# ABSTRACTS

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

## • Fats and Oils

EFFECT OF TAILING ON THE SEPARABILITY OF MIXTURES IN GAS CHROMATOGRAPHY. K. Takizawa, T. Shimbashi and T. Shiba (Dept. of Chem. Eng., Tokyo Inst. of Technol., Tokyo, Japan). *Anal. Chem.* 39(13), 1612–17 (1967). The theory of tailing in chromatography is applied to evaluate the effect of tailing on the purity of material obtained by cutting off around the elution peak. The results indicate that repetition of the elution peak cutoff at both inflection points and introduction of the cutoff portion into the column inlet as a subsequent source purifies a given material in a geometrical progression. The finite minimum value of "separability," defined as a measure of mixture separability in a column, and the optimum column length are found by considering the tailing role. The results on an applicability check of the theory are also described.

VOLATILE COMPONENTS OF DOUGLAS FIR NEEDLES. T. Sakai, H. Maarse, R. E. Kepner, W. G. Jennings and W. M. Longhurst (Dept. of Chem., Food Sci., and Technol., and Zoology, Univ. of Calif. Davis, Calif. 95616). *J. Agr. Food Chem.* 15(6), 1070–72 (1967). Volatile components of needles of Douglas fir, *Pseudotsuga menziesii* (Mirb.) Franco, isolated by steam distillation and ether extraction, were separated by repetitive gas chromatography on dissimilar substrates, utilizing both packed and wide-bore capillary columns. Individual components were characterized by relative retentions on several columns, Kovats' indices, and infrared spectroscopy. Compounds identified include α-pinene, camphene, β-pinene, 3-carene, myrcene, limonene, 2-hexenal, ethyl caproate, γ-terpinene, terpinolene, ethyl caprylate, citronellal, linalool, fenchyl alcohol, bornyl acetate, terpinen-4-ol, β-caryophyllene, citronellyl acetate, α-terpineol, citronellol, geranyl acetate, and farnesyl acetate; *p*-cymene and farnesol were identified on the basis of relative retentions only. Infrared spectra were obtained for two additional terpene alcohols and an aromatic alcohol which could not be identified.

RAPID METHOD FOR ISOLATION OF UNESTERIFIED STEROLS AND ITS APPLICATION TO DETECTION OF MILK FAT ADULTERATION WITH VEGETABLE OILS. I. Katz and M. Keeney (Dept. of Dairy Sci., Univ. of Maryland, College Park). *J. Dairy Sci.* 50(2), 1764–68 (1967). Unesterified sterols were isolated from 900-mg samples of fat by using a column of digitonin impregnated on Celite 545, then eluting the sterols with dimethylsulfoxide. The sterols were extracted from the dimethylsulfoxide with hexane-benzene mixtures in a condition suitable for analysis by gas-liquid chromatography. The addition of 1% corn, cottonseed, soybean or peanut oil could be easily detected by the presence of β-sitosterol. Coconut and safflower oil adulteration were detected at the 2% level.

WAX MICROCHANNELS IN THE EPIDERMIS OF WHITE CLOVER. D. M. Hall (Physics and Engineering Lab., Dept. of Scientific and Industrial Research, Lower Hutt, New Zealand). *Science* 158(3800), 505–06 (1967). The application of conventional electron microscopy to the study of plant leaves and fruit readily displays the surface wax deposits, but not the wax pathways from the underlying cells. A modified freeze-etch technique shows both at the same time and indicates that wax is transported from the epidermal cells to the leaf surface in microchannels.

PRELIMINARY EXPERIMENTS ON THE ADDITION OF DICHLOROCARBENE TO COTTONSEED OIL. S. N. Mahapatra and B. H. Iyer (Dept. of Org. Chem., Ind. Inst. of Sci., Bangalore, India). *Indian Oil Soap J.* 32(10), 271–274 (1967). Preliminary experiments have been conducted on the addition of dichlorocarbene to the unsaturated glycerides present in cottonseed oil. Cottonseed oil (15 g) was reacted with ethyl trichloroacetate (30 ml) and sodium methoxide (15 g). Thin-layer chromatography demonstrated that the carbene adduct was less polar than cottonseed oil. The infrared spectrum of the carbene showed that the carbene derivative was quite different from cottonseed oil especially in the finger print region.

PHYSICAL REFINING BY HIGH VACUUM DISTILLATION. S. Lerici (Milan, Italy). *Oils Oilseeds J.* (Bombay). 19(11), 8–11 (1967). The benefits of physical refining over caustic refining are discussed. A physical refining plant designed for 60 ton per 24 hour day complete with continuous bleaching and a solvent extraction plant to recover oil from the bleaching earth, would occupy 200 square meters and be 16 meters high. Physical refining and continuous bleaching are reported to have the following advantages over caustic refining: lower steam and power requirements, one operator is required, no soap stocks, distilled fatty acids which are high in quality, continuous bleaching is easily made a part of the system, no physical damage to the oils, no destruction of vitamins and no introduction of metal or alkaline earth soaps.

INFLUENCE OF THE METHOD OF USING ABSORBING EARTHS ON SOME VEGETABLE OIL CHARACTERISTICS. R. Guillaumin and J. F. Pertvisot (Lab. Inst. Fats and Oils, Paris, Fr.). *Rev. Franc. Corps Gras* 14(7), 449–460 (1967). Absorption at 270 mμ and, in the case of linolenic acid containing oils, at 305/315 mμ is increased with vegetable oils due to the bleaching effect of activated earth. Procedures are now available which minimize the formation of conjugated systems when an equivalent degree of bleaching is used. The procedures are related to the manner in which the earths are used. No conjugated polyenes are observed when oil is bleached at low temperatures (40C), or as a hexane miscella (20 to 50%).

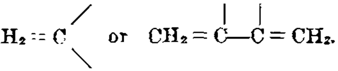
SOME OBSERVATIONS ON CITRIC ACID AS AN ANTIOXIDANT FOR SUNFLOWER OIL. A. Popov and I. Mizev (Inst. of Org. Chem., Bulgarian Acad. of Sci., Lipids Sect.). *Rev. Franc. Corps Gras* 14(7), 445–447 (1967). A study was made which related the inhibitor action of citric acid to the thermal decomposition products of citric acid when used in sunflower oil. Citric acid has an unfavorable effect on the stability of refined sunflower oil when citric acid is held at high temperature. The same is true also when the citric acid is added to the oil at the end of the deodorization step at a lower temperature. The best stabilization effect is obtained when the ratio of citric to citraconic is 1:1 to 1:2.

QUANTITATIVE DETERMINATION OF ESTERS BY SAPONIFICATION IN DIMETHYL SULPHOXIDE. J. A. Vinson, J. S. Fritz and C. A. Kingsbury. *Talanta* 13, 1673–7 (1966). A method is given for the quantitative determination of esters which makes use of the unusually rapid rate of their alkaline hydrolysis in aq. dimethyl sulphoxide medium. Only 5 min. heating on a steam bath is needed for quantitative hydrolysis of most esters and many react completely in 5 min. at room temperature. When hydrolysis is complete, the excess of base is titrated with standard acid, using a visual indicator. (Rev. Current Lit. Paint Allied Ind. No. 301.)

SPECTROPHOTOMETRIC ANALYSIS OF UNSATURATED POLYESTERS. B. Brudkowska *et al. Chemia Analityczna* 11, No. 3, 497–507 (1966). Experimental and industrial samples of unsaturated polyester resins prepared from phthalic and maleic anhydrides and ethylene, diethylene and propylene glycols have been subjected to I.R. spectrophotometric analysis and the assignment of the various absorption bands is discussed. It was found that the presence of modifier and traces of styrene did not interfere with the identification of the diol and acid components of the resin. It was also possible to establish a relationship between molar proportions of the anhydrides used in the synthesis and the ratio of intensities of the bands 775/1450 cm.$^{-1}$. (Rev. Current Lit. Paint Allied Ind. No. 301.)

## • Fatty Acid Derivatives

EMULSION POLYMERIZATION USING WATER INSOLUBLE METAL SALTS OF FATTY ACIDS. F. J. Donat and E. H. Baker (B. F. Goodrich Co.). *U.S. 3,344,100.* A method is claimed for preparing polyacrylic ester resins in latex form by polymerizing at least 60% by wt. of at least one acrylic ester having the formula $H_2C=CRCOOR_1$, where R is hydrogen, methyl or halogen and $R_1$ is a $C_1$ to $C_{18}$ alkyl group, and up to 40% by wt. of one or more other vinyl monomer containing a grouping of $CH_2=C\begin{smallmatrix}/\\ \backslash\end{smallmatrix}$ or $CH_2=\overset{|}{C}-\overset{|}{C}=CH_2$. The copolymerization reaction is carried out below 100C in a sufficient amount of water to provide emulsifying conditions for both monomers and resulting resin, and in the presence of 0.01 to 5 parts per 100 parts of monomers of an insoluble metallic soap as the sole emulsifying agent, the soap being the salt of a $C_8$ to $C_{22}$ fatty acid and a polyvalent metal.



AMINO-AMIDE REACTION PRODUCTS OF HYDROXYACIDS, EPOXPY COMPOUNDS AND POLYAMINES. P. Zuppinger, U. Niklaus, K.

Brugger and H. Zwicky (Ciba Ltd.). *U.S. 3,347,882.* An amino-amide compound is claimed, which is obtained by reacting without external heating a hydroxy compound selected from the group consisting of $C_{12}$ to $C_{18}$ fatty acids having 1 to 2 hydroxyl groups and esters of the same acids with a $C_1$–$C_6$ aliphatic alcohol having 1 to 3 hydroxyl groups. The reaction is carried out in a first stage in the presence of a Lewis acid with a 1,2-epoxy compound, leading to etherification of the hydroxyl groups. The etherified product is then heated in a second stage with a saturated aliphatic diprimary polyamine having at least 2 primary amino groups, in which stage the carboxyl (or carboxyl acid ester) group is converted into a carboxylic acid amide group at a temperature sufficient to eliminate water (or alcohol).

## • Biochemistry and Nutrition

The juvenile hormone. V. Synthesis of the racemic juvenile hormone. K. H. Dahm, B. M. Trost and H. Roller (Dept. of Zoology and Chem., Univ. of Wis., Madison, Wis.). *J. Am. Chem. Soc.* 89(20), 5292–94 (1967). The identification of the juvenile hormone isolated from *Hyalophora cecropia* was reported as methyl *trans,trans,cis*-10-epoxy-7-ethyl-3,11-dimethyl-2,6-tridecadienoate. Its synthesis is described.

Separation and further characterization of human adipose tissue neutral and alkaline lipolytic activities. J. D. Schnatz and J. A. Cortner (Dept. Med. and Pediatrics, State Univ. of N. Y., Buffalo, N. Y.). *J. Biol. Chem.* 242, 3850–59 (1967). Neutral lipolytic activity (hydrolysis of olive oil at 37C, pH 7.0) and alkaline lipolytic activity (hydrolysis of tributyrin at 47C, pH 8.0) have previously been demonstrated in human adipose tissue. Neutral lipolytic activity has currently been shown to be present in a large molecular weight substance, associated with lipid, and separable from most alkaline lipolytic activity by ammonium sulfate precipitation and Sephadex G-200 gel filtration. Alkaline lipolytic activity (ALA) has been shown to exist as three separable fractions.

Weight gain, serum lipids and vascular disease in diabetics. W. Reinheimer, G. Bliffen, J. McCoy, D. Wallace and M. J. Albrink (Dept. of Med., West Virginia Univ., Sch. of Med., Morgantown, W. Virginia). *Am. J. Clin. Nutr.* 20(9), 986 96 (1967). One hundred and twenty diabetics were studied with regard to age, sex, duration, family history, somatic index, weight gain, treatment, and triglyceride and cholesterol concentration in relation to the two distinguished vascular complications, specific diabetic microangiopathy (small-vessel disease) and nonspecific atherosclerosis (large-vessel disease). A high prevalence of hypertension was noted, especially in the youngest diabetics and in those without other complications. The possibility that hypertension is an early manifestation of small-vessel disease is discussed, as well as genetic and environmental influences on diabetes mellitus and its vascular complications.

Alterations in erythrocyte phospholipids produced by environmental change. W. H. R. Nye and G. V. Marinetti (Dept. of Med. and Biochem., Univ. of Rochester School of Med. and Dentistry, Rochester, N.Y.). *Proc. Soc. Exp. Biol. Med.* 125(4), 1220 24 (1967). In 10 subjects with liver disease and jaundice, and in one out of 2 hyperlipemic subjects, abnormalities in red cell phospholipid composition were found. Total red cell lipid phosphorus ranged from normal to elevated. Fatty acids of red cell glycerophospholipids showed a variable pattern. Plasma phospholipids were abnormal in 11 out of 12 subjects. In one subject whose disease improved, plasma and red cell phospholipids returned to normal. The phospholipid composition of the erythrocyte membrane has thus been shown to correlate with changes in plasma phospholipids, while the fatty acids of the erythrocyte phospholipids show variability in composition.

Differences in incorporation of riboflavine-$^{14}$C and its butylate-$^{14}$C into mouse organs as shown by autoradiography. T. Nakamura, M. Shimada, and S. Yoshida (Kyoto Prefect. Univ., Med., Kyoto, Japan). *Bitamin* 36(1), 62–8 (1967). Incorporation of riboflavine and its tetrabutylate into various organs of mouse and their excretion were investigated using autoradiography after administration of $^{14}$C compds. Riboflavine-$^{14}$C administered intragastrically was absorbed rapidly from the intestine and incorporated into various organs. The maximum concentration of $^{14}$C in the organs was observed 30 min. to 3 hrs. after administration. Absorption of riboflavine butylate-$^{14}$C from intestinal epithelium, on the contrary, was not as rapid as that of riboflavine and incorporation into various organs was also delayed. The radioactivity once incorporated into the organs remained for a long time, and even 12 hrs. after the administration, many grains were observed in various organs. Riboflavine butylate was also incorporated into brain much more than riboflavine and remained for a relatively long time.

Chemical assay of phospholipid renin preinhibitor in canine and human blood. D. Ostrovsky, S. Sen, R. R. Smeby and F. M. Bumpus (Res. Div., Cleveland Clinic Found., Cleveland, Ohio). *Circulation Res.* 21, 497–505 (1967). A phospholipid previously shown to be converted to a lysophospholipid renin inhibitor has been demonstrated in the plasma and red cells of man and the dog. This inhibitor precursor, designated preinhibitor, is chromatographically identical to the compound previously isolated from kidneys of dogs and hogs. A method for its quantitative measurement in plasma and red cells is presented. Normal dogs tested so far have an average of 119.6 $\mu$g of preinhibitor phospholipid/ml of blood; 16.3 $\mu$g of this is in the plasma. These concentrations are constant (in red cells even increased) 48 hr after bilateral nephrectomy. To assess the physiological importance of preinhibitor, it may be necessary to measure its active lyso derivative as well as the lipase(s) most directly involved in maintaining blood levels of these two phospholipids.

Sterol metabolism. I. 26-Hydroxycholesterol in the human aorta. J. E. van Lier and L. L. Smith (Dept. of Biochem., Univ. of Texas Med. Branch, Galveston, Texas 77550). *Biochemistry* 6, 3269–78 (1967). 26-Hydroxycholesterol has been isolated from healthy and diseased human aortal tissue by means of column, thin-layer, and gas chromatographic procedures and identified by comparison of the sterol and its $3\beta$,26-diacetate with authentic samples. Twenty odd sterol-like components present in the polar lipid fraction from the human aorta have been resolved, and 7-ketocholesterol, 25-hydroxycholesterol, $7\alpha$-hydroxycholesterol, $7\beta$-hydroxycholesterol, and $5\alpha$-cholestane-$3\beta$,5,$6\beta$-triol have been recognized among the components. 26-Hydroxycholesterol appears to be confined to intimal tissue alone. Gas chromatographic analyses indicate that 26-hydroxycholesterol is present in the human aorta at levels of ca. 32 $\mu$g/g of dry intimal tissue or 4–100 $\mu$g/g of dry combined intimal and medial tissue. The artifact nature of the 7-hydroxycholesterols is suggested, and the role of 26-hydroxycholesterol as a cholesterol companion sterol in the human aorta is considered.

Effect of cottonseed oil on egg production and egg quality. A. R. Kemmerer (Dept. of Agricultural Biochem., Univ. of Arizona, Tucson, Arizona 85721), B. W. Heywang and B. W. Lowe. *Poultry Sci.* 46(5), 1165–67 (1967). Cottonseed oil containing 0.60% cyclopropenoid fatty acids significantly reduced egg production when incorporated into laying rations at 2 and 5% levels but not at a 1% level. This oil also lowered quality of fresh eggs and eggs cold stored 3 and 6 months. Another oil containing 0.45% cyclopropenoid fatty acid did not affect egg production at any of the above levels of feeding but did lower the quality of eggs stored 3 months at all levels of feeding. Cottonseed meals containing 2.0 to 5.0% total lipids fed at a 10% level would not affect egg production and would not have a deleterious effect on the quality of fresh eggs.

Effects of cortisol and ACTH administration on some aspects of lipid metabolism in the hamster. B. J. Lloyd and J. H. Gans (Dept. of Pharmacol., Indiana Univ. Med. Center, Indianapolis). *Proc. Soc. Exp. Biol. Med.* 125(4), 1187–90 (1967). Acetate-$^{14}$C was given intraperitoneally to hamsters which had received cortisol for 3 days or ACTH only 10 minutes previously. Cortisol administration reduced the liver total lipid concentration in contrast to reports that cortisone administration to rats produces fatty livers. The contrasting response in hamsters and rats receiving similar hormones may either be attributable to species differences or depend on the amount of hormone given. Cortisol administration did not lower the specific activity or incorporation of label into liver total lipid. Hepatic lipid synthesis may have compensated during the 3-day dose period for a probable, initial inhibitory effect. Plasma esterified sterol concentration was elevated by cortisol treatment. The increased concentration may result from a redistribution of sterol to the vascular compartment, as found in the cortisone-treated rabbit. Plasma esterified sterol concentration was lowered by the brief ACTH treatment. This response, opposite to that produced by the prolonged cortisol treatment, indicates a direct effect, but one the basis of which is presently unknown. Both ACTH and cortisol administration reduced the specific activity of plasma total lipid, an observation consistent with the lipolytic action of these hormones. ACTH administration decreased the specific activity of liver total lipid. This effect could arise from the mobilization of free fatty acid and a consequent excessive generation of fatty acyl-Co A in the liver, inhibiting lipid synthesis.

The effect of rotenone on the regulation of fatty acid synthesis in heart mitochondria. F. E. Hull and A. F. Whereat (Depts. of Med. and Biochem., the Robinette Foundation, and the Lipschutz Lab., School of Med., Univ. of Pennsylvania, Philadelphia, Pa. 19104). *J. Biol. Chem.* 242, 4023–8 (1967). Acetate-1-$^{14}$C incorporation into long chain fatty acids by rabbit heart mitochondria was increased up to 20-fold by citrate, isocitrate, malate, or succinate in the presence of rotenone and ATP. Rotenone blocked NADH oxidation and enabled the maintenance of a high NADH:NAD$^+$ ratio. The rate of fatty acid synthesis was linearly related to the resulting endogenous mitochondrial NADH:NAD$^+$ ratio. By inhibiting reversed electron flow, rotenone inhibited the early high rate of acetate incorporation observed with succinate oxidation. In this situation, succinate supplied reducing equivalents for fatty acid synthesis via malate dehydrogenase. Rotenone also blocked the ADP- or dinitrophenol-induced cleavage of newly incorporated acetate-1-$^{14}$C from mitochondrial fatty acids by preventing a decrease in the NADH:NAD$^+$ ratio. The NAD oxidation-reduction state is concluded to be the regulator of the rate and direction of the heart mitochondrial fatty acid synthetic-oxidation system.

Effects of ouabain on force of contraction, oxygen consumption, and metabolism of free fatty acids in the perfused rabbit heart. A. G. Gousios, J. M. Felts and F. J. Havel (Cardiovascular Res. Inst., Dept. of Med., and Dept. of Physiol., U. Calif., San Francisco Med. Center, San Francisco, Calif.). *Circulation Res.* 21, 445–48 (1967). Isolated rabbit hearts were perfused with a suspension of red cells which assured adequate oxygenation. Ouabain added to the perfusate ($2.8 \times 10^{-7}$ M final concentration) promptly increased the force of contraction and oxygen consumption of the hearts. These events appeared to occur simultaneously. The extraction ratio of palmitate-1-$^{14}$C added to the perfusate (0.31) was not altered by ouabain. However, ouabain increased the oxidation of the extracted palmitate from an average of 34% to an average of 71% at the time intervals studied.

Carnitine stimulated transport of the intermediates of long chain fatty acid β oxidation in liver and heart mitochondria. V. W. Hollis, Jr. (Nat. Inst. of Arthritis & Metab. Dis., Bethesda, Md.) and M. Blecher. *Proc. Soc. Exp. Biol. Med.* 125(4), 1201–06 (1967). The effects of carnitine and BSA on the oxidation to $CO_2$ and conversion to acetoacetate of palmitate-1-$^{14}$C, *trans*-2-hexadecenoate-1-$^{14}$C, DL-3-hydroxyhexadecanoate-1-$^{14}$C and 3-ketohexadecanoate-1-$^{14}$C were examined in liver mitochondria from normal and diabetic rats and in heart muscle mitochondria from normal animals. Carnitine stimulated the oxidation of all substrates except the 3-keto intermediate by normal liver and heart muscle mitochondria; BSA increased basal oxidation and augmented the carnitine effect on the oxidation of these same compounds in both tissues. Carnitine increased the conversion of palmitate and the unsaturated and hydroxy derivatives to acetoacetate in liver mitochondria; BSA greatly increased both basal and carnitine-stimulated acetoacetate production; no acetoacetate accumulated under any conditions in heart mitochondria. Diabetes did not significantly influence the oxidation of, or the accumulation of acetoacetate from, any of the 4 substrates tested in liver mitochondria, nor was the effect of carnitine greater than normal in tissue obtained from diabetic rats.

β-Carotene vs. retinyl acetate for the baby pig and the effect upon ergocalciferol requirement. D. G. Hendricks, E. R. Miller, D. E. Ullrey, R. D. Struthers, B. V. Baltzer, J. A. Hoefer and R. W. Luecke (Dept. of Animal Husbandry and Biochem., Mich. State Univ., East Lansing, Mich.). *J. Nutr.* 93(1), 37–43 (1967). Twenty-four pigs were used in a study to compare the utilization of dietary fermentation β-carotene with retinyl acetate by the baby pig and to determine whether β-carotene has a rachitogenic effect which may increase the vitamin D requirement. Purified isolated soy diets containing 2,5, 6.25 or 12.5 μg of ergocalciferol/kg and containing either 8 mg/kg of fermentation β-carotene or 688 μg/kg of retinyl acetate were used in a 5-week feeding period. Total liver vitamin A storage of pigs receiving preformed vitamin A was about twice that of pigs receiving β-carotene (2.4 mg vs. 1.2 mg). Neither bone composition nor strength were greatly affected by source of vitamin A activity. In this experiment β-carotene did not increase the need for ergocalciferol above that normally required by baby pigs fed a soy protein diet containing retinyl acetate.

Plasma levels of free fatty acids in adolescents. F. P. Heald, G. Arnold, W. Seabold and D. Morrison (Div. Adolescent Med., Children's Hosp. of the Dist. of Columbia). *Am. J. Clin. Nutr.* 20, 1010–14 (1967). In boys, the plasma level of free fatty acids decreases with age prior to puberty but remains constant beginning in mid-puberty. In girls, a steady trend of decreasing FFA with age was not found in the premenarchial period. The premenarchial girls had significantly higher values of plasma FFA than postmenarchial girls. During puberty a significant sex difference in FFA was found, with girls having the higher value. There are no significant correlations of FFA with either body weight or skin-fold thickness.

Arteriosclerosis and food fats. H. Frahm and A. Lembke (Inst. Virusforch. Exp. Med., Sielbeck/Eutin, Ger.). *Kiel. Milchwirt. Forschungsber.* 18(1), 124 (1967). A review of the relation of nutrition, particularly dietary fat, and the development of arteriosclerosis. The importance of total fat composition with respect to protein and carbohydrate is discussed.

Fatty liver in the rat after intravenous infusion of orotic acid. L. H. von Euler and H. G. Windmueller (Lab. of Nutr. and Endocrinol., Nat. Inst. of Arthritis and Metabolic Diseases, Nat. Inst. of Health, Bethesda, Md.). *Proc. Soc. Exp. Biol. Med.* 125(4), 1251–54 (1967). Continuous intravenous infusion of 44–65 mg orotic acid per 24 hours in 120–180 g rats caused fatty liver, liver nucleotide changes and disappearance of plasma β-lipoprotein, effects which were indistinguishable from those caused by feeding a 1% orotic acid diet. Thus a method for continuous, controlled administration of orotic acid, independent of the diet, is now available for the study of fatty liver induction. The results suggest that the intestine and its contents do not play a necessary role in causing orotic acid induced fatty liver.

Hyperglycemia, a risk factor in coronary heart disease. F. H. Epstein (Dept. Epidemiology, Univ. of Mich. School of Public Health, Ann Arbor, Mich.). *Circulation* 36, 609–619 (1967). This review deals with the relation between hyperglycemia and myocardial infarction as observed after recovery from the acute attack or, to the extent that such data are available, antedating it. Hyperglycemia must be added to the various forms of hyperlipemia, positive caloric balance, hypertension, smoking, and others as a risk factor toward the development of manifest atherosclerosis. It remains to be established to what extent hyperglycemia, as one of multiple predisposing influences, is a predictive indicator in its own right. One part of this answer must come from prospective, epidemiological studies, the other from investigations of the interrelationships between lipid and carbohydrate metabolism in the different forms of hyperlipemia and the mechanisms by which hyperglycemia is produced.

Studies of essential fatty acid deficiency of the growing domestic cock. H. M. Edwards, Jr. (Poultry Dept., Univ. of Georgia, Athens, Georgia 30601). *Poultry Sci.* 46(5), 1128–33 (1967). Experiments were conducted to study the symptoms of essential fatty acid deficiency in the growing domestic cock, and to test the efficacy of several pure fatty acid preparations for preventing these symptoms. When male chicks received a corn oil supplemented fat free diet from one day of age to 6 weeks, their wattles and combs became red and began to grow, while birds receiving the fat free diet had pale combs and wattles that were not growing. When the cockerels were 15 weeks old the difference was so great that the animals receiving the deficient diet resembled hens. The deficiency chicks had significantly smaller testes and spleen and the pancreas was enlarged. Studies indicated that several fatty acids including methyl oleate, methyl linoleate and corn oil would stimulate the growth of cockerels fed fat free diets. However, the methyl oleate is only effective for the first few weeks, while the methyl linoleate and corn oil continues to stimulate growth. After young cockerels have received a methyl oleate supplemented diet for seven weeks, they are approximately the same size as birds that received the

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fat free diet and do not exhibit normal development of combs and wattle. While methyl oleate appears to be as effective as methyl linoleate in stimulating the growth of chicks from hens fed diets that contain linoleic acid, it was not as effective as methyl linoleate in stimulating the growth of chicks from hens fed fat free diets.

The nomenclature of lipids. W. E. Cohn (NAS-NRC Office of Biochem. Nomenclature, Oak Ridge Nat. Lab., Oak Ridge, Tenn. 37830). *Biochemistry* **6**, 3287–92 (1967). The nomenclature of lipids is the concern both of organic chemists and of biochemists. The systematic names of individual lipids can always be derived by the general rules of organic nomenclature; however, such names are often complex and need to be supplemented by alternative "semisystematic" names (as has been done, e.g., for steroids and corrinoids). Another problem is that of names for groups of related and homologous compounds (including mixtures); such names are hardly ever needed by the pure organic chemist, but are very necessary in biochemical work.

Vitamin A deficiency: effect on retinal structure of the moth Manduca sexta. S. D. Carlson (Dept. of Entomol. and Biol., Virg. Polytech. Inst., Blacksburg 24061). *Science* **158**(3798), 268–70 (1967). Sphingid moths (*Manduca sexta*) were reared for several generations on an artificial diet deficient in vitamin A and its precursors. Retinal tissue from depleted moths was removed for histological examination. There was extensive histolysis in the retinal epithelium and underlying nervous and connective tissues. This pathology correlated with severe visual impairment, even though normal growth, metamorphosis and reproduction occurred. In the adult this pathology could be reversed when the larvae were reared only on tobacco (its usual host) or on the artificial diet supplemented with β-carotene or vitamin A palmitate.

Structural studies of rat plasma lipoproteins. G. Camejo (Dept. of Biochem., Albert Einstein College of Med., Yeshiva Univ., Bronx, New York 10461). *Biochemistry* **6**, 3228–41 (1967). The very low density (VLDL) and high density (HDL) lipoproteins from rat plasma were partially and totally delipidated by a n-heptane and ethanol-acetone extraction. The partially delipidated lipoproteins contained only phospholipid and protein. HDL, originally sedimenting as a homogeneous boundary with $s_{20,w}$ of 5.8 S and mol wt 246,000, dissociated after partial extraction into two products with sedimentation coefficients of 5.4 and 1.9 S. An apparent relationship between immunochemical determinants in HDL and rat plasma albumin was found, but differences in amino acid composition and molecular size ruled out identity of these proteins.

Anti-hypercholesterolemic effect of dehydroepiandrosterone in rats. M. Ben-David, S. Dikstein, G. Bismuth and F. G. Sulman (Dept. of Applied Pharmacology, School of Pharm., Hebrew Univ., Jerusalem, Israel). *Proc. Soc. Exp. Biol. Med.* **125**(4), 1136–40 (1967). Dehydroepiandrosterone (DHA) and 3α-methoxy-17α-methyl-5α-androstane-17α-ol (SC-12790) were studied for their anti-hypercholesterolemic and thyromimetic activities. The following findings were established: DHA (5 mg/kg/day for 10 days) was found to be an anti-hypercholesterolemic agent which prevented increase in the serum cholesterol level (SCL) of rats made hypercholesterolemic by propylthiouracil (PTU) treatment. It was also found that the same dose of DHA given over a period of 21 days prevented an increase in SCL in rats made hypercholesterolemic by combined PTU and cholesterol feeding. DHA, however, did not reduce the SCL of normal rats. SC-12790, when given under the same experimental conditions as DHA, did not reduce the SCL of hypercholesterolemic rats. DHA did not produce any change in thyroid weight as did exogenous TSH and T-3. It seems that the antihypercholesterolemic effect of DHA cannot be explained by a thyromimetic activity. These findings are of clinical importance since DHA, which is a weak endogenous androgen, is orally active as an anti-hypercholesterolemic agent. The possible mechanism of its action is discussed.

The molecular organization of chloroplast membranes. T. E. Weier and A. Benson (Dept. of Botany, Univ. of Calif., Davis, Calif.). *Amer. J. Bot.* **54**, 389–402 (1967). Regular subunits (quantasomes) have been observed in chloroplast membranes. Thin-sections have revealed 2 types of membranes, the fret membrane composed of one layer of subunits and the partitions composed of 2 layers. The membranes consist of 45% protein and 55% lipid, 80% of the lipid being glycolipids. The subunits (lipoprotein) are visualized as consisting of a protein core surrounded by various components depending upon the nature and environment of the membrane. The chlorophyll appears between rows of subunits and within the subunits both in the frets and partitions. Chloroplast membranes differ from "unit membranes" in two respects (1) they are aggregates of globular subunits and (2) the lipoprotein subunits consist of a protein matrix which binds the chlorophylls and lipids by hydrophobic association with their hydrocarbon moieties.

Biological oxidation of carotenes. Keiji Harashima (Univ. Tokyo). *Yukagaku* **16**, 491–498 (1967). A review with 35 references.

Essential serum fatty acids from extreme carbohydrate-rich lipid-poor diets. G. Wolfram and N. Zoellner (Med. Poliklin. Univ. Munich, Ger.). *Verh. Deut. Ges. Inn. Med.* **72**, 777–80 (1967). Six people, 24–9 years, were fed a diet of 2500 3500 cal./day (4% fat, 15% protein and 81% carbohydrate). The fat for part of the group was coconut oil (contg. 1.3% linoleic acid (I)). For the control group corn oil, 60% I, was used. Total lipids (II), cholesterol (III), phospholipids (IV), and neutral fat (V) were detd. during a 24-day control period and at intervals during the 32-day test period. II, III, and IV fell then rose to above the prediet level. V rose through 25 days, then fell, but was still above the prediet level. On 1.3% I, the I content of cholesterol esters (VI) and IV fell. Increases were noted in palmitic, palmitoleic, and oleic acids. No changes occurred in stearic and arachidonic. The control group showed no change in the I content of VI and IV, but there was a slight increase in oleic acid. Decreases were noted when I constituted 0.05% by cal. of diet. No decrease was observed when I was 2.1%. The min. daily requirement of I is 2% by cal.

Effect of dietary fat and cholesterol on the in vitro incorporation of acetate $^{14}$C into hen liver and ovarian lipids. J. F. Weiss, E. C. Naber and R. M. Johnson (Inst. of Nutr. and the Depts. of Poultry Sci. and Phys. Chem., The Ohio State Univ., Columbus, Ohio). *J. Nutr.* **93**, 142–52 (1967). A study was made of the incorporation of acetate-1-$^{14}$C into the lipid fractions of liver slices and ovarian tissues from hens fed a basal diet and diets containing either safflower oil (30%), animal fat (30%), cholesterol (1%), or cholesterol (1%) and safflower oil (29%). When safflower oil was fed, acetate incorporation into total liver lipids decreased. The distribution of $^{14}$C (ratio of $^{14}$C in a particular fraction to the $^{14}$C in total lipids) increased in the cholesterol and phospholipid fractions, decreased in triglycerides, and remained the same in diglycerides and cholesterol esters. When animal fat was fed, the distribution of $^{14}$C increased in the cholesterol fraction and decreased in triglycerides, but total lipid synthesis was depressed further than it was when safflower oil was fed. When cholesterol was fed, acetate incorporation into liver cholesterol decreased, while incorporation into triglyceride increased slightly.

Effect of dietary fat and d-thyroxine on the incorporation of acetate-1-$^{14}$C into egg yolk lipids. *Ibid.*, 153–60. The effect of high fat diets and d-thyroxine treatment on the distribution of $^{14}$C and the absolute acetate incorporation into the yolk lipid fractions of eggs from hens given acetate-1-$^{14}$C orally was determined. Acetate incorporation into total yolk lipids was decreased when either safflower oil or animal fat was fed at a level of 30%, but incorporation into the cholesterol fraction was not changed. The distribution of acetate-$^{14}$C (ratio of $^{14}$C in a particular fraction to the $^{14}$C in total lipids) increased in the cholesterol fraction and decreased in triglycerides; $^{14}$C distribution increased slightly in the phospholipid fraction when safflower oil was fed and decreased slightly when animal fat was fed. d-Thyroxine injection resulted in an increased recovery of the isotope, with most of the increased radioactivity located in the triglyceride fraction. Regardless of treatment, the distribution of $^{14}$C increased with time in the cholesterol fraction and decreased with time in the triglyceride fraction, whereas it was constant with time in the phospholipid fraction.

Effect of mineral oil ingestion on growth and liver lipid composition in the rat. S. M. Vachha, F. A. Kummerow and E. G. Perkins (Burnsides Res. Lab., Dept. of Food Science, Univ. of Illinois, Urbana, Ill.). *Proc. Soc. Exp. Biol. Med.* **126**(1), 258–63 (1967). The effect of paraffin, transformer, spindle and the respective oxidized oils on growth rate and

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percentage composition of liver lipid in rats was studied for a period of 4 weeks. The results indicated that transformer, spindle, oxidized transformer and oxidized spindle oils significantly depressed growth rate in rats. A decreased percentage in phospholipids and an increased percentage in triglycerides was noted in the liver lipids from these animals. Paraffin oil and oxidized paraffin oils decreased the growth rate per week slightly; there was no change in the percentage of the various lipid classes in the liver in these animals. Increased levels of palmitoleic acid were found in the cholesterol esters fraction of rats fed paraffin, transformer, oxidized paraffin and transformer oils. More oleic acid was detected in free fatty acids and triglycerides of rats fed transformer, spindle, oxidized paraffin, transformer and spindle oils.

UPPER INTESTINAL TRACT INFECTION PRODUCED BY E. ACERVULINA AND ABSORPTION OF $^{65}$ZN AND $^{131}$I-LABELED OLEIC ACID. D. E. Turk and J. F. Stephens (Dept. of Poul. Sci., Clemson Univ. Clemson, S. Carolina). *J. Nutr.* 93, 161–5 (1967). A series of trials was conducted to determine the effects of upper intestinal tract damage upon the absorption of labeled zinc and oleic acid used as examples of mineral and fatty nutrients. The protozoan parasite *Eimeria acervulina*, which attacks the anterior portion of the chicken intestine, was used to produce the intestinal damage. The infection caused growth retardation on the seventh through tenth days post-inoculation and visible damage to the lining of the upper one-third of the intestinal tract during the period from 5 to 10 days post-inoculation. Increased absorption of orally administered $^{65}$Zn and $^{131}$I-labeled oleic acid occurred on day 1 and from days 14 through 21 post-inoculation, whereas greatly decreased absorption of both labeled nutrients was observed on days 5 through 10 post-inoculation. Both oleic acid and zinc absorption were severely and equally depressed by *E. acervulina* infection. This was contrasted with *E. necatrix* infection in which zinc absorption was much more severely affected than oleic acid absorption.

INFLUENCE OF UNSATURATION ON FIBRINOLYTIC ACTIVITY OF SALTS OF FATTY ACIDS. M. J. Surgala, E. D. Beesley and R. R. Brubaker (Biological Sciences Lab., Fort Detrick, Frederick, Md.). *Proc. Soc. Exp. Biol. Med.* 126(1), 256-58 (1967). Sodium or potassium salts of some long chain fatty acids induce fibrinolytic activity on unheated bovine fibrin films. The influence of chain length and unsaturation on ability to induce fibrinolysis has been studied. Unsaturated fatty acids seem to be more active than the saturated compounds. The presence of one unsaturated bond appears to make little difference in activity of C16 fatty acids. In C18 and C20 acids, it increases activity roughly 10-fold. In C22 and C24 acids, it increases activity more than 100-fold. A possible role of fatty acids in regulation of fibrin formation and digestion is suggested.

FATTY ALCOHOL INHIBITION OF TOBACCO AXILLARY AND TERMINAL BUD GROWTH. G. L. Steffens, T. C. Tso and D. W. Spaulding (Crops Res. Div., USDA, Beltsville, Md. 20705). *J. Agr. Food Chem.* 15(6), 972–75 (1967). Fatty alcohols with chain lengths of $C_9$, $C_{10}$ and $C_{11}$ were highly active in selectively killing or inhibiting axillary and terminal bud growth of tobacco. Fatty alcohols with chain lengths shorter than $C_9$, or longer than $C_{11}$, were less effective. On an equal molar basis, the most effective fatty alcohols are more active than the corresponding fatty acid methyl ester. Without the proper type and amount of surfactant, the $C_9$, $C_{10}$ and $C_{11}$ alcohols and esters exhibit nonselective tissue kill. With the aid of surfactants, the emulsions become phytotoxic only to young meristematic tissue but cause little or no visible injury to more mature tissue.

THE PHOSPHOFRUCTOKINASE AND SORBITOL DEHYDROGENASE ACTIVITIES OF ARTERIAL TISSUE IN INDIVIDUALS OF VARIOUS AGES. E. Ritz and J. E. Kirk (Div. of Gerontol., Washington Univ. School of Med., St. Louis, Missouri). *J. Gerontol.* 22(4), 433–38 (1967). Studies were made of the phosphofructokinase (PFK) and sorbitol dehydrogenase (SODH) activities in human vascular samples obtained fresh at autopsy from Ss of various ages who did not display liver disease and whose serum specimens did not contain detectable SODH. The average PFK activities of normal aortic tissue (N = 62), pulmonary artery (N = 55), normal coronary artery (N = 35), expressed as micromoles of fructose-6-phosphate metabolized/g wet tissue/hour were, respectively, 4.08, 5.63, 2.13, and 2.58. Approximately similar PFK values were observed for normal, lipid-arteriosclerotic, and fibrous-arteriosclerotic tissue portions. The mean SODH activity recorded for normal aortic tissue (N = 66) was 0.455 micromoles of D-fructose metabolized/g wet tissue/hour. The corresponding average values for the pulmonary artery (N = 49), normal coronary artery (N = 29), and inferior vena cava (N = 31) were: 0.490, 0.423, and 0.129. Moderately lower SODH activities were found in lipid-arteriosclerotic than in normal aortic tissue, and significantly reduced values were observed in fibrous arteriosclerotic specimens. Conspicuously lower activities of both PFK and SODH were usually displayed by vascular samples from children than from adults. For 20- to 87-year-old individuals, statistically significant variations in activities with age were not observed. The demonstrated SODH activity in the various types of blood vessels studied indicates the functioning of the sorbitol pathway in human vascular tissue.

INFLUENCE OF CARBOHYDRATE AND NITROGEN SOURCES ON THE RUMEN VOLATILE FATTY ACIDS AND ETHANOL OF CATTLE FED PURIFIED DIETS. E. R. Orskov and R. R. Oltjen (USDA, ARS, Animal Husbandry Res. Div., Beltsville, Md.). *J. Nutr.* 93, 222–8 (1967). Three experiments were conducted to study the influence of various carbohydrate and nitrogen sources on the volatile fatty acid and ethanol content in the ruminal ingesta of cattle fed purified diets. Molar percentages of isobutyric and isovaleric acids were significantly greater when cattle were fed a natural diet compared with purified diets containing either urea or isolated soy protein. Furthermore, the molar percentage of these same acids were significantly greater when isolated soy protein was compared with urea. Molar percentage of isobutyric and isovaleric acids were similar when urea phosphate, uric acid, biuret and urea were compared as nitrogen sources in purified diets. Cattle fed the biuret diet had the greatest ruminal concentrations of butyric, valeric and caproic acids and also ethanol. Major sources of carbohydrate studied and the molar percentages of acetic, propionic, butyric, and valeric acids in ruminal fluid were: wood pulp, 73.7, 18.3, 4.8, 0.8; starch, 60.4, 24.7, 10.4, 2.7; starch plus glucose, 57.1, 28.9, 9.9, 1.9; sucrose, 49.6, 23.2, 20.2, 4.4; and glucose, 38.0, 22.3, 25.8, 10.4.

CAROTENOID BIOSYNTHESIS IN RHODOSPIRILLUM RUBRUM: EFFECT OF PTERIDINE INHIBITOR. N. A. Nugent, R. C. Fuller (Dept. of Microbiol., Dartmouth Med. School, Hanover, New Hampshire). *Science* 158(3803), 922–24 (1967). A known inhibitor of pteridine utilization (4-phenoxy, 2,6-diamino pyridine) blocks the synthesis of colored carotenoids in the photosynthetic bacterium *Rhodospirillum rubrum*. In many ways the effect is similar to the inhibition of the synthesis of colored carotenoids by diphenylamine. This inhibition is probably independent of other effects of pteridine on photosynthetic electron transport since it is not as readily reversible as the total inhibition of photosynthetic activity by pteridine analogs.

IN VITRO INCORPORATION OF ACETATE-1-$^{14}$C INTO SPHINGOMYELIN, PHOSPHATIDYL CHOLINE AND PHOSPHATIDYL ETHANOLAMINE OF RABBIT TESTES. R. J. Morin (Dept. of Pathol., Los Angeles County Harbor Gen. Hosp., Torrance, Calif., and U.C.L.A. School of Med., Los Angeles). *Proc. Soc. Exp. Biol. Med.* 126(1), 229–32 (1967). Rabbit testes were incubated with acetate-1-$^{14}$C, following which the amounts, radioactivities, fatty acid compositions and fatty acid specific activities of the major phospholipids were determined. Phosphatidyl choline was present in highest amount and incorporated the most acetate-$^{14}$C. All the phospholipids contained high percentages of polyunsaturated fatty acids, particularly of the linoleic acid series. The rabbit testicular phospholipids were found to contain a higher percentage of 8,11,14-eicosatrienoic acid than is found in other normal tissues. Palmitic acid incorporated the highest amount of acetate-$^{14}$C in all the phospholipid classes. Smaller, but significant amounts of this precursor were also utilized in the synthesis of 8,11,14-eicosatrienoic, arachidonic and docosapentaenoic acids by the testes.

PATHS OF CARBON IN GLUCONEOGENESIS AND LIPOGENESIS. M. A. Mehlman, P. Walter and H. A. Lardy (Inst. for Enzyme Res., Univ. of Wisconsin, Madison, Wisc. 53706). *J. Biol. Chem.* 242(20), 4594–4602 (1967). In the presence of ATP, $P_i$, and magnesium ions, rat kidney mitochondria converted pyruvate and bicarbonate mainly to malate, fumarate and citrate. Pyruvate carboxylase activity was estimated by measuring the amounts of products formed and the radioactive bicarbonate retained. When glutamate was added to the system, radioactive aspartate was formed without changing the incorporation of radioactivity into malate and citrate. High concentrations of pyruvate, magnesium ions or bicarbonate inhibited pyruvate

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carboxylation, as did the absence of added $P_i$. Addition of short chain fatty acids or of acylcarnitines of various chain lengths decreased pyruvate decarboxylation. In the presence of octanoate and hexanoate, the formation of malate and citrate and the incorporation of radioactive bicarbonate were slightly decreased. The addition of ammonium chloride led to formation of small amounts of aspartate, but otherwise did not alter product formation or bicarbonate incorporation. With liver mitochondria, addition of ammonium chloride permitted formation of aspartate and glutamate in large quantities and malate production was depressed. With kidney mitochondria, the addition of malate, succinate, α-ketoglutarate or citrate led to large increases in bicarbonate incorporation into malate. Similar but smaller effects were observed with liver mitochondria. It is concluded that kidney pyruvate carboxylase is sufficiently active to permit this organ to contribute significantly to gluconeogenesis in the rat.

Effects of psychic stress on atherosclerosis in the squirrel monkey (Saimiri sciureus). C. M. Lang (Dept. of Lab. Animal Med., Bowman Gray School of Med., Wake Forest Univ., Winston-Salem, N. C.). *Proc. Soc. Exp. Biol. Med.* **126**(1), 30–34 (1967). Two groups of squirrel monkeys (*Saimiri sciureus*) were subjected to intermittent stress of different types (restraint alone and restraint combined with conditioned avoidance) for a period of 25 months. The following statistically significant differences were observed between the test groups and a control group of monkeys confined to cages for the same period of time: (1) The mean serum cholesterol was higher following the periods of stress; (2) excretion of urinary 17-ketosteroids was increased; and (3) coronary artery atherosclerosis was more marked.

Chain elongation of linoleic acid and its inhibition by other fatty acids in vitro. H. Mohrhauer, K. Christiansen, M. V. Gan, M. Deubig, and R. T. Holman (Univ. of Minnesota, The Hormel Inst., Austin, Minn. 55912). *J. Biol. Chem.* **242**(19), 4507–14 (1967). Linoleic acid-1-$^{14}C$ was incubated with subcellular fractions of rat liver to study the mechanism of polyunsaturated fatty acid synthesis. The most effective system for the chain elongation of linoleic acid to eicosadienoic acid was liver microsomes plus malonyl co-enzyme A with cofactors, NADPH and ATP. Under anaerobic conditions, the chain elongation reaction could be separated quantitatively from the dehydrogenation reaction which otherwise required the same system. The chain elongation of linoleic acid was inhibited by saturated fatty acids of which myristic and pentadecanoic acids were most effective. Mono-unsaturated and polyunsaturated fatty acids also act as inhibitors. From consideration of reaction kinetics and inhibition by other fatty acids, the conversion of linoleic acid to γ-linolenic acid seems preferred over the conversion of linoleic acid to homolinoleic acid.

Absolute stereochemical configuration of phytanyl (dihydrophytyl) groups in lipids of Halobacterium cutirubrum. M. Kates, C. N. Joo, B. Palameta and T. Shier (Div. of Biosciences, Nat. Res. Council, Ottawa, Canada). *Biochemistry* **6**(11), 3329–38 (1967). The absolute stereochemical configuration of the phytanyl (3,7,11,15-tetramethylhexadecyl) groups in the lipids of *H. cutirubrum* was determined as follows. Conversion of the phytanyl groups to phytanic and pristanic acids yielded (+)—3,7,11,15-tetramethylhexadecanoic acid and (−)—2,6,10,14-tetramethylpentadecanoic acid, respectively, showing that C-3 in the phytanyl group has the D or R configuration. Reduction of the pristanic acid to pristane (2,6,10,14-tetramethylpentadecane) gave the *meso*-6R, 10S isomer, identical with that obtained from phytol, showing that C-7 and C-11 in the phytanyl groups both have either the R,R or the S,S configuration. Barbier-Wieland degradation of the pristanic acid yielded a $C_{19}$ ketone identical with (6R,10R)-14-trimethylpentadecanone-2, showing that C-7 and C-11 in the phytanyl groups have the R configuration. These findings thus establish the absolute configuration of the bacterial phytanyl groups as (3R,7R,11R)-15-tetramethylhexadecyl. The bearing of these findings on the configuration of phytanyl derivatives from various sources is discussed.

β-Hydroxydecanoyl thioester dehydrase. L. R. Kass, D. J. H. Brock and K. Bloch (J. B. Conant Lab., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* **242**(19), 4418–31 (1967). β-Hydroxydecanoyl thioester dehydrase of *Escherichia coli* has been purified 1200-fold. Its molecular weight is estimated at 28,000 by gel filtration and by zone sedimentation analysis. At all stages of purification, the enzyme catalyzes the dehydration of β-hydroxydecanoate to a mixture of β,γ- and α,β-decenoates, α,β predominating; the β,γ:α,β product ratio does not change with purification. Several additional lines of evidence are presented which argue that a single enzyme is responsible for the formation of both isomeric decenoates. Attempts to alter the activity and β,γ:α,β specificity of the enzyme have proved unsuccessful. The enzyme is active over a wide pH range and is insensitive to sulfhydryl poisons. The presence of a thioesterase activity in *E. coli* is noted.

β-Hydroxydecanoyl thioester dehydrase. D. J. H. Brock, L. R. Kass and K. Bloch. *Ibid.*, 4432–40. The β-hydroxydecanoyl thioester dehydrase of *E. coli* has a high degree of chain length specificity, catalyzing the dehydration of β-hydroxydecanoyl-N-acetylcysteamine at more than 10 times the rate of the corresponding $C_8$ and $C_{12}$ compounds. The enzyme acts on different thioesters of β-hydroxydecanoic acid at the following relative rates: acyl carrier protein, 6; N-acetylcysteamine, 1; and pantetheine, 0.6. In each case, both α,β- and β,γ-unsaturated products are formed. The dehydrase also catalyzes the interconversion and hydration of the isomeric decenoyl thioesters. The same equilibrium mixture is obtained when either β-hydroxydecanoyl-, *trans*-α,β-decenoyl-, or *cis*-β,γ-decenoyl-N-acetylcysteamine is used as substrate. Experiments are described which attempt to delineate the pathway of interconversion of the different substrates, and which argue for a single, multifunctional enzyme catalyzing the transformations. In accord with the proposed pathway for the synthesis of long chain acids in *E. coli*, the bacterial fatty acid synthetase catalyzes the chain elongation of α,β-decenoyl acyl carrier protein to mainly saturated acids, and of β-hydroxydecanoyl and β,γ-decenoyl acyl carrier protein, to mixtures of long chain saturated and unsaturated acids. Explanations are offered for the apparent paradox that the isolated dehydrase converts β-hydroxydecanoyl thioesters primarily to α,β-decenoate, whereas the fatty acid synthetase, of which the dehydrase is a component, catalyzes the formation predominantly unsaturated acids, the elongation products of β,γ-decenoate.

Involvement of acyl carrier protein in acylation of glycerol 3-phosphate in Clostridium butyricum. II. Evidence for the participation of acyl thioesters of acyl carrier protein. H. Goldfine (Dept. of Bacteriol. and Immunol., Harvard Med. School, Boston, Mass. 02115), G. P. Ailhaud and P. R. Vagelos. *J. Biol. Chem.* **242**(19), 4466–75 (1967). In order to examine the involvement of acyl carrier protein in the acylation of glycerophosphate by bacterial extracts, a series of experiments with radioactive glycerol 3-phosphate, potential acyl donors, and enzyme preparations from *Clostridium butyricum* were carried out. The conversion of $^{14}C$-glycerophosphate to lipid, mainly lysophosphatidic acid, in the presence of a particulate fraction from *C. butyricum* was found to be dependent on the addition of acyl carrier protein (ACP) isolated from either *C. butyricum* or *Escherichia coli*. The apparent $K_m$ was $1.2 \times 10^{-6}$M for *C. butyricum* ACP and $3.4 \times 10^{-6}$M for *E. coli* ACP. Since no source of acyl groups was added in this series of experiments, it is postulated that the acyl groups transferred to glycerophosphate were derived from the particles. With this particulate fraction, chemically synthesized $^3H$-palmityl-ACP also markedly stimulated the acylation of glycerol 3-phosphate and was an efficient donor of palmitate in the synthesis of lysophosphatidic acid. Palmityl co-enzyme A had little effect on glycerophosphate acylation with the particulate fraction as the sole enzyme source. A two-fold stimulation of glycerophosphate acylation by palmityl-CoA was observed when a soluble protein fraction from *C. butyricum* was added to the particulate fraction.

New epoxyubiquinones. P. Friis, G. D. Daves, Jr., and K. Folkers (Stanford Res. Inst., Menlo Park, Calif.). *Biochemistry* **6**(11), 3618–24 (1967). Five new epoxy derivatives of ubiquinone-10 have been obtained by the techniques used to fractionate the lipids from *Rhodospirillum rubrum*, and it was possible to characterize two of them rather extensively. The epoxy group is in the isoprenoid side chain, but not in the unit adjacent to the quinone nucleus or in the terminal unit. These epoxyubiquinones were obtained in relatively low amounts such as 1–2% of the concentration of ubiquinone-10. Synthetic mono- and diepoxy derivatives have been prepared from ubiquinone-10. A monoepoxy derivative of ubiquinone-2 and two monoepoxy derivatives of ubiquinone-3 have also been synthesized. For further characterization, the isolated and synthesized epoxides were compared by their reaction with acetic acid; the products were hydroxy acetates of comparable characteristics. The epoxides of ubiquinone-10 from the fractionation may be naturally occurring in *R. rubrum,* or just artifacts of the isolation procedure, or conceivably they are both naturally occurring and artifactual. It is not yet possible to differentiate between these possibilities. That five such epoxides of ubiquinone-10 were obtained from fractionation clearly shows a lack of reaction specificity of a single isoprenoid unit in the epoxidation.

CHOLESTEROL-LOWERING EFFECTS OF CERTAIN GRAINS AND OF OAT FRACTIONS IN THE CHICK. H. Fisher and P. Griminger (Dept. of Nutr., Rutgers—The State Univ., New Brunswick, N. J.). *Proc. Soc. Exp. Biol. Med.* 126(1), 108–11 (1967). The plasma cholesterol-lowering activity of whole ground oats and its components was studied in chicks fed hypercholesterolemic diets. Oat hulls were most effective whereas oat starch and oat oil had no cholesterol-lowering activity. Liver lipids and cholesterol were also significantly reduced by whole oats and oat hulls, and, to a lesser extent, by dehulled oats. In contrast to observations made with pectin or scleroglucan, fecal lipids and sterols were not increased by the feeding of whole oats or oat hulls.

INCORPORATION OF $^{14}$C-LABELED ACETATE INTO LIPID BY ISOLATED FOAM CELLS AND BY ATHEROSCLEROTIC ARTERIAL INTIMA. A. J. Day, and Gwendoline K. Wilkinson (Dept. of Human Physiol. and Pharmacol., Univ. of Adelaide, S. Australia). *Circulation Res.* 21(5), 593–600 (1967). The synthesis of lipid by rabbit atherosclerotic intima incubated *in vitro* has been investigated and compared with that of foam cells isolated from intimal lesions. In the atherosclerotic arterial intima, $^{14}$C-labeled acetate is readily incorporated into the lipid fraction, most of the label being found in the phospholipid and cholesterol ester fatty acid fractions. Minimal incorporation into triglyceride, fatty acid and cholesterol occurred. The major phospholipid synthesized was lecithin but significant incorporation into phosphatidyl inositol, phosphatidyl ethanolamine and sphingomyelin also took place. The fatty acids synthesized were predominantly saturated in the phospholipid fraction. More monounsaturated fatty acids were present in the cholesterol ester fatty acids, but in both moieties little polyunsaturated fatty acids were labeled by the acetate.

EFFECT OF HYPERVITAMINOSIS D UPON THE PHOSPHOLIPIDS OF METAPHYSEAL AND DIAPHYSEAL BONE. R. L. Cruess and I. Clark (Orthopaedic Res. Lab., Royal Victoria Hosp., Montreal, Que.). *Proc. Soc. Exp. Biol. Med.* 126(1), 8–11 (1967). The phospholipids of the diaphyseal and metaphyseal portion of the long bones of rats have been analyzed. Lecithin, phosphatidylethanolamine, sphingomyelin and lysolecithin constitute the major phospholipids with small amounts of cardiolipin and phosphatidic acid also being present. Hypervitaminosis D was found to cause a significant increase in all phospholipids without a selective action on any one component. The incorporation of P$^{32}$ into the phospholipids was found to be increased indicating an increased synthesis rather than a decreased break-down. It is suggested that the accumulation of lipid material may be related to the failure of the osteoid in hypervitaminosis D to calcify properly.

CHOLESTEROL PRECURSOR POOLS OF PROGESTERONE IN THE BOVINE OVARY PERFUSED IN VITRO. D. B. Bartosik, E. B. Romanoff and D. J. Watson (Worcester Found. for Expt. Biology, Shrewsbury, Mass.). *Proc. Soc. Exp. Biol. Med.* 126(1), 119–23 (1967). Bovine ovaries were perfused *in vitro* with acetate-1-$^{14}$C throughout an experiment which lasted 377 minutes. Luteal ovaries and the contralateral follicular ovaries were sequentially infused with prolactin, and then with LH. At the end of the perfusion, the specific activity of luteal cholesterol-$^{14}$C was slightly greater than the specific activity of either the luteal tissue progesterone-$^{14}$C or the secreted progesterone-$^{14}$C. The specific activity of the cholesterol-$^{14}$C isolated from the residual stromal tissue and from the follicular ovaries was much lower than that observed in the corpus luteum.

INVOLVEMENT OF ACYL CARRIER PROTEIN IN ACYLATION OF GLYCEROL 3-PHOSPHATE IN CLOSTRIDIUM BUTYRICUM. I. PURIFICATION OF CLOSTRIDIUM BUTYRICUM ACYL CARRIER PROTEIN AND SYNTHESIS OF LONG CHAIN ACYL DERIVATIVES OF ACYL CARRIER PROTEIN. G. P. Ailhaud, P. R. Vagelos (Dept. of Biol. Chem., Washington Univ. School of Med., St. Louis, Missouri 63110) and H. Goldfine. *J. Biol. Chem.* 242(19), 4459–65 (1967). *Clostridium butyricum* grown in medium supplemented with radioactive pantothenic acid incorporates this compound into

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# Symposium on Parenteral Nutrition

An International Symposium on Parenteral Nutrition will be held at Vanderbilt University, Nashville, Tenn., on April 4–6, 1968. There will be one-half day sessions on Indications for Parenteral Nutrition, Carbohydrates, Amino Acids, Fat Emulsions and Studies of Complete Parenteral Nutrition.

Chairmen of the Symposium are: H. C. Meng, and D. H. Law. Guest speakers include: H. W. Bansi, Hamburg, Germany; K. H. Bässler, Mainz, West Germany; G. Berg, Erlangen, West Germany; G. F. Cahill, Boston, Mass.; J. E. Canham, Denver, Colo.; D. A. Coats, Melbourne, Australia; W. J. Darby, Nashville, Tenn.; A. C. Frazer, London, England; R. P. Geyer, Boston, Mass.; A. E. Harper, Madison, Wis.; K. Lang, Mainz, West Germany; R. Levine, New York, N. Y.; H. Mehnert, Munich, Germany; J. A. Moncrief, San Antonio, Texas; J. F. Mueller, Brooklyn, N. Y.; H. N. Munro, Cambridge, Mass.; M. J. T. Peaston, Liverpool, England; H. T. Randall, Providence, Rhode Island; J. E. Rhoads, Philadelphia, Pa.; O. Schuberth, Stockholm, Sweden; R. O. Scow, Bethesda, Md.; A. Wretlind, Stockholm, Sweden.

Advance registration is required. For information, contact symposium secretary, Mrs. Con O. T. Ball, Station 17, Vanderbilt University, Nashville, Tennessee, 37203.

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# Dates Given for Experiments Program

The 16th Annual Design of Experiments program will be held June 4–16, 1968, at the Rochester (N. Y.) Institute of Technology.

A second course, Statistical Techniques in Quality Control, will be held June 12–21.

Both courses, developed in cooperation with the Chemical Division of the American Society of Quality Control, are held at RIT.

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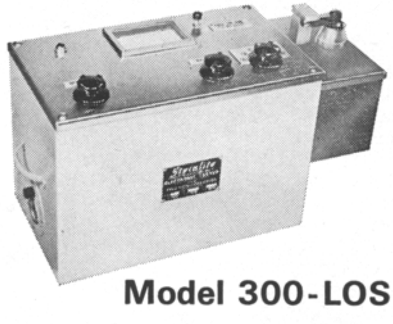

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(Continued from page 39A)

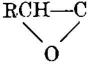
both protein and nonprotein fractions of the cell. Acyl carrier protein (ACP) is the major protein into which pantothenic acid is incorporated. *C. butyricum* ACP was isolated as a homogeneous protein, as judged by column chromatography on DEAE-Sephadex, disc gel electrophoresis and analytical ultracentrifugation. This protein contains a single sulfhydryl residue, 2-mercaptoethylamine, which is a component of the prosthetic group, 4′-phosphopantetheine. The prosthetic group is cleaved from the protein when the protein is incubated at pH 12, 70C, for 1 hour. Although this protein has properties similar to those of ACP of *Escherichia coli*, the amino acid compositions of the two proteins are different. The chemical synthesis of long chain fatty acyl-ACP derivatives is described. In this procedure other unidentified groups of the protein are acylated as well as the sulfhydryl group. The effects of acylation or acylation and alkylation of groups other than the sulfhydryl group of ACP were studied by testing ACP regenerated from such derivatives in the malonyl coenzyme A-$CO_2$ exchange reaction.

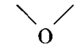
# • Drying Oils and Paints

Oil-modified polyurethanes. J. P. Burns and F. T. Sanderson (Atlas Chem. Industries, Inc.). *U.S. 3,332,896.* A polyurethane coating composition comprises the reaction product of an aliphatic or aromatic diisocyanate and the alcoholysis product of a drying oil such as linseed oil, soybean oil, safflower oil, sesame oil, poppy seed oil, sunflower oil, perilla oil, corn oil or dehydrated castor oil, and a polyoxyalkylene ether of a polyhydric alcohol such as the polyoxypropylene ether of sorbitol having 6–20 mols of propylene oxide or polyoxypropylene ether of methyl glucoside having 4–10 mols of propylene oxide. The proportion of polyoxyalkylene ether to drying oil used in producing the alcoholysis product is about (N/2)-1, where N is the number of hydroxyl groups per molecule of polyoxyalkylene ether, and the numerical ratio of isocyanate groups to hydroxyl groups in the reaction product is in the range of 0.9 to 1.0.

Superbodied oils. C. E. Penoyer (Sherwin-Williams Co.). *U.S. 3,337,593.* A process for making a superbodied unsaturated fatty oil free from gel particles and false body, and having a viscosity in the range 20–75 minutes (Gardner-Holt), comprises the steps of (a) heating a body of the oil under subatmospheric pressure to the temperature of its incipient polymerization, (b) contacting the heated oil with water vapor, (c) increasing the temperature to a maximum not in excess of 615F to initiate and sustain thermal polymerization of the oil while continuously contacting the body of the oil with water vapor, (d) maintaining the oil under thermal polymerization conditions until the viscosity of the oil reaches a maximum of 20–75 minutes (Gardner-Holt), (e) removing the body of oil from contact with water vapor, and (f) rapidly dropping the oil temperature to below that required to sustain thermal polymerization.

Coating compositions from monoepoxy alcohols. C. W. McGary, Jr. and C. T. Patrick, Jr. (Union Carbide Corp.). *U.S. 3,340,213.* A coating composition is claimed, comprising the reaction product obtained by heating at elevated temperatures a mixture of (1) at least one monoepoxy alcohol compound, (2) at least one saturated or unsaturated fatty acid or fatty acid oil, in an amount sufficient to provide 0.1 to 1.0 carboxy groups per hydroxy group of the monoepoxy alcohol; and (3) at least one polyfunctional compound selected from the group consisting of polycarboxylic acids and polycarboxylic acid anhydrides, in an amount sufficient to provide 0.2 to 3.0 carboxy groups per epoxy group of the monoepoxy alcohol compound; the total oxygen content of the reaction product being between 12 and 20% by wt.

Varnishes prepared from novel copolymers of monoepoxy alcohols and monoepoxides. K. L. Hoy (Union Carbide Corp.). *U.S. 3,341,484.* A fusible polyhydric copolymer is claimed, of at least one monoepoxide alcohol with at least one monoepoxide of the formula  $\underset{\diagdown\,\mathrm{O}\,\diagup}{\mathrm{RCH{-}CHR}}$, where R is selected from the group consisting of hydrogen, alkyl, haloalkyl, aryl, both R's being able to form a six-membered cycloaliphatic ring. The polyhydric copolymer is characterized by the fact that (1) it contains a plurality of alcoholic hydroxy groups, and (2) the copolymer chain is formed by reaction of an hydroxy group with a vicinal epoxy group of the monoepoxides. The polyhydric copolymer formed is finally esterified, at 100–300C, with an aliphatic monocarboxylic acid containing at least 4 C atoms.

Oxidized esters of fatty acids and polyhydroxyl-containing polymers. J. S. Long (Union Carbide Corp.). *U.S. 3,341,485.* A film-forming composition is claimed, comprising the blown oxidized monocarboxylic fatty acid esters of the polyhydroxyl-containing polymers selected from the group of (A) polymers obtained by the polymerization of at least one monoepoxy alcohol, and (B) copolymers obtained by the polymerization of at least one monoepoxy alcohol with at least one monoepoxide of the formula  $\underset{\diagdown\,\mathrm{O}\,\diagup}{\mathrm{RCH{-}CHR}}$, where R is selected from the group consisting of hydrogen, alkyl, haloalkyl, aryl, and where both R's can form a six-membered cycloaliphatic ring.

Acrylamide modified oils. O. I. Cline, Jr. (Celanese Coatings Co.). *U.S. 3,345,312.* A heat-curable coating composition comprises, in solution, a cross-linkable condensate prepared by allylic addition, at a temperature in excess of 180C, of (1) 10–40% by wt. of a monomer selected from the group consisting of acrylamide, methacrylamide, N-alkoxymethylacrylamide and N-alkoxymethylmethacrylamide, the alkoxy group in the latter two monomers having less than 10 C atoms, to (2) a drying oil which undergoes styrenation reactions, the allylic addition being carried out in the absence of free radical polymerization catalysts so as to minimize homopolymerization of (1).

Fatty acid-polyol partial esters reacted from bis(isocyanatoalkyl)fumarates. C. L. Milligan and K. L. Hoy (Union Carbide Corp.). *U.S. 3,345,388.* A coating composition consists essentially of the urethane-containing reaction product of (a) bis(2-isocyanatoethyl) fumarate, bis(1-methyl-2-isocyanatoethyl) fumarate or 1-methyl-2-isocyanatoethyl-2-isocyanatoethyl fumarate, and (b) a partial ester of (1) an aliphatic alcohol having at least 3 hydroxyl groups and (2) drying oil acid; the partial ester having an average alcoholic hydroxyl functionality greater than 1. The reactants (a) and (b) are reacted in proportions such that there is about one equivalent of isocyanate per equivalent of hydroxyl.

Preparation of epoxy triacetylricinoleic acid glyceride. N.-T. Pao, C.-M. Ch'en and T.-L. Chu. *Hua-Hsueh Shih-Chieh (Chem. World, China)* **1964**, No. 2, 70–2. This paper reports the use of castor oil as the raw material to prepare epoxytriacetylricinoleic acid glyceride. The product mixed very well with polyvinyl chloride resin. (Rev. Current Lit. Paint Allied Ind., No. 303.)

The dehydration of castor oil by ion exchange resins and its subsequent bodying. N. A. Ghanem and Z. H. Abd El-Latif (Dept. of Polymers and Paints, Dokki, Cairo, U.A.R.). *Paint Technol.* **39**(506), 144–151 (1967). A new method for the dehydration of castor oil using ion exchange resins of the type sulphonated poly- (styrene/divinyl benzene) co-polymer is described. The product is essentially monomeric dehydrated castor oil. With Dowex-50 and at 250-270C, 4% catalyst of particle diameter 62-125 $\mu$, clear light colored oil which corresponds closely with the standard specifications of dehydrated castor oil is obtained in less than 45 minutes reaction time. The catalyst is decomposed to inert material during dehydration and the product can be bodied normally by further heating to give an oil or much reduced drying time. The decomposed catalyst is insoluble and can be removed from the oil at any stage by filtration or decantation. The courses of dehydration of the oil with ion exchange resin and its subsequent bodying are determined by following changes with time of the chemical and physical constants such as iodine value, percent conjugated diene, viscosity or refractive index.

Chemical kinetics of photo-oxidative degradation of dried trilinolein film. R. S. Yamasuki (Nat. Res. Council of Canada, Ottawa, Ont., Canada). *Paint Technol.* **39**(506), 134–143 (1967). In a continuing effort toward better understanding of the basic degradation process taking place in exterior paint coatings, free films of dried trilinolein were subjected to controlled degradation. Films were exposed to oxygen, ultraviolet radiation and water vapor in a closed system in various combinations, and the changes in chemical composition of the film and of the volatiles evolved were analyzed periodically by infrared spectrophotometry. The formation of carbonyl compounds in the film and the evolution of volatile carbon compounds were attributed to internal body scissions and end chain-scission reactions, respectively. Combined, these reactions give the measure of the deterioration and non-film formation reactions occurring in the film in the early stages of exposure.

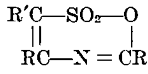
ATTENUATED TOTAL REFLECTANCE STUDIES ON DRYING OIL FILMS. A. E. Rheineck, R. H. Peterson and G. M. Sastry (N. Dakota State Univ., Fargo, N. D.). *Paint Technol.* 39(511), 484–489 (1967). Oxidative polymerization of oil films is a process which starts at the surface. It was felt that attenuated total reflectance (ATR) infrared spectroscopic studies would show changes in surface structure during the drying. Changes in the top and bottom surface spectra of 2 ml films cast on tin were determined with time for linseed, dehydrated castor, safflower and isomerized safflower oils. The area of absorption bands for hydroxyl (3600–3100 $cm^{-1}$), carbonyl (1800–1600 $cm^{-1}$) conjugated *trans-trans* and *cis-trans* and isolated *trans* (1000–925 $cm^{-1}$) were normalized by the area of the methylene and methyl bands (3000–2500 $cm^{-1}$) for the same sample to yield a Y function for each group. A series of plots of Y function for each group for film ages up to eight days were prepared. The data confirm previous findings concerning isomerization of *cis* to *trans* groups during film formation. Other changes in surface groups are specific to the oil compositions. There appears to be a general increase in concentration of *trans* unsaturation at the surfaces and an increase in more polar groups within the film. Top and bottom surfaces showed essentially identical spectra.

SUCROSE ESTER PROCESS. L. I. Osipow. *Am. Ink Maker* 44, No. 9, 48, 51 (1966). Sucrose stearate is formed by emulsifying sucrose dissolved in propylene glycol with methyl stearate to give a transparent micro-emulsion. Upon distillation of the propylene glycol, methyl alcohol is eliminated. Application of the process to the development of drying oils for printing inks is indicated. (Rev. Current Lit. Paint Allied Ind. No. 301.)

APPLICATION OF THE ANALYSIS OF STEROLS TO THE STUDY OF OIL PAINT MEDIA. J. P. Wolff, A. Karleskind and F. Audiau. *Double Liaison* **1966**, No. 136, 1529–36. Paint oils contain appreciable amounts of different sterols, the relative ratios of which vary according to their nature. The sterols may be accurately determined qualitatively and quantitatively by the analytical process described. The mixed sterols are separated from the other constituents of the oils by thin-layer chromatography, and the mixture is analyzed by gas chromatography. In the same way, this process enables us to know the purity of the oils with some precision and to determine the nature of the mixtures in the case of raw oils as well as in the case of paint media based on oils, whether or not the oils have been treated. (Rev. Current Lit. Paint Allied Ind. No. 301.)

## • Detergents

DETERGENT COMPOSITIONS CONTAINING 2-DIOXY-1,2,5-OXATHIAZINE. G. L. Broussalian (Monsanto Co.). *U.S. 3,337,467.* A process for manufacturing a detergent material comprises blending in a 100:5 to 100:70 weight ratio a soap and a 2-dioxy-1,2,5-oxathiazine having the formula:



$$\begin{array}{l} R'C—SO_2—O \\ \;\;\| \qquad\quad\;\; | \\ RC—N=CR'' \end{array}$$

where R and R' are alicyclic or aliphatic radicals containing 8 to 22 C atoms, or hydrogen; R and R' having a combined total of 8 to 22 C atoms and at most one of R and R' being hydrogen; R'' being either hydrogen or a lower alkyl radical. The compound described above is then hydrolyzed by heating the blend in the presence of alkali to the corresponding vicinal acylamido sulfonate.

DETERGENT COPOLYMER OF POLYGLYCOL ALKENYL ETHERS. F. A. Stuart, W. T. Stewart, W. Love and F. W. Kavanagh (Chevron Research Co.). *U.S. 3,337,516.* An oil-soluble polymer is claimed of (A) polymerizable oil-solubilizing compounds having a single double bond and containing an aliphatic chain of 4 to 30 C atoms, and (B) at least one alkenyl ether of polyalkylene glycol having a molecular weight of 220 to 30,000 and 2 to 7 C atoms in each alkylene group, the alkenyl group containing from 3 to 20 C atoms. The polymerized composition contains (A) and (B) in a weight ratio between 40:60 and 96:4, has a molecular weight of at least 50,000 and a solubility in oil of at least 0.5%.

MICROBIOLOGICALLY ACTIVE QUATERNARY AMMONIUM COMPOUNDS. R. L. Wakeman and J. F. Coates (Millmaster Onyx Corp.).

(Continued on page 42A)

## • *AOCS Past Presidents*

With the following biographical sketch of A. E. Bailey, JAOCS continues a series begun in the October issue, compiled and written by R. W. Bates. The series will include the twenty presidents who have served the Society since 1947, when the first series of this kind was completed.

### ALTON EDWARD BAILEY, 1951

Alton Edward Bailey was the 42nd president of the American Oil Chemists' Society. Ed was born in Midland, Texas, May 24, 1907. He received a B.S. Degree from the University of New Mexico in 1927.

A. E. Bailey

His first position was with the Santa Fe Railroad as an Analytical Chemist. In 1929 he joined the Cudahy Packing Co. where he worked until 1941. It was while he was with Cudahy that his remarkable interest and abilities in the technology of fats and oils developed. On leaving Cudahy he went to the Southern Regional Research Laboratory at New Orleans as a Fats and Oils Research Chemist where he remained until 1946. His contribution to the literature while at that institution was considerable.

He was Chief Process Engineer for the Girdler Corporation, 1946–1950 in Louisville, Ky. While at Girdler he was instrumental in the development of the semicontinuous deodorizer which is extensively used today in the industry.

At the time of his death in 1953, he was Vice-President, Director of Research of the HumKo Products Co. in Memphis, Tennessee.

Ed made many major contributions in original research, and fortunately for the industry, he was a prolific writer. His "Industrial Oil and Fat Products" (Ed. 1 & 2) is a standard reference book today. Another volume, "Melting and Solidification of Fats," paved the way for the dilatometric measurements used to characterize fats. He was also the editor and contributor to "Cottonseed." In all he had over 40 publications.

Ed was the father of four children: Mrs. Albert E. Maulin of New Orleans, John S. Bailey of Los Angeles, William Alton and Robert Edward of Memphis and three grandchildren, Edward, Melba and Mercedes Maulin of New Orleans.

Ed was one of the outstanding fat and oil technologists of our time.

We are indebted to Mrs. Dottie Bailey for the statistical information used.

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## Pollution Symposium at Montreal

Industrial Water and Air Pollution is the subject of a one-day symposium to be held at the Windsor Hotel, Montreal, Feb. 22, 1968. The symposium is sponsored by the Montreal Sections of the Chemical Institute of Canada and the Canadian Society for Chemical Engineering. It will deal with current problems and possible remedies.

For details, contact K. Dunlop, Domtar Chemicals Ltd., 1155 Dorchester Blvd. W., Montreal.

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(Continued from page 41A)

*U.S. 3,337,531.* A microbiologically active quaternary ammonium cellulose sulfate is claimed, having a degree of substitution of about 0.55 to 3, and with the quaternary ammonium cation having at least one $C_8$ to $C_{22}$ alkyl group attached to the nitrogen. The compound possesses a phenol coefficient of at least 100 with respect to *Staphylococcus aureus* and *Salmonella typhosa* at 20C.

Fatty acid esters of polyoxypropylated glycerol. W. A. Lamont (Nalco Chemical Co.). *U.S. 3,337,595.* An ester of polyoxy-1,2-propylated glycerol having a molecular weight of 600–1,000 and an aliphatic monocarboxylic acid with 12–22 C atoms is claimed.

Process for the production of alcohol sulfates. N. Whitman (Du Pont & Co.). *U.S. 3,337,601.* A continuous process for the preparation of alcohol sulfates comprises continuously saturating with hydrogen chloride at 1–4 atm pressure an unsubstituted $C_8$–$C_{22}$ straight chain primary alcohol, cooling the alcohol to above its freezing point, continuously and simultaneously introducing the alcohol and chlorosulfonic acid into a pipeline reactor in which the residence time of the reactants is maintained at 1–30 sec., continuously and rapidly removing the sulfation mass from the reactor and introducing into a gas-liquid separation zone where by-product hydrogen chloride is driven off. Lastly, the reaction mass is introduced into a neutralizing zone where a stoichiometric amount of a dilute, aqueous alkali solution is added, yielding an essentially white neutralized alcohol sulfate.

Biodegradation of synthetic detergents. I. Biodegradation of anionic surfactants under aerobic and anaerobic conditions. Kenkichi Oba, Yukio Yoshida and Shinichi Tomiyama (Lion Fat & Oil Co., Tokyo). *Yukagaku* 16, 517–523 (1967). Seven anionic surfactants were examined under anaerobic condition where the removal organic substances took place slowly and incompletely. Even the sulfonates with straight alkyl chains were found to show low biodegradation. Among sulfates tested, some showed a remarkable decrease in the response to methylene blue (MB) after anaerobic incubation. It was found by use of sulfate, DAS ($C_{12}$ coconut fatty alcohol sulfate), that an organic biodegradation intermediate was present in anaerobically incubated medium after disappearance of MB-response. The amount of organic biodegradation residue found in earlier stage of aerobic incubation was as much as compared with the estimate from the disappearance rate of the MB-response. Therefore, enzymatic hydrolysis seemed to take part in the biodegradation process besides the breakdown of the alkyl chain.

Emulsification. II. HLB value of nonionic surfactants of polyoxypropylene-polyethylene blockpolyester type of high molecular weight. Sōichi Hayashi and Takuo Fukushima (Asahi Electrochem. Research Lab., Tokyo). *Yukagaku* 16, 512–517 (1967). The HLB value was calculated from equations: HLB value $= 0.0980x + 4.02$, or HLB value $= 16.02 \log A - 7.34$, where $x =$ cloud point (°C) and $A =$ cloud number. These empirical relations were independent of the number of functional OH radical in these nonionic surfactants when the molecular weight of polyoxyethylene per OH radical was larger than 900–1000.

Detergent/iodine systems. W. Schmidt and M. Winicov (West Chem. Products, Inc.). *Soap Chem. Specialties* 43(8), 61–6, 170–1 (1967). Iodine concentrates and products are manufactured by a 'cold process' in which a solution of iodine and iodide are added to unheated detergent. Products prepared by this process are extremely stable with respect to available iodine content and are unique in that essentially no organic carbon-iodine bonded fragments are formed. The addition of iodide has a profound effect on detergent-iodine complexing. A practical method is described for determining the degree of complexing by means of a distribution coefficient.

Optical brighteners, IV. Brightener selection and usage. P. S. Stenby (Geigy Chem. Corp.). *Soap Chem. Specialties* 43(8), 94–103 (1967). The analytical techniques used for identifying optical brighteners and measuring their activity are discussed, as well as the criteria followed and the physical properties that are important in the selection of an optical brightener for detergent application.

Detergent formulations by dry neutralization. R. R. Keast, E. H. Krusius and J. S. Thompson (FMC Corp.). *Soap Chem. Specialties* 43(8), 45–7 (1967). A process for producing free-flowing granular detergent formulations consists in spraying a sulfonic acid produced by sulfonation of detergent alkylate onto a mixture of dry ingredients, including enough soda ash to accomplish neutralization of the acid, under continuous high shear mixing. When all the liquid has been added, mixing is continued until neutralization is completed, as indicated by a marked lightening in product color and improved flowability. The type of mixer used is the single most important factor in the process, especially when surfactant levels higher than 10% are desired. A twin shell blender equipped with spray-on devices was found to be very satisfactory. The product tackiness and softness associated with the use of soft detergent alkylates (LAS) can be combatted through the use of hydrotropes, such as toluene, benzene or xylene sulfonate.

Toxicology of some nonionic surfactants. C. W. Leaf (Wyandotte Chemicals Corp.). *Soap Chem. Specialties* 43(8), 48–51, 106–10 (1967). Acute, target organ and chronic feeding studies were carried out with selected members of the 'Pluronic' family of block polymeric nonionic surfactants. The products studied were selected to include a broad range of molecular weights and varying compositions. It was concluded that the toxicological properties of this family of surfactants varied in a regular and predictable manner as do their physical properties. The lowest molecular weight products and those with lower proportions of ethylene oxide have the lowest acute oral toxicity values and can safely be fed in chronic studies at lower levels. As the molecular weight and/or the proportion of ethylene oxide increases, the acute oral $LD_{50}$ values and the tolerance to the test products increases. The higher molecular weight products show essentially no effects on test animals.

Investigations into the behavior of biologically hard and soft detergents in sewage purification plants, III. H. Spohn and W. K. Fischer (Henkel & Cie, G.m.b.H.). *Tenside* 4, 241–7 (1967). The results of tests carried out at two German water purification plants over the period 1964–1966, i.e. over the period of transition from hard to soft detergents, are reported. One of the two plants was a trickling filter plant, the other an activated sludge plant. It was concluded that the minimum of 80% degradation required by German law is achieved in biological purification plants. Considerable detergent degradation (21–34%) takes place in the sewer pipes leading to the purification plant.

Built detergent compositions containing dialkyl sulfoxides. W. L. Lyness and D. E. O'Connor (Procter & Gamble Co.). *U.S. 3,336,230.* A detergent composition is claimed, consisting essentially of 0.5–90% of a material having the formula, $RSOCR_1R_2CHR_3CHR_4OR_5$, where at least one of the groups $R$, $R_1$, $R_2$, $R_3$, $R_4$ and $R_5$ is an alkyl or alkoxyalkyl group having 8 to 18 C atoms and where the alkoxyalkyl group contains from 1 to 10 ether linkages, the remaining groups being selected from the group consisting of hydrogen and $C_1$–$C_3$ alkyl groups, the total number of C atoms in the molecule being from about 12 to about 32, and from about 10% to about 90% of water soluble alkaline detergency builder salts.

Built detergent compositions containing 3-hydroxyalkyl alkyl sulfoxides. W. L. Lyness and D. E. O'Connor (Procter & Gamble Co.). *U.S. 3,336,233.* A detergent composition is claimed, consisting essentially of 0.5–90% of a material having the formula $R_3CHOHCHR_4CR_1R_2SOR$, where at least one of the groups $R$, $R_1$, $R_2$, $R_3$ and $R_4$ is an alkyl or alkoxyalkyl group containing 8 to 18 C atoms and where the alkoxyalkyl group contains from 1 to 10 ether linkages, the remaining groups being selected from the group consisting of hydrogen and $C_1$–$C_{18}$ alkyl groups, the total number of C atoms in the molecule being from about 12 to about 32; and from about 10 to about 90% of water soluble alkaline detergency builder salts, the ratio of builder salts to organic detergents being from about 1:4 to about 20:1.

Surface biactive amphoteric agents. P. G. Abend, W. M. Linfield and B. C. Brown (Armour & Co.). *U.S. 3,336,372.* The class of compounds represented by the following structural formula are claimed as new composition of matter: $R(R_2)_2N^+—R_1(SO^-_3)_2—N^+(R_2)_2R$ where $R$ is a $C_{12}$ to $C_{18}$ alkyl group, $R_1$ is a hydrocarbon chain selected from the class consisting of $C_2$–$C_6$ alkylene and phenyl alkylene having 2 to 4 C atoms in the alkylene chain and $R_2$ is selected from the group consisting of $C_1$–$C_8$ alkyl groups and $C_2$–$C_8$ hydroxy alkyl groups.

Cleansing tablets. E. H. Krusius and R. R. Keast (FMC Corp.). *U.S. 3,338,836.* A cleansing tablet is claimed, consisting of 2–95% of particulate sodium chloride having a particle size of 10 to 325 mesh, 5–98% of a polyphosphate water conditioner, 0.5–20% of a water soluble anionic or nonionic detergent and 0.5–98% of a chlorocyanuric compound, the tablet being characterized by being physically strong and capable of rapid disintegration and dissolution in water.

(Continued from page 42A)

IODINATED DETERGENT COMPOSITION. L. J. Hodes. *U.S. 3,338,837.* A stable, germicidal iodinated detergent composition is claimed, consisting of (1) 4–15% of an anionic, nonionic or cationic synthetic organic detergent, (2) 10–30% of an organic chloramine oxidant with an available chlorine content of at least 25%, (3) 0.5–5% of a water soluble monoatomic inorganic iodide, and (4) 51–85% of a water soluble alkalizer. The molal ratio of oxidant to iodide is maintained between 2.5:1 and 6:1 and the pH of the composition has a value of 7.8 to 8.4.

DETERGENT COMPOSITION. E. R. Wilson (Procter & Gamble Co.). *U.S. 3,338,838.* A built detergent composition consists essentially of (A) 10–80% of an organic detergent mixture consisting of (1) an alkali metal salt of the ester of methyl or ethyl alcohol with alpha-sulfonated coconut fatty acid, and (2) an alkali metal tallow alkyl sulfate, the ratio of detergent (1) to detergent (2) being in the range 2:1 to 1:4, and (B) 90–20% of a water soluble alkaline detergency builder salt.

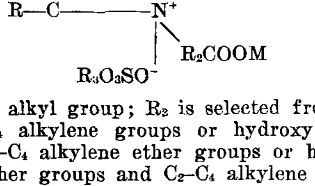
MILK SOLIDS IN A LIQUID COSMETIC PREPARATION. W. Kast. *U.S. 3,340,153.* A method of preparing a stable liquid cosmetic preparation comprises dissolving in water at least one surface active agent selected from a group consisting of alcohol sulfate, alkyl sulfonates, fatty alcohol ether sulfates and alkyl substituted aromatic sulfonates, heating the solution to 40C, separately mixing milk solids with water, mixing the heated solution of surface active agent with the milk solids and water at about 40C. The resulting mixture is maintained at 70–80C for 10–12 hours and then quickly cooled.

DETERGENT BAR. R. M. Anstett, W. W. Wellman and H. W. Andrews (Colgate-Palmolive Co.). *U.S. 3,340,196.* A detergent composition in bar form consists of 10–60% of a solid alkali metal salt of a higher fatty acid, 2–25% water, 0.1–5% of selenium disulfide, and a sufficient amount (up to 35%) of dicalcium phosphate to prevent discoloration of the bar when aged at room temperature for periods of time.

N-SUBSTITUTED AMIDES OF HYDROXYETHOXY-ACETIC ACID AND PROCESSES FOR USING SAME. R. L. Mayhew and E. P. Williams (General Aniline & Film Corp.). *U.S. 3,341,458.* A method for dispersing lime soaps formed in hard water by alkali metal fatty acid soaps consists of incorporating in the water as a dispersing agent a compound having the general formula: $XR_1NHCOCH_2OCH_2CH_2OH$, where X is either RCONH, RNH or $HOCH_2CH_2OCH_2CONR$, R is a hydrocarbon radical having from 8 to 21 C atoms and $R_1$ is a lower alkylene radical. The dispersing agent should be used in an amount of from 1 to 40% by wt. based on the amount of lime soap.

DETERGENT COMPOSITIONS. J. E. Davis (Procter & Gamble Co.). *U.S. 3,341,459.* A detergent composition is claimed, consisting essentially of an amine oxide of the following general formula: $R(OC_2H_4)_nNR'R''O$, where R is an alkyl radical with 12 to 14 C atoms, R′ and R″ are both methyl and n averages 3, and sodium tripolyphosphate, the weight ratio of amine oxide to tripolyphosphate being in the range 4:1 to 20:1. The above described detergent composition can be used to launder fabrics and garments under the following usage conditions: temperature 60–90F, pH 8–12, *detergent* concentration 0.05% to 0.50% by weight.

SHAMPOO COMPOSITION. L. Wei (Colgate-Palmolive Co.). *U.S. 3,341,460.* A shampoo composition substantially nonirritating to the eyes is claimed, consisting of (A) 10 20% by wt. of a compound having the general formula:



where R is a $C_4$–$C_{18}$ alkyl group; $R_2$ is selected from the class consisting of $C_1$–$C_4$ alkylene groups or hydroxy substituted alkylene groups, $C_2$–$C_4$ alkylene ether groups or hydroxy substituted alkylene ether groups and $C_2$–$C_4$ alkylene keto groups or hydroxy substituted alkylene keto groups; $R_3$ is a fatty acid monoglyceride group corresponding to a $C_8$–$C_{18}$ fatty acid; and M is either hydrogen or an alkali metal; and (B) 1–15% by wt. of an iminodipropionate having the general formula $R_4N(CH_2CH_2COOY)_2$, where $R_4$ is a $C_{10}$ to $C_{18}$ alkyl group and Y is either an alkali metal or alkylolamine; and water.

(Continued on page 47A)

## Cornell University Schedules Food Science Symposium, June 11-12

New Products and Processes, Food Quality, Food Lipids, and Convenience and Specialized Foods will be the subject matter areas covered at the second biannual Frontiers in Food Science Symposium sponsored by Cornell University's Graduate School of Food Science and Technology. Tuesday and Wednesday, June 11 and 12, 1968, have been chosen as the dates for the symposium. Cornell's New York State Agricultural Experiment Station at Geneva and its Department of Food Science and Technology will serve as hosts for the meeting.

The two-day symposium is geared to presenting latest research knowledge to food scientists. More than 20 papers in the four subject matter areas will be presented.

W. B. Robinson, Head of the Geneva Station's Department of Food Science and Technology, and Donald Downing, Extension Food Processing Specialist for Cornell, are serving as co-chairmen of the symposium.

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## IFT Meeting May 19-24, 1968

The 28th Annual Meeting and Industrial and Technical Exhibit, Institute of Food Technologists (IFT) will be held May 19–24, at the Philadelphia Civic Center.

Topics at the technical program will include product development, quality control, engineering, packaging, production, sanitation, ingredients, instruments and instrumentation, and automation as related to foods today and those of the future.

For further information, contact C. L. Willey, Executive Director, IFT, Suite 2120, 221 N. LaSalle St., Chicago, Ill. 60601.

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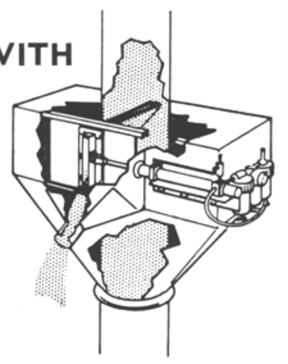

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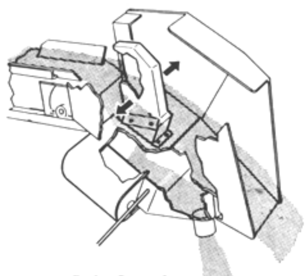

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(Continued from page 43A)

NOVEL GEL EMULSIONS. T. G. Kaufman and R. J. Tkaczuk (Drew Chem. Corp.). *U.S. 3,341,465.* A clear gel emulsion consists essentially of 10–40% by wt. of at least one ester having the following general formula: $R_1COOR_2$, where $R_1$ is a $C_8$–$C_{24}$ fatty acid residue and $R_2$ is a $C_1$–$C_4$ lower alkyl radical; 20–80% water; 3–15% of at least one alkylolamide having the general formula: $R_3CONR_4R_5$, where $R_3$ is a $C_8$–$C_{14}$ fatty acid residue, $R_4$ is either hydrogen or a $C_1$–$C_4$ monohydric alkyl radical and $R_5$ is a $C_1$–$C_4$ monohydric alkyl radical; 1–25% of a polyoxyethylene surfactant having one of the two following general formulas: $R_6O(C_2H_4O)_nH$ and $R_6COO(C_2H_4O)_nH$, where $R_6$ is a $C_8$–$C_{24}$ aliphatic radical and n is an integer between 2 and 40; and 1–8% of a partial oleic acid ester of a polyglycerol.

DETERGENT COMPOSITION. G. G. Corey and E. J. Kennedy (Colgate-Palmolive Co.). *U.S. 3,342,739.* A clear hard surface cleaning composition characterized by high flash foam during dilution and low residual foam at use concentration consists essentially of about one part of a polyethenoxy nonionic detergent, 0.4–3.0 parts of an ethoxylated fatty acid alkylolamide condensate with 10–14 C atoms in the acyl group and 0.05–0.3 parts of $C_{10}$-$C_{14}$ fatty acids, and the remainder water. This mixture of ingredients, having a pH of 6.9–7.5, forms a clear solution with a viscosity between 125 and 1,000 centipoises.

WINDOW CLEANER. J. E. Kazmierczak, A. B. Herrick and A. Carlo (Armour & Co.). *U.S. 3,342,740.* A window cleaner composition consists essentially of 0.1 to 2.5% by wt. of a water soluble silicone glycol copolymer, 10–30% of a $C_1$ to $C_4$ alcoholic solvent, 0.1–0.5% of a nonionic surfactant, and the rest water.

THIOETHER SULFONATES. E. P. Antoniades (Chevron Research Co.). *U.S. 3,342,741.* A detergent composition is claimed, consisting essentially of 10 to 40%, by wt., of a water soluble guanidinium 2-thioalkoxyethanesulfonate having 8–20 C atoms in the alkyl groups, and 60–90% of water soluble inorganic detergency builders.

PROCESS FOR PREPARING DETERGENT TABLETS. E. D. Wilcox, Jr. (Lever Bros. Co.). *U.S. 3,344,076.* An improvement is claimed in the process of preparing strong, abrasion-resistant, fast dissolving, low sudsing detergent tablets by blending together a mixture of (1) 4–13% by wt. of a synthetic nonionic detergent, and (2) 20–95% of a mixture of Form I and Form II pentasodium tripolyphosphate, and compressing the resulting granular mixture into tablets. The improvement claimed consists in chilling the compressed tablets to 10–45F for a period of 5 to 20 minutes to accelerate their strengthening.

ORGANIC PHOSPHORUS COMPOUNDS. R. R. Irani and K. Moedritzer (Monsanto Co.). *U.S. 3,344,077.* A detergent composition is described, consisting of at least 5% of a water soluble inorganic alkaline builder or of an organic sequestering builder, and at least 10% of an organo-amine-di-alkylene phosphorus compound having the formula $(XO)_2POCR_1R_2NRCR_3R_4PO(OX)_2$, where R is selected from a group consisting of $C_4$–$C_{30}$ aliphatic hydrocarbyl groups, $C_4$–$C_6$ alicyclic groups, $C_6$-$C_{10}$ aryl groups, $C_7$–$C_{30}$ alkaryl groups, $C_7$–$C_{30}$ aralkyl groups; $R_1$, $R_2$, $R_3$ and $R_4$ are selected from the class consisting of hydrogen, $C_1$–$C_{30}$ aliphatic hydrocarbyl groups, $C_4$–$C_6$ alicyclic groups, $C_6$–$C_{10}$ aryl groups, $C_7$–$C_{30}$ alkaryl groups and $C_7$–$C_{30}$ aralkyl groups; and X is selected from the group consisting of hydrogen, alkali metal, alkaline earth metal, ammonium and lower molecular weight alkyl, alkylene and alkanol amines.

COATING COMPOSITIONS COMPRISING ALKYLOLATED ACRYLAMIDE-ETHER VINYL MONOMER-DRYING OIL INTERPOLYMER. H. H. Flegenheimer (Celanese Coatings Co.). *U.S. 3,344,097.* A coating composition consists of an interpolymer of (1) an N-alkoxymethyl acrylamide having less than 10 C atoms in its alkoxy portion, (2) 5–60% by wt. of a material selected from the group consisting of natural drying and semidrying oils, reaction product of dehydrated castor oil and pentaerythritol, linseed fatty acid ester of pentaerythritol, cyclopentadiene modified linseed oil and styrenated natural drying oil, and (3) at least one other vinyl monomer copolymerizable with (1) and (2).

DRYCLEANING PROCESS IN WHICH GARMENTS ARE INITIALLY CONTACTED WITH AN ORGANIC SOLVENT-WATER-DETERGENT CONCENTRATE. J. M. Chisholm (Emery Industries, Inc.). *U.S. 3,345,123.* An improvement is claimed in a dry cleaning process employing a mixture of organic solvent, oil-soluble

(Continued on page 48A)

# 25th Anniversary of Hormel Institute

## Minnesota Univ. President Moos Addresses Group

The 25th anniversary of The Hormel Institute was celebrated on Nov. 8, 1967, with a luncheon at the Austin Country Club, Austin, Minn. Invited guests included Malcolm Moos, President of the University of Minnesota, and other University officials, former and present members of the Board of The Hormel Institute, various state, county, and city officials, and past and present employees of the Institute.

Following the luncheon, President Moos addressed the guests, speaking on "College Demonstrations Throughout the Nation."

Before the official celebration, W. O. Lundberg, Director of The Hormel Institute, R. T. Holman, and Herman Schlenk, senior staff members, appeared on the KAUS-TV program "Focal Point," and discussed various areas of research activities at the Institute. A question-and-answer period followed, with questions being telephoned in by people residing in the local area.

On Sunday, November 12, an open house was held at the Institute laboratories for the general public.

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## *Beta-Amines . . .*

(Continued from page 12A)

As for petroleum applications, increased hydrocarbon solubility, plus a high level of bactericidal activity toward anaerobic, corrosion-producing sulfate reducing organisms makes possible more efficient handling, storage and all-weather use in oil production usage. Excellent fuel oil additives, combining dehazing, corrosion inhibition and dispersancy, have been formulated; and chemicals which very effectively settle particulate matter from hydrocarbon systems have been developed.

Very promising anticaking formulations for hygroscopic particles, showing more even coating and easier application and better spreading characteristics, are now available. This is particularly true for mixed fertilizers, urea and ammonium sulfate.

Effective salts of the herbicidal acids, with low viscosities and pour points and high oil solubility have been prepared. Nonvolatility and low water loss are a characteristic of these. Invert emulsions for agricultural sprays have been readily prepared also.

Sound deadener formulations based on *beta* chemicals allow the preparation of coatings with good adhesion, even filler distribution and smooth, void-free films.

Excellent vapor-phase inhibitors, for protection in gas transmission lines and storage tanks, can be formulated.

In situ-prepared gelation systems for various polar and nonpolar solvents for a variety of uses are possible.

Toxicity data on these products are available and are in the same range of activity as the *alpha* amines, in terms of $LD_{50}$ and skin and eye irritation levels.

Additional applications have been developed but are not yet available for publication because of patent filings. Process and product applications are also pending.

A large pilot plant installation, capable of producing all product lines in field development quantities is in full operation. Full plant capability should be available in about two years.

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**The February JAOCS will carry the AOCS abstracts for the AOCS-AACC Joint Meeting in Washington, March 31-April 4. A complete listing of titles and authors was published in the December 1967 issue.**

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## • *Detergent Abstracts*

(Continued from page 47A)

detergent and water as the cleaning medium. The improvement consists in adding all of the water and a water-soluble detergent to a portion of the organic solvent initially contacting the fabric load to provide a temporarily high concentration of water and water soluble detergent in relation to the quantity of solvent.

PRODUCTION OF COMPLEX BASIC ALUMINUM SOAP GREASES. T. H. Koundakjian and J. L. Dreher (Chevron Res. Co.). *U.S. 3,345,291.* A process for producing complex basic aluminum soap greases comprises mixing 1.5 to 2.5 molar parts of a mixture of fatty acids and aromatic carboxylic acid in a relative mol ratio of 0.25:1 to 4:1, 1 molar part of a lower aluminum alcoholate, 0 to 1.5 molar parts of water and a large molar excess of an oil of lubricating viscosity. The resultant mixture is heated to 150–300F until reaction of the acids with the alcoholate is complete, blended with 0.05 to 10 molar parts of water and agitated vigorously at a temperature of 200–500F.

PROCESS FOR PREPARING DETERGENT GRANULES FROM TRIMETAPHOSPHATE. L. E. Meyer and R. D. Walker (Procter & Gamble Co.). *U.S. 3,345,297.* A process for preparing detergent granules comprises the steps of (1) forming a precursor slurry by mixing together 20 to 45 parts of water, 0.2 to 12 parts of a water soluble salt of nitrilotriacetic acid, 5 to 30 parts of soap, anionic, nonionic or zwitterionic synthetic detergent and from 20 to 60 parts of an alkali metal trimetaphosphate; (2) adjusting the temperature of the precursor slurry between about 140F and about 212F; (3) admixing into the continuously stirred precursor slurry 1.5 to 3.0 moles of an alkali metal hydroxide per mole of alkali metal trimetaphosphate to form the final slurry. The alkali metal hydroxide reacts with the trimetaphosphate converting it to tripolyphosphate with the resulting evolution of a substantial amount of steam from the slurry, whose temperature is maintained below about 275F.

DETERGENT COMPOSITION CONTAINING MIXED ANIONIC-CATIONIC SURFACTANTS. H. C. Speel (Universal Oil Products Co.). *U.S. 3,345,300.* A detergent composition consists of a quaternary cationic surface active agent and an anionic detergent consisting of a mono-alkali metal salt of a polybasic carboxylic acid mono-ester of the terminal alkylol group of a polyoxylated compound containing a hydrophobic radical. The carboxylic acid contains 2–3 carboxyl groups, the polyoxyalkylene chain contains 2–20 oxyalkylene units having 2–3 C atoms per unit and the hydrophobic radical contains 8–21 C atoms. The proportion of cationic surface active agent is from 5 to 95% of the mixture.

◆

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