

• Fats and Oils

OBSERVATIONS ON THE MICROFLORA OF OLIVES AND GROUND OLIVE PULP WITH SPECIAL REFERENCE TO LIPOLYTIC MICROFLORA. G. Florenzano and R. Materassi (Univ. of Florence, Italy). *Olearia* 19, 134-8 (1965). Studies on the evolution of microbial flora during the processing of olives have confirmed previous observations on the numerical increases which take place in a typical single phase processing cycle, passing from the olives to the ground pulp, oil and husks. Observations, carried out on 148 groups, showed that most of the microflora present in samples taken from the oil mill comes from the epiphytic microflora of the olives themselves, however, some species frequently found in the milled samples were absent from the olives.

PROTON MAGNETIC RESONANCE SPECTRA OF UNSATURATED FATTY ACIDS. J. M. Purcell, S. G. Morris and H. Susi (Eastern Reg. Res. Lab. U. S. Dept. of Agr., 600 E. Mermaid Ln., Phila, Pa.). *Anal. Chem.* 38, 588-92 (1966). The proton magnetic resonance spectra of various unsaturated fatty acids were studied. The types of compounds studied include those in which the methylene chain is interrupted by one or more carbon-carbon multiple bonds. The spectral effects produced by the multiple bonds are discussed. Chemical shifts and, when possible, coupling constants have been determined.

BRANCHED-CHAIN FATTY ACIDS IN SEDIMENTS. R. F. Leo and P. L. Parker (Inst. of Marine Science, Univ. of Texas, Port Aransas, Texas 78373). *Science* 152, 649-50 (1966). Branched-chain (iso and anteiso) fatty acids were isolated from marine sediments from several environments. The relatively high ratio of branched-chain to straight-chain fatty acids for the even-numbered carbon molecules suggests a bacterial origin for the branched-chain isomers. The branched-chain fatty acids are present in the Green River shale. Possible geochemical implications are suggested.

REACTIVITIES OF LIPID SOLVENTS WITH THIOBARBITURIC ACID. Su Yong Ho and W. D. Brown (Inst. of Marine Resources, Dept. of Nutr. Sci., Univ. of Cal., Berkeley, Cal. 94720). *J. Food Sci.* 31, 386-8 (1966). Methyl alcohol, ethyl alcohol, chloroform, diethyl ether, petroleum ether, cyclohexane and carbon tetrachloride were tested for reactivity with thiobarbituric acid. Pigments with absorption maxima at 450 and 532 m μ were readily formed from petroleum ether and diethyl ether; methyl alcohol, ethyl alcohol, chloroform, and hexane reacted, but to a lesser extent; carbon tetrachloride was unreactive. The production of these malonaldehyde-like compounds, presumably from contaminants in the solvents, was increased by heating.

ANALYSIS OF THE LOWER FREE FATTY ACIDS FROM MICROBIAL FERMENTATIONS. T. C. Grey and B. J. Stevens (Food Res. Inst., Earlham Lab., Norwich and Low Temp. Res. Station, Cambridge, England). *Anal. Chem.* 38, 724-6 (1966). A routine procedure is described for the quantitative isolation of C₁-C₃ fatty acids by steam distillation and analysis by gas-liquid chromatography. Separation was obtained on a 10-ft. column of Carbowax 4000 (terminated in terephthalic acid) on Fluoropak 80 at 125C. An argon ionization detector was used. The concentrations of individual acids were calculated from peak areas relative to dodecane, the internal standard.

PARTIAL GLYCERIDES IN THE FAT OF CHEDDAR CHEESE. J. M. deMan (Dept. of Dairy and Food Science, Univ. of Alberta, Edmonton, Alberta, Canada). *J. Dairy Sci.* 49, 343-5 (1966). The fat of Cheddar cheese was found to contain mono- and diglycerides. The amounts in mild and medium cheese did not differ, but old cheese contained larger percentages of partial glycerides. Rancid cheese contained no more partial glycerides than mild or medium cheese. The fatty acid composition of the tri-, di-, and mono-glycerides was determined by gas-liquid chromatography. The composition of the monoglycerides is in-

dicative of a lipolysis pattern not similar to that obtained by either milk or pancreatic lipase. Especially notable was the fact that the monoglycerides contained short-chain fatty acids. The monoglycerides of the fat of rancid cheese were characterized by high contents of short-chain fatty acids. It is suggested that monobutyrin is a contributing factor to the rancid defect of Cheddar cheese.

INSTRUMENTAL ASSESSMENT OF COLOUR DIFFERENCE. Anon. *Paint Manuf.* 35, No. 4, 48-9 (1965). Determination of colour differences by comparison of spectrophotometric curves is a tedious operation, but an accurate measurement in terms of three variables is obtained rapidly with a colour difference meter, a commercial model of which is described. (Rev. Current Lit. Paint Allied Ind. No. 285).

DETERMINATION OF CIS-TRANS ISOMERS OF ACIDS BY POTENTIOMETRIC METHOD USING NON-AQUEOUS MEDIA. A. P. Kreshkov and L. N. Balytinskaya. *Lakokras. Mat.* 1964, No. 6, 43-5. The method is based on the faster reaction of the *cis*-isomer with mercuric acetate and the determination of the total acid content potentiometrically in non-aqueous media. (Rev. Current Lit. Paint Allied Ind. No. 283).

INFRARED STUDY OF OXYGEN-CONTAINING GROUPS FORMED DURING AUTOXIDATION OF OLEIC ACID. E. Mariani and F. Pochetti. *Annali Chim.* 55, 1113-21 (1965). Oleic acid has been oxidised in air at 100 to 170C in absence and presence of light, and the build up of O-containing groups followed by I.R. spectroscopy. Major changes occurred in the CO group region and there was a development of 4 bands at 5.75, 5.79, 5.87 and 5.93 μ , assigned respectively to ester, aldehyde, ketone and $\alpha\beta$ -unsaturated carbonyl groups. (Rev. Current Lit. Paint Allied Ind. No. 284).

REACTION OF RAPE SEED OIL WITH SULPHUR. J. Zajic and O. Kopecká. *Prům. Potravin* 15, 395-6 (1964). Reactions of the oil with 3% and 10% S at 150C were studied. In the initial stage S is rapidly bound to the double bonds of the fatty acids with formation of sulphide chains. With a low content of S the oil becomes polymerized in the later stage, whereas with sufficient S content the linkage becomes disulphidic. By spectral study of the products, geometric and positional isomerisation of fatty acids have been established. (Rev. Current Lit. Paint Allied Ind. No. 284).

• Fatty Acid Derivatives

TRACE ANALYSIS OF FATTY AMINES BY GAS CHROMATOGRAPHY. W. H. McCurdy, Jr. and R. W. Reiser (Univ. of Delaware, Newark, Del.). *Anal. Chem.* 38, 795-6 (1966). A study of precision obtained in analysis of samples by the recommended procedure showed a standard deviation of 0.04 p.p.m. at 1 p.p.m. of octylamine. In the case of 1-p.p.m. octadecylamine, a standard deviation of 0.07 was obtained. These data are comparable in precision to results given by Silverstein using a colorimetric method. The proposed gas chromatographic procedure has advantages of speed and selectivity in the analysis of mixtures of amines.

AUTOXIDATION OF SODIUM LINOLEATE IN AQUEOUS COLLOIDAL SOLUTION, AND NEW SYSTEM OF EMULSION POLYMERIZATION USING THE OBTAINED REACTION PRODUCT AS INITIATOR AND EMULSIFIER. Kazuo Fukuzumi and Tadahiro Go (Nagoya University, Japan). *Kogyo Kagaku Zasshi* 69, 86-91 (1966). The effect of metallic ions (mainly 10⁻⁵ mol/l) in the autoxidation of sodium linoleate in an aqueous colloidal solution (7.1 \times 10⁻³ mol/l) at 37.5 \pm 0.1C or 30.0 \pm 0.1C and pH 9 was investigated. It was shown that cobalt ion is the most effective catalyst among those of cobalt, copper and iron, and that they decrease in the above-mentioned order. Air was blown into a 10⁻¹ mol/l aqueous solution of sodium linoleate containing 10⁻⁴ mol/l cobaltous chloride at 30.0 \pm 0.1C and pH 9 for 16 hrs. The reaction product was used as the initiator and emulsifier, and styrene was polymerized by this new emulsion polymerization system at 50.0 \pm 0.1C. The result was compared with that of the usual emulsion polymerization of styrene using potassium persulfate or benzoyl peroxide as the initiator. In this new polymerization system, the rates and degrees of polymerization were generally almost equal to those in the usual emulsion polymerizations.

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• Biochemistry and Nutrition

ON THE MECHANISMS OF FATTY ACID INHIBITION OF MITOCHONDRIAL METABOLISM. Leila Vázquez-Colón, F. D. Zeigler and W. B. Elliott (Dept. of Biochem., State Univ. of New York, Buffalo, N. Y.). *Biochemistry* 5, 1134-9 (1966). Fatty acids, at low concentrations, uncouple oxidative phosphorylation but at higher concentrations inhibit the oxidation of β -hydroxybutyrate and succinate. 2,4-Dinitrophenol (DNP), which exhibits the same action pattern, is unable to release the inhibition caused by fatty acids. These inhibitions require the intact relationship between the energy producing and energy conserving units that makes coupling of oxidative phosphorylation possible. The inhibition is markedly enhanced by the presence of phosphate acceptor. The effect is not caused by accumulation of acetate or by changes in pH; neither are the dehydrogenases of the β -hydroxybutyrate and the succinate oxidizing systems affected. The β -hydroxybutyrate oxidizing system is more sensitive to complete inhibition by low levels of the fatty acids and DNP than the succinate oxidizing system. Both nitrophenols and fatty acids appear to act at the level of the intermediate $\sim X$ step.

RELATIONSHIP OF PLASMA FREE FATTY ACIDS TO OTHER BLOOD COMPONENTS IN RUMINANTS UNDER VARIOUS PHYSIOLOGICAL CONDITIONS. H. D. Radloff, L. H. Schultz and W. G. Hoekstra (Depts. of Dairy Sci. and Biochem., Univ. of Wis., Madison, Wis.). *J. Dairy Sci.* 49, 179-82 (1966). Experiments were conducted with cows and goats to determine the normal concentrations of plasma free fatty acids (FFA) and their relationship to blood sugars and blood ketones. Plasma FFA concentrations in cows and goats were within the ranges reported for nonruminant species (100-2,000 $\mu\text{eq/liter}$), but under normal nonfasting conditions were lower (200-300 $\mu\text{eq/liter}$) than values reported for nonruminants. The plasma FFA concentration tended to be depressed 4 to 6 hr after feeding, at which time blood sugars were also depressed and blood ketones increased. Upon fasting the plasma FFA concentration increased, whereas the blood sugars were depressed and blood ketones increased. The response of all blood components to

feeding or fasting was much greater in milking than in dry animals. This suggests that blood sugar is a controlling factor in ketogenesis, under both fed and fasting conditions, but that plasma FFA are a primary source of ketones only under fasting conditions. The plasma FFA concentration was elevated at parturition, but was consistently higher at the time of peak milk production.

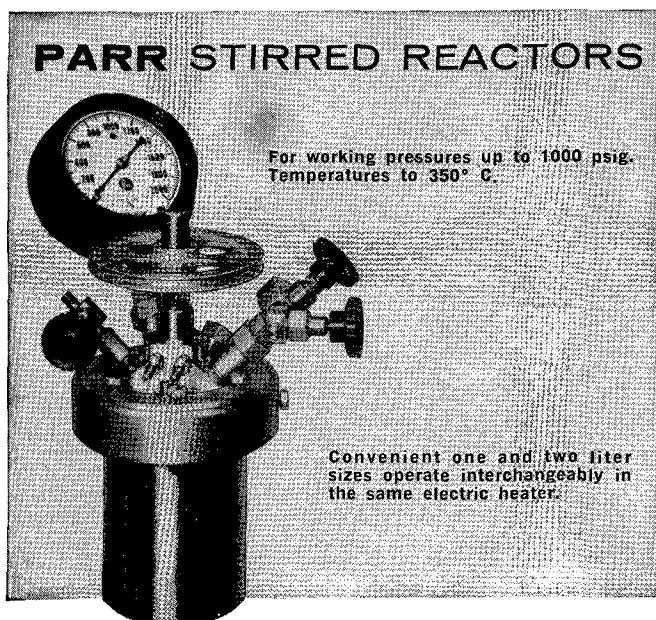
EFFECT OF ESTRADIOL AND TESTOSTERONE ON THE METABOLISM OF LINOLEIC ACID IN ESSENTIAL FATTY ACID-DEFICIENT RATS. R. Ostwald, P. Bouchard, A. Shannon, P. Miljanich and R. L. Lyman (Dept. of Nutr. Sci., Univ. of Cal., Berkeley, Cal.). *J. Nutr.* 88, 303-14 (1966). The distribution of activity in carcass, liver and plasma from C^{14} -labeled linoleic acid given orally to 3 groups of essential fatty acid-deficient rats (male castrates (O group), castrates treated with estradiol (E), and castrates treated with testosterone (T) was measured 6 hours after administration. More than 50% of the total incorporated radioactivity was observed in liver triglycerides and phospholipid. The specific activities of both cholesterol ester and phospholipid were higher in plasma than in liver, but the triglycerides of liver had a much higher specific activity than the triglycerides of plasma. The cholesteryl esters in plasma and the phospholipid of liver had acquired the greatest proportion of C^{14} -arachidonic acid. The E group incorporated a higher proportion of radioactivity into the arachidonic acid of the liver phospholipid than the T group. Ratio of specific activity of linoleic to arachidonic was significantly lower in one of 2 liver lecithin fractions in the E group than in the T group. This fraction was richer in stearic and arachidonic acids in contrast with a less polar fraction rich in palmitic and linoleic acids. Possible implications with respect to the effects of the gonadal hormones on the conversion of linoleic to arachidonic acid are discussed.

INFLUENCE OF DIETARY LITHOCHOLIC ACID ON HEPATIC LIPID TRANSPORT. G. A. Leveille and H. E. Sauberlich (U. S. Army Med. Res. and Nutr. Lab, Fitzsimons Gen. Hosp., Denver, Colo.). *Proc. Soc. Exp. Biol. Med.* 121, 816-18 (1966). Intravenously administered cholesterol-fed chick serum elevated liver cholesterol levels and depressed hepatic cholesterol synthesis in recipient mice. Serum from lithocholic acid-fed chicks, although supplying a greater quantity of cholesterol than that from cholesterol-fed chicks did not alter cholesterol levels or cholesterol synthesis in liver of recipient mice. The percentage hepatic uptake of cholesterol from serum by liver of recipient mice was significantly enhanced by administration of cholesterol-fed chick serum and was depressed in mice treated with lithocholic acid-fed chick serum. These data are interpreted to indicate that cholesterol in the serum of chicks ingesting lithocholic acid is bound in a lipoprotein complex which does not readily enter the liver cell.

THE METABOLISM OF SPHINGOMYELIN. J. N. Kanfer, O. M. Young, D. Shapiro and R. O. Brady (Lab. of Neurochem. Natl. Inst. of Neurological Diseases and Blindness, N.I.H., Bethesda, Md.). *J. Biol. Chem.* 241, 1081-4 (1966). A sphingomyelin-cleaving enzyme has been found in rat liver tissue. The enzyme, originally present in subcellular particulate fractions, could be released in a soluble form by treatment with appropriate detergents and was partially purified by conventional procedures. The most highly purified enzyme preparations catalyzed the hydrolysis of sphingomyelin, whereas lecithin and phosphatidylethanolamine were unaffected. The products of the reaction were identified as phosphorycholine and ceramide. Lecithin was a competitive inhibitor of the reaction.

THE IN VITRO CATABOLISM OF CHOLESTROL: A COMPARISON OF THE FORMATION OF CHOLEST-4-EN-7 α -OL-3-ONE AND 5 β -CHOLESTAN-7 α -OL-3-ONE FROM CHOLESTEROL IN RAT LIVER. D. Mendelsohn, L. Mendelsohn and E. Staple (Dept. of Chem. Pathol. and C.S.I.R. Nutr. and Met. Group, Witwatersrand Univ. Med. School, Johannesburg, S. Africa). *Biochemistry* 5, 1286-90 (1966). The enzymatic conversion of cholesterol to 7 α -hydroxycholest-4-en-3-one and 7 α -hydroxy-5 β -cholestan-3-one has been studied using a preparation from rat liver *in vitro*. The data demonstrate that rat liver is able to metabolize cholesterol to 7 α -hydroxycholest-4-en-3-one but not to 7 α -hydroxy-5 β -cholestan-3-one. It is suggested that 7 α -hydroxycholest-4-en-3-one is probably an intermediate on the cholesterol to bile acid metabolic pathway. The results also provide indirect evidence that epimerization of the 3 β -hydroxyl group of cholesterol to the α configuration may occur *via* ketone formation at position C-3 and, furthermore, that the Δ^5 double bond of cholesterol may be isomerized to the Δ^4 position before being reduced. A tentative scheme of the early stages in bile acid formation from cholesterol in rat liver has been presented.

(Continued on page 322A)



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(Continued from page 314A)

THE EFFECT OF CALCIUM IN MAINTAINING NORMAL LEVELS OF SERUM CHOLESTEROL AND PHOSPHOLIPIDS IN RABBITS DURING ACUTE STARVATION. J. M. Iacono and C. B. Ammerman (U. S. Army Med. Res. and Nutr. Lab., Denver, Colo.). *Am. J. Clin. Nutr.* 18, 197-202 (1966). The rise in serum cholesterol and phospholipid levels observed in acute starvation in rabbits could be overcome by forced feeding calcium carbonate at a level of 2 gm. per day. Increasing the dose of calcium carbonate to 4 gm. per day had no further effect on serum cholesterol and phospholipid levels. The elevation of serum triglyceride levels in starvation was unaffected by the administration of calcium. Forced feeding calcium carbonate prevented the decrease in serum calcium observed during a four day starvation period.

EFFECT OF MARGINAL INTAKES OF PYRIDOXINE ON ACETATE-2-C¹⁴ INCORPORATION INTO RAT LIVER LIPIDS. E. V. Hempstock and M. A. Williams (Dept. of Nutr. Sciences, Univ. of Cal., Berkeley, Cal.). *Proc. Soc. Exp. Biol. Med.* 121, 772-74 (1966). The purpose of the present study was to determine whether marginal intakes of pyridoxine would produce the increased incorporation of acetate-C¹⁴ into liver sterol previously observed in rats severely deficient in pyridoxine. Male weanling rats were fed 6, 12 or 36 µg of pyridoxine hydrochloride daily for 9 weeks, then enjected intraperitoneally with sodium acetate-2-C¹⁴ into liver sterol determined. C¹⁴ incorporation (cpm/mg) was the same however, in the groups fed 12 or 36 µg pyridoxine hydrochloride even though the growth of the former group was significantly less. It was concluded (1) that quite a severe deficiency of pyridoxine was required to produce the conditions

resulting in an increased incorporation of acetate-C¹⁴ into liver sterol and (2) that this effect, which might be interpreted as increased sterol synthesis, did not occur in moderate pyridoxine deficiency, under the conditions of this experiment.

FATTY ACID UPTAKE AND ESTERIFICATION BY FISH MUSCLE. M. Hamosh, R. Atia and B. Shapiro (Dept. of Biochem., Hebrew Univ. Hadassah Med. School, Jerusalem, Israel). *J. Food Sci.* 31, 146-50 (1966). Fresh carp muscle takes up fatty acid from a solution of bovine serum albumin-fatty acid complex, and converts a considerable part of the fatty acid taken up into glycerides. In this regard, brown muscle is much more active than white muscle. On storage of the muscle at -18C, its ability to take up fatty acid is not impaired by its esterifying capacity is rapidly reduced to a low level. Upon storage at 0C the esterifying capacity stayed intact for at least 24 hr. Of various fatty acids tested, uptake is highest with the long-chain acids (C₁₆---C₁₈), with no marked difference due to unsaturation. Unsaturated acids (oleic and linoleic) and a short-chain acid (caprylic) are partly absorbed to fish muscle proteins so strongly that they cannot be extracted with acidic isopropanol-heptane.

DEFATTING AND DEODORIZATION OF FISH PROTEIN CONCENTRATE FROM HARPODEN NEHEREUS. D. P. Sen, R. S. Satyanarayana Rao and N. I. Lahiry (Cent. Food Tech. Res. Inst., Mysore-2, India). *J. Food Sci.* 31, 344-50 (1966). In Bombay duck fish (*Harpodene nehereus*), petroleum ether extractives ("true" lipids), residual fats ("bound" lipids) obtained by acid hydrolysis, and ethanol extractives other than "true" and "bound" lipids were found to contribute to its odor, the last two fractions being more important. Exhaustive extraction with 95% ethanol yielded fish protein concentrate with no lipid or ethanol extractives but with 0.37% "bound" lipids; this concentrate was practically without any fishy odor but developed it on being cooked with water.

RAPID AND SENSITIVE ASSAY FOR MILK LIPASE. R. M. Paffy, Jr., R. C. Chandan and K. M. Shahani (Dept. of Dairy Sci., Univ. of Neb., Lincoln, Neb.). *J. Dairy Sci.* 49, 356-60 (1966). An improved micromethod has been developed for measuring lipase activity in milk by the pH stat technique. The silica-gel procedure measures only 16.8% of the lipase activity observed in milk by the pH stat method. The major factors contributing to this apparent low lipase activity by the silica-gel method were a) incomplete titration of the long chain free fatty acids, b) lack of proportionate response of milk lipase activity to increased concentrations of milk in the assay system, and c) variations in the pH of the lipase assay mixture during the silica-gel method; the pH stat assay had greater sensitivity, accuracy and rapidity and allowed measurement of the initial reaction velocity. During storage at 4C the lipolytic activity of fresh raw milk was constant up to 24 hr, after which it decreased. Homogenization of raw milk does not appear to affect lipase activity *per se*. It appears to be a substrate activating phenomenon, in that there is a direct relationship between homogenization pressure and susceptibility of milk fat to lipolysis.

ANALYSIS FOR STEREOISOMERS OF BETA-CAROTENE IN FERMENTATION PREPARATIONS. G. E. N. Nelson, A. Ciegler and H. H. Hall (Northern Reg. Res. Lab., Agr. Res. Serv., U. S. Dept. of Agr., Peoria, Ill. 61604). *J. Food Sci.* 31, 359-61 (1966). The potential vitamin A activity of a carotene-containing preparation obtained from mated cultures of *Blakeslea trispora* was investigated by determining the stereoisomers of the β-carotene extracted from some fresh mycelia contained about 94% of the all-trans isomer, the remainder being about 3.5% of neo-β-carotene B and 2.5% of neo-β-carotene U. β-Carotene from stored dried preparations showed about 91% of all-trans, 7.5% of neo-β-carotene B, and 1.5% of neo-β-carotene U.

SEASONAL VARIATION OF PHOSPHOLIPIDS AND THEIR INFLUENCE ON THE FOAMING CHARACTERISTICS OF CONCENTRATED WHOLE MILK. T. F. Holden, N. C. Aceto, E. S. Dellamonica and M. J. Calhoun (Eastern Reg. Res. Lab., Eastern Utilization Res. and Dev. Div., USDA, Philadelphia, Penn.). *J. Dairy Sci.* 49, 346-50 (1966). Qualitative observations of continuous vacuum foam drying of whole milk indicated that dryer performance was influenced by seasonal variations in milk concentrate foaming activity. An investigation showed that the phospholipids content of whole milk varies significantly with season and that this is directly related to a similar variation in the static rate of foam subsidence of whole milk concentrate. These seasonal variations are characterized by high phospholipids and rate of foam subsidence levels in the winter, and low levels in the summer. Seasonal variation in phospholipids is most pronounced in the lipid phase.

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RELATION OF PECTIC AND FATTY ACID CHANGES TO RESPIRATION RATE DURING RIPENING OF AVOCADO FRUITS. A. L. Dolendo, B. S. Luh and H. K. Pratt (Depts. of Food Sci. and Tech. and of Vegetable Crops, Univ. of Cal., Davis, Cal. 95616). *J. Food Sci.* 31, 332-6 (1966). The ripening of a lot of hard mature avocado fruits (*Persea americana* Miller, cv. MacArthur) was followed at 15C by measuring respiration rate and softening. The climacteric rise in respiration was accompanied by rapid softening of the flesh, a drop in content of protopectin and in degree of pectin esterification, and a rise in soluble pectin. Eight fatty acids were identified in the oil, but the oil composition did not change significantly, suggesting that the storage oil of the tissues has no major metabolic role in fruit ripening.

SERUM VITAMIN A IN KWASHIORKOR. Vinodini Reddy and S. G. Srikantia (Nutrition Res. Labs., Indian Council of Med. Res., Tarnaka, Hyberabad-7 (A.P.), India). *Am. J. Clin. Nutr.* 18, 105-09 (1966). Commercial preparations of vitamin A for parenteral administration usually were prepared in ethyl oleate solution. A water-dispersed preparation was given in an injection to a small number of children with kwashiorkor and the serum levels 4 and 24 hours later showed a considerable increase in vitamin A concentration, in contrast to the effect with the oily preparation. These preliminary studies suggest that in protein-deficient states it is probably the absorption of the fat base that is defective and not the absorption of vitamin A *per se*.

BETA-GLUCURONIDASE ACTIVITY IN SERUM INCREASED BY CORONARY-ARTERY ATHEROSCLEROSIS. B. F. Miller, F. P. Keyes and P. W. Curreri (Harrison Dept. of Surgical Res. and Hosp. of the Univ. of Pennsylvania School of Med., Philadelphia, Pa. 19104). *Science* 152, 775-6 (1966). Increase in activity of β -glucuronidase in serum has been demonstrated in patients having clinically evident coronary-artery atherosclerosis. This fact, yielded by the new, more specific method of Fishman, could not be elicited by the traditional method.

FATTY CIRRHOSIS IN THE RAT. X. EFFECT OF SEX. F. G. Zaki and F. W. Hoffbauer (Dept. of Med., Univ. of Minn. College of Med. Sciences, Minneapolis, Minn.). *Proc. Soc. Exp. Biol. Med.* 121, 918-20 (1966). Choline-deficient female rats responded in a very similar way as the males did. They appeared to be less susceptible to the ill effects of choline deficiency and fared better than the males.

REGULATION OF CELL LIPID METABOLISM AND ACCUMULATION. IV. THE ISOLATION AND COMPOSITION OF CYTOPLASMIC LIPID-RICH PARTICLES. C. G. Mackenzie, Julia B. Mackenzie, O. K. Reiss and D. E. Philpott (Dept. of Biochem., Univ. of Colorado School of Med., Denver, Col.). *Biochemistry* 5, 1454-61 (1966). A procedure is described for the isolation of a new particulate fraction from animal cells growing in culture. The fraction consists of spherical particles, with a mean diameter of 1 μ , which, by virtue of their low density, are separated completely by ultracentrifugation from the other formed elements of the cell. The twice-washed particles contain ca. 3% protein and 90% lipid. The lipid in turn contains 90% triglycerides plus small amounts of diglycerides, monoglycerides, cholesterol esters, and polar lipids. It contains negligible amounts of free cholesterol. The chemical composition and physical properties of the particles indicate that they consist of a lipid matrix surrounded by a protein-containing membrane. Sufficient protein is present in the particles to provide a membrane containing two monolayers of protein. Electron micrographs show that *in situ* most of the particles are surrounded by a unit membrane 80 A wide. The remainder of the particles are surrounded by a single membrane 25 A wide. The triglyceride content of the cell is directly related to the number of lipid-rich particles. The polar lipids and free cholesterol of the cell, on the other hand, are located in the pellet fraction and are unrelated to the number of particles. The cell sap contains little or no lipid. It is concluded that the cytoplasmic lipid-rich particles play an important role in the compartmentalization of cell lipids.

STUDIES ON THE MECHANISM OF FATTY ACID SYNTHESIS XVI. R. E. Toomey and S. J. Wakil (Dept. of Biochem., Duke Univ.

Med. Center, Durham, N. C.). *J. Biol. Chem.* 241, 1159-65 (1966). Acyl-malonyl acyl carrier protein (ACP)-condensing enzyme, prepared from extracts of *Escherichia coli*, catalyzes the condensation of acetyl-ACP and malonyl-ACP to form acetoacetyl-ACP. It also catalyzes the condensation of various longer chain saturated acyl-ACP derivatives with malonyl-ACP to form the β -ketoacyl-ACP of the longer homologues. The enzyme is specific for the acyl-ACP derivatives and does not act on acyl coenzyme A derivatives (acetyl-CoA or malonyl-CoA). The enzyme has a functional -SH group and can be readily inhibited by -SH-binding reagents such as N-ethylmaleimide and iodoacetamide. Acetyl-ACP protects the enzyme against thiol-binding reagents, which indicates that an acetyl-S-enzyme complex may be an intermediate in the condensation of acyl-ACP and malonyl-ACP to form β -ketoacyl-ACP.

EFFECT OF VITAMIN A DEFICIENCY OR EXCESS ON THE OXIDATIVE PHOSPHORYLATION BY RAT LIVER MITOCHONDRIA. C. R. Seward, G. Vaughan and E. L. Hove (Div. of Nutr., Bureau of Sci. Res., Food & Drug Adm., U. S. Dept. of H. E. & W., Wash, D. C.). *J. Biol. Chem.* 241, 1229-32 (1966). Liver mitochondria from hypo- or hypervitaminotic-A rats exhibited low efficiency for coupled oxidative phosphorylation. Supplementation *in vitro* or *in vivo* with retinyl acetate, but not with retinoic acid, restored low phosphorus to oxygen ratios to normal. Uncoupling of oxidative phosphorylation occurred with nicotinamide adenine dinucleotide-linked and non-AND-linked substrates. Serum albumin added to mitochondrial suspensions from livers of vitamin A-deficient or toxic rats restored normal oxidative phosphorylation efficiencies. Tri-o-cresyl phosphate caused uncoupling which was not restored by the addition of retinyl acetate. An inherent instability of liver mitochondria from vitamin A-deficient and toxic rats is indicated because their endogenous oxidative phosphorylation is lower than that of mitochondria from normal animals. It is suggested that vitamin A is required in mitochondria membranes at an optimum concentration; variations below or above this concentration cause these membranes to become unstable. Deviation from optimum may induce functional changes in enzymes associated with oxidative phosphorylation.

THE LIPID RESPONSE OF POSTMENOPAUSAL WOMEN TO DIETARY CARBOHYDRATES. I. MacDonald (Dept. of Physiol., Guy's Hosp. Med. School, London, S.E. 1, England). *Am. J. Clin. Nutr.* 18, 86-90 (1966). Low fat diets containing a relative excess of maize starch or sucrose were given to six postmenopausal women for periods of 25 days. The findings were compared with those in men and premenopausal women who had consumed similar diets. With the sucrose diet the glyceride and free sterol fraction of the serum increased in the men and in the postmenopausal women, but decreased in the premenopausal women. The fatty acid pattern of the adipose tissue did not alter in the pre- and postmenopausal groups with either diet, but it did alter in the men with comparable diets, which suggests that male hormones may be responsible for this lability in depot fatty acid composition. The level of free cholesterol in the serum was the main lipid level affected by weight loss in the postmenopausal group maintained on the starch diet; in addition, there was possibly an increase in the glycerides.

INFLUENCE OF FRUCTOSE AND GLUCOSE ON SERUM LIPID LEVELS IN MEN AND PRE- AND POSTMENOPAUSAL WOMEN. *Ibid.*, 369-72. Men, young women and postmenopausal women were given fat-free diets containing calcium caseinate and one of three carbohydrate mixtures, either 40% fructose and 60% starch, 40% glucose and 60% starch or 40% fructose and 60% glucose. The results obtained were compatible with the view that dietary fructose increases serum glycerides in men and postmenopausal women. Dietary glucose, when compared with dietary fructose or starch, seems to be associated with an increase in fasting serum phospholipids in men and a decrease in this fraction in pre- and postmenopausal women.

SOME INTERESTING RELATIONSHIPS BETWEEN DIETARY CARBOHYDRATES AND SERUM CHOLESTEROL. A. Lopez, R. E. Hodges and W. A. Krehl (Dept. of Internal Med., Univ. of Iowa, College of Med., Iowa City, Iowa). *Am. J. Clin. Nutr.* 18, 149-53 (1966). Recent information which attempts to relate a high intake of sugar in the diet to a high incidence of ischemic heart disease has been reviewed. Data collected by the Interdepartmental Committee on Nutrition for National Development (ICNND) have been evaluated for sixteen countries. In these countries the average intake of fat was associated in a significantly positive fashion with the intake of sugar. Similarly, there was a negative association between the average concentration of cholesterol in the blood and the average intake of complex carbohydrates as represented by cereals, vegetables and the like.

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METABOLISM OF UNSATURATED FATTY ACIDS IN PROTOZOA. Ann M. Lees and E. D. Korn (Lab. of Biochem., Sec. on Cellular Physiology, NHI, Nat. Inst. H. E. W., Bethesda, Maryland 20014). *Biochemistry* 5, 1475-81 (1966). *Tetrahymena pyriformis*, when grown on a fatty acid-free medium, contains only two polyunsaturated fatty acids, 9,12-octadecadienoate and 6,9,12-octadecatrienoate. When grown in the presence of 11,14-eicosadienoate, 8,11,14-eicosatrienoate, 11-eicosenoate, or 11-octadecenoate, the protozoa incorporated the fatty acids into their neutral lipids and phospholipids. Despite profound changes in fatty acid composition, the protozoa were normal in growth rate, appearance, and cell motility. Some of these fatty acids were desaturated or elongated. *T. pyriformis* incorporated 5,8,11,14-eicosatetraenoate into its lipids with nonreproducible effects on growth, rate, appearance and motility. 9,12,15-Octadecatrienoate, 6-octadecenoate, and 6,9,12-octadecatrienoate, but not 9,12-octadecadienoate, were very toxic to *T. pyriformis*. *Acanthamoeba* sp., which normally contains only ω -6-polyunsaturated fatty acids converted 9,12,15-octadetrienoate into several ω -3-polyunsaturated fatty acids which were incorporated into the lipids of the amoebae with no apparent toxicity.

THE METABOLISM OF SPHINGOMYELIN. I. J. N. Kanfer, O. M. Young, D. Shapiro and R. O. Brady (Lab. of Neurochem. Natl. Inst. of Neurological Diseases and Blindness, N.I.H., Bethesda, Md.). *J. Biol Chem.* 241, 1081-4 (1966). A sphingomyelin-cleaving enzyme has been found in rat liver tissue. The enzyme, originally present in subcellular particulate fractions, could be released in a soluble form by treatment with appropriate detergents and was partially purified by conventional procedures. The most highly purified enzyme preparations catalyzed the hydrolysis of sphingomyelin, whereas lecithin and phosphatidylethanolamine were unaffected. The products of the reaction were identified as phosphorylcholine and ceramide. Lecithin was a competitive inhibitor of the reaction.

CHANGES IN SERUM LIPID LEVELS OF HYPERLIPEMIC PATIENTS FOLLOWING THE FEEDING OF STARCH, SUCROSE AND GLUCOSE. N. A. Kaufmann, Rachel Poznanski, S. H. Blondheim and Yechezkiel Stein (Hadassah Univ. Hosp. and Hebrew Univ. Hadassah Med. School, Jerusalem, Israel). *Am. J. Clin Nutr.* 18, 261-9 (1966). Serum triglyceride and serum cholesterol responses to the interchange of starch with sucrose or glucose in four patients with carbohydrate-induced hypertriglyceridemia, one with the mixed type of hypertriglyceridemia and one with essential hypercholesterolemia are reported. In all cases feeding of sucrose or glucose caused a marked increase in serum triglycerides whereas feeding of starch reduced serum triglyceride levels. In general, serum cholesterol followed the same pattern as serum triglyceride. Metabolic differences between starch and di- or monosaccharides, which might explain their different effect on the blood lipids, are discussed.

INFLUENCES OF DIETARY FAT ON ALCOHOLIC FATTY LIVER. D. P. Jones and Elizabeth A. Greene (Thorndike Memorial Lab., Boston, Mass.). *Am. J. Clin Nutr.* 18, 350-7 (1966). Groups of rats were fed nutritionally adequate diets differing in fat content for three week periods. When alcohol was included in the diets as 36% of the total calories, hepatic lipids increased only when the dietary fat exceeded 20% of the total calories. When a high fat diet (43%) including alcohol was fed, liver fat increased three- to fourfold whether the dietary fat was highly saturated (coconut oil) or unsaturated (safflower oil). With the high fat diets (43%), the fatty acid composition of liver triglycerides resembled that of the diet whether alcohol was fed or not. In one volunteer subject, twice as much hepatic fat accumulated when he was fed alcohol and a high fat diet than when he was fed a low fat diet and alcohol. In both rats and man, the excess hepatic fat resulting from high fat diets and alcohol is probably derived from the diet to a significant extent.

FAILURE OF D- AND L-THYROXINE TO PROTECT CHOLESTEROL AND OIL FED COCKERELS AGAINST CORONARY ATHEROGENESIS. S. Jain, Ruth Pick, P. J. Johnson and L. N. Katz (Cardiovascular Inst. and Dept. of Cardiovascular Disease, Div. of Med., Michael Reese Hosp. and Med Center, Chicago, Ill.). *Circulation Res.* 18, 519-24 (1966). In cockerels, L-thyroxine was significantly more active biologically than an equivalent dose of D-thyroxine, even four times the dose, as demonstrated by the effects on body weights, organ weights and comb index. In cockerels fed an atherogenic diet, the plasma cholesterol concentrations in all the thyroxine-treated groups were significantly lower than in the control groups. No consistent effect of D-thyroxine on thoracic aorta atherosclerosis was observed. However, L-thyroxine had some protective action in the one experiment done.

(Continued on page 326A)

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 Paul A. Cardenas, Production Manager, Lance Hnos, S. A., Mexico, Mexico.
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 Haruo Uzawa, Assistant Professor, Kyushu University, Fukuoka, Japan.

Individual Associate

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 George J. Wetterholt, Chief Chemist, D. A. Stuart Oil Co., Ltd., Somerville, N. J.
 Dao Lip Lee, Technical Director, Industria e Comercio Lotus S. A., Sao Paulo, Brasil.

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 David Graham Guy, Graduate Student, Ohio State University, Columbus, Ohio.
 Barbara Jeanne Zook, Michigan State University, East Lansing, Mich.

(Continued from page 325A)

Despite suppression of hypercholesterolemia, no protection against coronary atherosclerosis was seen with the administration of either L- or D-thyroxine. In fact, with an increase in dose of D-thyroxine to 4 mg, there developed an increase in the percentage of coronary vessels showing atherosclerosis.

BIOSYNTHESIS OF LIPOPROTEIN BY RAT INTESTINAL MUCOSA. F. T. Hatch, Y. Aso, Lillian M. Hagopian, and J. J. Rubenstein (Dept. of Med., Harvard Med. School, Boston, Mass.). *J. Biol. Chem.* **241**, 1655-65 (1966). Lymph chylomicrons are at the lipid-rich end of the spectrum of the lipoproteins. The nature of their protein moiety and its biosynthesis have not yet been fully elucidated. Observations are reported on the incorporation of radioactive leucine into a "lowest density lipoprotein" by mucosal cells of the small intestine isolated from the rat during absorption of fat. The amino acid incorporation exhibited the characteristic energy requirement and sensitivity to inhibitors of other systems for biosynthesis of proteins. The protein moiety was not homogenous, but appeared to consist of a small number of species that could be separated by thin layer electrophoresis in starch granules. Similar, but non-identical, electrophoretic patterns were obtained with the residual soluble intracellular protein of the intestinal mucosa and with chylomicrons of intestinal lymph. No definitive conclusion could be drawn about the specificity of the protein which becomes associated with lipid during absorption through the intestinal mucosa. A speculative interpretation of the aforementioned similarity in peptide maps led to the suggestion that lipids in transit become associated with some of the more abundant soluble proteins of the mucosal cells and that the resulting lipoprotein complexes appear in the chylomicrons of intestinal lymph.

RELATIVE RATES OF DEPLETION OF α -TOCOPHEROL AND LINOLEIC ACID AFTER FEEDING POLYUNSATURATED FATS. E. M. Harmon, L. A. Witting, and M. K. Horwitt (L. B. Mendel Res. Lab., Elgin State Hosp., Elgin, Ill.). *Am. J. Clin. Nutr.* **18**, 243-8 (1966). Rats prefed diets high in polyunsaturated fat (PUFA) and either high in α -tocopherol (safflower oil) or moderately low in α -tocopherol (corn oil) for 109 days were simultaneously depleted of both linoleate and α -tocopherol by substituting a diet containing beef fat. After the rats were on beef fat diet for only 75 days, the arachidonate concentration in the hepatic lipids increased to a level which was comparable to that in tocopherol deficiency. From previous experiments, the appearance of such a sign of deficiency in animals fed tocopherol-deficient beef fat diets from the time of weaning would not be expected until after approximately twenty-eight weeks. On the basis of relative rates of depletion of α -tocopherol and linoleate in hepatic and adipose tissue, it is suggested that supplementation with α -tocopherol may be desirable for a period of time after a diet high in polyunsaturated fatty acids is replaced with a diet low in polyunsaturated fatty acids, or if only irregular adherence to the high polyunsaturated fatty acid diet is anticipated or suspected. This recommendation is largely based on the slow net turnover in adipose tissue linoleate.

PHOSPHOLIPIDS OF BACTERIA WITH EXTENSIVE INTRACYTOPLASMIC MEMBRANES. P-O. Hagen, H. Goldfine and P. J. Le B. Williams (Dept. Bacteriology, Harvard Med. School, Boston, Mass.). *Science* **151**, 1543-4 (1966). Examination of the lipids of three species of nonphotosynthetic bacteria with extensive internal membranes revealed phosphatidyl choline (lecithin) in two species. In one of these there was an unusual accumulation of phosphatidyl N-dimethylethanolamine. The relation between lecithin and membrane elaboration in microorganisms is discussed.

EFFECT OF MEAL FREQUENCY IN SCHOOL CHILDREN. CHANGES IN WEIGHT-HEIGHT PROPORTION AND SKINFOLD THICKNESS. P. Fabry, S. Hedja, K. Cerny, K. Osancova and J. Pechar, with K. Zvolankova (Inst. of Human Nutr., Prague 4, and Ped. Faculty, Charles Univ., Prague, Czechoslovakia). *Am. J. Clin. Nutr.* **18**, 358-61 (1966). In three boarding schools where the daily food

intake was experimentally divided between three, five and seven meals per day, respectively, 226 children of both sexes six to sixteen years of age were studied for a period of one year. Among older children (boys eleven to sixteen years and girls ten to sixteen years) in the school serving three meals per day (school A) there was a significantly greater percentage of subjects in whom the weight-height proportionality changed in favor of body weight than in the other two schools. In school A the increment of the skinfold thickness was also significantly greater compared with that found in children of similar age who ate five or seven meals per day. The difference in both parameters was more marked in girls than in boys. In the younger children (boys six to eleven years and girls six to ten years) no significant differences were found among the three schools.


THE EFFECT OF CHOLESTYRAMINE OF FECAL EXCRETION OF INGESTED RADIOIODINATED LIPIDS. I. E. Danhof (Det. of Physiol., Univ. of Texas, Southwestern Med. School, Dallas, Texas). *Am. J. Clin. Nutr.* **18**, 343-9 (1966). Fifteen normal human subjects free of gastrointestinal disease ingested daily, graded doses of cholestyramine. Control studies consisted of a medical history, physical examination, complete blood count, urinalysis, gravimetric stool fat analysis, triolein- I^{131} absorption studies, and serum cholesterol level. Groups of five subjects were placed on 12, 24 and 36 gm. of cholestyramine daily for from fifteen to twenty-seven consecutive days. Cholestyramine administration at these dosage levels was associated with minimal side effects including transient initial nausea, epigastric fullness and abdominal distention, increased flatulence and constipation. No instances of clinically significant diarrhea occurred in any of the groups and no systemic symptoms were manifest in any of the subjects. There were no significant changes observed in hematograms or urinalyses. Significant lowering of serum cholesterol values was observed at each of the three dosage levels. No enhancement in serum cholesterol reduction was seen in normal subjects ingesting more than 12 gm. cholestyramine per day. At a dosage level of 12 gm. of cholestyramine daily no significant impairment in the absorption of neutral fat or fatty acid occurred. At a level of 24 gm. daily some impairment in neutral fat was observed, but oleic acid absorption was considered essentially normal. At 36 gm per day significant impairment in both neutral fat and fatty acid absorption occurred.

FORMATION OF ISOCAPROALDEHYDE IN THE ENZYMIC CLEAVAGE OF CHOLESTEROL SIDE CHAIN BY ADRENAL EXTRACT. G. Constantopoulos, Audrey Carpenter, P. S. Satoh and T. T. Tchen (Dept. of Biochem., Wayne State Univ., School of Med., Detroit, Mich.). *Biochemistry* **5**, 1650-2 (1966). The enzymatic conversion of cholesterol to pregnenolone by adrenal extracts produces isocaproaldehyde and does not normally involve 20 α -hydroxy-22-ketocholesterol as an intermediate.

MITOCHONDRIAL SWELLING AND LIPID PEROXIDATION STUDIES WITH MIXTURES OF THYROXINE AND MICROMOLAR CONCENTRATIONS OF CERTAIN METAL IONS. W. D. Cash, M. Gardy, H. E. Carlson and E. A. Ekong (Dept. of Biochem., Cornell Univ., Med. School, N. Y., N. Y. 10021). *J. Biol. Chem.* **241**, 1745-50 (1966). Studies with isolated rat liver mitochondria were conducted in order to determine the influence of thyroxine on swelling and peroxidation of mitochondrial lipids caused by certain divalent metal ions. The effects of micromolar concentrations of certain divalent metal ions on the swelling action of thyroxine were also investigated. Thyroxine blocks mitochondrial swelling and lipid peroxidation caused by Fe^{++} . The hormone also blocks Cu^{++} -induced swelling. Swelling is strikingly potentiated when thyroxine and micromolar concentrations of Ca^{++} or Zn^{++} are tested in the presence of each other. Cu^{++} and Sr^{++} at concentrations of 10 μM or less block the swelling action of thyroxine. Fe^{++} also blocks thyroxine swelling at relatively low concentrations of metal ion and hormone, but higher concentrations of the two agents produce swelling. A strong lipid antioxidant action is exhibited by thyroxine at a concentration of 1 μM . This concentration of the hormone is about one-tenth that necessary to produce appreciable mitochondrial swelling. The finding that the response to an organic swelling agent can be altered markedly by levels of metal ions that might be present adventitiously further illustrates the importance of considering metal contaminants in studies with isolated mitochondria.

INFLUENCE OF DIET AND PHYSICAL ACTIVITY ON BLOOD SERUM CHOLESTEROL OF YOUNG MEN. D. E. Campbell (Phys. Ed. Res. Lab., Univ. of Texas, Austin, Tex.). *Am. J. of Clin. Nutr.* **18**, 79-85 (1966). This experimental study was carried out to determine the influence of a known amount of physical activity

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(treadmill running) on 86 men who were divided into six population groups including experimental (active) and control (inactive) subjects who were lean, muscular and obese. The variance analysis two-way classification with replicated measurements indicated a significant difference between active and inactive subjects, and between groups. The greatest mean reduction in serum cholesterol occurred in the obese, active subjects.

DESIGN OF PRACTICAL FAT-CONTROLLED DIETS. Helen B. Brown, Marilyn Farrand and I. H. Page (2020 East 93rd Street, Cleveland, Ohio 44106). *J. Am. Med. Assoc.* 196, 205-13 (1966). The effects of changing the kind and amounts of animal products, eggs and oil in a vegetable oil (standard) diet on serum cholesterol levels was studied in young, normal subjects in 18-day quantitative diet tests. Comparison of serum cholesterol reduction with standard and variant diets in the same subjects showed that effective diets with 38% of calories as fat contained less than 20 gm of animal fat, no more than 8 oz of lean meat/day and 4 eggs/week, and oil with at least 48% polyunsaturates. The fatty acid composition should be below 14% of calories as saturates and more than 15% polyunsaturates. The diet should contain less than 450 mg of cholesterol. An effective moderate fat diet (30% of calories) contained under 10% saturates and over 13% polyunsaturates.

FOCAL LIPID LESIONS IN BLOOD VESSELS DUE TO ERYTHROCYTES AND PLATELETS. EXPERIMENTAL OBSERVATIONS ON GOATS AND RABBITS. P. J. Barnard and D. H. Thompson (Med. Res. Center, Bulawayo, Rhodesia). *Circulation* 33, 744-52 (1966). Experiments on goats and rabbits living on a normal diet demonstrated that the lipid associated with organizing thrombi became concentrated in fibrosed focal lesions of blood vessels. The lipid that appeared during organization of lysed erythrocytes underwent changes similar to those of lipid in thrombi. From this it was concluded that what red cells there were in the thrombi contributed to the total lipid present. These observations are pertinent to the pathogenesis of atherosclerosis because they help to explain the thrombosis characteristically associated with this disease, and how lipid can be delivered to restricted regions of the arterial intima.

EFFECT OF CHOLESTEROL IN SUSPENSION ON THE INCORPORATION OF PHOSPHATE INTO PHOSPHOLIPID BY MACROPHAGES IN VITRO. A. J. Day, N. H. Fidge and G. N. Wilkinson (Dept. of Human Physiol., Univ. of Adelaide, C.S.I.R.O., Adelaide, So. Australia). *J. Lipid Res.* 7, 132-40 (1966). Macrophages obtained from the peritoneal cavity of rabbits were incubated with phosphate P^{32} in order to investigate the synthesis of phospholipid by these cells. After 6 hr of incubation 0.25% of the phosphate added to the medium had been incorporated into phospholipid by the macrophages, mainly into lecithin and sphingomyelin, but partly also into phosphatidyl ethanolamine and inositol phosphatide. The addition of cholesterol to the macrophage suspensions increased the rate of incorporation by 20% with 1 mg of cholesterol added, and 44% with 2.5 mg added. The increase was similar for all the phospholipid fractions, and was not accompanied by an increase in oxygen uptake by the cells. The addition of carbon particles (as a specific check for phagocytic effects) had only a small effect on the rate of incorporation. The data provide support for the concept that cholesterol stimulated phospholipid synthesis by similar cells in the arterial wall during atherogenesis.

DETERMINATION OF BRAIN GANGLIOSIDES BY DETERMINATION OF GANGLIOSIDE STEARIC ACID. Y. Kishimoto and N. S. Radin (Mental Health Res. Inst., Univ. Mich., Ann Arbor, Mich.). *J. Lipid Res.* 7, 141-5 (1966). A new method is described for the determination of brain gangliosides by measuring stearic acid, the chief acid of gangliosides, in an appropriately purified brain extract. The method includes extraction of tissue with chloroform-methanol, extraction of gangliosides from the extract with 0.1 M KCl, evaporation of the aqueous phase, methanolysis, and gas-liquid chromatography of the resultant methyl esters with a double internal standard. The method depends on the simple composition of ganglioside fatty acids (80% stearic acid) and allows determination of less than 0.05 micro-mole of gangliosides. Interfering lipids are removed from the

ganglioside extract by washing with chloroform-methanol-water. The effects of contamination with nonlipid N-acetylneuraminic acid are avoided.

USE OF A FILTER-PAPER DISK ASSAY IN THE MEASUREMENT OF LIPID BIOSYNTHESIS. H. Goldfine (Dept. of Bacteriol. and Immunology, Harvard Med. School, Boston, Mass.). *J. Lipid Res.* 7, 146-9 (1966). The precipitation by trichloroacetic acid (TCA) of radioactive lipids on disks of filter-paper, followed by extraction with TCA and water to remove soluble radioactive precursors, provides the means for a convenient assay for lipid biosynthesis. Large numbers of disks can be washed in the same vessel, dried, and assayed for radioactivity with liquid scintillation counting equipment. Extraction of disks with lipid solvents provides a convenient control for the possible presence of TCA- and water-insoluble, nonlipid products. The application of the method to the assay of cyclopropane fatty acid synthetase is shown.

ORIGIN AND CHARACTERISTICS OF ENDOGENOUS LIPID IN THORACIC DUCT LYMPH IN RAT. J. H. Baxter (Lab. of Metabolism, Nat. Heart Inst., Nat. Inst. of Health, Bethesda, Md.). *J. Lipid Res.* 7, 158-66 (1966). Thoracic duct lymph of rats eating a fat-free diet contained 7 mg of lipid per hr. The lipid was 70% triglyceride, and largely in the $d < 1.006$ lipoprotein fraction. Lipid of the $d < 1.006$ fraction of the lymph was many times more concentrated than that of the blood plasma at the same time. It reached the thoracic duct via lymphatics from the intestine; little entered from the liver. The fatty acid moiety composing over three-fourths of the lymph lipid mass was undoubtedly derived in part from bile lipid—possibly to the extent of roughly 50%, and in some part from other intraluminal materials. Studies with labeled palmitic acid indicated that little circulating free fatty acid was taken up by the intestinal mucosa and incorporated into lymph lipid.

DISC ELECTROPHORESIS OF RAT PLASMA LIPOPROTEINS. K. A. Narayan, H. L. Creinin and F. A. Kummerow (The Burnside Res. Lab., Univ. of Ill., Urbana, Ill.). *J. Lipid Res.* 7, 150-57 (1966). The disc electrophoresis of lipoproteins of unfractionated rat plasma is described. The plasma was prestained with Sudan black B and electrophoretically separated at polyacrylamide gel concentrations of 7.5, 5, and 3.75%. At least four lipoprotein components were observed, and an additional 2 or 3 components in the main gel and 2 to 5 components in the spacer gel possibly were present. Densitometry of the resolved gel patterns indicated good reproducibility. Thin-layer chromatography of lipids extracted from the Sudan black B-binding components confirmed the lipoprotein nature of these components of rat plasma. A comparison of the disc electrophoretic patterns of human serum and rat plasma suggested that the low-density lipoprotein components of rat plasma are smaller in size than those of human serum.

EVALUATION OF FOUR STOCK DIETS FOR LIVER RESEARCH ON RATS. II. FATTY ACID PATTERNS OF TOTAL LIPID EXTRACTS. A. J. Sheppard (Div. of Nutr., Food, and Drug Admin., Washington, D.C.). *J. Assoc. Offic. Agr. Chem.* 48, 384-89 (1965). Fatty acid patterns of total liver lipid extracts were determined for groups of young rats fed *ad libitum* on four different diets. The diets were both of natural and semisynthetic composition in which fat content was 3.6-5.5%. Results indicate that the liver fatty acid patterns were independent of the dietary fatty acid patterns. However, significant differences in liver fatty acid patterns resulting from the feeding of the different diets were observed for palmitic, oleic, linoleic, linolenic, arachidic and benenic. No significant differences were observed for arachidonic regardless of the diet fed.

THE DETECTION AND ESTIMATION OF AFLATOXIN IN GROUNDNUTS AND GROUNDNUT MATERIALS. PART IV. ROUTINE ASSESSMENT OF TOXICITY DUE TO AFLATOXIN B₁. T. J. Coomes, P. C. Crowther, B. J. Francis and Linda Stevens (Ministry of Overseas Dev., Tropical Prod. Inst., 56-62 Grays Inn Road, London, W.C.1.). *Analyst* 90, 492-97 (1965). A sensitive, high-resolution thin-layer chromatographic method is described for determining aflatoxin B₁ in peanut kernels, peanut meals and peanut butter by fluorescence. Kieselgel G is used as absorbent and is shown to offer advantages over alumina. Aflatoxin levels are determined by a dilution technique and expressed in terms of categories.

FATTY ACID COMPOSITION OF TISSUES OF PIGS FED WHOLE PEANUTS. R. A. Chung, C. L. Ramey, C. C. Lin, J. A. Walls, S. H. Settler, W. H. Farley and E. T. Miles (School of Agr., Tuskegee Inst., Tuskegee, Alabama 36088). *J. Food Sci.* 30, 632-36 (1965). The liver of pigs fed a whole peanut supplemented diet significantly increased in octadecenoic acid and octadecadienoic acid means and significantly decreased in

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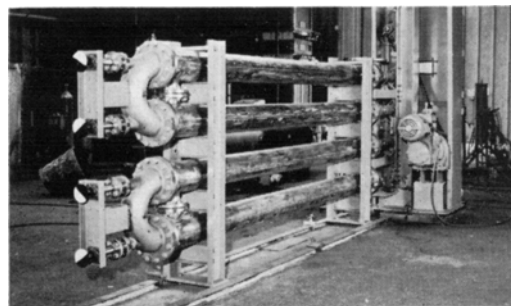
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Shop View, 4 shells, 6" ID x 12' Lg., SS316 material of construction. Tall Oil Crystallizer, drive cabinet in place.

octadecanoic acid compared with the liver of pigs on a control diet. The kidney decreased significantly in tetradecanoic and heptadecanoic acids and the heart decreased significantly in hexadecanoic acid. These changes were primarily the result of an increased total lipid consumption since the fatty acid compositions of both dietary lipids were very similar. Of the tissues studied (liver, heart, kidney, ham, shoulder, skin, bacon fat, and chop) the liver contained the largest amount of octadecanoic, octadecadienoic and eicosotetraenoic acids and the least amount of tetradecanoic, hexadecanoic, hexadecenoic, heptadecenoic and octadecenoic acids.

• Drying Oils and Paints

DETERMINATION OF THE HIDING POWER OF PAINTS BY AN OPTICAL METHOD. V. V. Verkholanstev. *Lakokras. Mat.* 1965, No. 1, 54-6. A method was developed to assess the hiding power of paints by measuring the reflectances of coats of known thickness on glass plates of a photocolimeter placing behind them alternately a black and a mirror deflector. An expression involving two constants was developed for calculating the hiding power from these reflectances. Comparison of results obtained by this method with those obtained by the standard visual method showed good agreement. The reliability of the method is increased if samples of paints of one colour and different hiding powers are compared with its help. (Rev. Current Lit. Paint Allied Ind. No. 284).

DRYING OF LINSEED OIL. R. Poisson. *7th FATIPEC Congress* 1964, 176-87. The mechanism of formation and the constitution of the oxidation polymers of linseed oil were studied by a combination of methods (chemical, spectroscopic, chromatographic, etc.) It was concluded that the polymers were mainly polyesters of hydroxy-acids. The formation of the latter was explained in terms of the oxidation of aldehyde scission products, in the presence of ethylenic material, to complex monoesters of α -glycols. (Rev. Current Lit. Paint Allied Ind. No. 283).

MODEL EXPERIMENTS UPON THE PEROXIDATION OF NATURALLY OCCURRING UNSATURATED FATS AND OILS. II PREPARATION AND PEROXIDATION OF HEPTA-3,6-DIENOIC ACID METHYL ESTER. A. Rieche and H. E. Seyfarth. *J. Prakt. Chem* 26, 206-17 (1964). (Rev. Current Lit. Paints Allied Ind. No. 283).

GAS CHROMATOGRAPHY. APPLICATIONS IN THE PAINT FIELD. M. Gagnaire. *Double Liaison* 1965, No. 113, 26, 37-46. Some definitions are given and the principle and technique of gas chromatography are described. The analysis of the solvents present in paint is then described, followed by that of alkyd resins and other polymers by gas chromatography of their pyrolysis products. The general appearance of the curves makes the identification of monomers possible in most cases. (Rev. Current Lit. Paint Allied Ind. No. 283).

STYRENATED OILS. E. Kostiuk. *7th FATIPEC Congress* 1964, 113-8. Methods of styrenating drying oils, the types of reaction products (adducts, copolymers and homopolymers) that can be formed, their influence on the drying mechanism and film properties, and the relative reactivities of various oils (tung, linseed, dehydrated castor, etc.) are described. A method of assessing the film-forming properties of styrenated oils by both I.V. and O_2 absorption measurements is proposed. (Rev. Current Lit. Paint Allied Ind. No. 283).

USE OF MALEIC ANHYDRIDE FOR EXTENDING THE OIL-LENGTH OF COTTONSEED OIL-BASED OLEORESINOUS VARNISHES. M. Aslam and M. Hussain. *Pakist. J. Sci. Ind. Res.* 7, 89-91 (1964). Incorporation of maleic anhydride by *in situ* technique is useful in increasing the oil/resin ratio from 1.25 to 3.0. Varnishes prepared with an oil/resin ratio of 2.0 and maleic anhydride 7.5% by wt of the oil have superior film forming properties. (Rev. Current Lit. Paint Allied Ind. No. 285).

OLEAGINOUS [CHALK-RESISTANT] PAINTS. Farbenfabriken Bayer. *Ger.* 1,181,353. Paints have improved properties (resistance to chalking, drying time, etc.) when the drying or semi-drying oils, thick or lithographic oils, or oil- or fatty acid-modified alkyd resins used are reacted with 0.1 to 25% of carbodiimides, e.g., the 2,2'-diethyl-diphenyl- and 2,2',6,6'-tetraethyl-3,3'-dichlorodiphenyl types. E.g., linseed oil/stand oil (1120 pts) of 60 poise viscosity and A.V. 5.05 is stirred at 100C for 1 hr. with 2,2',6,6'-tetraisopropylidiphenylcarbodiimide (36.2 pts.), so that the A.V. is zero and the viscosity 4950 cP./20C. The product may now be pigmented with rutile or with a 40:60 mixture of $TiO_2:ZnO$ (1% Co/Pb/Mn mixed naphthenate). Chalking tests gave the untreated linseed oil 430 hrs. before chalking, but with the carbodiimide 530 hrs. (Rev. Current Lit. Paint Allied Ind. No. 283).