ABSTRACTS

R.A. REINERS, Editor. Abstractors: N.E. Bednarcyk, J.E. Covey, J.C. Harris, Yoshio Hirano, S. Kawamura, D.A. Leo, F.A. Kummerow, E.G. Perkins, Biserka Matijasevic

• Fats and Oils

SYNTHESIS OF 1,2-DIALKYLCYCLOPROPENES, METHYL MALVALATE AND METHYL STERCULATE. N.E. Pawlowski, D.J. Lee and R.O. Sinnhuber (Dept. of Food Sci. and Technol., Oregon State Univ., Corvallis, Oregon 97331). *J. Org. Chem.* 37, 3245-8 (1972). Dipropyl-, dipentyl-, dihexyl-, diheptyl- and dioctylcyclopropene and methyl malvalate and sterculate have all been synthesized. Ethyl diazoacetate is decomposed in the presence of the appropriate alkyne, followed by hydrolysis to yield a 1,2-disubstituted 3-cyclopropenecarboxylic acid. Exposure to perchloric acid results in decarbonylation to a cyclopropenium ion, which is reduced by sodium borohydride to a 1,2-disubstituted cyclopropene. The absence of any 1,3-disubstituted cyclopropene in the product is consistent with theory. Spectroscopic data are presented. The cyclopropenethiol reaction is discussed.

UV-SPECTRA AND FATTY ACIDS COMPOSITION OF FRYING OILS FROM DIFFERENT CONDITIONS OF HEATING. V.F. Usenke et al. *Pishchevaya Tehnol.* 1972(3), 73-5. This paper gives UV-spectra and fatty acids composition of oils heated for 40 hours at 160C in air and in vacuum. Each 10 hours, samples were taken and examined. The results showed that the changes of the linoleic acid content and the values E_1 and E_2 are less if the oil is heated in vacuum. The advantage of heating the oil in vacuum is evident.

INFLUENCE OF THE DEFECT ON THE SUNFLOWER SEEDS ON THE COLOR OF THE EXTRACTED OILS. A.M. Goldovskij et al. *Pishchevaya Tehnol.* 1972(3), 62-6. Deterioration of seeds during the storage causes the formation of the new pigments which dissolve in hydrophobe solvents and in the oil. The result is a darker color in the refined oil, because these pigments are very difficult to eliminate during the refining process. The products obtained from these oils such as hydrogenated fats, fatty acids and glycerin are also darker.

SELECTIVE HYDROGENATION OF COTTONSEED OIL IN A SATURATED HYDROCARBON ON THE FIXED CATALYST. N.G. Krupenja et al. *Pishchevaya Tehnol.* 1972(3), 67-9. Selective hydrogenation of cottonseed oil in cyclohexane and in pure n-hexane on a nickel-aluminium-palladium catalyst increases with increasing temperature, but decreases with increasing pressure. Cyclohexane and n-hexane are the optimal solvents for the selective hydrogenation of the cottonseed oil at high hydrogen pressures.

CONDITIONS OF STORAGE OF DISTILLATED FATTY ACIDS. K. Ceglowska et al. *TSPK Pollena* 16(4), 25-30 (1972). To avoid changes in distillated fatty acids during the storage and transport, it is necessary that traces of iron be eliminated from the distillate and that the temperature during storage is not over 80C. Also, it is necessary to use aluminium steel of aluminium PA2 or aluminium 99.5.

EFFECT OF IONIZATION AND CATION SELECTIVITY ON THE EXPANSION OF STEARIC ACID MONOLAYERS. G.S. Patil, R.H. Matthews and D.G. Cornwell (Dept. of Physiological Chem., Ohio State Univ., Columbus, Ohio 43210). *J. Lipid Res.* 13, 574-9 (1972). Force-area isotherms of stearic acid and stearic acid-stearyl alcohol mixtures were investigated on alkaline subphases that contained Tris, Na^+ or K^+ cations and that varied in pH and ionic strength. The monolayer behaved as though ionization was effectively complete in the expanded region of the force-area isotherm. Surface pressure in this region was independent of pH and varied inversely with ionic strength as predicted by the Davies equation. The monolayer behaved as a partially ionized film in the plateau region of the force-area isotherm. Surface pressure in this region varied directly with pH and ionic strength as predicted by a modified Davies equation for partially ionized monolayers. The neutral molecule, stearyl alcohol, exerted a large condensing effect on the ionized film at pH 12.8, and this condensing effect also supported the concept that a partially ionized stearic acid film existed in the plateau region of the force-area isotherm. A greater binding affinity for Na^+ than for K^+ showed that the stearate anion surface behaved as a strong field at pH 10 and above, and a greater binding affinity for K^+ than for Na^+ showed that the stearate anion surface behaved as a weak field at pH 9. The weak field explained in part the anomalous binding affinity of the large Tris cation for the stearate monolayer at pH 9.

RICE OIL CONTAINING COMPOSITION FOR USE AS CUTTING, PENETRATING, OR LUBRICATING OIL. E.E. Baldwin. *U.S. 3,702,301.* The whole grain rice oil is dewaxed and blended with other active ingredients such as white mineral oil, dibasic esters of sebacic acid and oleic acid of a low titer. The rice oil may also be used as an additive for waxes, film-forming coatings, low pour point greases and lubricating oils and cosmetics.

DECOLORATION OF COTTONSEED OIL WITH FERRIC CHLORIDE. L.Y. Yatsu, T.J. Jacks, and T.P. Hensarling (U.S. Sec'y of Agr.). *U.S. 3,702,857.* Cottonseed miscella is treated with ferric chloride to form an iron-gossypol complex. The treated miscella is then extracted with aqueous alkali. The supernatant liquid, when filtered through bleaching clay, produces an oil containing virtually no light-absorbing color bodies and a product comparable, colorwise, with commercial oil.

TRIGLYCERIDE HYDROLYSIS AND ASSAY. G. Bucolo and H. David (Calbiochem). *U.S. 3,703,591.* Glycerol esters present in aqueous media, such as serum triglyceride and milk fat, are assayed by complete enzymatic hydrolysis using both a lipase and a protease, whereupon the liberated glycerol is determined. A number of alternative enzymatic procedures are provided for the glycerol assay, all in the original aqueous medium.

CHARACTERIZATION AND IN VIVO PRODUCTION OF THREE GLYCOLIPIDS FROM CANDIDA BOGORIENSIS: 13-GLUCOPYRANOSYLGLUCOPYRANOSYLOXYDOCOSANOIC ACID AND ITS MONO- AND DIACETYLATED DERIVATIVES. T.W. Esders and R.J. Light (Dept. of Chem., Florida State Univ., Tallahassee, Fl. 32306). *J. Lipid Res.* 13, 663-71 (1972). Three glycosides of 13-hydroxydocosanoic acid isolated from *Candida bogoriensis* were characterized by quantitating the amount of carbohydrate, acetate and hydroxy acid in each, and by gas-liquid chromatography and mass spectrometry of their methyl ester, trimethylsilyl ether derivatives. One of the glycosides was the diacetylated

derivative of 13-glucosylglucosyloxydocosanoic acid previously characterized by Tulloch, Spencer and Deinema, in which the disaccharide had the $\beta(1\rightarrow2)$-sophorose linkage and the acetyl groups were attached to the 6′ and 6″ positions of the glucose residues. The other two glycosides were 13-glucosylglucosyloxydocosanoic acid and its monoacetylated derivative. A comparison of the mass spectra of derivatives indicates that the acetyl group of the monoacetyl lipid is on the internal glucose. Methyl 13-glucosyloxydocosanoate was produced by acid hydrolysis of the methyl ester of the unacetylated glycolipid and was characterized by the same techniques as the other glycolipids. Time course of production of the three glycolipids is consistent with the diacetylated derivative being the first extracellular product and the other two glycolipids being formed by deacetylation. 13-Hydroxy[13-^{3}H]docosanoic acid, methyl, 13-hydroxy[13-^{3}H]docosanoate and 9-hydroxy[11,12-^{3}H] stearic acid were each incorporated into the glycolipid fraction.

FATTY ACIDS, PART 19. THE CONVERSION OF ALKENOIC ACIDS TO ALKYNOIC ACIDS BY BROMINATION-DEHYDROBROMINATION. F.D. Gunstone and G.M. Hornby (Dept. of Chem., The Univ. of St. Andrews, North Haugh, St. Andrews, Scotland). *Chem. Phys. Lipids* 9, 91–97 (1972). Alkynoic acids (including octadec-9-ynoic, hendec-10-ynoic, and 12-hydroxy-octadec-9-ynoic) can be prepared from the cis alkenoic acids by bromination followed by dehydrobromination with sodium in liquid ammonia or with DBU (1,5-diazabicyclo(5.4.0) undec-5-ene). With other bases extensive migration of the unsaturated centre was observed and no satisfactory procedure for converting trans alkenoic acids to alkynoic acids without migration was discovered. Both types of alkenoic acids could be converted to ene-bromides, sometimes in high yield, with DBU and DBN (1,5-diazabicyclo (4.3.0)non-5-ene).

FACTORS RESPONSIBLE FOR THE DEVELOPMENT OF PEROXIDES DURING PRODUCTION AND HANDLING OF PALM OIL. B. Bek-Nielsen (United Plantations Bhd, Teluk Anson, Perak, Malaya). Part 1. *Oleagineux* 27, 379–83 (1972). The experiments described in this paper were aimed at discovering where and how peroxides develop and methods for minimizing such development. Bruising of the fruit prior to oil extraction resulted in increased amounts of free fatty acids but no formation of peroxides. Likewise, little oxidation of the oil occurred during steam sterilization of the fruit, mainly because the oil was still within the mesocarp cells and there was little residual oxygen in the sterilizers. Oxidation was also minimal during the stripping, digestion, and pressing steps, probably because the oil was not exposed directly to a high temperature in the presence of air during these steps. However, removal of moisture and residue at high temperatures in ordinary purifiers can destabilize the oil to further oxidation. It was found that the presence of moisture at about 1% of the oil appears to act as an inhibitor of oxidation.

FATTY ACID CHANGES DURING RIPENING OF SESAME (SESAMUM INDICUM L.). K.S. Sekhon and I.S. Bhatia (Dept. of Chem. and Biochem., Punjab Agricultural Univ., Ludhiana, India). *Oleagineux* 27, 371–3 (1972). Changes in the fatty acid composition of polar and non-polar lipid fractions from the seeds of two varieties of sesame were studied. At 10 days after flowering, both fractions of the oil contained more palmitic acid and less oleic and linoleic acids than at later stages of ripening. Up to 30 days after flowering, palmitic acid decreased and oleic and linoleic acids increased, but beyond that time only minimal changes occurred. The amount of oleic acid was greater and linoleic acid smaller in the non-polar fraction as compared with the polar fraction at all stages of ripening. The data indicate that there is no preferential synthesis of any fatty acid and that the general composition of the oil is maintained throughout the ripening period with the exception of the earliest stage.

• Biochemistry and Nutrition

CHOLESTEROL METABOLISM IN MYELIN AND OTHER SUBCELLULAR FRACTIONS OF RAT BRAIN. Martha Spohn and A.N. Davison (M.R.C. Membrane Biol. Group, Biochem. Dept., Charing Cross Hosp. Med. Schl., London, WC2N 4HH, Eng.). *J. Lipid Res.* 13, 563–70 (1972). For many years the bulk of myelin in adult brain was believed to be metabolically stable, although some metabolic activity of a small myelin fraction, especially in the gray matter of the brain, was recognized. We have attempted to compare the composition of myelin fractions isolated from two different areas of the brain. No differences in chemical composition were observed. We have also investigated the metabolism of cholesterol in myelin and other subcellular fractions from the two areas. Both young (16-day-old) and adult rats were used. Results show an uptake of radioactive cholesterol by all subcellular fractions of the brain, including myelin, in both young and adult animals, with ultimate uniform distribution of the radioactive sterol and its persistence in all uniformly labeled subcellular fractions of the brain. On the basis of these results we suggest that there is a pool of cholesterol in the brain from which all metabolizing structures, including myelin, draw their cholesterol supplies. There is continuous exchange of cholesterol between the brain pool and the blood. The rate of this exchange may be related to the rate of blood flow through the tissue.

DIURNAL VARIATION OF HMG CoA REDUCTASE ACTIVITY IN RAT INTESTINE. S. Shefer, S. Hauser, V. Lapar and E.H. Mosbach (Dept. of Lipid Res. of the Public Health Res. Inst. of the City of New York, Inc., and the Bureau of Labs., N.Y. City Health Dept., N.Y. 10016). *J. Lipid Res.* 13, 571–3 (1972). HMG CoA reductase activity of rat intestinal mucosa has a diurnal rhythm which coincides with the diurnal variation of the hepatic HMG CoA reductase but has a lower amplitude. The rhythmic variation of the intestinal reductase was present in both jejunal and ileal crypt cell microsomes and was not abolished by cholestyramine administration.

EFFECT OF INSULIN UPON THE CELLULAR CHARACTER OF RAT ADIPOSE TISSUE. L.B. Salans, Mary Jane Zarnowski and Ruth Segal (Dept. of Med., Dartmouth Hitchcock Med. Center, Hanover, N.H. 03755). *J. Lipid Res.* 13, 616–23 (1972). The effect of insulin upon the lipid content, and the number and size of fat cells in the epididymal, retroperitoneal and subcutaneous adipose tissue of a large number of rats were examined. Insulin administration began either in early life (birth, 1 or 3 wk of age) or during adulthood (age 10 wk). At different times during growth, groups of treated and control animals were killed and the size and number of fat cells in each of the three adipose depots were determined. Insulin-treated animals gained weight at an increased rate

and had fatter epididymal, retroperitoneal and subcutaneous adipose depots than untreated controls. In each site the expanded adipose tissue was accompanied by an increase in the lipid content per cell (cell size), but in no case was there an increase in the number of adipose cells. This was the case regardless of whether insulin treatment was initiated before weaning (birth, 1 wk of age), at weaning (3 wk) or post weaning (10 wk) and irrespective of the duration of the insulin treatment.

STRUCTURES OF CERAMIDE TETRASACCHARIDES FROM VARIOUS SOURCES: UNIQUENESS OF RAT KIDNEY CERAMIDE TETRASACCHARIDE. B. Siddiqui, J. Kawanami, Y. Li and S. Hakomori (Depts. of Pathobiol. and Microbiol., Univ. of Wash., Seattle, Wash. 98195). *J. Lipid Res.* 13, 657–62 (1972). Methylation analysis of ceramide tetrasaccharide isolated from human erythrocytes gave acetates of 2,3,6-tri-O-methylgalactitol and 2,4,6-tri-O-methylgalactitol in a ratio of 1:1, and about 50% of the galactose was oxidized by periodate. Rat kidney ceramide tetrasaccharide gave, in contrast, a much larger proportion of the acetates of 2,4,6-tri-O-methylgalactitol (ratio 1:0.3), and less than 20% of the galactose was oxidized by periodate. Sequential degradation by β-N-acetylhexosaminidase, α-galactosidase and β-galactosidase showed ceramide tetrasaccharides to have identical carbohydrate sequences and anomeric structures. The major part of ceramide trihexoside derived from rat kidney ceramide tetrasaccharide migrated on thin-layer chromatography more slowly than that derived from other ceramide tetrasaccharides. The structure of a major part of rat kidney ceramide tetrasaccharide was thus determined to be GalNAcβ(1 → 3)Galα(1 → 3)Galβ(1 → 4)Glcβ(1 → 1)Cer, whereas other ceramide tetrasaccharides have Galα(1 → 4) structure at the penultimate residue.

EFFECT OF CELL SIZE ON LIPOLYSIS AND ANTILIPOLYTIC ACTION OF INSULIN IN HUMAN FAT CELLS. B. Jacobsson and U. Smith (Dept. of Med. II, Univ. of Gothenburg, Sahlgren's Hosp., Gothenburg, Sweden). *J. Lipid Res.* 13, 651–6 (1972). The lipolytic response to catecholamines and the antilipolytic effect of insulin were studied as a function of adipose cell size and number. The results show that cellular enlargement is associated with an increase in the basal lipolysis as well as the release of glycerol induced by salbutamol (a B_2-receptor agonist), noradrenaline, adrenaline and isopropylnoradrenaline. The glycerol release induced by all these agents seems to be more favorably correlated with cell surface area than with cell volume or diameter. Under the incubation conditions used with glucose in the medium, the antilipolytic effect of insulin on the basal as well as on the adrenaline- and isopropylnoradrenaline-stimulated lipolysis was not consistent at any cell size studied. However, in the presence of noradrenaline and salbutamol, insulin exerted a consistent antilipolytic effect. The results show that the larger adipose cells are at least as sensitive to the antilipolytic effect of insulin as the smaller cells. The results imply that the previously reported diminished responsiveness to insulin shown by large adipose cells is exerted only on the side of lipid accumulation. It is suggested that the negative correlation between cell size and responsiveness to insulin on the side of lipid accumulation may be one way to control adipose cell enlargement.

"PLASMALOGEN-TYPE" CYCLIC ACETALS: FORMATION AND CONFORMATION OF THE 1,3-DIOXANES AND 1,3-DIOXOLANES FROM 1-O-CIS-ALK-1'-ENYL-SN-GLYCEROLS. W.J. Baumann, T.H. Madson and B.J. Weseman (Univ. of Minn., Hormel Inst., Austin, Minn. 55912). *J. Lipid Res.* 13, 640–50 (1972). Acid-catalyzed cyclization of 1-O-cis-alk-1'-enyl-sn-glycerol produced four structurally and geometrically isomeric long-chain cyclic acetals of glycerol. The isomers were isolated by adsorption and gas-liquid chromatography and were identified as cis-2-alkyl-5-hydroxy-1,3-dioxane (Ia), trans-2-alkyl-5-hydroxy-1,3-dioxane (IIa), cis-2-alkyl-4-hydroxymethyl-1,3-dioxolane (IIIa), and trans-2-alkyl-4-hydroxymethyl-1,3-dioxolane (IVa). The structure of each isomer was established by chemical and spectroscopic methods. Cyclization with *p*-toluenesulfonic acid in boiling benzene led to a thermodynamically equilibrated mixture of isomers Ia-IVa in which the cis isomers predominated. Cyclization in acetic acid was found to be kinetically controlled, and formation of the trans isomers was relatively favored. Rearrangement of the cyclic acetal isomers did not occur in acetic acid; hence, optically active five-membered ring acetals were prepared.

SPECIFIC RADIOACTIVE LABELING OF TERMINAL N-ACETYLGALACTOSAMINE OF GLYCOSPHINGOLIPIDS BY THE GALACTOSE OXIDASE-SODIUM BOROHYDRIDE METHOD. Y. Suzuki and K. Suzuki (Dept. of Neurology, Univ. of Penn., Schl. of Med., Philadelphia, Pa. 19104). *J. Lipid Res.* 13, 687–90 (1972). The galactose oxidase-sodium borohydride method was used to specifically label the terminal N-acetylgalactosamine of three glycosphingolipids, G_{M2}-ganglioside, asialo-G_{M2}-ganglioside and globoside.

All of the compounds showed a minimum of 95% radiopurity, and generally more than 90% of the total radioactivity was located in the terminal galactosamine moiety. Globoside and asialo-G_{M2}-ganglioside were labeled to high specific activities comparable with those of the sphingolipids with a terminal galactose moiety, labeled with the same procedure. These labeled compounds were well suited as substrates for the study of specific sphingolipid N-acetylgalactosaminidase. G_{M2}-ganglioside, however, was a poor substrate for galactose oxidase, and its specific activity was only a small percentage of the others. Furthermore, because of the low specific activity of the galactosamine moiety, it was necessary to pretreat G_{M2}-ganglioside with unlabeled sodium borohydride to reduce the nonspecific labeling of other portions of the molecule. The use of labeled sodium borohydride of a very high specific activity may yield specifically labeled G_{M2}-ganglioside suitable for metabolic studies. Thus, the method is useful for labeling not only terminal galactose but also terminal N-acetylgalactosamine of glycosphingolipids.

GANGLIOSIDES OF HUMAN, BOVINE AND RABBIT PLASMA. R.K. Yu and R.W. Ledeen (Saul R. Korey Dept. of Neurology and Dept. of Biochem., Albert Einstein College of Med. of Yeshiva Univ., Bronx, N.Y. 10461). *J. Lipid Res.* 13, 680–6 (1972). Gangliosides were isolated from human, bovine and rabbit plasma and were quantified by gas-liquid chromatography. Purification was achieved by sequential use of partitioning in solvents, DEAE-Sephadex chromatography, base treatment and silicic acid chromatography. Human and bovine plasma yielded slightly more than 1 μmole of lipid-bound sialic acid/100 ml; for rabbit plasma the value was 0.28 μmole/100 ml. The total bovine plasma ganglioside fraction contained equal amounts of N-acetylneuraminic and N-glycolylneuraminic acids; rabbit plasma gangliosides had about 1% of the latter, and the human plasma sample contained only the former. Thin-layer chromatography revealed important differences among the plasmas from the three species, but all possessed hematosides and hexosamine-containing gangliosides. The approximate ratios of these two categories, based on sialic acid content, were (hematosides:hexosamine-type):human, 2:1, rabbit, 3:2; and bovine, 2:3. The fatty acid compositions of both categories were characteristic of extraneural gangliosides and included six major acids: palmitic, stearic, behenic, tricosanoic, lignoceric and nervonic. The major long-chain base in each sample was sphingosine, while only a trace of the C_{20} isomer was detected.

LIPID ACCUMULATION AND HEMORRHAGE IN LIVERS OF LAYING CHICKENS. A STUDY ON FATTY LIVER-HEMORRHAGIC SYNDROME (FLHS). J.H. Wolford and D. Polin (Poultry Sci. Dept. Mich. State Univ., East Lansing, Mich. 48823). *Poultry Sci.* 51, 1707–13 (1972). S.C. White Leghorn female chickens were subjected to a restricted-refeeding program in an attempt to induce fatty liver-hemorrhagic syndrome (FLHS) and to ascertain the relationship between hemorrhage occurrence and liver lipid content. Restricted feeding resulted in significantly ($P \leqslant 0.01$) lower liver, body and abdominal fat weights. The reduced liver weight reflected significantly ($P \leqslant 0.01$) lower water, lipid and non-lipid dry component weights. None of the hens on the restricted feeding schedules had any liver hemorrhages characteristic of FLHS; however, the control, ad libitum-fed hens, had a 25% incidence rate. The restricted-refeeding program employed did not increase the incidence of FLHS. High lipid content in the liver did not necessarily indicate FLHS, yet in some manner, lipid predisposed the liver to hemorrhage because the hemorrhage of FLHS was observed only in birds with high liver lipid values.

A RAPID PURIFICATION PROCEDURE FOR GLYCERALDEHYDE 3-PHOSPHATE DEHYDROGENASE FROM BAKERS' YEAST. W.B. Stallcup, S.C. Mockrin and D.E. Koshland Jr. (Dept. of Biochem., Univ. of Cal., Berkeley, Ca. 94720). *J. Biol. Chem.* 247, 6277–9 (1972). A new procedure utilizing column chromatography has been devised for the purification of yeast glyceraldehyde 3-phosphate dehydrogenase. It yields enzyme of the highest specific activity in a shorter period of time and with a better yield than the traditional procedure. The isozyme isolated is the most abundant and most acidic of the set of isozymes previously identified.

ENZYMIC SYNTHESIS OF 1-ALKYL-2-ACYL-SN-GLYCERO-3-PHOSPHORYLETHANOLAMINES BY THE CDP-ETHANOLAMINE:1-RADYL-2-ACYL-SN-GLYCEROL ETHANOLAMINEPHOSPHOTRANSFERASE FROM MICROSOMAL FRACTION OF RAT BRAIN. Anna Radominska-Pyrek and L.A. Horrocks (Dept. of Physiological Chem., Ohio State Univ., Columbus, Ohio 43210). *J. Lipid Res.* 13, 580–7 (1972). The incorporation of radioactivity from cytidine-5′-phosphate-[^{32}P]phosphorylethanolamine into 1-alkyl-2-acyl-*sn*-glycero-3-phosphorylethanolamines and 1,2-diacyl-*sn*-glycero-3-phosphorylethanolamines was stimulated more than fourfold by 1-alkyl-2-acyl-*sn*-glycerols and 1,2-diacyl-*sn*-glycerols, respectively, with an ethanolaminephosphotransferase (EC 2.7.8.1) present in the microsomal fraction from brains of mature rats. The K_m values, 0.28 mM for CDP-ethanolamine and 1.9 mM for 1-alkyl-2-acyl-*sn*-glycerols, were similar to those obtained by other investigators with other 1-radyl-2-acyl-*sn*-glycerols. The formation of 1,2-diacyl-*sn*-glycero-3-phosphorylethanolamines from endogenous 1,2-diacyl-*sn*-glycerols was inhibited by 1-alkyl-2-acyl-*sn*-glycerols. These properties indicate that the ethanolaminephosphotransferase lacks specificity for the type of group at the 1-position of the lipid substrate. The synthesis of 1-alkyl-2-acyl-*sn*-glycero-3-phosphorylethanolamines from 1-alkyl-2-acyl-*sn*-glycerols and CDP-ethanolamine by an enzyme from rat brain supports the inclusion of this reaction in the metabolic pathway for the synthesis of 1-alk-1′-enyl-2-acyl-*sn*-glycero-3-phosphorylethanolamines.

EFFECTS OF EXERCISE AND OF FOOD RESTRICTION ON ADIPOSE TISSUE CELLULARITY. L.B. Oscai, C.N. Spirakis, C.A. Wolff and R.J. Beck (Depts. of Physical Ed. and Biol. Sci., Univ. of Ill., Chicago Circle, Chicago, Ill. 60680). *J. Lipid Res.* 13, 588–92 (1972). The body weight and fat content of young, growing rats were kept low by regularly performed endurance exercise by the rats or by restriction of their food intake over a period of 14 wk. The cellular character of epididymal fat pads was studied to determine if the reduction in fat was due to a decrease in the number of adipose cells, their size or both. Compared with the sedentary freely eating control animals, both the exercisers and the sedentary paired-weight animals, which had their food intake restricted in order to maintain their body weights approximately the same as those of the exercisers, had significantly lighter epididymal fat pads ($P < 0.001$). This fat depot in the exercisers contained fewer ($4.46 \pm 0.48 \times 10^6$ vs. $6.89 \pm 0.55 \times 10^6$ cells/pad; $P < 0.001$) and smaller (0.286 ± 0.041 vs. 0.462 ± 0.040 μg of lipid/cell;

$P < 0.001$) cells than that in the sedentary freely eating animals. Food restriction also resulted in a significant reduction in adipose tissue cellularity ($P < 0.05$). Epididymal fat pads from the calorie-restricted rats had an average of $5.72 \pm 0.33 \times 10^6$ cells and they contained 0.319 ± 0.024 μg of lipid/cell. These results demonstrate that exercise in addition to food restriction in early life is effective in reducing the rate of accumulation of cells in epididymal fat pads of rats.

LIPOGENIC ENZYME ACTIVITIES AND CELLULARITY OF PORCINE ADIPOSE TISSUE FROM VARIOUS ANATOMICAL LOCATIONS. D.B. Anderson, R.G. Kauffman and L.L. Kastenschmidt (Dept. of Meat and Animal Sci., Univ. of Wisc., Madison, Wisc. 53706). *J. Lipid Res.* 13, 593–9 (1972). The activities of acetyl CoA carboxylase, citrate cleavage enzyme, malic enzyme, glucose-6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase were determined in porcine adipose tissue samples taken from seven anatomical locations, including three layers of backfat, intermuscular, perirenal, mesenteric and leg subcutaneous adipose tissues. Adipocyte size and number, as well as lipid and soluble protein content, were also measured in order to establish some of the differences that exist between different areas of porcine adipose tissue. It was found that adipose tissue from areas where fat is deposited very readily (particularly the perirenal region) had higher enzyme activities, larger adipose cells, a lesser amount of stromal tissue, a greater amount of ether-extractable lipid and a lower concentration of adipose cells per gram of tissue than samples from areas where fat is deposited only sparsely (leg subcutaneous).

EFFECTS OF FEEDING ANTIOXIDANTS ON RANCIDITY DEVELOPMENT IN PRE-COOKED, FROZEN BROILER PARTS. J.E. Webb, C.C. Brunson and J.D. Yates (Campbell Inst. for Agr. Res., Campbell Soup Co., Fayetteville, Ark. 72701). *Poultry Sci.* 51, 1601–5 (1972). The effects of feeding d,l-α-tocopherol acetate, ethoxyquin and BHT on rancidity development in pre-fried, frozen broiler parts were investigated through the use of TBA numbers and taste panel. Feeding 11 or 22 I.U. of vitamin E/kg. of feed for 36 days pre-slaughter held TBA numbers below those for controls ($P < 0.01$). However, panel scores showed no differences. Feeding 220 I.U. of vitamin E/kg. of feed for 12 days pre-slaughter held TBA numbers below those of the control ($P < 0.01$). Panel scores confirmed the TBA numbers results($P < 0.01$). Feeding BHT as 0.01, 0.02 or 0.04% of the diet did not significantly reduce rancidity development. A 0.04%-ethyoxyquin diet reduced TBA numbers ($P < 0.01$), and the panel detected the trend. A diet containing 0.02% ethoxyquin plus 0.02% BHT diet reduced TBA numbers ($P < 0.05$), but the panel reported no differences.

POLYCHLORINATED BIPHENYLS: METABOLIC BEHAVIOR OF PURE ISOMERS IN PIGEONS, RATS AND BROOK TROUT. O. Hutzinger, D.M. Nash, S. Safe, A.S.W. DeFreitas, R.J. Norstrom, D.J. Wildish and V. Zitko (Atlantic Reg. Lab., Nat'l Res. Council of Canada, Halifax, Nova Scotia). *Science* 178, 312–4 (1972). The metabolic behavior of pure mono-, di-, tetra- and hexachlorobiphenyl isomers in pigeons, rats and brook trout was investigated. Excreta from these animals were extracted and examined by chromatographic and mass spectrometric techniques. The results showed conversion of the 4-chloro-, 4,4'-dichloro-, and 2,2',5,5'-tetrachlorobiphenyl isomers into monohydroxylated derivatives by the rat and pigeon whereas no hydroxymetabolites were detected in the excreta of the brook trout. No hydroxylated products of 2,2',4,4',5,5'-hexachlorobiphenyl were detected in the excreta of pigeons, rats or brook trout.

VITAMIN E NUTRITION IN THE RHESUS MONKEY. J.G. Bieri and R.H. Poukka Evarts (Lab. of Nutr. and Endocrinology, Nat'l Inst. of Arthritis and Metabolic Diseases, Nat'l Inst. of Health, Bethesda, Md. 20014). *Proc. Soc. Expl. Biol. Med.* 140, 1162–5 (1972). Two normal monkeys were fed a vitamin E-free diet containing 3.6% calories as linoleic acid. Plasma α-tocopherol concentrations fell to 50% of initial values by 21 days and then remained essentially stable for another 39 days. *d-a*-Tocopherol was then added to the diet, 5 mg/kg for 40 days followed by 10 mg/kg for 60 days. The lower supplement stabilized the plasma level in one animal and gave a slight elevation in the other. The higher supplement produced progressive increases in both monkeys. It was estimated that the minimum requirement was slightly more than 0.36 mg *d-a*-tocopherol/g linoleic acid and that 0.72 mg was nutritionally adequate. Fecal excretion studies of normal doses of radioactive *d-a*-tocopherol gave an apparent intestinal absorption of about 50%.

RESPONSE OF BROILER CHICKS TO A SINGLE DOSE OF AFLATOXIN. E.C. Schroeder, K.P.C. Nair and P.T. Cardeilhac (Dept. of Veterinary Sci., Univ. of Florida, Gainesville, Fa. 32601). *Poultry Sci.* 51, 1552–6 (1972). Day-old broiler chicks (Peterson × Peterson) were divided into 5 groups of 54 birds. Each group was composed of 27 males and 27 females. The five groups of birds received crude aflatoxin administered directly into the gizzard, in doses of 0.0, 0.4, 0.8, 1.6 and 3.2 mg./kg. body weight, of aflatoxin B_1 equivalents. The experiment lasted for 46 days, and the parameters tested were mean body weight gain, mean body weight/liver weight ratio and hepatic microscopic changes. Transitory growth suppression was observed in male chicks receiving 3.2 mg./kg. of the toxin on day 4 and 11, but this was overcome by day 32. The ratio of liver weight to body weight was decreased in birds receiving lower doses of toxin but increased, apparently as a result of congestion and hyperplasia, in birds receiving higher doses of aflatoxin. Two male chicks which received 3.2 mg./kg. of toxin died of icterus and massive necrosis of the liver. The chief microscopic changes observed in the livers of chicks given toxin were hepatic cell degeneration, bile-duct hyperplasia and focal lymphoid nodules. By day 46, chicks in the 3.2 mg./kg. group had no detectable lesions, but livers in the 1.6 and 0.8 mg./kg. groups showed mild residual bile-duct hyperplasia.

ACYL CARRIER PROTEIN. XIX. AMINO ACID SEQUENCE OF LIVER FATTY ACID SYNTHETASE PEPTIDES CONTAINING 4'-PHOSPHOPANTETHEIN. D.A.K. Roncari, R.A. Bradshaw and P.R. Vagelos (Wash. Univ. Schl. of Med., Dept. of Biol. Chem., St. Louis, Mo. 63110). *J. Biol. Chem.* 247, 6234–42 (1972). Overlapping tryptic, peptic, thermolytic and Pronase peptides containing 4'-phosphopantethein were isolated from rat liver fatty acid synthetase. Characterization of these peptides and a 4'-phosphopantethein dipeptide obtained after dilute acid hydrolysis permitted the elucidation of the amino acid sequence of 13 residues. Five out of the 13 residues are identical with those in the corresponding region of *Escherichia coli* acyl carrier protein.

SELECTIVE CYSTEINE MODIFICATION IN GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE. J. Moore, Jr. and A. Fenselau (Dept. of Physiol. Chem., The Johns Hopkins Univ. Schl. of Med., Baltimore, Md. 21205). *Biochemistry* 11, 3762–70 (1972). A structural feature common to the glyceraldehyde phosphate dehydrogenases from a wide variety of sources in the amino acid sequence about the catalytically essential cysteine residue (Cys*):-Cys*-Thr-Thr-Asn-Cys-. The second cysteine can be modified selectively in rabbit muscle glyceraldehyde-3-phosphate dehydrogenase by first blocking, irreversibly or reversibly, the essential cysteine residue and by then treating the inactive enzyme with a SH reagent.

a-OXOGLUTARATE CARBOXYLATION IN LIVER MITOCHONDRIA ISOLATED FROM RATS FED DIETS OF VARIED FAT CONCENTRATION. C.R. Mackerer and M.A. Mehlman (Dept. Biochem., Univ. of Nebraska College of Med., Omaha, Neb. 68105). *Proc. Soc. Exptl. Biol. Med.* 140, 1127–9 (1972). Rat liver mitochondria, incubated under anaerobic conditions, in media containing *a*-oxoglutarate and $HCO_3^- + CO_2$, oxidized *a*-oxoglutarate through the tricarboxylic acid cycle and utilized the reducing equivalents produced by this oxidation to drive *a*-oxoglutarate to citrate via reductive carboxylation. Feeding rats artificially prepared diets high in fat (30 and 70%) for 12 weeks prior to sacrifice increased the rates of *a*-oxoglutarate oxidation and citrate accumulation by the isolated mitrochondria.

SERUM LIPIDS AND LIPOPROTEINS IN MEN AFTER MYOCARDIAL INFARCTION COMPARED WITH REPRESENTATIVE POPULATION SAMPLE. A. Gustafson, D. Elmfeldt, L. Wilhelmsen and G. Tibblin (Med. Depts. I and II, Sahlgren's Hosp., Univ. of Goteberg, Goteberg, Sweden). *Circulation* 46, 709–16 (1972). A nonselected series of 229 postmyocardial infarction (MI) patients was studied for up to 2 years following hospitalization. Their lipoprotein patterns, serum cholesterol and triglyceride values were compared to those of a random population sample of men at comparable ages. Hyperlipoproteinemia, cholesterol and triglyceride elevations were more common in MI patients than in men in the random sample, occurring with greatest frequency in the younger patients. There was a trend toward higher mortality among patients with hyperlipoproteinemia. Types II A and B were very common in young patients. Serum cholesterol values were significantly higher in the youngest patients and serum triglycerides higher than in the controls in age groups $\leqslant$40, 46–50 and 51–55 years.

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STRINGENT AND RELAXED CONTROL OF PHOSPHOLIPID METABOLISM IN ESCHERICHIA COLI. N.G. Golden and G.L. Powell (Dept. of Chem. and Geology, Clemson Univ., Clemson, S.C. 29631). *J. Biol Chem.* 247, 6651–8 (1972). Stringent cells of *Escherichia coli* (*rel*$^+$) cease growth and protein, RNA and lipid synthesis when deprived of a required amino acid; releaxed cells (*rel*$^-$) cease growth and protein synthesis but continue lipid synthesis when deprived of a required amino acid, as assayed by [^{14}C] acetate incorporation. When phospholipid synthesis was assayed by using $^{32}P_i$, some net synthesis does occur, but the majority of the incorporation is a consequence of rapid breakdown and resynthesis (turn-over) of phosphatidylethanolamine, normally a stable component of the cell envelope.

A NOVEL OLEFINIC REARRANGEMENT. THE ENZYMIC CONVERSION OF CHOLESTA-7,9-DIEN-3β-OL INTO CHOLESTA-8,14-DIEN-3β-OL. M. Akhtar, C.W. Freeman, A.D. Rahimtula and D.C. Wilton (Dept. of Physiology and Biochem., Univ. of Southampton, Southampton SO9 5NH, U.K.). *Biochem. J.* 129, 225–9 (1972). [3α-^{3}H]Cholesta-7,9-dien-3β-ol is converted in high yield into cholesterol by a 10000g_{av}. supernatant fraction of rat liver homogenated. Incubation of cholesta-7,9-dien-3β-ol with [4-3H] NADPH and rat liver microsomal fractions under anaerobic condition resulted in ^{3}H being incorporated into the 14α-position of cholest-7-en-3β-ol. Under anaerobic conditions in the absence of NADPH cholesta-7,9-dien-3β-ol was isomerized into cholesta-8,14-dien-3β-ol by rat liver microsomal fractions.

PHOSPHOLIPID OF THE RAT GLOMERULAR BASEMENT MEMBRANE IN EXPERIMENTAL NEPHROSIS. K.K. Fung and N. Kalant (Lady Davis Inst. for Med. Res. of the Jewish General Hosp. and the Dept. of Experimental Med., McGill Univ. Montreal, Que., Canada). *Biochem. J.* 129, 733–41 (1972). Phospholipids were found to be a constant component of rat glomerular basement-membrane preparations. The concentration fell during preparation of basement membrane by sonication of whole glomeruli, but then remained constant despite continued sonication. The proportions of the individual phospholipids were different from those of whole renal tissue or of isolated glomeruli. The basement-membrane preparations had no ($Na^+ + K^+$)-activated adenosine triphosphatase activity, an enzyme that is bound to plasma membranes. The concentration of lipid P was decreased on exposure in vivo or in vitro to antiserum against basement membrane; 7 days after injection of antiserum there was a change in the phospholipid composition, with a relative increase in phosphatidylcholine and a decrease in sphingomyelin content. The metabolic turnover rate of the lipid P remaining in the membrane was normal, as determined by ^{32}P incorporation. The loss of phospholipid was associated with decreases in the relative concentrations of hydroxyproline, hydroxylysine and glycine, and relative increases in proline, lysine, serine, threonine and valine. Administration of aminonucleoside and daunomycin produced proteinuria but did not cause a decrease in lipid P. Anticollagen and anti-lymphocyte sera that attached to the basement membrane but failed to produce proteinuria, also failed to affect the phospholipid content.

THE CONVERSION OF MEVALONATE TO 24-METHYLENECYCLOARTANOL BY A CELL-FREE ENZYME PREPARATION FROM NON-PHOTOSYNTHETIC TISSUE. H.C. Malhotra and W.R. Nes (Dept. of Biol. Sci., Drexel Univ., Philadelphia, Pa. 19104). *J. Biol. Chem.* 247, 6243–6 (1972). A cell-free enzyme preparation has been obtained from the endosperm of germinating seeds of *Pinus pinea* which is capable of converting mevalonate to 24-methylenecycloartanol. The intermediates, squalene and cycloartenol, were also identified, but lanosterol, its 24-methylene analog, 4-monomethyl, and 4-desmethyl sterols were not formed. Since the enzymatic apparatus for opening the 9,19-cyclo grouping and for demethylation at C-4 were absent, an experimental block following cyclization and introduction of the methylene group was provided. The absence of Δ^8 compounds thus implies that the endosperm does not contain a squalene oxide to lanosterol cyclase. From this information we tentatively conclude that endosperm tissue, which is not functionally photosynthetic, biosynthesizes sterols through cycloartenol rather than lanosterol. This suggests in turn that the entirety of a photosynthetic organism, rather than just photosynthetic tissue, operates the steroid pathway through the cycloartenol route.

SIMPLE TEST FOR MILK LIPOLYSIS AND CHANGES IN RANCIDITY IN REFRIGERATED PASTEURIZED MILK. C.M. Kason, I.V.P. Pavamani and S. Nakai (Dept. of Food Sci., Univ. of British Columbia, Vancouver 8, B.C., Canada). *J. Dairy Sci.* 55, 1420–3 (1972). The Rhodamine 6G method for determining fatty acids of Chakrabarty et al. (JAOCS 46, 473 (1969)) was modified for quick detection of lipolysis in milk. Two milliliters of milk are extracted with 5 ml of benzene, 0.4 ml of 30% potassium oxalate and one drop of phosphoric acid. Two milliliters of the filtered extract are mixed with 1 ml of Rhodamine 6G in benzene and the color is compared with a standard prepared by mixing lauric acid with Rhodamine 6G. This method is simpler than the previous Rhodamine B method as evaporation of solvents is unnecessary. The acid degree values in commercial pasteurized milks increased by 0.3 to 0.6 during refrigerated storage for seven days. A relationship was observed between the acid degree values and the bacterial counts after 7-day storage.

THE ROLE OF L-[METHYL-^{3}H,^{14}C]METHIONINE IN THE BIOSYNTHESIS OF POLYPRENOIDS. I. THE INCORPORATION OF L-[METHYL-^{3}H,^{14}C]METHIONINE IN CHOLESTEROL AND 5α-CHOLEST-7-EN-3β-OL IN VIVO IN THE RAT. J.G. Lloyd-Jones, P. Heidel, B. Yagen, P.J. Doyle, G.H. Friedell and E. Caspi (Worcester Found. for Exptl. Biol., Inc., Shrewsbury, Mass. 01545). *J. Biol. Chem.* 247, 6347–54 (1972). Evidence is presented for the in vivo incorporation of ^{3}H and ^{14}C into cholesterol and 5α-cholest-7-en-3β-ol following the administration of L-[methyl-^{3}H, ^{14}C]methionine to normal and mammary tumor-bearing rats. The incorporation of the ^{14}C into the total crude non-saponifiable residue was of the order of 0.05% of the administered ^{14}C. In all experiments the ^{3}H:^{14}C ratio of the cholesterol was 3 to 4 times higher than that of the 5α-cholest-7-en-3β-ol isolated from the same animals. An enrichment of tritium in the cholesterol isolated from normal animals was noted. Thus, while the cholesterol isolated from tumor-bearing animals had a ^{3}H:^{14}C ratio similar to that of the administered methionine, the ^{3}H:^{14}C ratio of the cholesterol from normal rats was about 50% higher.

CALORIMETRIC STUDIES OF DILUTE AQUEOUS SUSPENSIONS OF BILAYERS FORMED FROM SYNTHETIC L-α-LECITHINS. H. Hinz and J.M. Sturtevant (Depts. of Chem. and Molecular Biophysics and Biochem., Yale Univ., New Haven, Conn. 06520). *J. Biol. Chem.* 247, 6071–5 (1972). The gel-liquid crystal transitions in lipid bilayers formed from synthetic dimyristoyl, dipalmitoyl and distearoyl L-α-lecithins have been studied by high sensitivity differential scanning calorimetry in dilute aqueous suspensions ranging in concentration from 0 4 to 6.6 mg ml^{-1}. Each lipid shows two endothermic transitions, an extremely sharp main transition and a broader transition accompanied by a smaller heat absorption at a temperature 5–10C below the main transition. The enthalpy increases in the main transition are respectively 6.3, 9.7 and 10 8 kcal per mole of monomeric lipid. The main transition widths, which are not very reproducible, reach a minimum in the case of dimyristoyl lecithin of as little as 0.2C for 10% to 90% conversion, suggesting that these transitions would be truly isothermal with completely pure lipids. The apparent heat capacities of the lipids in the liquid crystal state are, with the possible exception of dipalmitoyl lecithin, no more than 5 cal deg^{-1} (mole of lipid)$^{-1}$ larger than in the gel state, indicating that the hydrocarbon chains have much less mobility in the liquid crystalline state than in the corresponding liquid normal paraffins.

STUDIES ON THE ENZYMATIC CONVERSION OF OXYGEN-SUBSTITUTED STEROLS TO CHOLESTEROL. A. Fiecchi, M.G. Kienle, A. Scala, G. Galli, R. Paoletti and E.G. Paoletti (Inst. of Chem., Schl. of Med., Univ. of Milan, 20133 Milan, Italy). *J. Biol. Chem.* 247, 5898–904 (1972). The intermediary role of oxygenated sterols in the conversion of cholest-7-en-3β-ol to cholesta-5,7-dien-3β-ol by rat liver homogenates is considered, assuming that an oxygen molecule may attack the double bond of cholest-7-en-3β-ol. Labeled cholestan-7α,8α-epoxy-3β-ol, cholestane-3β,7β,8α-triol, cholest-8-ene-3β,7ζ-diols, cholestane-3β,7α,8α-triol, cholestane-3β,-8α-diol-7-one, and cholest-8(14)-ene-3β,7α-diol have been synthesized. All these compounds, but cholestane-3β,7α,8α-

triol, are efficiently transformed to cholesterol under oxygen atmosphere. However, they cannot be considered as obligatory intermediates in the biosynthesis of cholesterol from cholest-7-en-3β-ol since under anaerobiosis they are transformed to cholest-7-en-3β-ol. The implications of these findings and the mechanisms involved are discussed.

THE PURIFICATION OF A LIPOPROTEIN LIPASE FROM BOVINE SKIM MILK. T. Egelrud and T. Olivecrona (Dept. of Chem., Section on Physiological Chem., Univ. of Umeå, S-90187 Umeå, Sweden). *J. Biol. Chem.* 247, 6212–7 (1972). The purification of a lipase from skim milk is described. The enzyme had the characteristics of a lipoprotein lipase, i.e. its activity against emulsified long chain triglyceride was stimulated more than 20-fold by addition of suitable amounts of serum to the assay system and the activity was almost competely inhibited by 1 M NaCl. After an initial fractionation of the skim milk, the main purification was obtained by affinity chromatography on Sepharose 4B with covalently linked heparin. The preparation obtained was purified 5,000 to 7,000-fold. Gel electrophoresis of this preparation in urea or in sodium dodecyl sulfate revealed one major component which stained for protein and for carbohydrate and which comprised more than 80% of the total protein. The apparent minimum molecular weight of this component was 62,000 to 66,000 as determined by electrophoresis in polyacrylamide gels in the presence of sodium dodecyl sulfate.

CLEARING-FACTOR LIPASE IN OBESE HYPERGLYCAEMIC MICE (OB/OB). M. Enser (Agr. Res. Council Meat Res. Inst., Langford, Bristol BS18 7DY, U.K.). *Biochem. J.* 129, 447–53 (1972). Clearing-factor lipase was assayed in acetone-ether-dried powders of heart and epididymal fat-pads of lean and genetically obese mice. In both tissues the enzyme activity in the adult was higher in the obese mice. In heart the enzyme activity was unchanged from 8 to 48 weeks of age in lean mice, but in obese mice it increased between 8 and 12 weeks of age and remained elevated. Starvation produced changes in the heart clearing-factor lipase activity in obese, but not lean mice. The clearing-factor lipase activity of epididymal fat-pids decreased rapidly during 24h starvation in both lean and obese mice, but the activity in the obese mice remained higher than that in lean mice. Plasma triglyceride and cholesterol concentrations were determined in both lean and obese mice. Triglyceride concentrations were not greatly different, but the obese mice were hypercholesterolaemic. Plasma cholesterol concentrations were not correlated with changes in clearing-factor lipase activity.

GLYCOSPHINGOLIPIDS IN CULTURED HUMAN SKIN FIBROBLASTS. I. CHARACTERIZATION AND METABOLISM IN NORMAL FIBROBLASTS. G. Dawson, R. Matalon and A. Dorfman (Dept. of Pediatrics and Biochem., J.P. Kennedy, Jr. Mental Retardation Center, Pritzker Schl. of Med., Univ. of Chicago, Chicago, Il. 60637). *J. Biol. Chem.* 247, 5944–50 (1972). Fibroblasts cultured from human skin or bone marrow biopsies contain the glycosphingolipids associated with human visceral organs, namely, glucosylceramide (GL-1a), lactasylceramide (GL-2a), trihexosylceramide (GL-3), globoside (GL-4), G_{M3} and G_{D3}. The presence of large amounts of GL-3 and GL-4 distinguishes normal human fibroblasts from most other normal mammalian cell lines so far investigated. Neither gangliosides (glycosphingolipids containing both sialic acid and hexosamine) nor sulfatides appeared to be present in these cells (concentration less than 0.01 μmole per g dry weight of cells). The glycosphingolipids constitute about 3% of the total lipid of fibroblasts, an amount comparable to that of normal human tissue. Further, the glycosphingolipid composition and concentration are largely independent of the amount of serum supplement. Confluent fibroblast cultures showed maximum incorporation of isotope from uniformly labeled D-[U-^{14}C]glucose into the hexose, sphingosine and fatty acid moieties of all six glycosphingolipids after 24 to 48 hours, indicating de novo synthesis of all three moieties. The half-life of 2 to 3 days was consistent with values generally accepted for membrane-bound phospholipids.

• Drying Oils and Paints

COPOLYMERISATION OF LINSEED AND SAFFLOWER ACRYLATES WITH VINYL ACETATE. N.G. Kulkarni, N. Krishnamurti and P.C. Chatterjee. *Paint Manuf.* 42 No. 4, 60–1 (1972). Acrylic and methacrylic esters of mixed fatty alcohols derived from linseed and safflower oils were copolymerised with vinyl acetate in different molar ratios yielding polymers with good coating characteristics. They gave medium-hard, water-white glossy films with good water and chemical resistance. (World Surface Coatings Abs. No. 362)

NEW POLYACETAL, POLY(ESTER-ACETAL) AND THEIR URETHANE MODIFIED COATINGS FROM HYDROFORMYLATED LINSEED OIL. T.H. Khoe, L.E. Gast, E.N. Frankel and J.C. Cowan (Northern Regional Res. Lab., Peoria, Ill. 61604). *Paintindia* 22(7), 17–20 (1972). Partly hydroformulated linseed oil, with an average of 1.3 to 3.4 meq aldehyde per gram of oil, was reacted with pentaerythritol hydroxymethyl linseed oil and trimethylolpropane in the presence of an acid catalyst to form viscous, high molecular weight polyacetals. Isophthalic acid or chlorendic anhydride-modified polyacetals (poly(ester-acetals)) were prepared by reacting the trimethylolpropane esters of the acids with the hydroformylated oils. Films of the products were cured at room temperature and at 140C. These films showed good hardness as well as chemical and impact resistance. Further modification of these polyacetals and poly (ester-acetals) by reacting the residual hydroxyl groups with an excess of toluene diisocyanate gave the corresponding isocyanate-terminated prepolymers. Films from these prepolymers had shorter drying times and showed greater hardness than the corresponding unmodified materials.

• Fatty Acid Derivatives

FORMATION AND MASS SPECTRAL FRAGMENTATION OF RITTER PRODUCTS FROM SOME MONOENIC FATTY ACIDS. LOCATION OF DOUBLE-BOND POSITION IN UNSATURATED ACIDS. S. Blum, S. Gertler, S. Sarel and D. Sinnreich (Dept. of Pharmaceutical Chem., The Hebrew Univ. Schl. of Pharmacy, Jerusalem, Israel). *J. Org. Chem.* 37, 3114–21 (1972). By modification of the known Ritter conditions for making N-substituted amides by addition of acrylonitrile to olefinic compounds, it is possible to apply this reaction to new monoenic fatty acids. Procedures are presented for the addition of acrylonitrile to oleic acid, methyl cis-5-eicosenoate, erucic, and brassidinic acids, and the addition of acetonitrile to brassidinic acid. Yields of 54 to 80–84% of the respective monoacrylamides and acetoamide were obtained in crystalline form from the monoenic fatty acids by applying the proper ration of reactants and by the mode of addition. Evidence is adduced, showing that it is possible to determine the addition sites in the Ritter products by mass spectrometry, and also that mass spectral analysis of Ritter products from olefinic compounds could be of general utility for the assignment of double bond position in the carbon chain.

SYNTHETIC AND MASS SPECTRAL STUDY OF BIS RITTER ADDUCTS FROM SOME DIENOIC FATTY ACIDS. S. Blum and S. Sarel. *Ibid.*, 3121–5. The Ritter reactions of some long-chain dienoic and hydroxymonoenic acids with acrylonitrile were investigated. The low temperture reactions of linoleic and 5,13-docosadienoic acid derivatives gave good yields of the respective bisacryloamides. In analogy to monoacrylamido fatty acid derivatives, it was possible to determine the addition sites in the Ritter products from the former dienoic fatty acids by mass spectrometry. For comparison, the synthesis and mass spectral study of 1,8-dipropionamido-*p*-menthane are also included.

MASS SPECTROMETRY OF THE PHOSPHATIDYL AMINO ALCOHOLS: DETECTION OF MOLECULAR SPECIES AND USE OF LOW VOLTAGE SPECTRA AND METASTABLE SCANNING IN THE ELUCIDATION OF STRUCTURE. R.A. Klein (Inst. of Animal Physiol., Agr. Res. Council, Babraham, Cambridge, England). *J. Lipid Res.* 13, 672–9 (1972). The basic fragmentation mechanisms occurring in the mass spectra of the phosphatidylcholines have been described previously, and evidence was adduced to show that many of the more abundant ions are related by electron impact-induced processes. A molecular ion was demonstrated for dioleoyl glycerylphosphorylcholine by accurate mass mea-

surement and by metastable scanning. In the present paper, results are reported which further extend the previous work by including a more detailed investigation of "nonapparent" fragment ions for a series of phosphatidylcholines with different acyl side chains and also for a series of phosphatidyl amino alcohols of fixed acyl composition. The results demonstrate the effect of the choline quaternary nitrogen on the stability of the molecular ion, and estimates for the appropriate rate constants are given. Nitrogen-containing fragments have been demonstrated by recording spectra at low electron voltages. The work has also been extended to include natural phosphatidylcholine preparations of mixed acyl composition, and the possibility of detecting particular molecular species has been established. Quantitative estimates may be made using suitable synthetic phosphatidylcholines. Results are presented to show the variation of the molar correction factor with acyl chain length.

DIELECTRIC CONSTANTS AND DIPOLE MOMENTS OF NORMAL LONG CHAIN ALCOHOLS. S.D. Pradhan, S.S. Katti and S.B. Kulkarni. *Indian J. Chem.* 9 No. 12, 1345-7 (1971). (World Surface Coatings Abs. No. 362)

PEROXIDE BLEACHING OF EPOXIDIZED FATTY ACID ESTERS. W.H. French and B.M. Rushton (Ashland Oil, Inc.). *U.S. 3,701,768.* The esters are treated concurrently with an alkaline material and with hydrogen peroxide. Sodium hydroxide is the preferred alkaline material. Examples of products amenable to this treatment are epoxidized soybean oil and epoxidized octyl tallate.

HYDRATED EMULSIFIERS FOR BAKERY PRODUCTS. M.E. Morris (SCM Corp.). *U.S. 3,702,307.* A hydrated emulsifier containing 20–30% water, 20–30% of an ethoxylated partial fatty acid ester of polyhydric alcohol, 35–45% of a partial fatty acid ester of polyglycerol, and 9–16% of a partial fatty acid ester of propylene glycol is disclosed. The emulsifier contains a relatively small amount of water but can be used for making sponge cakes of high specific volume.

AUTOMATIC DISHWASHING COMPOSITIONS. P.A. Finck (Colgate-Palmolive). *U.S. 3,701,735.* The compositions contain 1–20% sucrose, 0.5–5% halide bleaching agent, and 40–95% of a builder salt. They help reduce spotting and filming.

INHIBITION OF OVERGLAZE DAMAGE BY AUTOMATIC DISHWASHING DETERGENTS. A.E. Austin and C.L. Bechtold (Colgate-Palmolive). *U.S. 3,701,736.* The essential ingredient is metallic aluminum or an aluminum alloy.

SODIUM CARBONATE-SODIUM BICARBONATE AGGLOMERATES. D. Goldstein (FMC Corp.). *U.S. 3,701,737.* A low bulk density, absorptive agglomerate containing both sodium carbonate and sodium bicarbonate for use in mild detergent formulations is produced by (a) agglomerating fine soda ash particles with water, (b) carbonating the resulting wet sodium carbonate monohydrate with carbon dioxide. The resulting product contains mole ratios of bicarbonate:carbonate of 0.4:1 to 1.5:1.

LOW FOAMING RINSING, WASHING, AND CLEANING COMPOSITIONS. W. Stein, and H. Flory (Henkel & Cie). *U.S. 3,703,469.* The compositions comprise 90–99.9% of compounds having cleaning or complexing action and 0.1–10% of a foam inhibiting compound.

This Issue's Index to Advertisers

PROPERTIES OF SPRAY-MIXED, CONTROLLED SUDSING DETERGENTS OF TWO ACETIVE COMPONENTS AND ITS MANUFACTURE. H.E. Tschakert, Marl. *Seifen-Ole-Fette-Wachse* 98(19), 607–21 (1972). Detailed are the properties of spray-mixed detergents and cleaning products with two active components. Diverse manufacturing methods are discussed as well as equipment. Using the base product as an example a wide variety of formulations are discussed.

WHITENERS IN THE 1970's. P.S. Stensky and W.R. Findley (Ciba-Geigy Corp.). *Soap/Cosmetics/Chemical Specialties* 48 (10), 52–64 (1972). The authors review applications and usage of fluorescent whitening agents in the 1960's and make projections for the 1970's based on anticipated changes in textile and cleaning technology and detergent formulation. The trends which they foresee are: (1) Whiteners for cotton will retain their position as the most important type for home laundering; (2) Only relatively low levels of whiteners for synthetic fabrics will be used; (3) Improved whitening of durable press treated cotton and polyester might result from finishing or fiber modifications; (4) Whitener levels will not increase significantly over concentrations used in the past; (5) Part of the CC/DAS whiteners may be replaced by more efficient bleach-stable whiteners for cotton; (6) Whiteners for cotton with improved light fastness will be employed. At the end of the article, detailed procedures for the Detergent Powder Color Test, Wash Performance Tests and the Lightfastness Test are given.

A RAPID METHOD FOR DETERMINATION OF SODIUM SILICATE IN DETERGENTS. B.M. Milwidsky (Zohar Detergent Factory, Haifa, Israel). *Soap/Cosmetics/Chemical Specialties* 48(10), 38–42, 124 (1972). The method, which can provide an answer in 17 minutes, is based on the reaction of the silicates with ammonium molybdate to yield silicomolybdic acids. When reduced, the acids give blue colored complexes. While the method actually measures the SiO_2 content, if the type of silicate is known, then the percentage of sodium silicate can be calculated. Of the common ingredients found in detergent compositions, only active chlorine affects the determination, giving results which are about 10% high. The chlorine interference can be eliminated, but the total analysis time will be increased. The detailed procedure of the method is given.

BUILT DETERGENTS CONTAINING TRIS(METHYL PHOSPHONIC ACID) PHOSPHINE OXIDE AND ITS SALTS. L. Maier (Monsanto). *U.S. 3,639,281.* The title compounds are made by reacting a compound of the formula $P(O)_a(R^1)_b(CH_2Cl)_{3-b}$ with a compound of the formula $P(R^2)(R^3)OR^4$ to split off R^4Cl. Uses of the products as threshold agents, sequestering agents, detergent additives, peroxy solution stabilizers and chlorine-releasing agent stabilizers is claimed.

DETERGENT SLURRY PROCESS. F.J. Kerkhoven and S. Troost (Lever Bros.). *U.S. 3,639,288.* Detergents are produced by heat-drying a slurry containing small crystals of sodium tripolyphosphate hexahydrate. The small crystals are formed by dispersing anhydrous sodium tripolyphosphate in water prior to its hydration. Subsequently, other constituents are mixed with the slurry. An apparatus for forming detergent slurries is described.

WASHING AGENTS CONTAINING TEXTILE SOFTENER. H. W. Eckert and J.J. Perner (Henkel & Cie). *U.S. 3,704,228.* The compositions consist of 10–80% of surface active agents and 20–90% of other customary detergent components. The surface active agents consist of 20–90% of agents utilizable in neutral to alkaline solution and 80–10% of a textile softening composition of a higher fatty acid monoamide of a hydroxyalkylpolyamine.

SYNTHETIC DETERGENT IN BAR OR CAKE FORM. M. Ballestra and D. Triberti. *U.S. 3,639,286.* The product is made by mixing an organic detergent material with an alkali salt of trimetaphosphate, water and an alkali metal hydrate. ■