ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarcyk, J. E. Covey, J. G. Endres, J. Iavicoli, F. A. Kummerow, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• *Fats and Oils*

OXIDATION OF β-CAROTENE. SITE OF INITIAL ATTACK. A. H. El-Tinay and C. O. Chichester (Univ. of Rhode Island, Kingston, R.I. 02881). *J. Org. Chem.* 35, 2290–93 (1970). The reaction between β-carotene and molecular oxygen in toluene at 60C was investigated. A linear relation was found between the loss in β-carotene and time. The reaction rate increased with increasing temperature. The activation energy, E_a, for the oxidation of β-carotene was found to be 10.2 kcal/mol. Though free-radical initiators caused rate enhancement, the kinetics of the reaction and the light absorption characteristics of the reaction solution were altered. This indicated a difference in the mechanism of the reaction in the presence of free-radical initiators. The rate of loss of β-carotene was increased in the presence of cupric ions and decreased in the presence of diphenylamine. The products of the reaction were β-carotene-5,6-monoepoxide and its isomer, β-carotene-5,6,5′,6′-diepoxide, and β-carotene-5,8-monoepoxide and its isomer, β-carotene-5,8,5′,8′-diepoxide. The reaction mechanism was proposed.

THIN-LAYER CHROMATOGRAPHY OF TISSUE LIPIDS WITHOUT EXTRACTION. G. D. Cherayil, and K. S. Scaria (Dept. of Pathol., Marquette School of Med., Milwaukee, Wis. 53233 and Dept. of Biol., Mt. St. Paul College, Waukesha, Wis. 53186). *J. Lipid Res.* 11, 378–81 (1970). Frozen tissue sections were applied directly to silica gel plates, and the lipids were separated by developing the plates in different solvent systems. Quantitation of the lipid classes was achieved by direct transmission densitometry after the plates were treated with a chromic acid-sulfuric acid spray.

INFLUENCE OF THE DEEP-FAT FRYING MEDIUM OF THE ACCEPTABILITY AND STABILITY OF GLANDLESS COTTONSEED KERNELS FOR USE AS A HIGH-PROTEIN, LOW-COST EDIBLE NUT. J. T. Lawhon, C. M. Cater and K. F. Mattil (Texas A&M Univ., Oilseed Products Res. Center, College Station, Texas 77843). *Food Technol.* 24, 817–19 (1970). Glandless cottonseed kernels were deep fat fried in corn oil, cottonseed oil, peanut oil, safflower oil, soybean oil and sunflower oil under optimum conditions to produce a high-protein nut-like product known as Tamunuts. The third and fifth fryings in each oil were tested in storage at 100F. These fries were organoleptically evaluated by a laboratory taste panel after 0, 1, 2, 3, 4 and 5 weeks in storage. Stored kernels developed some rancidity by the end of the 3rd week.

TIME-TEMPERATURE PATTERNS DURING DEEP FAT FRYING OF CHICKEN PARTS AND THEIR RELATION TO THE SURVIVAL OF SALMONELLA. M. S. Mabee and G. J. Mountney (Ohio Agr. Res. and Develop. Center, Columbus, Ohio 43210). *Food Technol.* 24, 808–11 (1970). Internal temperature patterns of chicken legs, breasts and wings coated with batter and deep fat fried for 11 min at atmospheric or 15 lb gauge pressure from frozen (19F), refrigerated (53F) and room temperature (77F) states were determined. In one trial the survival of cultures of *S. senftenberg* 775W inoculated into 18 representative chicken parts and deep fat fried at atmospheric and 15 lb pressure was determined. *S. senftenberg* 775W was not recovered from inoculated chicken legs, breasts or wings deep fat fried at atmospheric or 15 lb pressure from any of the initial temperature states. It was recovered from the uncooked control groups.

ANALYSIS OF HIPTAGE MADABLOTA SEED OIL. R. C. Badami and S. M. Kudari (Karnatak Univ., Dharwar, India). *J. Sci. Food Agr.* 21, 248–9 (1970). *Hiptage madablota* seed kernels yield a pale yellow oil (67.0%) which is rich in ricinoleic acid (70.0%). The seed oil also contains the following acids: caprylic, capric, myristic, palmitic, stearic, oleic, linoleic, arachidic and behenic.

THE CHANGING SCENE IN LIPID RESEARCH. B. J. F. Hudson (Unilever Research Lab., Sharnbrook, England). *Chem. Ind. (London)* 252–9 (1970). A review.

NON-FOOD USES OF PROTEINS OBTAINED FROM OIL BEARING SEEDS. A. Lanzani and G. Jacini (Fats and Oils Exper. Station, Milan, Italy). *Riv. Ital. Sostanze Grasse* 47, 181–6 (1970). A review.

NEW TECHNOLOGICAL PROSPECTS FOR THE PRESERVATION OF OLIVES PRIOR TO EXTRACTION. G. Petruccioli, G. Montedoro and C. Cantarelli (Univ. of Perugia, Perugia, Italy). *Riv. Ital. Sostanze Grasse* 47, 150–6 (1970). Experimental results are reported on several techniques for preserving olives prior to extraction. Preservation is possible for at least 90 days if the fruits are immersed in acid, alkaline or salt solutions, or kept under an atmosphere of NH_3 or $CO_2 + SO_2$.

THE PHYSICAL REFINING OF OLIVE OIL. C. Carola (Fats and Oils Exper. Station, Milan, Italy). *Riv. Ital. Sostanze Grasse* 47, 192–210 (1970). Technological aspects of olive oil refining, especially steam distillation, are discussed.

BIOCHEMICAL AND BIOLOGIC IMPORTANCE OF ELAIDINIC ACID AND OF TRANS ACIDS. E. Le Breton and P. Lemarchal (Groupe Lipides et Nutrition, Paris, France). *Riv. Ital. Sostanze Grasse* 47, 231–40 (1970). A review is offered of the nutritional and biochemical aspects associated with elaidinic and *trans* acids, leading to the conclusion that *trans* acids are entirely harmless to animals and human beings.

NATURAL OCCURRENCE, PROPERTIES, ORIGINS AND BIOCHEMICAL ASPECTS OF TRANS ACIDS. F. Camurati, N. Cortesi and G. Favini (Fats and Oils Exper. Station, Milan, Italy). *Riv. Ital. Sostanze Grasse* 47, 241–7 (1970). A review.

HYDROTROPE REFINING OF TALLOW. E. Fedeli and G. Jacini (Fats and Oils Exper. Station, Milan, Italy). *Riv. Ital. Sostanze Grasse* 47, 147–9 (1970). Operational details concerning the refining of tallow in the presence of a hydrotrope (sodium xylene sulfonate) have been investigated, including optimum hydrotrope content of the neutralizing solution and optimum hydrotrope/free acid ratio.

PHYSICO-CHEMICAL STUDIES OF SOYBEAN OIL OXIDATION. J. Sliwiok and T. Kowalska (Silesian Univ., Katowice, Poland). *Riv. Ital. Sostanze Grasse* 47, 126–8 (1970). Experimental results on soybean oil oxidation are reported. The presence of ZnO was found to affect the course of the oxidation reaction.

THE ACCELERATING EFFECT OF PHOSPHORIC ACID ON HETEROGENEOUS CATALYTIC FAT HYDROGENATION. D. S. Raju, N. C. Rao, M. R. Subbaram and K. T. Achaya (Regional Res. Lab., Hyderabad, India). *Chem. Ind. (London)* 1970, 237–8. Experimental results are reported concerning the accelerating effect of phosphoric acid (at levels of 0.033% to 0.1%) on the heterogeneous catalytic hydrogenation of groundnut oil. The results also show that the peak in trans acids content is reached faster and is at a lower trans acids content in the presence of phosphoric acid than in the control.

ISOPRENOID FATTY ACIDS IN ANTARCTIC KRILL (EUPHAUSIA SUPERBA). R. P. Hansen and S. M. Meiklen (Dept. of Scientific and Industrial Res., Wellington, New Zealand). *J. Sci. Food Agr.* 21, 207–10 (1970). In an attempt to elucidate the origin of phytanic (3,7,11,15-tetramethylhexadecanoic), pristanic (2,6,10,14-tetramethylpentadecanoic) and 4,8,12-trimethyltridecanoic acids found in small quantities in whales, the fatty acid composition of Antarctic krill (*Euphausia superba* Dana) was determined. Phytanic acid was found to be present to the extent of 1.4% of the total fatty acids, and was isolated and identified. Two other isoprenoid acids, pristanic (0.04%) and 4,8,12-trimethyltridecanoic acid (0.05%) were detected by GLC. *E. superba* constitute almost exclusively the diet of whales in Antarctic waters and the phytanic acid in whale oils is probably derived from ingested krill which presumably biosynthesize this acid from the phytol moiety of chlorophyll present in the diatoms on which these planktonic crustaceans live.

INVESTIGATIONS ON THE CONTENT OF AROMATIC HYDROCARBONS IN OLIVE OIL. W. Ciusa, V. D'Arrigo and G. Marchesini (Univ. of Bologna, Bologna, Italy). *Riv. Ital. Sostanze*

Grasse **47**, 114–9 (1970). The analysis of aromatic polycyclic hydrocarbons in olive oil has been conducted by means of two different techniques, one involving chromatography on alumina and the other extraction with aqueous dimethylformamide. The fact that the first method yielded clearly superior results is attributed to a possible deficiency by the second method in extracting hydrocarbons which are somehow bound to triglycerides. It has been confirmed that polycyclic hydrocarbons are present in olive oil at a level of 500–700 μg/kilo.

PROCESSING OF INDIAN SWEET ORANGE SEED. R. Y. A. Khan, R. K. Viswanadham and S. D. T. Rao (Oil Tech. Res. Inst., Anantapur, India). *Riv. Ital. Sostanze Grasse* **47**, 262–4 (1970). Experiments on the utilization of mandarin orange seeds are reported. The seeds were processed by crushing, yielding 21–25% of a greenish-brown oil having a bitter taste and a pleasant odor reminiscent of the fruit. Alkali treatment almost completely removed the bitter flavor and bleaching was effective in producing oil of a light yellow color.

SOME PROBLEMS RELATING TO THE TRANSPORT OF TROPICAL OIL SEEDS TO EUROPE. J. G. Wiegand (Oliefabrieken Zwijndrecht N.V., Zwijndrecht, Holland). *Riv. Ital. Sostanze Grasse* **47**, 248–51 (1970). The method used for transporting oil seeds from the producing countries can and does at times have an adverse effect on oil quality. Experimental data and suggestions for quality improvement are presented.

COMPOSITION OF THE UNSAPONIFIABLE FRACTION OF CYPERUS AESCULENTUS TUBER OIL. E. Fedeli and N. Cortesi (National Center for Lipochem., Milan, Italy). *Riv. Ital. Sostanze Grasse* **47**, 252–3 (1970). The unsaponifiable fraction of *Cyperus aesculentus*, an oil-bearing tuber, is composed of three classes of compounds: hydrocarbons, terpenes and sterols. Each of these classes has been studied by GLC and the components have been identified by comparison with model substances.

FURTHER INVESTIGATIONS ON THE COMPOSITION OF THE WAX ISOLATED FROM SUNFLOWER HUSKS. A. Popov, M. Dodova-Anghelova, C. P. Ivanov and K. Stefanov (Inst. of Chem. Tech., Sofia, Bulgaria). *Riv. Ital. Sostanze Grasse* **47**, 254–6 (1970). Wax isolated from sunflower husks consists of 25% hard and 75% liquid wax. The hard wax contains 8.7% unsaturated fatty acids (C11–C24), 16.3% saturated fatty acids (C11–C32), 9% hydrocarbons (C15–C35) and 66% alcohols (C17–C32).

METHOD FOR THE PREPARATION OF CONFECTIONERS' FATS. C. F. Brown and C. M. Gooding (CPC International Inc.). *U.S. 3,512,994*. Confectioners' fats are prepared by interesterifying, in the presence of a catalyst, a lauric fat with one or more alkyl esters of fatty acids having 12, 14 or 16 C atoms. The interesterification reaction is permitted to reach a state of equilibrium, after which the mixture is brought to an unreactive state by removal or destruction of the catalyst. The new alkyl esters resulting from the reaction are removed from the final mixture and the resultant new triglycerides, which are useful as confectioners' fats, are recovered.

CONTINUOUS PROCESS OF PREPARING POWDERED FAT. R. L. Campbell, Jr., C. H. Wood and A. E. Brust (Anderson, Clayton & Co.). *U.S. 3,514,297*. A continuous process is described for preparing powdered fats by spraying liquid droplets of fat onto a cool surface where they solidify prior to their being able to run together and form a continuous film. The solid fat is then removed from the cool surface and ground into a powder.

SPRAY-DRYING A FAT-CARBOHYDRATE COMPOSITION. P. P. Noznick and C. W. Tatter (Beatrice Foods Co.). *U.S. 3,514,298*. Stable aqueous emulsions of a carbohydrate and fat containing large amounts of fat are obtained by employing a partial ester of a higher fatty acid and a polyglycerol even without the use of a protein. A small amount of protein, up to 2%, can also be included, as well as colloidal carbohydrate stabilizer in amount up to 5%. The products can be spray-dried.

SELECTIVE HYDROGENATION OF SOYBEAN OIL WITH SUPPORTED COPPER CATALYSTS. S. Koritala (U.S. Sec'y of Agric.). *U.S. 3,515,678*. Extremely active and selective hydrogenation catalysts consist of copper deposited either on micronized silica having a high content of surface hydroxyl groups or on molecular sieve zeolites having pore sizes of either 4 A or 10 A.

THE POLYMORPHISM OF ODD AND EVEN SATURATED SINGLE ACID TRIGLYCERIDES, C_8-C_{22}. E. S. Lutton and A. J. Fehl (Miami Valley Labs., The P & G Co., Cincinnati, Ohio 45239). *Lipids* **5**, 90–9 (1970). The polymorphism of single fatty acid odd triglycerides, C_{11} through C_{17}, has been reinvestigated with extension of the study to C_9, C_{19} and C_{21}. With study of the even glycerides C_8, C_{20} and C_{22} it has been possible to review the whole series (odd and even) C_8 through C_{22}. The odd glycerides resemble the even in showing three distinct melting levels. Lowest melting forms are α. Stable forms are β except for C_9 and C_{11} which show a different structure type. Intermediate melting β' forms of odd glycerides are substantially more stable than their even counterparts as well illustrated by differential thermal analysis.

CHOLESTEROL ESTERS OF MILK AND MAMMARY TISSUE. T. W. Keenan and S. Patton (Lipids Lab., Div. of Food Sci. and Industry, Penn. State Univ., University Park, Penn. 16802). *Lipids* **5**, 42–8 (1970). The fatty acid composition and metabolic activity of cholesterol esters in milk and mammary tissue (cow, sow and goat) were investigated. Cholesterol esters of freshly secreted milks incubated at 40C for 2 hours showed no

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change in fatty acid composition and no incorporation of 1-^{14}C-palmitate. The fatty acid composition of cholesterol esters in the milk of all three species exhibited comparatively elevated levels of monounsaturated acids and acids with odd numbers of carbons. Tissue cholesterol esters contained lower levels of these acids. Infusion experiments indicated that this group of unique acids is preferentially retained in the cholesterol ester fraction which is secreted with milk. These experiments also provided evidence that cholesterol esters accumulate in developing milk fat globules in a manner paralleling triglyceride accumulation, and that acyl moieties of cholesterol esters may be desaturated in the form of the intact ester. The results are compatible with the hypothesis that acyl moieties of cholesterol esters in lactating mammary tissue are turning over rapidly.

NOTE ON COLD BATH WITH AN IMMERSIBLE STIRRING ASSEMBLY FOR LOW TEMPERATURE PRECIPITATION OF FAT. S. D. Latham, and T. N. Blumer (Dept. of Food Sci., N. C. State Univ., Raleigh, N. C. 27607). *J. Assoc. Offic. Anal. Chemists* 53, 789–90 (1970). The feasibility of an immersible stirring assembly was investigated for use in the precipitation of fat at low temperatures. Precipitations of this type are useful, for example, in cleanup procedures for the determination of pesticide residues.

DETECTION OF IRRADIATION TREATMENT IN FOODS. W. W. Nawar and J. J. Balboni (Dept. of Food Sci. and Technol., Univ. of Mass., Amherst, Mass. 01002). *J. Assoc. Offic. Anal. Chemists* 53, 726–9 (1970). The major radiolytic hydrocarbons resulting from specific cleavage of fatty acids can be used as indicators of irradiation in fatty foods. Experiments with pork ground meat indicate that these compounds are present in samples irriadiated at doses as low as 0.1 megarad but absent in unirradiated or heated samples. The major radiolytic hydrocarbons reflect the severity of the irradiation treatment, since their production increases linearly with dose and temperature of irradiation. The presence of moisture or air during the irradiation treatment does not significantly alter the radiolytic pattern.

EXTRACTION AND GLC DETECTION OF PENTACHLOROPHENOL AND 2,3,4,6-TETRACHLOROPHENOL IN FATS, OILS AND FATTY ACIDS. G. R. Higginbotham, J. Ress and A. Rocke (Div. of Food Chem. and Technol., FDA, Washington, D.C. 20204). *J. Assoc. Offic. Anal. Chemists* 53, 673–6 (1970). A proposed tentative method for detection of residues of pentachlorophenol and 2,3,4,6-tetrachlorophenol in fats, oils and commercial food grade fatty acids consists of treating a 5.0 gram sample with concentrated sulfuric acid and Celite, followed by a series of liquid-liquid extractions with petroleum ether, aqueous alkali and chloroform. The residue from the final extract, after further treatment with concentrated sulfuric acid, is analyzed by electron capture GLC. Recoveries of the 2 volatile polychlorophenols were low and varied over a wide range; however, the tentative procedure appears to be satisfactory for qualitative detection at the 0.5 ppm level. Several samples of commercial oleic acids contaminated with chick edema factors were analyzed and were found to be contaminated with pentachlorophenol. Further study of the method is recommended.

SODIUM CHLORIDE EFFECT ON AUTOXIDATION OF THE LARD COMPONENT OF A GEL. R. Ellis, A. M. Gaddis, G. T. Currie and F. E. Thornton (USDA Eastern Utilization R & D Div., ARS, Meat Lab., Beltsville, Md. 20705). *J. Food Sci.* 35, 52–6 (1970). Stable gels composed of lard, sodium carbomethoxy cellulose and water were used for the examination of factors involved in the pro-oxidant activities of sodium chloride, heme compounds and other additives. Sodium chloride had a direct pro-oxidant action on the lard of freezer-stored and dehydrated gels, but inhibited the oxidation of hydrated gels at 20C. Heme catalysis was accelerated by sodium chloride.

OXIDATION PRODUCTS OF ALPHA-TOCOPHEROL FORMED IN AUTOXIDIZING METHYL LINOLEATE. A. Saari Csallany, Mei Chiu and H. H. Draper (Div. of Nutritional Biochem., Dept. of Animal Sci., Univ. of Ill., Urbana, Ill. 61801). *Lipids* 5, 63–70 (1970). The oxidation products of ^{14}C-alpha-tocopherol formed by heating with methyl linoleate in an air atmosphere at 60C or 100C were investigated. The products included a dimer, trimer and dihydroxy dimer, alpha-tocopherol quinone and unidentified degradation compounds. The dimer and trimer constituted the major products present after heating for 70 hours at 60C. After 70 hours at 100C most of the ^{14}C-alpha-tocopherol had been converted to degradation products; part of the ^{14}C originally present in the 5-methyl group was recovered as $^{14}CO_2$ and $^{14}CH_3OH$.

Other Committees at Work

1. **Membership**
2. **Communication**
3. **Joint Planning Committee—1972 Spring Meeting**
4. **Membership**
5. **Uniform Methods**
6. **Education**
7. **Membership**
8. **Fats & Oils By-Products**
9. **International Relations**
10. **ISF/AOCS Organizing**
11. **International Relations**
12. **Membership**
13. **Program Planning**
14. **1971 Short Course Committee**
15. **ISF/AOCS Organizing**
16. **Lipids Advisory Board**
17. **International Relations**

EFFECT OF WEIGHT LOSS OF SOLVENT EXTRACTIVES DURING OVEN DRYING UPON CRUDE FAT DETERMINATIONS IN SELECTED MATERIALS. J. T. Gillingham and D. A. Colby (Dept. of Agr. Chem. Services, Clemson Univ., Clemson, S.C. 29631). *J. Assoc. Offic. Anal. Chemists* 53, 804–7 (1970). Selected stock feeds were analyzed for crude fat by the direct (AOAC 22.033) and the indirect (AOAC 22.034) methods. The direct method invariably yielded lower values (about 2% crude fat). The difference between the methods was greatest for silages (about 4.5% crude fat) and it was shown to be due to volatilization of organic acids during drying of the solvent extractive at 100°C. The indirect method is the better approach to valid crude fat determinations. Vacuum drying (22.003) of oil seeds and silage preparatory to extraction was found to effect a weight loss, exclusive of moisture, either by volatilization or decomposition of heat-labile compounds. Titratable organic acids in silages decreased as a result of vacuum drying. It is claimed that preliminary drying of stock feeds, especially silage, should be accomplished by drying over H_2SO_4 (22.007) or by freeze-drying.

POULTRY PRODUCT QUALITY. 2. STORAGE TIME-TEMPERATURE EFFECTS ON CARBONYL COMPOSITION OF COOKED TURKEY AND CHICKEN SKIN FRACTIONS. P. S. Dimick and J. H. MacNeil (Div. of Food Sci. and Industry, Penn. State Univ., University Park, Penn. 16802). *J. Food Sci.* 35, 186–90 (1970). The carbonyl compounds in cooked turkey and chicken skin fractions after storage were isolated as their 2,4-dinitrophenylhydrazones. The monocarbonyl class was separated into methyl ketones, 2-enals and 2,4-dienals and measured spectrophotometrically. The turkey skin residue fraction contained higher concentrations of carbonyls than did the chicken samples. The oil extract from the skin of both groups was similar in carbonyl concentration. Lower storage temperature dramatically lowered the development of carbonyls. Phospholipid phosphorus determinations indicated the residue contained high levels of polar lipid; whereas, negligible amounts were in the oil. Thin-layer chromatography of the carbonyl classes from the skin residue indicated mainly C_7–C_9 2-enals and C_8 and C_9 2,4-dienals in the unsaturated aldehyde fractions. Changes in fatty acid composition of the residue polar lipids during storage suggested linoleic and arachidonic acids as the probable substrates in autoxidative deterioration.

INFLUENCE OF DIETARY TRANS,TRANS-LINOLEATE ON HEMATOLOGIC AND HEMOSTATIC PROPERTIES OF RAT BLOOD. G. Raceuglia (Div. of Hematology, Dept. of Medicine, Univ. of Louisville, Louisville, Ky.) and O. S. Privett. *Lipids* 5, 85–9 (1970). Studies of the comparative effects of a semi-synthetic diet containing

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supplements of corn oil, no fat, linolenate or *trans,trans*-linoleate on blood coagulation parameters are reported. In spite of large differences in fatty acid composition of the tissue lipids of the different groups, the only diets that appeared to produce abnormal hematologic and hemostatic properties were those containing trans,trans-linoleate. These groups of animals showed significant differences from a control group of animals fed Purina rat chow in platelet and fibrinogen concentration, and values for hematocrit and prothrombin time. A positive fibrinolysin test was also obtained in about 50% of the animals fed trans,trans-linoleate.

PRODUCTION AND PROPERTIES OF PENICILLIUM ROQUEFORTI LIPASE. R. R. Eitenmiller, J. R. Vakil and K. M. Shahani (Dept. of Food Sci. & Technol., Univ. of Nebr., Lincoln, Neb. 68503). *J. Food. Sci.* 35, 130–33 (1970). A *P. roqueforti* strain produced maximal amounts of lipase when grown in 0.5% casitone—1% proflo broth, pH 5.5, at 27C. Addition of butteroil, corn oil or olive oil to the growth medium inhibited lipase production. Under pH stasis the partially purified lipase of *P. roqueforti* had an optimum pH of 8.0 and an optimum temperature of 37C. Maximum lipolytic activity occurred with 5% butteroil emulsion as the substrate. Manganese chloride and magnesium chloride stimulated the enzyme activity. Calcium, sodium and potassium salts had no appreciable effect on lipolysis; silver, mercury and zinc salts were inhibitory. The lipase was thermolabile, being inactivated completely within 10 minutes at 50C. The lipase hydrolyzed tributyrin, tricaprylin, tricaprin, tripropionin and triolein in decreasing order.

COLLABORATIVE STUDY OF THE EXTRACTION OF PLANT STEROLS FROM ADULTRATED BUTTER OIL USING A DIGITONIN-IMPREGNATED CELITE COLUMN. D. E. LaCroix (Dairy Prod. Lab., Eastern Utilization R. & D Div., ARS, USDA, Washington, D.C. 20250). *J. Assoc. Offic. Anal. Chemists* 53, 535–8 (1970). A rapid screening method for the analysis of the phytosterol, β-sitosterol, in butter oil adulterated with vegetable oil has been studied collaboratively. The sterols are removed from the adulterated butter oil by passing the sample through a digitonin-impregnated Celite 545 column, eluting the sterols with dimethyl sulfoxide, and analyzing the eluate for β-sitosterol by gas-liquid chromatography using a 3% J X R column. The average coefficient of variation for those samples containing more than 4 mg β-sitosterol/100 g adulterated butter oil is 12.6%. Therefore, β-sitosterol can be used as an index to detect qualitatively vegetable oil adulteration of butter oil.

COMPARISON OF SEPARATION PROCEDURES FOR IDENTIFICATION OF OILS BY GAS CHROMATOGRAPHY. C. W. Thorpe (Div. of Food Chem. & Technol., FDA, Washington, D.C. 20204). *J. Assoc. Offic. Anal. Chemists* 53, 623–8 (1970). Four methods were evaluated for detecting adulteration of butter fat with vegetable fats. The procedures involve GLC determination of free or combined β-sitosterol after isolation of the sterols by either preparative GLC or digitonin precipitation. Each of the methods was sensitive enough to detect about 1 mg added β-sitosterol/100 g butter fat. Also studied was the free and combined β-sitosterol content of a number of crude and refined vegetable oils. The TLC-GLC method for determining cholesterol in fats and oils, which was collaboratively studied in 1968, is being recommended for official first action status. The GLC portion of this procedure replaces the obsolete one in methods 26.065–26.070 for detecting vegetable fats in butter fat.

DETERMINATION OF AFLATOXIN IN COTTONSEED BY FERRIC HYDROXIDE GEL CLEANUP. J. Velasco (Market Quality Res. Div., ARS, USDA, Beltsville, Md. 20705). *J. Assoc. Offic. Anal. Chemists* 53, 611–16 (1970). The procedure for determination of aflatoxin in cottonseed has been simplified by removal of interfering gossypol pigments with ferric hydroxide gel. The need for purification of the aflatoxin fractions through silica gel columns is eliminated, thereby reducing the time and cost of analysis. Greater amounts of aflatoxin B_1 are recovered by this method than by the official AOAC method.

LEVELS OF BROMINATED VEGETABLE OILS IN SOFT DRINKS BY X-RAY FLUORESCENCE SPECTROMETRY AND GAS-LIQUID CHROMATOGRAPHY. H. B. S. Conacher, J. C. Meranger and J. Leroux (Res. Labs., Food & Drug Directorate, Dept. of National Health & Welfare, Ottawa, Ontario, Canada). *J. Assoc. Offic. Anal. Chemists* 53, 572–5 (1970). A rapid screening method using X-ray fluorescence spectrometry has been developed for the detection and semiquantitative estimation of brominated vegetable oils in soft drinks. This method and a quantitative GLC technique have been applied to the determination of the brominated oil content in a wide range of soft drinks. Of 46 drinks examined, 23 contained brominated vegetable oils at levels between 7 and 85 mg/10 fluid ounces of drink.

Honored Student Activities at World Congress →

1. P. R. LeTellier	10. R. F. Lee
2. Breakfast	v1. Breakfast
3. R. F. McGovern	12. Breakfast
4. Breakfast	13. F. D. Dryden
5. Breakfast	14. A. Hsieh
6. F. R. Jacobsberg	15. R. M. G. Hamilton
7. P. R. Sampath	16. J. Moss
8. J. B. Somer	17. M. Silver
9. C. W. Conrad	18. Breakfast

COLLABORATIVE STUDY OF METHODS FOR THE DETERMINATION OF FAT IN CACAO PRODUCTS. P. G. Harrill (Div. of Food Chem. and Technol., FDA, Washington, D.C. 20204) and W. Y. Ibrahim. *J. Assoc. Offic. Anal. Chemists* 53, 490–4 (1970). A collaborative study was conducted comparing the AOAC methods (12.022 method I and 12.023 Method II) for the determination of fat in cacao products with the OICC Soxhlet method and a rapid refractometric method. Six samples of cacao products (breakfast cocoa, vegetable fat coating, cacao nibs, milk chocolate, sweet chocolate, and chocolate liquor) were analyzed by 7 collaborators. Results indicate that the OICC method gives better precision and somewhat lower results than the AOAC method. It is recommended (*1*) that the OICC method as presented, using a final HCl concentration of 4N in the digestion step, be adopted as official first action to replace 12.023 Method II; (*2*) that study be continued to accumulate data needed to correlate the results of the analysis of cacao products by the OICC method and 12.022 Method I; and (*3*) that 12.022 be qualified by a statement "Not applicable to cacao nibs unless finely ground."

CONSECUTIVE CHROMATOGRAPHIC TECHNIQUES IN THE COMPONENT FATTY ACID ANALYSIS OF SARDINE OIL. P. H. Gedam, M. R. Subbaram and J. S. Aggarwal, *Oil Technologists' Assoc. of India: Proc. Silver Jubilee Convention & Symposium on 25 Years of Research & Development in Oils, Fats & Allied Industries 1969, 24.* Use of argentation thin-layer chromatographic and subsequent gas-liquid chromatographic analysis using methyl heptadecanoate as internal standard, coupled with Ackman's method of linear log plot, separation factors and corrections for column and detector response, have enabled detailed quantitative estimation of the fatty acids of an Indian sardine (*Sardinella longiceps*) body oil. The major components are (in wt. %) myristic 10.9%, palmitic 24.9, hexadecanoic 11.1, eicosapentenoic 14.0 and docosahexenoic acid 9.1%. Minor, but significant, amounts of odd-numbered, saturated, monoenoic and polyenoic acids of various chain lengths are also present. (World Surface Coatings Abs. No. 337)

MICROBIAL ASSIMILATION OF HYDROCARBONS: IDENTIFICATION OF PHOSPHOLIPIDS. R. A. Makula and W. R. Finnerty (Dept. Microbiol., Univ. of Georgia, Athens, Ga. 30601). *J. Bacteriol.* 103, 348–55 (1970). The major phospholipids of *Micrococcus cerificans* grown on hexadecane, heptadecane and acetate as sole carbon source were found to be phosphatidyl-ethanolamine, phosphatidyl glycerol and cardiolipin. Minor phospholipids were phosphatidylglycerol phosphate and phosphatidylserine. Trace amounts of methylated derivative of phosphatidylethanolamine were also found.

FATTY ACID DISTRIBUTION IN MESOPHILIC AND THERMOPHILIC STRAINS OF THE GENUS BACILLUS. P. Y. Shen, E. Coles, J. L. Foote and J. Stenesh (Dept. Chem., Western Mich. Univ., Kalamazoo, Mich. 49001). *J. Bacteriol.* 103, 479–81 (1970). The fatty acid distribution of three mesophilic and three thermophilic strains of *Bacillus* were determined. Fatty acid *i*-15:0 was the most abundant in both strains. The second most abundant was *a*-15:0 in the mesophiles and *i*-17:0 in the thermophiles. The fatty acid pair *a*-15:0, *a*-17:0 was much higher in the mesophiles than in the thermophiles. The average

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fatty acid chain length was 15.5 for the mesophiles and 16.0 for the thermophiles. The authors discuss the significance of their results for the lipid theory of thermophily.

LIPIDS OF RHIZOPUS ARRHIZUS Fisher. J. D. Weete, D. J. Weber and J. L. Laseter (Dept. Biology, Univ. Houston, Houston, Tex. 77004). *J. Bacteriol.* 103, 536–40 (1970). The lipids of *Rhizopus arrhizus* mycelia and sporangiospores were examined. The major hydrocarbon was squalene. The polar lipids (44.4%) were found in highest concentration and the triglycerides (22.1%), sterols (16.7%) and free fatty acids (11.7%) were present in lesser concentrations. The major saturated fatty acids in the mycelium were palmitic and arachidic; the major unsaturated acids were oleic and linoleic.

COLLECTION AND EXPLOITATION OF SAL SEEDS. H. Sethi and N. S. Maini (Reg. Office, Oilseeds Devel., Hyderabad, India). *Oils Oilseeds J. (Bombay)* 35, 185–97 (1970). A detailed description is given of past and present research and utilization of a unique seed crop. Sal seed yields about 12.5% fat on solvent extraction. The fat can be bleached and refined. It has properties very similar to borneo tallow and cocoa butter. It can be used for both edible and inedible purposes. The meal is similar in composition to peanut meal and can be used for human feeding.

CHANGES IN WHEAT FLOUR DAMAGED BY MOLD DURING STORAGE EFFECTS ON LIPID, LIPOPROTEIN AND PROTEIN. R. D. Daftary, Y. Pomeranz and D. B. Sauer (Dept. of Grain Science and Ind., Kansas State Univ., U.S.D.A., Manhatten, Kan. 66502). *J. Agr. Food Chem.* 18, 613–16 (1970). Flours with 18% moisture from four wheats were stored for 16 weeks at 23, 30 and 37C. Free lipids decreased more in samples stored at 23 than at 30 or 37C; bound lipids decreased as the temperature of flour storage increased. Residual lipids in all storage-damaged flours contained markedly reduced amounts of polar components and of lipoprotein. The breakdown of bound lipids apparently was accompanied by transformation of polar to nonpolar-like components. The ratio of nonpolar to polar components in residual bound lipids increased as the storage temperature of the flour increased.

• Fatty Acid Derivatives

ISOLATION OF 9,10-EPOXYOCTADECANOL BY COLUMN CHROMATOGRAPHY. B. Y. Rao, P. N. Gautam and C. V. N. Rao (Laxinarayan Inst. of Tech., Nagpur Univ., Nagpur, India). *J. Oil Technologists' Assoc. India* 2, 16–17 (1970). Epoxidized oleyl alcohol (% epoxy oxygen 3.56) when reacted with silver nitrate solution for 2 hours in the dark and then eluted from an alumina column with hexane yielded 66% of 9,10-epoxyocatecanol of high purity (% epoxy oxygen 5.50–5.57, calcd 5.62). Elution from either alumina or silver nitrate impregnated alumina columns gave less satisfactory materials.

PREPARATION OF UNSATURATED HYDRAZIDES BY HYDRAZINOLYSIS. G. M. Kinhikar, B. Y. Rao and C. V. N. Rao (Laxminarayan Inst. of Tech., Nagpur Univ., Nagpur, India). *Fette Seifen Anstrichmittel* 72, 165 (1970). In the past several attempts were made to prepare oleic hydrazide by direct hydrazinolysis of methyl oleate with hydrazine hydrate. In all these studies stearic hydrazide was obtained instead of oleic hydrazide. Recent studies on the mechanism of hydrazine reduction has revealed that the actual reductant is an unstable intermediate produced by oxidation of hydrazine and it has also been shown that hydrazine acts as a reducing agent only in presence of oxygen or an oxidizing agent. Oleic hydrazide was prepared by direct hydrazinolysis in an atmosphere of nitrogen.

INFRARED STUDIES ON ISOMERIC OCTADECADIENOIC ACID ESTERS. A. E. Rheineck and D. D. Zimmerman (Polymer and Coatings Dept., College of Chem. and Physics, No. Dakota State Univ., Fargo, N. D.). *Fette Seifen Anstrichmittel* 72, 80–84 (1970). Glycerol esters of isomeric octadecadienoic acids prepared from dehydrated castor and safflower oils and several commercially available isomerized safflower oils were blended with oils of known compositions and analyzed by standard infrared methods for cis- and trans-isomer content in both isolated and conjugated dienes. The agreement between the analytical data for the known and the unknown mixtures was very good. For conjugated systems the absorptivities agreed with literature reports. Linoleic acid having the isolated cic-cis-structure was derived from naturally occurring oils and converted to the conjugated cis-trans-isomer by the alkali method. Esterification of the latter with glycerol at 190C to 220C showed no appreciable change in isomeric structure. The conjugated trans-trans oils were prepared from the cis-trans isomer with iodine. The isolated trans-trans oil was obtained by treatment of safflower oil with selenium or nitrous acid.

SYNTHESIS OF SOME HYDROXYALKYL GLYCERYL DIETHERS AND THEIR DIESTERS FROM HYDROGENATED CARDANOL. H. P. Kaufman and S. Watanabe (Lab. for Fat Res., Munster/Westf., W. Ger.). *Fette Seifen Anstrichmittel* 71, 1005–6 (1969). A few hydroxyalkyl glyceryl diethers and their diesters could be synthesized by the reaction of sodium salt of hydrogenated cardanol with various hydroxyalkyl chlorohydrinethers, and the latter being prepared by reacting epichlorohydrin with the corresponding glycols.

CYCLOHEXADIENOIC C-18 FATTY ACIDS FROM LINSEED OIL ISOMERIZED WITH POTASSIUM HYDROXIDE IN ETHYLENE GLYCOL. A. N. Sagredos (Unilever Res. Lab., Hamburg, W. Ger.). *Fette Seifen Anstrichmittel* 71, 1061–66 (1969). Cyclic C-18 fatty acids are obtained in 10% yields by the isomerization of linseed oil for 25 minutes with a 6.5% solution of potassium hydroxide in ethylene glycol at 180C. The cyclic acids consist of cyclohexadienoic isomers. The position of the conjugated double bonds was determined.

• Biochemistry and Nutrition

INTRANUCLEAR METABOLISM OF PROGESTERONE-1,2-^{3}H IN THE HEN OVIDUCT. M. D. Morgan and Jean D. Wilson (Dept. of Internal Med., Univ. of Texas Southwestern Med. School at Dallas, Dallas, Texas 75235). *J. Biol. Chem.* 245, 3781–89 (1970). The metabolism of progesterone-1,2-^{3}H has been studied in the estrogen-primed pullet. Following the intravenous administration of the hormone, radioactivity was recovered within 5 min in oviduct magnum, and at all time intervals up to 1 hour approximately one-fourth of the magnum radioactivity was localized within the nuclei of this tissue. Although the metabolism of progesterone-^{3}H to a variety of metabolites is rapid in all tissues studied, progesterone itself and its 5α-reduced derivatives allopregnanedione are the principal compounds identified in magnum cytoplasm and the

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only labeled steroids recovered from oviduct nuclei. The conversion of progesterone to allopregnanedione was shown to take place in magnum nuclei, and this metabolite of progesterone was recovered in significant amounts only in the magnum and shell gland of the oviduct, the comb, and the brain following the intravenous administration of progesterone-1,2-^{3}H. At all times studied progesterone itself is obtained from the magnum, whereas allopregnanedione is the principal radioactive steroid bound to nuclei in the shell gland of the oviduct.

LIPID METABOLISM IN THE PERFUSED CHICKEN LIVER. THE UPTAKE AND METABOLISM OF OLEIC ACID, ELAIDIC ACID, CIS-VACCENIC ACID, TRANS-VACCENIC ACID AND STEARIC ACID. R. Bickerstaffe and E. F. Annison. *Ibid.*, 433–42. Comparative studies were made of the uptake and metabolism of cis- and trans-octadecenoic acids by the perfused chicken liver. No differences were observed in the rates of uptake of the isomers. There was considerable incorporation of radioactivity into triglycerides and phospholipids, and some release of labelled lipid into the perfusate was observed. The cis-fatty acids were more readily incorporated into triglycerides than phospholipids, the reverse being true of the trans-fatty acids. Examination of the intramolecular distribution of fatty acids in triglycerides showed that the trans-fatty acid and stearate mainly occupied the 1- and 3-positions, and cis-fatty acids the 2-position. In the phospholipids phosphatidylcholine and phosphatidylethanolamine the trans-fatty acids again behaved like stearic acid and favoured the 1-position. No evidence was obtained of atypical patterns of uptake or metabolism of the trans-fatty acids.

IMMUNOASSAY OF PLASMA LOW-DENSITY LIPOPROTEINS. R. S. Lees (Clinical Res. Center and Dept. of Nutr. and Food Sci., Mass. Inst. of Technol., Cambridge, Mass. 02139). *Science* 169, 493–95 (1970). An immunoassay was developed for determining the concentration of the protein moiety of the low-density lipoproteins of human plasma. The concentration of this protein in the plasma was variable; it was higher than normal on the average in patients with familial hyperbetalipoproteinemia (type II) and endogenous hyperlipemia (type IV) and lower than normal in patients with fat-induced (type I) and mixed (type V) hyperlipemia. Patients with endogenous hyperlipemia were separable by the immunoassay into those with normal and those with supernormal low-density lipoprotein protein concentration.

PHYSICOCHEMICAL STUDIES ON THE GELATION OF HEN'S EGG YOLK; DELIPIDATION OF YOLK PLASMA BY TREATMENT WITH PHOSPHOLIPASE-C AND EXTRACTION WITH SOLVENTS. S. A. Kumar and S. Mahadevan (Dept. of Biochem., Indian Inst. of Science, Bangalore-12, India). *J. Agr. Food Chem.* 18, 666–70 (1970). A method for the delipidation of egg yolk plasma using phospholipase-C, *n*-heptane and 1-butanol has been described. An aggregating protein fraction and a soluble protein fraction were separated by the action of phospholipase-C. The aggregating protein fraction freed of most of the lipids by treatment with *n*-heptane and 1-butanol was shown to be the apolipoproteins of yolk plasma, whereas the soluble proteins were identified as the livetins. Carbohydrate and the N-terminal amino acid analysis of these protein fractions are reported. A comparison of these protein fractions with the corresponding fractions obtained by formic acid delipidation of yolk plasma has been made. The gelation of yolk plasma by the action of phospholipase-C has been interpreted as an aggregation of lipoproteins caused by ionic interactions. The role of lecithin in maintaining the structural integrity of lipoproteins has been discussed.

NOVEL PREPARATION OF CARDIOLIPIN FROM BEEF HEART. J. Eichberg and J. D. Burham (McLean Hosp., Bilmont, Mass. 02178; Dept. of Biol. Chem., Harvard Med. School, Boston, Mass. 02115). *J. Lipid Res.* 11, 386–88 (1970). A new method is described for the isolation of beef heart cardiolipin. A lipid-protein complex, rich in cardiolipin, is obtained by a one-step solvent fractionation of the tissue total lipid extract. Cardiolipin in the complex is largely freed of protein by salt denaturation and is further purified by gel filtration of Sephadex LH-20 followed by column chromatography on bicarbonate-treated silicic acid. The highly purified product is obtained as the sodium salt in a yield of 85–100 mg/100 g. of fresh tissue.

MEMBRANES OF ANIMAL CELLS. VI. THE GLYCOLIPIDS OF THE L CELL AND ITS SURFACE MEMBRANE. D. B. Weinstein and J. B. Marsh (Dept. of Therapeutic Res., School of Med., Univ. of Penn., Philadelphia, Penn. 19104). *J. Biol. Chem.* 245, 3928–37 (1970). Four glycolipid classes were isolated from mouse fibroblasts (L cells) and accounted for 0.7% of the total cell lipid. Ceramide lactoside was the only neutral glycolipid found and made up 20% of the total glycolipid. Mono- and disialoganglioside accounted for 38% of the cell glycolipid and hematosides containing N-acetylneuraminic and N-glycolylneuraminic acids made up an additional 42%. The L cell glycolipid pattern is similar to that of other fibroblasts but different than that of other extraneural tissues and of brain. Surface membranes of L cells were isolated by the fluorescein-mercuric acetate method. Glycolipids accounted for 0.7% of the total membrane lipid. Only the hematosides and disialoganglioside could be found in the surface membranes. Ceramide lactoside and monosialoganglioside must be located in intracellular membranes. It is suggested that glycolipid content and the specific localization of glycolipids may be useful as criteria for the classification of membranes.

GLYCEROL METABOLISM IN THE NEONATAL RAT. R. G. Vernon and D. G. Walker (Dept. of Biochem., Univ. of Birmingham, P.O. Box 363, Birmingham 15, U.K.). *Biochem. J.* 118, 531–36 (1970). The possible role of glycerol as a precursor in neonatal gluconeogenesis in the rat was investigated by recording the activities of glycerol kinase and L-glycerol 3-phosphate dehydrogenase in the liver, kidney and other tissues around birth and during the neonatal period. Blood glycerol concentrations in the neonatal rat are high. There is a marked increase after birth in the ability of both liver and kidney slices to convert glycerol into glucose plus glycogen that correlates with the increase in glycerol kinase activity. High hepatic and renal L-glycerol 3-phosphate dehydrogenase activities are also found in the neonatal period. The marked capacity for neonatal gluconeogenesis from glycerol is thus demonstrated and the role of glycerol kinase in its control are discussed.

THE SYNTHESIS OF BILE ACIDS IN PERFUSED RAT LIVER SUBJECTED TO CHRONIC BILIARY DRAINAGE. I. W. Percy-Robb and G. S. Boyd (Dept. of Biochem., Med. School, Univ. Edinburgh, Teviot Place, Edinburgh EH8 9AG, U.K.). *Biochem. J.* 118, 519–30 (1970). Isolated rat liver was perfused with heparinized whole blood under physiological pressure resulting in the secretion of bile at about the rate observed *in vivo*. The

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preparation remained metabolically active for 4 h and was apparently normal in function and microscopic appearance. When the perfusate plasma and liver cholesterol pool was labelled by the introduction of mevalonic acid-2-^{14}C the specific radioactivity of the perfusate cholesterol increased. The biliary acids (cholic acid and chenodeoxycholic acid) were labelled and had the same specific radioactivity. Livers removed from rats immediately after, and 40 h after the start of total biliary drainage were perfused; increased excretion rates of both cholic acid and chenodeoxycholic acid were found when the liver donors had been subjected to biliary drainage. The incorporation of mevalonic acid-2-^{14}C or rat lipoprotein labelled with cholesterol-^{14}C into bile acids was studied. A dissociation between the mass of bile acid excreted and the rate of incorporation of ^{14}C was found. This was attributed to the changing specific radioactivity of the cholesterol pool acting as the immediate bile acid precursor.

STEREOSPECIFIC HYDRATION OF THE Δ^9 DOUBLE BOND OF OLEIC ACID. W. G. Niehaus, Jr., A. Kisic, A. Torkelson, D. J. Bednarczyk and G. J. Schroepfer, Jr. (Div. of Biochem., Dept. of Chem. and Chem. Eng., Univ. of Illinois, Urbana, Ill. 61801). *J. Biol. Chem.* 245, 3790–97 (1970). A soluble (105,000 × *g* supernatant) enzyme preparation from a pseudomonad has been obtained which catalyzes the interconversion of oleic acid and 10D-hydroxystearic acid. Evidence compatible with a mechanism involving a hydration of the double bond is presented. The crude enzyme preparation also catalyzes the formation of Δ^{10}-trans octadecenoic acid from either oleic acid or 10D-hydroxystearic acid. The enzyme also catalyzes the formation of 10-hydroxypalmitic acid from palmitoleic acid. The enzyme did not catalyze the formation of an olefinic acid from 9C-hydroxystearic acid.

STEREOSPECIFIC HYDRATION OF CIS- AND TRANS- 9,10-EPOXYOCTADECANOIC ACIDS. *Ibid.*, 3802–9. A soluble enzyme preparation from a pseudomonad which catalyzed the stereospecific hydration of the double bond of a number of cis-Δ^9-olefinic fatty acids has been shown to catalyze the stereospecific conversion of cis- and trans-9,10-epoxy-stearic acids to threo- and erythro-9,10-dihydroxystearic acids, respectively. In both cases only one isomer of each of the incubated racemic substrates was utilized by the enzyme and only one isomer of each of the threo- or erythro-9,10-dihydroxystearates was formed. The results of incubations of the cis- and trans-9,10-epoxystearic acids in water enriched with respect to ^{18}O indicated that the enzyme-catalyzed hydration of the epoxide functions occurred with stereospecific incorporation of the oxygen of water at carbon atom 10. The bacterial enzyme also catalyzed the conversion of cis-9,10-epoxypalmitic acid to 9,10-dihydroxypalmitic acid.

ENZYMATIC CONVERSION OF LINOLEIC ACID TO 10D-HYDROXY-Δ^{12}-CIS-OCTADECENOIC ACID. G. J. Schroepfer, Jr. and W. G. Niehaus, Jr. (Div. of Biochem., Dept. of Chem. and Chem. Eng., Univ. of Illinois, Urbana, Ill. 61801). *J. Biol. Chem.* 245, 3798–3801 (1970). A soluble enzyme preparation from a pseudomonad was shown to catalyze the conversion of linoleic acid to 10D-hydroxy-cis-Δ^{12}-octadecenoic acid. The assignment of structure was based upon chromatographic studies, infrared spectroscopy, optical rotation studies, and, to a major extent, mass spectrometry, including combined gas-liquid chromatography-mass spectrometry, high resolution mass spectrometry, and the preparation of deuterium-labeled derivatives prior to mass spectrometry.

INVESTIGATIONS ON THE SYNTHESIS AND HYDROLYSIS OF GLYCERIDES IN MILK AND SOMATIC CELLS OF MILK USING ISOTOPIC TECHNIQUE. M. Korhenen, A. Luhtala, M. Antila and E. H. Koskinen (Inst. for Milk Res. Univ. Helsinki, Helsinki, Finland). *Fette Seifen Anstrichmittel* 72, 310–15 (1970). Using isotopic technique it was established that the synthesis and hydrolysis of glycerides occur simultaneously in fresh milk. The extent of synthesis is considerably increased by homogenizing the reaction mixture using an Ultra-Turax equipment, although the hydrolysis remains the predominant reaction. No relationship was observed between the synthesis and hydrolysis. However, the extent of glyceride synthesis was directly related to the number of milk cells. Simultaneously, the glyceride synthesizing and hydrolyzing activities were exhibited by milk cells, although the cells alone are not responsible for the synthesis. The synthesizing and hydrolyzing activities of the cells are mainly of intracellular nature. The hydrolytic activity is considerably stronger and its action is specific towards the short chain fatty acids.

LIPIDS OF ATHEROSCLEROTIC ARTERY. THE CAUSE OF ATHEROSCLEROSIS FROM THE VIEWPOINT OF FAT CHEMISTRY. K. Kukuzumi (Dept. App. Chem., Fac. of Eng., Nagoya University, Nagoya, Japan). *Fette Seifen Anstrichmittel* 71, 953–57 (1969). In order to explain the cause of atherosclerosis the author has presented a hypothesis that "the oxidized fats form complex with the protein in aorta vessel, and then the lipids, such as cholesterol or cholesterol esters, are deposited around the complex in the artery." The findings of the author as well as the results of other workers are in accord with this hypothesis.

FREE FATTY ACIDS IN CULTURED CELLS. Barbara V. Howard and D. Kritchevsky (Wistar Inst. of Anatomy and Biol., Philadelphia, Penn. 19104). *Lipids* 5, 49–55 (1970). A method for isolation and quantitation of cellular free fatty acid has been developed. When this method was used to quantitate the free fatty acid content of various cells and tissues, their levels of free fatty acids were found to vary over a wide range. In comparing tissue culture cells having different levels of free fatty acid, it was demonstrated that the conditions of culture and the type of serum in the medium are not responsible for the difference in levels. Isotopic studies have shown that the cellular free fatty acid is not biosynthesized, but is derived from the free fatty acid of the medium. Preliminary studies on the fate of the intracellular free fatty acid and a discussion of possible factors controlling the level of this compound in cells are presented.

NEW DAIRY FOODS, OPPORTUNITIES AND OBSTACLES. B. H. Webb (Dairy Prod. Lab., Eastern Utilization R. & D Div., Washington, D.C.). *Food Eng.* 42(8), 104–13 (1970). Processors are urged to meet the competition of non-dairy imitations. Many new-product possibilities are listed in eight categories of dairy foods with the potential advantages and problems of each.

METABOLISM OF PHOSPHOLIPID 2-LINKED FATTY ACIDS DURING THE RELEASE OF MEMBRANE FRAGMENTS FROM HAEMOPHILUS PARAINFLUENZER BY ETHYLENE-DIAMINETETRAACETIC ACID-TRIS (HYDROXYMETHYL) AMINOMETHANE. A. N. Tucker and D. C. White (Dept. Biochem., Univ. Kentucky Med. Center, Lexington, Ky. 40506). *J. Bacteriol.* 103, 329–34 (1970). Membrane fragments containing diacyl phospholipids were released from viable cells of *H. parainfluenzae* during incubation in EDTA-Tris buffer. The phospholipids located in the part of the membrane that was released during the EDTA-Tris treatment had markedly different proportions of fatty acids than the lipids remaining in the cell residue. Very little metabolism of

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the 1-linked fatty acid occurred. After a short pulse with ^{14}C, the specific activity of the 1-linked fatty acid was lower in the phospholipids released than in the phospholipids of the residue, indicating an earlier time of synthesis of those lipids released in the membrane fragments. During the EDTA-Tris treatment, the 2-linked fatty acid was metabolized. This metabolism may have involved phospholipase A_2 which stimulates the synthesis of fatty acids and the transfer of acyl groups to the lysophospholipid.

PLASMA TURNOVER OF S_f 0–9 LOW-DENSITY LIPOPROTEIN IN NORMAL MEN AND WOMEN. P. J. Hurley and P. J. Scott (Medical Unit, Auckland Hosp., Auckland, N.Z.). *Atherosclerosis* 11, 51–76 (1970). Experiments were performed to investigate the lower plasma low-density lipoprotein concentrations seen in premenopausal female populations compared with men or older women. Turnover studies were performed on normal subjects, using their own low-density lipoprotein radioiodinated in the peptide component. In men and young women, serum low-density lipoprotein levels had no correlation with fractional catabolic rates, but did correlate with absolute catabolic rates, suggesting that a fixed proportion of the plasma pool may be catabolised daily (although at different rates between the sexes). Results from the 3 older women suggested that a simple relationship between serum low-density lipoprotein levels and absolute catabolic rate may not apply to all age groups. Possible mechanisms of lipoprotein metabolism are discussed in the light of these results.

THE DISTRIBUTION OF RADIO-IODINATED SERUM ALBUMIN AND LOW-DENSITY LIPOPROTEIN IN TISSUES AND THE ARTERIAL WALL. P. J. Scott and P. J. Hurley. *Ibid.*, 77–103. Plasma low-density lipoprotein labelled in the peptide component with radioiodine (RI-LDL) was injected into 11 patients in coma, in whom death was considered inevitable. Injected material was primarily S_f 0–9 LDL. The serum turnover of RI-LDL was followed until death of the patient. Parallel studies were carried out in another 11 subjects using radioiodinated human serum albumin (RI-HSA). Equilibration between plasma and tissue radioactivity was most rapid in liver and spleen. Intima and inner media of aorta and coronary arteries showed rising ratios of tissue to plasma radioactivity over the 14-16-day maximum duration of these studies, and higher levels of radioactivity were reached in the arch and abdominal segments than in the thoracic aorta. Outer medial tissue/plasma ratios were lower and appeared to reach equilibrium earlier. The results show that plasma LDL peptide does enter the inner arterial wall, presumably across the intima, and that the intima may be the site of a slowly exchanging LDL pool.

FATTY ACID COMPOSITION OF BLOOD PLASMA LIPIDS OF NORMAL AND KETOTIC COWS. S. Yamdagni and L. H. Schultz (Dept. of Dairy Sci., Univ. of Wisconsin, Madison, Wis. 53706). *J. Dairy Sci.* 53, 1046–50 (1970). Blood plasma lipid fractions and their component fatty acids were determined on six normal cows: two each of the Guernsey, Holstein, and Jersey breeds; and on two cows with clinical ketosis, one each of the Guernsey and Jersey breeds. Breed differences, either in lipid fractions or component fatty acids, were minor. The total plasma lipids were reduced to approximately two-thirds of normal in the ketotic cows. All lipid fractions, except free fatty acids which were elevated tenfold, declined. Ketotic cows exhibited compositional changes in all lipid fractions. Palmitic acid was elevated in all lipid fractions except free fatty acids. Stearic acid decreased and oleic acid was increased. Linoleic acid, appearing primarily in the phospholipids and cholesterol esters, decreased in these fractions in the ketotic cow. These compositional changes and lowered total lipids suggest metabolic changes in the liver of ketotic cows.

THYROXINE DEGRADATION DURING LIPOXIDASE-CATALYZED PEROXIDATION OF LINOLEIC ACID. J. Wynn (Dept. of Med., Univ. of Arkansas Med. Center, Little Rock, Ark. 72201). *J. Biol. Chem.* 245, 3621–25 (1970). The possibility has been examined that thyroxine may be degraded by an intermediate free radical in the oxidation of linoleate catalyzed by lipoxidase. Although thyroxine serves as an antioxidant during autoxidation of lecithin, it was predicted that a similar reaction with enzyme-bound RO_2 might not influence oxidation rate or extent. In light of recent studies of the mechanism of deiodination of iodoaryl compounds, it is suggested that the lipid radical RO_2 might either initiate degradation by electron abstraction or react with a terminal product of thyroxine after deiodination. The enabling property of thyroxine making these reactions probable is its predicted capacity to take up, transiently hold, and yield electrons.

CONTROL FACTORS AFFECTING GLUCONEOGENESIS IN PERFUSED RAT LIVER. EFFECTS OF 4-PENTENOIC ACID. J. R. Williamson, S. G. Rostand and M. J. Peterson (Johnson Res. Found., Univ. of Penn., Philadelphia, Penn. 19104). *J. Biol. Chem.* 245, 3242–51 (1970). The metabolism and mechanism of action of 4-pentenoic acid has been investigated in isolated perfused rat livers. 4-Pentenoic acid (up to 10 μmoles per g of liver) was rapidly metabolized with the consumption of slightly more than 2 g atoms of oxygen per mole of 4-pentenoic acid added and production of 0.5 mole of ketone bodies. Addition of larger amounts of 4-pentenoic acid resulted in an incomplete metabolism. The inhibitory effects of 4-pentenoic acid on gluconeogenesis are interpreted in terms of altered allosteric control of pyruvate carboxylase and diminished rate of production and transport of reducing equivalents from mitochondira to cytosol.

METABOLISM OF UBIQUINONE-7. I. Imada, M. Watanabe, N. Matsumoto and H. Morimoto (Chem. Res. Lab., Takeda Chem. Ind., Ltd., Juso, Osaka, Japan). *Biochemistry* 9, 2870–78 (1970). Several new metabolites of ubiquinone-7 and one of their conjugates were obtained from the excrements and the tissues of rats and rabbits to which ubiquinone-7 had been administered. The three metabolites and one conjugate obtained from the excrements were identified as 2,3-dimethoxy-5-methyl-6-(3′-methyl-4′-oxopentyl)-1,4-benzoquinone, *d*-2,3-dimethoxy-5-methyl-6-(3′-carboxy-3′-methylpropyl)-1,4-benzoquinone (I), trans-2,3-dimethoxy-5-methyl-6-(5′-carboxy-3′-methyl-2′-pentenyl)-1,4-benzoquinone, and the disulfate of the hydroquinone form of I, respectively, by comparison of their spectral data with those of synthetic samples.

STUDIES ON THE PHOSPHOLIPASES OF RAT INTESTINAL MUCOSA. P. V. Subbaiah and J. Ganguly (Dept. of Biochem., Indian Inst. of Sci., Bangalore 12, India). *Biochem. J.* 118, 233–39 (1970). Subcellular distribution and characteristics of different phospholipases of rat intestinal mucosa were studied. The presence of free fatty acid was necessary for the maximal hydrolysis of lecithin (phosphatidylcholine), but there was no accumulation of lysolecithin (1 or 2-acylglycerophosphorylcholine); lysolecithin accumulated when the reaction was carried out in the presence of sodium deoxycholate and at or above pH 8.0. The fatty acid-activated phospholipase B as well as lysolecithinase showed optimum activity at pH 6.5, whereas for the phospholipase A it was about pH 8.6. The bulk of the phospholipase A was present in the microsomal fraction, whereas the phospholipase B and lysolecithinase activities were distributed between the microsomal and soluble fractions of the mucosal homogenate.

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Of particular interest to this reviewer is the material in the last three chapters. Chapter 13 is a review of qualitative and quantitative analytical techniques. The presence of large numbers of homologs in the hydrophobic chain, as well as the contamination with inorganic impurities often pose difficult problems with commercial material. This chapter offers a comprehensive bibliography of all published methods.

Utilization of cationic surfactants as antibacterial agents represented their first important practical applications. These are covered in considerable detail in Chapter 14. The book concludes (Chapter 15) with a review of the toxicological properties of cationic surfactants. A considerable amount of data on acute, subacute and chronic toxicity, and on various irritation studies is summarized for all major classes of cationic surfactants.

This volume is an extremely valuable addition to the written knowledge of industrial chemists and engineers in practically every field of business. After all surfactants of either the nonionic, anionic or cationic types are necessary to the high standard of living we enjoy today.

Everyone reading this review should have a copy of this most valuable and well written and edited book for his own; or at least readily accessible to him.

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Gas Chromatography, L. Szepesy, English translation edited by E. D. Morgan (The Chemical Rubber Co., 384 p., 1970, $23.50).

In the preface the author states his purpose as follows, "The present book aims at presenting a general outline of the theoretical and practical aspects of gas chromatography, including the possibilities of its application and the trend of developments. By presenting a detailed survey of the relevant literature we wish to assist the reader in his eventual further search and to facilitate the acquisition of the necessary data. Theoretical questions will be dealt with only to the extent necessary for the explanation of chromatographic separation as a physical process and for the understanding of the fundamental correlations which are indispensable for the solution of practical problems."

The author has achieved his purpose admirably in producing a fundamental text. The first chapter contains a general survey of the field of chromatography and a very useful listing of literature sources, such as books, symposia, reviews, bibliographies and serial publications up to 1968. Each of the chapters contains many references with a total of over 1100 in the book.

Two chapters on Fundamental Theory, and Theory of Gas Chromatography, give good coverage of the theoretical aspects and mathematical equations which express relationships of rate theories and column efficiencies. The chapter on Apparatus presents descriptions of the various parts of a gas chromatograph and suggests criteria for good operation. There is a large section covering the construction and theory of various types of detectors. A chapter on Choice of Columns and Stationary Phases gives very thorough coverage to absorbents, supports, liquid phases and column preparation. A mathematical treatment of the effect of column parameters is also included. Use of retention data and auxiliary methods for qualitative identification and the calculation of response factors to obtain quantitative values are described. A short chapter on Analytical Applications gives 224 references to different classes of gas and liquid samples.

The chapter on Special Techniques contains a large section on pyrolysis gas chromatography and a good introductory survey to reaction gas chromatography. The unique problems connected with Preparative Gas Chromatography and Process Gas Chromatography are described in other chapters. The final chapter presents Some Special Applications of Gas Chromatography such as: simulated distillation work, elemental analysis, and measurement of surface area.

This book is a good one for beginners in the field of gas chromatography or specialists in other fields who may wish to make use of gas chromatography. The book covers the fundamentals very well and, in addition, the references give the reader guidance in moving out into many specific and special applications. The English grammar is excellent and easy to read. There are many illustrations which promote understanding of the text.

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ABSTRACTS: BIOCHEMISTRY AND NUTRITION

(Continued from page 540A)

Acylation of lysolecithin in the intestinal mucosa of rats. P. V. Subbaiah, P. S. Sastry and J. Ganguly (Dept. of Biochem., Indian Inst. of Sci., Bangalore 12, India). *Biochem. J.* 118, 241–46 (1970). The presence of an active acyl-CoA-lysolecithin (1-acylglycerophosphorylcholine) acyltransferase was demonstrated in rat intestinal mucosa. ATP and CoA were necessary for the incorporation of free (1-^{14}C)-oleic acid into lecithin (phosphatidylcholine). The reaction was about 20 times as fast with (1-^{14}C)-oleoyl-CoA as with free oleic acid, CoA and ATP. With 1-acylglycerophosphorylcholine as the acceptor, both oleic acid and palmitic acid were incorporated into the β-position of lecithin; the incorporation of palmitic acid was 60% of that of oleic acid. Of the various analogues of lysolecithin tested as acyl acceptors from (1-^{14}C)oleoyl CoA, a lysolecithin with a long-chain fatty acid at the 1-position was most efficient. The enzyme was mostly present in the brush-border-free particulate fraction of the intestinal mucosa. Of the various tissues of rats tested for the activity, intestinal mucosa was found to be the most active, with testes, liver, kidneys and spleen following it in decreasing order.

Influence of duration of cholesterol feeding on esterification of fatty acids by cell-free preparation of pigeon aorta. Studies on the mechanism of cholesterol esterification. R. W. St. Clair, H. B. Lofland and T. B. Clarkson (Dept. of Pathol. and Lab. of Animal Med., Bowman Gray School of Med. of Wake Forest Univ., Winston-Salem, N.C. 27103). *Circulation Res.* 27, 213–25 (1970). Influence of duration of cholesterol feeding on esterification of fatty acids and hydrolysis of cholesteryl esters was studied in cell-free preparations of aorta from White Carneau pigeons. Esterification of fatty acids required ATP and CoA; greater than 80% of the esterifying activity was located in the particulate fraction obtained by centrifugation at 105,000 × g (after a preliminary centrifugation at 1000 × g). Fatty acids were incorporated most efficiently into phospholipid, primarily (82%) lecithin. Cholesterol was esterified by transfer of fatty acyl-CoA to cholesterol, a mechanism similar to that described for liver and adrenal cortex. Little if any cholesterol esterification occurred when lecithin labeled at the 2-position with oleic acid-1-^{14}C was used as substrate.

Biosynthesis of the peptidoglycan of bacterial cell walls. XX. Identification of phosphatidylglycerol and cardiolipin as cofactors for isoprenoid alcohol phosphokinase. Y. Higashi and J. L. Strominger (Dept. of Biochem. and Molecular Biol., Biological Labs., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* 245, 3691–96 (1970). The butanol-soluble, long chain isoprenoid alcohol, phosphokinase, from *Staphylococcus aureus* has been separated into a protein and phospholipid component by chromatography on a column of diethylaminoethylcellulose. The phospholipid is a mixture of phosphatidylglycerol and cardiolipid, either of which is effective alone in restoring the activity to the enzyme. Several

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detergents will also restore the activity, but these are less effective than the natural cofactors.

XXI. ISOLATION OF FREE C_{55}-ISOPRENOID ALCOHOL AND OF LIPID INTERMEDIATES IN PEPTIDOGLYCAN SYNTHESIS FROM STAPHYLOCOCCUS AUREUS. Y. Higashi, J. L. Strominger and C. C. Sweeley. *Ibid.*, 3697–3702. The lipid intermediate, disaccharide (-pentapeptide)-P-P-lipid, has been isolated from *S. aureus*. The lipid moiety, like that from a similar intermediate from *Micrococcus lysodeikticus*, is a C_{55}-isoprenoid alcohol. Less than 10% of the C_{55}-isoprenoid alcohol in *S. aureus* is present in the form of phosphorylated derivatives. The remainder is present as the free C_{55}-isoprenoid alcohol which has also been isolated in relatively large amounts. The nuclear magnetic resonance spectrum of the latter material indicated that it contains two internal trans double bonds, as did a similar compound isolated from *M. lysodeikticus*.

SERUM CHOLESTEROL AND TRIGLYCERIDE. AN EPIDEMIOLOGICAL AND PATHOGENETIC INTERPRETATION. F. J. Schilling, G. Christakis, A. Orbach and W. H. Becker (Continental Res. Inst., 25 Cedar Street, New York, N.Y.). *Am. J. Clin. Nutr.* 22, 133–38 (1970). Serum cholesterol and triglyceride levels were determined in 875 male and 989 female urban office workers. The means and standard errors for these lipids are presented by age and sex. Correlation coefficients between serum cholesterol and serum triglyceride indicate a positive relationship for 8 of 10 age categories for male subjects and in 3 of 10 age categories for the female, all 3 occurring after the 5th decade. The relationship of relative weight to each of the lipids is presented. No trend appears to exist. The rate of increase in serum cholesterol and triglyceride by age are interpreted in the light of their possible pathogenetic influence on coronary heart disease.

DEMOSTEROL AS THE MAJOR STEROL IN L-CELL MOUSE FIBROBLASTS GROWN IN STEROL-FREE CULTURE MEDIUM. G. H. Rothblat, C. H. Burns, R. L. Conner, and J. R. Landrey (Wistar Inst. of Anatomy and Biol., Philadelphia, Penn.). *Science* 169, 880–81 (1970). The principal sterol synthesized by L-cell mouse fibroblasts is desmosterol. Cholesterol was not detected in these cells when they were grown in a sterol-free culture medium. These findings indicate that, in cells, cholesterol can be replaced by demosterol. Sterol analyses of six other tissue culture cell lines revealed cholesterol synthesis.

SERUM LIPOPROTEINS OF RATS FED AN ESSENTIAL FATTY ACID-DEFICIENT DIET AND N-2-FLUORENYLACETAMIDE. K. A. Narayan (The Burnsides Res. Lab., Univ. of Ill., Urbana, Ill. 61801). *Cancer Res.* 30, 1185–91 (1970). The serum lipoprotein patterns were determined periodically by disc electrophoresis in rats maintained on an essential fatty acid-deficient diet both with and without the addition of 0.005% and 0.03% N-2-fluorenylacetamide for 1 year. Concomitant with the depletion of essential fatty acids in the first 10 weeks, the lipoprotein components of intermediate mobilities decreased in intensity in the rat serum lipoprotein patterns obtained with samples from all the groups. During the early stages of chemical carcinogenesis, the serum lipoprotein patterns indicated a striking increase in the high-density lipoproteins; in the later stages, the serum concentrations of low-density lipoproteins as well as that of high-density lipoproteins were increased. It is concluded that significant differences in the rat serum lipoproteins are encountered depending on whether there exists a cancer of the liver or a cancer of remote organs and tissues.

RAT MAMMARY GLAND ACETYL-COENZYME A CARBOXYLASE. INTERACTION WITH MILK FATTY ACIDS. A. L. Miller, Mary E. Geroch and H. R. Levy (Biol. Res. Labs., Dept. of Bacteriol. and Botany, Syracuse Univ., Syracuse, N.Y. 13210). *Biochem. J.* 118, 645–57 (1970). Highly purified rat mammary gland acetyl-CoA carboxylase was inhibited by milk obtained from rats 12h after their young were weaned. Enzyme that had been partly inactivated by aging, or by storing in the absence of citrate, was stimulated by low concentrations but inhibited by high concentrations of fatty acids. Various experiments suggested that fatty acids produce irreversible inactivation of acetyl-CoA carboxylase. The effect of palmitoyl-CoA on mammary-gland acetyl-CoA carboxylase were found to resemble those of fatty acids, except that palmitoyl-CoA was effective at lower concentration. The findings are consistent, both qualitatively and quantitatively, with a regulatory mechanism whereby milk fatty acids shut off fatty acid synthesis in the mammary gland after weaning by inhibiting acetyl-CoA carboxylase.

THE FORMATION OF MONOACYLGLYCEROPHOSPHATE FROM SN-GLYCEROL 3-PHOSPHATE BY A RAT LIVER PARTICULATE PREPARATION. R. G. Lamb and H. J. Fallon (Dept of Med. and Biochem., Univ. of North Carolina School of Med., Chapel Hill, N.C. 27514). *J. Biol. Chem.* 245, 3075–83 (1970). Monoacylglycerophosphate was identified as the major product of sn-glycerol-3-P esterification by a rat liver particulate perparation in the presence of CoA thioesters of long chain fatty acids, sn-glycerol-3-P, bovine serum albumin, and Tris buffer (pH 6.5). Analysis of the monoacylglycerophosphate formed at pH 6.5 suggests that the 1 isomer is the primary product when palmitoyl-CoA is the substrate and that the 2 isomer is the predominant product formed from oleoyl-CoA. Therefore, this reaction may contribute to the specific distribution of fatty acids found in the glycerolipids.

PROSTAGLANDIN RECEPTOR SITE: EVIDENCE FOR AN ESSENTIAL ROLE IN THE ACTION OF LUTEINIZING HORMONE. F. A. Kuehl, Jr., J. L. Humes, J. Tarnoff, V. J. Cirillo and E. A. Ham (Merck Inst. for Therapeutic Res., Rahway, N.J. 07065). *Science* 169, 883–85 (1970). A dose-response relation was established between prostaglandins and formation of adenosine 3′,5′-monophosphate in the mouse ovary. The prostaglandin antagonist, 7-oxa-13-prostynoic acid, blocked the stimulatory effect of prostaglandin E_1, prostaglandin E_2, and luteinizing hormone on adenosine 3′,5′-monophosphate formation in a competitive manner. Kinetic studies made it possible to suggest that there is a single luteinizing-hormone-related prostaglandin receptor in mouse ovaries, and that activation of this prostaglandin receptor is an essential requirement in the action of luteinizing hormone to stimulate adenosine 3′,5′-monophosphate formation and steroidogenesis.

BIOHYDROGENATION OF UNSATURATED FATTY ACIDS. IV. SUBSTRATE SPECIFICITY AND INHIBITION OF LINOLEATE Δ^{12}-CIS, Δ^{11}-TRANS-ISOMERASE FROM BUTYRIVIBRIO FIBRISOLVENS. Carol R. Kepler, W. P. Tucker and S. B. Tove (Dept. of Biochem. and Chem., North Carolina State Univ., Raleigh, N.C. 27607).

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H. K. Mangold Speaks for DGF at ISF-AOCS World Congress

"Mr. President of the International Society for Fat Research, Ladies and Gentlemen:

The founder of the International Society for Fat Research, Professor Kaufmann of Münster, Germany, has asked me to convey to you his kindest regards, and best wishes for an enjoyable and successful meeting.

Professor Kaufmann was looking forward to attending the Second World Fat Congress, together with Mrs. Kaufmann. He remembers very well the good time he spent with friends and colleagues several years ago in Chicago. Unfortunately, a serious automobile accident has made it impossible for Dr. and Mrs. Kaufmann to make the long trip to the United States.

I am pleased to be able to tell you that Professor Kaufmann is recovering steadily, and always enjoys following the developments of this society. It is his wish that the close contact between people from all over the world, which has been so rewarding in the past, should continue, and will continue to get even closer in the years to come.

The founder of the International Society for Fat Research hopes and believes that the Second World Fat Congress will become a landmark in the history of lipid research."

ABSTRACTS: BIOCHEMISTRY AND NUTRITION

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J. Biol. Chem. 245, 3612–20 (1970). Three parameters involved in the binding of substrate to linoleate isomerase of *B. fibrisolvens* have been identified from studies of inhibition by fatty acid isomers and analogues. They are (a) the π system of the substrate double bond, (b) hydrophobic interaction and (c) hydrogen bonding of the substrate carboxyl group. Almost every unsaturated fatty acid tested inhibited the enzyme, regardless of configuration or double bond position between carbons 3 and 12. Superimposed on this contribution of unsaturation was the correlation of inhibition with chain length and with the presence of an active hydrogen on a C-1 substituent. Inhibition by unsaturated fatty acids or their derivatives in all cases examined was competitive.

RELATIONSHIP OF SERUM TOCOPHEROL TO BETA-LIPOPROTEIN CONCENTRATIONS IN LIVER DISEASES. R. M. H. Kater, W. J. Unterecker, C. Y. Kim and C. S. Davidson (Thorndike Mem. Lab., Harvard Med. Unit, Boston City Hosp., Boston, Mass.). *Am. J. Clin. Nutr.* 23, 913–18 (1970). Patients with severe cirrhosis and fulminant hepatitis had significantly decreased serum tocopherol concentrations compared with healthy and hospitalized controls. No correlation was found between serum tocopherol concentration and adequacy of the dietary intake of tocopherol preceding the illness. A direct correlation was found between concentrations of tocopherol and beta-lipoprotein in serum. We suggest that in severe liver disease a critical degree of malfunction may be reached when beta-lipoprotein production is impaired sufficiently to cause a decrease in serum tocopherol.

STUDIES ON PHOSPHATIDYLCHOLINE VESICLES WITH THIOCHOLESTEROL AND THIOCHOLESTEROL-LINKED SPIN LABEL INCORPORATED IN THE VESICLE WALL. C. Huang, J. P. Charlton, C. I. Shyr and T. E. Thompson (Dept. of Biochem., Univ. of Virginia, School of Medicine, Charlottesville, Va. 22901). *Biochemistry* 9, 3422–26 (1970). Thiocholesterol, the sulfhydryl analog of cholesterol, can be incorporated into single-walled, homogeneous phospholipid vesicles of the type described by C. Huang. The thiol group provides a convenient chemical measure of the concentration of steroid in the vesicle wall. Under the conditions used, the concentration of thiocholesterol appears to reach a saturation value of about 1 steroid/10 phosphatidylcholine molecules.

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THE RELATION OF DIETARY CHOLINE AND METHIONINE TO PHOSPHOLIPID SYNTHESIS IN THE RAT. J. H. Haggard and P. F. Parks (Dept. of Animal Sci., Agr. Exp. Sta., Auburn Univ., Auburn, Ala. 36830). *J. Nutr.* 100, 965–71 (1970). Phospholipid synthesis in hepatic tissue from male, weanling rats fed a basal diet deficient in choline and limited in methionine was compared with that in rats receiving the basal diet plus 0.3% choline or 1% methionine or both. Rats fed one of the four diets for 5 days were injected with choline-1,2-^{14}C. The incorporation of choline into hepatic phospholipids in vivo was dependent upon the level of dietary choline but was independent of the level of dietary methionine. Rats on the choline-deficient diet incorporated two to six times as much labeled choline as rats on the choline-supplemented diet, while rats receiving 1% methionine incorporated three to six times as much label as the choline-supplemented rats. Rats receiving the diet supplemented with both methionine and choline incorporated approximately the same activity as the rats receiving the choline diet.

REGULATION OF LIPOGENESIS. STIMULATION OF FATTY ACID SYNTHESIS IN VIVO AND IN VITRO IN THE LIVER OF THE NEWLY HATCHED CHICK. A. G. Goodridge (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto, Ont., Canada). *Biochem. J.* 118, 259–63 (1970). A single glucose meal stimulated the incorporation of acetate into fatty acids in liver slices. If the glucose was added in vitro, it had no effect. Fructose and glycerol in vitro markedly stimulated fatty acid synthesis from acetate. Fructose and glycerol probably by-passed a rate-controlling reaction between glucose and triose phosphate. This reaction may have been stimulated by glucose administered in vivo. The stimulation of fatty acid synthesis caused by fructose did not require the synthesis of enzyme, thus indicating that fatty acid-synthesizing enzymes were present in a latent form in the livers from unfed chicks.

EFFECT OF DIETARY LIPIDS AND CHOLESTEROL ON THE LEVELS AND SYNTHESIS OF SOME HEPATIC LIPID COMPONENTS OF YOUNG CHICKENS. R. A. Chung, P. H. Tsai, C. N. Lai and J. Y. Lu (Dept. of Food Sci., Tuskegee Inst., Tuskegee, Ala. 36088). *Poultry Sci.* 49, 729–32 (1970). When a diet containing both cholesterol and CO (corn oil) or HCO (hydrogenated coconut oil) was fed, total and free cholesterol syntheses in the liver was greatly reduced below that with corresponding fat diets without cholesterol. Coincident with this was an increase in cholesteryl ester syntheses with CO + cholesterol and a lack of change with HCO + cholesterol. It appears, then, that dietary cholesterol increased the cholesteryl ester fatty acid synthesis.

FEED INTAKE OF GOATS DURING VOLATILE FATTY ACID INJECTIONS INTO FOUR GASTRIC AREAS. C. A. Baile and C. L. McLaughlin (Dept. of Nutr., Harvard School of Pub. Health, Boston, Mass. 02115). *J. Dairy Sci.* 53, 1058–63 (1970). Previous experiments indicated that changes in rumen fluid concentration of volatile fatty acids may be factors in the control of feed intake of ruminants. The present experiment was designed to test the sensitivity of different areas of the stomachs to volatile fatty acids. Water (control) or 1.0 M fatty acid solutions (pH = 6.5) were injected for 2 days into the dorsal rumen, ventral rumen, ventral reticulum or abomasum of goats during spontaneous meals. Acetate (175 and 0.65 moles per day) injected into the dorsal rumen or abomasum decreased feed intake 30 and 20% ($P < 0.01$). Propionate (approximately 0.80 mole per day) injected into each of the gastric areas decreased feed intake approximately 34% ($P < 0.05$). Similarly, a fatty acid mixture (55% acetate, 30% propionate and 15% butyrate) injected into each gastric area decreased feed intake 23 to 49% ($P < 0.02$). The dorsal rumen probably contains receptors for acetate and propionate, but the propionate response may be due, in addition, to receptors in the gastric veins. Injections into the abomasum, in contrast to those in the ruminoreticulum, probably result in unphysiological concentration changes although there is a similar decrease in feed intake.

• Drying Oils and Paints

OILS—INTERFACE WITH PAINT INDUSTRY. M. S. Saxena and S. Aravamudhan. *Oil Technologists' Assoc. of India: Proc. Silver Jubilee Convention & Symposium on 25 Years of Research & Development in Oils, Fats & Allied Industries 1969*, 122–6b. The various types of drying and semi-drying oils are surveyed with particular regard to their role in the Indian paint industry. (World Surface Coatings Abs. No. 337)

USE OF HIGHLY CONJUGATED DEHYDRATED CASTOR OIL FATTY ACIDS IN THE FABRICATION OF ACRYLATED ALKYD RESINS. G. Silvertone and J. A. Banks. *Pitture e Vernici* 45, No. 6, 204–7 (1969). A number of alkyd resins of 70% oil length on the basis of soya fatty acids containing 20% dehydrated castor oil fatty acids are prepared by a monoglyceride process incorporating 10% and 25% respectively of methyl methacrylate/methacrylic acid copolymer. These resins have better drying and hardening times than controls on the basis of soya fatty acids only, and both air-dried and stoved films show superior resistance to immersion in water. (World Surface Coatings Abs. No. 337)

STUDIES FOR THE SYNTHESIS OF PRIMARY PLASTICISERS FOR POLYVINYL CHLORIDE RESINS FROM CASTOR OIL. A. K. Jain and R. K. Bhatnagar. *Oil Technologists' Assoc. of India: Proc. Silver Jubilee Convention & Symposium on 25 Years of Research & Development in Oils, Fats & Allied Industries 1969, 22–3.* The synthesis of 12-acetoxyoleates of a few glycols was described, together with their plasticisation characteristics for polyvinyl chloride resins both as such and after epoxidation. It was noted that some of these derivatives possessed excellent compatibility and plasticisation efficiency, comparable with those of dioctyl phthalate. (World Surface Coatings Abs. No. 337)

STUDIES ON DEODORISATION OF SARDINE OIL. N. Bhojraj Naidu, *Oil Technologists' Assoc. of India: Proc. Silver Jubilee Convention & Symposium on 25 Years of Research & Development in Oils, Fats & Allied Industries 1969, 12.* Two methods using citric and acetic acids for deodorisation have been developed. In the first, the crude oil is refined with alkali and re-refined with alkali in the presence of either acetone or alcohol (5% v/w of oil). The latter oil is treated hot with aq. citric acid solution (10% citric by wt. of oil) and then washed with 20% brine solution and hot water followed by 3% attapulgite fuller's earth. In the acetic acid method, the refining of the oil with alcoholic alkali is eliminated. The oil is suitably hot treated with acetic acid (5% by wt. of oil) and washed well with 20% brine solution and hot water. Subsequent bleaching is not necessary. Deodorized oils prepared by the two methods in ½–1 kg. lots have been found satisfactory in printing ink manufacture.

STUDIES ON UTILISATION OF SARDINE OIL IN THE SURFACE COATINGS INDUSTRY. *Ibid.*, 22. Maleinised sardine oils (maleic modification range 3–7%) have been prepared with A.V. < 10 at temps. from 250 to 280C. Comparative data on maleic-glycerol/pentaerythritol-sardine oils have been obtained in respect of processing times, bodying rate and drying speed. Maleinised sardine oil exhibits rapid bodying above 260C, this being more rapid with increasing concentration of maleic anhydride. Sardine oil-modified glycerol phthalate alkyds of medium and long oil lengths with A.V.'s < 10 were obtained by the fusion method and evaluated for their film properties. Medium oil-length alkyds gave a faster dry and better water resistance than long oil products. However, incorporation of 3–5% maleic anhydride as part replacement for phthalic in the production of long oil alkyds conferred faster dry, higher viscosity, better colour and improved water resistance. (World Surface Coatings Abs. No. 337)

• Detergents

THE REMOVAL OF LONG CHAIN, NONIONIC ETHYLENE OXIDE ADDUCTS FROM AQUEOUS SOLUTIONS. F. Wolf and S. Wurster (Univ. of Halle, Germany). *Tenside* 7, 140–6 (1970). Experiments have been conducted on the adsorption of non-

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ionic, surface active ethylene oxide adducts from their aqueous solutions, employing active charcoal, carbon black, ionic exchangers and silica gel. Among the effects studied are that of ethylene oxide chain length and that of solution pH. Extraction at temperatures above the surfactant cloud point is more efficient than at lower temperatures. Active charcoal and a macro-porous acrylic resin in the acid form are suitable adsorbers for these nonionic surfactants.

THE DETERMINATION OF PROTEOLYTIC ACTIVITY IN ENZYME CONCENTRATES AND ENZYME CONTAINING DETERGENTS FOR WASHING, MANUAL AND AUTOMATIC DISHWASHING AND OTHER CLEANING PURPOSES. H. G. van Raay, H. Saran and H. Verbeek (Henkel & Cie., G.m.b.H., Düsseldorf, Germany). *Tenside* **7**, 126–32 (1970). Conventional analytical techniques for the determination of proteolytic enzyme activity are not directly applicable for use in the detergent field. A method has been developed, which is suitable for both the analysis of enzyme concentrates and for the determination of proteolytic activity in detergents. The method is also useful as a tool for manufacturing quality control.

THE CONVERSION OF ALKYLBENZENE SULFONIC ACID INTO DETERGENTS AND CLEANERS. H. Stache. *Tenside* **7**, 66–70 (1970). The economic advantages of using alkylbenzene sulfonic acid instead of sulfonate are discussed and the specifications of a commercially available sulfonic acid are reviewed. Problems related to storage, transport and neutralization are discussed and examples of liquid and powdered detergent manufacturing are given.

THE TOXICITY OF SOME COCONUT ALCOHOL AND DOBANOL 23 DERIVED SURFACTANTS. V. K. H. Brown and C. M. C. Muir. *Tenside* **7**, 137–9 (1970). Dobanol 23 is a synthetic fatty alcohol, containing both even- and odd-numbered carbon chains and technically comparable to coconut alcohol. Five sulfated derivatives of this compound have been compared with their natural coconut analogues with regard to acute oral toxicity and skin/eye irritation. No important differences have been found to exist between the two series of surfactants.

THE SEQUESTERING EFFECT OF SODIUM POLYPHOSPHATE/PYROPHOSPHATE BLENDS. E. Szmidtgal and H. Pasternak (Inst. of General Chem., Warsaw, Poland). *Tenside* **7**, 87–9 (1970). A modified nephelometric method for the determination of the sequestering capacity of condensed phosphates and their blends in the presence of sodium carbonate as precipitating agent is described. Tests run with this method indicate that the sequestering capacities of sodium polyphosphate/pyrophosphate blends are generally lower than the combined sequestering capacities of the individual components.

DEODORANT SOAPS AND THEIR ANTIMICROBIAL ADDITIVES. H. P. Fiedler (Wiesbaden, Germany). *Tenside* **7**, 89–90 (1970). A review.

RECENT ADVANCES ON THE CHARACTERIZATION OF NONIONIC SURFACTANTS BY MEANS OF THIN-LAYER CHROMATOGRAPHY. L. Favretto (Univ. of Trieste, Trieste, Italy). *Riv. Ital. Sostanze Grasse* **47**, 187–91 (1970). Thin-layer chromatography, coupled with the direct photometric measurement of the spots revealed by iodine vapor, offers a rapid means of estimating the distribution of the degree of polymerization of polyoxyethylene nonionic surfactants. The advantages obtainable through the use of long-path, sandwich-type development chambers in the fractionation of p,t-nonylphenol adducts are discussed.