Abstracts

Biochemistry and nutrition

EFFECT OF DIETARY FIBER ON EGG YOLK, LIVER, AND PLASMA CHOLESTEROL CONCENTRATIONS OF THE LAYING HEN. J.L. McNaughton (U.S. Dept. of Agr., S.E.A., F.R.S. (Central Poultry Res. Lab., Mississippi State, MS 39762) *J. Nutr.* 108, 1842–8 (1978). Two experiments were conducted to determine the effect of dietary fiber source and level on egg yolk, liver, and plasma cholesterol concentrations of white leghorn laying hens. No significant differences were found in plasma cholesterol due to dietary fiber level. Plasma triglycerides decreased and liver cholesterol increased as dietary fiber level increased in diets fed to laying hens. When laying hens were fed alfalfa meal, oats, rice mill feed, or wood shavings, plasma cholesterol significantly decreased. Liver cholesterol increased when hens were fed either alfalfa meal or rice mill feed as the primary fiber source.

SERUM AND LIVER CONCENTRATIONS OF VITAMIN A IN THAI FETUSES AS A FUNCTION OF GESTATIONAL AGE. N. Montreewasuwat, and J.A. Olson, (Dept. of Biochem., Faculty of Sci., Mahidol Univ., Rama 6 Road, Bangkok, Thailand.) *Am. J. Clin. Nutr.* 32, 601–6 (1979). Serum and liver vitamin A values were determined in 26 male and 20 female thai fetuses varying in gestational age from 13 weeks to term. In general pregnancies were of healthy young women from the Bangkok area. Serum retinol values declined slowly with gestational age to term, whereas liver vitamin A concentrations tended to increase until the 28th week and then to fall until term. Whereas the liver to body weight ratio remained essentially constant (0.0425 ± 0.003, $P < 0.0001$) during the gestational period, vitamin A concentrations in both serum and liver showed marked variability.

EFFECTS OF SOME CEREAL BRANS AND TEXTURED VEGETABLE PROTEIN ON PLASMA LIPIDS. J.M. Munoz, H.H. Sandstead, R.A. Jacob, G.M. Logan, Jr., S.J. Reck, L.M. Klevay, F.R. Dintzis, G.E. Inglett, and W.C. Shuey, (U.S. Dept. of Agr, Sci. and Education Admin., Human Nutr. Lab., Grand Forks, ND 58201). *Am. J. Clin. Nutr.* 32, 580–92 (1979). The hypothesis that dietary fiber lowers serum cholesterol was tested in 10 healthy men, 19 to 54 years old, who ate a mixed diet similar to the diets of many american adult males, that contained 16% of calories as protein (70% from animal), 40% as fat (P/S = 0.3), 44% as carbohydrate (9% of calories as sucrose) and 3 g of crude fiber. The energy intake ranged from 2700 to 3500 kcal adjusted to their height and weight. Weight and fitness were held constant. After 30 days of equilibration on the basal diet, they ate 26 g of either soft white wheat bran, corn bran (CB), soybean hulls (SH), textured vegetable protein, or hard red spring wheat bran (HRS) for periods of 28 to 30 days each in no particular sequence. Each fiber was fed to four to six subjects. Results were replicated when subjects were fed the same fiber source on two occasions at 2 to 4 month intervals.

ACTIVATION OF LIPOPROTEIN LIPASE BY NATIVE AND ACYLATED PEPTIDES OF APOLIPOPROTEIN C-II. T.A. Musliner, P.N. Herbert, and E.C. Church (Div. of Clin. and experimental Atherosclerosis, The Miriam Hosp., 164 Summit Avenue, Providence, RI 02906 (U.S.A.)) *Biochim. Biophys. Acta.* 573, 501–9 (1979). Apolipoprotein C-II, a protein found associated with all major classes of plasma lipoproteins, is a potent activator of the enzyme lipoprotein lipase. We have prepared the maleyl, citraconyl and succinyl derivatives of apolipoprotein C-II, and compared the capacities of the intact and tryptically cleaved proteins to activate lipoprotein lipase. The NH_2-terminal 50 residue peptide proved virtually inactive, even after removal of the masking groups from the citraconyl derivative. The COOH-terminal 29 residue peptides of maleyl and citraconyl apolipoprotein C-II were more active than the corresponding succinylated peptide. After deacylation of the citraconyl derivative, the COOH-terminal peptide activation remained dissimilar at low activator concentrations.

SYNTHESIS AND BIOLOGICAL ACTIVITY OF 24-HYDROXY-25-FLUOROVITAMIN D_3. A HIGHLY POTENT MEDIATOR OF CALCIUM METABOLISM. J.L. Napoli, W.S. Mellon, M.A. Fivizzani, H.K. Schnoes, and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, WI 53706) *J. Biol. Chem.* 254, 2017–22 (1979). 24R-hydroxy-25-fluorovitamin D_3 was chemically synthesized and compared to 1, 25-dihydroxyvitamin D_3 *in vitro* and to 25-hydroxyvitamin D_3 *in vivo* for ability to produce the characteristic responses of vitamin D metabolites in stimulating calcium and phosphorus metabolism. The structure of the new analog was verified by ultraviolet, nuclear magnetic resonance, and high resolution mass spectrometry; and it was homogeneous by high pressure liquid chromatography. This study produced an analog, 24R-hydroxy-25-fluorovitamin D_3, as active *in vivo* as its corresponding vitamin D metabolite, 25-hydroxyvitamin D_3, and further indicated the possibility of obtaining an analog, 1,24-dihydroxy-25-fluorovitamin D_3, as active as 1,25-dihydroxyvitamin D_3, the most active metabolite and hormonal form of vitamin D_3.

"PROTECTED" POLYUNSATURATED FATTY ACID IN THE DIET OF THE EWE AND THE ESSENTIAL FATTY ACID STATUS OF THE NEONATAL LAMB. R.C. Noble, J.H. Shand, J.T. Drummond and J. Moore (The Hannah Res. Inst., Ayr, Scotland KA6 5HL) *J. Nutr.* 108, 1868–76 (1978). A polyunsaturated fatty acid supplement, protected from biohydrogenation in the rumen by a formaldehyde-treated protein coat., was fed to ewes during the last 8 weeks of pregnancy as a possible method of improving the poor essential fatty acid status of the newborn lambs. Significant increases were observed in the concentrations of 18:2 (n-6) in both the cholesteryl ester and phospholipid fractions of the plasma and in the phospholipid fraction of the liver of the lamb at birth. These findings are discussed in relation to the known metabolic roles of essential fatty acids in the animal body, with particular reference to the essential fatty acid status of the lamb at birth.

MUTANT AND IMMUNOCHEMICAL STUDIES ON THE INVOLVEMENT OF CYTOCHROME B_5 IN FATTY ACID DESATURATION BY YEAST MICROSOMES. M. Ohba, R. Sato, Y. Yoshida, C. Bieglmayer, and H. Ruis (Inst. for Protein Res., Osaka Univ., Suita, Osala 565) *Biochim. Biophys. Acta.* 572, 352–62 (1979). The involvement of cytochrome b_5 in palmitoyl-CoA desaturation by yeast microsomes was studied by using yeast mutants requiring unsaturated fatty acids and an antibody to yeast cytochrome b_5. The mutants used were an unsaturated fatty acid auxotroph (strain E5) and a pleiotropic mutant (strain Ole 3) which requires either Tween 80 and ergosterol or δ-aminolevulinic acid for growth. Microsomes from the wild-type strain possessed both the desaturase activity and cytochrome b_5, whereas those from mutant E5 contained the cytochrome but lacked the desaturase activity. It is concluded that cytochrome b_5 is actually involved in the desaturase system of yeast microsomes.

VARIATIONS IN THE MOLECULAR SPECIES OF LUNG PHOSPHATIDYLGLYCEROL. G. Okano and T. Akino (Dept. of Biochem. Sapporo Med. College, Sapporo 060, Japan) *Lipids* 14, 541–6 (1979). Approximately 20% of the phosphatidylglycerol of the lung tissue of several animals was found to have both fatty acids saturated. Pulmonary washings from the lung of the rabbit and guinea pig had more saturated phosphatidylglycerol than the washed lung tissue. Lung-saturated phosphatidylglycerol was relatively low in the perinatal period, a time during which saturated phosphatidylcholine accumulated predominantly. This suggests that the metabolism of the saturated species of lung phosphatidylcholine and phosphatidylglycerol, which are considered to be the major pulmonary surfactants, may not be regulated in the same manner, at least in the perinatal lung.

INFLUENCE OF INITIAL FOOD RESTRICTION ON SUBSEQUENT BODY WEIGHT GAIN AND BODY FAT ACCUMULATION IN RATS. A. Ozelci, D.R. Romsos and G.A. Leveille (Food Sci. and Human Nutr. Dept. Michigan State Univ. East Lansing, Michigan 48824) *J. Nutr.* 108, 1724–32 (1978). To determine the effect of initial food restriction on subsequent body weight gain and body fat accumulation, rats were restricted to 75, 50, or 25% of the intake of control rats for 1 week and were subsequently pair-fed on a food intake basis to the control rats. As ex-

pected, restricted rats gained weight at a slower rate and had less body fat at the end of the restriction period than control rats. These results suggest that the initial food restriction inherent in many studies involving meal frequency may cause the subsequent increased food efficiency and greater accumulation of body fat often attributed to an alteration in meal pattern. Our studies indicate that meal pattern has a minimal influence on body fat content provided the control animals are pair-fed throughout the entire experiment.

THE INFLUENCE OF DIETARY FAT AND MEAL FREQUENCY ON LIPOPROTEIN LIPASE AND HORMONE-SENSITIVE LIPASE IN RAT ADIPOSE TISSUE. H.S. Paik and E.S. Yearick (Dept. of Foods and Nutr., Schl. of Home Economics, Oregon State Univ., Corvallis, OR 97331) *J. Nutr.* 108, 1798-805 (1978). Activities of NaCL-inactivated lipoprotein lipase (LPL) and protamine-resistant hormone-sensitive lipase (HSL) in adipose tissue, accumulation of carcass fat, and serum triglycerides (TG) were determined in meal-fed (MF) and ad libitum-fed (AD) rats. At each feeding frequency, diets provided total fat as 15 or 30% of calories and polyunsaturated fatty acids (PUFA) as 2.5 or 11% of calories. In AD rats, the percentage of body fat was significantly correlated with LPL:HSL and with serum TG, suggesting that the relative enzyme activities and fat deposition may be influenced by the concentration of circulating TG. Mean body fat of rats receiving the 30% fat diet was significantly greater than that of rats fed 15% fat. Both serum TG and adipose LPL activity were significantly reduced when the diet contained high levels of PUFA.

INTERACTION OF CHOLESTERYL ESTER EXCHANGE PROTEIN WITH HUMAN PLASMA LIPOPROTEINS AND PHOSPHOLIPID VESICLES. N.M. Pattnaik, and D.B. Zilversmit (Div. of Nutr. Sci. and Section of Biochem., Molecular and Cell Biology, Div. of Biol. Sci. Cornell Univ., Ithaca, New York 14853) *J. Biol. Chem.* 254, 2782–6 (1979). This report describes the interaction of human plasma cholesteryl ester exchange protein with isolated plasma lipoproteins and with lipoproteins in whole plasma as studied by gel permeation chromatography. Isolated high density lipoprotein (HDL), but not very low density lipoprotein (VLDL) or low density lipoprotein (LDL), was found to form an isolable complex with the exchange protein. It is suggested that the phospholipid phosphate groups are the primary sites for the interaction of lipoproteins with the cholesteryl ester exchange protein and that the stability of the complexes increases with the negative charge of the lipoproteins.

THE EFFECT OF 1α-HYDROXYVITAMIN D_3 ADMINISTRATION ON CALCIUM TRANSPORT IN CHICK INTESTINE BRUSH BORDER MEMBRANE VESICLES. H. Rasmussen, O. Fontaine, E.E. Max, and D.B.P. Goodman (Dept. of Cell Biology and Internal Med., Yale Univ. Med. Schl., New Haven, Connecticut 06510) *J. Biol. Chem.* 254, 2993–9 (1979). Membrane vesicles prepared from the brush border of the duodenum from the D-deficient chick take up calcium in a biphasic manner showing an initial rapid binding and slower accumulation into an osmotically active space. Prior treatment of D-deficient chicks with 1α-hydroxyvitamin D_3 leads to a 2.5- to 5.3-fold increase in the rate of calcium accumulation. The magnitude and time course of 1α-hydroxyvitamin D_3 action upon calcium accumulation into vesicles are similar to the action of the vitamin on intestinal calcium absorption in the intact animal.

THE EFFECT OF LIPIDS ON TAUROCHOLATE ABSORPTION FROM THE RAT SMALL INTESTINE (40500). C.C. Row, D. Lefebvre, G. Belanger, L. Chartrand, G. Lepage and A. Weber (Dept. of Pediatrics, Hospital Ste-Justine, l'Universite' de Montreal Montreal, Quebec, Canada H3T 1C5) *Proc. Soc. Exp. Biol. Med.* 161, 105–10 (1979). The effect of lipids on taurocholate absorption was studied in the rat small intestine. It was found that: (1) experimental pancreatic insufficiency induced by a 95% pancreatectomy or by a pancreatic fistula did not lead to impairment of bile acid transport in response to an increase in fat intake; (2) the ileal absorption of water, Na+, d-xylose and taurocholate was normal in response to an emulsion of triolein and impaired by a micellar solution of oleic acid-monoolein; (3) fatty acids and monoglycerides interfere with ileal bile acid absorption particularly if they form mixed micelles with bile acids. These data do not support the hypothesis that unhydrolyzed triglycerides account for the increased loss of bile acids in CF and suggest that unabsorbed lipolytic products reaching the ileum can adversely affect bile acid transport.

STABILIZING EFFECT OF CHOLESTEROL ON PHOSPHATIDYLCHOLINE VESICLES OBSERVED BY ULTRASONIC VELOCITY MEASUREMENT. A. Sakanishi, S. Mitaku, and A. Ikegami (Dept. of Phys., Faculty of Sci., Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan) *Biochemistry* 18, 2636–41 (1979). The temperature dependence of the ultrasonic velocity was measured in sonicated vesicles of dipalmitoyl-phosphatidylcholine by varying the content of cholesterol. When cholesterol is incorporated—an anomalous dip of the ultrasonic velocity gradually smeared out. At the same time, the ultrasonic velocity of the membrane increased remarkably above 30°C due to the increase of the bulk modulus by about 15%. On the other hand, the ultrasonic velocity and the bulk modulus decreased below 30°C. Comparing the cholesterol-incorporated membrane with vesicles of bovine brain sphingomyelin and human erythrocyte membrane, we discuss the role of cholesterol in biological membranes in terms of the stability of the membrane as a barrier.

UTILIZATION OF METHYLMALONATE FOR THE SYNTHESIS OF BRANCHED-CHAIN FATTY ACIDS BY PREPARATIONS OF CHICKEN LIVER AND SHEEP ADIPOSE TISSUE. J.R. Scaife, K.W.J. Wahle and G.A. Garton (Rowett Res. Inst., Bucksburn, Aberdeen AB2 9SB, U.K.) *Biochem. J.* 176, 799–804 (1978). The utilization of methyl {2-^{14}C}malonyl-CoA for fatty acid synthesis was investigated using synthetase preparations from chicken liver and sheep adipose tissue. The rate of fatty acid synthesis from acetyl-CoA and malonyl-CoA was greatly diminished in the presence of methylmalonyl-CoA. In the absence of malonyl-CoA, methylmalonyl-CoA was utilized for fatty acid synthesis only very slowly by the synthetase from sheep adipose tissue and not at all by that from chicken liver. Despite the inhibitory effect of methylmalonyl-CoA on fatty acid synthesis from malonyl-CoA, it was utilized by the synthetase preparations from both species to produce a complex mixture of methyl-branched fatty acids.

RESPONSE OF LACTATING COWS TO 300 MG OF SUPPLEMENTAL VITAMIN E DAILY. D.J. Schingoethe, J.G. Parsons, F.C. Ludens, L.V. Schaffer and H.J. Shave (South Dakota State Univ. Brookings 57007) *J. Dairy Sci.* 62, 333–8 (1979). Ten holstein cows in mid-lactation which had been fed only stored feeds for several years were paired on milk production. One cow from each pair was assigned to either the control or group treated with supplemental vitamin E for a 12-wk experiment. All cows were fed 3 kg alfalfabrome hay, corn silage ad libitum, and concentrate at 1 kg/3 kg milk produced daily. This ration provided about 500 mg of vitamin E (total tocopherols) daily. Five cows were fed an additional 300 mg vitamin E daily as D-α-tocopherol acetate in their concentrate mix. Feeding the supplemental vitamin E increased the vitamin E content of milk fat 15 to 20% from 18 μg/g fat to over 21 μg/g fat. However, this change in vitamin E content of milk was not sufficient to improve the oxidative stability of the milk. Blood characteristics indicative of vitamin E status generally were unaffected by vitamin E supplementation although red cell hemolysis, glutamic oxaloacetic transaminase, and lactate dehydrogenase of serum were lower in blood of supplemented cows.

A REVIEW OF BODY COMPOSITION STUDIES WITH EMPHASIS ON TOTAL BODY WATER AND FAT. H-P Sheng, and R.A. Huggins, (Dept. of Physiology, Baylor College of Med., and Childrens Nutr. Lab. Sci. and Ed. Admin., USDA, Houston, TX 77030). *J. Clin. Nutr.* 32, 630–47 (1979). Tritiated water measures a volume 4 to 15% of body weight larger than that by desiccation, and, at present, only 0.5 to 2.0% of the overestimation can be explained by the exchange of hydrogen of tritiated water with those of proteins and carbohydrates of the body. The remainder of the error is unexplained. Water in the lumen of the gut is an appreciable percentage of total body water (TBW) in many mammalian species, with the pig and the human as possible exceptions, and it should be considered an integral part of TBW. Consequently, the exclusion or inclusion of this transcellular water as part of TBW significantly affects the final TBW volume. If the percentage of water in fat-free wet weight lies between 70 and 76% for most species, then the error in calculating fat using the figure 73.2% in the equation (%fat = 100−%TBW/0.732) is significant. In the application of this equation, the largest potential error lies in the estimation of TBW with tritiated water.

QUANTIFICATION OF THE HEPATIC CONTRIBUTION TO THE CATABOLISM OF HIGH DENSITY LIPOPROTEINS IN RATS. G. Sigurdsson, S-P. Noel, and R.J. Havel (Cardiovascular Res. Inst. and Dept. of Med., Univ. of California, San Francisco,

CA 94143) *J. Lipid Res.* 20, 316–24 (1979). Isolated rat livers were perfused for four hours in a recirculating system containing washed rat erythrocytes. Biologically screened radioiodinated rat high density lipoproteins ($1.090 < d < 1.21$ g/ml) were added to the perfusate with different amounts of whole serum to supply unlabeled rat high density lipoproteins. The protein moiety of the lipoprotein contained more than 95% of the radioiodine. The results suggest that only a small fraction of high density lipoproteins in blood plasma of rats is degraded directly by the liver.

LIPID-LINKED OLIGOSACCHARIDES CONTAINING GLUCOSE IN LACTATING RABBIT MAMMARY GLAND. B.K. Speake and D.A. White (Dept. of Biochem., Univ. of Nottingham Med. Schl., Queen's Med. Centre, Nottingham NG7 2UH, U.K.) *Biochem. J.* 176, 993–1000 (1978). Microsomal fractions of lactating rabbit mammary gland incubated with UDP-glucose formed lipid-linked mono- and oligo-saccharides. The lipid-linked monosaccharide had chromatographic properties similar to those of dolichol phosphate mannose and yielded glucose on acid hydrolysis. Incubation of the microsomal fraction with GDP-{U-^{14}C}-mannose yielded an oligosaccharide lipid of approximately seven monosaccharide units. Further incubation with UDP-glucose increased the size of the oligosaccharide by approximately two units. Explants of lactating rabbit mammary gland incorporated {U-^{14}C}glucose into both lipid-linked mono- and oligo-saccharides. The oligosaccharide lipid was of approx. 11 monosaccharide units.

THE METABOLIC FATE OF DIETARY 1-{^{14}C}LINOLEATE AND 1-{^{14}C} PALMITATE IN MEAL-FED RATS (40440). A.I. Toorop, D.R. Romsos, and G.A. Leveille (Dept. of Food Science and Human Nutr., Michigan State Univ., East Lansing, Michigan 48824) *Proc. Soc. Exp. Biol. Med.* 160, 312–6 (1979). The relative rates of oxidation to respiratory $^{14}CO_2$ of dietary 1-{^{14}C} linoleate and 1-{^{14}C}palmitate in rats fed a single meal containing the labelled fatty acids were investigated. The oxidation of the dietary linoleate and palmitate, expressed as a fraction of the radioactivity absorbed, occurred at similar rates. Significantly more {^{14}C}linoleate than {^{14}C}palmitate accumulated in the livers of the rats and accumulation of label in hepatic phospholipids was greater when {^{14}C}linoleate was fed than when {^{14}C}palmitate was fed.

LACTATE AS A PRECURSOR OF FATTY ACIDS IN BOVINE ADIPOSE TISSUE. G.B. Whitehurst, D.C. Beitz, M.A. Pothoven, W.R. Ellison and M.H. Crump (Dept. of Animal Sci. and Biochem-Biophys., Iowa State Univ., Ames, Iowa 50011) *J. Nutr.* 108, 1806–11 (1978). In vitro experiments were conducted to determine the rates of lactate, acetate, and glucose conversions to glycerol, CO_2, and fatty acids by subcutaneous adipose tissue of cattle. To study the pathway for lactate utilization as a carbon source for lipogenesis, the effect of each of four substrates (lactate, acetate, pyruvate, and glucose) on the rate of conversion of the other three was determined. Our results clearly demonstrated that lactate can be used for fatty acid synthesis as well as for glycerogenesis by bovine adipose tissue.

LECITHIN: CHOLESTEROL ACYL TRANSFER (LACT) AND FATTY ACID COMPOSITION OF LECITHIN AND CHOLESTEROL ESTERS IN YOUNG MALE MYOCARDIAL INFARCTION SURVIVORS. O. Wiklund and A. Gustafson (Dept. of Med I, Sahlgren's Hosp., Univ. of Goteborg, Goteborg (Sweden)) *Atherosclerosis* 33, 1–8 (1979). Lecithin: cholesterol acyl transfer (LCAT) and relative fatty acid composition of serum lecithin and cholesterol esters were studied in 20 male survivors of myocardial infarction (MI). Comparisons were made with controls matched for serum cholesterol. There was no difference in LCAT rate between MI patients and controls. The relative content of arachidonic acid in cholesterol esters was higher in MI patients. The fatty acid composition of lecithin and cholesterol esters suggests an equal transfer of linoleic and oleic acids from lecithin to cholesterol. Furthermore negative correlations were found between LCAT and linoleic acid content of lecithin ($r = -0.43$, $P < 0.01$) and cholesterol esters ($r = -0.45$, $P < 0.01$). This inverse relationship does not seem to be linked to substrate specificity, but rather to be mediated by influences in common on serum lipid content and turnover.

SEX DIFFERENCES IN THE STEROL AND NONSTEROL METABOLISM OF MEVALONATE. M.H. Wiley, M.M. Howton, and M.D. Siperstein (Metabolism Section, Veterans Administration Med. Center; Cardiovascular Res. Inst: and the Dept. of Med., Univ. of California, San Francisco, San Francisco, CA 94121) *J. Biol. Chem.* 254, 837–42 (1979). Previous studies from this laboratory have demonstrated that the kidneys represent the major tissue site for the metabolism of circulating mevalonic acid by both the sterol and nonsterol pathways of mevalonate utilization. These earlier conclusions were based solely on observations in male rats; therefore, the present studies were carried out in both male and female rats to evaluate possible sex differences in mevalonate metabolism. These findings represent the first demonstration of a sex difference in cholesterol synthesis either in an intact animal or by an individual animal tissue. In addition, they raise the possibility that the kidneys play a role in the well known differences in cholesterol concentration between the two sexes.

APOPROTEINS OF AVIAN VERY LOW DENSITY LIPOPROTEIN: DEMONSTRATION OF A SINGLE HIGH MOLECULAR WEIGHT APOPROTEIN. D.L. Williams (Dept. of Pharmacological Sci., Health Sci. Center, State Univ. of New York at Stony Brook, Stony Brook, NY 11794) *Biochemistry* 18, 1056–63 (1979). The high molecular weight apoproteins of very low density lipoprotein (VLDL) were compared after preparation of VLDL from plasma and sera of diethylstilbestrol-treated roosters. When prepared from plasma with adequate control of endogenous proteolytic activity, VLDL contained a single high molecular weight apoprotein (apo-VLDL-B) as judged by electrophoresis in polyacrylamide gels containing sodium dodecyl sulfate.

VITAMIN E, ANTIOXIDANTS AND LIPID PEROXIDATION IN EXPERIMENTAL ATHEROSCLEROSIS OF RABBITS. R.B. Wilson, C.C. Middleton and G.Y. Sun (Dept. of Veterinary Microbiol., and Pathology, Washington State Univ., Pullman, WA 99164) *J. Nutr.* 108, 1858–67 (1978). The purpose of this study was to evaluate the effects of large amounts of dietary vitamin E and butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) in rabbits fed a low-cholesterol, atherogenic diet, and to seek for evidence of lipid peroxidation in the atherosclerotic lesions. Aortic and coronary atherosclerosis were more frequent and extensive in rabbits fed either the basal diet or the basal diet supplemented with BHA and BHT than in rabbits fed either the basal diet supplemented with vitamin E or the negative control diet. Dietary vitamin E inhibited atherogenesis by preventing hypercholesterolemia. No evidence of lipid peroxidation was detected in the arterial lesions.

REPRODUCTION AND SURVIVAL OF RAINBOW TROUT (SALMO GAIRDNERI) FED LINOLENIC ACID AS THE ONLY SOURCE OF ESSENTIAL FATTY ACIDS. T.C. Yu, R.O. Sinnhuber and J.D. Hendricks (Dept. of Food Sci. and Tech., Oregon State Univ. Corvallis, OR 97331) *Lipids* 14, 572–5 (1979). A semipurified test diet containing 1% linolenate as the sole dietary essential fatty acid was fed to a group of rainbow trout *(Salmo gairdneri)* for 34 months. The fish matured and the eggs produced were hatched. The second generation fry were fed our laboratory diet for 3 months. The growth of these fry was normal. Histologic examinations revealed no abnormality in liver, heart and kidney tissues of the fry during the three month period.

EFFECT OF HIGH- AND LOW-FIBER DIETS ON PLASMA LIPIDS AND INSULIN. M.J. Albrink, T. Newman and P.C. Davidson (Dept. of Med., West Virginia Univ. Schl. of Med., Morgantown, WV) *Am. J. Clin. Nutr.* 32, 1486–91 (1979). Seven healthy young adults were maintained for two separate 1-week periods on each of two very high-carbohydrate diets, one with low-fiber and one with high-fiber content. In both diets 15% of the calories were from protein, 15% from fat, and 70% were from carbohydrate. The insulin response to a low-fiber meal was twice as great as that to a high-fiber meal containing an equivalent amount of carbohydrate. The results suggest that carbohydrate-induced hyperlipemia does not occur if the high carbohydrate diet is rich in dietary fiber, and furthermore that the insulin-stimulating potential of foods in a very high-carbohydrate diet is a critical determinant of the magnitude of carbohydrate-induced lipemia.

EFFECTS OF ETHANOL ON LIPID METABOLISM. E. Baraona and C.S. Lieber (Alcohol Research Center, Bronx Veterans Admin. Hospital and Mount Sinai School of Medicine, New York 10468) *J. Lipid Res.* 20, 289–315 (1979). Alcohol promotes accumulation of fat in the liver mainly by substitution of ethanol for fatty acids as the major hepatic fuel. The degree of lipid accumulation depends on the supply of dietary fat. Progressive alteration of the mitochondria, which occurs during chronic alcohol consumption, decreases fatty acid oxidation

by interfering with citric acid cycle activity. Derangements of serum lipids similar to those found in other types of liver disease also become apparent. The changes in serum lipids may be a sensitive indicator of the progression of liver damage in the alcoholic.

RETINOID METABOLISM IN SPONTANEOUSLY TRANSFORMED MOUSE FIBROBLASTS (BALB/C 3T12-3 CELLS): ENZYMATIC CONVERSION OF RETINOL TO ANHYDRORETINOL. P.V. Bhat, L.M. DeLuca, S. Adamo, I. Akalovsky, C.S. Silverman-Jones, and G.L. Peck (Dermatology Branch and Differentiation Control Section, Natl. Cancer Institute, Bethesda, MD 20014) *J. Lipid Res.* 20, 357–62 (1979). Spontaneously transformed mouse fibroblasts (Balb/c 3T12-3 cells) displayed an increased adhesion when cultured in the presence of 10^{-6} M all-trans retinol and acquired morphological characteristics of the normal phenotype. Thus it was of interest to investigate the metabolism of [15-^{14}C]retinol in this system. Anhydroretinol appears to be an end product of the metabolism of retinol in 3T12-3 cells, as suggested by the finding that over 90% of [^{14}C]anhydroretinol incubated for 30 hours with 3T12-3 cells was recovered unaltered, without the formation of detectable retroretinol, retinol, or retinoic acid.

PREFERENTIAL UTILIZATION OF NEWLY SYNTHESIZED CHOLESTEROL AS SUBSTRATE FOR BILE ACID BIOSYNTHESIS: AN IN VIVO STUDY USING $^{18}O_2$-INHALATION TECHNIQUE. I. Bjorkhem and A. Lewenhaupt (Dept. of Clinical Chemistry and Surgery, Huddinge University Hospital, Karolinska Institutet, Stockholm, Sweden) *J. Biol. Chem.* 254, 5252–6 (1979). Incorporation of ^{18}O in cholic and chenodeoxycholic acid was determined after inhalation of $^{18}O_2$ by rats with biliary fistula. After a 30-min inhalation, the maximal incorporation of ^{18}O in the three hydroxyl groups of cholic acid was about 1.8 atoms, and in the two hydroxyl groups of chenodeoxycholic acid about 1.1 atoms. About 0.4 atom of ^{18}O in the cholic and chenodeoxycholic acid isolated was present at C-3. It was calculated that at least 50% of the biosynthesized bile acids were derived from newly synthesized cholesterol. Incorporation of ^{18}O in biliary cholesterol was less than 0.05 atom, indicating that the major part of this cholesterol is derived from a pool different from that utilized in bile acid biosynthesis.

THE EFFECTS OF VITAMIN E AND INDOMETHACIN ON BLOOD CREATINE PHOSPHOKINASE AND FATTY ACID COMPOSITION OF TISSUES FROM YOUNG RABBITS. A.C. Chan, C.E. Allen and P.V.J. Hegarty (Dept. of Food Sci. and Nutr., Univ. of Minnesota, St. Paul, Minn.) *Am. J. Clin. Nutr.* 32, 1454–61 (1979). The effects of vitamin E depletion and repletion and indomethacin treatment on blood creatine-phosphokinase (CPK) and fatty acid composition in phospholipids of the semitendinosus and gastrocnemius muscles, and in the heart, liver, kidney, and lung were studied in young rabbits. After 30 days of vitamin E repletion, the changes in fatty acid composition had returned to the control values. The failure of indomethacin to prevent myopathy in the E-deficient rabbits suggests that either prostaglandin synthesis was not affected by the dosage used, or that prostaglandin synthesis is not directly involved in the etiology of nutritional muscular dystrophy.

EFFECTS OF GUAR GUM AND WHEAT BRAN ON LIPID METABOLISM OF RATS. W.L. Chen and J.W. Anderson (Medical Service, Veterans Administration Medical Center and Department of Medicine, University of Kentucky College of Medicine, Lexington, Kentucky 40507) *J. Nutr.* 109, 1028–34 (1979). The effects of guar gum and wheat bran on blood and liver lipid levels of rats were measured. In experiment 1, rats were fed ad libitum a 55% sucrose diet containing 0, 15 or 25% wheat bran for 3 weeks. In experiment 2, rats were meal-fed one of four experimental diets for 3 weeks: sucrose, sucrose-cholesterol, sucrose-cholesterol-bran or sucrose-cholesterol-guar gum. These studies indicate that while guar gum lowers fasting plasma total cholesterol and raises HDL cholesterol, wheat bran does not.

PHOSPHOLIPID REQUIREMENT OF ACYL COENZYME A:SN-GLYCEROL-3-PHOSPHATE ACYLTRANSFERASE FROM RAT LIVER MITOCHONDRIA. H.C. Kelker and M.E. Pullman (Department of Biochemistry, The Public Health Research Institute of the City of New York, Inc., New York, New York 10016) *J. Biol. Chem.* 254, 5364–71 (1979). Acyl co-enzyme A:sn-glycerol-3-phosphate acyltransferase, a membrane-bound enzyme, was extracted from rat liver mitochondria in a phospholipid-depleted form. This preparation is inactive but can be reconstituted by the addition of phospholipid. Crude soybean phospholipid (ascolectin) was more effective than a mixture of crude phospholipids prepared from rat liver and beef heart mitochondria. The best reconstitution was achieved with a ternary mixture of purified phospholipids consisting of phosphatidylserine, phosphatidylinositol, and phosphatidylethanolamine. Other active phospholipids, in decreasing order of effectiveness, were: asolectin, phosphatidylserine, mixtures of phosphatidylethanolamine and phosphatidylinositol, crude mitochondrial phospholipid, and phosphatidylinositol. Although phosphatidylethanolamine alone was inactive, it exhibited a synergistic effect with phosphatidylinositol and with mixtures of the latter and phosphatidylserine. Other phospholipids and surfactants were ineffective in reconstituting enzyme activity.

ASYMMETRIC DISTRIBUTION OF PHOSPHOLIPIDS IN THE INNER MEMBRANE OF BEEF HEART MITCHONDRIA. J.J.R. Krebs, H. Hauser, and E. Carafoli (Laboratory of Biochem., Swiss Federal Inst. of Tech., Universitätstrasse 16, 8092 Zürich, Switzerland) *J. Biol. Chem.* 254, 5308–16 (1979). The transversal distribution of phosphatidylcholine, phosphatidylethanolamine, and cardiolipin in the inner membrane of beef heart mitochondria was investigated. Highly purified "right-side-out" (mitoplasts) and "inside-out" (submitochondrial particles) membranes were used, permitting the independent study of the phospholipid composition on either half of the membrane. Three independent, and partially complementary, methods were employed: (a) chemical labeling with fluorescamine; (b) phospholipase A_2 treatment; (c) immunoreaction with anticardiolipin antibodies. From the three approaches applied, the following phospholipid composition of the inner membrane of heart mitochondria was obtained: on the cytoplasmic side (mitoplasts) the composition was 28% phosphatidylcholine, 13% phosphatidylethanolamine, 6% cardiolipin; on the matrix side (submitochondrial particles) the composition was 11% phosphatidylcholine, 21% phosphatidylethanolamine, 18% cardiolipin.

CHLORINATED HYDROCARBON INSECTICIDE RESIDUES IN TISSUES OF RATS BEFORE AND AFTER REDUCTION OF BODY FAT BY DIETARY RESTRICTION. F.L. Lakshmanan, A. Pommer, and O. Patterson (Protein Nutrition Laboratory Nutrition Inst., Science and Education Admin., Federal Research, U.S. Dept. of Agriculture, Beltsville, MD 20705) *J. Agric. Food Chem.* 27, 720–5 (1979). Male weanling rats were fed ad libitum until 250 days of age one of three nutritionally adequate diets with or without the addition of 2.80 ppm of a chlorinated hydrocarbon insecticide (CHI) mixture. The mixture comprised DDT, TDE, DDE, lindane, dieldrin, and perthane. Between 251 and 300 days of age, half of the rats in each group were restricted to 50% of their ad libitum food intake. Concentration and total amounts of each insecticide were determined in adipose tissue, liver, and brain. Deposition, and mobilization during weight reduction, of insecticides varied with diet and tissue examined. When food intake was reduced, total DDT amount did not change in the three tissues regardless of diet. However, total amounts of DDT metabolites and dieldrin were altered with reduced intake. Differences associated with diet occurred primarily in adipose and liver tissues. Total DDT amount was not affected by diet.

Fats and oils

DETERMINATION OF VITAMIN D_3 IN MULTIVITAMIN TABLETS BY HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY. C. Mackay, J. Tillman and D.T. Burns, *Analyst (London)* 104, 626–36 (1979). A procedure is described for the determination of vitamin D_3 in multivitamin tablets. The vitamin is released from the tablets by enzymic digestion, which is followed by solvent extraction and chromatography on a microparticulate silica column. Other fat-soluble vitamins do not interfere with the assay.

LIPID COMPOSITION OF PEARL MILLET FLOUR. K.L. Ahuja, K.S. Sekhon, and K.L. Sehgal (Department of Plant Breeding, Punjab Agricultural University Ludhiana, India) *J. Food Sci Technol.* 16, 32–3 (1979). The content of free and bound lipid in two hybrids and five varieties of pearl millet in (g/100 g) flour varied from 2.85 to 4.37 and 0.37 to 0.02 respectively. Nonpolar and polar fraction of free lipid constituted in the range of 2.65 to 4.10 and 0.17 to 0.31 respec-

tively. Nonpolar fraction in the bound lipid, was in the range of 0.09 to 0.16 whereas the polar fraction was in the range of 0.23 to 0.29. The ratio between nonpolar and polar fraction of total lipid is high which makes it less suitable for breadmaking.

UTILIZATION OF WHEY FOR PRODUCTION OF MICROBIAL PROTEIN AND LIPID. M.J. Abraham and R.A. Srinivasan (National Dairy Research Institute Karnal-132001, India) *J. Food Sci. Technol.* 16, 11–5 (1979). Three fungi viz. *P. frequentans*, *A. nidulans* and *Fusarium* N_{11} were grown in cheese whey for production of fungal protein and lipid. The effect of supplementation at various concentrations of different carbon, nitrogen and growth factors on biomass, total protein and lipid were also studied. Glucose (7.5%), NH_4NO_3 (0.3%) and yeast extract (0.1%) had profound influence on growth and synthesis of protein and lipid. The biomass recovery (g/100 ml. medium) was highest in case of *P. frequentans* (2.482) followed by *A. nidulans* (2.440 g) and lowest in *Fusarium* N_{11} (2.100 g) under similar conditions. Lipid production was maximum in *Fusarium* N_{11} (38.56%), while it produced minimum amount of protein (16.62%). GLC analysis of the methyl esters indicated the preponderance of C_{18} group of fatty acids.

QUANTITATIVE ANALYSIS OF VITAMIN D_3 IN A FEED USING NORMAL PHASE HIGH PRESSURE LIQUID CHROMATOGRAPHY. H. Cohen and M. Lapointe (Laboratory Services Division, Food Production and Marketing Branch, Agriculture Canada, Ottawa, Ontario, Canada) *J. Chromatogr. Sci.* 17, 510–3 (1979). A procedure is described for the separation and quantification of Vitamin D_3 from different feeds and premixes. The study was conducted, first using a liquid partition step as a preliminary clean-up after extraction, then chromatography on activated Silica gel 60 before final analysis on a high pressure liquid chromatograph (HPLC) using a LiChrosorb NH_2 (10μ) column and a variable wavelength UV detector set at 264 nm. The detector response curve for an authentic D_3 standard was linear using peak areas with a minimum detectable amount being 5 ng. The overall percent recovery of D_3 in feeds was $94.4 \pm 2.4\%$.

SOME EFFECTS OF INTERRUPTED AUTOXIDATION. S.M. Argandeh and T.W.J. Apperley (School of Colour Chemistry and Colour Technology, University of Bradford, Richmond Road, Bradford BD7 1DP) *J. Oil Colour Chem. Assoc.* 62, 207–8 (1979). Experimental evidence is provided to show the importance of the presence of oxygen in the reactions following the decomposition of peroxides during the course of the autoxidation of linseed oil.

OPTIMIZATION OF THE REGIME OF PREPARATION OF THE KERNEL OF COTTONSEEDS FOR THE DIRECT EXTRACTION OF THE OIL. A.K. Esik et al. *Maslo-zhir. Promst.* 1979(2), 10–2. The cotton kernels are prepared as flakes under the following conditions: temperature of the kernel 20C, humidity of the kernel before reduction to flakes 14.0–14.3%, thickness of flakes 0.20–0.30 mm, humidity of the flakes before extraction 6.0–7.9% These conditions produce an easily refinable oil. The oil obtained by direct extraction of the flakes from non-dehulled seeds is more difficult to refine than the oil extracted from a dehulled kernel with a low hull content. The oil obtained by direct extraction from defective cottonseeds is better for refining in miscella. (Rev. Fr. Corps Gras)

SECONDARY REACTIONS IN THE TREATMENT OF TECHNICAL ANIMAL FAT WITH SULFURIC ACID. S.N. Volotovskaya et al. *Maslo-zhir. Promst.* 1979(2), 16–8. At the present time, the technical animal fats are purified by mixing them with 3–5% of sulfuric acid, for 2–3 hr at 100C. It was established that such a treatment contributes to the sulfonation of mono- and diglycerides, as well as of the unsaturated fatty acids. The surface active compounds formed have a negative effect on the purification of fats. In conclusion, sulfuric acid is not good for this purpose. (Rev. Fr. Corps Gras)

OBTAINMENT OF CALCIUM SALTS OF FATTY ACIDS FROM WASTE WATERS CONTAINING SOAPS AND LIPIDS. N.I. Gozalishvili. *Maslo-zhir. Promst.* 1979(2), 20–2. The purification of waste waters from oil factories by flotation doesn't completely resolve the problem of purification (in the optimal case, the degree of purification doesn't exceed 98%). The author has elaborated a new process of extraction of lipid products from the waste waters. The possibility of obtainment, from the water soluble sodium salts, the calcium salts insoluble in water and with an adsorbent power for the neutral fat in the emulsion state in the water which contains soaps and lipids, was studied. (Rev. Fr. Corps Gras)

VARIATION OF CERTAIN PHYSICO-CHEMICAL AND BIOLOGICAL PROPERTIES OF SUNFLOWER SEEDS DURING THE STORAGE IN SILOS. P.P. Iline et al. *Maslo-zhir. Promst.* 1979(3), 16–7. The effect of the variation of the pressure in the lower part of the silo at the time of loading and during the storage was studied. The data is given of the variations of the acid value of the oil in the seeds, of the germinating power of the seeds, of the amount of oil in the hull, and of the degree of deterioration of these during the storage of the sunflower in silos more or less full. (Rev. Fr. Corps Gras)

INFLUENCE OF THE PROCESSES OF OBTAINMENT AND TREATMENT OF VEGETABLE OILS ON THE AMOUNT AND COMPOSITION OF HYDROCARBONS. N.A. Pisareva et al. *Maslo-zhir. Promst.* 1979 (3), 18–21. The process of oil extraction doesn't lead to an increase of hydrocarbons in the oils. In the examined samples, the content of aromatic hydrocarbons in the extracted oils was less than in the oils obtained by pressing. 20% of the hydrocarbons were eliminated during drying and deodorization. On the other hand, a certain decrease of the quantity of the alkanes C_{11}–C_{22} and an increase of the relative quantity of the n-alkanes C_{25}–C_{31} occur. (Rev. Fr. Corps Gras)

SOLUBILITY OF OXYGEN IN THE VEGETABLE OILS. T.B. Morozova et al. *Troudy VNIIZha* 33, 35–8 (1977). The solubility of oxygen in the oils (sunflower, soybean, cotton, olive) at atmospheric pressure and at a temperature of 18–20C varies between 5.9 and 6.3 mmole/l and is independent of the presence in the oil of phosphatides (up to 1%) and of free fatty acids (up to 4.8%). The process of dissolution of oxygen in the oils obeys Henry's law. (Rev. Fr. Corps Gras)

ESTABLISHMENT OF A DEPENDENCY BETWEEN THE CHEMICAL VALUES OF THE OILS OF PRODUCTION AND THEIR BIOLOGICAL PROPERTIES. T.B. Morozova et al. *Troudy VNIIZha* 33, 45–52 (1977). There exists a correlation between the content of linoleic acid and seven of the nine biological tests considered: the increase of linoleic acid from 59.3 to 70.2% exerts an unfavorable influence on the biological values with the exclusion of the relative test of the protein content of tissues. There doesn't exist any correlation between the carbonyl compounds (benzidine values 0.3–9.0 mg% g), the free fatty acids (acid value up to 2), and the biological values. (Rev. Fr. Corps Gras)

USE OF ULTRASOUND FOR THE INTENSIFICATION OF PURIFICATION OF SUNFLOWER OIL. P.G. Gorodenko et al. *Maslo-zhir. Promst.* 1978(9), 6–7. The experiments (of a total duration of 216 h) about the study of the influence of ultrasounds on the purification of sunflower oil have shown that under industrial conditions, the effect of the action of ultrasounds is considerable: the content of phosphatides of hydrated oil decreases from 0.27 to 0.10%. (Rev. Fr. Corps Gras)

TREATMENT OF SOAPSTOCK AFTER REFINING OF SUNFLOWER OIL IN MISCELLA. A.K. Mosian et al. *Maslo-zhir. Promst.* 1978(9), 13–4. The method of decomposition of the soapstock with sulfuric acid can be used in the process of refining of oil in miscella. The decomposition with sulfuric acid allows the obtainment of lipids of a better quality. The solvent contained in the soapstock is extracted with lipids resulting from the sulfuric decomposition and it is practically absent in the used acid water. (Rev. Fr. Corps Gras)

INFLUENCE OF BLEACHING ON THE DEGREE OF DECOLORATION OF VEGETABLE OILS. S.N. Volotovskaya et al. *Maslo-zhir. Promst.* 1978(9), 15–6. The sunflower, corn, and palm oils contain carotenoids group pigments and it is rational to bleach them by a thermal process, combined with deodorization. The soybean oil must be bleached at 120C under vacuum. It is recommended that the filtration of bleached oils be done at a temperature not exceeding 70C. (Rev. Fr. Corps Gras)

THE LIPIDS OF THE SEEDS OF A NEW VARIETY OF SUNFLOWER RICH IN OLEIC ACID. L.N. Khartchenko et al. *Maslo-zhir. Promst.* 1798(11), 20–2. The variety of sunflower Pervenetz differs from other varieties by the level of oleic acid in all the lipids. The content and composition of sterols, tocopherols, and carotenoids are unchanged. The oil of the new variety of sunflower is more stable to oxidation and polymerization during thermal treatment. One can expect that

the oil from the new variety will be used for frying, in the can industry, and in the industries where olive oil is used today (vitamin, perfumes, etc.). (Rev. Fr. Corps Gras)

ASPECTS OF HYDROGENATION OF FATS AND FATTY ACIDS. W. Zschau, *Fette, Seifen, Anstrichm.* 81(8), 303–10 (1979). Hydrogenation is of great significance, both in animal nutrition as well as for technical purposes. In the area of nutrition, adequate food for the increasing world population is unthinkable without utilization of all fat resources, that can be made available as food fats only after catalytic hydrogenation. In the area of technical use, a similar development is observed owing to shortage of mineral oils. Thus, fatty alcohols derived from vegetable oils and waxes can be competitive in price with fully synthetic fatty alcohols derived from mineral oils. The aspects of selectivity and isomerization in the partial hydrogenation of neutral fats are discussed. In the hydrogenation of fatty acids and their derivatives, emphasis is laid on other factors such as activity, poisoning and acid resistance of the catalyst.

CANDELILLA WAX—RECOVERY, COMPOSITION AND PROPERTIES. G. Illmann, *Fette, Seifen, Anstrichm.* 81(8), 322–6 (1979). Candelilla wax is a natural wax, recovered from plants belonging to the family of Euphorbiacese. They occur in desert areas, particularly in Mexico. The crude wax, recovered by boiling the plant, is purified in a refinery. Candelilla wax is a complex mixture of many subtances. The composition of the wax is explained on the basis of IR spectra, DSC-diagrams and gas chromatographic investigations. Properties resulting from the specific composition of the wax and its applications are discussed.

OPTIMIZATION OF FILTER PRESS CAPACITY—A CONTRIBUTION ON THE APPLICATION OF INTEGRATED METHODS IN PROCESSING TECHNOLOGY. G.A.M. Sprangers, *Fette, Seifen, Anstrichm.* 81(8), 316–22 (1979). An integrated approach, hardly known so far in the processing technology, yields a universal formula which describes technical filtrations and enables their optimization by simple means. The combination of automation and optimum thickness of filter cake leads to unusually high rates of filtration and low cost. Use of novel chamber presses made out of stainless steel is recommended.

TECHNICAL AND ECONOMIC ASPECTS OF A NEW COMBINED SEPARATION AND DRYING SYSTEM. M. Steinbrecher, *Fette, Seifen, Anstrichm.* 81(8), 311–6 (1979). In the preparation of biological or synthetic active principles, salts or other solid substances from liquids, the processes such as crystallization, filtration, washing and drying are mostly carried out consecutively. For this purpose several units such as crystallizer, filter and drier are generally used. The possibility of carrying out all these operations in a single unit, even under sterile conditions, is reported.

DEACIDIFICATION OF VEGETABLE OILS WITH AMMONIA—AN ENVIRONMENTALLY SAFE REFINING METHOD. H. Pardun, *Fette, Seifen, Anstrichm.* 81(8), 297–302 (1979). Compared to conventional deacidification of vegetable oils using sodium hydroxide, neutralization with aqueous ammonia has the advantage of being safe to the environment, because the deacidification agent can be repeatedly reused. Oils, especially soybean oil with low degree of oxidation, can be fully deacidified only with the help of ammonia. The same effect can be frequently achieved by a preliminary desliming with 5% formic acid or citric acid. Deodorization at 210 C of oils that have been deacidified with ammonia and washed with water yields bland and pale edible oils having good keepability.

γ IRRADIATION OF SUBTROPICAL FRUITS. 2. VOLATILE COMPONENTS, LIPIDS, AND AMINO ACIDS OF MANGO, PAPAYA, AND STRAWBERRY PULP. C.N. Blakesley, J.G. Loots, L.M. du Plessis, and G. de Bruyn (Div. of Food Chem., Natl. Food Research Inst., Council for Scientific and Industrial Research, Pretoria, South Africa, 0001) *J. Agric. Food Chem.* 27, 42–8 (1979). An investigation of volatile components, amino acids, and fatty acids in irradiated and nonirradiated mango, papaya, and strawberry pulp samples was made. Capillary gas chromatographic analyses of sample extracts have revealed at least 137 mango volatiles, 85 papaya volatiles, and 124 strawberry volatiles. It was also noted that the organoleptic qualities, volatile profiles, and lipid content of these fruits were highly dependent on the degree of maturity. This factor must be carefully considered in future comparative studies.

EFFECTS OF SUPPLEMENTAL IRON AND COPPER ON LIPID OXIDATION IN MILK. 1. COMPARISON OF METAL COMPLEXES IN EMULSIFIED AND HOMOGENIZED MILK. J. Hegenauer, P. Saltman, D. Ludwig, L. Ripley, and P. Bajo (Dept. of Biology, Univ. of Calif.-San Diego, La Jolla, CA 92093) *J. Agric. Food Chem.* 27, 860–7 (1979). Because of its wide consumption in the United States, cow milk is a good vehicle for delivering supplemental iron and copper to prevent anemia in infants, children, and adolescents, but transition metals may cause "oxidized" flavors and odors in dairy products. To help predict oxidative deterioration that may occur in commercially fortified milks and to complement organoleptic evaluations we describe the use of the thiobarbituric acid (TBA) test to quantitate lipid peroxidation due to iron and copper. Various chemical forms of iron and copper complexes—ionic, chelated, and polynuclear—are compared with respect to their ability to promote lipid peroxidation during short-term incubation and long-term cold storage in raw and pasteurized milk. Emulsification of milk fat prior to fortification greatly reduced lipid peroxidation by all metal complexes. Compared under any conditions to the simple ferrous and cupric salts, the iron(III) and copper(II) chelates of nitrilotriacetate and lactobionate produced significantly less lipid peroxidation at concentrations within the practical range of fortification.

EFFECTS OF SUPPLEMENTAL IRON AND COPPER ON LIPID OXIDATION IN MILK. 2. COMPARISON OF METAL COMPLEXES IN HEATED AND PASTEURIZED MILK. J. Hegenauer, P. Saltman, and D. Ludwig (Dept. of Biology, Univ. of Calif.-San Diego, La Jolla, CA 92093) *J. Agric. Food Chem.* 27, 868–71 (1979). The preceding paper showed that lipid oxidation in iron- and copper-supplemented dairy products can be reduced by the use of chelated forms of iron(III) and copper(II). Prolonged batch heating increased the susceptibility of raw milk to oxidation by chelated iron(III) but decreased oxidation by ferrous salts. Oxidation produced by a given metal complex was about the same whether the metal was added before or after heat treatment. Oxidation was affected very little by brief heating or by lengthening the interval between addition of iron and pasteurization by a high-temperature/short-time process. With any of the heating variables tested, the iron(III) chelates of nitrilotriacetate and lactobionate catalyzed less oxidation than ferrous salts. In order to minimize reactions leading to oxidative deterioration in fortified milk, the data indicate that the addition of chelated iron(III) and copper(II) should be made after homogenization (to emulsify and protect the milk fat fraction) but before pasteurization by a high-temperature/short-time process.

BUTYLATED HYDROXYANISOLE (BHA) RETENTION DURING THE EXTRUSION OF CORN. O.O. Fapojuwo and J.A. Maga (Colorado State Univ., Dept. of Food Science and Nutrition, Fort Collins, CO 80523) *J. Agric. Food Chem.* 27, 822–4 (1979). The Brabender plasticoder was used to extrude corn grits, containing 2,000 ppm of BHA, under different extruder conditions. Parameters varied during the extrusion process included temperature, screw size, screw speed, and the die size, and all these were statistically found not to influence the retention of BHA. Losses were due partially to volatility. However, other factors were assumed to include thermal degradation and thermal rearrangement.

ANALYSIS OF AUTOXIDIZED FATS BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY.—V. SOYBEAN OIL METHYL ESTERS. E.N. Frankel and W.E. Neff (Northern Reg. Res. Center, Agr. Res., Sci. and Education Admin., U.S. Dept. of Agr., Peoria, IL) *Lipids* 14, 39–46 (1979). An unusual distribution of hydroperoxides has been found in soybean oil esters oxidized at low levels (peroxide values below 50). The unexpectedly high concentration of the 12-hydroperoxide isomer is in marked contrast to the isomeric composition of oxidized pure linolenate. The different isomeric hydroperoxides observed at low levels of oxidation may contribute through their decomposition to the unique flavor deterioration of soybean oil.

FATTY ACID PROFILES OF THREE SWEET ORANGE CULTIVARS DURING MATURATION. H.E. Nordby and S. Nagy (U.S. Citrus and Subtropical Products Lab., Science and Education Admin., Federal Research, U.S. Dept. of Agriculture, Winter Haven, Florida 33880) *J. Agric. Food Chem.* 27, 15–9 (1979). Total lipid fatty acid profiles for Hamlin (early ripening), Pineapple (midseason ripening), and Valencia (late ripening) oranges were examined monthly over an 11-month growing period. Purified total lipid extracts were separated into neutral lipid, glycolipid, and polar lipid fractions, and each fraction, in turn, was analyzed for fatty acids. Fatty acid profiles were also obtained for the triglyceride and sterol ester fractions for the months of September (immature fruit) and April (mature fruit). Fatty acid analyses by GLC revealed three periods, or stages, in the maturation of the cultivars. The period of greatest change occured between July and the end of October; and the rate of change was greatest for Pineapple, next for Hamlin, and lastly, Valencia. Following this early rapid-change period was a 3- to 5-month period of relative inactivity (rates of change were noticeably lower). The late (senescent) period, which then ensued, showed accelerated rate changes for the major fatty acids. Each of the three orange cultivars showed different fatty acid profiles at their respective maturation dates.

PHOSPHOLIPIDS OF BARLEY GRAIN. J.G. Parsons and P.B. Price (Dairy Science Dept., South Dakota State Univ. and Science and Education Admin., U.S. Dept. of Agriculture, Brookings, SD 57007) *J. Agric. Food Chem.* 27, 913–5 (1979). Fractionation of the phospholipids of two barley (*Hordeum vulgare* L.) varieties, "Kearney" (winter type) and "Prilar" (spring type), by thin-layer chromatography produced ten lipid classes. Phosphorus analysis of each fraction showed that phosphatidylcholine, lysophosphatidylcholine, and phosphatidylethanolamine were present in highest amounts. Lesser amounts of phosphatidylserine, phosphatidylinositol, phosphatidylglycerol, diphosphatidylglycerol, and small amounts of phosphatidic acid and two unknown phospholipids were present. Fatty acids present in the fractions ranged from lauric (12:0) to arachidic (20:0). Linoleic acid (18:2) was the principal fatty acid in seven fractions and palmitic (16:0) was predominant in the other three fractions. This study provides a basis for monitoring of changes in phospholipids during cold acclimation of barley seedlings.

DISTRIBUTION OF LIPIDS IN EMBRYONIC AXIS, BRAN-ENDOSPERM, AND HULL FRACTIONS OF HULLESS BARLEY AND HULLESS OAT GRAIN. P.B. Price and J. Parsons (Science and Education Admin., U.S. Dept. of Agriculture, Plant Science Dept. (P.B.P.) and the Dairy Science Dept., South Dakota State Univ., Brookings, SD 57007) *J. Agric. Food Chem.* 27, 813–5 (1979). Content and composition of lipids in the embryonic axis, bran-endosperm, and hull fractions of hulless barley and hulless oat caryopses were determined as a basis for genetic improvement of the oil content of barley. Total lipid content of "Prilar Hulless" barley was 3.2% and "James Hulless" oats was 7.2%. Total lipid content of embryo, endosperm, and hull fractions of barley was 19.6, 2.8, and 2.4%, respectively, and of oats was 21.2, 7.1, and 4.4%, respectively. Barley had a higher percentage of linoleic acid (18:2) than oats, although linoleic was the predominant unsaturated fatty acid in the embryonic axis and bran-endosperm fractions in all lipid classes of both. Palmitic acid was the most abundant fatty acid in the glycolipid and phospholipid classes of barley hulls and the neutral lipid and glycolipid classes of oat hulls.

Drying oils and paints

INSULATING SURFACE COATINGS BASED ON CASTOR OIL. B.M. Badran, I.M. El-Anwar, M.S. Ibrahim and W.M. Khalifa (National Research Centre, Dokki, Cairo, Egypt) *J. Oil Colour Chem. Assoc.* 62, 199–208 (1979). Castor oil was dehydrated and the resulting dehydrated castor oil (DCO) was lightly maleinised in six different concentrations (1 to 6 per cent maleic anhydride). The dielectric constant and loss of the DCO as well as of the six samples of maleinised DCO adducts were measured within the frequency range of 10^5 to 10^7 Hz and at a temperature range of 10–50°C. Two of the maleinised DCO adducts were chosen for epoxidation. The epoxidised adducts were mixed with melamine resin. Stannic chloride

pentahydrate ($SnCl_4 \cdot 5H_2O$) was added as a catalyst, then films were cast on glass and tin plate. Glossy films of fair appearance and good physical and mechanical properties were obtained. An outstanding property was the film's excellent resistance to alkalies.

Classified Advertising

POSITION WANTED

A Ph.D. in Oils & Fats (1968), age 40 years, with 7 years of teaching and 7 years of industrial research experience, presently employed as R & D Chemist in India, with seven published papers, instrumental analysis, seeks research, teaching, analytical or industrial position. Desired salary minimum $12,000/-p.a. Contact: Box 251, American Oil Chemists' Society, 508 S. Sixth Street, Champaign, IL 61820.

Lipids Chemist

New England Nuclear, a world leader in the development and manufacture of radioactive chemicals for medical research, is seeking a senior level chemist for our Boston Labeled Chemicals Division.

Your responsibilities will include the synthesis and purification of labeled lipids and developing new areas of interest in the lipid field. Qualified applicants will have their PhD in Chemistry with technical expertise in lipids. Any postdoctoral experience would be helpful, as well as supervisory potential.

Interested applicants should forward their resume with salary history to Ann Magno, New England Nuclear, 549 Albany Street, Boston, MA 02118.

NEN New England Nuclear

...A BETTER WORLD

an equal opportunity employer

ASSISTANT PROFESSOR, FLAVOR CHEMISTRY

Applications are invited for a non-tenured Assistant Professor of Food Science for research in Flavor Chemistry and supervision of an interphased GC-Mass Spectrometer. Candidates should possess operation and interpretation of Mass Spectrometry. Must have strong background in food, organic, and physical chemistry. The appointment will be for one year, grant funded, with a salary of $16,793. Closing date for receipt of applications is December 31, 1979, or until position is filled. Applications with curriculum vitae, transcripts and names of three references should be sent to Dr. Henryk Daum, Chairman of Search Committee, Department of Food Science, Cook College/Rutgers University, P.O. Box 231, New Brunswick, New Jersey 08903.

An equal opportunity/affirmative action employer.

EMPLOYMENT WANTED

Senior chemical engineer with over 30 years plant, laboratory, R & D and management experience in vegetable oils seeks employment without regard to geographical location. Contact: Box 250, American Oil Chemists' Society, 508 South Sixth Street, Champaign, IL 61820.

PALM OIL RESEARCH INSTITUTE OF MALAYSIA

This new National institute is being developed to provide research and advisory services for the Malaysian Palm Oil Industry and its customers throughout the world.

VACANCIES FOR TECHNICAL ADVISORY OFFICERS

Applicants should be oils and fats technologists, aged not less than 30, who are graduates in a relevant science and have a minimum of 7 years experience in refining edible oils, including palm oil, or in the manufacture of shortenings and margarines.

After a period of orientation in Malaysia, duties will involve 3 to 6 months travel per year in countries that are present or potential users of palm oil to gain knowledge of their oils and fats industries and markets, and to provide information and technical assistance for their use of palm oil products. The officers will also fulfill a liaison role between users, the Institute and the Malaysian Palm Oil industry on problems and opportunities for palm oil.

Terms: 3 year contract; salary not less than Malay Dollars 5000 (2.2 Malay Dollars equals one U.S. Dollar approximately) per month (subject to negotiation), gratuity equal to 2 months salary per year on completion of contract, economy class airfares to Malaysia for officer, wife and chidren aged under 16 on appointment, termination and for annual leave (35 working days per year); free furnished quarters and medical attention.

Applications, including full curriculum vitae and passport-sized photograph to Director-General, Palm Oil Research Institute, 18th Floor, Angkasa Raya, Jalan Ampang, Kuala Lumpur 04-06 Malaysia, not later than February 1, 1980, from whom further particulars may be obtained.

SURPLUS . . . USED . . . AND REBUILT
PROCESS EQUIPMENT . . . FOR THE
EDIBLE OIL INDUSTRY.

PURCHASE AND SALE OF EQUIPMENT.
CONSULTATION.

"ZEKE" ZEHNDER

DuMond Company, Inc.

Watterson City Office Bldg. – Suite 702
Louisville, KY 40218 – 502/451-3901

TROUBLE-SHOOTING SPECIALIST

Specialize in solving manufacturing problems. We have outstanding track record of turning around a large Fats & Oils refinery in Midwest, resulting in significant improvement in cost per unit due to correction of plant problems such as labor, supervision, yield, quality, sanitation, energy usage, preventive maintenance and customer shipments.

If you can use our services for anyone of the problems or the entire plant operation, please contact us.

Shein and Associates
1800 Island Drive, Suite 201
Fullerton, CA 92633
(714) 738-6417

WILLIAM B. HENDRICK
Oil Mill Consultant

Asesor-Fabricas de Aceite
1914 Patton Court — Fort Worth, Texas 76110
Tele: 817/927-2294
(Se habla español)