ABSTRACTS

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

• Fats and Oils

PROPERTIES OF CHOLESTERYL ESTERS IN PURE AND MIXED MONOLAYERS. C. N. Kwong, R. E. Heikkila, and D. G. Cornwell (Dept. of Physiolog. Chem., Ohio State Univ., Columbus, Ohio 43210). *J. Lipid Res.* 12, 31–35 (1971). The surface properties of cholesteryl palmitate, stearate, linoleate, linolenate, arachidonate and acetate were investigated. Long-chain esters were not surface-active and force-area (π-A) isotherms were not obtained. Unsaturated cholesteryl esters were oxidized at the air-water interface and these oxidized lipids gave expanded π-A isotherms. Cholesterol acetate had an equilibrium spreading pressure of 14.0 dynes/cm and formed a stable monolayer indistinguishable from cholesterol below that surface pressure. Cholesteryl linoleate formed mixed monolayers with surface-active lipids, and the amount of cholesteryl linoleate in the monolayer depended both on its solubility in the other lipid and on the surface pressure. Even at moderate surface pressures cholesteryl linoleate was extruded from the monolayer into a bulk phase. Cholesteryl acetate exhibited the well-known condensing effect of cholesterol in mixed monolayers with egg lecithin.

THE COMPOSITION OF MARINE OIL TRIGLYCERIDES AS DETERMINED BY SILVER ION-THIN-LAYER CHROMATOGRAPHY. N. R. Bottino (Dept. of Biochem. and Biophysics, Texas A&M Univ., College Station, Texas 77843). *J. Lipid Res.* 12, 24–29 (1971). The fractionation of marine oil triglycerides according to their degree of unsaturation was achieved on silica gel thin-layers with 8% silver nitrate (w/w). Under the optimum conditions, cod liver and whale oils were reproducibly separated into seven and six fractions, respectively. The fatty acid compositions of the fractions obtained from cod liver and whale oils were further studied by gas-liquid chromatography. The following was found in both oils: Saturated and monoenoic acids were not only abundant in their corresponding fractions, but also comprised about two-thirds of the fatty acids in the more unsaturated fractions. Instead, polyenoic fatty acids of similar degrees of unsaturation predominated only in the particular fraction which corresponded to their number of double bonds. Thus, the distribution of fatty acids of varying degrees of unsaturation among marine triglycerides is not random.

THE ALKYL MOIETIES IN WAX ESTERS AND ALKYL DIACYL GLYCEROLS OF SHARKS. F. Spener and H. K. Mangold (Univ. of Minn., Hormel Inst., Austin, Minn. 55912). *J. Lipid Res.* 12, 12–15 (1971). The alkyl moieties in wax esters and alkyl diacyl glycerols from the liver of the dogfish, soupfin shark and silky shark are almost exclusively saturated and monounsaturated, the main alkyl moieties being the C_{16} and C_{18} chains in both lipid classes. However, the alkyl moieties in wax esters occur in a wider range of chain lengths. The unsaturated alkyl moieties in the two classes of lipids are mixtures of isomers. The distribution of isomeric octadecenyl moieties in wax esters and alkyl diacyl glycerols is almost the same.

MASS SPECTROMETRY OF NEUTRAL, MONO- AND DISIALOGLYCOSPHINGOLIPIDS. G. Dawson and C. C. Sweeley (Dept. of Biochem., Michigan State Univ., East Lansing, Mich. 48823). *J. Lipid Res.* 12, 56–64 (1971). Microgram quantities of complex glycosphingolipids were fully trimethylsilylated and analyzed by mass spectrometry. Reproducible ratios of the intensities of certain sugar fragment ions to the total intensity of ions characteristic of the sphingolipid bases were used to determine the number of monosaccharides in the glycosyl moiety and how many of them were unsubstituted at C-3. N-Acetylated hexosamine residues were readily detected and further characteristic fragment ions appeared if they were the terminal residues of the oligosaccharide chain. It was also possible to distinguish between the *N*-glycolyl and *N*-acetyl forms of neuraminic acid and to determine the number of sialic acid residues present in the lipid. Considerable information about the fatty acid and long-chain base composition was obtained from the same mass spectral analysis. It has been concluded that reliable structural information can be obtained from small amounts (less than 50 μg) of a purified glycosphingolipid.

FORMATION OF HYDROCARBONS IN THE AUTOXIDATION OF SATURATED FATTY ACIDS AND THEIR METHYL ESTERS. H. J. Kleinan and Ch. Neitzel (Inst. for Nutr. Chem. of the Tech. Univ., Braunschweig, Ger.). *Fette Seifen Anstrichmittel* 72, 1025–29 (1970). Oxidation of heated fatty acids and their methyl esters lead to the formation of saturated and unsaturated hydrocarbons among other reactions. These substances could be detected even when the material under investigation was subjected to thermal stress in the absence of oxygen. The hydrocarbons are formed by thermal decomposition of fatty acids.

SOLVENT CRYSTALLIZATION OF THE FAT AND FATTY ACIDS OF SCHLEICHERA TRIJUGA SEED. M. K. Kundu (Dept. of Applied Chem., Univ. of Colleges of Sci. and Tech., 92, Arharyga Profulla Chandra Road, Calcutta, 9, India). *Fette Seifen Anstrichmittel* 72, 1029–31 (1970). The crystallizations of kusum oil and the mixed fatty acids thereof were studied from several solvents at various temperatures (+10C to −60C). The results indicate, in general, that in this range, petroleum ether as a single solvent is comparable in efficiency to methanol and superior to both acetone and ethanol in respect to the separation of the saturated and unsaturated components of the fatty acid mixture. The saturated and unsaturated fractions of the oil also are better separated by petroleum ether than acetone. Further, oleic acid essentially free from linoleic acid is obtainable by a preliminary crystallization of the fatty acid mixture from petroleum ether at −12C, followed by two additional crystallizations from acetone at −55C.

FILTRATION OF EDIBLE OILS AND FATS AND ITS AUTOMATION. K. H. Rubbeling (N.V. AMA, Alkmaar, Holland). *Fette Seifen Anstrichmittel* 72, 1037–40 (1970). The various filtration operations in the edible oil industry are given. Processes are listed in which pressure filters, consisting of a pressure vessel and filter elements provided with metal cloth are advantageous. Automation of various filtration operations using these filters is dealt with.

NEW METHOD FOR THE IMPROVEMENT OF TALL OIL DISTILLATION. P. Knoer (Luwa A. G., Zurich, Switzerland). *Fette Seifen Anstrichmittel* 72, 1066–70 (1970). Experimental results are reported on the distillation of tall oil in a pilot plant as well as in an industrial unit. The process involves the use of thin-film evaporators that enable short time of contact. The yield of pitch is decreased. Undesirable side reactions, such as esterification, decarboxylation and polymerization are reduced. The typical characteristics of the fractions ob-

(Continued on page 229A)

(Continued from page 226A)

tained have been investigated and correlated with the operational data. It is shown that since the pretreatments of the product such as heating, dehydration and separation of pitch are carried out under very mild conditions, the subsequent fractionation of resin acids and fatty acids into fractions having low content of unsaponifiables can easily be achieved.

DIRECT DETERMINATION OF THE THIOBARBITURIC ACID VALUE IN TRICHLORACETIC ACID EXTRACTS OF FISH AS A MEASURE OF OXIDATIVE RANCIDITY. W. Vyncke (Ministry of Agri., Fisheries Res. Station, Ostend, Belgium). *Fette Seifen Anstrichmittel* 72, 1084–87 (1970). The possibilities of the direct determination of the thiobarbituric acid (TBA) value in trichloracetic acid (TCA) extracts instead of distillates were evaluated. Tests carried out on herring (*Clupea harengus* L), redfish (*Sebastes marinus* L) and spurdog (*Squalus acanthias* L.) of varying degree of oxidation gave 95.3% recovery in the teleost species but only 75.2% in the elasmobranch, due to the urea present. With the distillation technique, recoveries were lower and averaged 66.1% for teleosts and 43.0% for spurdog. Addition of 0.1% of both propyl gallate and EDTA to the TCA solution lowered TBA values by 25 to 59%. When fish samples were submitted to a 4 hours' forced oxidation period, TBA values increased to a greater extent with the direct extraction procedure than with the distillation method.

REVIEW OF LIPID ANALYSIS VII. THIN-LAYER CHROMATOGRAPHY, PART 4. Anon. *Fette Seifen Anstrichmittel* 72, 1091–1103 (1970). An extensive review covering the TLC analysis of phospho-, glyco- and sulfolipids, steroids and steroid esters, lipochromoids and lipochromoid esters, and olefins.

CHANGES IN PRESERVED MILK MARGARINE BROUGHT ABOUT BY LIPOLYTIC BACTERIA, YEAST, AND MOLDS. I. STUDIES ON PASTEURIZED AND NON-PASTEURIZED MARGARINE. A. Lorane *et al. Tluszcze Jadalne* 14(5), 243–56 (1970). Non-pasteurized margarines contain more micro-organisms and hence are less stable than pasteurized margarines. The chemical (*e.g.*, acid value, peroxide value, TBA value and carbonyl value) and organoleptic changes caused by the micro-organisms are much more important than the physical changes. (Rev. Franc. Corps Gras)

II. STUDIES WITH A MODEL SYSTEM. *Ibid.* 14(6), 303–14 (1970). A correlation was found between chemical changes and organoleptic evaluation. The correlation coefficients were as follows: acid value, −0.849; TBA test, −0.908; and carbonyl value, −0.917. The character of the chemical and organoleptic changes depends on the types of microorganisms present. (Rev. Franc. Corps Gras)

PRACTICAL TECHNICAL PLANS AND OPTIMUM OPERATIONS FOR THE TREATMENT OF CORN GERM PRODUCED BY WET MILLING. L. Stepanov *et al. Maslo-Sapunema Prom., Byul.* 6(3), 1–10 (1970). The procedure consists of prepressing the germ at 100–105C followed by extraction of the presscake without prior grinding. The yield of high quality oil from the prepressing is about 70%. The presscake leaving the extractor contains only 24% solvent against 33% for presscakes which had been made into flakes. (Rev. Franc. Corps Gras)

BLEACHING OF COTTONSEED OIL. EFFECT OF THE TIME OF STORAGE OF THE CRUDE OIL ON ITS BLEACHABILITY FOLLOWING ALKALI REFINING. I. Ilev. *Maslo-Sapunema Prom., Byul.* 6(3), 13–21 (1970). Using a spectrophotometric color determination, the maximum period of storage of the crude oil was found to be 6–7 days. The acid-activated bleaching earth "Rodopa" had the greatest decolorizing power and was better than West German and Italian earths (*e.g.*, Tonsil). (Rev. Franc. Corps Gras)

EJECTER PUMPS AND THEIR USE IN THE OIL PROCESSING INDUSTRY. W. Dziedzic. *Tluszcze Jadalne* 14(6), 323–31 (1970). Studies carried out at the Institute of the Fats and Oils Industry of Warsaw are described. This work resulted in Polish patents 56/993, 58/111, and 58/634, and several pending patents. The areas where the pumps have been particularly useful include degumming and refining. Trials have been carried out on passing gas into shortening and on the decomposition of soapstocks with sulfuric acid. (Rev. Franc. Corps Gras)

EFFECT OF THERMAL DRYING AND STORAGE ON THE OXIDATIVE STABILITY OF THE MITOCHONDRIA OF SUNFLOWER SEEDS RICH IN OIL. V. G. Scerbakov *et al. Izv. Vysshikh Uchebn.*

(Continued on page 230A)

(Continued from page 229A)

Zavedenii, Pishchevaya Tekhnol. 1970(6), 11–15. During the period just before harvest there is a general decrease in respiratory activity of the seeds. The loss of activity of enzymes involved in the Krebs Cycle is relatively greater than the loss in the enzymes involved in the glyoxylic cycle. The most desirable technical characteristics (oil content, acid value, intensity of respiration) were found in seeds harvested in two phases and in mature harvested seeds which were dried at 60C. (Rev. Franc. Corps Gras)

THE RELATIONSHIP BETWEEN METHODS FOR STUDYING THE STABILITY OF FATS. J. Slowikowska *et al. Tluszcze Jadalne* 14(6), 297–302 (1970). The following relationship was found between AOM values determined at 98.7C and at 110C: AOM(110C) × 2 ± 0.2 = AOM(98.7C). (Rev. Franc. Corps Gras)

DETERMINATION OF THE DECOLORIZING POWER OF ACTIVATED EARTHS. H. Szemraj *et al. Tluszcze Jadalne* 14(6), 291–6 (1970). The method is especially useful for evaluating earths used for bleaching rapeseed oil which does not contain more than 0.003% soaps. The color of the oil on the iodine scale should be between 45 and 58 mg I/100 ml of solution. The method consists of treating the oil to be bleached with 1% of the test earth at 90–95C, in an inert atmosphere, for 30 minutes. Only earths with decolorizing power greater than 80% proved satisfactory. (Rev. Franc. Corps Gras)

LINOLEIC ACID CONTENT OF MARGARINES AND BUTTER PRODUCED IN POLAND IN THE SECOND HALF OF 1969. C. Rozycki *et al. Tluszcze Jadalne* 14(5), 227–32 (1970). Poland produces two different margarines; one containing milk and the other a dessert margarine called "Palma." The first is made from a mixture of hydrogenated rapeseed oil and imported liquid oils such as sunflower, soya and cottonseed. The second uses either palm or coconut oil. The milk margarine usually contains 20–25% linoleic acid; the dessert margarine 15–20%, and butter only 1–1.5%. (Rev. Franc. Corps Gras)

COMPOSITION OF THE SEED, THE SHELL AND THE KERNEL OF OIL-RICH SUNFLOWER. J. Lezajic *et al. Bilten Biljna Ulja I Masti.* 7(2–3), 31–7 (1970). Seeds from the VNIIMK 8931, Peredovic, Smena, Armaveric, and Majak varieties of sunflower were examined. Moisture contents were 6.63–7.53% for the seed, 10.51–11.63% for the shell, and 4.99–5.53% for the kernel. Extractable matter in the seed averaged 47%; that of the shell varied from 2.42% to 3.58%. The shell contained 6.63% of the protein and 90% of the total cellulose in the seed. (Rev. Franc. Corps Gras)

EXTRACTION OF SEEDS CONTAINING A HIGH PROPORTION OF OIL WITHOUT PRESSING. E. Bernardini. *Bilten Biljna Ulja I Masti.* 7(2–3), 17–22 (1970). The method used was double extraction with solvents. Compared with the usual method employing pressing and extraction, the double extraction method offers advantages of greater capacity, a simpler process and lower capital and operating costs. (Rev. Franc. Corps Gras)

FLOOR POLISH REMOVERS. W. E. Draper and Mrs. Lou P. Johnson (Ind. Chem. Div., Eastman Chem. Products, Kingsport, Tenn.). *Soap Chem. Specialties* 47(1), 38–42, 74–5 (1971). Among aromatic amines studied, phenyldiethanolamine was very effective when used with enough ammonia to adjust the pH of the stripping solution to 10.5 or higher. In the absence of ammonia, sufficient inorganic alkaline reagents must be added to bring the pH to 12.5 or higher.

POSSIBILITIES OF USING ANIMAL FATS IN THE COKE INDUSTRY. ELIMINATION OF THIOPHENE FROM BENZENE. D. Ruscev *et al. Maslo-Sapunema Prom., Byul.* 6(3), 25–37 (1970). Benzene from coke containing 0.118% thiophene was purified by sulfuric acid treatment in the presence of different animal fats (pork fat, trimmings, skin, bone, fish oil and tallow), and also free fatty acids and technical grade oleic acid. The optimum addition of fat was 5–8%. The best results were obtained with 10% of 93–94% sulfuric acid and a reaction temperature of 40C. This procedure yielded a benzene with 0.0005% thiophene or less. (Rev. Franc. Corps Gras)

DECOMPOSITION OF THE CHLOROPHYLLS INTO PHEOPHYTINS DURING AUTOXIDATION OF RAPESEED OIL. I. DECOMPOSITION OF THE CHLOROPHYLLS IN AN OIL OF LOW ACID VALUE. I. Bratkowska *et al. Roczniki Technol. Chem. Zywnosci* 18, 69–75 (1970). In an oil of low acid value, chlorophylls A and B decompose into the corresponding pheophytins. These are the only ones present in an oil of this type. (Rev. Franc. Corps Gras)

RESIDUAL LIPIDS IN EXTRACTED RAPESEED PRESSCAKE. A. Katzer *et al. Tluszcze Jadalne* 14(6), 315–22 (1970). The residual lipids differ from normal rapeseed oil in fatty acid composition as well as amount of non-glyceride compounds. They contain less erucic acid and many times more unsaponifiable matter, sterols, phosphorus, and green color bodies. Considering the total amount of lipids, the proportions of these latter compounds are small, and it is still worth the effort to remove as much lipid as possible from the rapeseeds. (Rev. Franc. Corps Gras)

EFFECT OF OXIDATION OF THE OIL ON THE DETERMINATION OF THE TOCOPHEROL CONTENT OF INDUSTRIAL VEGETABLE OILS BY THIN-LAYER CHROMATOGRAPHY. A. Rutkowski *et al. Roczniki Technol. Chem. Zywnosci* 18, 57–67 (1970). Thin-layer chromatography using an alumina-benzene system is a rapid and simple method for the determination of tocopherols. It is most accurate on fresh oils. Oxidation of rapeseed oil during processing affects the accuracy adversely. In this case, it is necessary either to rechromatograph the sample or else prepurify it by column chromatography. (Rev. Franc. Corps Gras)

COMPOSITION OF THE BY-PRODUCTS OF THE REFINING INDUSTRY. G. P. Cygankova *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1970(6), 35–7. The material retained in the barometric wells during deodorization of hydrogenated oils contains, in addition to the fatty acids, a large quantity of unidentified material, apparently hydrocarbons. It is a problem to the industry to find a use for the large amounts of unsaponifiables in the soapstock and other by-products of refining. (Rev. Franc. Corps Gras)

INTERESTERIFIED BINARY MIXTURES AS BASE STOCKS FOR MARGARINE PRODUCTION. II. U. Fal *et al. Tluszcze Jadalne* 14(5), 233–42 (1970). This part of the study was concerned with mixtures of hydrogenated lard (1.1 I.V.) and liquid soybean or sunflower oil. The best mixtures for margarine contained 20–25% hydrogenated lard with 80–75% soybean oil, and 20% lard with 80% sunflower oil. These mixtures had softening points in the range of 31.4–34.4C. (Rev. Franc. Corps Gras)

• Fatty Acid Derivatives

THE DIMERIZATION OF OLEIC ACID WITH A MONTMORILLONITE CATALYST III. TEST OF THE REACTION MODEL. M.J.A.M. den Olter (Lab. of Chem. Tech., Tech. Univ. Eindhoven, The Netherlands). *Fette Seifen Anstrichmittel 72,* 1056–66 (1970). In order to check the reaction model proposed in a previous publication, a number of experiments were carried out with oleic acid (cis) and elaidic acid (trans) of >99% purity. By using an analogue computer the results were compared with the predictions from the model. It was observed that the model gave a good approximation of the experimental results, especially at low temperatures, at which no cracking products are formed. Elaidic acid dimerizes more rapidly than oleic acid, which indicates that in case of the dimerization of oleic acid, in the early stages of the reaction the geometrical isomerization is somewhat slower than the hydrogen transfer reaction. Later, the hydrogen transfer is rate determining. This explains why no dienoic acid could be found. The amounts of monoenic acid consumed to form dimeric and trimeric acids are always between the theoretical limits. If the dimerization reactions are reversible, the rates of the reverse reactions are very small.

A PREPARATIVE METHOD FOR OBTAINING N-BUTYLIC AND N-OCTYLIC ESTERS OF BRASSYLIC ACID. M. Beldowicz *et al. Tluszcze, Srodki Piorace, Kosmet.* 14(3), 98–9 (1970).

(Continued on page 232A)

(Continued from page 230A)

Brassylic acid resulting from the ozonolysis of erucic acid has the following characteristics: saponification value, 458; neutralization value, 457.3; melting point, 112C; fatty acid composition (weight per cent): tridecanedioic, 98.1; dodecanedioic, 1.0; undecanedioic, 0.3; unidentified, 0.6. Esterification was carried out with the following proportions of reagents: brassylic acid, 1 mole; alcohol, 3 moles; *p*-toluenesulfonic acid, 0.035 mole; benzene, 10 times the quantity of brassylic acid. The products contained little unreacted brassylic acid (acid value, 1.5–2.1) or alcohol (hydroxyl value, 4.4–1.6). The yield was good (*n*-butylic diester, 91%; *n*-octylic diester, 97.7%). (Rev. Franc. Corps Gras)

DISTRIBUTION OF FATTY ACIDS IN SYNTHETIC TRIGLYCERIDES. B. N. Tjutjunnikov *et al. Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* **1970**(6), 25–7. Esterification of glycerol with the fatty acids from beef tallow produced the following amounts of the different types of glycerides: GS_3, 14.97%; GS_2U, 39.67%; GSU_2, 35.04%; GU_3, 40.32%. When the equivalent amount of fatty acids was used, the equilibrium distribution was close to the statistical distribution. (Rev. Franc. Corps Gras)

• Biochemistry and Nutrition

CYCLIC NUCLEOTIDE-DEPENDENT PROTEIN KINASES. VIII. AN ASSAY METHOD FOR THE MEASUREMENT OF ADENOSINE 3′,5′-MONOPHOSPHATE IN VARIOUS TISSUES AND A STUDY OF AGENTS INFLUENCING ITS LEVEL IN ADIPOSE CELLS. J. F. Kuo and P. Greengard (Dept. of Pharmacol., Yale Univ. Schl. of Med., New Haven, Conn. 06510). *J. Biol. Chem.* **245**, 4067–73 (1970). An assay method has been developed for the measurement of tissue levels of adenosine 3′,5′-monophosphate (cyclic AMP) based upon the ability of the cyclic nucleotide to activate cyclic AMP-dependent protein kinase purified from bovine heart, kidney cortex or brain. In isolated adipose cells, Filipin, a polyene antibiotic with antilipolytic properties, decreased the intracellular cyclic AMP level, apparently by causing its leakage from the cells into the incubation medium. The data also show a differential inhibition by Ca^{++}, EDTA, and *dl*-β-hydroxy-*N*-*tert*-butyl-2,4-dichlorophenethylamine of the action of various lipolytic hormones in elevating cyclic AMP levels in adipose cells. It is suggested that there occur at least three distinct types of hormone "receptor" in adipose cells, each interacting specifically with one of three categories of hormone, namely, (a) norepinephrine, (b) glucagon, and (c) corticotropin and thyroid-stimulating hormone.

KETONE BODY AND FATTY ACID METABOLISM IN SHEEP TISSUES. 3-HYDROXYBUTYRATE DEHYDROGENASE, A CYTOPLASMIC ENZYME IN SHEEP LIVER AND KIDNEY. Patricia P. Koundakjian and A. M. Snoswell (Dept. of Agr. Biochem., Waite Agr. Res. Inst., Univ. of Adelaide, Glen Osmond, S. Austral., Australia 5064). *Biochem. J.* **119**, 49–57 (1970). 3-Hydroxybutyrate dehydrogenase (EC 1.1.1.30) activities in sheep kidney cortex, rumen epithelium, skeletal muscle, brain heart and liver were 177, 41, 38, 33, 27 and 17 μmol/h per g of tissue respectively, and in rat liver and kidney cortex the values were 1150 and 170 respectively. Laurate, myristate, palmitate and stearate were not oxidized by sheep liver mitochondria, whereas the L-carnitine esters were oxidized at appreciable rates. The free acids were readily oxidized by rat liver mitochondria. During oxidation of palmitoyl-L-carnitine by sheep liver mitochondria, acetoacetate production accounted for 63% of the oxygen uptake. The physiological implications of the low activity of 3-hydroxybutyrate dehydrogenase in sheep liver and the fact that it is found in the cytoplasm in sheep liver and kidney cortex are discussed.

UTILIZATION OF ETHANOL AND ITS EFFECT ON FATTY ACID PATTERNS IN RUMINANTS. K. Pradhan and R. W. Hemken (Dept of Dairy Sci., Univ. of Maryland, College Park, Md. 20742). *J. Dairy Sci.* **53**, 1739–46 (1970). In an in vivo experiment designed as a Latin-square, an ethanol solution was continuously infused for 5 weeks into the rumen of 4 lactating Holstein cows fed 2 rations (a milk fat depressing, high-grain and a 40% hay control). Ethanol (1300 to 1500 ml/day) infusion caused a three- to fourfold increase in the proportion of iso-valeric acid in the rumen fluid, which was accompanied by an approximately equimolar decrease in propionic acid. Also the concentrations of *n*-valeric and caproic acids were higher in the rumen during the ethanol infusion period. Ethanol disappeared more rapidly from the rumen ingesta of cows fed the high grain diet. Milk fat was increased by ethanol infusion with both rations. An adaptation to alcohol by rumen microorganisms was demonstrated in vitro. The importance of ethanol in the synthesis of iso-valeric acid, as studied in vivo, was also demonstrated in vitro by a higher specific activity of the C5 fraction (iso-valeric and *n*-valeric acid). An increase in ruminal iso-valeric acid with a concomitant decrease in the propionic acid concentration during in vivo ethanol infusion, coupled with a greater in vitro incorporation of ethanol-2-^{14}C presumably into the isovaleric acid, may suggest a possible common intermediate for the bio-synthesis of these acids in the rumen.

EFFECT OF METHOD OF DETERMINATION ON THE METABOLIZABLE ENERGY VALUE OF RAPESEED MEAL. P. V. Rao and D. R. Clandinin (Dept. of Animal Sci., Univ. of Alberta, Edmonton, Alberta, Canada). *Poultry Sci.* **49**, 1069–74 (1970). Studies were conducted to determine whether the metabolizable energy (ME) value of rapeseed meal was affected by the type of reference ration used in the procedure for the determination of ME. The ME value for rapeseed meal obtained when the procedure followed involved the substitution of rapeseed meal for glucose in a semipurified-type reference ration was significantly lower ($P \leq 0.05$) than when the value was obtained by a procedure involving the substitution of rapeseed meal for part of a practical-type reference ration. The data confirm the finding that the ME value of rapeseed meal is unaffected by the presence of progoitrin in rapeseed meal and that the ME value of rapeseed meal for chickens increases as the age of the chickens increases.

FACTORS AFFECTING THE METABOLIZABLE ENERGY VALUE OF RAPESEED MEAL. 2. NITROGEN ABSORBABILITY. G. N. Lodhi, Ruth Renner and D. R. Clandinin (Dept. of Animal Sci. and Schl. of Household Economics, Univ. of Alberta, Edmonton, Alberta, Canada). *Poultry Sci.* **49**, 991–98 (1970). Studies were conducted to determine the apparent absorbability of nitrogen in rapeseed meal by growing chickens and laying hens. Metabolizable energy values of rapeseed meal for 4 week old chicks, 6 week old chicks and laying hens, determined when rapeseed meal served as the sole source of dietary nitrogen, were 1880, 1865 and 1800 kcal. per kilogram, respectively. The higher metabolizable energy values obtained, when rapeseed meal served as the sole source of protein, were due, at least in part, to the difference in the absorbability of nitrogen under the two feeding systems (79.7 vs. 63.0%).

FURTHER STUDIES ON THE LINOLEIC ACID REQUIREMENT OF HEN USING PURIFIED AND PRACTICAL TYPE DIETS. H. Menge (U.S. Dept. of Agr., Animal Husbandry Res. Div., ARS, Beltsville, Md. 20705). *Poultry Sci.* **49**, 1027–30 (1970). The effects of a purified diet *vs.* practical type diets on the linoleic acid (18:2) requirement of the hen was studied. After an experimental period of 32 weeks, the data showed that the hen required approximately 2% 18:2 for egg production and at least 0.75% for hatchability in the diets used in this study. Hens fed the purified diet required between 1–1.5% dietary 18:2 for maximum egg weight. Both practical type diets stimulated a significant increase in egg weight over that observed in the groups fed the purified diets. This suggests that a factor(s) other than 18:2 is involved. Hens receiving a corn-soy diet containing fish meal and alfalfa exhibited a significant increase over all other groups in the percentage of fertile eggs produced.

SYNTHESIS AND CHARACTERIZATION OF C_3 AND C_{17} STEROIDAL AMINES. R. Glaser and E. J. Gabbay (Sch. of Chem., Rutgers, the State Univ., New Brunswick, N.J. 08903). *J. Org. Chem.* **35**, 2907–12 (1970). The synthesis and characterization of 5α-androstane C_3 and C_{17} amines are reported. Primary, tertiary and quarternary mono- and diammonium salts of 5α-androstane have been synthesized. The salts are found to interact selectively with nucleic acids.

(Continued on page 235A)

(Continued from page 232A)

TERPENOIDS. LXVII. CHEMICAL STUDIES OF MARINE INVERTEBRATES. VII. INTERRELATION OF SEYCHELLOGENIN AND LANOSTEROL THROUGH LANOSTANE-3β,11β,18-TRIOL. P. Roller, B. Tursch and C. Djerassi (Dept. of Chem., Stanford Univ., Stanford, Calif. 94305). *J. Org. Chem.* **35**, 2585–93 (1970). Seychellogenin and lanosterol were chemically correlated through a common intermediate, lanostane 3β,11β,18-triol. Seychellogenin was reduced to the triol, whose 3,18-diacetate was dehydrated and then hydrogenated to give a mixture of C-20 epimer. Reduction provided the desired triol.

BIOLOGICAL ACITIVITY OF 25-HYDROXYERGOCALCIFEROL IN RATS. T. Suda, H. F. DeLuca and Y. Tanaka (Dept. of Biochem., Univ. of Wisconsin, Madison, Wis. 53706). *J. Nutr.* **100**, 1049–52 (1970). 25-Hydroxyergocalciferol is 1.5 times more effective than either vitamin D_2 or D_3 in curing rickets in rats (60 units antirachitic activity per microgram). It is effective in inducing intestinal calcium transport and mobilization of bone mineral in rats and acts much more rapidly in these two systems than does vitamin D_2.

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

IODINATION OF GLYCERALDEHYDE 3-PHOSPHATE DEHYDROGENASE. J. O. Thomas and J. I. Harris (Med. Res. Council Lab. of Molecular Biology, Hills Road, Cambridge CB2 2QH, U.K.). *Biochem. J.* **119**, 307–16 (1970). A high degree of homology in the positions of tyrosine residues in glyceraldehyde 3-phosphate dehydrogenase from lobster and pig muscle, and from yeast, prompted an examination of the reactivity of tyrosine residues in the enzyme. Iodination of the enzyme from lobster muscle with low concentrations of potassium tri-[^{125}I]-iodide led to the identification of tyrosine residues of differing reactivity. Tyrosine-46 appeared to be the most reactive in the native enzyme. When the monocarboxymethylated enzyme was briefly treated with small amounts of iodine, iodination could be confined almost entirely to tyrosine-46 in the lobster enzyme; tyrosine-39 or tyrosine-42, or both, were also beginning to react. These three tyrosine residues were also those that reacted most readily in the carboxymethylated pig and yeast enzymes. The difficulties in attaining specific reaction of the native enzyme are considered. The differences between our results and those of other workers are discussed.

ROLE OF SPECIFIC GLYCOPEPTIDES OF HUMAN SERUM LIPOPROTEINS IN THE ACTIVATION OF LIPOPROTEIN LIPASE. R. J. Havel, Virgie G. Shore, B. Shore and D. M. Bier (Cardiovascular Res. Inst. and the Dept. of Med., Univ. of Calif. San

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Francisco Med. Cen., San Francisco, Calif. 94122). *Circulation Res.* 27, 595–600 (1970). Lipoprotein lipase forms an enzyme-substrate complex with fat emulsions in the presence of serum lipoproteins. Lipoproteins of very low density and high density have this property, but the former are much more active per unit weight of protein. In this investigation, the activity, expressed as quantity giving half-maximal rate of production of free fatty acids, of specific glycopeptides isolated from very low density and high density lipoproteins was tested in an incubation mixture containing lipoprotein lipase from cows' milk and 1.8 mg triglyceride per ml. The two major polypeptides of high density lipoproteins were virtually inactive in amounts up to 100 μg per ml. Activity of the unfractionated apoproteins of very low density lipoprotein was similar to that of the native lipoprotein (about 4 μg/ml). These studies indicate that specific glycopeptides are required for the action of lipoprotein lipase on emulsified triglycerides and suggest that they are important components of the mechanism for extra-hepatic utilization of plasma triglycerides.

HEAT INCREMENTS OF STEAM-VOLATILE FATTY ACIDS INFUSED SEPARATELY AND IN A MIXTURE INTO FASTING COWS. J. B. Holter, C. W. Heald and N. F. Colovos (Dept. of Animal Sci., Ritzman Lab., Univ. of New Hampshire, Durham 03824). *J. Dairy Sci.* 53, 1241–47 (1970). Heat increments for equicaloric amounts of acetic, propionic and butyric acids and a 52A:31P:17B molar mixture of acids were determined in mature, fasted dairy cows. Acids were infused continuously into the rumen at 32 kcal per kilogram body wt daily. A number of rumen fluid and blood traits were measured daily during each of 10 experiments. No acidosis was indicated by the CO_2-combining capacity of whole venous blood. Mean heat increments were acetic acid, 40; propionic acid, 18; butyric acid, 18; and acid mixture, 32 kcal per 100 kcal metabolizable energy.

• *New Books . . .*

(Continued from page 234A)

ray, helium, micro cross-section and electron capture detectors.

Both qualitative and quantitative treatment of data is considered in Chapter 4. Relationships between component retention times and carbon number or boiling point are discussed and illustrated. Quantitation of data is viewed with regard to possible sources of error from numerous possibilities. Sampling, sample storage, adsorption or decomposition of sample, detector performance and peak area measurement are all studied. Methods for quantitating peak area (triangulation, planimetry, cut and weight, mechanical and electronic integrators) are briefly discussed

Chapter 5 deals with ancillary techniques in gas chromatography. Topics include sample collection, spectrophotometric analysis of eluted fractions, thin layer chromatographic treatment, reaction gas chromatography as related to hydrogenation, elemental analysis, radio chromatography, pyrolysis and derivative formation of eluted fractions. Process control chromatography is also briefly discussed with regard to detectors, sampling technique and availability of process analyzers.

Chapter 6 presents a concise review of chromatography publications and a comprehensive review of gas chromatography instrumentation available today. Additional listings include suppliers of associated materials such as syringes, support phases and stationary phases with suitable solvents for coating. Safe upper temperature limits for usage with the various stationary phases are tabulated for easy reference.

The brief, but informative nature of this book makes it an excellent primer for anyone contemplating purchase or use of a gas chromatograph. It is well illustrated and current in its references.

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THE ABSORPTION AND METABOLISM OF ORALLY ADMINISTERED TRITIUM LABELED SODIUM STEARYL FUMARATE IN THE RAT AND DOG. S. K. Figdor and R. Pinson (Dept. of Pharmacol., Med. Res. Lab., Chas. Pfizer & Co., Inc., Groton, Conn. 06430). *J. Agr. Food Chem.* 18, 872–80 (1970). Sodium stearyl fumarate labeled with tritium at carbon atom 1 of the stearyl alcohol moiety was administered by stomach tube to rats and dogs. Examination of excreta and body fluids indicated that in the rat approximately 80% of the dose was absorbed. The major portion of absorbed sodium stearyl fumarate was metabolized within 2 hr following administration, and was completely metabolized in less than 8 hr. Tritium water was the source of the only significant radioactivity found in body fluids. The sodium stearyl fumarate that was not absorbed, approximately 20% of the administered dose, was excreted in the feces as a mixture of stearyl fumarate and stearyl alcohol. When the experiment was repeated with rats which had received 300 mg/kg unlabeled sodium stearyl fumarate daily for 90 days (stressed rats), the absorption and metabolism of sodium stearyl fumarate was indistinguishable from results obtained with control untreated rats. In the dog, approximately 35% of the administered dose of sodium stearyl fumarate was absorbed and rapidly metabolized. Tritium water was the only source of significant radioactivity found in body fluids within 8 hr after administration. Sodium stearyl fumarate not absorbed, approximately 65% of the dose, was excreted unchanged in the feces within the first 24 hr. The metabolism of sodium stearyl fumarate is qualitatively the same in the rat and dog.

CITRUS JUICE CHARACTERIZATION. IDENTIFICATION AND ESTIMATION OF THE MAJOR PHOSPHOLIPIDS. C. E. Vandercook, H. C. Guerrero and Ruth L. Price (Fruit and Vegetable Chem. Lab., Agr. Res. Ser., USDA, Pasadena, Calif. 91106). *J. Agr. Food Chem.* 18, 905–7 (1970). The major phospholipids in orange, lemon and grapefruit juices were identified as phosphatidylethanolamine (PE), phosphatidylcholine (PC), phosphatidic acid (PA), phosphatidylserine (PS) and phosphatidylinositol (PI). The individual phospholipids were separated by thin-layer chromatography and estimated by their phosphorus content. The average values (mg per 100 ml) for orange, lemon, and grapefruit juices were: PE, 13, 11, 6; PC, 14, 12, 8; PA, 2, 0.7, 0.2; PS, 1, 1, 0.2; and PI, 3, 5, 3, respectively. An unidentified phospholipid was observed in commercial orange juice and several lemon and grapefruit juices, but not in any of the fresh hand-reamed juices.

THE PENETRATION OF SERUM ALBUMIN INTO PHOSPHOLIPID MONOLAYERS OF DIFFERENT FATTY ACID CHAIN LENGTH AND INTERFACIAL CHARGE. P. Quinn and R. M. C. Dawson (Dept. of Biochem., Agr. Res. Council Inst. of Animal Physiol., Babraham, Cambridge CB2 4AT, U.K.). *Biochem. J.* 119, 21–25 (1970). The highest surface pressure of phosphatidylcholine monolayers allowing penetration of delipidated serum albumin decreased in the order dibehenoyl > distearoyl > dipalmitoyl = dimyristoyl. This pressure was not related to the area occupied or to the space available between the phospholipid molecules at the interface. Penetration of albumin into yeast phosphatidylcholine monolayers was increased by adding a small percentage of long-chain anions (phosphatidic acid, dicetylphosphoric acid) to the film but only when the protein was below its isoelectric point (i.e. positively charged). Stearylamine added to phosphatidylcholine monolayers had no effect on albumin penetration even when the protein was oppositely charged to that of the phospholipid/water interface. The results are discussed in relation to the activation of certain phospholipases by anionic amphipathic substances.

THE USE OF CONVENTIONAL AND ZONAL CENTRIFUGATION TO STUDY THE LIFE CYCLE OF MAMMALIAN CELLS. PHOSPHOLIPID AND MACROMOLECULAR SYNTHESIS IN NEOPLASTIC MAST CELLS. A. M. H. Warmsley and C. A. Pasternak (Dept. of Biochem., Univ. of Oxford, Oxford OX1 3QU, U.K.). *Biochem. J.* 119, 493–99 (1970). Conventional gradient centrifugation has been used to separate cells according to their position in the cell cycle, and to obtain synchronously growing cells. Analysis of prelabelled cells by gradient centrifugation confirms that phospholipid, protein and RNA synthesis begins to increase already during the G_1 phase. The pattern of phospholipid degradation follows that of synthesis. The limitations of conventional gradient centrifugation have been overcome by use of a zonal rotor. Analysis of prelabelled cells confirms the results obtained by conventional centrifugation and in

(Continued on page 238A)

(Continued from page 236A)

addition shows that the rates of phospholipid, protein and RNA synthesis decrease during the G_2 phase. The mean cell volume and the net amount of phospholipid, protein and RNA, unlike that of DNA, are found to increase continuously throughout the intermitotic period. These results show that the synthesis of macromolecules, and probably that of membranes also, is controlled by a mechanism other than that of gene dosage.

PHOSPHOLIPID SYNTHESIS AND DEGRADATION DURING THE LIFE-CYCLE OF P815Y MAST CELLS SYNCHRONIZED WITH EXCESS OF THYMIDINE. J. J. M. Bergeron, A. M. H. Warmsley and C. A. Pasternak (Dept. of Biochem., Univ. of Oxford, Oxford OX1 3QU, U.K.). *Biochem. J.* 119, 489–92 (1970). P815Y cells synchronized with excess of thymidine incorporate choline, proline and uridine throughout the cell cycle; the rate increases two- to four-fold during the S phase, when thymidine incorporation increases more than 15-fold. Choline incorporated at any stage of the cell cycle turns over in a biphasic manner; stable and unstable components are each labelled maximally during the S phase. Total phospholipid also doubles predominantly during the S phase. It is concluded that, despite turnover, choline incorporation is a useful measure of net phospholipid formation during the cell cycle.

METABOLISM OF PROSTAGLANDIN E_2 IN GUINEA PIG LIVER. I. IDENTIFICATION OF SEVEN METABOLITES. M Hamberg and U. Israelsson (Dept. of Med. Chem., Royal Vet. College, Stockholm, Sweden). *J. Biol. Chem.* 245, 5107–14 (1970). Seven metabolites were isolated by reversed phase partition chromatography and thin-layer chromatography after incubation of tritium-labeled prostaglandin E_2 with the soluble fraction of homogenates of guinea pig liver. The two major compounds (forming about 61% of the recovered radioactivity) were identified as 11α,15-dihydroxy-9-ketoprost-5-enoic acid and 11α-hydroxy-9,15-diketoprost-5-enoic acid. Three compounds (together about 26% of the recovered radioactivity) belonged to the F series of prostaglandins and were identified as prostaglandin $F_{2\alpha}$, 9α,11α,15-trihydroxyprost-5-enoic acid and 9α,11α-dihydroxy-15-keto-prost-5-enoic acid. The isolation of these compounds after incubation of prostaglandin E_2 for the first time showed that prostaglandin F_α compounds can be formed from prostaglandin E compounds in animal tissue. Two minor compounds (together about 5% of the recovered radioactivity) were identified as 8-isoprostaglandin E_2 and, tentatively, 8-isoprostaglandin $F_{2\alpha}$.

REGULATION OF MICROSOMAL ENZYMES BY PHOSPHOLIPIDS. I. THE EFFECT OF PHOSPHOLIPASES AND PHOSPHOLIPIDS ON GLUCOSE 6-PHOSPHATASE. D. Zakim (Div. of Mol. Biol., Veterans Admin. Hosp., San Francisco, Calif. 94121). *J. Biol. Chem.* 245, 4953–61 (1970). Incubation of bovine liver microsomes with partially purified phospholipase A from *Naja naja* venom inactivates the phosphohydrolase activities of glucose 6-phosphatase, but there is no quantitative correlation between hydrolysis of phospholipids and loss of enzyme activity. Furthermore, addition of EDTA to an incubating mixture of microsomes and phospholipase A completely stops hydrolysis of phospholipids, but does not halt the decline of glucose 6-phosphatase activity. These results indicate that hydrolysis of phospholipids by phospholipase A does not per se inactivate glucose 6-phosphatase. Instead, hydrolysis of phospholipids by phospholipase A produces an unstable form of the enzyme.

BIOSYNTHESIS OF A MYCOBACTERIAL LIPOPOLYSACCHARIDE. PROPERTIES OF THE POLYSACCHARIDE METHYLTRANSFERASE. J. A. Ferguson and C. E. Ballou (Dept. of Biochem., Univ. of Calif., Berkeley, Calif. 94720). *J. Biol. Chem.* 245, 4213–23 (1970). Whole cells of *Mycobacterium phlei*, incubated with methyl-^{14}C-L-methionine, synthesize a 6-0-methyl-D-glucose-containing lipopolysaccharide in which the methyl groups of the 6-0-methylglucose become extensively labeled. A soluble enzyme was obtained from sonically disrupted *M. phlei* cells which catalyzed the transfer of methyl groups from methyl-^{14}C-S-adenosylmethionine to endogenous acceptor, yielding labled lipopolysaccharide. Nucleotides containing 6-0-methylglucose could not be detected in such incubations or in incubations with whole cells.

DENATURATION OF GLOBULAR PROTEINS. II. THE INTERACTION OF UREA WITH LYSOZYME. J. R. Warren and J. A. Gordon (Dept. of Pathol., Univ. of Colorado Schl. of Med., Denver, Col. 80220). *J. Biol. Chem.* 245, 4097–4104 (1970). The extent of urea interaction with lysozyme in aqueous solution at various concentrations of urea was shown to equal that previously reported for bovine serum albumin. The native stability toward mercaptans observed with lysozyme in aqueous acetamide was consistent with the smaller solute-protein interaction and the known poor denaturing ability of this amide.

ON THE MODE OF ACTION OF LIPID-LOWERING AGENTS. III. KINETICS OF ACTIVATION AND INHIBITION OF ACETYL COENZYME A CARBOXYLASE. M. E. Maragoudakis (CIBA Pharmaceutical Co., Res. Dept., Summit, N.J. 07901). *J. Biol. Chem.* 245, 4136–40 (1970). Kinetic analyses were carried out for the isocitrate activation, and the inhibition by hypolipidemic drugs of avian liver acetyl-CoA carboxylase. Inhibition was found to be competitive for both the substrate acetyl-CoA, and the activator isocitrate and noncompetitive for ATP and HCO_3^-. The isocitrate activation of the enzyme was shown to be due to an elevation of V_m values for the substrates, acetyl-CoA and ATP, rather than their apparent Michaelis constants (K_m). Molecular orders of participation for acetyl-CoA in the carboxylation reaction, and for isocitrate in the activation process of the enzyme seem to be approximately 1 as shown by Hill-type analysis. Relative affinities of acetyl-CoA carboxylase for acetyl-CoA, isocitrate, and the drugs are expressed by the dissociation constants calculated for acetyl-CoA and isocitrate and the inhibition constants of the drugs. These constants indicate that the drugs may interfere with acetyl-CoA carboxylase activity in vivo either by competing with the activator isocitrate or the substrate acetyl-CoA.

THE EFFECT OF STEROIDS AND NUCLEOTIDES ON SOLUBILIZED BILIRUBIN URIDINE DIPHOSPHATE-GLUCURONYL-TRANSFERASE. B. P. F. Adlard and G. H. Lathe (Dept. of Chem. Pathol., Univ. of Leeds, Leeds LS2 9NL, U.K.). *Biochem. J.* 119, 437–45 (1970). It was confirmed that bilirubin glucuronyltransferase can be obtained in solubilized form from rat liver microsomes. Michaelis-Menten kinetics were not followed by the enzyme with bilirubin as substrate when the bilirubin/albumin ratio was varied. High concentrations of bilirubin were inhibitory. The K_m for UDP-glucuronic acid at the optimum bilirubin concentration was 0.46mM. Low concentrations of Ca^{2+} were inhibitory in the absence of Mg^{2+} but stimulatory in its presence; the converse applied for EDTA. UDP-*N*-acetylglucosamine and UDP-glucose enhanced conjugation by untreated, but not by solubilized microsomes. The apparent 9.5-fold increase in activity after solubilization was probably due to the absence of UDP-glucuronic acid pyrophophatase activity in the solubilized preparation. The activation of solubilized enzyme activity by ATP was considered to be a result of chelation of inhibitory metal ions. The solubilized enzyme activity was inhibited by UMP and UDP. The effect of UMP was not competitive with respect to UDP-glucuronic acid. A number of steroids inhibited the solubilized enzyme activity. The competitive effects of stilboestrol, oestrone sulphate and 3β-hydroxyandrost-5-en-17-one, with respect to UDP-glucuronic acid, may be explained on an allosteric basis.

COMPARATIVE HEMATOLOGY DURING DEFICIENCIES OF IRON AND VITAMIN A IN THE RAT. E. K. Amine, Joyce Corey, D. M. Hegsted and K. C. Hayes (Dept. of Nutr., Harvard Schl. of Public Health, Boston, Mass. 02115). *J. Nutr.* 100, 1033–40 (1970). Male weanling rats were used in three experiments to study the hematologic response during deficiencies of iron and vitamin A, or both deficiencies together. In the first study 24 animals were divided into four groups and fed an iron-low, vitamin A-low, iron- and vitamin A-low, or a control diet. Iron deficiency resulted in hypochromic microcytic anemia, whereas vitamin A deficiency produced hypochromic microcytic polycythemia. A normocytic hypochromic anemia developed in animals deficient in both iron and vitamin A. Growth retardation occurred in all vitamin A deficiency studies, the retention of radioactive iron was tested at three levels of vitamin A supplementation. Under these conditions iron absorption and retention were inversely related to vitamin A intake. This was thought to be a reflection of increased hematopoiesis produced by vitamin A deficiency. In a third experiment the effect of limited resupplementation of either iron or vitamin A to animals deficient in both iron and vitamin A was tested. Iron supplementation produced a direct positive response in growth and red blood cell counts whereas the limited vitamin A supplement produced delayed decreases in growth and red cell number. These data suggest that vitamin A and iron are interrelated factors in hematologic responses of the rat.

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(Continued from page 238A)

ON THE MECHANISMS OF pH-DEPENDENT HYDROGEN EXCHANGE OF BOVINE PLASMA ALBUMIN IN THE RANGE OF pH 5 TO 8.5. E. S. Benson and B. E. Hallaway (Dept. of Lab. Med. and Biochem., Univ. of Minn. Med. Sehl., Mnpolis., Minn. 55455). *J. Biol. Chem.* 245, 4144–49 (1970). Hydrogen exchange rates of bovine plasma albumin vary over the range of pH 5 to 8.5. As the pH is raised, the number of very slowly exchanging hydrogens decreases and the number of rapidly exchanging hydrogens steadily increases. The effects of sodium dodecyl sulfate, glycerol and changing ionic strength were also studied at pH 5 and 7.7. The results were consistent with three possible explanations: (a) that these agents stabilize compact conformational states of segments of bovine plasma albumin. (b) that they reduce segmental conformational "motility"; or (c) that they alter the local environment of individual exchanging groups and thus influence the rate dependencies of exchange of these units.

THE REGULATION OF TRIGLYCERIDE SYNTHESIS AND FATTY ACID SYNTHESIS IN RAT EPIDIDYMAL ADIPOSE TISSUE. EFFECTS OF INSULIN, ADRENALINE AND SOME METABOLITES IN VITRO. E. D. Saggerson and A. L. Greenbaum (Dept. of Biochem., Univ. Col. London, Gower Street, London W.C.1, U.K.). *Biochem. J.* 119, 193–219 (1970). Adipose tissues from rats fed a balanced diet were incubated in the presence of glucose (20mM) with the following additions: insulin, anti-insulin serum, insulin + acetate, insulin + pyruvate, insulin + lactate, insulin + phenazine methosulphate, insulin + oleate + albumin, insulin + adrenaline + albumin, insulin + 6-N-2′-O-dibutyryl 3′,5′-cyclic AMP + albumin. Measurements were made of the whole tissue concentrations of adenine nucleotides, hexose phosphates, triose phosphates, glycerol 1-phosphate, 3-phosphoglycerate, 6-phosphogluconate, long-chain fatty acyl-CoA, acid-soluble CoA, citrate, isocitrate, malate and 2-oxoglutarate, and of the release into the incubation medium of lactate, pyruvate and glycerol after 1h of incubation. The relative rates of production of NADPH for fatty acid synthesis by the hexose monophosphate pathway and by the 'malic enzyme' are discussed. It is suggested that all NADH produced in the cytoplasm may be used in that compartment for reductive synthesis of fatty acids, lactate or glycerol 1-phosphate.

ROLE OF SPECIFIC GLYCOPEPTIDES OF HUMAN SERUM LIPOPROTEINS IN THE ACTIVATION OF LIPOPROTEIN LIPASE. R. J. Havel, V. G. Shore, B. Shore and D. M. Bier (Cardiovascular Res. Inst., Univ. of Cal. San Francisco Med. Cen., San Francisco, Cal. 94122). *Circulation Res.* 27, 595–600 (1970). Lipoprotein lipase forms an enzyme-substrate complex with fat emulsions in the presence of serum lipoproteins. Lipoproteins of very low density and high density have this property, but the former are much more active per unit weight of protein. In this investigation, the activity, expressed as quantity giving half-maximal rate of production of free fatty acids, of specific glycopeptides isolated from very low density and high density lipoproteins was tested in an incubation mixture containing lipoprotein lipase from cows' milk and 1.8 mg triglyceride per ml. The two major polypeptides of high density lipoproteins were virtually inactive in amounts up to 100 μg per ml. Activity of the unfractionated apoproteins of very low density lipoprotein was similar to that of the native lipoprotein (about 4 μg/ml). These studies indicate that specific glycopeptides are required for the action of lipoprotein lipase on emulsified triglycerides and suggest that they are important components of the mechanism for extrahepatic utilization of plasma triglycerides.

TURNOVER OF MAMMALIAN PHOSPHOLIPIDS. STABLE AND UNSTABLE COMPONENTS IN NEOPLASTIC MAST CELLS. C. A. Pasternak and J. J. M. Bergeron (Dept. of Biochem., Univ. of Oxford, Oxford OX1 3QU, U.K.). *Biochem. J.* 119, 473–80 (1970). Choline- and inositol-labelled phospholipids of exponentially growing or static neoplastic mast cells turn over by degradation and resynthesis of the entire molecule. Turnover follows a biphasic pattern, the unstable rapidly turning-over component accounting for 60–80% of labelled phospholipid. The residual stable component does not turn over any more than does protein or DNA. Subcellular fractions and surface membranes of choline-labelled P815Y cells contain the same proportion of stable and unstable components as do whole cells. The unstable component is largely phosphatidylcholine; the stable component is relatively richer in sphingomyelin. It is concluded that the phospholipids of neoplastic mast cells are of two classes, one of which is susceptible to continual enzymic degradation and resynthesis, and the other of which is metabolically stable.

TURNOVER OF MAMMALIAN PHOSPHOLIPIDS. RATES OF TURNOVER AND METABOLIC HETEROGENEITY IN CULTURED HUMAN LYMPHOCYTES AND IN TISSUES OF HEALTHY, STARVED AND VITAMIN A-DEFICIENT RATS. C. A. Pasternak and Beverly Friedrichs. *Ibid.* 481–88. Choline- and inositol-labelled phospholipids of human cultured lymphocytes turned over in a biphasic manner; phytohaemagglutinin activation stimulates turnover. Choline-labelled phospholipids of rat liver and kidney, but not of blood, turn over in vivo as fast as those of duodenum, ileum or colon. Turnover in the intestinal tissues is greater in feed than in starved or vitamin A-deficient rats. In each case phophatidylcholine turns over relatively faster than sphingomyelin or lysophosphatidylcholine. It is concluded that phospholipid turnover of the type described is a common feature of viable cells, and that metabolically favourable conditions increase, rather than decrease, turnover.

FATTY ACID METABOLISM IN THE PERFUSED RAT LIVER. H. A. Krebs and R. Hems (Metabolic Res. Lab., Nuffield Dept. of Clinical Med., Radcliffe Infirmary, Oxford OX2 6HE, U.K.). *Biochem. J.* 119, 525–33 (1970). The formation of acetoacetate, β-hydroxybutyrate and glucose was measured in the isolated perfused rat liver after addition of fatty acids. The rates of ketone-body formation from ten fatty acids were approximately equal and independent of chain length (90–132 μmol/h per g), with the exception of pentanoate, which reacted at one-third of this rate. The [β-hydroxybutyrate]/[acetoacetate] ratio in the perfusion medium was increased by long-chain fatty acids. Glucose was formed from all odd-numbered fatty acids tested. The rate of ketone-body formation in the livers of rats kept on a high fat diet was up to 50% higher than in the livers of rats starved for 48h. In the livers of fat fed rats almost all the O_2 consumed was accounted for by the formation of ketone bodies. Arachidonate was almost quantitatively converted into ketone bodies and yielded no glucose, demonstrating that gluconeogenesis form polyunsaturated fatty acids with an even number of carbon atoms does not occur.

NONENZYMATIC LIPID OXIDATION BY LACTOPEROXIDASE. EFFECT OF HEAT TREATMENT. C. E. Eriksson (Swedish Inst. for Food Preservation Res. (SIK), Fack, S-400 21 Goteborg 16, Sweden). *J. Dairy Sci.* 53, 1649–53 (1970). The enzyme lactoperoxidase might, like other hemoproteins, nonenzymatically catalyze oxidation of unsaturated fatty acids and hence contribute to the development of oxidized flavor. Purified native lactoperoxidase had a catalytic activity on linoleic acid comparable to that of other native hemoproteins but this activity was drastically increased on heat-treatment of the enzyme. Both native and denaturated lactoperoxidase accelerated the development of the expected aldehydes from linoleic acid, which were identified by combined gas chromatography-mass spectrometry. In addition 2-pentyl-furan, propan-1-ol and pentan-1-ol were identified.

EFFECT OF DIETARY EGG AND CARBOHYDRATE ON HEXOSEMONOPHOSPHATE SHUNT DEHYDROGENASES AND LIPIDS OF LIVER IN RATS. M. W. Chang, Jo Ann Lee and D. L. Trout (Human Nutr. Res. Div., Agr. Res. Ser., U.S. Dept. of Agr., Beltsville, Md. 20705). *J. Nutr.* 100, 1317–22 (1970). The effects of consuming dried egg and various carbohydrates on 1) the concentration of liver lipids and on 2) the activities of liver dehydrogenases of the hexosemonophosphate (HMP) shunt were investigated. The animals used were male rats of the Wistar strain which had been fasted for 64 hours and were refed one of four diets for 1, 2, or 14 days. The three test diets contained 25% dried whole egg and were identical except for the carbohydrate portion, which was sucrose, cornstarch or fructose. The reference diet con-

(Continued on page 244A)

(Continued from page 240A)

tained similar proportions of fat and protein but no egg. The activities of liver dehydrogenases in the HMP shunt reached the highest level in all diet groups after 2 days of refeeding. High levels of these enzymes were associated with high levels of liver lipid at this time. The inclusion of egg reduced the early rise in liver lipids and in liver dehydrogenase activities. The kind of dietary carbohydrate present in egg-containing diets influenced both liver lipids and dehydrogenase activities. However, animals fed the egg diets for more than 2 days showed a further accumulation of hepatic lipid which was not accompanied by high dehydrogenase activities.

SIDE-CHAIN TRANSFORMATIONS AND DEUTERIUM LABELING IN THE STEROIDAL SAPOGENIN SERIES. W. H. Faul, A. Failli and C. Djerassi (Dept. of Chem., Stanford Univ., Stanford, Calif. 94305). *J. Org. Chem.* 35, 2571–85 (1970). Synthetic transformations, notably through introduction of double bonds into rings E and F, have led to the preparation and characterization of a significant number of new derivatives of the basic nucleus of the steroidal sapogenin, (25R)-5α-spirostan, and to thirteen mono- or polydeuterated analogs. In the course of the work, it was possible to study the effect of acidic reagents on the spiroketal side chain, the ease of exchange proceeding in the order 23>>20>>>25. The availability of the various deuterium-labeled sapogenins proved of great value for many nmr assignments in this class of natural products.

DIETARY OBESITY IN RATS: BODY WEIGHT AND BODY FAT ACCRETION IN SEVEN STRAINS OF RATS. Rachel Schemmel, O. Michkelsen and J. L. Gill (Dept. of Foods and Nutr. and Dept. of Dairy, Michigan State Univ., East Lansing, Mich. 48823). *J. Nutr.* 100, 1041–49 (1970). Ten male and 10 female rats from each of seven strains were fed a grain ration for 10 or 20 weeks from weaning. Body weight and body fat of these rats were compared with those of 20 rats of the same age and sex fed a ration containing 60% hydrogenated fat. Also, five male and five female rats of the same seven strains were killed at weaning. Mean weanling weights and the percentage of body fat for the seven strains of rats were similar. Mean weights of five male rats fed grain for 20 weeks ranged from 304 g for S 5B/P1 rats to 445 g for Osborne-Mendel rats; for five female rats, mean weights ranged from 163 g for S 5B/P1 to 301 g for Osborne-Mendel rats. Male rats fed the high fat ration ranged in weight from 346 g for S 5B/P1 to 693 g for Osborne-Mendel males. Females fed the high fat ration ranged in weight from 170 g for S 5B/P1 to 452 g for Osborne-Mendel rats. After 20 weeks of experiment (at 23 weeks of age), carcasses of both male and female rats fed grain from 14 (S 5B/P1) to 40% (Osborne-Mendel) body fat. For rats of the same sex and age, body weight was influenced nearly equally by genetics (strain differences) and ration, but the percentage of body fat was influenced largely by the ration (74% of variation due to ration difference).

EFFECTS OF DIETARY FAT AND DOSE LEVEL OF 7,12-DIMETHYLBENZ(α)ANTHRACENE ON MAMMARY TUMOR INCIDENCE IN RATS. K. K. Carroll and H. T. Khor (Dept. of Biochem., Univ. of West. Ontario, London 72, Ontario, Canada). *Can. Res.* 30, 2260–64 (1970). Female Sprague-Dawley rats maintained on a semisynthetic diet containing 20% corn oil developed more mammary tumors after treatment with a single p.o. dose of 7,12-dimenthylbenz(α)anthracene than rats treated similarly but fed a low-fat semisynthetic diet. The tumor yield varied with the dose of 7,12-dimenthylbenz(α)anthracene, but the rats on high-fat diet developed more tumors at each of 3 dose levels tested. The type of diet fed after administration of 7,12-dimethylbenz(α)anthracene had a greater influence on mammary tumor incidence than did the type fed before the carcinogen was given, indicating that the effect is exerted mainly at the promotional stage of mammary carcinogenesis.

BIOSYNTHESIS OF PLASMA LIPOPROTEINS. INCORPORATION OF ^{14}C-GLUCOSAMINE BY CELLS AND SUBCELLULAR FRACTIONS OF RAT LIVER. Chai-Ho Lo and J. B. Marsh (Dept. of Biochem. and the Cen. for Oral Health Res., School of Dental Med., Univ. of Penn., Philadelphia, Penn. 19104). *J. Biol. Chem.* 245, 5001–6 (1970). The incorporation of glucosamine-^{14}C into plasma lipoproteins has been measured in the intact rat, in liver slices and in the liver microsome fraction. The labeling of lipoprotein was studied in microsome subfractions, both in vivo with glucosamine-^{14}C and in vitro with UDP-N acetyglucosamine-^{14}C. After isolation of lipoproteins with the aid of carrier plasma, labeled lipoproteins were found in smooth endoplasmic reticulum and Golgi membranes, but not in rough endoplasmic reticulum or ribosomes. Approximately 100 times as much smooth membrane protein as Golgi membrane protein was required to isolate the same total amount of labeled lipoprotein, in vivo as well as in vitro. High density lipoproteins had 3 times as much total label as low density lipoproteins, which may be related to the larger amount of the former molecules found in plasma. It is concluded that carbohydrate is attached to the lipoprotein after it has left the ribosome and that the Golgi apparatus plays a major role in this process.

ESTER AND ETHER-LINKED LIPIDS IN THE MANDIBULAR CANAL OF A PORPOISE (PHOCOENA PHOCOENA). OCCURRENCE OF ISOVALERIC ACID IN GLYCEROLIPIDS. U. Varanasi and D. C. Malins (Bureau of Commercial Fisheries Pioneer Res. Lab., Seattle, Washington). *Biochemistry* 9, 4576–79 (1970). High proportions of isovaleric acid (40.5 mole %) and long-chain iso acids, such as isopentadecanoic acid (4.8 mole %), are present in the neutral glycerolipids of the mandibular canal of the porpoise (*Phocoena phocoena*). Although isovaleric acid, a product of leucine metabolism, is readily esterified in triglyceride biosynthesis, the isopentyloxy structure was not detected in the alkyl chains of glyceryl ethers or the dialkoxypentane fraction of the diol lipids. These findings suggest that isovaleric acid, unlike longer chain structures, is not readily reduced and incorporated into alkyl moieties. The apparent absence in the mandibular canal of C_{20} and C_{22} unsaturated acids characteristics of marine organisms suggests that lipid biosynthesis is not significantly dependent on dietary polyenoic acids.

EXCHANGE OF PHOSPHOLIPID CLASSES BETWEEN LIVER MICROSOMES AND PLASMA: COMPARISON OF RAT, RABBIT, AND GUINEA PIG. D. B. Zilversmit (Graduate Schl. of Nutr., Div. Biol. Sci., Cornell Univ., Ithaca, New York 14850). *J. Lipid Res.* 12, 36–41 (1971). Rat and guinea pig liver microsomes labeled with phospholipid ^{32}P were incubated with rat, guinea pig and rabbit plasma in a KCl-Tris-EDTA buffer. A net transfer of microsomal phosphatidylcholine and phosphatidylethanolamine to plasma was observed. In addition, an exchange of phospholipids between microsomes and plasma took place. During 20-min incubations at 37C, the exchange of phosphatidylcholine was the most extensive. Microsomal sphingomyelin exchanged with plasma sphingomyelin only very slowly. A soluble protein factor in liver, which had previously been observed to stimulate the exchange of liver mitochondrial and microsomal phospholipids, also increased the exchange of phosphatidylcholine between liver microsomes and plasma. The pronounced differences in the relative percentages of phosphatidylethanolamine of guinea pig, rabbit, and rat plasmas did not appear to be related to differences in the relative exchange of this phospholipid compared to that of other phospholipids in these plasmas.

PHENOBARBITAL-INDUCED ALTERATIONS IN PHOSPHATIDYLCHOLINE AND TRIGLYCERIDE SYNTHESIS IN HEPATIC ENDOPLASMIC RETICULUM. D. L. Young, Geraldine Powell and W. O. McMillan (Dept. of Med., Duke Univ. Med. Cen., Durham, N.C. 27706). *J. Lipid Res.* 12, 1–8 (1971). In vitro measurements of hepatic microsomal enzymes which catalyze phosphatidylcholine biosynthesis revealed a significant increase in specific activity of the enzyme governing phosphatidylcholine synthesis by sequential methylation of phosphatidylethanolamine. The specific activity of phosphorylcholineglyceride transferase, which catalyzes phosphatidylcholine synthesis from D-1,2-diglyceride and CDP-choline, was not altered. Specific activity of diglyceride acyltransferase, which catalyzes triglyceride biosynthesis, was increased to a degree comparable to the increase in specific activity found in the phenobarbital-induced drug-metabolizing enzyme which oxidatively demethylates aminopyrine. In vivo incorporation of methyl-^{3}H from L-methioninemethyl-^{3}H into microsomal phosphatidylcholine was significantly increased, resulting in an increased methyl-^{3}H to choline-1, 2-^{14}C incorporation ratio of more than three times that found in control animals. A comparable increase in this incorporation ratio was noted in serum phospholipids. The in vitro enzyme studies, in agreement with in vivo incorporation data, indicate that the increase in phosphatidylcholine content of phenobarbital-induced proliferating endoplasmic reticulum is related to increased activity of the pathway of phosphatidylcholine biosynthesis involving the sequential methylation of phosphatidylethanolamine.

(Continued on page 246A)

(Continued from page 244A)

INTRACELLULAR ACCUMULATION OF FREE FATTY ACIDS IN ISOLATED WHITE ADIPOSE CELLS. A. Angel, K. S. Desai and M. L. Halperin (Dept. of Med., Univ. of Toronto, Toronto 181, Canada). *J. Lipid Res.* 12, 101–11 (1971). A simple, rapid and accurate method was developed for measuring intracellular FFA levels in isolated white adipose cells using sucrose-^{14}C or insulin carboxyl-^{14}C as nontransportable, nonutilizable markers of the extracellular space. The volume of medium trapped between cells was determined by measuring the amount of sucrose-^{14}C or inulin carboxyl-^{14}C retained in the floating packed adipose cells. In this way the FFA content of the adipose cells could be corrected for contamination by FFA bound to extracellular albumin. With this technique the initial events in hormone-activated lipolysis were studied under conditions of maximal and constant rates of triglyceride hydrolysis. The FFA content of isolated adipocytes of fed rats was 0.5 μmole/g cell lipid. On addition of norepinephrine in the presence of medium albumin, the concentration of intracellular FFA rapidly increased and reached a plateau at a concentration of 2–2.5 μmoles/g cell lipid. In the presence of medium albumin an initial lag in glycerol release occurred and this was attributed to partial hydrolysis of triglyceride with retention of lower glycerides. In the absence of medium albumin norepinephrine-stimulated lipolysis was reduced more than 90% and extracellular FFA release was not detected. Nevertheless, intracellular FFA accumulation was identical to that seen in the presence of albumin.

GAS-LIQUID CHROMATOGRAPHY OF HYOCHOLIC ACID. G. E. Mott, R. W. Moore, and R. Reiser (Dept. of Biochem. and Biophysics, and Dept. of Vet. Micro., Texas A&M Univ., College Station, Texas 77843). *J. Lipid Res.* 12, 117–119 (1971). Partial derivatives of hyocholic acid were formed under the usual conditions for trifluoroacetylation of bile acids (trifluoroacetic anhydride, 35C for 20 min). Complete trifluoroacetylation of hyocholic acid was achieved at 80C for 30 min, or at 60C for 30 min when a trace of pyridine was added to the reaction mixture.

ACYL TRANSFERASE ACTIVITIES IN DOG LUNG MICROSOMES. M. F. Frosolono, S. Slivka and B. L. Charms (Pulmonary Res. Lab., Mt. Sinai Hosp. of Cleveland, Univ. Circle, Cleveland, Ohio 44106). *J. Lipid Res.* 12, 96–103 (1971). Mammalian lung has a high concentration of dipalmitoyl phosphatidylcholine and other phospholipids in which both fatty acid ester chains are saturated, as opposed to usual asymmetric phospholipid (one saturated fatty acid and one unsaturated fatty acid). The acyl transferase system in dog lung microsomes was studied by determining the reactivities of various acyl CoA derivatives with 1-lyso-2-acyl- and 1-acyl-2-lysophosphatidylcholine. The 16:0 derivative had equal reactivity for both the 1- and 2-lyso positions. The 18:0 derivative also exhibited marked reactivity toward both positions, although the specific activity of the enzyme when palmitoyl CoA was used was approximately twice that compared to when stearoyl CoA was used. The 16:1 derivative showed approximately the same reactivity toward the 1-lyso-position as did 16:0 but both 16:1 and 18:1 were more active with the 2-lyso position. These results suggest that acyl transferases may be important in the lung to insure that sufficient amounts of dipalmitoyl phosphatidylcholine will always be present for use in pulmonary surfactant biosynthesis. It is also conceivable that the acyl transferase system described acts on 1- and 2-lyso-palmitoyl phosphatidylcholine (produced by phospholipase hydrolysis of dipalmitoyl phosphatidylcholine) in order to produce phosphatidylcholine species needed for cellular purposes other than surfactant function.

EFFECT OF CELL SIZE ON EPINEPHRINE- AND ACTH-INDUCED FATTY ACID RELEASE FROM ISOLATED FAT CELLS. O. Zinder and B. Shapiro (Dept. of Biochem., The Hebrew Univ.-Hadassah Med. Schl., Jerusalem, Israel). *J. Lipid Res.* 12, 91–95 (1971). Free fatty acid release from fat cells, obtained from epididymal adipose tissue of rats of different sizes, was found to be dependent on the cell surface area, regardless of the age of the animals. The same result was found with cells of different sizes from the same animal. These results, when related to in vivo conditions, would decrease with increasing cell size. On the other hand, the total activity of a given tissue would increase by increasing the size of its cells.

NEURONAL PERIKARYA AND ASTROGLIA OF RAT BRAIN: CHEMICAL COMPOSITION DURING MYELINATION. W. T. Norton and Shirley E. Poduslo (The Saul R. Korey Dept. of Neurology, and Dept. of Biochem., Albert Einstein College of Med., Bronx, New York 10461). *J. Lipid Res.* 12, 84–90 (1971). Cells isolated by a new technique from 10-, 20-, and 30-day-old rat brains have been analyzed for total lipid, cholesterol, galactolipid, individual phospholipids, gangliosides, DNA, and RNA. The lipid composition does not vary appreciably in either neurons or astrocytes during this period of rapid myelination. Moreover, the lipid compositions of the two cell types are surprisingly similar, both having very low galactolipid concentrations, high phospholipid content and cholesterol concentrations lower than whole brain. Astrocytes have a higher ganglioside content than neuronal perikarya, a finding ascribed to the higher ratio of surface membrane to mass in the astrocytes, and considered as evidence that gangliosides are normal glial constitutents. Compared with an average astrocyte, the individual neuron soma has less mass, a lower total lipid content and a much higher RNA content.

MECHANISM OF FATTY LIVER DEVELOPMENT AND HYPERLIPEMIA IN RATS TREATED WITH ALLYLISOPROPYLACETAMIDE. P. S. Roheim, L. Biempica, Diane Edelstein and N. S. Kosower (Depts. of Physiol., Pathol., and Med., Albert Einstein College of Med., Bronx, New York 10461). *J. Lipid Res.* 12, 76–83 (1971). Treatment of rats with allylisopropylacetamide results in two related effects that occur sequentially. After one injection, serum FFA concentration increases and fatty liver develops without any decrease in lipoprotein synthesis. With repeated administration of the drug, fatty acid mobilization continues and acetate incorporation into lipids increases. However, fatty liver disappears with a concomitant increase in lipoprotein synthesis, resulting in hyperlipemia. It is postulated that accumulation of the liver lipid might be a regulating factor in the synthesis and transport of lipoproteins.

STUDY OF THE TRANSFER OF PHOSPHOLIPIDS FROM THE ENDOPLASMIC RETICULUM TO THE OTHER AND INNER MITOCHONDRIAL MEMBRANES. Marie-Therese Sauner and Marianne Levy (Lab. Physiol. Nutr., Faculte des Sciences, 1 Rue Victor Cousin, Paris 5°, France). *J. Lipid Res.* 12, 71–75 (1971). Isolated mitochondria cannot synthesize their own phospholipids, there is only an exchange between exogenous and mitochondrial phospholipid fatty acids. In vitro, the endoplasmic reticulum phospholipids exchange with the phospholipids of the mitochondrial outer and inner membranes. Exchange of the endoplasmic reticulum phospholipids with those of the inner membrane is the same when the incubation is carried out with whole mitochondria or with mitochondria devoid of outer membranes.

EFFECT OF CELL SIZE ON LIPID SYNTHESIS BY HUMAN ADIPOSE TISSUE IN VITRO. U. Smith (Dept. of Clinical Chem., Univ. of Gothenburg, Gothenburg, Sweden). *J. Lipid Res.* 12, 65–70 (1971). When adipose tissue cells were incubated with collagenase for different periods of time, cell populations with different mean cell sizes were obtained from the same tissue sample. Lipid synthesis from glucose was studied as a function of adipose cell size and number. The incubations were performed in Parker medium 199, which is suitable for tissue culture of human adipose tissue. The results show that the larger cells of a specimen have a greater rate of lipid synthesis than the smaller cells of the same specimen. This is mainly due to an increase in the synthesis of glyceride-glycerol. Addition of insulin stimulated lipid synthesis. However, the larger adipose cells were less sensitive to the stimulating effect of insulin than the smaller cells.

THE UPTAKE OF OLEIC ACID BY RAT SMALL INTESTINE: A COMPARISON OF METHODOLOGIES. Susanne B. Clark (Gastroinestinal Div., Dept. of Med., St. Luke's Hosp. Cen., New York 10025). *J. Lipid Res.* 12, 43–55 (1971). The interaction between long-chain and medium-chain lipids during intestinal absorption was examined using several model systems. A decrease in steady-state triolein (LCT) output in thoracic duct lymph after addition of trioctanoin (MCT) to the duodenal infusion confirmed previous studies in unanesthesized rats which demonstrated inhibition of steady-state LCT uptake from the small intestinal lumen by MCT. In slices of everted rat jejunum octanoic acid reduced incorporation into triglyceride and initial uptake of ^{14}C-labeled oleic acid from micellar solutions. Inhibition of uptake did not occur at 0C, when triglyceride synthesis was blocked. Incubation of slices at low pH (5.8) or in the presence of dimethyl sulfoxide also reduced uptake of oleic acid and its incorporation into triglyceride. However, when everted sacs of jejunum were similarly incubated, octanoate, dimethyl sulfoxide, or low pH

(Continued on page 247A)

(Continued from page 246A)

caused no inhibition of oleic acid uptake or esterification. The results indicate that the significance of kinetic data describing intestinal fatty acid absorption which were obtained from experiments conducted in vitro is highly questionable, and that suitable models for in vivo uptake kinetics have yet to be developed. However, analysis of the in vitro kinetic data suggests that the intestinal mucosal membrane does not function as a simple lipid interface with respect to fatty acid absorption.

METABOLISM OF CHOLESTANE-3β,5α,6β-TRIOL. II. IDENTIFICATION OF TWO MAJOR NEUTRAL METABOLITES IN THE RAT. H. G. Roscoe and M. J. Fahrenbach (Dept. of Metabolic Chemotherapy, Ex. Therapeutics Res. Sec., Lederle Labs. Div., Am. Cyanamid Co., Pearl River, New York 10965). *J. Lipid Res.* 12, 17–23 (1971). Rats were given a single oral dose of cholestane-3β,5α,6β-triol-4-^{14}C, and their feces were collected. The two major neutral metabolites were separated and isolated by use of solvent fractionation and chromatographic methods. The metabolites were identified as cholestane-3β,5α-diol-6-one and a mixture of long-chain fatty acid esters of cholestane-3β,5α,6β-triol. Cholestane-3β,5α-diol-6-one was identified using thin-layer and gas-liquid chromatography, infrared spectroscopy and the spectrum produced by reaction with 65% sulfuric acid. The mixed esters of cholestane-3β,5α,6β-triol were subjected to basic hydrolysis, and the steroid moiety was identified using the same techniques employed for cholestane-3β,5α-diol-6-one. The fatty acids were analyzed by gas-liquid chromatography of their methyl esters.

THE SUBCELLULAR DISTRIBUTION OF PLATELET LIPIDS LABELED BY ACETATE-1-^{14}C. D. Deykin (Dept. of Med., Beth Israel Hosp., and Harvard Med. Schl., Boston, Mass. 02215). *J. Lipid Res.* 12, 9–11 (1971). The lipids of intact human platelets were labeled in vitro with acetate-1-^{14}C, and the distribution of radioactivity in individual fatty acids and in lipid classes was examined in platelet subcellular fractions separated by sucrose density gradient ultracentrifugation. The distribution of newly formed fatty acids among individual lipid classes was similar in all subcellular components, and no highly unusual or characteristic lipid metabolic pool was present in either the soluble, membrane or granule fractions.

THE PHOTOMETRIC DETERMINATION OF GANGLIOSIDES WITH THE SULFO-PHOSPHO-VANILLIN REACTION. A. Saifer and N. I. Feldman (Biochem. Dept., Isaac Albert Res. Inst., Kingsbrook Jewish Med. Cen., Brooklyn, New York 11203). *J. Lipid Res.* 12, 112–15 (1971). A simple, quantitative method is described for the photometric determination of gangliosides. The precedure is based on the sulfo-phospho-vanillin reaction, and does not require prior hydrolysis. It has been shown that the reaction is probably due to oxidation by sulfuric acid of the sphingosine moiety which results in the formation of aldehydes or ketones or both which then react with the phosphoric acid-vanillin reagent to produce a rose-colored complex. The reaction permits the determination of the amount of ganglioside present in a sample; and, together with the resorcinol reaction to measure the NANA content, it can be used to determine whether a purified ganglioside is a mono-, di-, or trisialoganglioside.

ON THE AUTOXIDATION OF VITAMIN D PREPARATIONS II. THE AUTOXIDATION OF ERGOCALCIFEROL. M. M. Amer, A. K. S. Ahmad and S. P. Varda (Anal. Chem. Dept. Faculty of Pharm., Cairo Univ., Cairo, U.A.R.). *Fette Seifen Anstrichmittel* 72, 1040–45 (1970). Ergocalciferol was used as a model for the autoxidation studies of Vitamin D. It was shown that ergocalciferol is sensitive to light, moisture and heat in the presence of oxygen. The autoxidation proceeds through isomerisation to a carbonyl compound without the development of peroxidic groups.

VITAMIN REQUIREMENT OF FISHES. H. Mann (Inst. for Fish Res. Hamburg, Ger.). *Fette Seifen Anstrichmittel* 72, 1079–83 (1970). Vitamin requirement of fresh water fishes, especially of carp and trout is dealt with. For fishes in natural water, this requirement is met by the feed. However, if the fishes are held in ponds or traps, vitamins must be incorporated into the feeds (pellets). As in the case with other domestic animals, at low levels of vitamins or in their absence symptoms of deficiency relating to growth, muscle atrophy and nervous disorders are observed. The hitherto known symptoms of deficiency in fishes and their daily vitamin requirement per kilogram weight of fish or per kilogram feed are summarized in a table.

Commerce Releases Figures on Trade With East Europe

Two-way trade between the United States and Eastern Europe during the third quarter of 1970 totaled $126.3 million, the U.S. Department of Commerce reports. The total is compared with $135.7 million in the previous quarter and $111.5 million in the third quarter of 1969.

Principal U.S. exports to Eastern Europe during the quarter were agricultural products and crude materials. They included $4.1 million in soybean oilcake and meal to Hungary, $1.7 million to Poland and $1.4 million to Czechoslovakia; $4.3 million in animal and vegetable oils, fats and waxes to Poland; $2.4 million in wheat to Poland and $2.2 million to Romania; $3.5 million in lifting and loading equipment to the U.S.S.R.; and $3 million in computers and parts to East Germany.

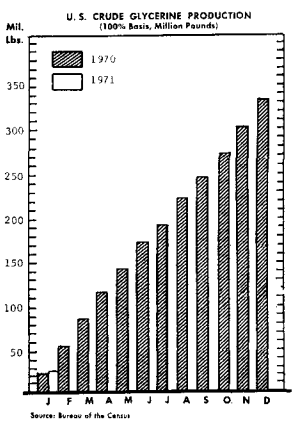
The 94th Quarterly Report on Export Control can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, or any U.S. Department of Commerce field office.

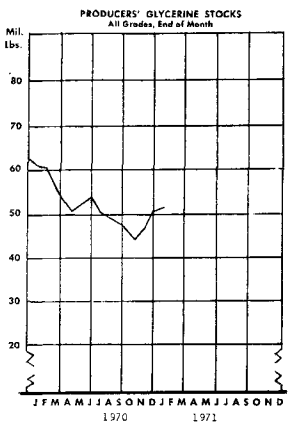
Glycerine Production Statistics

According to the U.S. Department of Commerce, production of crude glycerine (including synthetic) for January 1971 totalled 27.7 million pounds, down 3.3 million pounds from December 1970 (revised), but up 0.5 million pounds from January 1970.

At the end of January, producers' stocks of crude and refined glycerine totalled 52.8 million pounds, up 2.5 million pounds from December (revised), but down 8.4 million pounds from the end of January 1970.

The December 1970 crude and refined glycerine production and stocks were revised as follows, in thousands of pounds, 100% basis: crude production, from 31,070 to 30,922; refined production, from 31,740 to 31,757; crude stocks, from 20,748 to 20,751; refined stocks, from 29,794 to 29,573. These revisions have lowered the total stocks level from 50,542,000 to 50,324,000 pounds and raised domestic disappearance from 20,627,000 to 20,697,000 pounds.





• Drying Oils and Paints

CASHEWNUT SHELL LIQUID DISTILLATION RESIDUE—ITS UTILIZATION IN COATINGS. T. Ramalingan, B. G. K. Murthy, M. A. Sivasamban and J. S. Aggarwal (Regional Res. Lab., Hyderabad). *Paintindia* 20(10), 29–31 (1970). The properties of varnishes prepared by copolymerizing the residue obtained during the isolation of cardanol from cashewnut shell liquid with drying oils, resins, and polymerizable monomers are discussed.

PROTECTION BY PAINTS. K. S. Rajagopalan and S. Guruvih (Central Electrochemical Res. Inst., Karaikudi-3). *Paintindia* 20(10), 23–8, 31 (1970). The first part of this review article

(Continued on page 249A)

(Continued from page 247A)

covers the chemistry of organic coatings, their resistance to deterioration and ageing, and the mechanism and inhibition of corrosion of metals. The primers discussed include red lead and chromates, and the principal vehicle discussed is cashewnut shell liquid. This raw material is potentially widely available in India. Current work with this vehicle and the results of exposure tests carried on at various locations are mentioned.

• Detergents

SODIUM PERBORATE AND HYDROTOPES IN DISH WASHING PREPARATIONS. Anon. *Soap, Perfumery Cosmetics* 43, 705–9 (1970). A review of sodium perborate reactions and a discussion of the theory of hydrotopes. Applications of both are presented.

THE MANUFACTURE OF TOILET SOAP. SOURCES OF DEFECTS AND THEIR ELIMINATION. Anon. *Soap, Perfumery Cosmetics* 43, 787–91 (1970). This is an English translation of a technical bulletin published by Haarmann and Reimer G.m.b.h., Holzminden, W. Ger. The bulletin covers many of the common defects encountered in the production of toilet soaps. Solutions to the defects are given.

SPHERICAL FOAM CHROMATOGRAPHY. K. Maas (Org. Chem. Inst., Heidelberg Univ., Heidelberg, Ger.). *Fette Seifen Anstrichmittel* 72, 1032–37 (1970). In contrast to usual foam separation methods, in spherical foam chromatography, a current of air or nitrogen, saturated with the supporting phase (volatile organic or inorganic liquid) is circulated through the aqueous solutions. The advantages of this simple technique are: (1) enrichment of surface-active substance even from highly diluted solutions, and (2) speed of separation. Characteristic efficiency of the process (also as a function of the temperature) indicates varying degree of interaction between the molecules of water, surfactant and supporting phase. Variations of the process, such as continuous method etc. are dealt with.

FORMULATING DETERGENTS WITH LESS PHOSPHATES. R. D. Katstra (Continental Oil Co., Teterboro, N.J.). *Soap Chem. Specialties* 47(2), 36–42, 54–6, 107 (1971). Data on formulations which appear to have promise in the search for an effective laundry product that will satisfy both performance and environmental requirements are presented and discussed. Much of the discussion is concerned with trisodium nitrilotriacetate (NTA). (The article was written prior to the report of the Surgeon General and Administrator of the Environmental Protection Agency.) Another approach is use of higher levels of existing detergents. Experimental formulations and soil removal data on various fabrics are given.

CAR WASH DETERGENTS. T. M. Kaneko and J. W. Compton (BASF Wyandotte Corp., Wyandotte, Mich.). *Soap Chem. Specialties* 47(1), 11, 62, 121–3, 133–4 (1971). Factors which must be considered in developing and testing detergent systems for modern automatic car wash systems are discussed. Suggested formulations are given. Current research is directed toward removing the phosphates from these products.

STUDIES ON THE REPLACEMENT OF COCONUT OIL IN THE FATTY COMPONENT OF TOILET SOAPS. E. Szmidtgal. *Tluszcze, Srodki Piorace, Kosmet.* 14(3), 87–92 (1970). As a replacement for coconut oil in toilet soaps, 6% of linear sodium dodecylbenzene sulfonate was used in conjunction with tallow or distilled tallow acids. Stearine was added as needed. The color of the tallow or fatty acids should be about 7 mg I/100 ml of KI solution. The fatty component should contain about 45% oleic acid. The remainder should be made up of both stearic acid and a 1:1 mixture of stearic and palmitic acids. (Rev. Franc. Corps Gras)

SURFACE ACTIVE PROPERTIES OF ESTERS OF SACCHAROSE AND FATTY ACIDS. J. Broniarz *et al. Tluszcze, Srodki Piorace, Kosmet.* 14(3), 93–7 (1970). Aqueous solutions of saccharose and synthetic C_5-C_9 fatty acids or lauric acid were found to lower the surface and interfacial tension to the same degree as sodium dodecylbenzene sulfonate. Raffinose monostearate showed significantly better detergent power than saccharose monostearate. The saccharose esters dissolve best in chloroform. In polar solvents, such as methanol, ethanol, propanol-1, and butanol-1, the solubility of the esters was appreciable. In acetone, it was no more than 10%. (Rev. Franc. Corps Gras)

SDA Reports Record High 1970 Soap and Detergent Sales

Soap and synthetic detergent sales rose to a new high in 1970, according to reports from 36 manufacturers participating in the Sales Census conducted by The Soap and Detergent Association.

These manufacturers, representing a major segment of the industry, had aggregate sales of 6,112,867,000 lb. and $1,642,918,000. Sales were up 2.7% in volume and 5.1% in value compared with the calendar year 1969, the previous high.

This was the 12th consecutive year that sales had established a new record.

Synthetic detergent sales in 1970 totalled 5,186,634,000 lb. and $1,266,353,000, up 3.5% in volume and up 5.2% in value from the year 1969.

Soap sales amounted to 926,233,000 lb. and $376,565,000 compared with 942,364,000 lb. and $359,970,000 in 1969.

Hodag Chemical Corporation Receives Presidential "E" Award

The Presidential "E" Award for excellence in exporting was made to Hodag Chemical Corporation, Skokie, Illinois, at the 1971 Mid-America World Trade Conference in Chicago. The award was presented to S. E. Kent, president of Hodag, by R. L. McLellan, Assistant Secretary for domestic and international business, U.S. Department of Commerce, acting for the Secretary of Commerce of the United States.

The presidential award cited Hodag for making a significant contribution to the nation's export expansion program; for conducting an imaginative research and sales campaign abroad; and for aiding in producing a favorable U.S. balance of trade by expanding Hodag's market to more than 50 countries.

Hodag is a leading developer and manufacturer of surface active chemicals in the United States. The company's product line includes emulsifiers, surfactants, antifoam agents and other additives used in industries such as adhesives, pulp and paper, paint, pharmaceutical, cosmetics, food processing, sugar refining and other chemical specialties. Hodag's headquarters is at 7247 North Central Park Avenue, Skokie.

Outlook for Chemicals in 1971

Shipments of chemicals and allied products are expected to reach $54 billion in 1971, up 9% from last year's total of $49.5 billion. Most of the increase will come from greater volume, with only 2% or so reflecting long-overdue increases in chemical prices.

Chemical industry profits, which fell in 1970, should climb back to the 1969 level of about $3.6 billion. Capital outlays in 1971 are expected to exceed $3.5 billion, up slightly from last year. Overseas investment will continue at a high level in 1971, about $1.5 billion. The chemical industry's balance of trade should also improve slightly this year—advancing to $2.6 billion from $2.5 billion in 1970. Meanwhile, companies in the industry continue to invest heavily in research and development programs. Total spending in 1971 should reach $2.5 billion, compared with $2.2 billion in 1970.

Even if 1971 does not shape up as a great year, it should be a good year for chemicals, and long-term prospects are even more encouraging. Much of the industry's profit and pricing difficulties stem from overcapacity, a good deal of which has resulted from companies outside the chemical industry looking for higher returns. The fact that returns have fallen should make investments in chemicals less attractive and help slow down the capacity build-up.