ABSTRACTS

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

• Fats and Oils

The structure of α-keto hydroperoxides. W. H. Richardson and R. F. Steed (Dept. of Chem., San Diego State College, San Diego, Calif.). *J. Organic Chem.* 32, 771–4 (1967). The structure of α-keto hydroperoxides was investigated in carbon tetrachloride and chloroform solution. Intra- as well as intermolecular hydrogen bonding was observed for 2,4-dimethyl-2-hydroperoxy-3-pentanone in carbon tetrachloride solution. The equilibrium constant for intermolecular hydrogen bonding at 33.1, 50.3, and 70.2C is given along with the corresponding enthalpy, free-energy, and entropy values. In addition, the enthalpy of intramolecular hydrogen bonding is reported. These values are discussed with relationship to intermolecular hydrogen bonding of t-butyl hydroperoxide. Both aryl- and alkyl-α-keto hydroperoxides exist solely in the hydroperoxide form. No cyclic peroxide tautomer could be detected by infrared or ultraviolet spectral analysis.

Improved technique for analysis of free fatty acids in butteroil and Provolone cheese. Mrs. M. Iyer, T. Richardson, C. H. Amundson and A. Boudreau (Dept. of Food Sci. and Ind., Univ. Wisconsin, Madison). *J. Dairy Sci.* 50, 285–91 (1967). A method is described for isolating the free fatty acids (FFA) of butteroil and Provolone cheese, using a silicic acid-KOH column. The FFA were eluted from the column with phosphoric acid in diethyl ether. After addition of methanol, the FFA and excess phosphoric acid were titrated with methanolic KOH. The potassium phosphate salts were sedimented and the supernatant evaporated to dryness under nitrogen. Experiments indicated no saponification of triglcerides and no esterification of FFA during the above manipulations. Butyl esters were prepared using sulfuric acid as a catalyst and esters from butyrate through linolenate were estimated with GLC, using heptanoic and hepta-decanoic acids as internal standards. FFA were determined in three different samples of butteroil and in Provolone cheese. In butteroil the short-chain FFA were low and the long-chain FFA were high in concentration. In Provolone cheese the short-chain FFA were extremely high. Butyric acid was highest in concentration of all the FFA.

Wax esters of mullet (Mugil cephalus) roe oil. R. Ivyengar and H. Schlenk (Hormel Inst., Univ. Minn.). *Biochemistry* 6, 396–402 (1967). Lipids of mullet roe were separated and analyzed by liquid and gas chromatographic methods. Nearly 70% of the oil consists of wax esters in which saturated and monounsaturated fatty alcohols are bound to fatty acids with up to six double bonds. Alcohols and acids from wax esters were identified and quantified. Both contain appreciable amounts of odd-numbered straight-chain compounds. The structures of monoenoic alcohols are the same as those of monoenoic acids, e.g., 9-heptadecenoic, 9- and 11-octadecenoic, and nonadecenoic. The total content of odd-numbered alcohols was between 10 and 25% while that of odd-numbered acids was consistently somewhat lower. Several polyunsaturated acids such as 4,7,10,13,16-heneicosapentaenoic or 4,7,10,13,16,19-docosahexaenoic and related acids were newly identified from mullet. They occur more in wax esters than in triglycerides of roe or of the body oil.

Pro-oxidative activity of the free fatty acids on the autoxidation of fats. A. D. Popov and I. D. Mizev (Acad. of Sci. of Bulgaria). *Rev. Franc. Corps Gras* 13, 621–624 (1966). Free fatty acids accelerate the autoxidation and decrease the stability of the fats. The action of free fatty acids can be explained by the acceleration of the decomposition of the hydroperoxides which form free radicals, and, on the other hand, by the deactivation of the phenolic antioxidants. It is believed that in both cases, the existence of intermolecular H-bonds between the free fatty acids and hydroperoxides and/or phenolic groups of the antioxidants plays an important role.

Rapid method for the determination of hydroxyl values. J. Fleming (Gala Cosmetic Group, Ltd., Surbiton, Surrey, G. B.). *J. Soc. Cosmetic Chemists* 17, 625–630 (1966). A rapid method is described for the routine determination of hydroxyl values on a wide range of hydroxy compounds commonly used in the cosmetic industry. The procedure is to acetylate the compound at 60C by means of a single reagent containing acetic anhydride and pyridine in toluene. After the reaction period, unreacted anhydride is hydrolyzed with water and titrated. The method is simple, accurate and applicable to a wide range of oils, waxes, and solvents and is especially suitable for use by non-technical personnel.

Preparative gas chromatography. G. R. Fitch (Dept. of Chem. and Bio., Bristol Coll. of Sci. and Tech., Bristol, 7 G.B.). *J. Soc. Cosmetic Chemists* 17, 657–667 (1966). The main aspects of this technique are discussed, including the newer developments in continuous gas chromatography. Some possible applications in the field of cosmetic chemistry are given.

Pilu wealth in India. C. L. Sharma (Asst. Dir., Non-edible Oils and Soap Industry). *Indian Oil Soap. J.* 31, 308–319 (1966). While India produces 8–9% of the world's supply of coconut oil, it is still a large importer. Therefore, it is important that India find alternate sources of supply. The oil of Pilu (*Salvadora oleoides*) can be a suitable substitute for coconut oil. Pilu is avialable in huge quantities in saline tracts and littoral forests.

Regarding the dilatometry of margarines and other plastic fats. E. Sambuc and M. Naudet (ITERG, Marseille, Fr.). *Rev. Franc. Corps Gras* 13, 677–680 (1966). A special dilatometer and pycometer were developed for the direct dilatometric study of plastic fats which are subject to conditioned crystallization during manufacture. Conditions for use of the apparatus are described. Practical examples are given.

Investigations of various fast methods for determining the oil content in seeds. B. Solomon (Ser. of Doc., ITERG, Paris, Fr.). *Rev. Franc. Corps. Gras* 13, 681–688 (1966). Various new methods for determining oil content in seeds are reviewed.

The determination of oxyacids in acidulated foots. C. Wojnarowicz. *Tluszcze jadalne* 10 (4), 117–22 (1966). The authors surveyed the various methods used to determine oxyacids and chose the AOCS method, the method of Vniiz and the method of Fahrion. The final comparison showed that the best method is the AOCS method. (Rev. Franc. Corps Gras).

Conversion of fatty aldehyde dimethyl acetals to the corresponding alk-1-enyl methyl ethers (substituted vinyl ethers) during gas-liquid chromatography. V. Mahadevan, C. V. Viswanathan and F. Phillips (Univ. of Minnesota, Hormel Inst., Austin). *J. Lipid Res.* 8, 2–6 (1967). The behavior of palmitaldehyde and linolealdehyde and of their dimethyl acetals during gas-liquid chromatography on β-cyclodextrin acetate (β-CDX acetate) and ethylene glycol succinate polyester-phosphoric acid (EGSP) columns were studied. The aldehydes were well separated from their dimethyl acetals on the β-CDX acetate column. However, on the EGSP column the retention times of palmitaldehyde and its dimethyl acetal were identical; a mixture of linolealdehyde and its dimethyl acetal gave a split peak. The aldehydes were recovered unchanged in 80–85% yield by preparative GLC from both columns, but the dimethyl acetals were quantitatively converted to the corresponding alk-1-enyl methyl ethers. The structure of these compounds was elucidated by infrared spectroscopy, mass spectrometry and by chemical means. Upon hydrolysis at low temperatures with 100% sulfuric acid, they yielded the corresponding aldehydes, which were identified as 2,4-dinitrophenylhydrazones.

The uropygiols: Identification of the unsaponifiable constituent of a diester wax from chicken preen glands. E. A. Haahti and H. M. Fales (Lab. of Metabolism, Nat. Heart Inst., Bethesda, Md. 20014). *J. Lipid Res.* 8, 131–7 (1967). The chief lipid fraction in the uropygial gland excretion of the domestic hen is a diester wax. The saponifiable fraction of this wax consists of saturated normal C_{10}–C_{20} fatty acids. The unsaponifiable fraction consists of a series of three homologous compounds, which have been named the uropygiols and identified by mass spectrometry, gas-liquid chromatography, and periodate cleavage as 2,3-*n*-alkanediols containing 22–24 carbon atoms. The native diols were shown to consist of about equal amounts of the *threo* and *erythro* isomers. Records of analyses of the natural products as well as related synthetic compounds are shown.

Catalytic hydrogenation II. A New convenient technique for laboratory hydrogenations. A simple automatic device for atmospheric pressure hydrogenations. C. A. Brown and H. C. Brown (R. B. Wetherill Lab., Purdue Univ., Lafayette, Ind.). *J. Org. Chem.* 31, 3989–95 (1966). The rapid, *in situ* preparation of highly active hydrogenation catalysts by the reduction of platinum metal salts with borohydride was combined with a convenient automatic hydrogen generator based on sodium borohydride to provide a new highly convenient procedure for laboratory scale hydrogenations.

Citrus carotenoids V. The isolation of 8′-hydroxy-8′-9′-dihydrocitranaxanthin. H. Yokoyama and M. J. White (Fruit and Veg. Chem. Lab., Pasadena, Cal. 91106). *J. Org. Chem.* 31, 3452–54 (1966). The isolation of a new carotenoid ketone containing an in-chain hydroxyl group at the 8′ position was reported.

Minor components of the unsaponifiable fraction from different anatomical parts of the soybean seed. E. Fedeli, A. Lanzani and G. Jacini (National Lipochem. Center, Milan, Italy). *Riv. Ital. Sostanze Grasse* 43, 509–11 (1966). Different anatomical parts, such as the germ, cotyledon and skin, were separated from the soybeans and the unsaponifiable fraction of each part was recovered, by the usual analytical techniques, from the lipid extract. The lipids content of the various part was: 15.7% in the cotyledon, 9.55% in the germ and 0.28% in the skin. The unsaponifiable represented 0.98% of the lipid fraction in the cotyledon and 13% in the germ. The presence of such high amounts of sterols and terpenes in the germ suggest that these substances play an important role in the mechanism of germination. The same sterols (in order of decreasing level: β-sitosterol, campesterol, stigmasterol) are found in both unsaponifiable fractions, although in different relative amounts. Triterpenic alcohols appear in an amount much lower than sterols in the germ, while no more than traces of their presence are found in the cotyledon.

Comparative studies on the lipids present in seeds and rhyzomes. G. Lotti and V. Averna (Univ. of Palermo, Palermo, Italy). *Riv. Ital. Sostanze Grasse* 43, 485–93 (1966). The analytical characteristics and the fatty acid composition of the fats contained in seeds of 13 species and in the rhyzomes of 27 vegetable species belonging to 14 families have been determined for the first time. The fatty acid content of the seeds was always higher than that of the rhyzomes, while the unsaponifiable was always lower. The U.V. absorption, at all wavelengths, was always higher for the rhyzome extracts than for the seed extracts. Important differences, both qualitative and quantitative, have also been found between the fatty acid composition of the rhyzomes and that of the seeds, especially as far as the C_{18} acids are concerned. Such differences were, however, very irregular. The conclusion is offered that the mechanisms of lipid formation in the seeds and rhyzomes of the same plant are substantially different.

On the composition of Italian olive oils. G. Losi and U. Pallotta (Univ. of Bologna, Italy). *Riv. Ital. Sostanze Grasse* 43, 425–31 (1966). Physical and chemical determinations (refractive index, organic acidity. I.V., peroxide number, U.V. spectrophotometry and gas chromatographic analysis with both polar and non-polar capillary columns) have been performed on a series of virgin olive oils from several Italian regions. It has been confirmed that oils produced in southern regions have a higher content of saturated fatty acids than northern oils. The use of polar capillary columns with high resolving power has revealed the presence of many minor constituents: lauric, myristic, myristoleic, pentadecanoic, eicosanoic, erucic and tricosanoic acids, as well as two other acids whose peaks appear after the pentadecanoic and before the behenic. Only a few of these acids have been found to be present in all of the samples examined, and their content varied from traces to 0.1%. This study has confirmed the presence in olive oil of small amounts of fatty acids with an odd number of C atoms.

On the fatty acid composition of lard. A Lotito and A. Cucurachi (Agric. Exper. Station, Bari, Italy). *Riv. Ital. Sostanze Grasse* 43, 499–504 (1966). The fatty acid composition of 30 samples of lard of known origin has been determined and compared to that of 31 commercial samples. Some of the authentic samples contained traces of C-12:0 branched, C-12:1, up to 0.1–0.2% of C-14:0 branched, C-14:1 and C-16:0 branched. Most samples contained from traces to 0.3% of C-8:0, C-15:0 and C-20:4. All samples contained from traces to 0.7% of C-17:0, C-17:1 and C-20:2. Values for the major constituent acids, except those for C:20, are close to those reported in the literature. Some of the trade samples exhibited differences respect to the authentic ones, due to the appearance of peaks between C_8 and C_{10} and C_{10} and C_{12} and also for the higher content of C_8, C_{12} and C_{14}.

New wax esters as raw materials for cosmetic and pharmaceutical products. G. Konetzke, G. Pakleppa and E. Koenig (VEB Deutsches Hydrierwerk Rodleben, Germany). *Tenside* 3, 386–8 (1966). It is possible to produce wax esters by dehydrogenating esterification of fatty alcohols having a chain length C_{12}–C_{18}. The reaction employs mixed catalysts and yields up to 90% of an extremely pure product with a characteristic melting point. The reaction of "acid-free esterification" and the properties of the wax esters thus obtained are described. By-products, which amount to less than 10%, are removed by recrystallization or distillation. Wax esters are suitable as suppository bases, for creams, ointments and other cosmetic preparations.

The significance of U.V. spectrophotometry for the control of olive oil quality. A. M. Leone (Univ. of Bari, Italy). *Olearia* 19, 215–9 (1965). U.V. spectrophotometry has often been proposed as an analytical technique for distinguishing crude (or virgin) olive oil from treated (or rectified) oils. It has now been found that by carrying out the Diels and Alder reaction (dienic synthesis) on a rectified olive oil, heating for 2 hours at 160C after addition of 0.1% maleic anhydride, the U.V. spectrogram of a rectified olive oil loses its characteristic peaks and becomes flat, because of the loss of conjugated unsaturation. Only the value of the specific absorption at 268 mμ remains as a probable element for characterization. Future studies will have to be directed at its evaluation.

Maleic anhydride in edible oil refining. E. Benedetti, D. Buoncristiani and R. Salvadorini (Prov. Chem. Lab., Pisa, Italy). *Riv. Ital. Sostanze Grasse* 43, 496–8 (1966). The results of the addition of maleic anhydride to olive oil during refining are described, with particular reference to the U.V. absorption characteristics. This treatment greatly lowers and sometimes completely eliminates the absorption maximum due to dienes at 232 mμ, and also at 262, 268 and 274 mμ.

Continuous purification of crude edible oils by a Sharples system. E. Luotti (Sharples Ital. S.p.A., Milan, Italy). *Riv. Ital. Sostanze Grasse* 43, 494–5 (1966). A continuous process for purifying crude edible oils is described, accomplished with Sharples Super-D-Center centrifuges having a capacity of 6 to 90 tons/day. The oil after purification is clear with a content of moisture and impurities lower than 0.5%. A Sharples Autojector demucillaging centrifuge is also described, having a 100–120 tons/day capacity and yielding a degummed oil at 0.2% residual moisture.

On the composition of cherry-stone almond oil. P. G. Pifferi (Univ. of Bologna, Italy). *Riv. Ital. Sostanze Grasse* 43, 505–8 (1966). Analytical values and gas chromatographic fatty acid composition of the oil extracted from cherry-stone almonds are reported. The most important acids in this oil are: linoleic (45–49%), oleic (21–25%) and two acids with three double bonds, eleostearic (13.5–14.9%) and linolenic (1.7–1.9%). The presence of the former has been confirmed also by U.V. spectrophotometry. The properties of this oil bear considerable resemblance to those of soybean oil.

U.V. absorption of Italian virgin olive oils produced in 1965–66. L. Laporta (Prov. Chem. Lab., Pescara, Italy). *Riv. Ital. Sostanze Grasse* 43, 218–22 (1966). The spectrophotometric constants of over 200 samples of virgin olive oils produced in three Italian regions during the 1965–66 campaign are reported.

A study on the structure of glycerides by means of coordinated chromatographic techniques. D. Avancini, G. Pedroni and F. DeFrancesco (Prov. Chem. Lab., SanMichele Adige, Italy). *Riv. Ital. Sostanze Grasse* 43, 450–6 (1966). A method has been studied for the separation of mono-, di- and polyunsaturated triglycerides by thin-layer chromatography. The glycerides thus separated according to their degree of unsaturation, can then be collected and further separated by molecular weight, either by GLC or by gas phase chromatography. The combined results of these chromatographic techniques afford a close approximation of the original triglyceride distribution.

Olive oils of the different varieties grown in Sicily. G. Lotti, E. Bazan and V. Averna (Univ. of Palermo, Italy). *Riv. Ital. Sostanze Grasse* 43, 438–49 (1966). Oils from 32 different olive varieties grown in Sicily have been examined. The results point out remarkable differences either in the analytical properties or in the fatty acid compositions of the different varieties. The U.V. spectrophotometric characteristics, on the other hand, were found to be very similar for all of the tested varieties.

(Continued on page 226A)

New Coatings and New Coatings Raw Materials Ninth Symposium

North Dakota State University is Host

The Ninth Annual Symposium on New Coatings and New Coatings Raw Materials, sponsored by the Polymers and Coatings Department of North Dakota State University will be held at the Fair Hills Resort on Pelican Lake, near Detroit Lakes, Minnesota, June 5–8, 1967.

There will be three subsymposiums; 1) Electro-Deposition, 2) Solubility Parameter, 3) High Temperature Coating Systems. In addition, there will be a number of General Papers.

General Papers

The Latest Developments in Clean Air, Dan Ring, Council, NPVLA.

Development of Epoxy Coating Systems for Steel Structures, P. R. Yingst, CIBA Products Company.

Studies at the Northern Regional Research Laboratory on Pigment Activity in and Film Properties of Linseed Oil Paints, R. L. Eissler and L. G. Princen, Northern Regional Research Laboratory.

Some New Structural Developments of Phenolics, R. H. Peterson, NDSU.

Hexakis (methoxymethyl)melamine: Its Chemistry and Utilization in Surface Coatings, J. C. Petropoulos and J. N. Koral, American Cyanamid Company.

Nuclear Magnetic Resonance Spectroscopy and Its Applications to Coatings Chemist, L. C. Afremow, DeSoto Chemical Coatings Co.

Alkyd Resins: A Discovery Due to an Accident of Nature, R. J. Blackinton, Interchemical Corp.

Symposium on Electro-Depositions

Development of Electrocoating Systems Utilizing an Amino Cross-Linking Agent, J. N. Koral and W. J. Blank, American Cynamid Company.

Factors Effecting the Throwing Power of Electrocoating Polymers, Ralph Swanson, E. I. duPont de Nemours and Company, Inc.

Attenuated Total Reflectance and Transmitted Infrared Spectra of Electrodeposited Acrylic Resin Films, A. T. Usmani and A. E. Rheineck, NDSU.

Symposium on Solubility Parameters

Computer Methods in Solubility Parameter Theory, R. N. Satterfield, NDSU.

Solubility Parameter and Its Correlation with Structure, K. L. Hoy, Union Carbide.

A Three-Dimensional Approach to Solubility. III, J. D. Crowley, G. S. Teague, Jr., and J. W. Love, Jr., Eastman Chemical Products.

Symposium on High Temperature Coating Systems

Heterolinked Polyaromatic Thermoplastics: Structures, Properties and Applications, H. A. Vogel and W. D. Womer, 3 M Company.

Heat-Resistant Polymers; Some Recent Work on Polyheteroaromatics, B. M. Culbertson, Archer Daniels Midland Company.

The Effect of Polymer Structure on the Degradation of Heterocyclic Polymers, G. P. Shulman, Martin Company.

High Temperature Resistant Coatings, C. E. Hathaway and J. M. Butler, Monsanto Company.

New Resin Systems for High Temperature Coating Applications, Frank Fekete, Koppers Company.

Registration Information

For further details address inquiries to: Polymers and Coatings Department, College of Chemistry and Physics, North Dakota State University, Fargo, N. D.

(Continued from page 216A)

THE EFFECT OF OXYGEN PRESSURE ON THE OXIDATION OF FATS. R. Marcuse (Swedish Inst. for Food Preserv., Goteborg, Sweden). *Riv. Ital. Sostanze Grasse* 43, 302–9 (1966). The methods used by the food processing industry to protect against fat oxidation are surveyed with special emphasis on processing and storing fat-containing foods under reduced oxygen pressure. Examples of practical applications and experimental results are given.

ELAIDIC ACID IN OLIVE OIL. E. G. Mondino (S.A.I.C.A., Castelvetrano, Italy). *Olearia* 19, 220–6 (1965). A capillary gas chromatographic method has been used for determining the elaidic acid content of several samples of olive oil. The presence of a peak in the *trans*-oleic position has always been noted, with indications, however, that the peak is due to a mixture of several components rather than to elaidic acid alone.

PICKLED OLIVE FRUITS AT THE PRESENT TIME. G. Savastano (Olive Exper. Station, Genoa, Italy). *Riv. Ital. Sostanze Grasse* 43, 207–13 (1966). The present status of the pickled olive industry is discussed.

HYDRAULIC AND HYDROPNEUMATIC CONVEYING IN OLIVE OIL MILLS. A Chelazzi (Veraci S.p.A., Florence, Italy). *Riv. Ital. Sostanze Grasse* 43, 432–7 (1966). The principles and machinery used in olive oil mills for handling and conveying olives are reviewed.

RHEOLOGICAL STUDIES ON OLIVE OIL EXTRACTION. J. M. Martinez-Moreno *et al. Ind. Alim.* 5, 71–5 (1966). A rheological model is proposed that permits the theoretical treatment of the physical processes occurring during mechanical oil extraction.

MARGARINE OILS. P. Seiden (Procter & Gamble Co.). *U.S. 3,298,837.* A margarine oil adapted to be manufactured into margarine of good spreadability, oil-off, slump and eating quality is claimed. It consists of an oil selected from the group consisting of soybean oil, cottonseed oil, corn oil, sunflower oil and mixtures thereof, and an oil selected from the group consisting of 5–30% by wt., coconut oil, 10–40% palm oil, and 10–40% palm kernel oil, and containing 0.2–2.5% of rapeseed oil hydrogenated to an I.V. of less than 30, the combined fatty acid content of the rapeseed oil being at least 10% of acid selected from the group consisting of arachidic acid, behenic acid, and mixtures thereof.

FAT CRYSTALLIZATION. C. C. Loo (Carnation Co.). *U.S. 3,301,682.* A composition is described, comprising an integrally formed dried product consisting of individual parts, each having a fat composition and a non-fat composition that is immiscible in the fat. The non-fat composition coats the high and low melting point fat fractions to effectively separate the high- and low-melting components of the fat mixture.

• Fatty Acid Derivatives

USE OF ESTERS OF N-HYDROXYSUCCINIMIDE IN THE SYNTHESIS OF N-ACYLAMINO ACIDS. Y. Lapidot, S. Rappoport and Y. Wolman (Dept. Biol. Chem. and Dept. of Organic Chem, The Hebrew Univ. of Jerusalem, Israel). *J. Lipid Res.* 8, 142–5 (1967). Several crystalline N-hydroxysuccinimide esters of short- and long-chain fatty acids have been synthesized. These compounds react with free amino acids to form preferentially N-acylamino acids. The reaction of the N-hydroxysuccinimide esters wtih hydroxylamine and the behavior of the N-acylamino acids on thin-layer chromatography are described.

APPLICATION OF THE ROSENMUND REACTION TO THE SYNTHESIS OF SATURATED FATTY ALDEHYDES. H. B. White, Jr., L. L. Sulya and C. E. Cain (Dept. of Biochem., Univ. Miss. School Med., Jackson, Miss. 39216). *J. Lipid Res.* 8, 158–60 (1967). A method is described for the simple and rapid formation of saturated fatty aldehydes from the corresponding acid chlorides. It is not suitable for the preparation of unsaturated aldehydes because of the partial reduction and positional and geometrical isomerization of the double bond in the chain.

LIQUID STABILIZERS FOR VINYL CHLORIDE- RESINS COMPRISING METAL SALTS OF EPOXIDIZED FATTY ACIDS. A Szczepanek and G. Koenen (Chem. Fabrik Hoesch K. G.). *U.S. 3,297,584.* Liquid stabilizers for polymeric and copolymeric vinyl chloride are described, comprising a solution containing 40–60 wt. per cent of a barium, zinc or cadmium soap of epoxy stearic acid, diepoxy stearic acid or hydroxy epoxy stearic acid in an organic solvent capable of simultaneously serving as a plasticizer and/or stabilizer for the polymeric vinyl chloride such

(Continued on page 228A)

(Continued from page 226A)

as alkyl monohydric phenols, esters of phthalic acid with short-chain alcohols, epoxidized castor oil, and others. The finished composition is prepared by heating a mixture of the soap and solvent at a temperature of 80–140C. *Ibid., U.S. 3,298,964.* A liquid stabilizer for polymeric and copolymeric vinyl chloride consists of a solution containing 40–60% by wt. of at least one member selected from the group of Li, Na, K, Ca, Sr, Mg, Be, Zn, Ni, Mn, Sn, Ce, Bi and Co soaps of epoxidized higher fatty acids having 16–18C atoms in an organic solvent capable of simultaneously serving as a plasticizer and/or stabilizer for the polymeric vinyl chloride selected from the group consisting of alkyl monohydric phenols, aliphatic polyhydric alcohols, alkanolamines with at least two OH groups, partial ethers and esters of aliphatic polyhydric alcohols and alkanolamines containing at least one free OH group, and non-volatile esters of phosphorous acid. The stabilizer is prepared by heating a mixture of the soap and organic solvent at a temperature of 80–140C.

STEPWISE PREPARATION OF FATTY ACID NITRILES. R. H. Potts (Armour and Co.). *U.S. 3,299,117.* An improvement is claimed in the stepwise preparation of fatty acid nitriles by reacting fatty acid feed with ammonia in a reaction zone to form a corresponding fatty acid amide and subsequently reacting the fatty acid amide in a second separate and discrete zone with additional ammonia to form a corresponding fatty acid nitrile, the pressure in the reaction zones being suitable to keep the acid, amide, nitrile and all intermediate products in the liquid state. The improvement consists in subjecting the resultant products in a third separate and discrete zone to additional ammonia at about 300C and under sufficient pressure to maintain the products in the liquid state, the amount of ammonia in this third reaction zone being about 0.5 mols per mole of fatty acid feed. The pressure is then reduced to atmospheric to remove the ammonia and the liquid product is distilled under vacuum to obtain a nitrile product substantially free of impurities.

METHOD FOR THE MANUFACTURE OF DRY MILK PRODUCTS. L. J. Nava, J. T. Hutton, J. B. Shields and C. A. Kempf (Foremost Dairies, Inc.). *U.S. 3,300,315.* A method for the manufacture of instantized fat-containing milk comprises the steps of spray-drying a milk concentrate to form discrete moist particles of milk products having a moisture content of 6 to 12.5%, rapidly heating such moist particles while dispersed to a temperature of 130 to 160F by subjecting them to a premixed atmosphere of steam and liquid droplets containing lecithin dispersed in it. In this manner the moist particles are caused to become sticky and to adhere together in the form of moist aggregates with lecithin incorporated in them, at a level of 0.1 to 1% lecithin in the final product. The process is completed by removing excess moisture from the aggregates.

POLYHYDRIC PHENOL MODIFIED FATTY MEDIA AND IRON SURFACES CHELATED THEREWITH. R. N. Faulkner and L. A. O'Neill (U.S. Sec'y of Agr.). *U.S. 3,304,276.* A process for obtaining high yields of polyhydroxy phenol-substituted vegetable oil based media comprises heating for about 2–4 hours at about 150C to 230C in the presence of a catalyst, a reaction mixture comprising (a) a vegetable oil, such as castor oil, hydrogenated castor oil, linseed oil, soybean oil, tung oil, dehydrated castor oil, mixed linseed methyl esters and a castor-phthalic-glycerol alkyd, and (b) a polyhydroxy phenol such as pyrogallol, catechol, methyl gallate and propyl gallate. The lower alcohol produced when the vegetable oil member contains hydroxy groups and the polyhydric phenol is a lower alkyl gallate is continuously removed. The catalyst is selected from the group consisting of acid-activated montmorillonite and a C_2-C_4 alkoxide of aluminum, titanium or zirconium.

• Biochemistry and Nutrition

EFFECT OF DIETARY ENERGY SOURCES ON DEPOT FAT COMPOSITION IN PRERUMINANT FATTENING CALVES. R. Toullec and J. Rigaud (63—Theix pres Ste-Genes, Champanelle, Fr.). *Rev. Franc. Corps Gras* 13, 535–541 (1966). Sixty-six fattening calves were killed after ingesting whole milk or replacement milks. The latter were obtained by replacement of the whole milk fat by tallow or, for a great part, by starch. Perinephric and peritoneal adipose tissues of calves fed milk fat or tallow had fatty acid compositions which appeared like the calves dietary fats. Depot fats of calves fed starch had a composition near tallow (their species fat). The composition of body fats of fattening calves during the preruminant state, varies with the source of the energy in the diet (glucids, lipids) and particularly, with the introduction of different fats in the milks.

TURNOVER OF CHOLESTERYL ESTER OF PLASMA LIPOPROTEINS IN THE RAT. L. I. Gidez, P. S. Roheim and H. A. Eder (Depts. of Biochem., Med. and Physiol., A. Einstein College of Med., Yeshiva Univ., New York). *J. Lipid Res.* 8, 7–15 (1967). Turnover of individual classes of cholesteryl esters (classified on the basis of the degree of unsaturation of the fatty acid moiety) in rat plasma lipoproteins and liver was studied after the administration of mevalonic acid-5-^{3}H and mevalonic acid-2-^{14}C. Comparisons of specific activities of individual cholesteryl ester classes of liver subcellular fractions and lipoproteins suggest that the $d < 1.019$ lipoprotein cholesteryl esters are synthesized from newly synthesized cholesterol in the liver and are rapidly released into this lipoprotein. Tetraenoic cholesteryl esters, however, may originate from esterification of free cholesterol in plasma. Tetraenoic esters are formed from cholesterol in plasma during incubation or ultracentrifugation unless a thiol-reacting or alkylating agent is added. Failure to add such a reagent to plasma results in erroneous specific activities.

CONVERSION OF CHOLESTEROL INJECTED INTO MAN TO CHOLESTANOL VIA A 3-KETONIC INTERMEDIATE. R. S. Rosenfeld, B. Zumoff and L. Hellman (Inst. for Steroid Res., Montefiore Hosp. and Med. Center, New York). *J. Lipid Res.* 8, 16–23 (1967). Cholesterol-3-^{3}H,4-^{14}C was injected intravenously in man and its transformation to cholestanol was studied. From the ^{3}H:^{14}C ratios in cholestanol isolated from blood, evidence for the participation of a ketonic intermediate in the conversion was obtained. In a second subject given cholestanol-3-^{3}H,4-^{14}C, the ^{3}H:^{14}C ratios in blood sterols remained unchanged for as long as 1 week after the injection, which showed that cholestanol did not lose tritium by interconversion with cholestanone.

HYPOLIPIDEMIC EFFECTS OF ORALLY ADMINISTERED DEXTRAN AND CELLULOSE ANION EXCHANGERS IN COCKERELS AND DOGS. T. A. Parkinson (Metabolic Diseases Res. Lab., Upjohn Co., Kalamazoo, Mich.). *J. Lipid Res.* 8, 24–9 (1967). Various cellulose and dextran anion exchangers bind bile salts *in vitro* under conditions of pH and ionic strength resembling those in the lumen of the small intestine. Of these substances, diethylaminoethyl (DEAE) cellulose, guanidoethyl cellulose, and DEAE Sephadex reduced hypercholesterolemia when added to the diet of cholesterol-fed cockerels. In addition DEAE Sephadex reduced serum sterols in normcholesterolemic cockerels and dogs, lowered serum phospholipids and triglycerides in cholesterol-fed hypercholesterolemic cockerels and in normocholesterolemic dogs, and increased fecal excretion of bile acids in hypercholesterolemic cockerels. The data indicate that these insoluble cationic polymers exert their hypocholesterolemic effects by interrupting the enterohepatic circulation of bile acids.

ISOLATION AND ANALYSIS OF FREE FATTY ALDEHYDES FROM RAT, DOG, AND BOVINE HEART MUSCLE. J. R. Gilbertson, W. J. Ferrell and Rose A. Gelman (Dept. Biochem. and Nutr., Grad. School of Public Health, Univ. of Pittsburgh, Pa.). *J. Lipid Res.* 8, 38–45 (1967). Procedures are described for the isolation of free fatty aldehydes from total lipid extracts of rat, dog and bovine heart muscle. These aldehydes did not arise from hydrolysis of the naturally occurring alkenyl ethers in either the extraction or isolation procedures. Free fatty aldehydes were present in heart muscle in amounts between 0.27 and 0.56 µmole per 100 mg of lipid. Hexadecanal and octadecanal are the principal free fatty aldehydes present, except in dog heart muscle where an unidentified aldehyde constitutes 20% of the mixtures.

POST-HEPARIN SERUM LECITHINASE IN MAN AND ITS POSITIONAL SPECIFICITY. W. C. Vogel and E. L. Bierman (VA Hosp. and Dept. of Med., Univ. Washington School of Med., Seattle). *J. Lipid Res.* 8, 46–53 (1967). Lecithinase activity in post-heparin serum has been demonstrated. Phosphatidyl choline (PC) can be degraded to lysophosphatidyl choline and fatty acids at a rate of more than 1 µmole/hr per ml of serum in an incubation system containing PC, 0.1 M glycine-NaOH

(Continued on page 230A)

Safflower Utilization Research Conference

Sponsored by the
West Coast Oilseeds Development Committee
and the
Western Utilization Research and
Development Division
Agricultural Research Service
U.S. Department of Agriculture
Glenn Fuller, General Chairman
May 25 and 26, 1967

TENTATIVE PROGRAM

May 25, 1967

First Session: Safflower Seed, G. O. Kohler, Chairman

Over-All View of Safflower Utilization Research, *G. O. Kohler,* WURDD

Economics of Safflower Production and Utilization, *M. D. Miller,* Extension Division, University of California, Davis, California

Plant Science Related to Utilization, *R. W. Howell,* Crops Research Division, Beltsville, Maryland

Plant Breeding Experiments at the University of Arizona, *D. D. Rubis,* University of Arizona

Sampling and Analysis of Safflower Seed, *E. Jacobson,* Pacific Vegetable Oil Corporation

Composition of Safflower Seed, *J. Goggolz,* WURDD

Second Session: Safflower Oil, T. H. Applewhite, Chairman

Color and Odor Problems in Safflower Oil, *R. G. Binder* and *H. J. Burkhardt,* WURDD

Composition of Safflower Oil, *T. H. Applewhite,* Pacific Vegetable Oil Corporation

The Relation of Polyunsaturated Fats to Heart Disease, *L. W. Kinsell,* Institute for Metabolic Research

Autoxidation and Antioxidants in Safflower Oil, *A. R. Kemmerer,* University of Arizona

High-Temperature Stability of Safflower Oil, *G. Fuller,* WURDD

Market Potential of High Oleic Safflower Oil, *C. L. Rasmussen,* WURDD

Safflower Industrial Use Research, *B. Freedman* and *G. Fuller,* WURDD

Dinner Program

Safflower Around the World, *P. F. Knowles,* University of California, Davis, California

May 26, 1967

Third Session: Safflower Meal, Glenn Fuller, Chairman

Amino Acid Composition of Safflower Meal: A Fast Hydrolysis Procedure, *G. O. Kohler* and *R. Palter,* WURDD

Application of Automated Analysis to Estimations of Lysine and Total Amino Acids in Safflower Seed Hydrolysates, *L. M. White* and *M. A. Gauger,* WURDD

Lysine Content of Single Safflower Kernels, *A. T. Noma, B. A. Ricci,* and *L. M. White,* WURDD

Safflower Meal in Poultry Rations, *D. D. Kuzmicky,* WURDD

Safflower Protein Products in Human Nutrition, *A. E. Goodban,* WURDD

Safflower and the World Food Problem, *G. O. Kohler,* WURDD

Tour of the Laboratory (Optional)

(Continued from page 228A)

buffer (pH 9.6) and deoxycholate. This activity cannot be found in serum obtained prior to the injection of heparin. Post-heparin serum lecithinase can be distinguished from the heat-stable pancreatic lecithinase by the markedly different effects of heat, paraoxon and EDTA, and from serum lecithin: cholesterol acyltransferase by the differential effect of *p*-hydroxymercuribenzoate. In contrast to the acyltransferase and to pancreatic lecithinase, which are active at the β(C-2)-position of lecithin, post-heparin serum lecithinase is active at the α'(C-1)-position.

MICROREACTOR FOR METHANOLYSIS OF TRIGLYCERIDES BEFORE GAS-LIQUID CHROMATOGRAPHY. V. L. Davison and H. J. Dutton (North. Reg. Res. Lab., Peoria, Ill. 61604). *J. Lipid Res.* **8**, 147–9 (1967). A rapid, accurate microtechnique has been developed for gas chromatographic determination of the fatty acid composition of small (2–3 μl) samples of vegetable oils. This microtechnique combines transesterification and sample injection into a single operation. The fatty acid compositions of soybean, linseed and safflower oils thus determined compare favorably with those obtained by the usual two-step procedure.

SEPARATION OF STEROL ACETATES BY COLUMN AND THIN-LAYER ARGENTATION CHROMATOGRAPHY. H. E. Vroman and C. F. Cohen (Entomol. Res. Div., Agr. Res. Service, U.S.D.A., Beltsville, Md. 20705). *J. Lipid Res.* **8**, 150–2 (1967). Column and thin-layer chromatographic systems employing silver nitrate-impregnated adsorbents are described for the separation of sterol acetates which differ in the number of double bonds in the steroid nucleus or side chain.

REVERSED-PHASE PARTITION THIN-LAYER CHROMATOGRAPHY OF RAT LIVER-LECITHINS TO YIELD EIGHT SIMPLE PHOSPHATIDYL CHOLINES. G. A. E. Arividson (Dept. of Physiolog. Chem., Univ. Lund, Lund, Sweden). *J. Lipid Res.* **8**, 155–8 (1967). The four fractions obtained by argentation thin-layer chromatography of intact rat liver lecithins can be further subdivided by reversed-phase partition thin-layer chromatography on hydrophobic kieselguhr. The resultant eight fractions contain virtually only one saturated and one unsaturated acid each.

EFFECT OF ASCORBIC ACID ON CERTAIN BLOOD FAT METABOLISM FACTORS IN ANIMALS AND MAN. B. Sokoloff, M. Hori, C. Saelhof, B. McConnell and T. Imai (Southern Bio-Res. Inst., Florida Southern College, Lakeland). *J. Nutr.* **91**, 107–118 (1967). The possible relationship between certain fat metabolism disturbances and alterations in ascorbic acid metabolism was studied, including the influence of long-term, heavy-dose ascorbic acid therapy on blood cholesterol, lipoprotein lipase (LPL) and triglycerides in animals and man. Rabbits (180) were divided into 3 groups: a) control; b) fed cholesterol, 100 mg/kg body weight/day; and c) cholesterol, 100 mg/kg body weight/day, plus ascorbic acid, 150 mg/kg body weight/day for 8 months. The total cholesterol was decreased from 1234 ± 8.8 (SD) in the cholesterol group to 308 ± 4.0 mg/100 ml in animals receiving ascorbic acid. The triglycerides were decreased from 195 ± 9.5 mg/100 ml, average, to 89 ± 1.4 mg/100 ml. The activity of LPL, 0.189 in the cholesterol, increased almost to the normal level of 0.45 + 0.02 unit. Histopathologic examination showed pronounced atheromatous-like lesions in the vascular system of the cholesterol group, and mild incipient pathologic alterations in the cholesterol-ascorbic acid group.

THE CITRATE CLEAVAGE PATHWAY AND LIPOGENESIS IN RAT ADIPOSE TISSUE: REPLENISHMENT OF OXALOACETATE. F. J. Ballard and R. W. Hanson (Fels Research Inst., Temple Univ. School of Med., Phil., Penn. 19140). *J. Lipid Res.* **8**, 73–9 (1967). Fatty acid synthesis via the citrate cleavage pathway requires the continual replenishment of oxaloacetate within the mitochondria, probably by carboxylation of pyruvate. Malic enzyme, although present in adipose tissue, is completely localized in the cytoplasm and has insufficient activity to support lipogenesis. Pyruvate carboxylase was found to be active in both the mitochondria and cytoplasm of epididymal adipose tissue cells; it was dependent on both ATP and biotin. Alterations in dietary conditions induced no significant changes in mitochondrial pyruvate carboxylase activity, but the soluble activity was depressed in fat-fed animals. The possible importance of the soluble activity in lipogenesis lies in its participation in a soluble malate transhydrogenation cycle with NAD malate dehydrogenase and malic enzyme, whereby a continual supply of NADPH is produced. Consequently, the pyruvate carboxylase in adipose tissue both generates mitochondrial oxaloacetate for the citrate cleavage pathway and

(Continued on page 232A)

(Continued from page 230A)

supplies soluble NADPH for the conversion of acetyl-CoA to fatty acid.

Lipogenesis from amino acids in perfused isolated dog skin. V. R. Wheatley, G. Lipkin, and Tae Ha Woo (Dept. of Dermatology, New York Univ. School of Med., N. Y. 10016). *J. Lipid Res.* **8**, 84–9 (1967). Lipogenesis from amino acids has been studied in isolated perfused dog skin. Uniformly labeled alanine-^{14}C, glycine-^{14}C, isoleucine-^{14}C, phenylalanine-^{14}C, leucine-^{14}C, and valine-^{14}C are all incorporated into the cutaneous lipids, with significant incorporation into most of the isolated lipid fractions. Efficiency of lipogenesis has been expressed relative to the extent of incorporation of acetate under the same experimental conditions. This efficiency was highest for the three branched-chain amino acids. The accuracy, uses, and limitations of the perfusion technique for the study of cutaneous lipogenesis have been evaluated.

Effect of cholesterol feeding and fasting on sterol synthesis in seventeen tissues of the rat. J. M. Dietschy and M. D. Siperstein (Dept. of Internal Med., Univ. Texas Southwest Med. School, Dallas, Texas 75235). *J. Lipid Res.* **8**, 97–104 (1967). Rates of sterol synthesis were measured in 17 tissues of the rat, and the responsiveness of these rates to cholesterol feeding and to fasting was determined. The liver and gastrointestinal tract together account for 90% of synthetic activity of the whole body. After the rats had been fed cholesterol or fasted, liver synthesis was markedly decreased, whereas synthetic rates in all other organs tested were essentially unaffected (this conclusion applies to synthesis of cholesterol and of five other digitonin-precipitable tissue sterols). Consequently, the highest rate of cholesterogenesis in the cholesterol-fed or fasted rat is found in the gastrointestinal tract.

Quantitative and compositional changes in monogalactosyl and digalactosyl diglycerides during light-induced formation of chloroplasts in Euglena gracilis. A. Rosenberg and June Gouaux (College of Physicians and Surgeons, Columbia Univ. Res. Service, Goldwater Memorial Hosp., N. Y. 10017). *J. Lipid Res.* **8**, 80–3 (1967). The formation of chloroplasts in dark-grown cells of *Euglena gracilis* was induced by exposing the cells to constant illumination. Following a lag, the cells accumulated chlorophyll and galactosyl diglycerides simultaneously at almost linear rates. The digalacto compounds increased more rapidly than the monogalacto compounds at first, but their rate of accumulation began to diminish long before greening of the cell was complete. As accumulation of the digalacto compounds diminished, that of the monogalacto compounds increased. Towards the end of greening, the major fatty acids were 16:2, 16:3, 16:4, 18:2, and 18:3 in the monogalacto and 16:2 in the digalacto compounds.

Serum lipoproteinemia in pregnant and lactating rats. V. Bosch and G. Camejo (Catedra de Patologia General y Fisiopatologia, Universidad Central de Venezuela, Caracas, Venez.). *J. Lipid Res.* **8**, 138–41 (1967). Serum lipoproteins of pregnant and puerperal rats were studied by preparative and analytical ultracentrifugation. The concentration for the fraction with density less than 1.019 was markedly elevated in rats during the 3rd week of gestation and in lactating rats. This fraction showed similar triglyceride fatty acid composition and immunoelectrophoretic behavior whether it was derived from pregnant or nonpregnant rats, and when partially delipidized, the lipoproteins from both groups showed similar immunoelectrophoretic characteristics and sedimentation rates. When lactation was interrupted during puerperium, serum lipoproteins returned to control levels; but in lactating rats, high levels of serum very low density lipoprotein persisted up to 3 weeks post partum.

Metabolism of chylomicrons by the isolated rat liver. J. A. Ontko and D. B. Zilversmit (Dept. Physiol. and Biophys., Univ. of Tenn. Medical Units, Memphis). *J. Lipid Res.* **8**, 90–6 (1967). Isolated livers perfused with washed corn oil chylomicrons labeled *in vivo* with palmitic acid-1-^{14}C removed a large proportion of the chylomicrons. Slices from these livers oxidized chylomicron fatty acid esters to both carbon dioxide and acetoacetate. The liver slices also generated free fatty acids from chylomicron lipids and converted chylomicron triglycerides to phospholipids. Similar activities were observed in rat liver slices prepared shortly after the intraveous administration of chylomicrons to intact rats. The observed chylomicron uptake and lipid conversions were similar in livers from both fed and fasted rats. Fasting increased the oxidation of chylomicron fatty acid esters by livers labeled *in vivo* and by perfusion. In livers removed from intact rats given labeled chylomicrons, the triglyceride-^{14}C to phospholipid-^{14}C ratio was high, a finding unexpected if the liver had acquired this ^{14}C by removal of circulating fatty acids formed by extrahepatic lipolysis. These results demonstrate the ability of the liver to remove and utilize chylomicrons directly and suggest that direct removal accounts for a significant portion of the chyloemicron fatty acids utilized by the liver of intact rats.

Some effects of caloric restriction and deprivation on the obese hyperlipemic rat. Lois M. Zucker (Harriet G. Bird Memorial Lab., Stow, Mass.). *J. Nutr.* **91**, 247–54 (1967). To explore the nature of the genetic obesity in rats of the obese hyperlipemic strain (designated as "fatties"), we studied rates of deposition and of depletion of adipose tissue stores under varying conditions of food intake and stage of growth. When totally starved, young fatties survived until all visible fat stores were exhausted; their low water consumption indicated that they were metabolizing principally fat. Control non-obese rats died much earlier, after exhausting their much smaller fat stores. Controls receiving a diet of fat had survival rates comparable to those of fatties. Terminal weights of all rats were comparable. Adult fatties showed no abnormalities in response to 1, 2 or 7 days of fasting. Young fatties pair-fed to normal sibs for 14 days, with a 40% reduction in weight gain, grew abnormally in that they laid down more fat, and less muscle and bone, than the controls. These fatties finished the experiment as obese as they were at the start. Fat, muscle and bone gains were estimated from gains in representative fat pads and muscle and from the increase in length of a long bone.

Effects of feeding alternately maize oil and coconut oil on atherosclerosis in rabbits. R. O. Vles and J. Kloeze (Unilever Res. Lab., Vlaardingen, The Netherlands). *J. Atheroscler. Res.* **7**, 59–68 (1967). The atherogenic properties of two dietary regimens have been compared. One group of rabbits (group 1) received a diet containing a 50-50 mixture of maize and coconut oils. The other group (group 2) was fed these dietary fats in alternate periods of 10 weeks. Consequently, the total amounts of maize oil and coconut oil administered to the animals were the same in both experimental groups. The animals did not receive cholesterol. The mean atheroma indices of the animals for the dietary groups 2 and 1 were 1.4 and 0.7 respectively. More animals were affected in group 2 than in group 1; the difference, however, was not significant. The histo-pathological investigation of the animals at the end of the 100-week experiment yielded the following results: The atherosclerotic lesions of the aorta were of the advanced type. The coronary arteries of the animals of group 2 were much more affected (significant difference) than the coronaries of the animals of group 1. The serum cholesterol level of group was mostly higher than that of group 1. No significant differences in the platelet-adhesiveness value have been found between the animals of both dietary groups nor a correlation between the individual adhesiveness values and atheroma indices. The present results suggest that a mixture of maize and coconut oil is less atherogenic than when these oils are fed alternately.

Influence of dietary carbohydrates on liver content and on serum lipids in relation to age and strain of rat. Doris D. Taylor, Emily S. Conway, E. M. Schuster and Mildred Adams (Human Nutr. Res. Div., Agricultural Res. Service, U.S.D.A., Beltsville, Md.). *J. Nutr.* **91**, 275–82 (1967). To determine the effect of kind of carbohydrate on the lipid metabolism of the rat as influenced by age and heredity, rats of the BHE and Wistar strains, known to differ in their metabolism, were fed high cholesterol diets identical except for the dietary carbohydrate, supplied as sucrose, cornstarch, or glucose. Livers of 150- and 350-day-old rats were analyzed for moisture, protein, total lipid, cholesterol and glycogen; blood for total serum cholesterol and for non-cholesterol lipids as fatty acids. The most striking differences were in the liver lipids. Cholesterol and noncholesterol lipids were generally higher in livers of sucrose-fed rats of either strain than in dextrose- or cornstarch-fed rats. Livers of BHE rats contained more cholesterol and noncholesterol lipids than those from

Wistar rats. Liver lipids of sucrose fed BHE rats increased with age; no significant age effect was apparent with cornstarch or glucose. With Wistar rats, liver cholesterol decreased with age with all 3 carbohydrates; noncholesterol lipids remained relatively constant. Differences in liver size and composition between fasted and nonfasted rats suggest that the metabolic activity of this organ varies with dietary carbohydrate. Serum cholesterol levels increased with age, were higher in BHE than in Wistar rats and did not differ significantly with dietary carbohydrate. Noncholesterol lipids were generally high in sera from sucrose-fed rats.

FAT METABOLISM IN HIGHER PLANTS. R. D. Simoni, R. S. Criddle and P. K. Stumpf (Dept. of Biochem. and Biophys., Univ. of Calif., Davis, 95616). *J. Biol. Chem.* 242, 573–81 (1967). The enzymic function of each acyl carrier protein was examined with fatty acid synthetase enzymes from both *E. coli* and spinach chloroplasts. These experiments showed that bacterial acyl carrier proteins had higher specific activities than the plant acyl carrier proteins in both synthetase systems. It was observed that the bacterial acyl carrier proteins from both *E. coli* and *Arthrobacter* were functionally indistinguishable. The spinach and avocado acyl carrier proteins were also similar to each other in their reactions with the synthetases.

BINDING OF HUMAN SERUM HIGH DENSITY LIPOPROTEIN APOPROTEIN WITH AQUEOUS DISPERSIONS OF PHOSPHOLIPIDS. A. Scanu (Depts. of Medicine and Biochem., Univ. of Chicago, Ill. 60637). *J. Biol. Chem.* 242, 711–19 (1967). The apoprotein separated from human serum lipoproteins of density 1.063 to 1.21 (HDL) by extraction with ethanol-ethyl ether (3:2) at −10C was shown to recombine in definite stoichiometric ratios either with the whole phospholipids of HDL or with the lecithin, phosphatidylethanolamine and sphingomyelin fractions separated from the same lipoproteins. For the reaction, aqueous dispersions of phospholipids were obtained by sonic oscillation. HDL apoprotein maintained its binding property for phospholipids after acetylation, succinylation, reduction and alkylation, and treatment with neuraminidase, as well as in the presence of urea. The reconstituted protein-phospholipid complex acted as a substrate activator for the enzyme lipoprotein lipase obtained from chicken adipose tissue. This activity, previously reported for whole HDL, was not observed when either HDL apoprotein or phospholipids were used alone. The results are considered compatible with the concept that HDL is made of apoprotein subunits held by lipid bridges.

EFFECT OF CARBOHYDRATE INGESTION IN HUMANS ON INTRACELLULAR LIPID DEPOSITION IN TISSUE CULTURE. D. D. Rutstein, W. P. Castelli and R. J. Nickerson (Dept. of Preventive Med., Harvard Univ. Med. School, Boston, Mass.). *Am. J. Clin. Nutr.* 20, 98–107 (1967). In a series of test meals, measurements on the same specimens of serum revealed a parallelism between the concentration of NEFA and the grade of intracellular lipid deposition in human MAF cells in tissue culture. Thus in comparison with control measurements, serum specimens collected: a) 3 hr after a 1,000 cal carbohydrate test meal contained a lower concentration of NEFA and produced a lower grade on intracellular lipid deposition in tissue culture; b) 6 and 9 hr after safflower oil (135 g) test meal contained a higher concentration of NEFA and produced a higher grade of intracellular lipid deposition in tissue culture; c) at the end of the prolonged fasting state contained a higher concentration of NEFA and produced a higher grade of intracellular lipid deposition. The results confirm in the same specimens of serum the associations between the concentration of NEFA and the grade of intracellular lipid deposition in tissue culture previously observed in different serum specimens in separate experiments.

PLASMA TRIGLYCERIDE AND CHOLESTEROL LEVELS IN CEREBROVASCULAR DISEASE: SEX AND ANGIOGRAPHIC DIFFERENCES. A. Randrup and H. Pakkenberg (Biochem. Lab., Sct. Hans Mental Hosp., Roskilde; and Dept. of Neurology, Kommunehospitalet, Copenhagen, Denmark). *J. Atheroscler. Res.* 7, 17–24 (1967). Plasma triglyceride and cholesterol was measured in 60 arteriographed apoplectric patients and in 60 comparable control patients without clinically demonstrable cerebrovascular disease. Both plasma lipids were found elevated in the group of patients with cerebral thrombosis, but not in those with cerebral circulatory insufficiency without occusion. In all groups of patients (thrombosis, cerebrovascular insufficiency and non-apoplectic controls) cholesterol, but not triglyceride was found higher in women than in men. The implications of these findings are discussed in relation to the cholesterol and lipid theories of atherosclerotic-thrombotic disease.

NUTRITIONAL CONTROL OF ARTERIAL LIPID COMPOSITION IN SQUIRREL MONKEYS: MAJOR ESTER CLASSES AND TYPES OF PHOSPHOLIPIDS. O. W. Portman, M. Alexander, and C. A. Maruffo (Oregon Regional Primate Res. Center, Beaverton, Oregon). *J. Nutr.* 91, 35–46 (1967). The lipid composition of the intima and inner media of the aorta was studied in squirrel monkeys fed either a basal semipurified diet which did not produce arterial lesions or an analogous diet which induced atherosclerosis. The cholesterol ester and total cholesterol concentrations of one-half of the fresh aorta were shown in a preliminary study to correlate closely with the percentage of intimal sudanophilia in the corresponding fixed and stained half. Animals were killed at 2,3,6 and 8 months. In addition some animals were transferred from the lesion-inducing to the control diet at 3 months and some animals were killed at 6 and 8 months (after being fed the basal diet 3 and 5 months). Variance analyses indicated that there was a difference between the arteries of the basal and atherogenic groups in concentrations of total, free and esterified cholesterol, total phospholipid, and phosphatidylcholine; but not in triglycerides, sphingomyelin or total protein. The sphingomyelin and free cholesterol concentrations of aorta increased above those of natural diet controls for all groups fed the semipurified diets, and these components appeared to increase and stabilize at the higher level before increases in other lipid components.

EFFECT UPON LIPID METABOLISM OF FEEDING ALFALFA HAY OR CONCENTRATE AD LIBITUM AS THE SOLE FEED FOR MILKING COWS. J. Opstvedt (Inst. of Animal Nutr., Royal Agricultural College of Norway, Vollebekk). and M. Ronning. *J. Dairy Sci.* 50, 345–54 (1967). *Ad libitum* group feeding of only alfalfa hay was compared to only concentrate in an experiment with six Holstein and six Jersey cows. A double-reversal design with 5-wk periods was applied. Intakes of dry matter from the two feeds were equal with Holstein cows, but were higher on hay than on concentrate in the Jersey cows. All-concentrate feeding depressed the per cent and yield of milk fat in both breeds, but the responses were lower and more variable in the Jersey than in the Holstein cows. Reduced output of milk fat was due to a reduction in the amounts of all major fatty acids syntesized, but the magnitudes of the decreases were considerably less for the lower and unsaturated than for the higher saturated fatty acids. Increased outputs of certain unsaturated and odd-numbered fatty acids were found. All-concentrate feeding increased the amount of milk secreted, but outputs of milk energy were about equal on the two feeds. Concentration and yield of SNF and live weight gains were higher on concentrate.

CHEMICAL CHARACTERIZATION OF INBRED STRAIN MOUSE MILK. II. TOTAL FATTY ACIDS AND FATTY ACID ANALYSES. H. Meier, W. G. Hoag, J. J. McBurney and D. D. Myers (The Jackson Lab., Bar Harbor, Maine). *Proc. Soc. Exp. Biol. Med.* 124, 633–6 (1967). Fatty acid composition of milk from DBA/2J, C57BL/6J, B6D2F$_1$ and 3 backcross types classified according to coat color (B6D2F$_1$ × DBA/2J) was obtained by gas-liquid chromatography. The total of fatty acids in mouse milk ranged from 7.79 to 19.02 g/100 ml and 14 fatty acids were identified. Measureable quantities, 0.02 g/100 ml or more, of C-10 to C-22:1 were present. Eight were saturated fatty acids and of the 6 unsaturated ones, 4 were singly unsaturated and 2 were doubly unsaturated. Linoleic, palmitic, and oleic acids occurred in highest concentration, probably because the dietary corn oil is especially rich in these acids. Linolenic acid and arachidonic acids were absent in milk, and are also lacking in corn oil. Although genetic analysis of fatty acid composition could not be done because of procedural difficulties in obtaining sufficiently large samples of milk from individual mice, the possibility of genetic influences upon fatty acid levels exists.

• Detergents

OIL-BASED SURFACE ACTIVE AGENTS. IV. SULPHATION OF MONOGLYCERIDES. D. Atchvuta Ramayya, V. Sirish Chandra Kumar and S. D. Thirumala Rao (Oil Tech. Res. Inst., Anantapur, India). *Indian Oil Soap J.* 31, 335–340 (1966). Technical and pure monoglycerides were sulphated both on laboratory and pilot plant scale, the products were analyzed for their composition and evaluated for their gross properties. The use of high purity monoglycerides is not necessary for preparation of good quality sulphated products. In another set of studies, mixtures of glycerol and sulphating agent were added to the oil and the resulting products were evaluated for their surface active properties and composition. Reacting glycerol, oil and 30% sulfuric acid at 30C for 1 hour yielded satisfactory products.

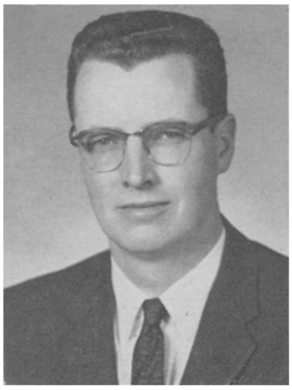
THE SURFACE PROPERTIES OF AN OIL-WATER EMULSION STABILIZED BY MIXTURES OF CASEIN AND GELATIN. P. R. Mussellwhite (Unilever Res. Lab., (The Frythe, Welwyn Herts, V. K.). *J. Colloid Interface Sci.* 21, 99–106 (1966). Casein will occur with gelatin at the interface of a palm oil-water emulsion unless the casein is present in too low a concentration to compete with the gelatin for adsorption at the interface or to penetrate any gelatin layer present.

LUBRICANTS CONTAINING MIXED METAL SALTS OF FATTY ACID AND AROMATIC POLYBASIC ACID. A. J. Morway (Esso Research Co.). *U.S. 3,298,953.* A lubricating grease is claimed, consisting essentially of a major amount of lubricating oil and about 5–40% by wt. of an alkali metal salt of C_2 to C_6 fatty acid, a C_{10} to C_{30} fatty acid and a polycarboxylic aromatic acid consisting of a single benzene ring having 2 to 4 carboxyl groups, in a mole equivalent ratio of about 0.5 to 6.0 mole equivalents of C_2–C_6 fatty acid per mole equivalent of the

(Continued on page 238A)

Detergent Short Course . . .

(Continued from page 210A)


F. H. Healey
Session Chairman


Giuliana Tesoro

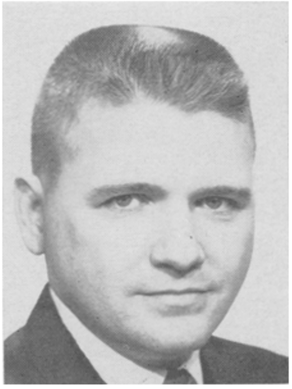
who will correlate laboratory detergency and redeposition testing with the practical laundry behavior of these fabrics.—A discussion directed towards the application of radiotracers to larger scale, practical laundry experiments using washing machines will be led by B. E. Gordon, Shell Development Company. He will present the advantages of the modern liquid scintillation counter combined with suitable computer programs together with an analytical scheme for the determination of labeled materials on fabric surfaces.

Advances in Area of Toilet Soaps

Four papers will be presented dealing with various phases of the toilet soap business and some of the new developments in this field. Luis Spitz, G. Mazzoni S.p.A., will discuss some of the developments in the area of soap manufacture, while R. J. Steltenkamp, Colgate-Palmolive Company, will review perfuming problems. E. Jungermann, Armour and Company, will discuss the growing use of bacteriostats in soaps. All classes of chemicals which find application in this field, such as bisphenols, salicylanilides and substituted ureas will be examined and their efficacy and properties compared. The various in vivo and in vitro test methodologies to evaluate potential new soap bacteriostats will be reviewed critically. Finally, C. C. Kraus of Procter and Gamble will review recent developments in the toilet bar market, emphasizing in particular the current trend towards surfactant formula bars and antibacterial bars.

* * *

Membership in the American Oil Chemists' Society is not a prerequisite for attending this course. Please address any further inquiries to J. F. Gerecht, American Oil Chemists' Society, 35 East Wacker Drive, Chicago, Illinois 60601.


T. H. Grindstaff


Leo Weaver
Session Chairman

Classified Advertising

Processing and Crystal Structure . . .

(Continued from page 204A)

REFERENCES

1. Bailey, A. E., "Industrial Oil and Fat Products," edited by D. Swern, Third Ed., Interscience Publishers Inc., Division of John Wiley and Sons Inc., New York, 1964.
2. Bailey, A. E., "Melting and Solidification of Fats," Interscience Publishers, Inc., Division of John Wiley and Sons Inc., New York, 1950.
3. Chapman, D., Chem. Rev. *62*, 433 (1962).
4. Hoerr, C. W., and D. Waugh, JAOCS *32*, 37 (1955).
5. Hoerr, C. W., JAOCS *32*, 659 (1955).
6. Hoerr, C. W., and A. A. Kiess, The Baking Characteristics of Rearranged Lard, Proc. 8th Res. Conf. Amer. Meat Inst., 1956.
7. Hoerr, C. W., JAOCS *37*, 539 (1960).
8. Hoerr, C. W., and F. R. Paulicka, "Crystal Structure of Triglycerides," Clark's Encyclopedia of X-rays and Gamma Rays, Reinhold Publishing Corporation, New York, 1963.
9. Hoerr, C. W., JAOCS *41*, 4 (1964).
10. Hoerr, C. W., and J. V. Ziemba, Food Engineering *37*, 90 (1965).
11. Hoerr, C. W., J. Moncrieff, and F. R. Paulicka, Bakers Digest *40*, 38 (1966).
12. Luck, J. V., Manufacturing Confectioner *42*, 29 (1962).
13. Lutton, E. S., J. Soc. Cosmetic Chemists *6*, 26 (1955).
14. Malkin, T., Glyceride Polymorphism, "Progress in the Chemistry of Fats and Other Lipids," Vol. II, Academic Press Inc., New York, 1954.

◆

• *Industry Items*

Cargill engineers are putting the finishing touches on a new soybean processing plant in Gainesville, Ga. Phillip St. Clair, Cargill manager in Gainesville, said the new facility will process its first soybeans by May 1. Capacity of the plant is 10 million bushels of beans the first year, an amount greater than the total soybean production of the state last year, but less than one third of its annual consumption. Ultimate crushing potential of the new plant is 15 million bushels per year.

DeSoto Chemical Coatings new 70,000 square foot laboratory is scheduled for completion this month, according to an announcement by company president S. U. Greenberg (1943). The laboratory will engage in its own product research and development, as well as coordinate research being done in the 16 plants comprising DeSoto's five divisions. Under construction concurrently is an addition designed to double the firm's 35,000 square foot administrative headquarters. DeSoto's present administrative center, also located in Des Plaines, Illinois, was opened three years ago.

(Continued from page 234A)

aromatic acid and about 0.5 to 3.0 mole equivalents of C_{10} to C_{30} fatty acid per mole equivalent of aromatic acid.

Surfactant mixtures. G. L. Broussalian (Monsanto Co.). *U.S. 3,303,137.* A detergent mixture is claimed, comprising a mixture of (a) from 40 to 98% by wt. of a vicinal acylamido sulfonate having the formula (I): $R''—CO—NH—C(R)H—C(SO_3M)H—R'$ where R and R' are either alkyl radicals or hydrogen, the total number of C atoms in R plus R' being 8 to 22; M is an alkali metal, alkaline earth metal or ammonium cation; R'' is an alkyl radical containing 1 to 6 C atoms; (b) from 1 to 30% by wt. of a beta-hydroxy sulfonate having the formula: $RCHOH—C(SO_3M)H—R'$ with R, R' and M having the same meaning as in formula (I); and (c) from 0.5 to 30% by wt. of a beta-ethylenically unsaturated sulfonate having the formula: $RCH{=}CH—C(SO_3M)H—R'$, where M has the same meaning as in formula (I) and R and R' are either alkyl radicals or hydrogen, the total number of C atoms in R plus R' being 7 to 21.

Triethanolamine straight chain secondary alkylbenzene sulfonate liquid detergent compositions containing degelling agents. W. J. DeWitt and R. C. Taylor (Atlantic Refining Co.). *U.S. 3,303,138.* A non-gelling aqueous solution is described, consisting essentially of 40 to 70% by wt. of triethanolamine straight chain secondary alkylbenzene sulfonates having a straight alkyl side chain length of 9 to 15 C atoms and an organic degelling compound in amounts at least sufficient to prevent the gelling of the sulfonates in aqueous solution. The degelling compounds are selected from the group consisting of glycols, polyglycols, hydroxy diamines, N-alkyl substituted *beta*-amino propionic acids and their salts and derivatives of cycloimidine.

Biodegradable surfactants. E. K. Jones (Universal Oil Products Co.). *U.S. 3,303,233.* A process is described for the preparation of an olefinic alkylating agent for use in the production of a biologically soft alkylaryl detergent product. A straight chain paraffin is separated from a paraffinic naphtha boiling in the range 125–250C, where it is contained in admixture with branched isomers. The straight chain paraffin thus separated is then converted to a monoolefin derivative of straight chain structure by a series of steps comprising monohalogenating the paraffin at a temperature from 0 to 400C and dehydrohalogenating the halogenated paraffin at a temperature from 50 to 400C.

Cleansing composition and method of manufacture thereof. G. G. Corey (Colgate-Palmolive Co.). *U.S. 3,304,262.* A stable gelated oil-in-water emulsion cleansing composition consists essentially of (by weight of the composition) 20–50% odorless mineral spirits, 40–60% water, 5–15% of a condensate of an aliphatic alcohol with 4–12 mols of ethylene oxide, the aliphatic alcohol containing 12 to 20C atoms, from 0.1 to 10% of a hydrophobic-hydrophilic polyoxyalkylene polyoxypropylene glycol of the formula $HO(C_2H_4O)_m(C_3H_6O)_n(C_2H_4O)_mH$, where n and m are numbers such that the molecular weight of $(C_3H_6O)_n$ is between 1750 and 3500 and that $(C_2H_4O)_m$ equals 20–50% of the total weight of the compound, and about 3 to 14% of higher fatty acid, sufficient to gel the ingredients into a stable oil-in-water emulsion having a pH between 7 and 9.

Phosphine oxide detergent composition. J. T. Yoke III and R. G. Laughlin (Procter & Gamble Co.). *U.S. 3,304,263.* A detergent composition is claimed, consisting essentially of a tertiary phosphine oxide detergent compound having the formula $RR'R''P \rightarrow O$, where R is an alkyl, alkenyl or monohydroxyalkyl radical with from 10 to 18C atoms and R' and R'' are each selected from the group consisting of alkyl and monohydroxyalkyl radicals containing from 1 to 3C atoms. In addition to the phosphine oxide detergent compound, the detergent composition contains a material selected from the group consisting of anionic detergents, nonionic detergents, water-soluble inorganic builders, and organic alkaline sequestrant builders, the ratio of the phosphine oxide compound to the other material ranging from about 4:1 to about 1:20.

Tertiary phosphine oxide compounds. J. T. Yoke III and R. G. Laughlin (Procter & Gamble Co.). *U.S. 3,304,330.* Tertiary phosphine oxide compounds having the formula $RR'R''P \rightarrow O$ are claimed, where R is an alkyl or monohydroxyalkyl radical with from 10 to 18C atoms, R' and R'' are selected from the group consisting of alkyl and monohydroxyalkyl radicals containing from 1 to 3C atoms.

◆