ABSTRACTS

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

• Fats and Oils

CHROMATOGRAPHIC SEPARATION OF COMPLEX FATTY ACID MIXTURES. H. Wagner, J. D. Goetschel and P. Lesch (Univ. of Basel, Switzerland). *Helv. Chim. Acta* 46, 2986–9 (1963). Column chromatography on silica gel impregnated with 10% silver nitrate gives good resolution of a highly complex mixture of fatty acid methyl esters. Examples are given for the separation of saturated, unsaturated and monohydroxylated acids and of linolenic and stearolic acids.

THE DETERMINATION OF ACETIC ACID IN ACETYLATED FATS. O. Flohsová and J. Pokorný (Inst. Chem. Tech., Prague). *J. Inst. Chem. Tech. Prague* 7–2, 199–203 (1963). The properties of acetylated fats depend on the content of combined acetic acid, i.e. degree of acetylation. The Reichert-Meissl method is not suitable for the analysis of acetylated fats as the acetic acid is not distilled quantitatively under the conditions of the method. A modification of the method is proposed.

MEASUREMENT OF FAT AUTOXIDATION AND BROWNING ALDEHYDES IN FOOD VAPORS BY DIRECT VAPOR INJECTION GAS-LIQUID CHROMATOGRAPHY. R. G. Buttery and R. Teranishi (Western Reg. Res. Lab., Albany, Calif.). *J. Agric. Food Chem.* 11(6), 504–507 (1963). The method presented has the advantage that the concentrations of several different compounds arising from more than one type of food deterioration can be followed with one simple, rapid and specific analysis. The concentration of hexanal and other fatty acid autoxidation products in the vapor above reconstituted dehydrated potato was readily determined. This method was also suitable for measuring the concentration of browning products such as 2-methylpropanal and 2- and 3-methylbutanal in the vapor.

THE ANTIOXIDANT ACTIVITY OF VEGETABLE EXTRACTS. I. FLAVONE AGLYCONES. D. E. Pratt and Betty M. Watts (Dept. Food and Nutrition, Fla. State Univ., Tallahassee, Fla.). *J. Food Sci.* 29(1), 27–34 (1964). Hot-water extracts of several plant tissues showed the following descending order of antioxidant activity when used as cover solutions of meats or in artifical systems: green onion tops, green pepper seeds, green peppers, celery, potato peels, green onions and tomato peel. Quercetin isolated from hydrolyzed extracts accounted for most of the antioxidant activity of the extracts. It is believed that the most significant role of the extracts as antioxidants is apparently their ability to break the chain reaction in lipid oxidation of heme-catalyzed systems.

THE PROTECTION OF MILK FAT TOCOPHEROLS DURING SAPONIFICATION WITH ASCORBIC ACID. V. N. Krubovsky (Dept. of Dairy and Food Sci., N.Y. State College of Agric., Cornell Univ., Ithaca N.Y.). *J. Agr. Food Chem.* 12(3), 289–293 (1964). An analytical procedure is presented utilizing ascorbic acid in the chemical determination of tocopherols. By this procedure vitamins A and E and carotenoids may be concurrently determined on the unsaponifiable matter of fat. Six samples can be run a day.

LIPIDS OF DEHYDRATED ALFALFA (MEDICAGO SATIVA). J. W. Van der Veen and H. S. Olcott (Inst. of Marine Resources, Dept. of Nutritional Sci., Univ. of Calif., Berkeley, Calif.). *J. Agric. Food Chem.* 12(3), 287–289 (1964). The lipids of dehydrated alfalfa (6.4%) were fractionated by silicic acid chromatography into nine fractions. The first fraction contained 30% low molecular wt fatty acids, mainly caprylic. Main glyceride lipids were found to be mono- and digalactosyldiglycerides. These contained abut 80% linolenic acid. Large amounts of unsaponifiables were also present in all fractions.

RAPID CLEANUP OF DAIRY PRODUCTS FOR ANALYSIS OF CHLORINATED INSECTICIDE RESIDUE BY ELECTRON CAPTURE GAS CHROMATOGRAPHY. B. E. Langlois, A. R. Stemp and B. J. Liska (Dept. of Animal Sci., Purdue Univ., Lafayette, Ind.). *J. Agric. Food Chem.* 12(3), 243–245 (1964). An extraction and column chromatographic cleanup technique is presented for dairy products. Twenty-five to thirty-five samples per eight hour day can be determined by one technician for nanogram quantities of insecticides. Recoveries of added insecticides are greater than 90%.

FORCED VOLATILIZATION CLEANUP OF BUTTERFAT FOR GAS CHROMATOGRAPHIC EVALUATION OF ORGANOCHLORINE INSECTICIDE RESIDUES. D. E. Ott and F. A. Gunther (Dept. of Entomology, Univ. of Calif. Citrus Res. Ctr. and Agric. Exp. Sta., Riverside, Calif.). *J. Agric. and Food Chem.* 12(3), 239–243 (1964). A procedure is given for the complete cleanup of butterfat prior to analysis for organochlorine insecticide residues. This method utilizes a forced volatilization principle for the cleanup step and analysis are performed by use of a microcoulometric gas chromatography. The length of time required for the entire method is one hour for a two gram sample and the method is sensitive to about 0.5 ppm of the possible organochlorine insecticide residues in butterfat.

THE DETERMINATION AND CONTENTS OF α- AND γ-TOCOPHEROLS IN MARGARINE. C. Lambertsen, H. Myklestad and O. R. Braelskan (Government Vitamin Lab., Norwegian Fisheries Res. Inst., Bergen, Norway). *J. Food Sci.* 29(2), 164–68 (1964). Methods are given for the determination of α- and γ-tocopherols in margarine by column and paper chromatography and spectrophotometric measurement of the tocopherols. The samples analyzed showed an average of 52 μg of α-tocopherol and 89 μg of γ-tocopherol. Samples which were analyzed after seven months storage showed losses of 20% α-tocopherol and 14% γ-tocopherol. Hydrogenation was shown not to have destroyed the tocopherol content. By comparison of tocopherol content of fats used for margarine production to that calculated from the margarine value indicate some loss during margarine production.

OXIDATIVE CHANGES IN CURED AND UNCURED FROZEN COOKED PORK. M. W. Zipser, T. W. Kwon and Betty M. Watts (Dept. of Food and Nutrition, Fla. State Univ., Tallahassee, Fla.). *J. Agric. Food Chem.* 12(2), 105–109 (1964). It was reported that heme-catalyzed oxidation occurred during preparation for freezing and thawing but not during frozen storage of uncured meat. Cured samples exhibited salt-catalyzed oxidation during frozen storage. It was found that the ratio of peroxides to TBA number was 8 to 10 times as high in cured as in uncured meats. This is believed to be due to the more rapid decomposition of peroxides by the ferric hemes of cooked meat. Rancid odor showed a high significant correlation with TBA numbers in both cured and uncured meats. No completely satisfactory antioxidant was found for the frozen cured meat.

DETERMINATION OF ANTIOXIDANTS IN CERTAIN FOOD PRODUCTS AND PACKAGING MATERIALS BY GAS CHROMATOGRAPHY. W. M. Schwecke and J. H. Nelson (Qual. Control Dept., General Mills Inc., Minneapolis, Minn.). *J. Agric. Food Chem.* 12(1), 86–89 (1964). A method is described for measuring ppm quantities of BHA and BHT in food products. This method includes a rapid extraction step and analysis with GLC utilizing 3,5 di-tert-butyl-4-hydroxyanisole (di-BHA) as an internal standard. The column used was a mixture of SE-30 and Tween 80 and gave complete separation of BHA and BHT from interfering compounds.

DETERMINATION OF BUTYLATED HYDROXYANISOLE, BUTYLATED HYDROXYTOLUENE AND ETHOXYQUIN IN HYDROCARBON-SOLUBLE SAMPLES. N. J. Alicino, H. C. Klein, J. J. Qualtrone, Jr. and T. K. Choy (Fine Chem. Div., Nopco Chem. Co., Harrison, N.J.). *J. Agric. Food Chem.* 11(6), 496–498 (1963). A rapid method is reported for the analysis of BHT and BHA in the presence or absence of ethoxyquin which is based upon solvent extraction and column chromatographic procedures. The sample being analyzed is dissolved in a hydrocarbon. Ethoxyquin is determined by ultraviolet spectroscopy by separating it from the BHA and BHT by shaking the hydrocarbon solution with hydrochloric solution. BHA is then determined either colorimetrically or by ultraviolet spectroscopy by dissolving it in a solution of ethanol. BHT is determined by passing the portion of the original hydrocarbon solution through a Florisil column and ultraviolet spectrophotometrically analyzing the effluent. All antioxidants except BHT will remain on the column.

REACTION OF CAROTENE WITH NITRILE SOLUTIONS. D. L. Pugh and G. B. Garner (Dept. of Agric. Chem., Univ. of Missouri, Columbia, Mo.). *J. Agric. Food Chem.* 11(6), 528–529 (1963). Carotene and vitamin A alcohol are readily destroyed in the

chemical changes in nitrite resulting from acidic conditions. The recent apparent increase in vitamin A requirement for cattle fed forages high in nitrate may conceivably be explained on this basis.

THE ROLE OF THIOL GROUPS AND FLOUR LIPIDS IN OXIDATION—REDUCTION REACTIONS IN DOUGH. A. H. Bloksma (Inst. for Cereals, Flour and Bread, T. N. O. Wageningen, The Netherlands). *Baker's Digest* 38(2), 53–61 (1964). The oxidation of thiol groups in dough can be effected by improvers such as bromate and iodate or by atmospheric oxygen. This oxidation of thiol groups is much more complex reaction i.e. lipid peroxides are also possible. The uptake of the larger part of the oxygen is dependent upon the oxidation of unsaturated lipids. Contradictory conclusions on the interactions between thiol groups and unsaturated lipids were given on the basis of the rheological measurements and the analytical results. These interactions require further study.

DETERMINATION OF MALONALDEHYDE BY ULTRAVIOLET SPECTROPHOTOMETRY. T. W. Kwon and Betty M. Watts (Dept. of Food and Nutrition, Fla. State Univ., Tallahassee, Fla.). *J. Food Sci.* 28(6), 627–631 (1963). Malonaldehyde occurs mainly in its enol form in aqueous solutions. The ultraviolet spectrum was found to be pH-dependent. Below pH 3.0, its absorption maximum is 245 mμ; above pH 7.0 its absorption maximum is 267 mμ. This absorbance difference between acidic and basic solutions was used in measuring the amount of malonaldehyde even in the presence of other compounds that absorb in this region only are not pH-dependent. It has been found to be about 40% as sensitive as the TBA test, but it is simpler, more rapid and more specific than the TBA test. Also its sensitivity is sufficient to detect threshold levels of rancidity.

MALONALDEHYDE IN AQUEOUS SOLUTION AND ITS ROLE AS A MEASURE OF LIPID OXIDATION IN FOODS. T. W. Kwon and Betty M. Watts (Dept. of Food and Nutrition, Fla. State Univ., Tallahassee, Fla.). *J. Food Sci.* 29(3), 294–303 (1964). The kinetics of the production of malonaldehyde by acid hydrolysis of its *bis*-diethylacetal is described and its ionization constants and polymerization in aqueous solution are explored. The significance of the acidification on the isolation of the compound from foods and its possible role as a measure of lipid oxidation in food systems are discussed.

TOCOPHEROL DISTRIBUTION IN MILK FRACTIONS AND ITS RELATION TO ANTIOXIDANT ACTIVITY. D. R. Erickson, W. L. Dunkley and L. M. Smith (Dept. of Food Sci. and Tech., Univ. of Calif., Davis, Calif.). *J. Food Sci.* 29(3), 269–76 (1964). Studies were made of the distribution of tocopherol between the lipid in the fat globule membrane and inside the milk fat globule and the relation of that distribution to the loss of tocopherol during lipid oxidation. The tocopherol content was at least three times greater in the lipid of the fat globule membrane than inside the fat globule. During oxidation, tocopherol associated with the fat globule membrane was lost more rapidly. Thus for oxidative stability studies of milk, the membrane tocopherol would be more important that the fat globule tocopherol.

THE LIMITING VISCOSITY AND THE PARTIAL SPECIFIC VOLUME OF OILS IN ORGANIC SOLVENTS. H. Lück, R. Kohn and E. Rickerl (Deut. Forsch. Lehensmittlechemie, Munich). *Fette Seifen Anstrichmittel* 64, 721–725 (1963). The partial specific volumes V* of edible and polymerized oils in organic solvents were found to be either greater or smaller than the specific volumes of pure oils. Solvents such as ether, hexane and carbon disulfide decrease the constant V*; while benzene cyclohexane and tetralin increase the value of V*. Linseed oil and polymerized linseed oil were studied in this manner.

SEPARATION OF LIPIDS BY MEANS OF THIN LAYER CHROMATOGRAPHY WITH SILVER NITRATE IMPREGNATED SILICA GEL. B. de Vries and G. Jurriens (Unilever Research Laboratories). *Fette Seifen Anstrichmittel* 65, 725–727 (1963). Thin layer chromatography with $AgNO_3$-impregnated silica gel has proven appropriate for the separation of molecules differing in the number of double bonds and geometric configuration (*cis, trans*). The R_f value is also influenced by the chain length and position of the double bonds. The authors have completely separated the monoenoic isomers, positional and geometrical; the esters of the various isomers of conjugated and elaidinized linoleate; cholesterol and chlostanol; and representative saturated, unsaturated and elaidinized triglycerides.

THIN LAYER CHROMATOGRAPHY IN THE FIELD OF FATS X: ANALYSIS OF THE METABOLISM OF LIPIDS. H. P. Kaufmann and C. V. Visuanathan (Deut. Inst. Fettforsch, Munster). *Fette Seifen Anstrichmittel* 65, 538–543 (1963). Thin layer chromatographic methods for the qualitative and quantitative analysis of lipids of biological importance are described. Especially interesting is the separation of the various cholesterol esters. Such esters were separated using both reversed phase and normal plates. The systems employed were: ethyl methyl ketone/acetonitrile (7:3), saturated with paraffin and using paraffin impregnated silica gel; isooctane/isopropyl ether (98:2) and petroleum ether (50–70C)/benzene (85:15). The total lipids of animal blood and liver as well as the urine of a man suffering from Chyluna were analyzed in this manner.

XI: ANALYSIS OF LECITHINS AND THE HYDROLYTIC CLEAVAGE PRODUCTS OF PHOSPHATIDES. H. P. Kaufmann, H. Wessels and C. Bondopadhyaya. *Ibid.*, 543–547. The homologs of natural lecithins were fractionated on silica gel/$AgNO_3$ plates. The saturated homologs were more mobile than the unsaturated homologs. From soya lecithin 9 fractions were obtained and from egg lecithin 7 fractions were obtained. The compounds cleavable by acid hydrolysis from phosphatides, such as choline, ethanolamine, serine, threonine, inositol, N-mono- and N,N'-dimethylethanolamine were separated on silica gel plates using chloroform/ether/acetic acid or ethanol/aqueous NH_3 solution (7%) (1:2).

XIV: THE SEPARATION OF TRIGLYCERIDES BY A COMBINATION OF ADSORPTION AND REVERSED PHASE CHROMATOGRAPHY. H. P. Kaufmann and H. Wessels. *Ibid.*, 66, 81–86 (1964). Triglycerides are first separated on $AgNO_3$-impregnated plates, then further separated in a reversed phase system. This combination of techniques permitted complete separation of triglyceride mixtures. The method was demonstrated using sunflower oil as an example. All of the possible triglycerides were separated using a paraffin impregnated plate and acetone: acetonitrile (satd. with paraffin) (8:2).

SPECTROANALYTICAL DETECTION OF FISH OIL IN LINSEED OIL. Cl. Franzke (Inst. Lebensmittlechemie, Humboldt Univ., Berlin). *Fette Seifen Anstrichmittel* 66, 3–6 (1964). The detection of fish oil in linseed oil is possible by spectroanalysis after alkali isomerization. Definite differences in light absorption at 315 mμ are evident. On the average up to 3% of fish oil in linseed oil can be readily determined.

THE OCCURRENCE OF TRANS FATTY ACIDS. H. P. Kaufmann and G. Mankel (Deut. Inst. Fettforsch, Munster). *Fette Seifen Anstrichmittel* 66, 6–13 (1964). The authors present a review of the occurrence of *trans*-fatty acids formed in plants and animals. The controversial nutritional and biological aspects of the *trans*-acids is also discussed.

THE STRUCTURE OF TRIGLYCERIDES: THEORIES AND METHODS OF DETERMINATION. H. P. Kaufmann and H. Wessels (Deut. Inst. Fettforsch, Munster). *Fette Seifen Anstrichmittel* 66, 13–20 (1964). The distribution of fatty acids in individual triglycerides of natural fats has been partially explained by several theories of glyceride structure. The present paper reviews these theories and critically compares them with one another. The various methods for the determination of triglyceride structure and the principles involved are discussed.

PREPARATION OF MONOGLYCERIDES FROM NATURAL FATS. Cl. Franzke and F. Kretyschmann (Inst. Lebensmittlechemie, Humboldt Univ., Berlin). *Fette Seifen Anstrichmittel* 65, 275–277 (1963). The yields of monoglycerides from the catalytic glycerolysis of natural fats depend on the time, temperature, amount of catalyst, glycerol and solvent. If the fat:glycerol:pyridine:$NaHCO_3$ system is adjusted to the ratios 1:2:5:0.025–0.05, a yield of approximately 90% is obtained.

MOLECULAR WEIGHT DETERMINATION OF FATS AND FAT-POLYMERS IN THE ULTRACENTRIFUGE. III. AN APPROACH TO THE DETERMINATION OF THE MOLECULAR WEIGHT OF HEAT POLYMERIZED LINSEED OIL FROM SEDIMENTATION EQUILIBRIUM. H. Luck and H. Bach (Deut. Forschunganstatt Lebensmittelchemie, Munich). *Fette Seifen Anstrichmittel* 66, 101–106 (1964). The difficulties in molecular weight determination of heat polymerized linseed oil using the ultracentrifuge are discribed and discussed. Association of the polymerized molecules causes much of the difficulty. Examples are discussed.

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THE CONVERSION OF LONG CHAIN SATURATED FATTY ACIDS TO THEIR α,β-UNSATURATED, β,γ-UNSATURATED AND β-HYDROXY DERIVATIVES BY ENZYMES FROM THE CELLULAR SLIME MOLD, DICTYOSTELIUM DISCOIDEUM. F. Davidoff and E. D. Korn (Lab. of Biochem., Section on Cellular Physiology, National Heart Institute, National Institutes of Health, Bethesda 14, Maryland). *J. Biol. Chem.* **239**, 2496–2506 (1964). Subcellular fractions from homogenates of the cellular slime mold, *Dictyostelium discoideum*, convert saturated C_{14}, C_{16} and C_{18} fatty acyl coenzyme A to the *trans*-α,β-unsaturated-, D(--)-β-hydroxy and *cis*- and *trans*-β,γ-unsaturated fatty acids of the same chain length. Soluble enzymes, derived from acetone powders of such subcellular fractions, catalyze the interconversion of all of these products. Evidence is presented that the reactions involved include the reversible hydration of α,β-unsaturated acids and the direct isomerization of α,β- and β,γ-unsaturated acids.

CARDIOVASCULAR DISEASE IN THE MASAI. G. V. Mann, R. D. Shaffer, R. S. Anderson and H. H. Sandstead (The Nutrition Division, Vanderbilt Univ. Medical School, Nashville, Tenn.). *J. Atheroscler. Res.* **4**, 289–312 (1964). A field survey of 400 Masai men and additional women and children in Tanganyika indicate little or no clinical or chemical evidence for atherosclerosis. Despite a long continued diet of exclusively meat and milk the men have low levels of serum cholesterol and no evidence for arteriosclerotic heart disease. The reasons for this disagreement with the popular hypothesis relating animal fat intake to coronary disease are examined. The authors concede that some overriding protective mechanism such as freedom from emotional stress or abundance of physical exercise may be present. They favor the conclusion that diet fat is not responsible for coronary disease.

THE DIGESTION AND ABSORPTION OF TRIGLYCERIDES. F. H. Mattson and R. A. Volpenhein (Miami Valley Laboratories, The Procter and Gamble Co., Cincinnati 39, Ohio). *J. Biol. Chem.* **239**, 2772–77 (1964). Rats were fed triolein, diolein, and monoolein in which the fatty acids occupying specific positions of the glyceride molecule and the glycerol were labeled. The recovery of labeled glycerol and oleic acid and the location of the labeled acid in the triglyceride molecules of the lymph were determined. From these data and the results obtained by others, the following scheme is proposed for the digestion and absorption of oleoyl glycerides. In the lumen of the intestine, triglycerides are hydrolyzed by way of α,β-diglycerides to 72 parts β-monoglyceride, 6 parts α-monoglyceride and 22 parts free glycerol. This hydrolysis results in the cleavage of all of the fatty acids esterified at the α and α′ positions and 22% of those esterified at the β position of the dietary triglyceride. The free glycerol is absorbed independently of the lipids and little of it is used in glyceride synthesis. In the intestinal wall the β-monoglycerides are re-esterified to triglycerides.

THE METABOLISM OF C-LABELED CIS AND TRANS ISOMERS OF OCTADECENOIC AND OCTADECADIENOIC ACIDS. Katsuto Ono and D. S. Fredrickson (Section on Molecular Diseases, Lab. of Metabolism, Natl. Heart Institute, N.I.H., Bethesda 14, Maryland). *J. Biol. Chem.* **239**, 2482–88 (1964). 1-C^{14}-Oleic, elaidic, *cis*, *cis*-linoleic and *trans*, *trans*-linoleic acids were prepared in relatively pure form. These geometrical isomers were then compared for their rates of removal from plasma as nonesterified fatty acids and subsequent oxidation, rates of intestinal absorption and capacity to pass the placental membrane. Each acid was studied simultaneously with 9,10-H-palmitic acid and compared with its isomer on the basis of H: C ratios obtained during the experiments. The rates of appearance in thoracic duct lymph of the fed isomers, relative to that of palmitic acid, were similar. There was also no difference in distribution within the classes of chyle lipids. Isomerization during absorption was not detected. All of the unsaturated isomers were removed from the plasma as albumin-bound fatty acid faster than palmitic acid and at rates similar for the isomeric pairs.

SENSORY DISCRIMINATION OF FAT AND SOLIDS-NOT-FAT IN MILK. R. M. Pangborn and W. L. Dunkley (Dept. of Food Science and Tech., Univ. of Calif., Davis, Calif.). *J. Dairy Sci.* **47**, 719–26 (1964). A dual-standard paired-comparison method was used by a highly trained panel to detect differences in fat and in solids-not-fat (SNF). Homogenized milk of desired composition was prepared by special techniques, using heat-treatments below the legal minimum for pasteurization to avoid cooked

flavors and a vacuum treatment to remove volatiles. In milk containing 0, 2.0, 4.0 and 6.0% fat at base SNF levels (prepared from nonfat milk solids) of 8.5 and 10.0%, the level of fat and SNF did not influence significantly the detection of added SNF (approximately 0.5% added SNF detected 67% of the time). In specially prepared fluid milk, however, it was slightly easier to detect SNF in skimmilk than in milk containing 2.0 or 3.5% fat. In skimmilks, the level of SNF (8.5 vs. 10.0%) influenced detection of fat, but in whole milk the difference was not significant. The data emphasize that in sensory discrimination of concentration differences, SNF are more important than fat.

ROLE OF DIETARY FATS IN INDUCING HYPERCHOLESTEROLEMIA IN RATS. T. S. Anantha Samy and H. R. Cama (Dept. of Biochem., Indian Institute of Sci., Bangalore (India). *J. Atheroscler. Res.* 4, 356–66 (1964). Various dietary fats have been tested for induction of hypercholesterolemia in rats. Results of the study show that the presence of cholesterol and oleic acid in the diet are the necessary factors for induction, which seems to be counteracted by the presence of linoleic acid in the fat. No significant changes have been observed in the esterase, cholesterol esterase and vitamin A esterase activities of the livers of hypercholesterolemic rats when compared to normal. Significant decrease in rat-heart lipoprotein lipase activity, in whole blood clotting time, in plasma prothrombin time and in fibrinolytic activity have been observed with induced hypercholesterolemia. An increase in the −SH levels of aorta and liver in hypercholesterolemic rats has also been observed.

MILK POWDERS. VI. PREPARATION AND PROPERTIES OF MILK POWDERS CONTAINING SIMPLE TRIGLYCERIDES. A. L. Symes and B. E. Baker (Dept. of Agr. Chem., Macdonald College of McGill Univ., Quebec, Canada). *J. Dairy Sci.* 47, 739–42 (1964). Freeze-dried milk powders were prepared from homogenized mixtures of simple triglycerides and skimmilk to determine the effects of the fat components on wettability of the powders. Wettability of the powders decreased as the molecular weights of their triglycerides increased. A noteworthy exception was the powder containing tripropionin, which had a lower wettability than the one containing tripalmitin. The wettabilities of powders containing tristearin and low molecular weight triglycerides decreased as the proportion of tristearin in the mixture increased. However, tripropionin yielded a powder of low wettability and the 25% tristearin—75% tripropionin mixture yielded one of high wettability. There was no simple relation between the wettability of a powder and the interfacial tension (oil-water) of the fat component.

METABOLISM OF 4,7,10,13,16-DOCOSAPENTAENOIC ACID IN THE ESSENTIAL FATTY ACID-DEFICIENT RAT. B. Verdino, M. L. Blank, O. S. Privett and W. O. Lundberg (The Hormel Inst., Austin, Minn.). *J. Nutr.* 83, 234–8 (1964). Three groups of male rats of the Sprague-Dawley strain, in advanced stages of essential fatty acid deficiency, were given orally 150 mg/animal/day, of safflower oil, 50 mg/animal/day, of ethyl arachidonate and of methyl 4,7,10,13,16-docosapentaenoate, respectively. After a supplementation period of 52 days, the animals were killed by exsanguination, the livers were excised and the fatty acids of liver lipids analyzed. Growth, dermal symptoms and fatty acid composition showed that docosapentaenoic acid possessed almost the same degree of essential fatty acid activity as arachidonic acid. The fatty acid composition analyses also showed that docosapentaenoic acid was converted to arachidonic acid, and, together with other considerations, provided evidence for the degradation of unsaturated fatty acids via a concerted chain shortening-reduction process which may be represented as follows: 22:4,7,10,13,16 → (20:2,5,8,11,14) → 20:5,8,11,14.

SERUM AND AORTIC LIPIDS IN RABBITS FED CHOLESTEROL AND LINOLEIC ACID STEREOISOMERS. B. I. Weigensberg and G. C. McMillan (Dept. of Pathology, Pathological Institute, McGill University, Montreal, Canada). *J. Nutr.* 83, 314–24 (1964). Rabbits fed 1 g of cholesterol and 6 g of elaidinized linoleic acid (a mixture of linoelaidic stereoisomers) daily for 84 days showed no higher concentration of free cholesterol, cholesterol ester, triglyceride, phosphatidyl ethanolamine, phosphatidyl serine, lecithin, sphingomyelin or other lipid fractions in their serum than did control rabbits fed 1 g cholesterol and 6 g linoleic acid for a similar period. In the rabbits fed the elaidinized linoleic acid the concentration of *trans* isomer after 84 days was 13.2 ± 11.3% in the serum cholesterol ester fatty acids and 11.3 ± 8.2% in the triglyceride fatty acids, whereas it was usually less than 2.5% in the phospholipid fatty acids. The

rabbits fed elaidinized linoleic acid showed little, or no more, atherosclerosis of the aortic arch, no more atherosclerosis in the thoracic and abdominal aorta and only a slightly higher cholesterol content in their aortas than did those rabbits fed natural linoleic acid and cholesterol. The relationship of these results to those of similar experiments in which supplements of elaidinized oleic acid or olive oil were fed with cholesterol to rabbits is discussed.

THE ACTIVITY OF LIPOXIDASE IN SUNFLOWER SEEDS AND METHODS FOR ITS DETERMINATION. L. V. Romanova *et al.*, *Trudy Vniiz* 23, 5–13 (1963). A technique has been developed to determine the lipoxidase activity in sunflower seeds. Lipoxidase passes into the aqueous phase of a water extract and the activity reaches a maximum at a pH of 5.6. The lipoxidase is inactivated when the seeds are treated to a temperature in excess of 80C. (Rev. Franc. Corps Gras)

BIOSYNTHESIS OF LIVER PHOSPHOLIPIDS DURING THE DEVELOPMENT OF A FATTY LIVER. W. E. Cornatzer and A. H. Walser (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of North Dakota School of Med., Grand Forks). *Proc. Soc. Exp. Biol. Med.* 116, 893–97 (1964). Liver total lipids, phospholipid P and phospholipid synthesis has been investigated during the development of a fatty-cirrhotic liver in animals maintained on a low-fat, low-protein diet for 17 to 297 days. There is an increase in the specific and relative specific activities of total liver phospholipids between the 36th and 64th days, i.e., during the development of the fatty liver. Chromatography of liver phospholipids and lipid phosphorylation during the development of a fatty liver was studied in rats maintained on low protein-low fat diets. A statistically significant decrease of liver lecithin and sphingomyelin occurred at end of 5 weeks of dietary regime and continued to decrease as long as the animals were maintained on the low protein diet. A statistically significant decrease of phosphatidyl ethanolamine and phosphatidyl inositol occurs at the end of 9 weeks on the dietary regime.

BEHAVIOR OF C^{14}-LABELED PARTICULATE PLASMA TRIGLYCERIDE AND RE "TEST EMULSION" IN RE HYPERFUNCTIONAL RATS. N. R. DiLuzio and E. L. Bierman (Dept. of Med., Univ. of Washington, Seattle). *Proc. Soc. Exp. Biol. Med.* 116, 1045–47 (1964). The behavior of a radioactive triglyceride-plasma complex prepared *in vitro* was compared to that of an "RE test emulsion" in normal and RE hyperfunctional rats. The removal rate and organ distribution of the particulate fat tracer was not influenced by RE hyperfunction. However, the corresponding dose of the "RE test emulsion" was removed more rapidly from plasma in RE hyperfunctional rats. Thus the particulate fat tracer does not appear to be removed by a phagocytic process and therefore behaves more like native lipid particles than foreign emulsified material.

BODY COMPOSITION AND ATHEROSCLEROSIS IN ONE TO FIVE YEAR OLD HENS. H. Fisher, P. Griminger and H. S. Weiss (Dept. of Animal Sciences, Rutgers, The State University, New Brunswick, New Jersey). *Poultry Sci.* 43, 1184–1187 (1964). Leghorn hens, one to five years old, were killed for body composition analyses and grading of abdominal aortic atherosclerosis. There were no marked changes in body composition that could be attributed to increasing age. Body fat content of the hens from all age groups was twice that observed previously in 3-year-old males from the same genetic background. There was no correlation between rate of egg production and degree of fatness. Atherosclerosis increased in severity up through the third year but thereafter was more typical of one and two years old hens. Based on previous observations it was suggested that the lack of relationship between age beyond three years and atherosclerosis may be due to the earlier death of more severly afflicted animals. Good correlation was noted between a rapid visual evaluation of atherosclerosis and an objective procedure which utilized the weight area ratio of the abdominal aorta.

CREATINE SYNTHESIS IN PERFUSED LIVER OF VITAMIN E-DEFICIENT RATS. G. B. Gerber, T. R. Koszalka, G. Gerber and L. L. Miller (Univ. of Rochester School of Med. and Dentistry, Rochester N.Y.). *Proc. Soc. Exp. Biol. Med.* 116, 884–87 (1964). The synthesis of creatine from glycocyamine was studied in the perfused livers of rats fed a stock diet, a diet deficient in vitamin E and a diet deficient in vitamin E but supplemented with α-tocopheryl acetate. No significant differences were found when creatine synthesis was compared in the 3 groups of animals. It is postulated that the inability of skeletal muscle to utilize creatine, rather than increased synthesis of creatine by the liver, is primarily responsible for the creatinuria observed in vitamin E deficiency.

SENSITIVITY OF VISUAL RECEPTORS OF CAROTENOID-DEPLETED FLIES: A VITAMIN A DEFICIENCY IN AN INVERTEBRATE. T. H.

Goldsmith, R. J. Barker, C. F. Cohen. *Science* **146**, 65–67 (1964). House flies *(Musca domestica)* raised under sterile conditions on a diet lacking carotenoids and retinol (vitamin A) have visual receptor sensitivities—as assessed electroretinographically—which average more than 2 log units below normal, both in the near ultraviolet (340 mμ) and visible (500 mμ) regions of the spectrum. Loss of sensitivity can be prevented by the addition of β-carotene to the larval food. Flies reared for several generations on a carotenoid-free diet, but under conditions where the adults are not kept sterile, do not show a further loss of sensitivity. It is suggested that carotenoid stored in the egg prevents complete blindness in the first generation and that microorganisms can supply small amounts of carotenoid and thereby prevent complete blindness in the second and successive generations.

FATTY ACID DISTRIBUTION IN BACTERIAL PHOSPHOLIPIDS. THE SPECIFICITY OF THE CYCLOPROPANE SYNTHETASE REACTION. J. G. Hildebrand and J. H. Law (J. B. Conant Laboratory, Harvard Univ., Cambridge, Mass.). *Biochemistry* **3**, 1304–1308 (1964). The distribution of fatty acids in purified phospholipids isolated from several different bacteria has been examined by use of the specific phospholipase A of snake venom. In general the distribution is in accord with that found elsewhere in nature; the unsaturated acids are found in the β-position and the saturated acids in the γ-position. The distribution of cyclopropane fatty acids follows closely that of the unsaturated fatty acids. A notable exception was encountered with the phosphatidylethanolamine of *Clostridium butyricum*, in which unsaturated and cyclopropane fatty acids were found in more abundance in the γ-position. The specificity of the *C. butyricum* cyclopropane synthetase reaction has been examined by employing as substrate a phosphatidylethanolamine with a known distribution of unsaturated fatty acids and analyzing the distribution of cyclopropane fatty acids in the phospholipid produced by the enzyme reaction. These experiments indicate that the enzyme has a definite, but no absolute, specificity for an unsaturated fatty acid in the γ-position.

CHANGES OBSERVED IN EGG YOLK CHOLESTEROL, SERUM CHOLESTEROL AND SERUM GLUTAMIC OXALACETIC TRANSAMINASE BY FEEDING CHOLESTEROL AND VEGETABLE OIL TO MATURE HENS. B. J. Hulett, R. E. Davies and J. R. Couch (Texas A & M University, College Station, Texas). *Poultry Sci.* **43**, 1075–1078 (1964). Egg yolk and serum cholesterol levels of hens fed up to 5% dietary cholesterol for 9 weeks were elevated and closely related. Hens fed diets containing cholesterol without supplemental fat had a lower serum SGO-T activity, a lower level of serum cholesterol, a lower level of cholesterol in the egg yolk and a higher percentage of egg production than did similar birds fed identical diets supplemented with 10% rice oil.

PLASMA AND LIVER LIPIDS OF MICE AS INFLUENCED BY DIETARY PROTEIN AND SULFUR-CONTAINING AMINO ACIDS. G. A. Leveille and H. E. Sauberlich (U.S. Army Med Res. and Nutr. Lab., Fitzsimons General Hospital, Denver, Colo.). *J. Nutr.* **84**, 10–14 (1964). The influence of dietary protein level and of sulfur-containing amino acids on plasma and liver lipids was studied in young adult mice. Increasing the level of dietary protein resulted in decreased plasma and liver cholesterol and liver fat levels. A greater hypocholesterolemic effect of dietary protein was observed in mice fed a cholesterol-supplemented diet. The increased level of sulfur-containing amino acids could, in part, account for the hypocholesterolemic effect of dietary protein.

PLASMALOGEN AND GLYCEROL ETHER CONCENTRATIONS IN NORMAL AND ATHEROSCLEROTIC AORTIC TISSUE. B. Miller, C. E. Anderson and C. Piantadosi (Depts. of Biochemistry and Medicinal Chem., Univ. of N.C., Chapel Hill). *J. Gerontol.* **19**, 430–34 (1964). Lipids were extracted from the combined intima-media of normal and graded atherosclerotic areas of 120 human aortas obtained from individuals ranging in age from newborn to 85 years. Analysis of the lipid fractions showed significant elevations of total lipid and total phospholipid with atherosclerotic involvement. Plasmalogen, measured as aldehydrogenic lipid, showed a significant diminution in atherosclerotic affected samples. Aortic samples from individuals of the 7th decade showed an elevation in choline-containing phospholipids in atherosclerosis. Choline containing plasmalogens were reduced in atherosclerotic samples but not to as great a degree as total plasmalogen. On the basis of age, total lipid and total phospholipid were elevated in lipid plaques.

FEEDING OF FISH OIL AND ETHYL ESTER FRACTIONS OF FISH OIL TO BROILERS. K. C. Leong, G. M. Knobl, Jr., D. G. Snyder and E. H. Gruger, Jr. (Bureau of Commercial Fisheries Technological Lab., Seattle, Washington). *Poultry Sci.* **43**, 1235–40

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(1964). At the 5% level in the diet, light, cold-pressed menhaden oil, bleached and distilled triglycerides prepared from the light, cold-pressed menhaden oil, and corn oil were all equal in feeding value for broilers. In contrast, the feeding value of the unfractionated menhaden oil ethyl esters, fatty acids prepared from the light, cold-pressed oil, and four ethyl ester fatty acid fractions of progressively increasing unsaturation was significantly inferior to tallow. A comparison of the iodine value of the oils and oil fractions indicates that the nutritive value of ethyl esters of fatty acids does not correlate with the unsaturation of the fatty acids per se. This lack of correlation seems to be caused by detrimental (low-weight gains, exudative diathesis, muscular dystrophy) factors that become more concentrated as the degree of unsaturation of the menhaden oil fractions increases. Organoleptic tests showed that all fish oil samples fed at the 5% level imparted an off-flavor to the flesh of the chicks.

EXUDATIVE DIATHESIS AND MUSCULAR DYSTROPHY INDUCED IN THE CHICK BY ESTERS OF POLYUNSATURATED FATTY ACIDS. D. Miller, K. C. Leong, G. M. Knobl, Jr. and E. Gruger, Jr. (Bureau of Commercial Fisheries Technological Lab., Seattle, Washington). *Proc. Soc. Exp. Biol. Med.* **116**, 1147–51 (1964). Exudative diathesis, muscular dystrophy and depressed growth with accompanying high incidence of mortality were observed in chicks fed certain fractions of molecularly-distilled polyunsaturated fatty acids obtained from menhaden oil. These fractions were fed daily as either ethyl esters or reconstituted triglycerides in supposedly adequate nutritional diets containing 0.3 ppm Se, 44 ppm dl-α-tocopherol acetate, 0.9% sulfur amino acids and 167 ppm ethoxyquin. The chicks developed exudative diathesis as early as the 9th day of the experiment when fed the ethyl esters or reconstituted triglycerides obtained from the most unsaturated fractions of fish oil. The observed disorders are not due to the ethyl ester form of the fatty acids or to the oxidation of the oil in the feed.

APPLICATION OF GEL FILTRATION OF BILE ACIDS TO STUDIES OF LIPID-COMPLEXES IN BILE. A. Norman (Dept. of Clinical Chem., Stockholms Lans Centrallasarett, Danderyd, Sweden). *Proc. Soc. Exp. Biol. Med.* **116**, 902–05 (1964). Gel filtration on Sephadex G-25 was applied to conjugated bile acids in water solution or in bile. An adsorption of bile acids occurs during gel filtration. The adsorption was more pronounced when gel filtration was performed with saline than with water. Conjugates of monohydroxycholanic acid were adsorbed to the greatest extent followed by trihydroxycholanic acid and dihydroxycholanic acid. Rates of elution of taurine and glycine conjugates of a bile acid were about the same. Labeled conjugated bile acids dissolved in bile or *in vivo* labeled conjugates, obtained by administration of the corresponding free acid to patients, showed the same behavior on gel filtration. The conjugates of cholic, deoxycholic and chenodeoxycholic acid were all absent from the molecular weight fraction (M 3,500–4,500) and were eluted at about the same rate as the corresponding conjugates gel filtered in the absence of bile. A small amount of the lithocholic acid conjugates in bile were eluted in the macromolecular fraction.

LIPOLYSIS OF MILK FAT BY PREGASTRIC ESTERASE IN THE ABOMASUM OF THE CALF. D. E. Otterby, H. A. Ramsey and G. H. Wise (Dept. of Animal Sci., Univ. of North Carolina, Raleigh). *J. Dairy Sci.* **47**, 993–96 (1964). The role of pregastric esterase in the abomasal digestion of milk fat was studied in calves having fistulae both in the rumen and the duodenum. Two systems of feeding were employed. Whole milk either was nipple-fed (oral feeding) or was infused directly into the abomasum via the rumen fistula (abomasal feeding). The latter method bypasses the site of pregastric esterase secretion. After feeding, serial collections of the digesta passing from the abomasum into the duodenum were taken for 10 hr. Each hourly sample was analyzed for butyric acid, both total and free, and for higher fatty acids, both total and free. When the milk was fed orally, a high proportion of the total butyric was present as the free acid. When pregastric esterase was excluded by abomasal feeding, however, only a small percentage of the total butyric was present as the free acid.

EFFECT OF LINOLEIC ACID UPON THE METABOLISM OF LINOLENIC ACID. J. J. Rahm and R. T. Holman (Univ. of Minn., The Hormel Institute, Austin, Minn.). *J. Nutr.* **84**, 15–19 (1964). Weanling rats were fed a fat-free diet supplemented with various ratios of corn and linseed oils to furnish a constant dietary level of linolenate at 1% of calories and levels of linoleate from 0.3 to 17.3% of calories. The fatty acid composition of the total liver lipids was analyzed by gas chromatography. Increasing amounts of dietary linoleate suppressed the levels of the 20:5, 22:5 and 22:6 metabolites of linolenic acid in the liver lipids. The level of dietary vitamin E had no effect upon this phenomenon. When the level of dietary linoleate was increased, the level of 22:4 in the liver lipids, as well as the other metabolities of linoleate, was shown to increase.

A GLYCEROL GALACTOFURANOSIDE FROM THE LIPID OF AN ANAEROBE. R. E. Reeves, Nelda G. Latour and R. J. Lousteau (Dept. of Biochemistry, Louisiana State University School of Medicine, New Orleans). *Biochemistry* **3**, 1248–1249 (1964). The lipid from an anaerobic organism provisionally designated *Bacteroides symbiosus* was found to contain D-galactose. Alkaline hydrolysis of the lipid yielded a new glycerol galactoside, specific rotation −73, with a crystalline hexabenzoate, mp 133–134C, specific rotation −6. The properties of the new galactoside indicate it to be a 1-glycerol β-D galactofuranoside. This appears to be the first recorded recognition occurring galactofuranoside.

HYDROLYSIS OF MONOGALACTOSYL AND DIGALACTOSYL DIGLYCERIDES BY SPECIFIC ENZYMES IN RUNNER-BEAN LEAVES. P. S. Sastry and M. Kates (Div. of Biosciences, National Research Council, Ottawa, Canada). *Biochemistry* **3**, 1280–1287 (1964). Runner-bean leaves contain specific enzymes, associated both with the chloroplast and cell sap cytoplasm fractions, which catalyze the hydrolysis of monogalactosyldilinolenin and digalactosyldilinolenin to the corresponding galactosylglycerols and free linolenic acid. No evidence for the formation of "lyso" compounds was obtained, but these are presumed to be intermediates. The cell-sap cytoplasm also contains α- and β-galactosidases which catalyze hydrolysis of the galactosylglycerols to free galactose and glycerol. The galactolipid-hydrolizing enzymes in the cell-sap cytoplasm, after 3-fold purification by ammonium sulfate fractionation, had the following properties: optimum pH, 7.0 for monogalactosyldilinolein, 5.6 for digalactosyldilolenin; apparent Michaelis-Menten constant, 7.8 times 10^{-3} M for monogalactosyldilinolenin, 1.5 times 10^{-3} M for digalactosyldilinolenin. This enzyme preparation was active only toward unsaturated galactolipids and was free from lipase and phospholipase activities. Calcium ion had no effect and solvents such as ethyl ether were inhibitory rather than stimulating. Galactolipid-hydrolyzing activity has so far been demonstrated only in leaves of Phaseolus species and in commercial pancreatin.

LIPID COMPONENTS OF LEAVES. V. GALACTOLIPIDS, CEREBROSIDES AND LECITHIN OF RUNNER-BEAN LEAVES. P. S. Sastry and M. Kates (Div. of Biosciences, National Research Council, Ottawa, Canada). *Biochemistry* **3**, 1271–1280 (1964). Mono- and digalactosyl diglycerides have been isolated from runner-beans leaves and shown to have the structures 2,3-di-0-linolenoyl-1-0-β-D-galactopyranosyl-D-glycerol (I), and 2,3-di-0-linolenoyl-1-0-β-(6-0-α-D-galactopyranosyl-D-galactopyranosyl)-D-glycerol (II), respectively. A cerebroside fraction has also been isolated and found to contain glucose as sole sugar constituent; α-hydroxy acids (chiefly α-hydroxypalmitic, α-hydroxy-C_{22} and α-hydroxy-C_{24} acids) were the only fatty acids present, and the long-chain bases consisted chiefly of C_{18}-dehydrophytosphingosine with small amounts of C_{18}-phytosphingosine, C_{18}-dihydrosphingosine, and an isomer of C_{18}-sphingosine. The lecithin fraction was isolated in pure form and found to contain palmitic (27%), stearic (6%), oleic (4%), linoleic (38%), and linolenic (26%) acids; almost all the saturated acids were found to be in the α-position.

TRIGLYCERIDE ACCUMULATION AND RELEASE IN THE RARE-EARTH FATTY LIVER. F. Snyder and G. C. Kyker (Oak Ridge Institute of Nuclear Studies, Med. Div., Oak Ridge, Tenn.). *Proc. Soc. Exp. Biol. Med.* **116**, 890–93 (1964). It has been demonstrated

that the reduction in the release of esterified fatty acids from the liver is an insignificant factor in the mechanism of the rare-earth fatty liver. Intravenous cerium in rats caused the fatty acid composition of total liver lipids to become similar to that of adipose tissue even before the detection of the massive accumulation of fat in hepatic cells. This change is explained on the basis of the fatty acid composition of the triglycerides that accumulate in the liver.

CARCINOGENIC EFFECT OF ETHER EXTRACT OF WHOLE EGG, ALCOHOL EXTRACT OF EGG YOLK AND POWDERED EGG FREE OF THE ETHER EXTRACTABLE PART IN MICE. J. Szepsenwol (Dept. of Anatomy, Univ. of Puerto Rico School of Med., San Juan, Puerto Rico). *Proc. Soc. Exp. Biol. Med.* **116**, 1136–39 (1964). Mice of the T.M. strain were maintained from the age of 4 weeks on the Rockland rat diet (Group 1) supplemented with ether extract of whole powdered egg (Group 2), alcohol extract of egg yolk (Group 3) or with whole powdered egg from which the ether extractable part was removed (Group 4). The mice of the 4 groups were bred and their offspring maintained on the same diets. Each of the groups, consequently, consisted of mice of 5 to 6 generations. The results were: The mice of all 3 experimental groups developed a high incidence of malignancies, varying from 74.3% to 79.5%, as compared with the 15.9% of Group 1, the control. The incidence of the different malignancies was not the same in the mice on the diet supplemented with ether extract of whole egg as in those receiving alcohol extract of egg yolk or powdered egg from which the ether extractable part was removed.

SELENIUM-75 METABOLISM IN THE GESTATING EWE AND FETAL LAMB: EFFECTS OF DIETARY α-TOCOPHEROL AND SELENIUM. P. L. Wright and M. C. Bell (Agr. Res. Lab., Univ. of Tenn., Oak Ridge, Tenn.). *J. Nutr.* **84**, 49–57 (1964). Forty-eight pregnant ewes were fed a purified ration containing urea as the sole nitrogen source. Selenium and α-tocopherol were added separately and in combination to the basal ratio. Serum glutamic oxaloacetic transaminase (SGO-T) in young pregnant ewes was increased after the animals had received the α-tocopherol-deficient ratio for 9 weeks; selenium delayed but did not prevent this increase. No changes in SGO-T values were observed in the aged ewes during the 18-week experimental period. Selenium supplementation reduced the apparent adsorption of an oral dose of Se and increased the urinary Se excretion. Very high concentrations of radioselenium were noted in kidney and spleen samples from the selenium-deficient ewes, implicating these tissues as prime areas of importance in selenium metabolism. Intracellular particulate matter separations revealed an increase in Se content of the liver microsomes and kidney nuclei in tissues from selenium-deficient ewes.

BIOCHEMICAL PROCESSES INVOLVING THE TRANSFORMATION OF SATURATED HIGHER FATTY ACIDS INTO UNSATURATED ACIDS. E. LeBreton and P. LeMarchal (CNRS cancer Study Center, Paris, France). *Riv. Ital. Sostanze Grasse* **41**, 203–9 (1964). Current trends of thought on the role of essential fatty acids are reviewed.

THE PRECIPITATION OF RAPESEED PROTEINS FROM ALKALINE SOLUTIONS WITH DILUTED ACIDS. J. Pokorný, M. Vodička and J. Zalud (Inst. Chem. Tech., Prague). *J. Inst. Chem. Tech. Prague* **7–2**, 167–72 (1963). Strong mineral acids forming non-toxic sodium salts are more suitable for the precipitation of protein from alkaline extracts of rapeseed meal than weak acids such as acetic acid. The addition of acids must be adjusted accurately to the isoelectric point. The volume of the acid solution depends on the concentration of the nitrogen-containing compounds in the extract, the yield being a little lower in the case of more concentrated extracts. The temperature (18–40C) and the age of the solution (1 to 80 hr) do not affect the yield of precipitated protein.

THE "FREE LIPIDS" OF BRUCELLA ABORTUS BANG I: INVESTIGATION OF THE PHOSPHATIDE. W. Wober, O. W. Thiele and B. Urbaschek (Physiologisch-Chem. Inst. der Univ., Gottingen, Tierhygienisches Inst., Freiburg i. Br., Deutschland). *Biochim. Biophys. Acta* **84**, 376–390 (1964). *Brucella abortus* Bang was grown aerobically on glycerol-thionin-agar. The "free-lipids" extracted from these bacteria (yielding 1% of dry wt) inhibit the Schultz-Dale reaction in the brucellose system. The acetone-insoluble part was separated by column chromatography under thin-layer chromatographic control. According to appearing or disappearing of a component in the thin-layer chromatogram the fractions obtained by column chromatography were combined to form 30 collective fractions. By preparative thin-layer chromatography 7 aminophosphatides were isolated from the column-chromatographic fractions. Phosphatidylethanolamine, phosphatidylserine, lecithin and lysolecithin were identified. One of the remaining 3 phosphatides contains ethanolamine, two contain choline among their hydrolysis products. Among the component fatty acids of the 7 phosphatides, saturated acids predominate, especially palmitic acid. Monoethenoic acids and octadecadienoic acid are also present in low concentrations and perhaps saturated methyl-branched C_{17}, C_{19} and C_{21} acids.

STUDIES ON THE GANGLIOSIDE MICELLE. R. E. Howard and R. M. Burton (Dept. of Pharmacology and the Beaumont-May Inst. of Neurology, Wash. Univ. Schl. of Med., St. Louis, Mo.). *Biochim. Biophys. Acta* **84**, 435–440 (1964). The molecular weight of β-ganglioside was measured by vapor pressure depression in a number of different solvents. The molecular weight was found to be near 1665, corresponding to a structure containing sphingosine, stearic acid, glucose, galactose, N-acetylgalactosamine and two N-acetylneuraminic acid residues. In aqueous solution, the ganglioside was associated to form a micelle structure with an aggregate weight of 200,000 or greater. The critical micelle concentration was found to be $1.0 \cdot 10^{-5}$ M.

GANGLIOSIDES AND ACETYLCHOLINE OF THE CENTRAL NERVOUS SYSTEM. R. M. Burton, R. E. Howard, Stanley Barr and Yvonna M. Balfour. *Ibid.*, 441–447. Both gangliosides and bound acetylcholine are higher in grey matter than in white. The subcellular distributions of these two compounds appear to be parallel in rat brain, occurring primarily in the crude mitochondrial fraction and upon further fractionation both gangliosides and bound acetylcholine appear in the pinched-off nerve ending fraction. The synaptic vesicle fraction isolated

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after disruption of the nerve endings by osmotic shock contains both acetylcholine and gangliosides. This parallel distribution and the physical properties of gangliosides suggest a functional role for gangliosides in the transport of acetylcholine from synaptic vesicles through the presynaptic membrane.

THE UTILIZATION OF 1- AND 2-MONOGLYCERIDES FOR INTESTINAL TRIGLYCERIDE BIOSYNTHESIS. J. L. Brown and J. M. Johnston (Dept. of Biochem., Univ. of Texas, Southwestern Med. Schl., Dallas, Texas). *Biochim. Biophys. Acta* **84**, 448–457 (1964). Evidence for the intact utilization of 2-monopalmitin for triglyceride biosynthesis by the intestines has been obtained. The enzymes catalyzing the conversion of both the 1- and 2-monoglycerides to triglycerides reside primarily in the microsomes. One enzyme, monoglyceride transacylase (acyl-CoA-monoglyceride acyltransferase), accepts both the 1- and 2-isomers. The enzyme demonstrates a preferential utilization of the 2-monoglyceride. The interrelationships of the reported finding to the absorption of fats is presented.

THE OCCURRENCE AND METABOLISM IN VITRO OF UNESTERIFIED FATTY ACID IN MOUSE BRAIN. C. W. Rowe (Dept. of Physiology, The Med. Schl., Univ. Birmingham, Birmingham, Gt. Brit.). *Biochim. Biophys. Acta* **84**, 424–434 (1964). A method has been developed for the isolation and estimation of unesterified fatty acid in tissue extracts. It is based on treatment of extracted lipid with diazomethane followed by isolation of the methyl esters by thin-layer chromatography on alumina. Mouse brain contains appreciable quantities of unesterified fatty acid, principally palmitic, stearic, oleic and arachidonic acids. When mouse brain was incubated with sodium acetate-I-C^{14} for periods up to 6 h, 28–66% of the incorporated acetate was converted into unesterified fatty acid. Of the principal acids, acetate was incorporated only into palmitic.

FAT-EMULSIFYING PROPERTIES OF PRERIGOR AND POSTRIGOR PORK PROTEINS. J. C. Trautman (Res. Lab., Oscar Mayer & Co., Madison, Wisconsin). *Food Tech.* **18**, 121–2 (1964). The rate of fat-emulsion separation has been used to study the relative emulsifying capacity of ham muscle proteins. Salt-soluble proteins have been shown to be the major emulsifying components in ham muscle and are greatly influenced by time post-mortem. The water-soluble proteins and salt-insoluble residue possess very little emulsifying power.

BIOPOTENCY OF *l*-α-TOCOPHERYL ACETATE FOR THE RAT. L. A. Witting and M. K. Horwitt (L. B. Mendel Res. Lab., Elgin State Hosp., Elgin, Ill.). *Proc. Soc. Exp. Biol. Med.* **116**, 655–8 (1964). The *l* epimer of α-tocopheryl acetate appears to have approximately 20% of the biological activity of the d epimer in the rat by the criteria of growth and delay in onset of creatinuria as a sign of nutritional muscular dystrophy. The *l* epimer alone can replace d-α-tocopherol but only if sufficient is supplied. No evidence of synergism or sparing action was observed.

IN VIVO SYNTHESIS OF CERTAIN LOW MOLECULAR WEIGHT MILK FATTY ACIDS. R. A. Ahrens and J. R. Luick (Dept. of Animal Husbandary, Univ. of Calif., Davis, Calif.). *J. Dairy Sci.* **47**, 849–54 (1964). Ten lactating dairy cows were given 1-C^{14} and 2-C^{14} acetate and 1-C^{14}, 2-C^{14} and 3-C^{14} butyrate by intravenous injection in a series of separate investigation. Butyric, caproic and caprylic acids were isolated from the milk fat produced at 3 and 10 hr after injection and were degraded to determine their intramolecular C labeling patterns. Low molecular weight milk fatty acids are synthesized via the successive addition of two carbon units. The carboxyl carbon of the primary precursor—presumably Acetyl CoA—retains its identity as the carboxyl carbon of the higher milk fatty acids. Carbon chain elongation seems to proceed at the methyl end of the primary precursor and of each successive two carbon homologue. The four carbon skeleton of butyrate may be utilized as such for the synthesis of the lower milk fatty acids. It appears that this is a relatively minor pathway of butyrate metabolism—the major pathway being beta oxidation to Acetyl CoA molecules which are, in turn, used for fatty acid synthesis.

TOCOPHEROL ASCORBATES. A. N. Spannel (International Latex Corp.). *U.S. 3,151,127.* Described is a vitamin E-active ascorbate ester of a vitamin E-active tocopherol.

METHODS OF REDUCING PLASMA CHOLESTEROL. D. K. Bosshardt, E. E. Howe and J. W. Huff (Merck & Co., Inc.). *U.S. 3,153,615.* A method of lowering the cholesterol content of mammalian plasma comprises incorporating in the diet from 0.05 to 1.0% of lithocholic acid, based on the weight of the diet.