ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarcyk, J. E. Covey, J. G. Endres, J. Iavicoli, S. Kawamura, F. A. Kummerow, E. G. Perkins, and R. W. Walker

• Fats and Oils

THE ECOLOGIC ENVIRONMENT AND THE WORKS OF ART. LIPIDS IN THE DEGRADATION PRODUCTS. A. Paleni and S. Curri. *Riv. Ital. Sostanze Grasse* **47**, 309–34 (1970). A graphic documentation is presented of the active occurrence of molds and bacteria on frescos, sculptures, bronzes and in the decay products of art objects. The lipid component which is always found to be present in these decay products is taken as indication of the presence of an ecological system which is still active upon the art object and is the first cause of its decay.

KEEPING PROPERTIES OF OILS: ARE THEY ANALYTICALLY PREDICTABLE? G. Hoffmann (Unilever Res. Lab., Vlaardingen, Netherlands). *Chem. Ind. (London)* **1970**, 729–32. A review is presented of the current state of knowledge on mechanisms of off flavor development in edible oils, measurement of off flavors and predictability of future keeping properties.

PROGRESS IN THE TECHNOLOGY OF RAPESEED OIL FOR EDIBLE PURPOSES. H. Niewiadomski (Tech. Univ., Gdansk, Poland). *Chem. Ind. (London)* **1970**, 883–8. A review.

STUDIES ON THE LIPIDS OF FLOUR, V. EFFECT OF AIR ON LIPID BINDING. N. W. R. Daniels, P. S. Wood, P. W. Russell Eggitt and J. B. M. Coppock (Spillers Ltd., Cambridge, England). *J. Sci. Food Agr.* **21**, 377–84 (1970). Lipid distribution in mechanically developed doughs was found to be sensitive to relatively small amounts of air present in the dough mixer atmosphere. In doughs mixed to high work levels, less than 5% air present in the nitrogen-air mixture fed into the mixing bowl was sufficient to cause a significant decrease in bound lipid. Though flour pigments were readily bleached by small amounts of air, lipid peroxides did not increase significantly until at least 50% air was present. Polyunsaturated free fatty acids were most susceptible to peroxidation although, at high work levels in air, peroxides were found in all lipid classes. While lipids bound during nitrogen mixing were readily released by subsequent mixing in air, the effect of air on lipid binding was not reversed by further mixing in nitrogen. Addition of peroxidized lipid to the dough did not prevent lipid binding in nitrogen-mixed doughs and it was concluded that a mechanism of lipoxidase-coupled site oxidation was responsible for the effect of air on lipid binding rather than the direct action of the lipid peroxides themselves.

LIPIDS IN CEREALS. I. PENNISETUM TYPHOIDEUM. T. D. Pruthi and I. S. Bathia (Punjab Agr. Univ., Ludhiana, Punjab, India). *J. Sci. Food Agr.* **21**, 419–21 (1970). Two improved strains of *Pennisetum typhoideum* ('bajra') were found to have a free lipid content of about 5.0% and bound lipid content of about 0.5%. In the non-polar fraction, sterol esters and hydrocarbons, triglycerides, free fatty acids, free sterols and partial glycerides were present with triglycerides as the principal constituents. Polar lipids were separated by two-dimensional TLC and lecithin was found to be the major component. Sterol-containing glycolipids (sterol glycosides and esterified sterol glycosides) were present in appreciable amounts. Phosphatidyl ethanolamine, phosphatidyl glycerol, phosphatidyl inositol, lysophosphatidyl ethanolamine, lysolecithin, phosphatidic acid, polyglycerophosphatide, mono- and digalactosyl glycerides and cerebrosides have also been tentatively identified.

NOVEL VEGETABLE OIL. D. Melnick and A. E. Waltking (CPC International, Inc.). *U.S. 3,529,974*. A vegetable oil having properties similar to corn oil is prepared by blending together, in specified proportions, the following refined bleached oils: an oil of high p/s ratio such as safflower or sunflower oil; a modified soybean oil; winterized cottonseed oil; and peanut oil. The blend is subsequently deodorized.

METHOD FOR THE PRODUCTION OF α-SUBSTITUTED ACIDS. L. S. Bondar and R. A. Okunev. *U.S. 3,530,156*. A method for the production of α-substituted acids comprises reacting an alkyl or cycloalkyl malonic ester with α,β-unsaturated aliphatic alcohols, such as terpene alcohols, at a temperature above the boiling point of the alcohol and saponifying the resultant ester. The products are useful as detergents, wetting agents, flotation agents and foaming agents.

SUGAR-SHORTENING EMULSION AND PROCESS OF MAKING SAME. I. Cooper, D. Melnick and J. Akerboom (CPC International, Inc.). *U.S. 3,533,802*. A stable oil-in-water emulsion, for use in the preparation of food products containing sugar and shortening, is prepared by emulsifying together a shortening, an aqueous sugar solution, and specified water-soluble or water-dispersible emulsifiers.

• Biochemistry and Nutrition

DETERMINATION OF THE OPTIMAL PRIMING DOSES FOR ACHIEVING AN ISOTOPIC STEADY STATE IN A TWO-POOL SYSTEM: APPLICATION TO THE STUDY OF CHOLESTEROL METABOLISM. D. B. Zilversmit and R. A. Wentworth (Grad. Schl. of Nutr. and Section of Biochem. and Molecular Biol., Cornell Univ., Ithaca, N.Y. 14850). *J. Lipid Res.* **11**, 551–57 (1970). The daily administration of labeled cholesterol to humans or animals leads to an isotopic steady state. The specific activity of plasma cholesterol in the isotopic steady state gives information about the fraction of plasma cholesterol derived from endogenous and exogenous sources. A method, based on a two-pool model, is presented which allows the estimation of an optimal priming dose of labeled cholesterol whereby the time to reach the isotopic steady state is reduced to a minimum. A graphic procedure is presented which allows the estimation of an optimal priming dose for two-compartment systems with widely differing characteristics.

MOLECULAR SPECIES OF MONO-, DI-, AND TRIPHOSPHOINOSITIDES OF BOVINE BRAIN. B. J. Holub, A. Kuksis, and W. Thompson (Dept. of Biochem. and the Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto, Ontario, Can.). *J. Lipid Res.* **11**, 588–64 (1970). The mono-, di- and triphosphoinositides of bovine brain were isolated by chromatography on columns of DEAE-cellulose, alumina and silicic acid. The major molecular species in each phosphoinositide class were identified and quantitatively estimated by combined thin-layer and gas-liquid chromatography of the component diglycerides, which were released by hydrolysis with a specific brain phosphodiesterase. The diglycerides were treated with pancreatic lipase, and the positional distribution of the fatty acids was determined. Over 27 molecular species were identified, and these accounted for about 95% of each phosphoinositide class, but the 1-stearoyl-2-arachidonate derivative contributed more than 40% of the total in each class. The other molecular species also were qualitatively and quantitatively similar in the three phosphoinositide classes. All the long-chain and polyunsaturated acids were confined to the 2-position and were preferentially paired with stearic acid in the 1-position. Oleic acid in the 2-position was about equally divided between species with palmitic and stearic acids in the 1-position.

ACTIVATION OF LIPOPROTEIN LIPASE BY LIPOPROTEIN FRACTIONS OF HUMAN SERUM. D. M. Bier and R. J. Havel (Cardiovascular Res. Inst., Dept. of Med. and Dept. of Pediatrics, Univ. of California San Francisco, San Francisco, Cal. 94122). *J. Lipid Res.* **11**, 565–70 (1970). Triglycerides in fat emulsions are hydrolyzed by lipoprotein lipase only when they are "activated" by serum lipoproteins. The contribution of different lipoprotein fractions to hydrolysis of triglycerides in soybean oil emulsion was assessed by determining the quantity of lipoprotein fraction required to give half-maximal hydrolysis. Most of the activator property of whole serum from normolipidemic, postabsorptive subjects was in high density lipoproteins. Low density lipoproteins and serum from which all lipoprotein classes were removed had little or no activity. Also, little activator was present in guinea pig serum or in very low density-poor serum from an individual with lecithin:cholesterol acyltransferase deficiency, both of which are deficient in high density lipoproteins. Human very low density lipoproteins are potent activators and are much more active than predicted from their content of high density lipoprotein-protein. Per unit weight of protein, very low density lipoproteins had 13 times the activity of high density lipoproteins. These observations suggest that one or more of the major apoproteins of very low density lipoproteins,

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present as a minor constituent of high density lipoproteins, may be required for the activation process.

IDENTIFICATION OF ALBUMIN-BOUND FATTY ACIDS AS THE MAJOR FACTOR IN SERUM-INDUCED LIPID ACCUMULATION BY CULTURED CELLS. C. G. Mackenzie, Julia B. Mackenzie, O. K. Reiss and Judith A. Wisneski (Dept. of Biochem., Univ. of Colorado Schl. of Med., and the Webb-Waring Inst. for Med. Res., Denver, Col. 80220). *J. Lipid Res.* 11, 570–82 (1970). Factors responsible for the high lipogenic activity of rabbit serum were investigated using an assay procedure based on the gravimetric determination of the 24 hr increase in cell lipid. Cellular synthesis of fatty acids was inhibited by the presence of serum in the assay medium. Approximately 90% of the increase in cell lipid produced by serum fractions was due to triglyceride accumulation. Fractionation of rabbit serum both by precipitation with ammonium sulfate or by ultracentrifugation in high density medium indicated that three-quarters of its lipogenic activity was associated with albumin. The lipoproteins prepared by ultracentrifugation also exhibited about one-half the activity of whole serum. The lipogenic activity of albumin was confirmed by the high potency of the albumin isolated in a nearly pure form from proteins of $d > 1.21$ by precipitation with trichloroacetic acid and extraction with ethanol. As judged from chemical and isotopic analysis, neither the lipid content nor the lipid composition of the albumin was appreciably altered during its isolation. Of the albumin-bound lipids, only the free fatty acids, as determined by DEAE column chromatography, were present in an amount sufficient to account for the observed increase in cell triglycerides.

RAPID METHOD FOR THE ISOLATION OF LIPOPROTEINS FROM HUMAN SERUM BY PRECIPITATION WITH POLYANIONS. M. Burstein, H. R. Scholnick and R. Morfin (Cen. National de Transfusion Sanguine, Paris, France). *J. Lipid Res.* 11, 583–95 (1970). Procedures are described for the isolation of lipoproteins from human serum by precipitation with polyanions and divalent cations. A mixture of low and very low density lipoproteins can be prepared without ultracentrifugation by precipitation with heparin and either $MnCl_2$ alone or $MgCl_2$ plus sucrose. In both cases the precipitation is reversible, selective and complete. The highly concentrated isolated lipoproteins are free of other plasma proteins as judged by immunological and electrophoretic methods. The low density and very low density lipoproteins can then be separated from each other by ultracentrifugation. The advantage of the method is that large amounts of lipoproteins can be prepared with only a single preparative ultracentrifugation. Polyanions other than heparin may also be used; when the precipitation of the low and very low density lipoproteins is achieved with dextran sulfate and $MgCl_2$, or sodium phosphotungstate and $MgCl_2$, the high density lipoproteins can subsequently be precipitated by increasing the concentrations of the reagents. These lipoproteins, containing small amounts of protein contaminants, are further purified by ultracentrifugation at d 1.22. With a single preparative ultracentrifugation, immunologically pure high density lipoproteins can be isolated from large volumes of serum.

METABOLISM OF LYSOLECITHIN IN VIVO: EFFECTS OF HYPERLIPEMIA AND ATHEROSCLEROSIS IN SQUIRREL MONKEYS. O. W. Portman, Patricia Soltys, M. Alexander and T. Osuga (Dept. of Primate Nutr., Oregon Regional Primate Res. Cen., Beaverton, Oregon 97005). *J. Lipid Res.* 11, 596–604 (1970). We have studied the effect of long-term hyperlipemia and atherosclerosis in squirrel monkeys on the metabolism of lysolecithin-^{14}C (1-palmitoyl-1′-^{14}C *sn*-glycerol 3-phosphorylcholine) in order to explain elevated plasma and arterial concentrations of lysolecithin. The die-away curves of lysolecithin-^{14}C from plasma and the timing of appearances of other ^{14}C-labeled moieties in plasma and other tissues demonstrated a complex pattern of metabolic reactions. There was a rapid equilibration of specific activities of lysolecithin of plasma, liver and aortic intima plus inner media. The specific activities of lecithin peaked first in liver, then in plasma, and rose slowly in aortic intima plus inner media. The appearance of lecithin-^{14}C in heart and skeletal muscle was also slower than in the liver and some other tissues. Triglycerides, and to a lesser extent, cholesteryl esters contained radioactivity. The concentrations of aortic lysolecithin in the atherosclerotic aortas were several times greater than comparable values for control aortas, and time equilibration of plasma and aorta lysolecithin-^{14}C was much greater for the atherosclerotic group. The quantities of lysolecithin in plasma and in the pool of which the plasma was a part, were increased with hyperlipemia and atherosclerosis, as was the rate of lysolecithin production in the fast pool.

AUTOMATIC LIPID EXTRACTION AND THIN-LAYER CHROMATOGRAPHY APPLICATION WITH A PROGRAMMED FLOW SYSTEM. E. Fosslien and F. Musil (Dept. of Pathol., Univ. of Chicago, Chgo., Ill. 60637). *J. Lipid Res.* 11, 605–09 (1970). An eight-channel programmed flow system for automatic lipid extraction and TLC application is described. Each channel has a container for lipid extraction connected by Acidflex tubing through as AutoAnalyzer pump to a TLC applicator needle. Extraction containers are prepared from disposable Oxford sampler pipet tips by inserting a small cotton filter into their lower, narrower end, which is connected to the pump tubing. The applicator needles are supported vertically in a manifold, and their tips rest on a TLC plate placed on a hot plate. Serum is added to isopropanol in each extraction container, and proteins are completely precipitated in 2 min and retained in the extraction chambers by the cotton filters; lipid extracts are then transferred onto the heated TLC plate by intermittent pumping at a rate allowing for continuous evaporation of isopropanol under a stream of warmed air or nitrogen. The lipids accumulate on the plate in eight small spots, one for each channel. Solvent is proportionally added into the extraction chambers from a common reservoir through Acidflex tubing in a second AutoAnalyzer pump. During the extraction procedure, both pump motors are automatically operated by a programmed timer with a solid-state switch. Of several different solvents tested, isopropanol is the fastest for protein precipitation and lipid extraction and does not extract substances from the Acidflex tubing which interfere with chromatographic separation.

SIMPLIFIED FLUOROMETRIC METHOD FOR THE DETERMINATION OF PLASMA GLYCEROL. M. B. Davidson and R. Karjala (Dept. of Med., Univ. of Calif. at Los Angeles School of Med., Los Angeles, Calif. 90024). *J. Lipid Res.* 11, 609–12 (1970). A simplified method for determining plasma glycerol is described. This assay utilizes the fluorometric measurement of the reduced adenine dinucleotide, $NADH_2$ which is formed when glycerol is oxidized by glycerol dehydrogenase. Only three pipettings are necessary for each reaction tube, and a large number of samples can be included in each assay.

GAS-LIQUID CHROMATOGRAPHIC ASSAY OF LIPID-BOUND SIALIC ACIDS: MEASUREMENT OF GANGLIOSIDES IN BRAIN OF SEVERAL SPECIES. R. K. Yu and R. W. Ledeen (The Saul R. Korey Dept. of Neurology, Albert Einstein College of Med. of Yeshiva Univ., Bronx, N. Y. 10461). *J. Lipid Res.* 11, 506–16 (1970). A method is described for analysis of gangliosides by GLC assay of the sialic acid component. Mild acid treatment in methanol converted the latter to methol ketoside methyl ester, which was then chromatographed as the TMS derivative. The major methanolysis product was shown to be the β-anomer, and its chromatographic peak was used for quantification. NANA and NGNA could be analyzed simultaneously, while an 0-acetylated derivative of NGNA was detected qualitatively. The GLC method has been applied to analysis of the total brain ganglioside content of several species, and a general trend was observed toward decreasing levels in the lower vertebrates. In addition, NGNA was detected and quantified in several of these samples.

MOBILIZATION OF FATTY ACIDS IN GENETICALLY OBESE RATS. G. A. Bray, Stella Mothon and Andrea S. Cohen (New England Med. Cen. Hospitals and Dept. of Med., Boston, Mass. 02111). *J. Lipid Res.* 11, 517–21 (1970). The mobilization of fatty acids has been studied in genetically obese rats of the Zucker strain and in control obese animals with bilateral destructive lesions in the hypothalamus. The body weight and size of adipose cells did not differ significantly between the genetically obese rats and the obese controls. Weight loss in control and genetically obese rats was identical during a 1 month fast. The release of glycerol and the rise in free fatty acids in adipose tissue incubated in vitro were similar in tissue from genetic and hypothalamic obese rats. Epinephrine, theophylline and dibutyryl cyclic adenoeine monophosphate all augmented lipolysis, and the effects were usually greater in tissues from genetically obese rats.

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EFFECT OF ESSENTIAL FATTY ACID DEFICIENCY ON RELEASE OF TRIGLYCERIDES BY THE PERFUSED RAT LIVER. T. Fukazawa, O. S. Privett, and Y. Takahashi (The Hormel Inst., Univ. of Minn., Austin, Minn. 55912). *J. Lipid Res.* 11, 522–27 (1970). Studies are reported on release of triglycerides during perfusion of livers of male Sprague-Dawley rats fed a fat-free diet or diets containing hydrogenated coconut oil or corn oil. Perfusions were carried out with Krebs-Ringer bicarbonate buffer containing albumin with and without infusion of oleate or linoleate. Infusion with sodium oleate or linoleate caused an accumulation of triglycerides in the livers of the corn oil-fed animals and stimulated the release of triglycerides into the perfusing medium. In similar experiments with essential fatty acid-deficient animals, which were fed fat-free diets or diets containing hydrogenated coconut oil, there was no increase in secretion of triglycerides into the perfusate, and the amount of triglyceride which accumulated in the liver was greater than in the livers of the control (corn oil-fed) animals. Tracer experiments with oleate-1-^{14}C or linoleate-1-^{14}C also showed that with livers of essential fatty acid-deficient animals, secretion of triglyceride into the perfusate was not stimulated by infusion of fatty acids into the perfusing medium. It is concluded that impairment of the secretion of triglycerides is a factor in the accumulation of fat in the livers of essential fatty acid-deficient animals.

QUANTITATION OF THE IN VITRO FREE CHOLESTEROL EXCHANGE OF HUMAN RED CELLS AND LIPOPROTEINS. S. H. Quarfordt and Helen L. Hilderman (Dept. of Med., Duke Univ. Med. Cen., Durham, North Carolina 27706). *J. Lipid Res.* 11, 528–35 (1970). The exchange of free cholesterol in vitro between human red blood cells and low density lipoproteins (LDL) was quantified. The flux of sterol between LDL and red cells was relatively constant over a wide range of concentrations of free cholesterol in lipoproteins. In a system containing a suspension of red blood cells in a mixed solution of high density lipoproteins (HDL) and LDL, the fractional rate of exchange of HDL cholesterol was most rapid followed by LDL and lastly, by red cells. Increasing the ionic strength of the incubation media had no effect on the exchange of cholesterol between LDL and red cells. However, when both HDL and LDL were incubated with red cells in a buffer of increased ionic strength, total red cell cholesterol exchange was unaltered, but proportionately more exchange occurred with HDL and less with LDL. Addition of acetone to the buffer increased the exchange of cholesterol between LDL and red cells but produced no increment in red cell-HDL exchange.

BIOSYNTHESIS OF RETINAL PHOSPHOLIPIDS: INCORPORATION OF RADIOACTIVITY FROM LABELED PHOSPHORYLCHOLINE AND CYTIDINE DIPHOSPHATE CHOLINE. J. G. Swartz and J. E. Mitchell (Dept. of Ophthalmology, The Mount Sinai Schl. of Med., N.Y. 10029). *J. Lipid Res.* 11, 544–50 (1970). Phosphorylcholine-1,2-^{14}C and choline-1,2-^{14}C-labeled cytidine diphosphate choline are incorporated into lecithin by whole homogenates and particulate fractions of rat retina with optimal incorporation of label by the microsomal fraction. The soluble fraction contains a factor(s) which stimulates incorporation of label with release of inorganic phosphate. Mg^{++} is required for optimal incorporation of intermediates into lecithin in the presence of added diglycerides; without added diglycerides, incorporation of phosphorylcholine or cytidine diphosphate choline was moderately stimulated by preincubating the system in the absence of Mg^{++} with added phosphatidic acid and by adding this mixture to fresh enzyme and the complete incubation mixture (including Mg^{++}). The results show that the retina is capable of *de novo* synthesis of phosphatides and suggest that the rod outer segments depend on the pigment epithelium and(or) the inner rod segments for a source of phospholipids. Coenzyme A and ATP added to whole homogenate of retina did not significantly increase the incorporation of CDP-choline-1,2-^{14}C into lecithin but slightly increased the radioactivity found in lysolecithin and sphingomyelin.

THE ROLE OF FATTY ACIDS IN MITOCHONDRIAL CHANGES DURING LIVER ISCHEMIA. I. Boime, E. E. Smith and F. E. Hunter, Jr. (Washington Univ. School of Med., St. Louis, Mo.). *Arch. Biochem. Biophys.* 139, 425–43 (1970). Exposure of rat liver

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to periods of ischemia results in a progressive increase in mitochondrial free fatty acids (FFA), with a 6–7 fold increase when the liver has been ischemic either for 2 hrs. at 38C or 13 hrs. at 24C. A decline in respiratory control parallels the rise in FFA. Bovine serum albumin (BSA) which restores respiratory control to a considerable degree and enhances the stability of mitochondria isolated from ischemic tissue, reduces the FFA levels about 70%. Despite the presence of BSA during isolation and testing of the mitochondria, there is still a gradual decline in the respiratory control ratio over a period of ischemia lasting several hours. The data suggest that mitochondrial changes during ischemia involve (a) a BSA-reversible phase produced by FFA released by lipolysis, and (b) a further change, not reversed by BSA, which may be due to loss of essential mitochondrial lipid like cardiolipin, the presence of lysophosphatides or proteolysis. Morphological changes in mitochondria in liver sections are consistent with these interpretations.

THE EFFECT OF FAT DEPRIVATION ON THE ALLOSTERIC INHIBITION BY FLUORIDE OF THE (Mg^{2+})-ATPASE AND $(Na^+ + K^+)$-ATPASE FROM RAT ERYTHROCYTES. R. N. Farias, A. L. Goldemberg and R. E. Trucco (Instituto de Ciencias Quimicas, Cordoba, Argentina). *Arch. Biochem. Biophys.* 139, 38–44 (1970). It has been found that the ATP-ases from rat erythrocytes are inhibited by F^-. Allosteric type of kinetics with $n = -2.1$ for the (Mg^{2+})-ATPase and -2.8 for the $(Na^+ + K^+)$-ATPase have been obtained for the inhibition by F^-. In animals fed fat deficient diet, the value of n for the (Mg^{2+})-ATPase changed from -2.1 to -1.4 and for the $(Na^+ + K^+)$-ATPase from -2.7 to -1.5. When these animals were then fed fat sufficient diet, the value of n increased to the normal values. The possibility that changes in the unsaturated fatty acid composition of the erythrocyte membrane were responsible for the changes in the value of n is discussed.

ABSORPTION OF β-CAROTENE FROM GREEN LEAFY VEGETABLES IN UNDERNOURISHED CHILDREN. V. R. Lala and V. Reddy (Dept. of Pediatrics, B. J. Med. College, Civil Hosp., Ahmedabad-16, India). *Amer. J. Clin. Nutr.* 23, 110–13 (1970). Balance studies were carried out in six undernourished preschool children to determine the efficiency of absorption of β-carotene from amaranth. The results showed that the absorption of β-carotene was about 70%, a value similar to that reported for normal adults, suggesting that the absorption of carotene is not impaired in children with a mild degree of protein-calorie malnutrition. Thirty-two undernourished preschool children were given a daily supplement of 40 g amaranth providing 1,200 μg of β-carotene for 2 weeks with serum vitamin A levels determined initially and again on the 15th day. There was a significant increase in serum vitamin A after feeding the green, leafy vegetable. The rise in serum level was more marked in those children in whom the initial level was below 25 μg than in those with the level already in the normal range. Results of these studies suggest that by encouraging the consumption of green, leafy vegetables among the people in the poor communities and without introducing any other change in their diets, the incidence of vitamin A deficiency can be lowered considerably.

THE STEREOCHEMISTRY OF HYDROGEN TRANSFER FROM REDUCED NICOTINAMIDE-ADENINE DINUCLEOTIDE PHOSPHATE IN THE REDUCTION OF ETHYLENIC LINKAGES DURING CHOLESTEROL BIOSYNTHESIS. D. C. Wilton, I. A. Watkinson and M. Akhitar (Dept. of Phys. and Biochem., Univ. of Southampton, Southampton SO9 5NH, U.K.). *Biochem. J.* 119, 673–75 (1970). It is shown that during the saturation of steroid carbon-carbon double bonds at $\Delta^{24,25}$ and $\Delta^{14,15}$ the 'hydride ion' originates from the 4B side of the NADPH.

CALCIUM AND FAT ABSORPTION IN NEONATAL PERIOD. Margaret L. Williams, Catherine S. Rose, G. Morrow III, Sandra E. Sloan and L. A. Barness. *Am. J. Clinical Nutr.* 23, 1322–30 (1970). Human milks and four adapted cow's milk formulas that varied only in their fat composition were fed to 55 infants from the 4th to the 11th day of life. Absorption and retention of calcium, phosphorus and fat were measured by metabolic balance technique. The following observations were made: 1) Calcium absorption showed significant variation among formulas. Loss of calcium in the feces accompanied excretion of total fat, which was related to fatty acid composition of the formula. High content of stearate and palmitate in the formula increased losses. Retention of calcium was greatest in a formula low in stearate and palmitate and high in oleate. 2) With all formulas, fat absorption correlated with intake over the entire range of intakes studied. No level of intake was observed where no further absorption occurred.

THE USE OF CONVENTIONAL AND ZONAL CENTRIFUGATION TO STUDY THE LIFE CYCLE OF MAMMALIAN CELLS. A. M. H. Warmsley and C. A. Pasternak (Dept. of Biochem., Univ. of Oxford, Oxford OX1 3QU, U.K.). *Biochem. J.* 119, 493–99 (1970). Conventional gradient centrifugation has been used to separate cells according to their position in the cell cycle, and to obtain synchronously growing cells. Analysis of prelabelled cells by gradient centrifugation confirms that phospholipid, protein and RNA synthesis is continuous throughout the cell cycle and shows that the rate of synthesis begins to increase already during the G_1 phase. The pattern of phospholipid degradation follows that of synthesis. The limitations of conventional gradient centrifugation have been overcome by use of a zonal rotor. Analysis of prelabelled cells confirms the results obtained by conventional centrifugation and in addition shows that the rates of phospholipid, protein and RNA synthesis decrease during the G_2 phase. The mean cell volume and the net amount of phospholipid, protein and RNA, unlike that of DNA, are found to increase continuously throughout the intermitotic period. These results show that the synthesis of macromolecules, and probably that of membranes also, is controlled by a mechanism other than that of gene dosage.

TRANSFORMATION OF TESTOSTERONE INTO 17β-HYDROXY-5α-ANDROSTAN-3-ONE BY MICROSOMAL PREPARATIONS OF HUMAN SKIN. W. Voigt, E. P. Fernandez and S. L. Hsia (Dept. of Derm. and Biochem., Univ. of Miami Schl. of Med., Miami, Fla. 33136). *J. Biol. Chem.* 245, 5594–99 (1970). Enzymic transformation of testoterone to the potent androgen, 5α-dihydrotestosterone, has been shown by incubation of testosterone-4-^{14}C with microsomal preparations of human neonatal foreskin. The activity was stimulated by NADPH but not by NADH, and the reaction proceeded optimally at pH 5.6. Formation of 5α-androstanediol from 5α-dihydrotestosterone was also shown after longer incubation. Purified nuclear preparations of human skin seemed to possess little or no testosterone 5α-reductase activity, in contrast to similar preparations of rat prostate. The testosterone 5α-reductase in skin microsomes exhibited a K_m of 1.1×10^{-6} for testosterone. A number of steroids were found to inhibit the 5α-pregnane-3,20-dione, and competed effectively with testosterone for the active site of the enzyme. The K_i of progesterone was approximately 0.7×10^{-6} M, indicating a slightly greater affinity of this steroid for the 5α-reductase than that of testosterone. Other potent inhibitors tested were androstenedione and deoxycorticosterone, while estradiol, hydrocortisone and the anti-androgen, testololactone, had no inhibitory effect. The necessary structural characteristics of an effective inhibitor seem to be a Δ^4-3-keto structure, a 17β but not 17α substituent, and no modification or other substitutions in the steroid nucleus.

ESTER AND ETHER-LINKED LIPIDS IN THE MANDIBULAR CANAL OF A PORPOISE. OCCURRENCE OF ISOVALERIC ACID IN GLYCEROLIPIDS.

U. Varanasi and D. C. Malins *Biochemistry* **9**, 4576–79 (1970). High proportions of isovaleric acid and long-chain iso acids, such as isopentadecanoic acid (4.8 mole %), are present in the neutral glycerolipids of the mandibular canal of the porpoise (*Phocoena phocoena*). Although isovaleric acid, a product of leucine metabolism, is readily esterified in triglyceride biosynthesis, the isopentyloxy structure was not detected in the alkyl chains of glyceryl ethers or the dialkoxypentane fraction of the diol lipids. These findings suggest that isovaleric acid, unlike longer chain structures, is not readily reduced and incorporated into alkyl moieties. The apparent absence in the mandibular canal of C_{20} and C_{22} unsaturated acids characteristic of marine organisms suggests that lipid biosynthesis is not significantly dependent on dietary polyenoic acids.

REACTION OF GLYCERALDEHYDE 3-PHOSPHATE DEHYDROGENASE WITH ALIPHATIC ALDEHYDES. T. H. Fife and T. Rikihisa. *Biochemistry* **9**, 4064–67 (1970). The reaction of glyceraldehyde 3-phosphate dehydrogenase with a series of aliphatic aldehydes has been studied at 25C. A plot of log V max vs. σ^*, the Taft substituent constant, is linear with a slope of 2.08. Thus the rate of the reaction is facilitated by electron withdrawing substituents. Steric factors are of minor importance. Increased steric bulk in the aldehyde did not in general produce significant deviations in the plot of log V max vs. σ^*, although there was positive deviation of the points for isovaleraldehyde and isobutyraldehyde. Arsenate had no effect on the rate of the reactions. Trimethylacetyl phosphate is an inhibitor toward these substrates. This inhibition is of the noncompetitive type. Normal inhibition kinetics are observed.

ROLE OF DIETARY PROTEIN UPON SERUM CHOLESTEROL LEVEL IN MALNOURISHED SUBJECTS. K. Tripathy, H. Lotero and O. Bolanos (Dept. Med., Univ. del Valle, School of Med., Cali, Colombia). *J. Clin. Nutr.* **23**, 1160–68 (1970). The effect of high protein diets on the serum cholesterol level in 12 malnourished adults, 6 males and 6 females, was studied. The control diets consisted of 2,000–2,800 kcal, 70–100 g fat (butter fat in 10 and corn oil in 2), and 15–30 g protein. Within a 3-week period following the initiation of the high protein diet there was a significant increment of 90 ± 10 mg/100 ml in the levels of serum cholesterol and in phospholipid levels by 59 ± 10 mg/100 ml; both were highly significant ($P < 0.001$). There was no difference between the results of the group that had equal levels of dietary cholesterol and the one that had unequal dietary cholesterol levels during the two dietary regimens (control and repletion). Two subjects, whose main dietary fats were supplied in the form of corn oil, also had a significant increment in serum cholesterol and phospholipid levels in response to protein repletion.

EFFECTS OF SHORT-CHAIN FATTY ACIDS, FEEDING, FASTING AND TYPE OF DIET ON PLASMA INSULIN LEVELS IN SHEEP. A. Trenkle. *J. Nutr.* **100**, 1323–30 (1970). Four experiments with sheep were conducted to study the effects of intravenous injection of short-chain fatty acids, feeding, fasting and type of diet on plasma insulin levels. Injection of propionate, butyrate or glucose was shown to increase insulin secretion with the greatest responses observed after injection of either propionate or butyrate. Although fasting the sheep resulted in decreases in the plasma insulin levels, feeding grain as opposed to feeding only hay produced increases of 50–60%. These increases were associated with corresponding increases in propionate and butyrate levels in the rumen. Therefore, since intravenous injection of short-chain fatty acids increases plasma insulin levels and diet affects the concentrations of these fatty acids, the present studies show that diet affects plasma insulin levels in sheep by altering the short-chain fatty acid pattern in the rumen.

EFFECTS OF LONG-TERM PHYSICAL EXERCISE ON BILE STEROLS, FECAL FAT AND FATTY ACID METABOLISM IN RATS. V. Simko, R. Ondreicka, V. Chorvathova aand P. Bobek (Res. Inst. Human Nutr., Bratislava, Czechoslavakia). *J. Nutr.* **100**, 1331–39 (1970). Food consumption and fecal fat excretion do not explain the lower liver cholesterol repeatedly observed in exercising rats. Rats swimming 1 hr daily for 105 days were subjected to cannulation of the bile duct. After 24 hrs bile collection there was a significant drop in liver cholesterol in the trained animals only. These had a lower concentration and output of cholesterol in the bile, but the concentration of bile deoxycholic acid was higher than in con-

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trols. The amount of bile excreted in 24 hrs, the concentration of cholic and the output of cholic and deoxycholic acid were not different. Fatty acid (FA) composition of epididymal fat triglycerides, liver triglycerides and liver cholesterol esters was studied in rats subjected to 118 days of swimming. Exercise has a pronounced effect on depot fat triglycerides FA, with higher levels of saturated FA, palmitate and stearate, with lower monoenes and polyenes. Liver triglyceride FA presented in exercising rats an inverse picture: lower saturated FA and palmitate, higher monoenes and polyenes. In liver cholesterol esters the exercised animals had higher proportions of linoleate and palmitate, lower oleate. A higher release of unsaturated FA from the depot fat in exercising animals is suggested, with higher levels of unsaturated FA in blood and liver. These may promote the transport and catabolism of cholesterol and so explain the lower liver cholesterol in exercising animals.

THE REGULATION OF TRIGLYCERIDE SYNTHESIS AND FATTY ACID SYNTHESIS IN RAT EPIDIDYMAL ADIPOSE TISSUE. E. D. Saggerson and A. L. Greenbaum (Dept. of Biochem., Univ. College London, Gower St., London W.C.1, U.K.). *Biochem. J.* 119, 221–42 (1970). Epididymal adipose tissues obtained from rats that had been previously starved, starved and refed a high fat diet for 72h, starved and refed bread for 144h or fed a normal diet were incubated in the presence of insulin + glucose or insulin + glucose + acetate. Measurements were made of the whole tissue concentrations of hexose phosphates, triose phosphates, glycerol 1-phosphate, 3-phosphoglycerate, 6-phosphogluconate, adenine nucleotides, acid-soluble CoA, long-chain fatty acyl-CoA, malate and citrate after 1h of incubation. The activities of acetyl-CoA carboxylase and fatty acid synthetase roughly paralleled the ability of tissues to incorporate glucose into fatty acids. Rates of triglyceride synthesis and fatty acid synthesis could not be correlated with tissue concentrations of long-chain fatty acyl-CoA, citrate or glycerol 1-phosphate. In some cases changes in phosphofructokinase flux rates could be correlated with changes in citrate concentration. The main lesion in fatty acid synthesis in tissues from starved, starved fat-refed, and alloxan-diabetic rats appeared to reside at the level of pyruvate utilization and to be related to the rate of endogenous lipolysis. It is suggested that pyruvate utilization by the tissue may be regulated by the metabolism of fatty acids within the tissue. The significance of this in directing glucose utilization away from fatty acid synthesis and into glyceride-glycerol synthesis is discussed.

CHOLESTEROL LOWERING, FECAL BILE ACID, AND STEROL CHANGES DURING NEOMYCIN AND COLCHICINE. A. Rubulis, M. Rubert and W. W. Faloon. *Am. J. Clinical Nutr.* 23, 1251–59 (1970). The effect of oral neomycin in large doses upon serum cholesterol, fecal sterols and bile acids was studied in three obese subjects and one hypocholesteremic cirrhotic patient. Four other obese subjects were studied similarly; two while they were given oral colchicine (2.4 mg daily) and two while receiving combined neomycin and colchine. These results indicate a probable common mechanism of cholesterol lowering by neomycin and cholchicine: interference with the enterophepatic cycle of bile acids and neutral sterols.

BIOSYNTHESIS OF HEME IN THE VITAMIN E-DEFICIENT RAT. S. Murty, Priscilla I. Caasi, Sherry K. Brooks and P. P. Nair (Biochem. Res. Div., Dept. of Med., Sinai Hosp. of Baltimore, Inc., Baltimore, Md. 21215). *J. Biol. Chem.* 245, 5498–5504 (1970). Vitamin E deficiency in the rat leads to decreased activities of bone marrow δ-aminolevulinic acid synthase and hepatic δ-aminolevulinic acid dehydratase. Studies on the incorporation of radioactivity from glycine-2-^{14}C and δ-aminolevulinic acid-4-^{14}C into bone marrow heme show that the defect in this tissue is at the level of the first enzyme, δ-aminolevulinic acid synthase. However, in the liver, the incorporation of δ-aminolevulinic acid-4-^{14}C into microsomal protoheme in vivo was significantly lower than those in the controls, while no differences were observed when porphobilinogen-^{14}C was used. Thus, unlike the bone marrow, the defect in the liver appears to be at the level of the second enzyme δ-aminolevulinic acid dehydratase. The results suggest that vitamin E functions as a regulator of heme synthesis at one of the rate-limiting steps in the pathway to heme.

AGENTS AFFECTING LIPID METABOLISM. M. N. Cayen. *Am. J. Clinical Nutr.* 23, 1234–40 (1970). Male albino rats were fed neomycin as 0.5% of the drinking water for 14 days. Liver homogenates and intestinal sections were prepared and incubated simultaneously with 2-^{14}C-acetate and ^{3}H-mevalonate and the incorporation of these precursors into cholesterol was determined. The results show that orally administered neomycin does not have a cholestyramine-like effect on the incorporation of labeled acetate and mevalonate into cholesterol and that this is due to the selective action of the antibiotic in precipitating bile acids. Inferences drawn from these data indicate that the hypocholesterolemic action of neomycin in man and the chick, however, may be mediated by precipitation of dihydroxy bile acid conjugates.

INVESTIGATION OF THE COMPONENT REACTIONS OF OXIDATIVE STEROL DEMETHYLATION. W. L. Miller and J. L. Gaylor (Grad. Schl. of Nutr., Cornell Univ., Savage Hall, Ithaca, New York 14850). *J. Biol. Chem.* 245, 5375–81 (1970). Microsomal enzymes of rat liver catalyze the oxidative demethylation of 4,4-dimethyl-5α-cholest-7-en-3β-ol. Demethylation requires oxygen and both reduced and oxidized pyridine nucleotides. Aerobic incubation of 30,31-^{14}C-4-dimethyl-5α-cholest-7-en-3β-ol with a microsomal preparation depleted of NAD^+ and containing a NADPH-generation system yields oxidative attack of substrate but no release of $^{14}C_2$. Following incubation, sterols are extracted from the microsomal protein with acetone. Only one oxygenated sterol is formed in high yield. Homogeneity and purity of the new sterol have been established by thin-layer chromatography on plates of silica gel. Nuclear magnetic resonance and mass spectrometry have been used to identify the new sterol as 3β-hydroxy-4β-methyl-5α-cholest-7-ene-4α-carboxylic acid.

USE OF SEMISYNTHETIC FATS IN DETERMINING EFFECTS OF SPECIFIC DIETARY FATTY ACIDS ON SERUM LIPIDS IN MAN. R. B. McGandy, D. M. Hegsted and Madge L. Myers. *Am. J. Clinical Nutr.* 23, 1288–98 (1970). Estimates of the effects of specific dietary saturated fatty acids on circulating lipids have been limited by the composition of available natural fats and oils. Semisynthetic fats have been used to expand the range of variation of particular fatty acids. A series of such products in which lauric, myristic, palmitic or stearic acids were randomly transesterified with olive, safflower or MCT oils have been used as test fats in human feeding studies. Although both lauric and stearic acids were hypercholesterolemic under these conditions, they are less so than myristic and palmitic acids. The contrast in the behavior of stearic acid to its almost complete ineffectiveness in a natural product (cocoa butter) suggests that, in addition to the known effects related to both chain length and saturation, the position of a fatty acid on the glyceride molecule also influences its metabolism.

CHOLESTEROL SYNTHESIS INHIBITOR SHOWING REDUCTION OF LIPIDS AND HORMONE ANTAGONISM. L. J. Lerner, D. N. Harris, W. Yiacas, R. Hilf and Inge Michel. *Am. J. Clinical Nutr.* 23, 1241–50 (1970). The compound, SQ 10,591, lowered plasma cholesterol in rats fed normal or hyperlipemic diets by blocking the biosynthesis of cholesterol between mevalonate and lanosterol. It also reduced serum free fatty acids and triglycerides. In addition to its effect on lipids, SQ 10,591 inhibited the uterotrophic activity of estrogen in mice and inhibited production or release of pituitary gonadotrophins in rats. In mature female rats SQ 10,591 caused an interruption of the estrous cycle.

FATTY ACID METABOLISM IN THE PERFUSED RAT LIVER. H. A. Krebs and R. Hems (Metabolic Res. Lab., Nuffield Dept. of Clinical Med., Radcliffe Infirmary, Oxford OX2 6HE, U.K.). *Biochem. J.* 119, 525–33 (1970). The formation of acetoacetate, β-hydroxybutyrate and glucose was measured in the isolated perfused rat liver after addition of fatty acids. The rates of ketone-body formation from ten fatty acids were approximately equal and independent of chain length (90–132 μ mol/h per g), with the exception of pentanoate, which reacted at one-third of this rate. The [β-hydroxybutyrate]/[acetoacetate] ratio in the perfusion medium was increased by long-chain fatty acids. Glucose was formed from all odd-numbered fatty acids tested. The rate of ketone-body formation in the

livers of rats kept on a high-fat diet was up to 50% higher than in the livers of rats starved for 48h. Arachidonate was almost quantitatively converted into ketone bodies and yielded no glucose, demonstrating that gluconeogenesis from polyunsaturated fatty acids with an even number of carbon atoms does not occur.

BIOSYNTHESIS OF LOW DENSITY LIPOPROTEIN BY CELL-FREE PREPARATIONS OF RAT INTESTINAL MUCOSA. J. I. Kessler, June Stein, D. Dannacker and P. Narcessian (Lab. for Gastro. Res., McGill Univ. Clinic, Royal Victoria Hosp., and Lab. for Nutr. and Metab. Res., Jewish Gen. Hos., Montreal, Canada). *J. Biol. Chem.* 245, 5281–88 (1970). The capacity of cell-free preparations of rat small intestinal mucosa to synthesize and release lipoproteins was investigated. Palmitate-1-^{14}C was administered intragasterically and 30 min later labeled cell-free fractions from homogenates of intestinal mucosa were prepared. The fractions (whole homogenate, mitochondria and microsomes) were incubated in fortified media containing ^{3}H-labeled amino acids, and lipoproteins of various densities were separated, after the addition of carrier rat plasma, by density centrifugation, by polyanion precipitation and by immunoprecipitation. All fractions incorporated radioactivity into the lipid and protein moieties of the medium lipoproteins.

LOCAL VASCULAR CHANGES INDUCED BY THE COCARCINOGEN, PHORBOL MYRISTATE ACETATE. A. Janoff, A. Klassen and W. Troll. (Dept. of Pathol. and Environmental Med., N.Y. Univ. Schl. of Med., N.Y., New York 10016). *Can. Res.* 30, 2568–71 (1970). Phorbol myristate acetate, an active tumor-promoting agent from croton oil, produces a severe, local vascular reaction in skin (ear) of CF_1 and STS mice. The response is characterized by hyperemia and edema formation which can be quantitatively monitored by measuring uptake of circulating ^{125}I-labeled bovine serum albumin. Microscopic detection of sites of endothelial injury in mice receiving i.v. carbon suspension shows the reaction to be primarily limited to venules. These microvascular changes are accompanied by mast cell degranulation in the affected tissues. Reactions develop about 1 hr after phorbol ester application, persist through 6 to 8 hr, and appear to be lessening in intensity by 24 hr. High doses of 7,12-dimethylbenz(a)anthracene induce similar vascular changes, although of much lower intensity and after a longer delay interval. Antagonists of histamine, serotonin, and kinins produce mild, transient suppression of the local vascular response to the phorbol ester. Hydrocortisone and salicylate are without effect on this component of the tissue reaction. Local application of tosyl phenylalanine chloromethyl ketone, a protease inhibitor previously shown to suppress tumor promotion, affords a more sustained protection against the inflammatory activity of the phorbol ester.

COMPARISON OF EFFECTS OF PALMITIC AND STEARIC ACIDS IN THE DIET ON SERUM CHOLESTEROL IN MAN. F. Grande, J. Anderson and A. Keys. (Lab. of Phys. Hygiene, Univ. of Minnesota, Minneapolis, Minn.). *J. Clin. Nutr.* 23, 1184–93 (1970). Previous observations have indicated that stearic acid, in the diet of man, lacks the cholesterol-raising effect of other saturated fatty acids. A critical test of the lack of effect was made by comparing cocoa butter, the fat used in the original experiments, with a mixture of other fats matching cocoa butter in linoleic, oleic, palmitic and stearic acid contents. The observed serum cholesterol difference agreed with that predicted, assuming that stearic acid, like oleic acid or mixed carbohydrate, has no effect on serum cholesterol concentration in man.

EFFECT OF GROWTH HORMONE ON GLUCOSE, NONESTERIFIED FATTY ACID AND INSULIN LEVELS, AND ON GLUCOSE UTILIZATION IN DAIRY CALVES. H. H. Head, M. Ventura, D. W. Webb and C. J. Wilcox (Dept. of Dairy Sci., Inst. of Food and Agr. Sci., Univ. of Fla., Gainesville, Fla. 32601). *J. Dairy Sci.* 53, 1496–1501 (1970). Bovine growth hormone (1 mg/kg/day) and a comparable volume of saline were injected intramuscularly once daily for 5 consecutive days to 6 treated and 7 control 130-day-old dairy calves. Comparative treatment effects on blood and plasma glucose, plasma nonesterified fatty acid and plasma insulin concentrations, and on glucose utilization rate from ^{14}C-glucose constant infusions were studied 16 hours post-feeding and post-treatment. Blood and plasma nonesterified fatty acids increased following the first injection, reached a maximum on the second day, and declined to pretreatment concentration.

PHOSPHOLIPID METABOLISM DURING REGENERATION OF RAT LIVER. G. Fex (Dept. of Chem., Univ. of Umea, S 901 87 Umea, Sweden). *Biochem. J.* 119, 743–47 (1970). The concentration and composition of phospholipids and mitotic activity in regenerating rat liver were studied. (1) The total amount of liver phospholipid increased approximately linearly during 48h after operation but without change in the relative concentrations of individual phospholipids. (2) The appearance of mitoses 30h after operation was accompanied by an increased incorporation of ^{32}P into the liver phospholipids. (3) The regenerating livers incorporated a higher percentage of the label into the phosphatidylserine + phosphatidylinositol fraction than those of control rats. The percentage of the label incorporated into phosphatidylethanolamine in these livers increased but decreased in the phosphatidylcholine.

DIFFERENTIAL UPTAKE OF CHOLESTEROL AND OF DIFFERENT CHOLESTERL ESTERS BY ATHEROSCLEROTIC INTIMA IN VIVO AND IN VITRO. A. J. Day, M. L. Wahlqvist and D. J. Campbell (Dept. of Physiol., Univ. of Melbourne, Parville, Vic. Australia). *Atherosclerosis*, 11, 301–20 (1970). Cholesterol-fed rabbits were intubated with a single dose of ^{3}H-cholesterol and the entry of the resultant labelled free cholesterol, cholesterol ester and of the individual cholesterol esters in the serum into the aortic intima and media was determined 4 days after ingestion of the cholesterol. The entry of cholesterol into the aortic intima exceeded that of cholesterol ester; the entry of monounsaturated cholesterol ester exceeded that of polyunsaturated cholesterol ester. The greater entry of cholesterol relative to cholesterol ester was confirmed in experiments in vitro in which atherosclerotic aortas were incubated with hypercholesterolaemic serum labelled with ^{3}H-cholesterol ester and ^{3}H/^{14}C-labelled free cholesterol in the lipoprotein. It was not possible, however, to demonstrate, any significant increase in entry of monounsaturated cholesterol ester over polyunsaturated cholesterol ester in these experiment in vitro. By using hypercholesterolaemic serum containing ^{3}H-cholesterol ester and ^{3}H/^{14}C-labelled free cholesterol in the lipoprotein as incubation medium, it was possible to demonstrate in the experiments in vitro that hydrolysis of the labelled cholesterol ester entering the intima could not account for the greater relative influx of cholesterol and of various cholesterol esters in the atherosclerotic lesion are discussed.

AGENTS AFFECTING LIPID METABOLISM. M. Cayen (Dept. of Biochem., Ayerst Res. Lab, Montreal, Quebec, Canada). *J. Clin. Nutr.* 23, 1234–40 (1970). Male albino rats were fed neomycin as 0.5% of the drinking water for 14 days. Liver homogenates and intestinal sections were prepared and incubated simultaneously with 2-^{14}C-acetate and ^{3}H-mevalonate and the incorporation of these precursors into cholesterol was determined. The results show that orally administered neomycin does not have a cholestyramine-like effect on the incorporation of labeled acetate and mevalonate into cholesterol and that this is due to the selective action of the antibiotic in precipitating bile acids. Inferences drawn from these data indicate that the hypocholesterolemic action of neomycin in man and the chick, however, may be mediated by precipitation of dihydroxy bile acid conjugates.

PURIFICATION AND MECHANISM OF ACTION OF HOG LIVER MEVALONIC KINASE. E. Beytia, J. K. Dorsey, Jane Marr, W. W. Cleland and J. W. Porter (Lipid Metabolism Lab., Vet. Admin. Hosp., and Dept. of Biochem. and Phys. Chem., Univ. of Wisconsin, Madison, Wis. 53706). *J. Biol. Chem.* 245, 5450–58 (1970). Mevalonic kinase (EC 2.7.1.36), the first enzyme in the ATP-requiring sequence of cholesterol biosynthesis, has been purified from hog liver. This enzyme has a specific activity of 17 μmoles of product formed per min per mg of protein. The purified mevalonic kinase is homogeneous, or nearly homogeneous, on assay by Sephadex gel filtration, polyacrylamide gel electrophoresis, electrofocusing and sucrose density gradient centrifugation. The molecular weight of this enzyme is estimated to be 98,000 from its elution position on Sephadex gel filtration. Evidence is also presented that an —SH group is important in the phosphorylation of mevalonic acid and that the reactivity of this group is influenced by the presence of potassium mevalonate and MgATP. No evidence has been obtained for the formation of enzyme-bound intermediates in this reaction.

HYPOCHOLESTEROLEMIC EFFECT OF 4,4′-(ISOPROPYLIDENEDITHIO)-BIS(2,6-DI-T-BUTYLPHENOL) (PROBUCOL). J. W. Barnhart, Joan A. Sefranka and D. D. McIntosh. *Am. J. Clinical Nutr.* 23, 1229–33 (1970). Probucol (DH-581) is a lipophilic bisphenol that lowers serum cholesterol in several species. There is no effect on liver weight or liver cholesterol, and there is no consistent effect on serum and liver triglycerides. Incorporation of mevalonate-2-^{14}C into cholesterol is not affected, indicating that Probucol does not exert an influence on the late stages of biosynthesis. An inhibition of lipoprotein formation or transport is suggested.

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• Detergents

CALORIMETRIC DETERMINATION OF THE HLB VALUE OF LIPOPHILIC SURFACTANTS. E. Orban (Inst. for Med. Research, Budapest, Hungary). *Tenside* **7**, 203–5 (1970). A rapid method for the experimental determination of the HLB value of nonionic, lipophilic surfactants has been developed, based on an empirical correlation between the HLB values and the mix enthalpies of the surfactants. In surfactant blends with HLB values between 5 and 10, a positive deviation was found to exist between the determined HLB value and the theoretical one.

THE PREPARATION AND PROPERTIES OF FLUORESCENT SURFACTANTS. K. H. Ködel (German Acad. of Sci., Berlin, Germany). *Tenside* **7**, 201–3 (1970). Fluorescent surfactants were prepared in order to examine adsorption at the liquid/liquid interface. Alkylacridinium compounds are obtained by quaternization of 9-alkylacridines. The surface tension-concentration curves and the UV and visible spectra were determined.

THE WORLD STATUS OF SYNTHETIC DETERGENT RANGE PRIMARY ALCOHOLS. H. A. W. Hill (Shell International Chem. Co.). *Tenside* **7**, 185–7 (1970). A review.

THE DETERMINATION OF FREE ALKYLPHENOL IN POLYETHOXYLATED ALKYLPHENOLS. E. Cropper and N. A. Puttnam (Colgate-Palmolive Co., Manchester, England). *Tenside* **7**, 259–60 (1970). A rapid colorimetric procedure is described for the determination of the free alkylphenol content of commercial samples of polyethoxylated alkylphenols. The procedure is based on measurement of the intensity of the orange coloration formed by coupling the alkylphenol with the diazonium salt of para-chloroaniline. The standard deviation of the procedure is 0.001 at the 0.021% free alkylphenol level.

THE RELATIONSHIP BETWEEN THE CONSTITUTION AND CERTAIN PROPERTIES OF INTERFACIALLY ACTIVE BENZENE SULFONATES WITH HETEROATOMS IN THE ALIPHATIC SIDE CHAIN, III: PREPARATION OF THE SULFONATES. F. Püschel and O. Todorov (German Acad. of Sci., Berlin, Germany). *Tenside* **7**, 249–54 (1970). Methods are described for the synthesis of surface active sulfonates containing heteroatoms in the aliphatic side chain. Data are reported on their IR spectra, as well as on the thermal behavior of their S-benzylisothiuronium salts.

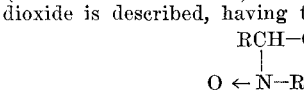
POLYMERIC SURFACTANTS WITH POLYETHER SIDE CHAINS AND THEIR INTERACTION WITH ACID DYESTUFFS. W. Langmann (Bayer A. G., Leverkusen, Germany). *Tenside* **7**, 198–201 (1970). The interaction between acid dyestuffs and polymeric surfactants with polyether side chains was studied. The formation of an addition compound was observed with Acid Blue 118 dyestuff as evidenced by the displacement of its extinction maximum towards longer wavelengths. From this it was possible to calculate both the stoichiometric ratio of the addition compound as well as the association constant. Incorporation of additional hydrophobic groups had no effect on the composition but did have an effect upon the equilibrium. Results are discussed with special reference to practical applications.

THE EFFECT OF THE WIDTH OF DISTRIBUTION OF LAURYL POLYGLYCOL ETHERS ON CERTAIN APPLICATIONAL PROPERTIES AS DETERGENT RAW MATERIALS. H. Grossmann (Chemische Werke Hüls). *Tenside* **7**, 188–94 (1970). Industrially produced polyglycol ethers consist of mixtures, in quantities approximately corresponding to a Poisson distribution, of several homologues, having different degrees of ethoxylation. The width of the distribution varies according to the catalyst used for ethoxylation. A study has been conducted, using pure ethoxylated fractions, of the effect of the width of distribution upon certain properties of these detergent compounds. Cleaning and foaming were found to be unaffected by changes in the width of distribution. On the other hand, a broader width of distribution was found to have higher wetting power and higher cloud point than a narrower distribution having the same mean ethylene oxide content.

SCOURING CLEANSERS CONTAINING CHLORINATED TRISODIUM PHOSPHATE STABILIZED AGAINST LOSS OF BLEACHING EFFECTIVENESS WITH BORAX. R. D. Moore (Procter & Gamble Co.). *U.S. 3,530,071.* Scouring cleansers are described, containing water-insoluble abrasive, chlorinated trisodium orthophosphate, borax, and, optionally, organic detergent and/or alkaline detergency builder.

COLOR STABILIZATION OF FATTY ACID FORERUNNINGS. S. S. Naskar, H. L. Hülsmann and G. Renckhoff (Dynamit Nobel A.G.). *U.S. 3,531,506.* Discoloration and subsequent darkening of fatty acid forerunnings are prevented by heating the fatty acids with at least one alkyl ester of silicic acid, polysilicic acid and/or carbonic acid at a temperature of approximately 180–250C, and then distilling the resultant mixture to recover the fatty acids. The heating step is carried out for about 0.5–8 hours.

DIAMINE DIOXIDE DETERGENT COMPOUNDS. T. J. Logan (Procter & Gamble Co.). *U.S. 3,531,526.* A detergent diamine dioxide is described, having the structural formula:



where R is a C_8 to C_{18} alkyl radical and each R′ is selected from the group consisting of methyl, ethyl, propyl, hydroxyethyl and hydroxypropyl radicals. Preferred members of the class which are especially mild to human skin are those in which R contains 8–10 C atoms. Detergent compositions are also described which contain these diamine dioxides and builders and/or other compounds, especially detergent alkylbenzene sulfonates.

BLEACHING COMPOSITIONS AND METHODS. W. G. Woods (U.S. Borax & Chemical Corp.). *U.S. 3,532,634.* Activated persalt bleaching compositions are claimed, containing an inorganic persalt, a water soluble salt of a transition metal having atomic number of 24 to 29, an oxidatively stable chelating agent and a persalt activator agent. The bleaching compositions can be formulated with the usual detergent materials to provide a detergent-persalt bleach combination.

OPACIFIED LIQUID PRODUCTS AND METHODS FOR THEIR PRODUCTION. H. B. Hans (Purex Corp.). *U.S. 3,532,635.* Crystalline melamine cyanurate, prepared by reaction of cyanuric acid or one of its salts with melamine, is effective as an opacifying material for liquid products such as detergent solutions, by simple incorporation in effective amounts.

DETERGENT COMPOSITION. A. J. Pacini (Purex Corp.). *U.S. 3,532,636.* Detergent compositions are provided affording reduced tendency to chemically burn users which consist essentially of a synthetic organic detergent and a small, effective amount of traumatic acid or one of its salts.