ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: S. Kawamura, F. A. Kummerow, H. S. Liles, C. C. Litchfield, Louise R. Morrow, E. G. Perkins, and T. H. Smouse

• Fats and Oils

MONOENOIC FATTY ACIDS IN DOGFISH LIVERS: ISOMERS OF THE C_{16}, C_{18}, C_{20}, AND C_{22} SERIES. D. C. Malins, and C. R. Houle (U. S. Bureau of Commercial Fisheries, Tech Lab., Seattle, Wash.). *Proc. Soc. Exp. Biol. Med.* **108**, 126-9 (1961). Structural isomers of monoenoic fatty acids in dogfish *(Squalus acanthias)* liver oil were determined. These fatty acids comprised 58% of total fatty acids and 87% of unsaturated fatty acids of the oil. Although it is known that polyunsaturated C_{20} and C_{22} fatty acids are present in quantity in most fish oils, dogfish-liver oil was found to contain substantial amounts of C_{20} and C_{22} monoenoic fatty acids as well. The following isomers were found in the oil: *cis*-9-hexadecenoic acid (6.1%), *cis*-9-octadecenoic acid (24.7%), *cis*-11-octadecenoic acid (9.8%), *cis*-9-eicosenoic acid (4.0%), *cis* 11-eicosenoic acid (5.1%), *cis*-11-docosenoic acid (6.7%), and *cis*-13-docosenoic acid (1.8%). It is suggested that most of the monoenoic fatty acids of dogfish-liver oil may be formed by addition of acetate units to oleic acid and other fatty acids having a Δ_9 double bond.

CONTROLLED CRYSTALLIZATION OF SHORTENING. L. H. Wiedermann (Swift & Co.). *U. S. 3,006,770.* A plastic shortening agent having an improved equilibrium between inter- and intra-crystal composition is prepared by spraying a liquefied normally solid shortening composition having a solid fat index at 50F of less than 45 units and at 100F of less than 25 units into a crystallizing atmosphere and adjusting the temperature to a level of about 60–70F whereby plastic particles are formed and collected.

FAT COMPOSITION FOR MARGARINE AND OTHER PURPOSES. V. K. Babayan (E. F. Drew & Co., Inc.). *U. S. 3,006,771.* A fat composition for incorporation in margarine consists of a coconut type oil interesterified with the triglycerides of fatty acids having 8, 10, 16, and 18 carbon atoms. The relative proportions of the acids in the interesterified oil are about 10–25% capric and caprylic, 25–65% of lauric and myristic, and 15–60% of palmitic and stearic. The product has a setting point of 20–28C, a Wiley melting point of 88–108F, and a penetration at 70F of about 35–70.

MARGARINE, ANTISPATTERING SUBSTANCE AND METHOD OF MANUFACTURING THE SAME. G. M. M. Houben and E. W. Jonker (N. V. Koninklijke Stearine Kaarsenfabrieken "Gouda-Appolo"). *U. S. 3,006,772.* To make margarine antispattering, it is treated with a mixed ester of an aliphatic polyalcohol, a fatty acid residue and an aliphatic polycarboxylic acid. A mixture of the compounds is heated to a temperature between 110 and 170C during a time between about 10 hours and about 15 minutes, the shorter time corresponding to the higher temperature, until the mixed ester is formed. Heating is then discontinued to prevent polymerization and condensation of the mixed ester.

WAXY COMPOSITION SUITABLE AS AN IMPREGNATING AGENT, A PROCESS FOR ITS PRODUCTION, AND IMPREGNATION OF POROUS, ESPECIALLY CELLULOSIC MATERIALS OR OBJECTS WITH THE AID OF THIS COMPOSITION. E. Johansson. *U. S. 3,006,778.* The described composition is a mixture of esters of tall oil acids containing from 3–23% of rosin acids, from 6–9% unsaponifiable matter and from 68–91% fatty acids, with at least one high molecular monohydric, aliphatic alcohol having from 12 to 36 carbons. The mixture of esters has an acid number within the range of 0 to 100 and also contains a salt of zinc or tin with mineral acids.

STABILIZED HALOGENATED OILS. J. M. Becktel, F. E. Kuester, and E. Fritz (Swift & Co.). *U. S. 3,008,833.* Brominated oils which tend to develop unpleasant flavors and odors are treated with at least 0.08% of an epoxidized fatty acid ester and then deodorized. The objectionable flavor and odor are thus removed while the desirable color of the oil is retained.

METHOD FOR PURIFYING FATTY OILS AND FATS. M. Mitani. *U. S. 3,008,972.* Fatty oils and fats which contain free fatty acid are treated with an alkali in an amount less than that required to neutralize the free fatty acids, sufficient water to dissolve the formed soap as a micelle solution, and a substance which yields in water a phosphate or ammonium ion (ammonium phosphate, sodium monohydrogen phosphate, sodium dihydrogen phosphate, ammonium sulfate). Thus the free fatty acid is separated from the oil as a micelle solution of the soap while emulsification by the soap is prevented.

• Fatty Acid Derivatives

FORMATION OF CIS,CIS CONJUGATED OCTADECADIENOATES DURING DEHYDRATION OF METHYL RICINOLEATE. D. R. Body and F. B. Shorland (Fats Res. Lab., Dept. of Sci. & Ind. Res., Wellington, New Zealand). *Chem. & Ind. (London)* **1961**, 1665–1666. Methyl ricinoleate was distilled *in vacuo* over potassium hydrogen sulfate. The distillate was found to contain 1.2 mole % of the methyl ester of C_{16} saturated acid, a trace of C_{18} saturated acid, 68.9 mole % of the nonconjugated C_{18} dienoic acid, 15.6 mole % of *cis,trans-*, 8.3 mole % of *cis,cis-*, and 5.9 mole % of the *trans,trans*-conjugated octadecadienoates.

FAT OXIDATION. I. PREPARATION OF TRANS-TRANS METHYL LINOLEATE HYDROPEROXIDE. A. Banks, S. Fazakerley, J. N. Keay, and J. G. M. Smith (Torry Res. Sta., Aberdeen). *J. Sci. Food Agr.* **12**, 724–8 (1961). A method is described for the preparation of methyl linoleate hydroperoxide by the oxidation of methyl linoleate in solution in light petroleum, followed by partition of the product between light petroleum (b.p. 60–80C) and 85% aqueous methanol which gave material with an extinction coefficient ($E^{1\%,1cm}$) of 810 at 231.5 mμ in ethanol. This hydroperoxide was found to be a mixture of *cis-trans* and *trans-trans* conjugated dienes, from which the latter was isolated by low-temperature precipitation from light petroleum (b.p. 40–60) followed by low-temperature crystallization from ethanol. This product had an E of 890 at 231.5 mμ.

PROCESS FOR THE PURIFICATION OF DARK COLORED RAW FATTY ACID AMIDES. G. Dieckelmann (Dehydag, Deutsche Hydrierwerke G.m.b.H.). *U. S. 3,006,934.* Molten fatty acid amide material is treated with an oxygen yielding agent such as hydrogen peroxide or its adducts, perborates, percarbonates, performic acid, or peracetic acid at a temperature between 100C and a temperature about 20C above the melting point of the amide.

• Biology and Nutrition

CHICK LIVER-STORAGE BIOASSAY OF ALPHA-TOCOPHEROL: METHODS. Martha W. Dicks and L. D. Matterson (Univ. Connecticut). *J. Nutrition* **75**, 165–74 (1961). The results of both a long chick liver-storage bioassay and a short bioassay indicated that the different forms of α-tocopherol were utilized to the same relative degree under the two sets of conditions. The method of Bro-Rasmussen and Hjarde, when modified as to the saponification procedure, with the same procedure of chromatography through secondary magnesium phosphate, and with a modified method of reading with ferric chloride-dipyridyl, was shown to be a possible substitute for the method of molecular distillation and Florex-chromatography for analysis of liver for α-tocopherol.

EFFECT OF DIETARY FATTY ACIDS AND CHOLESTEROL ON GROWTH AND FATTY ACID COMPOSITION OF THE CHICKEN. L. J. Machlin and R. S. Gordon. (Monsanto Chemical Co.). *J. Nutrition* **75**, 157–64 (1961). Analysis of depot fat, heart, liver, testes, and cerebrum using gas-liquid chromatography revealed that dietary linoleic acid profoundly affected the fatty acid composition of tissues analyzed. In tissues of chickens fed linoleic acid-free diets the level of fatty acid tentatively identified as a C-20 triene was elevated and the linoleic and arachidonic acid content was very low; there was no detectable (<0.1%) linoleic acid in testis, cerebrum, or depot fat, whereas all tissues except depot fat contained at least 1.5% of arachidonic acid. Methyl laurate and methyl myristate supplementation increased tissue levels of these fatty acids but had no effect on the per cent linoleic acid or arachidonic acid. Addition of linoleic acid resulted in a decrease in percentage of C-20 triene and an increase in the linoleic and arachidonic acid in all tissues analyzed.

THE ALLEGED "THIAMINE-DESTROYING FACTOR" IN SOYBEANS. F. B. Weakley, A. C. Eldridge, and L. L. McKinney (Northern Reg. Res. Lab., Peoria, Ill.). *J. Ag. Food Chem.* **9**, 435–39 (1961). For 15 years, the literature has contained an unrefuted postulation that soybeans contain a thiamine-destroying factor. This postulation is based on loss of thiamine added to aqueous slurries of soybean meal, and an analogous observation with oriental millet meal which caused thiamine deficiency symptoms on bioassay. Data presented here show that the reported loss of thiamine is based on an unreliable thiochrome assay procedure, and that the analogy with millet meal is untenable. Thiamine in soybean meal exists as 40% free and 60% bound, presumably as cocarboxylase. Enzymes in unheated meal readily convert cocarboxylase to thiamine. Thiamine stability at neutral pH is decreased by addition of phenolic compounds, and increased by absence of air or addition of (ethylenedinitrilo)tetraacetic acid.

MICROBIOLOGICAL PRODUCTION OF CAROTENOIDS. STABILIZATION OF β-CAROTENE IN DRIED FERMENTATION SOLIDS. A. Ciegler, G. E. N. Nelson, and H. H. Hall (Northern Reg. Res. Lab., Peoria, Ill.). *J. Agr. Food Chem.* **9**, 447–51 (1961). Storage tests were conducted on stabilization of carotene produced intracellularly by mated cultures of the mold, *blakeslea trispora*. Addition of 0.25% of ethoxyquin either to the medium during fermentation or to the dried product effectively stabilized carotene. Replacement of white grease with vegetable oil in the fermentation medium resulted in a more stable product in nonprotected solids. Effective stabilization was also achieved by suspended dried mycelium in vegetable oil, by storage under inert atmospheres, or in high vacuum. Addition of a chelating agent or incorporation of dried mycelium in gelatin or casein did not increase stability.

RADIATION STERILIZATION OF FOODS, COMPARISON OF THE RADIOSENSITIVITIES OF THE FAT-SOLUBLE VITAMINS BY GAMMA IRRADIATION. F. W. Knapp and A. L. Tappel (Univ. of Calif., Davis, Calif.). *J. Agr. Food Chem.* **9**, 430–33 (1961). In order to compare the radiosensitivities of the fat-soluble vitamins under controlled conditions, each was gamma-irradiated in pure solution, aerobically and anaerobically. Vitamin E is by far the most sensitive, followed in order of decreasing sensitivity by carotene and vitamins A, D, and K. Only vitamin E is affected adversely by the presence of oxygen during irradiation; vitamins D and K are considerably stabilized.

FAT METABOLISM IN HIGHER PLANTS. XVI. ACETYL COENZYME A CARBOXYLASE AND ACYL COENZYME A-MALONYL COENZYME A TRANSCARBOXYLASE FROM WHEAT GERM. M. D. Hatch and P. K. Stumpf (U. of Calif., Davis, Calif.). *J. Biol. Chem.* **236**, 2879–85 (1961). The preparation and properties of an acetyl coenzyme A carboxylase from wheat germ are described. Crude wheat germ extracts also contained an enzyme that catalyzed a reversible transcarboxylation from malonyl coenzyme A to an acyl coenzyme A moiety to form α-substituted malonyl coenzyme A derivatives. This enzyme was named malonyl coenzyme A transcarboxylase. During the 170-fold purification of carboxylase, the ratio of this activity and the carboxylase activity remained constant, indicating that the two activities were catalyzed by the same enzyme.

TISSUE LIPID FATTY ACID CHANGES FOLLOWING THE FEEDING OF HIGH-CHOLESTEROL, ESSENTIAL FATTY ACID-SUPPLEMENTED DIETS TO RABBITS. L. Sewell, M. D. Law, P. E. Schools, Jr., and C. R. Treadwell (Vet. Adm. Center, Martinsburg, W. Virginia and Washington Univ.). *J. Nutrition* **75**, 181–91 (1961). Rabbits were fed a normal stock diet supplemented with 1 g of cholesterol per day plus one of the following: 150 mg olive oil, 150 mg linoleic acid, 150 mg linoleic acid plus 3 mg pyridoxine, and 150 mg ethyl arachidonate. A control group fed the stock diet was run in parallel. Animals were sacrificed after 9 weeks, and the aorta graded visually and the tissues analyzed for lipids and lipid fatty acid composition by gas-liquid chromatography. All of the cholesterol-fed groups showed moderate degrees of atherosclerosis. There did not appear to be any difference with respect to the effect of the various diets on the development of atherosclerosis with the possible exception of the group receiving linoleic acid and pyridoxine.

ISOLATION AND CHARACTERIZATION OF GLYCOLIPIDS FROM ERYTHROCYTES OF HUMAN BLOOD A (PLUS) AND B (PLUS). S. Hakomori and R. W. Jeanloz (Harvard Med. School and Mass. General Hospital, Boston, Mass.). *J. Biol. Chem.* **236**, 2827–34 (1961). Extraction of erythrocytes from human A (plus) and B (plus) blood afforded glycolipids possessing blood group activity. Purification was obtained by adsorption on activated alumina and activated silica gel, followed by partition chromatography on cellulose. Partial hydrolysis showed a resistant core composed of fatty acid, sphingosine, glucose, and galactose for the substance isolated from A (plus) blood, and a resistant core composed of fatty acid, sphingosine, glucose, and galactosamine for the substance isolated from B (plus) blood. In both substances, part of the galactose and of the galactosamine constituents were located at, or near, the extremities of the carbohydrate chain.

STUDIES OF CHOLESTEROL BIOSYNTHESIS. III. THE DESMOSTEROL REDUCTASE SYSTEM IN LIVER. J. Avigan and D. Steinberg (Section on Metabolism, Natl. Insts. of Health, Bethesda 14, Md.). *J. Biol. Chem.* **236**, 2898–2900 (1961). A rapid conversion of desmosterol to cholesterol was demonstrated in washed rat liver mitochondria and microsomes. The reaction requires TPNH, the hydrogen of which is incorporated into the cholesterol formed. Sulfhydryl inhibitors inhibit the reduction, and the inhibition is reversed with reduced glutathione.

STUDIES OF THE ELECTRON TRANSFER SYSTEM. XXXVIII. LIPID COMPOSITION OF PURIFIED ENZYME PREPARATIONS DERIVED FROM BEEF HEART MITOCHONDRIA. S. Fleischer, H. Klouwen, and G. Brierley (Inst. for Enzyme Res., Univ. of Wisc., Madison). *J. Biol. Chem.* **236**, 2936–41 (1961). Analytical data are presented on the lipid composition of beef heart mitochondria and various submitochondrial particles which correspond to the different segments of the electron transfer chain. The highly active electron transport subunits, cytochrome *c* oxidase, DNPH-cytochrome *c* reductase, succinic cytochrome *c* reductase, and succinic coenzyme Q reductase have a lipid content in the range of that found in mitochondria, i.e. 26 to 27%. The lipid in all particles is predominantly phospholipid. Lecithin, phosphatidylethanolamine, cardiolipin, and phosphatidylinositol account for practically all of the phospholipids.

SEPARATION OF STEROLS BY COUNTERCURRENT CRYSTALLIZATION. A. Poulos, J. W. Greiner, and G. A. Fevig (Upjohn Co., Kalamazoo, Mich.). *Ind. Eng. Chem.* **53**, 949–62 (1961). The process starts with soybean-derived sterols containing about 20% stigmasterol; six successive crystallizations of this material result in a final product with assays 97% stigmasterol.

INFLUENCE OF THYROACTIVE COMPOUNDS ON SERUM AND LIVER CHOLESTEROL IN RATS. D. Kritchevsky, Janet Moynihan and M. L. Sachs (Wistar Inst. of Anatomy and Biol. and Dept. of Med., Univ. of Pa. School of Med., Phila.). *Proc. Soc. Exp. Biol. Med.* **108**, 254–7 (1961). In a series of 5 separate experiments, rats were fed high fat and high fat-high cholesterol diets and were treated with various thyroactive compounds. Two dosages of 3,5,3′-triiodothyropropionic acid (triprop) (0.03 mg and 0.15 mg/100 g body weight) were administered subcutaneously and, in general, were found to lower serum and liver cholesterol levels when compared with controls. Administration of D-thyroxine (0.05 mg/100 g body weight) and L-thyroxine (0.005 mg/100 g) also lowered serum and liver cholesterol levels. Among individual experiments there was a variation in magnitude and in a few instances in the direction of effect.

EFFECT OF 2,4-DINITROPHENOL ON FREE FATTY ACID UPTAKE BY SKELETAL MUSCLE. J. J. Spitzer, W. T. McElroy, Jr., and B. Issekutz, Jr. (Dept. of Physiology, Hahnemann Med. College and Hospital and Div. of Res., Lankenau Hosp., Phila, Pa.). *Proc. Soc. Exp. Biol. Med.* **108**, 89–91 (1961). Uptake of free fatty acids by skeletal muscle was determined by simultaneously measuring blood flow through profunda femoris veins, and arteriovenous fatty acid differences in anesthetized dogs. Administration of 2.5 mg/ml of DNP for 30 minutes caused elevation of blood flow and uptake of free fatty acids by the skeletal muscle.

EFFECT OF FASTING ON SERUM AND LIVER LIPID LEVELS IN THE RAT. Helen Mayfield and R. R. Roehm (Dept. of Home Econ. Res., Montana State College, Ag. Expt. Sta., Bozeman, Mont.). *J. Nutrition* **75**, 265–69 (1961). Under the experimental conditions of this study the procedure of fasting rats 10 to 12 hours prior to obtaining liver and serum samples for lipid determinations affected the amount of lipid and cholesterol present in the tissues and serums. This procedure also affected the statistical interpretation of the results.

INFLUENCE OF GRADED LEVELS OF DIETARY LINOLEIC AND LINOLENIC ACIDS ON THE FATTY ACID COMPOSITION OF HEN'S EGGS. N. L. Murty and R. Reiser (Dept. of Biochem. and Nutrition, Texas Ag. Expt. Station, College Station). *J. Nutrition* **75**, 287–94 (1961). The levels of linoleic and linolenic acid incorporation into the egg lipids increased with the amounts

present in the diet and reached plateaus at the 5% dietary level. Linoleic acid reached a higher level than linolenic acid. The levels of incorporation of each were decreased, however, when tallow was included in the ration. Linoleic acid is the precursor of arachidonic and docosapentaenoic acids, linolenic of eicosapentaenoic and docosahexaenoic acids. When linoleic acid was fed without tallow, there was a higher degree of incorporation of labeled acetate in the yolk fatty acids than when linolenic acid was fed, but the degree of its incorporation into cholesterol was the same with both. The inclusion of tallow in the diet markedly reduced the degree of incorporation of acetate into both fatty acids and cholesterol.

A CYTOCHROME C-PHOSPHOLIPID COMPLEX. M. Reich and W. W. Wainio (Dept. of Physiology and Biochem., Rutgers, New Brunswick, N. J.). *J. Biol. Chem.* **236**, 3058–61 (1961). A precipitable complex containing approximately 15% cytochrome *c* and 85% phosphatidylethanolamine has been studied. Its minimal molecular weight is approximately 78,500, and the heme iron does not seem to be the site of attachment of the phospholipid to the enzyme. The complex is soluble in acids, alkalies, and in aqueous solutions of the bile salts, sodium deoxycholate, and sodium cholate. The bile salts may act by displacing the phospholipid from its attachment to the protein, forming a soluble cytochrome *c*-bile salt-phospholipid complex.

ROLE OF PHOSPHOLIPIDS IN CYTOCHROME C OXIDASE ACTIVITY. *Ibid.*, 3062–3065 (1961). The enzymatic activity of a cytochrome *c* oxidase preparation, low in lipid, was restored, and that of an already active preparation increased by several hundred per cent, by the addition of purified phospholipids. In each instance, sodium deoxycholate acted as a competitive inhibitor with respect to the added lipid. Coenzyme Q_{10} (ubiquinone) was without effect in the restoration or stimulation of activity. Treatment of a solution containing cytochrome *c* and phospholipid by chemical or physical methods which are known to disrupt natural lipoproteins and a particulate cytochrome *c*-phospholipid complex caused a reduction in cytochrome *c* oxidase activity.

PLASMA CHOLESTEROL CONCENTRATIONS IN COCKERELS AND DOGS TREATED WITH BILE ACID BINDING POLYMER AND CHOLESTEROL SYNTHESIS INHIBITORS. D. M. Tennent, G. W. Kuron, Mary Zanetti and W. H. Ott (Merck Inst. for Therapeutic Res., Rahway, N. J.). *Proc. Soc. Exp. Biol. Med.* **108**, 214–6 (1961). In cholesterolemic cockerels the bile acid binding polymer, cholestyramine resin (MK-135), lowered plasma cholesterol concentrations when fed in the diet; the hepatic cholesterol synthesis inhibitor, benzmalecene, lowered cholesterol levels when given by injection, but not when fed in the diet. In combination, their effect was additive. In dogs, feeding of cholestyramine resin plus benzmalecene or triparanol (MER-29) had additive cholesterol-lowering effect.

INCREASED LIPOTROPIC REQUIREMENTS WITH RENAL NECROSIS INDUCED IN RATS BY HIGH-FAT DIETS. R. M. O'Neal, W. J. S. Still, and W. S. Hartroft (Dept. of Pathology, Wash. Univ. School of Medicine, St. Louis, Mo.). *J. Nutrition* **75**, 309–18 (1961). In weanling rats a high cholesterol diet provides a sensitive indicator for the effect of various dietary fats on choline requirement. Results indicate that under these conditions cocoa butter increased choline requirement markedly, whereas butter did not. This effect was not the result of saturation of fat, as corn oil is almost as effective as cocoa butter. A lipotropic effect of sodium cholate was observed in these experiments. High-fat and high-cholesterol diets used in other experimental studies must be formulated with care because even with usually adequate amounts of choline, a deficiency state can be induced.

AMINO ACID IMBALANCE AND CHOLESTEROL LEVELS IN CHICKS. M. G. Kokatnur and F. A. Kummerow (Dept. of Food Tech., Univ. of Ill., Urbana). *J. Nutrition* **75**, 319–29 (1961). Among the amino acids observed to be essential for optimal growth in chicks, 6 have been tested for their effect on the serum cholesterol levels in diets which were either deficient or more than adequate in one of the amino acids. Under these conditions arginine, lysine, and leucine influenced the serum cholesterol level as well as growth. Of the amino acids tested, the toxicity produced by a more-than-adequate amount of phenylalanine caused depression in growth but had no effect on serum cholesterol levels. Lysine and histidine elevated serum cholesterol levels and depressed growth. The toxic effect of lysine could be partly overcome by supplements of a mixture of glycine and arginine or glycine and methionine, but arginine and methionine showed antagonism in their influence on cholesterol level. A mere increase in the dietary nitrogen intake effected by manipulating the amount of a balanced amino acid mixture progressively lowered the serum cholesterol levels. Although not essential for optimal growth, some nonessential amino acids such as serine and aspartic acid in combination, or serine, aspartic acid, and alanine decreased serum cholesterol levels in chicks.

IDENTIFICATION OF 24-DEHYDROCHOLESTEROL IN HUMAN BLOOD VESSELS FOLLOWING MER-29 THERAPY. D. H. Blankenhorn (Dept. of Medicine, Univ. of S. Calif. School of Med., Los Angeles). *Proc. Soc. Exp. Biol. Med.* **108**, 43–5 (1961). This report indicates that 24-dehydrocholesterol accumulated in human blood vessel walls and it seems probable that treatment with MER-29 was responsible. Although 24-dehydrocholesterol was not demonstrable in the extensive atheromatosis which covered 90% of the aorta, it accounted for 13–16% of the sterols in normal aortic wall. The magnitude of accumulation of 24-dehydrocholesterol in normal aortic wall would not have been apparent if assays had been performed on sterols extracted from the aorta as a whole because the sterols of normal wall would have been greatly diluted by atheromatosis lipid containing no 24-dehydrocholesterol. Because these vessels were examined only 79 days after onset of therapy with MER-29, the presence of 24-dehydrocholesterol in normal wall but not in atheromas seems best explained by a more rapid accumulation in normal wall. However, it is possible that 24-dehydrocholesterol may only accumulate in normal vessel walls.

CHOLESTEROL IN VITAMIN B_{12}-DEFICIENT CHICK EMBRYO. Louise Daniel, Shirley Cohen, and D. W. Yesair (Dept. of Biochem., Cornell Univ., Ithaca, N. Y.). *Proc. Soc. Exp. Biol. Med.* **108**, 119–21 (1961). The cholesterol content (free and esterified) of the chicken egg during incubation did not differ from that of its vitamin B_{12}-deficient counterpart. Under the conditions of this experiment where a marked B_{12} deficiency existed, vitamin B_{12} has no effect on cholesterol status of the developing chick embryo.

DECLINE IN RATE OF CHOLESTEROL SYNTHESIS DURING MATURATION OF CHICKEN AORTA. S. Dayton (VA Center and Dept. of Med., Univ. of Calif., Los Angeles). *Proc. Soc. Exp. Biol. Med.* **108**, 257–61 (1961). *In vitro* synthesis of labeled cholesterol by aortic tissue of cockerels was found to fall off rapidly with maturation, with either acetate-1-C^{14} or mevalonate-2-C^{14} as precursor. Production of $C^{14}O_2$ failed to show a similar relationship, indicating that the declining rate of cholesterol synthesis is not a consequence of decreasing permeability of the tissue to the substrate. In the system employed, mevalonate was only twice as efficient as acetate as a source of sterol carbon, and almost all the sterol radioactivity derived from mevalonate was removed by bromination. Thoracic and abdominal aorta displayed similar rates of cholesterol synthesis.

COMPARISON OF LIPID METABOLISM OF CHICKEN EMBRYO ORGANS AND CELLS IN CULTURE. S. Halevy and R. P. Geyer (Dept. of Nutrition, Harvard School of Public Health, Boston). *Proc. Soc. Exp. Biol. Med.* **108**, 6–9 (1961). A study was made of the relative incorporation of acetate-1-C^{14} into lipids of chicken embryo tissues *in ovo* and in tissue culture. Embryonic heart, thigh, and stomach incorporated C^{14} mainly into phospholipids *in ovo*, and into neutral fat *in vitro*. Relative C^{14} content of the cholesterol esters was higher when the cells were grown in medium containing calf serum as compared with chicken serum, an effect not correlated with serum fatty acid composition or fatty acid and cholesterol content. Acetate incorporation by established cell lines (HeLa and Chang liver) resembled more closely that of chick embryo organs *in ovo* rather than that of chick embryo tissues *in vitro*.

RELATION OF SELENIUM, VITAMIN E, AND OTHER FACTORS TO MUSCULAR DYSTROPHY IN THE RABBIT. J. F. Proctor, D. C. Maplesden, D. E. Hogue, and J. K. Loosli (Dept. of Animal Husbandry, Cornell Univ., Ithaca, N. Y.). *Proc. Soc. Exp. Biol. Med.* **108**, 77–9 (1961). Rabbits maintained on a torula yeast, vitamin E deficient diet, developed a severe and rapidly progressing muscular dystrophy. This condition was not prevented by addition to the diet of 1 ppm selenium or of supplements of dl-alpha tocopheryl acetate alone or in combination. Additions of natural feedstuffs (wheat bran, linseed oil meal or kidney beans) to the semi-purified diet did not fully prevent the condition, although they did lessen the severity of the lesion and increase the average number of days of survival indicating deficiencies other than selenium and vitamin E were involved in the particular experimental diets used. A marked

alopecia was observed in all animals fed diets not containing a natural feedstuff.

THE LIVER-LIPID CONSTITUENTS OF MALE AND FEMALE RATS. 2. EFFECTS OF THE FAT-DEFICIENCY SYNDROME, AGGRAVATED BY DIETARY CHOLESTEROL. R. A. Morton and A. A. Horner (Univ. of Liverpool). *Biochem. J.* **79**, 636–42 (1961). The liver vitamin A stores of fat-deficient male rats fed on a diet containing cholesterol (1%) did not differ significantly from those of controls which received linoleic acid; vitamin A stores of females, however, were 48% lower than those of their controls. The addition of cholesterol to a fat-free diet aggravated fat deficiency as judged by more rapid cessation of growth at a lower body weight. Both effects were appreciably more pronounced in males. Cholesterol supplementation of the diet caused much larger accumulations of cholesteryl esters in livers than are caused by fat deficiency alone. The effect was much greater in males. Linoleic acid (100 mg./day) did not alter the severity of this phenomenon in males; a smaller dose (25 mg./day) reduced the effect considerably in females. The rise in liver triglyceride concentration caused by fat deficiency was not altered by adding cholesterol to the diet. Cholesterol caused an increase in the concentrations of polyunsaturated acid in triglycerides, both in deficient animals and controls; the effect was more pronounced in males. Dietary cholesterol decreased the concentrations of dienoic and tetraenoic acids in the liver phospholipids of control animals; it also raised the triene:tetraene ratio. It raised the diene:tetraene ratio in total liver lipids, phospholipids, and cholesteryl esters, and lowered this value in the triglycerides. These effects occurred both in deficient animals and in controls.

ESTER-LINKED LONG-CHAIN FATTY ACIDS OF NERVOUS TISSUE. R.W.R. Baker (Guy's Hospital Medical School, London). *Biochem. J.* **79**, 642–8 (1961). The esterified fatty acids in lipids extracted from normal human whole brain, from 5 regions of brain, from spinal cord, and from sciatic nerve were hydrolyzed and examined as methyl esters by gas chromatography. The fatty acid pattern of sciatic nerve was distinct from that of the other samples and resembled that of body fat, with 13–26% palmitic, 2–9% stearic, 43–55% oleic, and 8–10% linoleic. The compositions of fatty acid mixtures from brain varied little from site to site. The approximate values were palmitic 20%, stearic 20%, C_{20} acids 16%, C_{22} acids 5%, and C_{24} acids 4% the remaining 35% being mostly oleic. Fatty acid values for spinal-cord lipid lay between those of brain and of the nerve.

HIGH CHOLESTEROL DIET AND ESTERIFICATION OF CHOLESTEROL BY THE INTESTINAL MUCOSA OF RATS. S. K. Murthy, S. Mahadevan, and J. Ganguly (Indian Inst. of Science, Bangalore). *Arch. Biochem. Biophys.* **95**, 176–80 (1961). Rats were maintained on a diet containing 1% cholesterol and various fats at 10% level and the changes in the hydrolytic and synthetic activities of the pancreas and intestinal mucosa for cholesterol esters were investigated. The hydrolytic activities of both tissues did not show any significant changes, while the esterifying activity of the mucosa, but not of the pancreas, increased markedly over a period of 5 weeks. The esterifying activity for vitamin A also showed a similar rise only in the mucosa of the rats. It is suggested that one of the reasons for the accumulation of cholesterol esters in animal tissues may be due to the increased esterification of the sterol in the mucosa induced by dietary cholesterol.

FATTY ACID COMPONENT OF VITAMIN A ESTER IN SHEEP LIVER. K. S. Rao, P. S. Sastry, and J. Ganguly (Indian Inst. of Sci.). *Arch. Biochem. Biophys.* **95**, 285–9 (1961). Vitamin A, when extracted along with other lipids from sheep liver, had an $E^{1\%,1cm}$ value of 14.4, which was raised to 45.57 on removal of the phospholipids by cold acetone. Selective hydrolysis of triglycerides by an extract of acetone-dried sheep pancreas in the presence of $HgCl_2$ as inhibitor of vitamin A esterase, followed by chromatography on alumina gave a product with E value of 276. Chromatography on magnesium oxide raised the E value to 601.5, representing 64% pure vitamin A ester calculated as palmitate. The total recovery was 23% of the starting oil. The purified ester preparation, when subjected to reverse-phase chromatography on silicone-impregnated paper, gave a single ultraviolet fluorescent band. On hydrolysis, the band gave only one fatty acid, conclusively identified as palmitic acid.

PRODUCTION OF ERGOSTEROL FROM YEAST. J. Green, S. A. Price, and E. E. Edwin (Vitamins Ltd.). *U. S. 3,006,932.* Yeast, while moist and while retaining yeast protein substantially unimpaired, is subjected to the action of a catalytic, nonsolvent amount of a water-soluble amino compound which is a mild base having a dissociation constant between 1×10^{-6} and 1×10^{-2} to liberate the bound ergosterol. The proportion of amino compound should be between 0.5 and 5%, by weight, calculated on the yeast.

• Drying Oils and Paints

THERMAL POLYMERIZATION OF METHYL LINOLEATE. K. Barbara Norton, D. E. A. Rivett, and D. A. Sutton (South African Council for Scientific & Ind. Research). *Chem. & Ind. (London)* **1961**, 1452–3. Two batches of methyl linoleate were heated in a vacuum at 300° for one hour and the dimer fractions, about 3%, isolated by falling film molecular distillation. These showed $\lambda_{max.}$ 233 mμ, E 1%/1 cm. = 100; thus about 20% of the dimer molecules were conjugated on the basis of E 1%/1 cm. = 1000 for conjugated monomeric linoleate. The yield of prehnitic acid from these preparations was 3%. On hydrogenation (PtO_2/HOAc) 2.2 moles H_2/mole were absorbed. Heating in a vacuum at 300° caused a rapid fall in unsaturation from 2.1 to 1.6 double bonds/mole in 5 hours. The fact that the yield of prehnitic acid is no greater than from dimers isolated from long-heated (12 hours) linoleate, and the finding that a considerable amount of unsaturation was present, are in accordance with the hypothesis that the Diels-Alder type addition is not the sole dimerization mechanism. Attempts to separate the conjugated and nonconjugated dimer species by reversed phase partition column chromatography failed.

POLYISOCYANATE POLYESTER REACTION PRODUCT AND PROCESS. J. C. Petropoulos (American Cyanamid Co.). *U. S. 2,998,399.* Described is the polymeric interreaction product of (1) a polyisocyanate and (2) the polyester reaction product of (a) a material selected from the group consisting of a glyceride, glyceride oil fatty acids and glyceride oil monoglycerides, (b) a polyhydric alcohol, and (c) 4,4'-(2,2-butyldiene)dibenzoic acid. The polyisocyanate is devoid of any vinyl group.

PROCESS FOR SIMULTANEOUS ALCOHOLYSIS AND GASPROOFING OF TUNG OIL. L. A. Goldblatt, L. L. Hopper, and E. T. Rayner (U.S.D.A., Secretary of Agriculture). *U. S. 2,999,104.* A process for simultaneously alcoholizing and gasproofing tung oil without danger of gelation consists of heating 1 part by weight of tung oil with at least 0.136 part of trimethylolethane in the presence of an alcoholysis catalyst at a temperature of at least 565° for about 10 minutes.

PRIMER PAINT COMPOSITION AND WOOD COATED THEREWITH. R. W. LaBerge (E. I. du Pont de Nemours & Co.). *U. S. 3,008,847.* The primer contains as an essential film-forming component linseed oil modified glyceryl phthalate in which the linseed oil constitutes from 50–70% by weight, an organic solvent, and 10–30% pigment volume concentration of pigment. The paint, when in the form of a dried film, has a permeability factor between about 0.01 and 0.05.

PROCESS FOR SIMULTANEOUS ALCOHOLYSIS AND GASPROOFING OF TUNG OIL, AND PRODUCTION OF ALKYD RESINS THEREFROM. L. A. Goldblatt, L. L. Hopper, Jr., and E. T. Rayner (U.S.A.,Sec'y of Agr.). *U. S. 3,008,910.* A process for preparing a gasproof, nongelling tung oil alkyd, the dried films of which exhibit outstanding water resistance, consists of the following steps: heating 1 part by weight of tung oil and 1 part tall oil fatty acids with at least 0.28 parts of trimethylolethane in the presence of an alcoholysis catalyst at a temperature of at least 565F for about 10 minutes; and adding 0.3 parts isophthalic acid and heating at a temperature of about 500F in the presence of an esterification catalyst until the resulting alkyd has an acid value below 11.

• Detergents

THE MECHANISM OF DETERGENCE. A. S. C. Lawrence (The University, Sheffield). *Chem. & Ind. (London)* **1961**, 1764–71. The author pictures the mechanism of detergence as follows: there is in the detergence of polar dirt a spontaneous process of penetration of soap and water into the dirt, followed by peptization. This process has nothing to do with surface forces, but results from cryoscopic forces and diffusion processes in the ternary soap-water-polar dirt system. Each phase in the mechanism is discussed in detail.

EVALUATION OF FOUR HOSPITAL DETERGENT-SANITIZERS. L. J. Vinson (Lever Bros. Co.), P. Dineen, and W. Schneider. *Soap Chem. Specialties* **37**(10), 45–8, 117–21 (1961). Described are the properties and the methods used for evaluation of a laundry and hard surface sanitizer, an antiseptic spray, a cleanser-disinfectant, and a surgical scrub. In addition the authors discuss the desirable properties of a germicide.

CHELATING AGENTS IN DETERGENTS. J. J. Singer, Jr. (Hampshire Chem. Corp). *Soap Chem. Specialties* **37**(10), 49–51, 125–6 (1961). To produce the best possible cleaning compound at a given cost, it is recommended that the formulation incorporate members of both polyphosphates and amino acid chelating agents. The ratio of each component will be determined by performance at the given cost. Performance in a given formulation is invariably the only final assessment of a compound's value. Laboratory tests provide a useful guide, but use tests are absolutely necessary.

CLEANERS IN THE AERO-SPACE FIELD. M. C. Weast and S. W. Coryell (R. M. Hollingshead Corp.). *Soap Chem. Specialties* **37**(10), 52–5, 126–8 (1961). The two most favored and efficient types of aircraft surface cleaners are the alkaline water-base type and the solvent-emulsion type cleaners. The water-base cleaner has been finding increasing favor because of lowered use costs, high efficiency, safety from fire hazards and freedom from disposal problems. A typical formulation for this type cleaner is: trisodium phosphate (dodecahydrate) 10%, nonionic surface active agent (Triton X-100) 2%, Cellosolve 6%, and water 82%. Also described are the technique for cleaning reciprocating and turbine engines, missiles, radioactive surfaces and for removing carbon from pistons, valves, or other parts.

PREPARATION OF ALKARYL SULFONATES. J. W. Conwell, H. E. Luntz, and D. O. Popovac (Continental Oil Co.). *U. S. 3,007,961.* An alkyl substituted benzene product is applied as a film to a heat exchange surface which is maintained within the range of 30–180F. A sulfonating agent in an amount sufficient to sulfonate from 85 to 95% of the alkyl benzenes present is introduced at a point closely in advance of a progressively moving scraper, thus partially sulfonating the alkyl benzenes. The reaction mixture is allowed to separate into two layers, and the upper layer containing branched-chain acyclic aliphatic hydrocarbons diluted with unsulfonated alkyl substituted benzenes is reapplied to a second heat exchange surface and the sulfonation is repeated.