum tocopherol value of 649 μg/100 ml whereas 42 children from a day-care creche had an average level of 470 μg/100 ml. The patients with kwashiorkor had an average value of 410 μg/100 ml when admitted to the hospital. The estimated dietary intake of α-tocopherol of the normal preschool children was 4 mg per child per day.

The requirement of free fatty acids for the fatty liver of CCl_4 intoxication. I. Weinstein, L. Willhite, H. Klausner and M. Heinberg (Dept. Pharmacol., Vanderbilt Univ. School of Med., Nashville, Tenn. 37203). *Proc. Soc. Expt. Biol. Med.* 127, 850–54 (1968). Livers, isolated surgically from normal animals and from rats intoxicated with CCl_4, were perfused *in vitro* with a medium into which palmitic acid was infused continuously. Livers from normal rats were also treated with CCl_4 *in vitro* by direct addition of the chlorinated hydrocarbon to the medium. Under the conditions of these experiments, poisoning with CCl_4 resulted in inhibition of net release of triglyceride by the liver into the perfusate and simultaneous accumulation of triglyceride in the liver. These observations support the hypothesis that the fatty liver of CCl_4 intoxication results primarily from interference with the biochemical mechanisms involved in formation and release of the triglyceride in the very low density lipoprotein of the serum.

Dietary prevention of coronary heart disease: long-term experiment. I. Observations on male subjects. O. Turpeinen, M. Miettinen, J. Karvonen, P. Roine, M. Pekkarinen, E. Lehtosuo and P. Alivirta (College of Veterinary Med., Helsinki, Finland). *Amer. J. Clin. Nutr.* 21, 255–76 (1968). The feasibility of primary prevention of coronary heart disease by dietary means was studied in two mental hospitals. In one of them the diet was changed so that most of the milk fat was replaced by soybean oil, whereas the other hospitals were kept as the control without any intentional dietary change. A fall in the serum cholesterol level occurred after the dietary change. The incidence of coronary heart disease assessed on the basis of both electrocardiographic changes and coronary mortality was significantly lower in the experimental hospital.

Further observations on the cleavage of bovine insulin by rat adipose tissue. D. Rudman, L. Garcia, A. Del Rio and S. Akgun. (Columbia Univ. Res. Serv., Goldwater Mem. Hosp., New York, N.Y. 10017). *Biochemistry* 7, 1864–74 (1968). A previous investigation showed that the water-insoluble, lipid-rich fraction of the aqueous homogenate of rat adipose tissue contains a system of peptidases which cleave insulin into numerous fragments. In this study, bovine insulin was incubated for 2 hr at pH 7.5 with this fraction of rat adipose tissue homogenate and the mixture of insulin cleavage products was then fractionated by gradient elution chromatography on DEAE-cellulose columns followed by high-voltage electrophoresis and paper chromatography. In the first experiment 13 peptide fragments of insulin, and in the second experiment 17 peptide fragments, were isolated and their quantitative amino acid compositions were determined. These data, as well as those previously reported on the quanti-

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1 and 2) and allow to escape into the atmosphere, then raise pressure in the bomb to 50 ± 5 lb, close the valves, and disconnect the bomb assembly from the oxygen cylinder. A tire valve may be used to facilitate oxygen entry to the bomb. If a tire valve is used, pressure should be released through a brass stopcock. The stopcock is connected to a T-joint located between the tire valve and needle valve.

4. Immerse the bomb assembly in a bucket of water to check for leaks. Tighten any joints or seals that leak and adjust the pressure to 50 ± 5 lb.
5. A permanent connection between bomb assembly and recorder is desirable. If not permanently connected, connect bomb assembly to pressure recorder and open the valve so that pressure in the bomb will register on the recorder. Place the bomb in the boiling water bath.
6. Observe the pressure change and record the time indicated on the chart that the bomb was placed in the bath and the time at the end of the first 60-minute period in which the pressure drop is 2 psi. All times are read to the nearest 5 minutes.
7. Report to the nearest tenth of an hour the difference in times.

D. Notes and Cautions

1. Do not set oxygen regulator valve to more than 10 psi above the pressure to which the bomb is being filled to insure uniform composition of the atmosphere in the bomb and to protect the recorder.
2. The recorder or pressure gauge used for measuring the pressure in the bombs when filling with oxygen must be checked against an accurate gauge and correction made if necessary to assure accurate filling in the range specified.
3. Keep gasket and sealing surface of bomb clean at all times.
4. The stem attached to the top of the bomb should be cleaned at selected intervals or whenever there is evidence that the rate for filling and exhausting has increased. To clean, remove the top from the bomb, disconnect top from flexible tubing to the recorder and screw out the metal insert in the stem. Using a small test tube brush, brush inside of stem with a generous application of oven cleaner, allow to stand for ½ to 2 hr, rinse out thoroughly with water admitted through the top of the stem and the oxygen inlet, rinse with acetone in the same manner and dry by drawing air through the stem and oxygen inlet. Clean the insert and dry in a similar manner. Assemble stem, connect to the recorder, attach the bomb and check for leaks.
5. The filter pulp is weighed directly into the liner, or transferred to it, being careful not to compress it in any manner.

E. Precision

Collaborative studies have shown that the following 95% confidence limits may be expected.

	Oxygen bomb—Hours					
	5	10	20	40	80	100
Duplicate determinations on the same day by an analyst should not differ more than approximately	0.2	0.4	0.6	1.2	2.0	2.3
Single determinations in two different laboratories should not differ more than approximately	1.2	2.3	4.0	6.8	12.0	15.0

Dan L. Henry, Chairman, and
E. M. Sallee
Uniform Methods Committee

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tative composition of the mixture of free amino acids released, are compatible with the hypothesis that the cleavage process involves initial hydrolyses in the regions of A 13–14 (Leu-Tyr), A 18–19 (Asn-Tyr), B 11–12 (Leu-Val), B 15–16 (Leu-Tyr), B 24–25 (Phe-Phe), and B 25–26 (Phe-Tyr); the resulting five peptides then undergo stepwise removal of COOH- and NH_2-terminal residues. The cleavage of insulin in this manner abolishes the hormone's antilipolytic activity on rat and hamster adipose tissue but allows persistence of a weak degree of activity in stimulating the oxidation of glucose to CO_2 by the rat tissue. The structure of the peptide fragments responsible for the residual glucose oxidation activity was not established. These observations nevertheless indicate separate structural bases for the *in vitro* glucose oxidation and antilipolytic actions of insulin on adipose tissue slices.

Effects on mammalian adipose tissue of fragments of bovine insulin and of certain synthetic peptides. D. Rudman, L. Garcia and A. Del Rio. *Ibid.*, 1875–80. Insulin causes at least two different effects on adipose tissue *in vitro*: acceleration of the metabolism of glucose and suppression of the lipolytic response to adrenocorticotropin, epinephrine or other lipase-activating hormones. A series of synthetic di- and tripeptides, including several corresponding to various sequences in the insulin structure, were also assayed. The minimal effective dose for antilipolytic activity of these peptides was 1000 times or more greater than that of insulin but the magnitude of the effect was the same.

Effects of ethylenic bond position upon acyltransferase activity with isomeric cis,cis-octadecadienoyl coenzyme A thiol esters. R. Reitz and W. Lands (Dept. Biol. Chem., Univ. Michigan, Ann Arbor, Michigan 55912) W. Christie and R. Holman. *J. Biol. Chem.* 243, 2241–6 (1968). Coenzyme A thiol esters of the complete series of positional isomers of methylene-interrupted *cis,cis*-octadecadienoic acid were synthesized. Their rates of reaction, catalyzed by acyl-CoA: phospholipid acyltransferases in liver microsomal preparations from four species, ranged from 0 to 87 mμ moles per min per mg of protein. In general, acyl transfer was relatively rapid with compounds containing the *cis*-ethylenic bonds near the methyl end of the fatty acid chain. The commonly found 9,12-isomer, linoleate, was not rapidly esterified at position 1 of 2-acylglycero-3-phosphorylcholine, although six other positional isomers reacted rapidly at the primary hydroxyl. In contrast to the 9,12-isomer, the 8,11- and 10,13-isomers were esterified rapidly to position 1 of lecithin and slowly to position 2. The alternating activities of the 8,11- 9,12- and 10,13-isomers and their inverse effects at positions 1 and 2 indicate that the structure near carbon atoms 8,9 and 10 is critical in the metabolism of polyunsaturated acids.

The catalytic versatility of erythrocyte carbonic anhydrase. V. Kinetic studies of enzyme-catalyzed hydrations of aliphatic aldehydes. Y. Pocker and D. Dickerson (Dept. Chem., Univ. Washington, Seattle, Wash.). *Biochemistry* 7, 1995–2004 (1968). The present investigation demonstrates that bovine carbonic anhydrase is a powerful catalyst for the reversible hydrations of propionaldehyde and isobutyraldehyde. The enzyme does not catalyze the hydration of pivalaldehyde, and, furthermore, it does not even appear to bind detectable amounts of this aldehyde. Hydrase activity rises with pH between 4.3 and 8; although the pH profiles for the propionaldehyde and isobutyraldehyde are sigmoidal, the former is characterized by an inflection around pH 6.6 whereas the inflection obtained with isobutyraldehyde is around 5.6. The profile for propionaldehyde reflects the variation in the turnover number with pH. Acetazolamide functions as a noncompetitive inhibitor of enzyme activity with propionaldehyde as substrate but serves as a competitive inhibitor of markedly diminished inhibitory capacity in the enzymic hydration of isobutyraldehyde.

The lecithinase (α toxin) activity of strains of Clostridium perfringens. M. Nakamura and W. Cross (Dept. of Microbiol., Univ. of Montana, Missoula, Montana 59801). *Proc. Soc. Expt. Biol. Med.* 127, 719–22 (1968). Lecithinase activity was determined for 8 strains of type A. *C. perfringens* isolated from various sources. The 3 classical infectious strains of *C. perfringens* with spores of low heat resistance produced high lecithinase activity. In general, there was an inverse relationship between lecithinase activity and heat resistance of the spores. However, strains that produced high lecithinase activity had wider ranges and greater standard deviation values than strains with low levels of lecithinase.

Reduced triphosphopyridine nucleotide oxidase-catalyzed alterations of membrane phospholipids. II. Enzymic properties and stoichiometry. H. May and P. McCay (Biochem. Sect. Oklahoma Med. Res. Found., Oklahoma City, Oklahoma 73104). *J. Biol. Chem.* 243, 2296–2305 (1968). A study of the TPNH-dependent utilization of the polyunsaturated fatty acids in the phospholipids of the microsomal membranes has shown that the process is enzymic in nature. TPNH is oxidized during the reaction and O_2 is consumed. When all of the nucleotide is oxidized, both the lipid changes and the oxygen consumption stop. Addition of more TPNH (or a TPNH-regenerating system) reinitiates these activities. Parameters affecting the course of the reaction have been investigated, including studies with a number of inhibitors. The stoichiometry of the system has been determined with regard to TPNH, polyunsaturated fatty acid, and oxygen. Malondialdehyde is produced during this reaction, but it has been shown to be insignificant in terms of accounting for the polyunsaturated fatty acids which are utilized. The system bears some resemblance to that which synthesizes prostaglandins.

Reduced triphosphopyridine nucleotide oxidase-catalyzed alterations of membrane phospholipids. H. May and P. McCay (Biochem. Sect. Oklahoma Med. Res. Found., Oklahoma City, Oklahoma 73104). *J. Biol. Chem.* 243, 2288–95 (1968). Oxidation of TPNH by liver microsomes from normal rats resulted in a concomitant disappearance of polyunsaturated fatty acids (primarily arachidonic acid) from the membrane phospholipids. The utilization of the polyunsaturated fatty acids was completely dependent on the presence of TPNH in the system. As much as 15% of the total microsomal fatty acids was consumed by the reaction within 30 to 45 min. Since the ester value of the phospholipids remained constant, it was evident that polyunsaturated fatty acids were being converted to some as yet unidentified moiety *in situ* on the phospholipid. The reaction showed greatest specificity for arachidonic acid at the β-acyl position. The polyunsaturated fatty acids in both phosphatidylethanolamine and phosphatidylcholine were consumed. The altered phospholipids were shown to be considerably more polar than normal microsomal phospholipids. They were still subject to the action of phospholipase A, however.

The similarity of the glyceraldehyde 3-phosphate dehydrogenases isolated from rabbit brain and muscle. Marian Kochman and W. Rutter (Dept. Biochem. and Genetics, Univ. of Washington, Seattle, Washington 98105). *Biochemistry* 7, 1671–77 (1968). Glyceraldehyde 3-phosphate dehydrogenase (GAPDH) has been isolated from rabbit brain. The crystalline enzyme appears homogeneous by chromatographic, electrophoretic and ultracentrifugal criteria. The properties of the rabbit brain GAPDH are essentially the same as those of rabbit muscle GAPDH. The following characteristics of the brain enzyme were defined: (a) molecular weight, 147,000; (b) turnover number, 13,750 moles of nicotinamide-adenine di-nucleotide (NAD) reduced/mole of enzyme per min; (c) 12.1 sulfhydryl groups/molecule; (d) four "active" sulfhydryl residues per mole; and (e) 2.5 moles of reductible NAD/mole of enzyme. No significant differences were detected in the peptide maps obtained after tryptic digestion or in the immunological properties of the two enzymes. It is concluded that the amino acid sequences of the brain and the muscle GAPDH are remarkably similar or identical.

Fatty acid changes in liver and plasma lipid fractions after safflower oil was fed to rats deficient in essential fatty acids. R. Johnson, P. Bouchard, J. Tinoco and R. Lyman (Dept. Nutr. Sci., Univ. Calif., Berkeley, Calif. 94720). *Biochem. J.* 105, 343–50 (1968). Fatty acid patterns of liver and plasma triglycerides, phospholipids and cholesteryl esters were determined at intervals during 24 hr. after essential fatty acid-deficient rats were given one feeding of linoleate (as safflower oil). Liver triglyceride, phospholipid and cholesteryl ester fatty acid compositions did not change up to 7 hr. after feeding. Between 7 and 10 hr., linoleic acid began to increase in all fractions, but arachidonic acid did not begin to rise in the phospholipid until 14–19 hr. after feeding. Oleic acid and eicosatrienoic acid in liver phospholipid began to decline at about the time that linoleic acid increased, i.e. about 9 hr. before arachidonic acid began to increase. Changes

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in linoleic acid, arachidonic acid and eicosatrienoic acid in phosphatidylcholine resembled those of the total phospholipid. Phosphatidylethanolamine had a higher content of arachidonic acid before the linoleate was given than did phosphatidylcholine, and after the linoleate was given the fatty acid composition of this fraction was little changed. The behaviour of the plasma lipid fatty acids was similar to that of the liver lipids, with changes in linoleic acid, eicosatrienoic acid and arachidonic acid appearing at the same times as they occurred in the liver. The results indicated that linoleic acid was preferentially incorporated into the liver phospholipid at the expense of eicosatrienoic acid and oleic acid. The decline in these fatty acids apparently resulted from their competition with linoleic acid for available sites in the phospholipids rather than from any direct replacement by arachidonic acid.

CALORIGENESIS OF BROWN ADIPOSE TISSUE IN COLD-EXPOSED RATS. Y. Imai, Barbara Horwitz and R. Smith (Dept. of Physiol. Sci., School of Veterinary Med., Univ. of Calif., Davis, Calif. 95616). *Proc. Soc. Expt. Biol. Med.* **127**, 717–19 (1968). Six adult rats, exposed to 5C for 3–4 weeks and returned to a 26C room for 10–14 days, were prepared by insertion of thermocouples to measure temperatures of the colon, the interscapular brown fat, the arterial and venous blood perfusing the interscapular pad, and the inner and outer surfaces of the skin overlying the pad. From the temperature changes observed when the rats were reexposed to cold, the heat produced by the interscapular pad was calculated and extrapolated to that of the total brown fat. These values compared to the concurrently measured total caloric output indicated that during cold stress the intrinsic metabolism of brown adipose tissue accounted for 8.2% of the total heat production.

STEROL REQUIREMENT FOR REPRODUCTION OF A FREE-LIVING NEMATODE. W. Hieb (Dept. Biol., State Univ. of New York, Buffalo, N.Y.). *Science* **160**, 778–9 (1968). The free-living, hermaphroditic nematode (*Caenorhabditis briggsae*) has a nutritional requirement for sterols. It will reproduce indefinitely in a liquid medium containing only bacterial cells (*Escherichia coli*) and salts if various sterols are present. Several other lipid-soluble materials are ineffective in supporting reproduction.

RESPIRATION IN ISOLATED FAT CELLS AND THE EFFECTS OF EPINEPHRINE. D. Hepp. D. Challoner and R. Williams (Univ. Washington, Dept. Med., Seattle, Wash. 98105). *J. Biol. Chem.* **243**, 2321-27 (1968). A technique was devised for ready sequential sampling of lipocyte suspensions for measurement of metabolic activities. With the use of this technique in paired incubations, an effect of oligomycin to decrease the Q_{O_2} of fat cells to 45% of control was shown. It is concluded that oligomycin inhibits oxidative phosphorylation in the fat cell. Under these conditions, (a) a significant portion of the respiration of the lipocyte is not linked in an obligatory fashion to phosphorylation, and (b) it may be inferred that the calorigenic effect of epinephrine in adipose tissue involves electron flow to oxygen not linked to phosphorylation.

INFLUENCE OF VITAMIN E AND BILE COMPOUNDS ON CYSTEINE METABOLISM IN NUTRITIONAL MUSCULAR DYSTROPHY IN CHICKS. J. Hathcock, M. Scott and J. Thompson (Dept. of Poultry Sci. and Graduate School of Nutr., Cornell Univ., Ithaca, N.Y. 14850). *Proc. Soc. Expt. Biol. Med.* **127**, 935–37 (1968). The results of these experiments support the hypothesis that cysteine is the sulfur compound, or the precursor of a compound, involved in the prevention of nutritional muscular dystrophy in the chicken. Dietary cholic acid increases the rate of cysteine to taurine conversion and at the same time accentuates the dystrophy. Taurocholic acid and taurine decrease the rate of cysteine to taurine conversion and also partially alleviate the dystrophy. Vitamin E supplementation greatly reduces the taurine excretion rate, compared to that of the dystrophic chicks fed the basal diet.

"ALVEOLAR" AND WHOLE LUNG PHOSPHOLIPIDS OF NEWBORN LAMBS. T. Fujiwara, F. Adams, Adel El-Salawy, and Sara Sipos (Div. Cardiol., Dept. of Pediatrics, UCLA School of Med., Los Angeles, Calif. 90024). *Proc. Soc. Expt. Biol. Med.* **127**, 962–69 (1968). Fifteen newborn lambs ranging in age from 10 min to 192 hours were studied. The qualitative and

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• Apologies

This handsome picture of Past-President (1954) and Mrs. C. E. Morris, was published in the May issue of JAOCS, with a caption identifying it as showing Past-President (1948) and Mrs. C. P. Long. Apologies to all concerned for any confusion thereby created.

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Sixth International Gel Permeation Chromatography Seminar

The Sixth International GPC Seminar will be held in Miami Beach, Fla. at the Eden Roc Hotel Oct. 7–9, 1968. The program format and activity schedule is similar to that of the Fourth International Seminar.

The 1968 Program includes 25 technical papers and two panel discussions—one on "Application of GPC to Small Molecules" and the other on "Universal Calibration." Fred Billmeyer, Rensselaer Polytechnic Institute and Don Bly, DuPont, will be the panel moderators. A special feature of the program will be a discussion of computer correction techniques by Archie Hamielec, McMasters University, Hamilton, Ontario. The 25 technical papers cover a broad spectrum of subjects ranging from sophisticated theoretical concepts to practical GPC applications. Preprints of these papers will be distributed at the Seminar.

For abstracts of the Seminar papers and Registration information, contact the Chairman, Sixth International GPC Seminar c/o Waters Associates, Inc., 61 Fountain Street, Framingham, Mass, 01701.

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ASTM Forms Subcommittee on Thermoanalytical Test Methods

Differential thermal analysis, thermogravimetric analysis, and differential scanning calorimetry are being covered in a new Provisional Subcommittee on Thermoanalytical Test Methods of Committee E-1 on Methods of Testing of the American Society for Testing and Materials. Subcommittee sections on test methods and recommended practices, standard reference materials, nomenclature, and technical programs have been formed.

The work of the subcommittee is just getting underway and everyone interested is invited to attend the next subcommittee meeting to be held August 19, 1968, Holy Cross College, Worcester, Mass. For additional information contact the subcommittee chairman, Samuel Greenberg, American Instrument Co., Silver Spring, Md.

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(Continued from page 409A)

quantitative nature of "alveolar" phospholipids and whole lung tissue phospholipids were determined and compared with data previously obtained on term fetuses. Sequential lung washing removed practically all of the surface-active material from the internal surface of the lung. The "alveolar" phospholipids increased twofold in 10 min after the onset of respiration, fourfold in the first 24 hours and eightfold in the second day of life. The "alveolar" phospholipid composition of the newborn is similar to the term fetus, but differs from whole lung tissue phospholipids. The percentage minimal disaturates of the phosphatidylcholine of the newborn is slightly higher than that of the term fetus. "Alveolar" disaturated phosphatidylcholine represents the major portion of dipalmitoyl phosphatidylcholine. Phosphatidyldimethylethanolamine was isolated from "alveolar" phospholipids. This phospholipid contains a higher concentration of disaturated phosphatidyldimethylethanolamine in the newborn than in the fetus. It is concluded that respiration of the newborn has a profound effect both mechanically and metabolically upon the liberation and elaboration of surface-active material.

CITRATE CLEAVAGE ENZYME AND FATTY ACID SYNTHESIS. D. Foster and P. Srere (Dept. Internal Med., Univ. of Texas Southwest. Med. School, Dallas, Texas 75235). *J. Biol. Chem.* **243**, 1926–30 (1968). A series of experiments was performed to test the proposal of others that citrate cleavage enzyme (EC 4.1.3.8) regulates the rate of fatty acid synthesis in rat liver. The results show that, in recovery from fasting, fatty acid synthesis increased markedly without change in citrate cleavage enzyme activity. After the administration of alloxan, fatty acid synthesis decreased prior to any change in citrate cleavage enzyme. Substitution of a high carbohydrate, low fat diet resulted in large increases in citrate cleavage enzyme activity without concomitant change in lipogenesis. The addition of purified citrate cleavage enzyme from rat liver to the fatty acid-synthesizing system from fasted animals did not restore fatty acid synthesis. It was concluded that citrate cleavage enzyme does not play a primary regulatory role in fatty acid synthesis.

STUDIES ON THE PHOSPHOLIPID REQUIREMENT OF GLUCOSE 6-PHOSPHATASE. Sue Duttera, W. Byren and M. Ganoza (Dept. Biochem., Duke Univ. Med. Cnt., Durham, North Carolina 27706). *J. Biol. Chem.* **243**, 2216–28 (1968). The role of phospholipid in rat liver microsomal glucose 6-phosphatase has been investigated with the use of phospholipase A and phospholipase C to alter the microsomal phospholipids. The phospholipase C-treated preparation lost a maximum of 80% to 90% of the original activity, and 70% of the microsomal phospholipid was hydrolyzed. Addition of phospholipid completely restored the original activity. The soluble and insoluble products of the phospholipase C treatment had no effect on the inactivation of glucose 6-phosphatase or the subsequent reactivation by phospholipid. The relative effectiveness of a various single and mixed phospholipids, with respect to reactivation of the lipid-deficient, phospholipase C-treated glucose 6-phosphatase, was compared. Lecithin, which represents 53% of the microsomal phospholipid, was essentially all hydrolyzed by phospholipase C, but it was ineffective in reactivation. Phosphatidyl ethanolamine, which represents 23% of the phospholipid, was 60% hydrolyzed by phospholipase C, and it was the most effective individual phospholipid in terms of maximal reactivation.

TOCOPHEROL CONCENTRATION AND OXIDATIVE STABILITY OF MILK FROM COWS FED SUPPLEMENTS OF D OR DL-α-TOCOPHERYL ACETATE. W. Dunkley, A. Franke and J. Robb (Dept. of Food Sci. and Technol., Univ. of Calif., Davis, Calif.). *J. Dairy Sci.* **51**, 531–4 (1968). In a Latin square changeover feeding trial, cows were fed *d*- or *dl*-α-tocopheryl acetate at 0.0025% of tocopherol in the dry matter intake, which provided respective average daily intakes of α-tocopherol (and IU of vitamin E) of 400 mg (596 IU) and 390 mg (429 IU). The *d* supplement gave a significantly higher concentration (μg/g lipid) of tocopherols in the milk ($P < 0.01$), but the difference between the two supplements in the amount of α-tocopherol that transferred to milk was not significant. The ratio of the increase in the amount transferred that was attributable to the supplements was 1.43:1, which is similar to the generally accepted ratio (1.36:1) of vitamin E activity of the two forms. Differences in oxidative stability of the milk were not significant, possibly because the cows produced milks with relatively high oxidative stability when they were fed the control ration (i.e., without a tocopherol supplement). Data from several feeding trials revealed that the amount of α-tocopherol that transferred from feed to milk averaged about 2%. For milk samples collected during two field trials, correlations of flavor scores with the tocopherol concentrations did not differ significantly from zero, whereas correlations with the copper concentrations did.

EFFECT OF ENVIRONMENTAL FACTORS ON MONOCARBONYL POTENTIAL IN FRESH BOVINE MILK FAT. P. Dimick and Helen Walker (Dept. of Dairy Sci., Penn. State Univ., University Park, Pa.). *J. Dairy Sci.* **51**, 478–82 (1968). A quantitative study of various environmental and physiological factors on the monocarbonyl potential in heat-treated bovine milk fat was conducted. Analyses of monocarbonyls (as their 2,4-dinitrophenylhydrazones) indicate a definite seasonal trend, being higher in the winter than in the summer. A highly significant ($P < 1\%$) positive correlation between the monocarbonyls and the aliphatic delta-lactones occurred over the season. Analyses of weekly samples throughout a complete lactation for monocarbonyls and methyl ketones indicated a positive correlation ($P < 1\%$) with the aliphatic delta-lactone and short-chain fatty acid (4:0–14:1) production. No significant difference in total monocarbonyl potential from fats of different breeds, fat production and milk from ketotic animals could be shown. These data aid in characterizing the variability in formation of the nonoxidative compounds in milk fat and further lend support to the evidence that their precursors arise from, and are controlled by the availability of acetate during the biosynthesis of fatty acids.

IN VITRO CONVERSION OF LONG-CHAIN FATTY ACIDS TO KETONES BY BOVINE RUMEN MUCOSA. D. Cook, A. McGilliard and Marlene Richard (Dept. Animal Sci., Iowa State Univ., Ames, Iowa). *J. Dairy Sci.* **51**, 715–20 (1968). The rate of conversion of lauric, myristic, palmitic, stearic, oleic and linoleic acids to ketone bodies by rumen mucosal tissue from five normal and five fasted nonpregnant, nonlactating Holstein heifers was studied *in vitro*. Endogenous formation of ketone bodies occurred in tissue from both groups of animals. The net rate of ketone formation in the presence of exogeneous long-chain fatty acids was significantly faster ($P < 0.01$) in tissue from fasted animals than from control animals, but the extent of conversion of the exogenous substrates to ketones was of small magnitude in tissue from both groups. The fatty acids containing 12, 14, and 16 carbon atoms tended to be more ketogenic than the 18 carbon acids. Results of two additional *in vitro* incubation experiments, in which ^{14}C-labeled palmitic and oleic acids were used as substrates, conclusively showed that ketones were derived directly from the long-chain fatty acids.

RATES OF OXIDATION OF DIFFERENT FATTY ACIDS BY ISOLATED RAT LIVER MITOCHONDRIA. P. Bjorntorp (First Med. Serv., Sahlgrenska Sjukhuset, Univ. Goteborg, Goteborg, Sweden). *J. Biol. Chem.* **243**, 2130–33 (1968). The oxidation rates for palmitic, stearic, oleic and linoleic acids as their albumin complexes and for caprylic, butyric and acetic acid as their potassium salts with isolated rat liver mitochondria were studied in a system where it had previously been demonstrated that the respiratory chain and the coupling of phosphorylation to oxidation is intact even at high concentrations of long chain fatty acids. Results were obtained which apparently fitted the Michaelis-Menten equation. The values of K_m decreased with increasing length of the carbon chain. Of the long chain fatty acids, linoleic acid has the lowest constant. V_{max} for long chain fatty acids was highest for linoleic acid, but this value was not as high as those of short chain fatty acids. However, if different substrates were compared in terms of the product nV_{max}, where n is the number of carbon atoms in the fatty acid, linoleic acid values are as high as those of the short chain fatty acids. The possibility is discussed that linoleic acid has the highest affinity for the mitochondrial fatty acid oxidation system and that it is oxidized at the fastest rate of the long chain fatty acids studied. Implications of this finding for previously observed differences in fatty acid metabolism *in vivo*, explainable by increased linoleic acid oxidation, are considered.

FATTY ACID COMPOSITION OF DIFFERENT SERUM PHOSPHOLIPIDS IN MEN AND WOMEN. M. Antar, Margaret Ohlson and Margaret Osborn (Dept. Internal Med., Coll. Med. and Home Economics Univ. Iowa, Iowa City, Iowa). *Biochem. J.* **105**, 117–9 (1968). Eight young healthy persons, four men and four women, were maintained for a total of 2 months on a diet in which 40%, 16% and 44% of the total calories were present as fats, proteins and carbohydrates respectively. The ratio of complex to simple carbohydrates in the diet was 1:4. The fatty acids of serum cephalins, lecithins, lysolecithins and sphingomyelins were determined by gas-liquid column chromatography. Lysolecithins in both men and women had the highest content of saturated acids, followed by sphingomyelins, lecithins and kephalins, in that order. The degrees of saturation and of polyunsaturation of the fatty acids in the different phospholipid fractions were significantly different, except for the differences in the polyunsaturation of the cephalins and lecithins. No sex difference was found in the fatty acid composition of the different phospholipids.

Ionic properties of acidic lipids. Phosphatidylinoisitol. M. Abranson, G. Colasicco, R. Curci, and M. Rapport (Saul R. Korey Dept. of Neurol., Albert Einstein Coll. Med., New York, N.Y.). *Biochemistry* 7, 1692–98 (1968). Clear dispersions of 8–10 mg of ammonium phosphatidylinositol or sodium phosphatidylinositol in 5 ml of water obtained by gentle sonic radiation were titrated in the pH range of 2.5–10.0. The initial pH was 6.1–6.5. The pK′ of phosphatidylinositol, which was 3.12 in the absence of electrolyte, was lowered to 2.50 in 0.08 M NaCl. The interaction of phosphatidylinositol with metallic cations was studied by three methods. (1) Hydrogen ion release: Dispersions of phosphatidylinositol were adjusted to pH 3.5 and increments of electrolyte were added. The quantity of H^+ released (measured by the quantity of tetramethylammonium hydroxide required to maintain pH 3.5) followed the order $Ca^{2+} > Mg^{2+} >> K^+ > Na^+$. (2) Turbidity: the turbidity of dispersions was measured by the scattering ratio $I_{90°}/I_{0°}$. The effectiveness of the cations in increasing turbidity was $Ca^{2+} > Mg^{2+} >> K^+ > Na^+ > Li^+$ choline chloride. (3) Coagulation: Dispersions of phosphatidylinositol were coagulated by the addition of salts. Analysis of cations in the coagula provided a measure of cation selectivity. The molar ratio of divalent cation to phosphatidylinositol of 0.5 indicated bridging of two phosphatidylinositol molecules by each Ca^{2+} or Mg^{2+}. The selectivity ratios were $Ca^{2+}:Mg^{2+} \cong 2.4$ and $K^+ : Na^+ \cong 1.2$. An apparent constant for the association of sodium phosphatidylinositol was obtained from data on cation-proton exchange at pH 3.5, $K'_{Na} = 6.9$. The viscosity of phosphatidylinositol dispersions in water was much greater than for other acidic lipids; however, low concentration (2.5 mM) of NaCl produced a sharp decrease.

Stability of unimolecular films of ^{32}P-labelled lecithin. H. Hauser and R. Dawson (Dept. Biochem., Agr. Res. Council Inst. Animal Physiol., Babraham, Cambridge). *Biochem. J.* **105**, 401–7 (1968). The stability of monolayers of a highly unsaturated yeast lecithin labelled with ^{32}P has been investigated by a surface radioactivity technique. Lecithin films on distilled water at all surface pressures between 6 and 48 dynes/cm. were completely stable on rapid perfusion of the subphase and on addition of ionic amphipathic substances to the film. Ultrasonically treated lecithin added to the subphase caused a slow loss of surface radioactivity but little pressure change. The addition of proteins to the subphase caused negligible changes in the film even when conditions were favorable for electrostatic heterocoagulation and penetration. Lecithin films were not hydrolysed by a strongly acid subphase at room temperature. The very low rate of hydrolysis produced by alkali was proportional to the subphase OH^- ion concentration: the apparent activation energy and temperature coefficient (Q_{10}) of the reaction were 14250 cal. and 2.37 respectively. Alkaline hydrolysis of lecithin monolayers was markedly stimulated by adding methanol (10–20%, v/v) to the subphase. The addition of ionic amphipaths to the monolayer had the expected type of effect on the hydrolysis rate, but its magnitude was far less than that suggested by an application of the Poisson-Boltzmann equation for ion distribution at a charged interface.

Influence of porcine muscle structure on its lipid accumulation during growth. R. G. Kauffman and A. H. Safanie (Dept. of Animal Sci., Univ. of Ill., Urbana, Ill.). *J. Food Sci.* 32, 283–86 (1967). To determine the influence of fascicular organization and disposition of muscle stroma on the deposition of interfascicular lipids, six muscles representing two contrasting structural types were selected from each of five littermate pigs exsanguinated at different stages of growth. Looseness of fascicular organization, as determined subjectively by microscopic examination, generally paralleled the quantity of interfascicular lipid as determined by chemical analysis.

Effect of refined menhaden oil on the flavor and fatty acid composition of broiler flesh. D. Miller, E. H. Gruger Jr., K. C. Leong and G. M. Knobl, Jr. (Bureau of Commercial Fisheries, College Park, Md. 20740). *J. Food Sci.* 32, 342–45 (1967). Three menhaden oil preparations—1) destearinated, 2) molecularly distilled triglycerides, and 3) ethyl esters of menhaden fatty acids—were fed to broilers at a 5% level. Corn oil and tallow were fed as controls. The flavor-contributing component(s) in the menhaden oil preparations apparently resided in the fatty acids whether the preparations were fed as the triglyceride or as the ethyl ester.

Call for Nominations
For Fifth AOCS Award
In Lipid Chemistry

In April 1964 the Governing Board of The American Oil Chemists' Society established The American Oil Chemists' Award in Lipid Chemistry under the sponsorship of the Applied Science Laboratories, Inc., State College, Pennsylvania. The previous recipients of the award are Erich Baer, Ernst Klenk, H. E. Carter and Sune Bergström. The fifth award will be presented at the 42nd Fall Meeting in New York, October 20-23, 1968. The award consists of a $2,500 honorarium accompanied by an appropriate scroll.

Policies and procedures governing the selection of award winners have been set forth by the AOCS Governing Board. Chairman of the Award Nomination Canvassing Committee is R. J. VanderWal, Armour & Co. The function of the committee is to solicit nominations for the fifth award. Selection of the award winner will be made by a special award committee whose membership will remain anonymous.

Rules

The rules prescribe that nominees shall have been responsible for the accomplishment of original research in lipid chemistry and must have presented the results thereof through publication of technical papers of high quality. Preference will be given to individuals who are actively associated with research in lipid chemistry and who have made fundamental discoveries that affect a large segment of the lipid field. For award purposes, the term "lipid chemistry" is considered to embrace all aspects of the chemistry and biochemistry of fatty acids, of naturally occurring and synthetic compounds and derivatives of fatty acids, and of compounds that are related to fatty acids metabolically, or occur naturally in close association with fatty acids or derivatives thereof. The award will be made without regard for national origin, race, color, creed or sex.

Letters of nomination together with supporting documents must be submitted in octuplicate to R. J. VanderWal, Chairman, AOCS Award Nomination Canvassing Committee, Armour & Co., Research Division, 801 W. 22nd St., Oak Brook, Illinois 60521 before the deadline date of August 1, 1968. The supporting documents shall consist of professional biographical data, including a summary of the nominee's research accomplishments, a list of his publications, the degrees he holds, together with the names of granting institutions, and the positions held during his professional career. There is no requirement that either the nominator or the nominee be a member of the American Oil Chemists' Society.

Remember the DEADLINE, August 1, 1968

Composition of bovine muscle lipids at various carcass locations. P. W. O'Keefe, G. H. Wellington, L. R. Mattick and J. R. Stouffer (Cornell Univ., Ithaca, New York). *J. Food Sci.* 33, 188–92 (1968). Bovine intramuscular lipids extracted from the semitendinosus triceps brachii and longissimus dorsi muscles were fractionated into neutral fats and phospholipids. There were significantly lower contents of total fat and neutral fat in the semitendinosus as compared to the other two muscles. The phospholipids were present in all three muscles at a level of approximately 500 mg per 100 g of tissue. There was significantly more C14:0 in the longissimus dorsi neutral fat fractions than in the semitendinosus neutral fat fractions.

Effect of dietary fat and protein on lipid composition and oxidation in chicken muscle. J. E. Marion, T. S. Boggess Jr. and J. G. Woodroof (Food Sci. Dept., Univ. of Ga., Experiment, Ga.). *J. Food Sci.* 32, 426–29 (1967). Samples of white muscle (pectoralis major) were taken from 100 male, broiler-type chickens which had been reared to 58 days of age on rations differing in protein level and in type of supplemental fat. Lipids were extracted from each sample and fractionated into (1) neutral lipids, (2) cephalin and (3) lecithin. Correlation coefficients between TBA values and level of each lipid component were obtained after treatment effect was statistically removed. The 22-carbon fatty acids with four or five double bonds in cephalin and lecithin, and linoleic acid in neutral lipids and lecithin were positively correlated with TBA values.

The aminoethylphosphonate-containing lipids of rumen

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protozoa. R. M. C. Dawson and P. Kemp (Inst. of Animal Physiol., Cambridge, England). *Biochem. J.* **105**, 837–42 (1967). A method is presented for identifying and estimating the aminoethylphosphonate (ciliatine)-containing phospholipids in a complex mixture. Evidence was obtained that the phospholipids of a pure culture of *Entodinium caudatum* and a mixed rumen protozoa sample contain diglyceride ciliatine, and a plasmalogen ciliatine was detected in the latter. A ninhydrin-positive sphingolipid was isolated from rumen protozoa. Although chromatographically homogeneous on silica gel it contains two components, which were provisionally identified as ceramide ciliatine and ceramide phosphorylethanolamine. A detailed phospholipid analysis of *E. caudatum* and rumen protozoa is presented. They contain no phosphatidylserine or cardiolipin, but an unidentified phosphoglyceride containing a zwitterionic amino acid is present.

Dietary sterols and their relationship to atherosclerosis. W. E. Connor (Univ. of Iowa, Iowa City). *J. Am. Dietetic Assoc.* **52**, 202–7 (1968). The role of dietary sterols in the pathogenesis of atherosclerosis is discussed. Cholesterol is the most significant sterol in food, both quantitatively and because it enters the body's metabolism. Cholesterol in the diet produces hypercholesteremia, atherosclerosis and coronary heart disease in many experimental animals, including primates. In human population groups, dietary cholesterol concentration correlates well with the incidence of coronary heart disease and, finally, dietary cholesterol level greatly influences the serum cholesterol and phospholipid levels in human beings. The restriction of cholesterol in diets designed to prevent and treat hypercholesteremia and coronary heart disease in man has sound logical and experimental basis.

Changes in hepatic lipogenesis during development of the rat. C. H. Taylor, E. Bailey and W. Bartley (Univ. of Sheffield, England). *Biochem. J.* **105**, 717–22 (1967). Changes in the activity of ATP citrate lyase, malic enzyme, glucose 6-phosphate dehydrogenase, pyruvate kinase and fructose 1,6-diphosphatase, and in the ability to incorporate acetate-1-^{14}C into lipid have been measured in the livers of developing rats between late foetal life and maturity. In male rats the activity of those systems directly or indirectly concerned in lipogenesis fall after birth and remain at a low value until weaning, after which time they rise to a maximum at 30 to 40 days and then decline, reaching adult values at about 60 days. Malic enzyme activity follows a similar course, except that none was detected in the foetal liver. Pyruvate kinase activity is lower in foetal than in adult livers and rises to slightly higher than the adult value in the post-weaning period. Fructose 1,6-diphosphatase activity rises from a very low foetal value to a maximum at about 10 days but falls rapidly to reach adult values at about 30 days. Weaning rats onto a high-fat diet caused the low activities of acetate incorporation, ATP citrate lyase, glucose 6-phosphate dehydrogenase and pyruvate kinase to persist after the suckling period. No differences could be detected in hepatic enzyme activities between males and females up to 35 days, but after this time female rats gave higher values for acetate incorporation, glucose 6-phosphate dehydrogenase activity and malic enzyme activity. The results are discussed in relation to changes in alimentation and hormonal influences.

Effect of hypophysectomy and replacement therapy on fatty acid metabolism in the rat testis. A. Goswami and W. L. Williams (Univ. of Georgia, Athens, Ga.). *Biochem. J.* **105**, 537–43 (1967). The influence of pituitary gonadotrophins and of testosterone on the conversion of linoleic acid into other polyunsaturated fatty acids by rat testicular tissue was studied. In immature hypophysectomized rats, follicle-stimulating hormone caused a threefold increase in the incorporation of radioactivity from linoleic-1-^{14}C acid into testicular lipids; the distribution of ^{14}C in the polyunsaturated fatty acids, however, was not significantly affected. In mature hypophysectomized rats, the hormonal treatments had less pronounced effects on ^{14}C incorporation into testicular lipids, but caused a significant increase in the percentage of ^{14}C incorporated into polyunsaturated fatty acids of the ω-6 series, luteinizing hormone and testosterone having the more pronounced influences. A time-course study of the appearance of radioactivity in the ejaculated spermatozoa of rabbits, after they had been given a tracer dose of linoleic-1-^{14}C acid, indicated that incorporation of radioactivity into spermatozoa occurred during all stages of spermatogenesis.

The relative significance of acetate and glucose as precursors for lipid synthesis in liver and adipose tissue from ruminants. R. W. Hanson and F. J. Ballard (Temple Univ. Med. School, Philadelphia, Pa.). *Biochem. J.* **105**, 529–36 (1967). The incorporation of labelled glucose into lipid by liver slices from sheep and cows is considerably less than that by liver slices from the rat, though oxidation to CO_2 occurs to a similar extent. Considerable amounts of acetate-^{14}C are incorporated into fatty acids and non-saponifiable lipids in rat and ruminant liver. Acetyl-CoA synthetase, the initial enzyme in the metabolism of acetate, has a high activity in liver from fats and ruminants. In adipose tissue from ruminants more acetate than glucose is converted into lipids, whereas the converse is true in rat adipose tissue. The greater incorporation of acetate-^{14}C into fatty acids in adipose tissue from the ruminant as compared with the non-ruminant may be caused, in part, by the higher activity of acetyl-CoA synthetase activity in the ruminant. The results suggest that, in both liver and adipose tissue from ruminants, acetate is a more important source of lipid than glucose. Two enzymes of the hexose monophosphate shunt, glucose 6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase, are active in both tissues and from the three species.

• Drying Oils and Paints

Corrosion inhibition by the salts of the long-chain fatty acids. A. G. Appleby and J. E. O. Mayne. *J. Oil Col. Chem. Assoc.* **50**, 897–910 (1967). When basic pigments, such as red lead, ZnO and $CaCO_3$, are ground in drying oils, soaps are formed. These soaps break down in the presence of water and oxygen to yield a range of salts of mono- and di-basic acids, which may inhibit the corrosion of iron at a pH as low as 4.8. It is suggested that this inhibition is brought about by the formation of insoluble complex ferric salts, which reinforce the air-formed film until it becomes impermeable to ferrous ions. In the presence of lead ions, inhibition takes place at much lower concentrations, and a possible explanation is put forward based on modification of the cathodic reaction. (Rev. Current Lit. Paint Allied Ind. No. 308)

The glycerolysis step in the production of oil modified alkyd resins: Part IV. Some new aspects. N. A. Ghanem and F. F. Abd El-Mohsen (Dept. of Polymers and Paints, The Natl. Res. Centre, Dokki, Cairo, U.A.R.). *J. Oil Colour Chem. Assoc.* **50**, 441–50 (1967). Some new aspects of the glycerolysis of the linseed and cottonseed mixed triglycerides are presented. The reaction rate does not increase to any appreciable extent with the increase of the molar concentration of glycerine even under very efficient stirring. Oxygen seems to retard the glycerolysis reaction, as it is found that the reaction time is almost doubled when the glycerolysis is carried out in absence of a blanket of inert gas. Standard curves are devised from which the percentage of monoglyceride formed at any stage can be determined from the turbidity temperature of the mixture in ethyl alcohol. A method is proposed whereby, from experimental knowledge of the amounts of glycerol and monoglycerides, the remaining amounts of diglycerides and triglycerides can be calculated. The reaction mixture components are thereby fully assessed.

Fatty acids in the manufacture of surface coatings. Anon. (V. Wolf, Ltd.). *Booklet* **1967**, 2nd Ed., 30 pp. This English edition covers the manufacture of fatty acids and their use in the formulation of alkyds, epoxy resin esters and urethane oils. (Rev. Current Lit. Paint Allied Ind. No. 309.)

CONJUGATION OF VEGETABLE OILS VIA IRON TRICARBONYL COMPLEX. E. N. Frankel (U.S. Sec'y of Agr.). *U.S. 3,373,175.* A process of conjugation of polyunsaturated vegetable oils or of their methyl esters using an excess of iron pentacarbonyl for 2–4 hrs. at a critical temperature of 185C provides markedly improved yields of conjugated fatty iron tricarbonyl complex which is then completely decomposed with $FeCl_3$ to give an almost fully conjugated drying oil product. At 185C the formation of conjugated complex is greatly increased and the reaction need not be interrupted to vent complex-inhibiting formations of CO_2.

COCONUT OIL MODIFIED ALKYD RESINS AND COPOLYMERS THEREOF WITH AN ALKYL ACRYLATE. R. H. Wholf (Allied Chemical Corp.). *U.S. 3,374,194.* A method is described for preparing a modified alkyd resin capable of forming a homogeneous copolymer with methyl or ethyl acrylate. The method comprises heat-reacting (a) 2–5 parts by wt. of an alpha ethylenically unsaturated organic acid, (b) 25–60 parts by wt. of coconut oil, (c) 20–55 parts by wt. of a saturated dicarboxylic acid, and (d) a polyhydric alcohol in an amount sufficient to provide a 10 to 75% molar excess of hydroxyl groups over the amount required to react stoichiometrically with the carboxyl groups of the carboxylic acid components. The reaction is carried out in the presence of from 0.005% to 0.5% by wt. of a polymerization inhibitor until an alkyd resin having an acid number of from 1 to 25 is formed.

• Detergents

THE TECHNOLOGY OF MANUAL AND MECHANICAL DISH WASHING. H. Wedell. *Fette Seifen Anstrichmittel* **68**, 551–556 (1966). The mode of washing dishes manually differs substantially from mechanical dish washing in that, in the former, neutral surface active agents are used, while in the latter, alkaline and acid or rinsing agents are used. Health hazards due to residual washing agent are not to be feared.

THE EFFECT OF DETERGENT LEGISLATION IN WEST GERMANY. W. Husman. *Fette Seifen Anstrichmittel* **68**, 557–560 (1966). Since the detergent law has been in effect, the level of detergents flowing in the waters has been reduced considerably. The soft detergents are to a large extent biologically decomposed by the purification plants. Decomposition of detergents in the waters is now accomplished much more rapidly. While the detergent law has been quite effective, the ultimate solution to the problem will be a substantial increase in the number of biological purification plants.

PREPARATION AND SULFATION OF MONO AND DISUBSTITUTED AMIDES OF 12-HYDROXYOCTADECANOIC ACID. H. Bertsch, H. Reinheckel and G. Czichocki (Inst. for Fat. Chem., Fer. Acd. of Sci., Berlin-Adlershof, Ger.). *Fette Seifen Anstrichimittel* **68**, 817–824 (1966). A series of mono and disubstituted amides of 12-hydroxystearic acid are prepared using different methods.

Classified Advertising

By sulfation with a chlorosulfuric acid diethyl ether adduct followed by neutralization, sodium salt of monosulfuric acid esters of the substituted 12-hydroxystearic acid amide (sodium salt of substituted 12-hydroxysulfonyloxystearic acid amide) is formed. These compounds were investigated for use as anionic syndets. The surface tension, interfacial tension at the liquid/solid interface, contact angle, wetting capacity and wetting rate in relation to the concentration as well as the washing property of the aqueous solutions are measured.

PHASE DIAGRAMS OF TERNARY POLYOXYETHYLENE NONYLPHENYL ETHER-NONYLPHENOL-WATER SYSTEMS. Kazutoshi Kenjo (Takahashi Toyodo Co., Tokyo). *Yukagaku* **17**, 254–61 (1968). Phase diagrams of ternary systems consisting of polyoxyethylene nonylphenyl ether, $(NP)_n$, in which n represents the degree of polymerization of ethylene oxide, nonylphenol $(NP)_0$ and water were studied. The phase diagrams of ternary $(NP)_{10}$-$(NP)_0$-H_2O systems resembled those of binary $(NP)_n$-H_2O systems, in which (n) equals to the calculated average degree of polymerization of ethylene oxide in the mixture of $(NP)_{10}$ and $(NP)_0$.

VISCOSITY OF AQUEOUS SODIUM DODECYL SULFATE SOLUTION AND THE EFFECT OF INORGANIC ELECTROLYTES ON IT. Tomoo Ito and Hiroshi Mizutani (Kao Soap Co., Tokyo). *Yukagaku* **17**, 246–8 (1968). The relation between the logarithm of the viscosity and concentration of sodium dodecyl sulfate was linear up to 25%. The viscosity of aqueous sodium dodecyl sulfate was lowered by addition of a small amount of inorganic electrolytes, but increased by addition of large amount of them. The viscosity was also affected by ionic valence of the anion of the inorganic electrolyte.

PREPARATION AND SULFATION OF N-SUBSTITUTED 12-HYDROXY-OCTADECANE-(9)ACID-(1)AMIDES. H. Bertsch, H. Reinheckel and G. Czichocki (Inst. for Fat Chem, Ger. Acad. of Sci. Berlin-Adlershof, Ger.). *Fette Seifen Anstrichmittel* **68**, 1002–1009 (1966). Ricinoleic acid amides, substituted at the nitrogen atom, were converted to the sodium salts of the monosulfuric acid esters of the substituted ricinoleic acid amides (sodium salt of substituted 12-hydroxy sulfonyloxyoleic acid amide) by sulfation with chlorosulfuric acid-diethyl ether-adduct followed by neutralization. Washing capacity, surface tension, angle of contact and wetting capacity were measured in relation to the concentration of the aqueous solutions of these anion active surfactants.

THE EFFECT OF SURFACTANTS ON HETEROGENEOUS POLYMERIZATIONS. A. E. Alexander and D. H. Napper (Univ. of Sydney, Sydney, Australia). *Chem. Ind. (London)* **1967**, 1936–40. Experimental results are reported which illustrate the complexity of the effects which surfactants exert on heterogeneous polymerizations. One of the most important of these is the modification of colloid stability which accompanies surfactant adsorption onto the polymer surface, thus making the particle nucleation stage especially susceptible to profound alteration.

PROCESS FOR PREPARING DETERGENT COMPOSITIONS. D. M. van Kampen, F. J. Kerkhoven and W. van der Star (Lever Bros. Co.). *U.S. 3,370,015.* A process is claimed which is suitable for forming a strong, fast-dissolving detergent tablet and in which a hydrated condensed phosphate is added to the detergent prior to compression into tablet form.

DETERGENT ALKYLATE COMPOSITION. G. J. McEwan (Monsanto Co.). *U.S. 3,370,100.* A detergent intermediate composition comprises a mixture of (1) monododecyl aromatic hydrocarbons selected from the group consisting of monododecyl-benzene, -toluene and -xylene in which the dodecyl portion contains 6 to 9 methylene groups and branching on about 25 to 50% of its alpha carbon atoms, and (2) mono-octadecyl aromatic hydrocarbons selected from the group consisting of mono-octadecyl-benzene, -toluene and -xylene, in which the octadecyl portion contains 9 to 15 methylene groups and branching on about 5 to 50% of its alpha carbon atoms; the weight ratio of the monododecyl aromatic hydrocarbon to the mono-octadecyl aromatic hydrocarbon in the mixture is from about 1:4 to about 4:1.

WATER-SOLUBLE SURFACTANT COMPOSITIONS IN THE FORM OF CONDENSATION PRODUCTS OF LONG CHAIN MONOCARBOXYLIC ACIDS, DIETHANOLAMINE AND AROMATIC POLYBASIC ACIDS, DIETHANOLAMINE AND AROMATIC POLYBASIC ACIDS IN CERTAIN MOL RATIOS. J. T. Foley and G. Barker (Witco Chem. Co.). *U.S. 3,373,173.* Water-soluble surfactants which are useful as detergents and emulsifying agents comprise condensation products of long chain aliphatic monocarboxylic acids, diethanolamine and mononuclear aromatic polybasic acids in certain molar ratios to each other, depending upon whether the aromatic polybasic acid is di-, tri-, tetra- or hexacarboxylic. An illustration of this class of compounds is the condensation product of 1 mol of a long chain aliphatic monocarboxylic acid, 6 to 7.5 mols of diethanolamine and 2 to 2.4 mols of phthalic anhydride.

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SCC Announces '68 Seminar

The 1968 Seminar of the Society of Cosmetic Chemists will be held September 12–13, 1968, at the Sheraton Hotel, Boston, Mass. The Seminar theme is "Cosmetic Aerosols—Technology and Marketing."

Seminar Chairman W. E. Lange has announced the following tentative program:

Marketing Section:

New Marketing Aspects of Aluminum Aerosol Containers in the Drug and Cosmetic Field. Frank Rubino, Peerless Tube Company.

The Mystical, Magical World of Aerosols. B. A. Rausch, E. I. du Pont de Nemours & Company.

The Shaving Cream Olympic Games. R. J. Pietrzak, Gillette Safety Razor Co.

Technical Section:

Alcohol Quality and the Degradation of Aerosol Products and Packages. R. F. Robey, Enjay Chemical Laboratory.

An Evaluation of the Single Stage Undercap Filler for Cosmetic and Pharmaceutical Aerosol Products. R. T. Voegeli, J. B. Ward and H. H. Hutchins, Johnson & Johnson.

Technology of Consistent Aerosol Foam Dispensing Without Costly Gadgetry. Carmelo Carrion, Jr. and H. W. Mace, Aerosol Techniques.

A Comparative Evaluation of Aerosol Containers, Valves and Gaskets With Respect to Minimizing Weight Loss. F. J. Stanave, J. B. Ward and H. H. Hutchins, Johnson and Johnson.

Aerosol Formulations—A General Outline. P. Sgaramella, Beecham.

In Vivo Evaluation of Aerosol Sprays in the Human Eye. M. V. Shelanski, Food and Drug Research Laboratories.

Fluorinated Additives in Aerosol Cosmetics. B. B. Cover, Pennsalt Chemicals.

A Rationale for the Physical Measurements of Household and Cosmetic Aerosols. S. Posner, J. Scheimberg, R. Goldhamer and S. Carson, Food and Drug Research Laboratories.

Evaluation of Several Methods for the Determination of Particle Size Distribution of Selected Aerosol Cosmetics. J. J. Sciarra, St. John's University.

Studies of New Aluminum Compounds for Antiperspirant Use. II. S. M. Beekman, J. M. Holbert and H. W. Schmank, Chattem Chemicals.

The Identification and Quantitative Determination of Propellants in Aerosols. W. R. Murphy, Gillette Safety Razor Company.

New Concepts in Pressurized Packaging. M. J. Root, G. Barr Company.

Rheological Evaluation of Aerosol Systems Under Pressure. Ralph Shangraw, University of Maryland.

Effect of Vapor Tap Valves on Propellant-Product Ratio. Allied Chemical Corporation.

Registration blanks will be mailed to the S.C.C. membership. Others may obtain blanks by writing to: Society of Cosmetic Chemists, 50 East 41st St., New York, N.Y. 10017.

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