abstracts

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ABSTRACTORS: N. E. Bednarcyk, J. E. Covey, J. C. Harris, S. F. Herb, F. A. Kummerow, T. Mares, B. Matijasevic, E. G. Perkins, and R. W. Walker

• Fats and Oils

LOSS OF FREE-RADICAL SIGNAL DURING INDUCTION PERIOD OF UNSATURATED LIPIDS CONTAINING NITROXIDE ANTIOXIDANTS. J.S. Lin, V. Smith and H.S. Olcott (Inst. of Marine Resources, Dept. of Food Sci. and Technol., Univ. of Calif., Davis, Calif. 95616). *J. Agr. Food Chem.* 22, 682–4 (1974). Stable free-radical nitroxides have marked antioxidant activity in unsaturated lipids. The amount of residual nitroxide can be estimated from the electron paramagnetic resonance (epr) signal. With three different nitroxides in squalene at 37C the signal gradually decreased during the induction period. Only when it was no longer or barely detectable, did active uptake of oxygen begin. At 50C with squalene and with menhaden oil, active oxidation began while the nitroxide signal was still measurable. In squalene at 37C, the three nitroxides studied, Tempol (2,2,6,6-tetramethyl-4-piperidinol-*N*-oxyl), Synvar 611 (4′,4′-dimethylspiro[5α-cholestane-3,2′-oxazolidin]-3′-yloxyl) and Synvar 614 (2-[10-carboxydecyl]-2-hexyl-4,4-dimethyl-3-oxazolidinyloxyl), had relative antioxidant activities at equivalent molarities of approximately 2:1.2:1. A simplified method for following weight gain and epr signal without transfer of sample is described.

THE ISOLATION AND PARTIAL CHARACTERIZATION OF TWO NOVEL SPHINGOLIPIDS FROM NEUROSPORA CRASSA: DI(INOSITOLPHOSPHORYL)CERAMIDE AND [(GAL)$_3$GLU]CERAMIDE. R.L. Lester, S.W. Smith, G.B. Wells, D.C. Rees and W.W. Angus (Dept. of Biochem., College of Med., Univ. of Ky., Lexington, Ky. 40506). *J. Biol. Chem.* 249, 3388-94 (1974). *Neurospora crassa* strains labeled uniformly with $^{32}P_i$ and [^{3}H]inositol exhibit at least six phospholipid components containing ^{3}H when separated by paper chromatography. One of the major components is phosphatidylinositol. Other components, which account for 40 to 60% of the lipid-extractable ^{3}H in various strains, are stable to mild alkaline methanolysis and appear to be sphingolipids with equivalent amounts of inositol and phosphorus. The major phosphosphingolipid was purified by means of differential solubility and by column chromatography on porous silica beads. This substance contains equivalent amounts of hydroxysphinganine and hydroxytetracosanoic acid and 2 eq each of myoinositol, phosphorus, and sodium. Alkaline degradation yielded 2 eq of inositol monophosphate and periodate degradation gave a C-15 fragment. The elemental composition of this compound also fits the formulation, (inositol-P)$_2$-ceramide.

STRUCTURAL MODIFICATIONS OF FATS. A.—MODIFICATIONS INVOLVING THE FATTY CHAIN. E. Ucciani (Lab. Nat. Matieres Grasses—ITERG, Univ. Provence, Marseille). *Rev. Franc. Corps Gras* 21, 25–33 (1974). The ethylenic fatty acids when subjected to certain conditions undergo structural modifications without changing molecular weight. This is called isomerization. Isomerization has several aspects: it is geometrical, structural or constitutional. For each of these aspects, the origin of the phenomenon, the means to determine it and its consequences are examined. All these phenomena are discussed on the three principal ethylenic chains (oleic, linoleic and linolenic) which are present in edible fats and oils.

TRENDS, OBJECTS AND MEANS OF THE RESEARCH AT THE FAT AND OIL INDUSTRIES' SERVICE: PLANNED ECONOMY. H. Niewiadomski (Inst. of Organic and Food Chem. and Technol., Gdansk, Poland). *Rev. Franc. Corps Gras* 21, 7–13 (1974). Scientific research is planned in all socio-economic governments, but may differ considerably in various countries. In Poland, there are three main research units: Academy of Science Institutes, High Schools and Institutes devoted to particular economic fields. Financing of these researches is different because edible fat and oil industries are related to Food Industry Ministry and technical fat and oil industries to Chemical Industry Ministry. Principally, the research is divided into fundamental and applied but the theoretical studies must have some possibility of succeeding in practical application. The places where fat and oil research is being done are mentioned. The main accomplishments in this field are discussed.

TRENDS, OBJECTS, AND MEANS OF THE RESEARCH AT THE FAT AND OIL INDUSTRIES' SERVICE: MULTINATIONAL COMPANY CASE. J. Boldingh (Unilever Research Lab. Vlaardingen/Duiven, Holland). *Rev. Franc. Corps Gras* 21, 15–23 (1974). The evolution of research in the Unilever Group during last 30 years is reviewed. Based on a multidisciplinary organization with judicious geographical distribution, all fields of group's activity are included. The contributions from these laboratories in dietetics, physiology, biochemistry, analytical methods, catalysis and technological treatments are given as examples. The author points out the need to elaborate a research program adaptated to the long term strategy. The collaboration and planning which are indispensable to accomplish a successful research program are described. The necessity of effectively transfering research results into practice is also pointed out.

UNIVERSITY-INDUSTRY RELATIONSHIP IN FRANCE. G. Champetier (Academie des Sciences, Paris). *Rev. Franc. Corps Gras* 20, 689–95 (1973). After a short review of the evolution in France of the University and industry cooperation, the author describes the government action for its promotion by common research and development studies. The roles of Centre National de la Recherche Scientifique (C.N.R.S.), of the Delegation Generale a la Recherche scientifique et technique (D.G.R.S.T.), and of the Association pour la Valorisation de la Recherche (AN.VA.R.) are pointed out. The author described the contribution of governmental research and development contracts developed by the Concerted Action Committees.

FROM BIOCHEMICAL AND BIOLOGICAL SCIENCE TO KNOWLEDGE ABOUT FATS AND OILS. P. Desnuelle (Univ. d' Aix Marseille, Centre Bioch. et Biologie Moleculaire du C.N.R.S., Marseille). *Rev. Franc. Corps Gras* 20, 683–88 (1973). As the major use of fats and oils is for food and feed, biologists and biochemists have done much research in this field. Important progress has been made and this is discussed by the author. Some areas discussed are: digestibility of fats in relation with their composition and state of oxidation, utilization (calorie production), storage, influence of fat and oil composition on vascular diseases, etc. Some properties of proteins and meals, the particular character of certain amino acids and progress in plant breeding are also discussed.

CONSEQUENCES OF COMMON MARKET BROADENING FROM 6 TO 9 ON THE FRENCH FAT AND OIL INDUSTRIES. P. Carriere (Federation Nat. Industries de Corps Gras, Paris). *Rev. Franc. Corps Gras* 20, 673–81 (1973). New members of the E.E.C. (Great Britain, Denmark and Ireland) have introduced many problems which will have important consequences on the economy of the first six members, especially for France. This broadening will not convulse the fat and oil market. However, some repercussions are foreseen.

SELECTIVE HYDROGENATION OF SOYBEAN OIL: STUDY OF THE ISOMERS. P.Y. Vigneron and P. Spicht (Lesieur-Cotelle, Condekerque). *Rev. Franc. Corps Gras* 20, 631–36 (1973). Selective hydrogenation of soybean oil has been done with copper and nickel catalysts. Isomers in hydrogenated fats were analyzed by liquid-solid chromatography on silver nitrate-kieselgel column. There are no significant differences in positional isomers in monoene and diene fractions of the two types of hydrogenations. If hydrogenation is done with a copper catalyst, more linoleate is reduced. In this case, there is no formation of saturated fatty acids and there is a lesser content of trans-isomers.

POSITIONAL ISOMERS OF CIS AND TRANS C-18 MONO-UNSATURATED FATTY ACIDS OF BUTTERFAT. A. Strocchi, G. Lercker and J. Losi (Inst. di Industrie Agrarie, Univ. of Bologna 40126, Italy). *Rev. Franc. Corps Gras* 20, 625–30 (1973). The methyl esters of cis and trans C-18 fatty acids, isolated from butterfat by TLC-GLC, were ozonolized in reducing conditions which lead to ester-alcohol fragments and alcohols. GLC of acetyl derivatives from ester-alcohols (ω-acetoxy-esters) shows the presence of C-18 trans monoene isomers from Δ^7 to Δ^{16} and of C-18 cis monoene isomers from Δ^7 to Δ^{14}. Of the trans-isomers, the most common is the Δ^{11} (72.10%) while of the cis-isomers the Δ^9 amounts to 87.03%. Not taking into consideration the geometric isomerism of the double bond, the relative quantities of the single positional isomers were Δ^9, 70.51; Δ^{11}, 17.29; Δ^8, 3.14%; Δ^{10}, 2.80% with about 1% or less of the remaining isomers.

SUPPLIES IN RAW MATERIALS AND FINISHED PRODUCTS OF FATS AND OILS: CONJENCTURAL ASPECTS AND OUTLOOK. M. Lesieur (Lesieur-Cotelle Assoc., 92100 Boulogne). *Rev. Franc. Corps Gras* 20, 607–14 (1973). The problem of supplies of oil seeds is directly related to the fundamental need for lipids and proteins for human consumption. These needs will increase but supplies of raw materials are influenced by complex environmental problems which are impossible to control entirely and rationally. In the paper, some aspects of the market of oil seeds and possible solutions to these problems have been analyzed.

SOME FACTORS AFFECTING THE ARGININE MATURITY INDEX (AMI) FOR PEANUTS. C.T. Young and R.O. Hammons (Georgia Station, Experiment, Georgia). *Oléagineux* 29, 189–91 (1974). Effects of variety, digging date and drying method on the arginine maturity index (AMI) of peanuts were investigated. Seven varieties of peanuts were grown using recommended and controlled growing practices. These were harvested periodically, and the fresh green pods analyzed for maturity (AMI). Corresponding lots were stack-cured or artificially dried before the AMI maturity values were determined. In five of the seven varieties, stack curing had a strong tendency to mask the effect of harvest date on the AMI values. Most of the free arginine (81.2–94.4%), as measured by AMI, was destroyed by drying at 110C for five hours. Variety and drying time had more influence on the maturity index than drying temperature.

CHLORINE NUTRITION OF GROUNDNUTS IN SENEGAL. R. Schilling and P.J. Hirsch (I.R.H.O.). *Oléagineux* 29, 85–90 (1974). Chlorine deficiency induces different diseases and for many plants, deficiency symptoms disappear with the addition of chlorine. In Senegal, groundnuts have extremely variable chlorine leaf levels (0.078–1.38%). The study of correlations between chlorine and other elements in leaf analysis has shown positive relations with magnesium and calcium, a negative one with potassium, and no relation with nitrogen, phosphorus and sulphur. No clear correlation has been found with yield.

COCONUT RESEARCH IN JAMAICA. ANNUAL REPORT OF "COCONUT INDUSTRY BOARD," JAMAICA. D.H. Romney. *Oléagineux* 29, 81–84 (1974). The principal research carried out and the results obtained in regard to selection-hybridization are given. Research will be pursued to extend the range of varieties or crosses with good resistance to the maximum: the introduction of a few varieties from the Philippines, Brazil and Viet-Nam which have not yet been planted in Jamaica; the development of F1 hybrids combining resistance to lethal yellowing with good yield characteristics. The improvement of pollen preparation methods makes the large-scale production of F1 hybrids possible.

PLANT IMPROVEMENT. Y. Demarly (Univ. Paris-Sud). *Oléagineux* 29, 63–72 (1974). Plant improvement brings into play all the scientific resources of plant biology. In addition to a methodology for the improvement of complex characters (quantitative genetics), this science has acquired an enormous potential of possible actions at the level of the genetic code itself, its chromosomic dosage, its assemblage and even its level of expression. Selection is making rapid progress. Its use depends on the policy of the plant breeder in the face of changing consumer tastes, technical and commercial requirements and the social structure of agriculture.

THE USE OF ACTIVATED BLEACHING EARTHS FOR THE BLEACHING OF OILS OF TROPICAL ORIGIN. R. Fahn and K. Fenderl (Süd-Chemie AG, Munich). *Oléagineux* 29, 193–97 (1974). Tests were made of the bleaching of palm, groundnut and coconut oils by means of earths whose water content, apparent density, pH, speed of filtration and oil retention had been determined before. It was shown that the adsorbant power of bentonite grows with the concentration of acid and falls off after passing through a maximum. The best colour stability in the bleached oil is obtained with an earth with optimum bleaching power.

MECHANIZED LOADING AND TRANSPORT OF OIL PALM FRUIT. J.G.M. Price, D.D. Kidd. *Oléagineux* 29, 155–56 (1974). It is only in recent years that mechanical loading has been introduced for oil palm fruit in West Malaysia, with the aim of increasing efficiency and reducing costs. This paper indicates the advantages of mechanical loading in the field and the rapid transport of freshly cut bunches from field to mill. Two systems have been evolved for the loading of fresh fruit bunches by means of nets into road vehicles. One uses tipper lorries, each with a fitted crane, the other is a tractormounted crane to load into a trailer.

STUDY OF PISTACHIO OIL (PISTACIA VERA L). A. Danechrad (Univ. of Teheran, Iran). *Oléagineux* 29, 153–54 (1974). After a review of previous research, the results are given of analyses carried out on the kernels and oil of the most common variety grown in Iran, *Pistacia vera L.* The oil contains 68% oleic acid and 17% linoleic acid. The unsaponifiables, which represent 0.54% of the oil, contain about 2.1% of triterpenic alcohols, 5.2% tocopherols and 92.7% sterols of which the main constituent is β-sitosterol.

DIFFERENTIAL FROST TOLERANCE OF GROUNDNUT (ARACHIS HYPOGAEA *L.*) CULTIVARS. Y. Gutstein (Agr. Res. Organ., Volcani Center, Bet Dagan, Israel). *Oléagineux* 29, 151–52 (1974). The response of different types of cultivars to low temperatures occurring in the field during the winter months in a subtropical region was determined. This is a part of an investigation of the factors responsible for the annual growth habit of the cultivated groundnut. The cultivars tested were: a) Valencia 28 and b) Common Spanish, both of the subspecies fastigiata Waldron, c) Improved Virginia Bunch and d) Shulamit, both belonging to var. hypogaea of the subspecies hypogaea. Valencia 28 is chilling-stress-sensitive and was killed by 4–5C night temperatures, whereas Shulamit survived a period of 16 consecutive nights of subzero temperatures dropping down to −4C.

THE CULTURE IN VITRO OF PEANUT STAMENS (ARACHIS HYPOGAEA L.). I. STAGES OF DEVELOPMENT OF THE FLOWER BUDS AND MICROSPOROGENESIS. J.P. Martin, S. Cas and H. Rabechault (Lab. O.R.S.T.O.M., 70, route d'Aulnay, 93140 Bondy). *Oléagineux* 29, 145–49 (1974). With a view to culturing peanuts stamens in vitro, the development of the flower bud was followed in optimum growing conditions, so as to establish the relationship between their morphological characters and the state of advancement of the pollen in the anthers. Microsporogenesis, slightly in advance of macrosporogenesis, begins very early, as soon as the flower begins to form. Five stages of development of the flower buds have been distinguished. The following stages: 3-flowering in 3–4 day (tetrads), 4-flowering

in 48 hours (mononucleous pollen), and 5-flowering in 12–24 hours (binucleous pollen) have been removed for the culturing of the stamens.

DEODORIZING SYSTEM MODIFICATION FOR HEAT RECOVERY AND STEAM REFINING OF PALM OIL. A.M. Gavin and R.W. Berger (EMI Corp., 3166 Des Plaines Avenue, Des Plaines, Ill.). *Oléagineux* 29, 95–97 (1974). With continuous deodorizers of the double shell type, most of the steam normally used to preheat the feedstock in the deaerating section can be saved by a modification, the essential feature of which is the addition of a heat recovery section located between the final deodorizing section and the cooling section, by means of which heat is transferred from the hot deodorized oil to the feedstock. Continuous deodorizers of the stripping tray type can be modified for "steam refining" or "stripping" of high free fatty acid palm oil to reduce the free fatty acids to 0.03% max. This is accomplished by means of additional trays in the stripping sections of the deodorizer.

EVALUATION OF THE FOSS-LET INSTRUMENT FOR DETERMINING OIL CONTENT IN PEANUTS. J.L. Heinis and M.M. Saunders (Florida Univ., Tallahassee). *Oléagineux* 29, 91–93 (1974). The Peanut Protein Laboratory of Florida A&M University acquired a Foss-Let instrument which is used to determine oils or fats in seeds, feeds, meats, etc. The oil extracted by homogenization in tetrachlorethylene ($C_2H_2Cl_4$). The oil content is measured by means of a hydrometer. With peanuts, 22.5 gram samples gave reproducible results. The analysis required less than ten minutes for each sample, while with the Soxhlet and Goldfisch methods, up to 22 hours were required. For a large number of samples, the Foss-Let method was calculated to be cheaper than the Soxhlet method and just as accurate.

DEVELOPMENT OF A PROCESS TO EXTRACT PROTEIN AND OIL FROM FRESH COCONUT. THE WORK OF THE TROPICAL PRODUCTS INSTITUTE. D.A.V. Dendy and W.H. Timmins (Tropical Products Inst., London). *Oléagineux* 28, 589–94 (1973). Numerous attempts have been made to develop a process to extract protein as well as oil from fresh coconuts. It has been shown that the quality of coconut protein is severely lowered by the conditions under which copra is usually processed for its oil. The paper describes investigations carried out on the extraction of oil and protein from fresh coconut. The use of wedge mills was most satisfactory for breaking open the coconut cells to release an emulsion of oil, protein and water, which is separated by pH adjustment and centrifugation to give high grade oil and protein. Overall yield is 85% for a pilot scale plant. The solvent defatted protein isolate is suitable for supplementing composite flour bread.

SOME CHEMICAL, PHYSICAL, AND TECHNOLOGICAL ASPECTS OF ARGAN OIL. A. Huyghebaert and H. Hendrickx (Univ. de l'Etat, B-9000 Gand, Belgium). *Oléagineux* 29, 29–31 (1974). The chemical and physical properties of argan oil have been studied. The oil of the argan tree or Moroccan olive tree is similar to olive oil; only the linoleic acid content is higher. The results show that argan oil is one of the oleic-linoleic group of oils. The oil can easily be refined.

CORRELATION AND HERITABILITY STUDIES OF NINE CHARACTERS IN PARENTAL AND INFRASPECIFIC-CROSS POPULATIONS OF ARACHIS HYPOGAEA. T.A. Coffelt and R.O. Hammons (Univ. of Georgia). *Oléagineux* 29, 23–27 (1974). The objectives of most peanut breeding programs are increased yield of seed or oil, improved shelling and milling properties and enhanced quality of end-use products. Genetic and breeding studies are needed to establish the breeding behavior of the various pod and seed characters in peanut (*Arachis hypogaea L.*) varieties. The purpose of this study was to obtain correlation coefficients and heritability estimates for nine characters in parental and infraspecific-cross populations. Parental cultivars used were "Argentine" and "Early Runner." Reciprocal crosses between these cultivars, analyzed individually and together, provided three of the six populations. The other three populations consisted of the individual and pooled parental populations.

SPECTACULAR INCREASE OF PRODUCTION AND TRADE OF PALM OIL IN WEST MALAYSIA. E.W. Denney. *Oléagineux* 12, 595–96 (1973). West Malaysia is the first producer and exporter of palm oil in the world. This year, a new record is being attempted. Production in the first three months in 1973 was 28% more than for the same period in 1972. It is estimated that the production in 1973 will be 825,000t and that most of this will be exported (about 800,000t). The increase of production of palm oil in Malaysia is not astonishing taking into account that from 1965 this industry has been well organized and that production is increasing 25% yearly.

UPTAKE AND TRANSLOCATION OF NUTRIENTS IN GROUNDNUT (ARACHIS HYPOGAEA *L.*). II. PHOSPHORUS. R.S. Chahal and S.M. Virmani (Haryana Agricultural Univ., Hissar). *Oléagineux* 28, 579–81 (1973). The yield and quality of groundnut may be improved by providing adequate nutrients at the stage at which their uptake is at peak. The present experiment was conducted to study the relative amount of phosphorus absorbed by the two plant organs: roots and fruits; and its subsequent translocation in various plant parts. The results showed that gynophores were actively involved in the absorption of phosphorus. The relative amount of phosphorus absorbed by the auxillary mechanism contributed about 39% of the total P. The relative distribution of phosphorus absorbed through the roots or gynophores, showed it to be in the order pods > leaves. Phosphorus was found to be quite mobile and was translocated to vegetative parts when absorbed by gynophores and to fruits when absorbed through roots.

HYDROGENATION OF VEGETABLE OILS. THE HYDROGENATION PROCESS. H.B.W. Patterson (Unilever, London). *Oléagineux* 28, 583–87 (1973). A review of some fundamental ideas on the chemistry of fats and of the industrial hydrogenation of oils is given. A short description is given of the determination of solid fat index. Certain side effects of hydrogenation have been examined and selectivity has been studied in more detail. Finally, there is a review of hydrogenation of lauric, palm, olive groundnut, cotton, sunflower and soya oils with indications of hydrogen consumption.

INFLUENCE OF CLIMATIC FACTORS ON THE GROWTH AND DEVELOPMENT OF THE GROUNDNUT. J. Gautreau (I.R.H.O., C.N.R.A. Bambey, Senegal). *Oléagineux* 28, 567–77 (1973). The influence of climatic factors on the growth and development of groundnut has been studied by cultivating an early variety in earth jars for three months and in three different conditions. The results acquired from series of plants gathered every 10 days permitted the evaluation of the modification induced by the variations of these factors, in particular total radiation, temperature and hygrometry. It was the total radiation which had the clearest action under the experimental conditions which are described. The exact knowledge of the influence of the principal climatic factors on groundnuts allows a valid comparison of results obtained in differing environments.

MOLECULAR OXIDATION AND AUTOXIDATION REACTIONS OF SOME UNSATURATED SUBSTANCES. N.A. Khan, T.H. Khan, and K.A. Siddiqui (B.C.S.I.R. Lab., Chittagong, Bangladesh). *Oléagineux* 28, 523–24 (1973). The possible plurality of mechanisms in molecular oxidation and autoxidation reactions of methyl undecenoate and oleate substantiates different viewpoints. Methyl undecenoate was autoxidized at 75C until 1.4 moles of oxygen were absorbed over 130 hours. Methyl oleate was autoxidized at 75C until 2.0 moles of oxygen were absorbed. The variation of charge density due to electron mobility in substrate molecules according to the conditions, particularly time and temperature, the types of unsaturation, degree of oxygenation and allied effects, has been found to be at the root of the plurality of mechanisms.

A FEW ASPECTS OF PROGRESS IN OIL INDUSTRY EQUIPMENT AND PROCESSING (SECOND PART). J. Colin (ENSIA). *Oléagineux* 28, 527–32 (1973). Progress in the oil industry has been made recently in the following fields: the increasing of the unit capacity of the machines, better designed equipment, automatization and new refining techniques. The author describes, among other examples, the latest crushing and flatting machines, high-capacity presses, the purification of crude oils, various types of neutralization and deodorization, the recovery of certain by-products, and the fractioning of oils and fats.

FATTY ACID COMPOSITION AND CORRELATION STUDIES IN LINSEED (LINUM USITATISSIMUM *L.*). K.S. Sekhon, K.S. Gill, K.L. Ahuja and R.S. Sandhu (Punjab Agricultural Univ., Ludhiana). *Oléagineux* 28, 525–26 (1973). Variability of fatty acid composition has been described in the Linum species by many authors. The variations of this composition is largely ascribed to genetic causes. Data on oil content, iodine value and fatty acid composition and correlation coefficients in 23 linseed strains are given in this paper. A great variability in all the constituents was observed, the maximum variability in fatty acids being in linoleic acid. A highly significant positive

correlation between iodine value and linolenic acid and a highly negative correlation between linolenic and oleic acids have been found.

KINETICS OF PHOSPHORUS AND POTASSIUM ABSORPTION BY INTACT GROUNDNUT PLANTS IN DILUTED SOLUTIONS. Tang van Hai and J.P. Rolland (Univ. Cathol. Louvain, 3030 Heverlee, Belgium). *Oléagineux* 28, 517–20 (1973). This study, which covers three elements: phosphorus, potassium and calcium, was made under controlled conditions chosen so that the concentrations of principal elements of nutritive solutions were similar to those found in soil. The flow of the nutritive solution through the root system is shown to be important for the absorption of phosphorus by groundnut, especially at the low concentrations of phosphorus, which are very common in tropical soils. The rate of absorption of phosphorus increases by about 250% when the concentration passes from 1.5 to 0.05 ppm, and for flows of 50 to 200 ml/h. The concentration of potassium does not seem to have any marked influence on the absorption of phosphorus, but on the other hand, the absorption of potassium is stimulated in the presence of calcium concentrations of 0.5 to 8 ppm.

INTERACTION BETWEEN NITROGEN AND POTASSIUM IN THE NUTRITION OF TROPICAL OIL PLANTS. M. Ollagnier and R. Ochs (Inst. Rech. Huiles et Oleagineux, Paris). *Oléagineux* 28, 493–508 (1973). When oil or coconut palms are grown in the early years in association with legume covers, response to applications of potassium is much greater than that obtained by nitrogen. When there is a lack of potassium, interactions occur which result in depressive effects when nitrogen is used alone. This interaction is explained by the existence of an antagonism between NH_4^+ and K^+ at absorption level. Possibly by using nitrates, positive interactions will be obtained between nitrogen and potassium, which would be of interest from the economic point of view.

RECOVERY OF A MONOGLYCERIDE BY AZEOTROPIC DISTILLATION WITH AN ALCOHOL. E.R. Lowrey (Procter & Gamble). *U.S. 3,826,720.* Surface active agents are recovered from aqueous solvents by use of unsubstituted, low carbon aliphatic alcohol to form a heterogeneous, minimum boiling point azeotrope. The azeotrope is removed from the surface active agent by distillation. This process permits recovery of the agents from heterogeneous mixtures with a reduction of foaming to acceptable levels.

OINTMENT BASE. T. Suyama, M. Saeki, and R. Okada (Sankyo Co.). *U.S. 3,826,845.* The base, whose physical properties do not vary significantly with temperature, comprises triglyceride which is liquid at ordinary temperatures or a mixture of dibasic aliphatic carboxylic acid ester and a salicylic acid ester; silicic acid anhydride; and a nonionic surfactant or an ionic surfactant selected from the group consisting of a fatty acid polyoxyethylene-phosphate, and alkylsulfate, a fatty acid-polypeptide condensate or an ampholytic surfactant of carboxylic acid type.

METHOD OF IMPARTING FATTY-FRIED FLAVOR TO FOODS. D.G. Guadagni and R.G. Buttery (U.S. Secy. of Agriculture). *U.S. 3,829,582.* A mixture containing methional, 2-acetylthiazoline, deca-2,4-dienal, 2-octenal, 2-acetyl-1,4,5,6-tetrahydropyridine, 2-ethyl-3,6-dimethylpyrazine, 2,6-diethylpyrazine, and 2-phenylacetaldehyde is used to impart a fatty fried flavor to potato and other fried food products.

MEMBRANE SUBSTANCE CONCENTRATES. A.O. Bratland. *U.S. 3,829,592.* The concentrates are prepared by emulsifying a product of milk containing the substances with fat, separating the emulsion into aqueous serum and fat-rich fractions, separating the fat-rich fraction into further aqueous serum and fat-rich fractions, and combining the aqueous serum fractions. If more concentrated membrane substance is required, the resulting serum fractions can be emulsified with fat and the entire procedure repeated. The concentrates are especially useful as additives to milk products.

SOAP STOCK RECLAMATION PROCESS FOR PRODUCING FATTY ACIDS, GLYCERINE AND SALTS. R.L. Garrett, C.B. Garrett and A.B. Rubin (Adams Laboratories, Inc.). *U.S. 3,830,789.* Raw soap stock is saponified to a completely water soluble form which enables efficient separation of pigments and tocopherols and increases fatty acid yields during later steps. The saponified solution is solvent-extracted to remove water insoluble pigments and tocopherols. The remaining solution is acidulated and centrifuged to remove purified fatty acids. The remaining solution, containing glycerine, salt, and suspended particles

of seed meal, is flocculated and filtered to recover the seed meal. A final evaporation step separates the components of the aqueous solution into concentrated glycerine and precipitated organic salts.

METHOD FOR REMOVING THE FAT FROM FAT-CONTAINING RAW MATERIALS. H.E. Fritze (Escher Wyss GmbH). *U.S. 3,832,233.* The process for defatting dry degerminated seed material, such as corn grits, involves soaking a ground fraction of the seed with a fat solvent and then separating the solvent from the remainder. The process is especially applicable to obtaining starch from corn grits.

HYDROLYSIS AND SYNTHESIS OF AORTIC CHOLESTEROL ESTERS IN ATHEROSCLEROTIC BABOONS. EFFECT OF POLYUNSATURATED PHOSPHATIDYL CHOLINE ON ENZYME ACTIVITIES. A.N. Howard and J. Patelski (Dept. of Investigative Med., Univ. of Cambridge, (Great Britain) and Dept. of Biochem., Med. Acad., Poznan, Poland). *Atherosclerosis* 20, 225–32 (1974). Groups of baboons were fed an atherogenic diet containing cholesterol for 6 months and injected every 2 weeks with bovine serum albumin to produce aortic atherosclerosis. Subsequently the animals were transferred to a laboratory chow diet and injected intravenously with saline or a solution of polyunsaturated phosphatidyl choline (EPL soln.) thrice weekly for 16 weeks. Under these conditions EPL solution did not affect the regression of aortic lesions as judged by the extent of sudanophilia or cholesterol content; cholesterol esterase was increased in aorta and heart; other lipolytic enzymes were unaffected. Aortic acyl co-A cholesterol acyl transferase (ACAT) was inhibited. It is concluded that the previously reported anti-atherosclerotic effect of EPL solution given prophylactically could be related to its inhibition of aortic ACAT.

ACTIVATION OF LIPOPROTEIN LIPASE IN VITRO BY UNSATURATED PHOSPHOLIPIDS. V. Blaton, D. Vandamme and H. Peeters (Simon Stevin Inst. for Sci. Res., Jerusalemstraat 34, B-8000 Brugge, Belgium). *FEBS Letters* 44, 185–8 (1974). Crude milk lipoprotein lipase contains some other enzymes which

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liberate H_3O^+ ions. The crude enzyme preparation has little or no phospholipase activity. Optimal chemical conditions for enzyme activity were developed and the results indicate that phosphatidylcholine activates in vitro. The degree of activation is strongly dependent on the fatty acid composition of the molecule. Unsaturated PC activates much more than does saturated PC, so that essential phospholipids play an important role in triglyceride metabolism.

THE MECHANISM OF INTESTINAL ABSORPTION OF PHOSPHATIDYLCHOLINE IN RATS. S. Parthasarathy, P.V. Subbaiah and J. Ganguly (Dept. of Biochem., Indian Inst. of Sci., Bangalore-560012, India). *Biochem. J.* **140**, 503–8 (1974). The mechanism of absorption of phosphatidylcholine was studied in rats by injecting into the intestine phosphatidylcholine specifically labelled either in the fatty acid or in the glycerol moiety or with ^{32}P, when considerable amounts of 1-acyl-lysophosphatidylcholine were found in the intestinal lumen. 2-([^{14}C] Acyl)phosphatidylcholine gave markedly more radioactive unesterified fatty acids in the lumen, compared with the 1-([^{14}C]acyl)derivative. Some of the radioactivity from either the fatty acid or the glycerol moiety of the injected phosphatidylcholine appeared in the mucosal triacylglycerols. Injection of ^{32}P-labelled phosphatidylcholine or ^{32}P-labelled lysophosphatidylcholine led to the appearance of radioactive glycerylphosphorylcholine, glycerophosphate and P_i in the mucosa. Rat mucosa was found to contain a highly active glycerylphosphorylcholine diesterase. It was concluded that the dietary phosphatidylcholline is hydrolysed in the intestinal lumen by the pancreatic phospholipase A to 1-acylglycerylphosphorylcholine, which on entering the mucosal cell is partly reacylated to phosphatidylcholine, and the rest is further hydrolysed to glycerylphosphorylcholine, glycerophosphate, glycerol and P_i. The fatty acids and glycerophosphate are then reassembled to give triacylglycerols via the Kennedy pathway.

A NEW ASSAY PROCEDURE FOR MONOGLYCERIDE ACYLTRANSFERASE. V.J. Short, D.N. Brindley and R. Dils (Dept. of Biochem., Med. Schl., Univ. of Nottingham, Nottingham NG72RD, U.K.). *Biochem. J.* **141**, 407–11 (1974). A new assay system is described for monoglyceride acyltransferase (acylglycerol palmitoyltransferase, EC 2.3.1.22) in which palmitoyl-CoA is generated from palmitoyl(−)-carnitine. With the microsomal fraction from homogenates of guinea-pig intestinal mucosa, the V_{max} of this enzyme decreased with different acyl acceptors in the order 2-monopalmitoylglycerol > 2-hexadecylglycerol > *rac*-1-monopalmitoylglycerol. There were highly significant correlations between the monoglyceride acyltransferase activity as measured with these three substrates. This demonstrates that each of these substrates can be used to measure the same enzyme activity. The advantages of using generated palmitoyl-CoA with 2-hexadecylglycerol and *rac*-1-monopalmitoylglycerol as model substrates for this enzyme are discussed.

THE TURNOVER RATE OF SERUM GLYCERIDES IN THE LIPOPROTEINS OF FASTING OBESE WOMEN DURING WEIGHT LOSS. M. Jourdan, S. Margen and R.B. Bradfield (Dept. of Nutr. Sci., Univ. of Calif., Berkeley, Calif. 94720). *Am. J. Clin. Nutr.* **27**, 850–8 (1974). Six obese women were housed in a metabolic facility for 2 months. During the first 15 days, the women were fed a liquid/stabilization diet, and energy intakes were adjusted for each subject to permit maintenance of an essentially constant weight. During the next 12 days, the women maintained a constant weight on these diets. During this period, glyceride turnover was determined in both the very low density (VLDL) and the low density (LDL) lipoproteins by means of the radioglycerol labeling technique. Then the energy levels of the liquid diets were adjusted so that each woman received only 50% of the kilocalories necessary to maintain weight for 12 days, and then 25% of weight maintenance kilocalories for 24 days. During the last week of acute weight loss, glyceride turnover rates were again determined. The fasting serum glyceride turnover rate for the weight-stabilized obese women was higher than that reported for normal-weight women. Most of the subjects showed a type 4 hyperlipoproteinemia during the weight-stabilization period. This abnormal lipoprotein pattern remained during acute weight loss despite a fall in serum glyceride concentration in all subjects.

PLASMA AND LIVER CONCENTRATIONS OF VITAMIN A IN A NORMAL POPULATION OF URBAN THAI. S. Suthutvoravoot and J.A. Olson (Dept. of Biochem., Faculty of Sci., Mahidol Univ., Bangkok, Thailand). *Am. J. Clin. Nutr.* **27**, 883–91 (1974). Vitamin A concentrations in the plasma liver of 84 accident victims in Bangkok were determined. The group, all of whom were in apparent good health prior to the accidents, consisted of 68 males and 16 females, varied in age from 2 to 66 years, and represented a spectrum of occupations. Median and mean plasma values were 36.6 μg/100 ml and 36.2 ± 16.1 μg/100 ml, with a range from 6.8 to 82 μg/100 ml. The median, mean, and range of liver values were 89 μg/g wet tissue, 183 μg/g, and 7.5 to 3,200 μg/g, respectively. Plasma values above 10 μg/100 ml and liver stores were not at all correlated in our sample.

LUMINAL EVENTS OF LIPID ABSORPTION IN PROTEIN-CALORIE MALNOURISHED CHILDREN; RELATIONSHIP WITH NUTRITIONAL RECOVERY AND DIARRHEA. I. CAPACITY OF THE DUODENAL CONTENT TO ACHIEVE MICELLAR SOLUBILIZATION OF LIPIDS. R.E. Schneider and F.E. Viteri (Gastrointestinal Sect., Biomed. Div., Inst. of Nutr. of Central America and Panama (INCAP), Carretera Roosevelt, Zone 11, Guatemala City, Guatemala, C.A.). *Am. J. Clin. Nutr.* **27**, 777–87 (1974). Fat absorption and the capacity of the duodenal content to achieve micellar solubilization of lipids were studied longitudinally in 18 severely protein-calorie malnourished (PCM) children on admission and at different stages of nutritional recovery, as well as in the presence or absence of diarrhea. Four healthy children were studied as controls. It was found that micellar lipid (ML) and fat absorption were abnormally low in PCM children and that both improved, reaching normal values with nutritional recovery. Diarrhea hampered this improvement and was associated with larger amounts of duodenal aspirates in 90 min and higher dilution of the emulsion. Stepwise regression analysis revealed that bile acids, especially conjugated bile acids (CBA) explained 44% of the variability in ML observed. Other factors such as pancreatic lipase activity and dilution played a minimal role in explaining such variability (8% and less than 1%, respectively). Increased concentrations of free bile acids (FBA) were also observed in all patients, regardless of nutritional status.

CLUSTERS IN LIPID BILAYERS AND THE INTERPRETATION OF THERMAL EFFECTS IN BIOLOGICAL MEMBRANES. A.G. Lee, N.J.M. Birdsall, J.C. Metcalfe, P.A. Toon and G.B. Warren (Natl. Inst. for Med. Res., Mill Hill, London, NW7 1AA). *Biochemistry* **13**, 3699–3705 (1974). The partitioning of the spin label, 2,2,6,6-tetramethylpiperidine-1-oxyl (Tempo), has been studied in a number of aqueous phospholipid dispersions. In dioleoyllecithin bilayers the formation of quasicrystalline clusters has been detected at temperatures below ca. 30C, as shown by the exclusion of Tempo from the clusters. A pure complex of dioleoyllecithin with the [Ca^{2+}; Mg^{2+}] ATPase from sarcoplasmic reticulum has been prepared, and a break in the Arrhenius plot observed at 29C.

INFLUENCE OF SYNTHETIC CONJUGATES OF CHOLIC ACID ON CHOLESTEREMIA IN RATS. J.A. Story, S.A. Tepper and D. Kritchevsky (Wistar Inst. of Anatomy and Biol., 36th St. at Spruce, Philadelphia, Pa. 19104). *J. Nutr.* **104**, 1185–8 (1974). The effects on serum and liver cholesterol levels in rats of two naturally occurring conjugates of cholic acid (taurocholic and glycocholic acids) and four synthetic conjugates (glutamocholic, aspartocholic, cysteocholic and cysteinocholic acids) (0.5% diet), in combination with cholesterol (0.5% of diet) were investigated. Hydrolysis of these conjugates by cholylglycine hydrolase (EC 3.5) was also measured. Cholesterol alone did not cause cholesteremia but when fed with cholic acid or any of its conjugates, except aspartocholate, the animals had significantly higher serum-liver cholesterol pools (15 to 70%). The aspartocholic acid-fed group had serum and liver cholesterol levels significantly lower than the cholic acid:cholesterol-fed animals but similar to control animals. When the degree of hydrolysis of each of the conjugates by cholylglycine hydrolase was measured, all conjugates were hydrolyzed to a similar extent (77 to 87%) except aspartocholic (36%) and cysteinocholic acids (42%). Apparently there is a relationship between the ability of a cholic acid conjugate to produce elevated serum and/or liver cholesterol levels in rats and the degree to which it is hydrolyzed by the intestinal microflora.

MECHANISM OF ACTION OF COUMARINS. SIGNIFICANCE OF VITAMIN K EPOXIDE. J.A. Sadowski and J.W. Suttie (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisc.-Madison, Wisc. 53706). *Biochemistry* **13**, 3696–3699 (1974). The 2,3-epoxide of phylloquinone is a normal metabolite of the vitamin, and it has been demonstrated that coumarin anticoagulants inhibit an enzyme system that converts this metabolite to the vitamin.

It has been postulated that this epoxide is a competitive inhibitor of vitamin K at the metabolic site where it is involved in prothrombin synthesis and that coumarins act as anticoagulants because they increase the tissue levels of this epoxide. This study demonstrates that there is little correlation between the effectiveness of four different coumarins as anticoagulants, and their effect on phylloquinone epoxide metabolism. It also demonstrates that the administration of phylloquine epoxide to vitamin K deficient, hypoprothrombinemic rats causes a significant initiation of prothrombin synthesis within 15 min. During this 15-min period, the ratio of the epoxide to the vitamin in the liver is considerably in excess of that which has previously been postulated to be inhibitory. These data would appear to rule out the hypothesis that vitamin K epoxide is an inhibitor of vitamin K action and that warfarin function as an anticoagulant by increasing the tissue ratio of vitamin K epoxide to vitamin K.

VITAMIN E ACTIVITY OF γ-TOCOPHEROL IN THE RAT, CHICK AND HAMSTER. J.G. Bieri and R.P. Evarts (Lab. of Nutr. and Endocrinology, Natl. Inst. of Arthritis, Metabolism and Digestive Diseases, Natl. Insts. of Health, Bethesda, Md. 20014). *J. Nutr.* **104**, 850–7 (1974). The purpose of this study was to reevaluate the vitamin E activity of γ-tocopherol relative to α-tocopherol in several species of animals (literature values range from 1 to 25%). In the prevention of liver necrosis in the rat, *d*-γ-tocopherol acetate had a relative potency compared with *d*-α-tocopherol acetate of 5.7 ± 1.5%, when computed from individual survival times. When α- and γ-tocopherols were fed as mixtures, comparison of the incidence of liver necrosis indicated a relative activity for γ-tocopherol of 13 to 16%. There was evidence that an interaction between the two tocopherols occurred. In the prevention of chick exudative diathesis, γ-tocopherol had an indicated relative activity of 8 and 9% in two trials. Comparison of the two tocopherols for their ability to prevent chick muscle dystrophy and the accompanying elevation in serum creatine phosphokinase indicated a relative activity of about 10% for γ-tocopherol. In a single experiment with hamsters, the comparison was based on the prevention of testicular degeneration and the maintenance of serum creatine phosphokinase levels. By both criteria, γ-tocopherol showed about 5% activity. On the basis of the more extensive rat and chick experiments, it is concluded that the relative activity of γ-tocopherol is from 6 to 16% that of α-tocopherol.

ASSOCIATION OF GLYCOPROTEINS WITH THE MEMBRANES. II. ISOLATION AND PARTIAL CHARACTERIZATION OF "LIPOPHILIC FRAGMENT" FROM HUMAN ERYTHROCYTE MEMBRANE GLYCOPROTEIN. J.I. Javaid and R.J. Winzler (Dept. of Chem., Florida State Univ., Tallahassee, Florida 32306). *Biochemistry* 13, 3639–42 (1974). The trypsin digestion of the isolated glycoprotein from human erythrocyte membranes resulted in a carbohydrate rich soluble sialoglycopeptide and an insoluble lipophilic peptide. The amino acid composition of the sialoglycopeptide showed an enrichment in hydroxy amino acids and a decrease in hydrophobic amino acids in comparison with the membrane glycoprotein, and was similar to the glycopeptide isolated from intact human erythrocytes by trypsin digestion. The insoluble lipophilic fragment purified by Sephadex G-50 had no detectable carbohydrate and was poor in hydroxy amino acids. The hydrophobic amino acids constituted 64 mol % of the total amino acid residues. The molecular weight was 7500 and the amino terminal was leucine. These results suggested that the human erythrocyte membrane glycoprotein was an asymmetric molecule the hydrophilic part of which contains all the carbohydrates and the lipophilic part was presumably responsible for its association with the lipids of the membrane.

TWO PATTERNS OF NEUTRAL STEROID CONVERSION IN THE FECES OF NORMAL NORTH AMERICANS. T.D. Wilkins and A.S. Hackman (Anaerobe Lab., Virginia Polytech. Inst. and State Univ., Blacksburg, Va. 24060). *Cancer Res.* **34**, 2250–4 (1974). It has been suggested by other investigators that the extent of neutral and acid steroid conversion by human intestinal flora may be correlated with large-bowel carcinogenesis. Within a population of 31 normal North Americans, we found that two distinct patterns of neutral steroid conversion could be detected by gas-liquid chromatographic procedures. One pattern was characterized by extensive conversion of cholesterol, the other by little or no conversion of cholesterol. Similar conversion patterns were also observed for the plant steroids, sitosterol and campesterol. These patterns were found to be relatively stable over long periods of time. It is possible that there may be differences in the risk level for colon cancer between these two groups.

DUODENAL CALCIUM BINDING PROTEIN IN THE CHICK: A NEW BIOASSAY FOR VITAMIN D. A. Bar and R.H. Wasserman (Dept. of Physical Biol., New York State Vet. College, Cornell Univ. Ithaca, N.Y. 14850). *J. Nutr.* **104**, 1202–7 (1974). The use of intestinal vitamin D-induced calcium binding protein (CaBP) as the end point in the assay of cholecalciferol activity was investigated. CaBP formation, determined by recently developed highly sensitive immunoassays, was induced by quite low doses of cholecalciferol. The sensitivity of this bioassay for vitamin D is similar to, if not greater than, those reported for other bioassays. Increasing the vitamin D dose level over a wide range (up to 5000 IU/chick) is associated with a direct increase in the concentration of intestinal CaBP. Over a range of 5 to 125 IU cholecalciferol/chick (by single oral or intramuscular injection), CaBP level is well related to the log dose of cholecafciferol. Similarly, feeding vitamin D-depleted chicks for a week with 80 to 640 IU cholecalciferol/kilogram diet resulted in a linear relationship between the log of cholecalciferol intake and duodenal CaBP levels. These linear relationships make possible the quantitation of the cholecalciferol activity in unknown preparations with reasonable accuracy. Using the CaBP-based bioassay, the cholecalciferol equivalent of two commercially available sources of the vitamin was estimated; the observed values were close to those specified by the manufacturer. The cholecalciferol equivalent of a commercial chick diet was also bioassayed.

EFFECT OF VARYING THE DIETARY LEVEL OF CALCIUM ON PLASMA AND TISSUE LIPIDS OF RABBITS. J.M. Iacono (Div. of Nutr., Dept. of Internal Med., Univ. of Cincinnati Med. Schl., Cincinnati, Ohio 45229). *J. Nutr.* **104**, 1165–71 (1974). A study was undertaken to determine the effect on blood and tissue lipids of rabbits fed a low fat diet containing three levels of calcium, <0.02%, 0.8% and 1.6%. Plasma cholesterol and phospholipids were elevated in the group fed the calcium-deficient diet, whereas plasma triglycerides appeared to be unaffected by the level of calcium fed. Lipid levels of tissues also varied depending on the amount of calcium in the diet. In calcium deficiency, liver showed an elevation of cholesterol and phospholipid whereas lung showed decreased levels of these lipids. When the rabbits were fed the high calcium diet, heart, skeletal muscle and adrenal gland showed significant decreases in free cholesterol, but only skeletal muscle showed a decrease in total phospholipids with high calcium supplementation. Tissue triglycerides varied independently of cholesterol and phospholipids. Increases in the levels of triglycerides of kidney, skeletal muscle and adrenal gland were observed with increasing increments of dietary calcium. The role of calcium on tissue lipids appears widespread and warrants further investigation.

INDUCTION OF RAPID, SYNCHRONOUS VITAMIN A DEFICIENCY IN THE RAT. A.J. Lamb, P. Apiwatanaporn and J.A. Olson (Dept. of Biochem., Faculty of Sci., Mahidol Univ., Rama VI Road, Bangkok, Thailand). *J. Nutr.* **104**, 1140–8 (1974). A procedure enabling the induction of rapid synchronous vitamin A deficiency is described. Young weanling rats were fed a vitamin A-free diet until early weight plateau and were then fed, cyclically, a diet first supplemented with and then lacking in retinoic acid. Rapid, synchronized phases of vitamin A deficiency where thereby induced in which secondary nutritional differences between animals were minimized. The effects of different levels of retinoic acid supplementation and of variations in length of the supplementation and withdrawal phases on overall growth rate, mortality, and weight loss following the withdrawal of retinoic acid were then investigated. In addition, the effect of cyclical retinoate supplementation on female mating and reproductive capacities was determined. It was found that an 18-day supplementation: 10-day deprivation cycle is optimal when animals are supplemented with 2 μg retinoic acid/gram diet, and that cycling leads to a more rapid or complete deficiency than occurs when animals are supplemented continuously with retinoic acid. The general advantages of such a cycling procedure are discussed in relation to conventional means of rearing vitamin A-deficient animals.

DIFFERENTIAL UTILIZATION OF LOW AND HIGH DIETARY CHOLESTEROL BY COCKERELS FED MEDIUM-CHAIN TRIGLYCERIDES OR CORN OIL. J. Kenney and H. Fisher (Dept. of Nutr., Rutgers Univ., New Brunswick, N.J. 08903). *J. Nutr.* **104**, 1135–9 (1974). Literature reports suggest a difference in the relative hypercholesterolemic properties of medium-chain triglycerides (MCT) and corn oil between man and a number of experimental animals. In the present study cholesterol absorption and concentration in plasma and liver were studied in week-old cockerels fed corn oil or MCT in the presence of a relatively high (1.2%) and a low (0.15%) level of dietary cholesterol.

It was found that corn oil was more hypercholesterolemic in the presence of the high level of dietary cholesterol. This could be attributed to significantly better cholesterol absorption in the presence of corn oil. With the relatively low level of dietary cholesterol, MCT were found more hypercholesterolemic than corn oil. This could be attributed to a significantly lower cholesterol turnover rate. These findings explain the apparent differences noted earlier as between man and certain experimental animals and point to the importance of evaluating the relative hypercholesterolemic properties of fats at more than one level of dietary cholesterol.

LIVER STORAGE OF VITAMIN A BY RATS FED CARROTS IN VARIOUS FORMS. J.P. Sweeney and A.C. Marsh (Nutr. Inst., ARS, USDA, Beltsville, Md. 20705). *J. Nutr.* **104**, 1115–20 (1974). The availability to rats of carotene contained in carrots was assayed by liver and kidney storage of vitamin A. Carrots were assayed as: fresh; frozen (sliced); frozen (blended and freeze-dried); and frozen (blended, treated by ultrasonics and freeze-dried). Comparisons were made with all-trans-β-carotene dissolved in cottonseed oil. The results indicated that carotene in carrots, as measured by liver and kidney storage of vitamin A, was equal in availability to all-trans-β-carotene dissolved in cottonseed oil. Disruption of carrot cells by freezing, blending, freeze-drying, or ultrasonic treatment did not increase carotene availability. Despite similar liver and kidney storage values, fecal excretions of carotene for rats receiving carrots were much higher than for those receiving carotene in cottonseed oil. Higher liver storage values were obtained when the rate of weight gain during the assay period was decreased by restricting the food intake.

BASAL ENERGY METABOLISM IN PROTEIN-CALORIE MALNUTRITION AND VITAMIN A DEFICIENCY. K.S.J. Rao and L. Khan (Natl. Inst. of Nutr., Indian Council of Med. Res., Hyderabad-500007, India). *Am. J. Clin. Nutr.* **27**, 892–6 (1974). Measurements of basal metabolic rate (BMR) were done in children suffering from kwashiorkor, marasmus, and in children with ocular signs of vitamin A deficiency. BMR was markedly depressed in kwashiorkor and marasmus. The control children drawn from the same socio-economic stratum had no clinical signs of protein-calorie malnutrition, but had a weight deficit of 17 to 35% when compared with Harvard standards. Their BMR, however, was similar to that reported for well-nourished children.

ASCORBATE-CHOLESTEROL-LECITHIN INTERACTIONS: FACTORS OF POTENTIAL IMPORTANCE IN THE PATHOGENESIS OF ATHEROSCLEROSIS. C. Krumdieck and C.E. Butterworth, Jr. (Nutr. Program, Schl. of Med., Univ. of Ala. in Birmingham, Birmingham, Ala. 35294). *Am. J. Clin. Nutr.* **27**, 866–76 (1974). In a number of animal experiments and in some (but not all) human studies, ascorbate is reported to have a cholesterol-lowering effect. Thus, vitamin C seems to occupy a position of unique importance by virtue of its involvement in two systems: the maintenance of vascular integrity and the metabolism of cholesterol to bile acids. This review describes certain aspects of cholesterol mobilization as related to β-unsaturated lecithins. Although vitamin C and the lecithins are being actively promoted and widely sold in health-food stores, there have been no carefully controlled scientific evaluations of either their effectiveness or safety in statistically significant groups of humans. It is our belief that the available evidence clearly justifies, and indeed calls for, such studies.

STUDIES ON THE BIOSYNTHESIS OF TETRAHYMANOL IN TETRAHYMENA PYRIFORMIS. THE MECHANISM OF INHIBITION BY CHOLESTEROL. A.S. Beedle, K.A. Munday and D.C. Wilton (Dept. of Physiol. and Biochem., Univ. of Southampton, Med. and Biol. Sci. Bldg., Bassett Crescent East, Southampton SO9 3TU, U.K.). *Biochem. J.* **142**, 57–64 (1974). Tetrahymanol biosynthesis by the protozoan *Tetrahymena pyriformis* was progressively inhibited by the inclusion of cholesterol in the growth medium. Studies with labelled precursors of tetrahymanol have established that there are two major sites of inhibition in whole cells. The inhibition at the first site, between acetate and mevalonate, occurred rapidly after addition of cholesterol. The activity of 3-hydroxy-3-methylglutaryl-CoA reductase (EC 1.1.1.34), a predominantly cytosolic enzyme in this organism, was not inhibited in cholesterol-grown cells nor by addition of cholesterol directly to the assay medium. The second major site of inhibition in whole cells is between mevalonate and squalene and this is accompanied by inhibition of the enzyme that converts farnesylpyrophosphate into squalene (squalene synthetase). Squalene cyclase is partially inhibited. The conversion of mevalonate into tetrahymanol in vitro was not inhibited by the addition of cholesterol to the assay medium. Tetrahymanol added to the culture medium is taken up by the cells but does not inhibit endogenous biosynthesis.

METABOLISM OF DIHYDROTACHYSTEROL AND 5,6-TRANS-CHOLECALCIFEROL IN THE CHICK AND THE RAT. D.E.M. Lawson and P.A. Bell (Dunn Nutr. Lab., Univ. of Cambridge and Med. Res. Council, Milton Rd., Cambridge CB4 1XJ, U.K.). *Biochem. J.* **142**, 37–46 (1974). Dihydrotachysterol and 5,6-trans-cholecalciferol are biologically active analogues of cholecalciferol (vitamin D) with a similarity in steric structure to 1,25-dihydroxycholecalciferol, the active form of the vitamin. The question arises as to the nature of the active form of these analogues. High specific radioactivity ^{14}C- and ^{3}H-labelled forms of dihydrotachysterol and 5,6-trans-cholecalciferol and its 25-hydroxy derivative were synthesized and their metabolism was studied in chicks and rats. All these steroids were very rapidly metabolized compared with cholecalciferol; 20% of the dihydrotachysterol dose was excreted in bile in the first 24 h, about 50% as a carboxylic acid derivative. Although polar metabolites were detected in tissues, no 1-hydroxy form was observed. Larger proportions of the parent steroid and its 25-hydroxy metabolite were detected in tissues compared with cholecalciferol, but no single metabolite was detected at the intracellular site of action of cholecalciferol.

SOLUBILIZATION AND FRACTIONATION OF GLYCOPROTEINS AND GLYCOLIPIDS OF KB CELL MEMBRANES. T.B. Butters and R.C. Hughes (Natl. Inst. for Med. Res., Mill Hill, London NW7 1AA, U.K.). *Biochem. J.* **140**, 469–78 (1974). A fraction enriched in plasma membranes of human tumour KB cell line, a permissive cell for adenovirus type 5, was obtained. Electrophoresis of the membranes in polyacrylamide gels with buffers containing sodium dodecyl sulphate showed that the membranes after reduction with 2-mercaptoethanol contained over 20 polypeptide species. Three polypeptides were glycosylated and had apparent mol. wts. of 92000, 72000 and 62000. The glycoproteins and the specific receptors responsible for adenovirus adsorption to the membranes were readily extracted into solutions containing low concentrations of Triton X-100. Glycolipids and proteins were also made soluble. A membranous residue obtained after Triton X-100 extraction was enriched in several proteins that appeared to consist of polypeptides of lower molecular weight than the average of KB membrane polypeptides. Sphingomyelin, cholesterol and triglycerides were similarly concentrated in the insoluble residue remaining after successive extractions of KB membranes with Triton X-100. Further, ceramide trihexoside was significantly less easily extracted from KB membranes than lactosyl ceramide. The components of membranes made soluble by detergent extraction and containing the large part of the KB membrane glycoproteins were subjected to chromatography on Sepharose 6B and DEAE-cellulose and to isoelectric focusing in the presence of buffers containing Triton X-100.

PHOSPHOLIPID SYNTHESIS IN RAT LIVER ENDOPLASMIC RETICULUM AFTER THE ADMINISTRATION OF PHENOBARBITONE AND 20-METHYLCHOLANTHRENE. S.C. Davison and E.D. Wills (Dept. of Biochem. and Chem., Med. College of St. Bartholomew's Hosp., Charterhouse Sq., London EC1M 6BQ, U.K.). *Biochem. J.* **142**, 19–26 (1974). Phenobarbitone injection did not affect the concentration of phospholipids in the liver endoplasmic reticulum, but it increased the rate of incorporation of [^{32}P] orthophosphate into the phospholipids. 20-Methylcholanthrene caused a transient increase in total phospholipid but a decrease in the turnover rate of the phospholipids. Incorporation of [^{32}P]orthophosphate into phosphatidylcholine, compared with that into phosphatidylethanolamine, was increased by phenobarbitone injection but decreased by 20-methylcholanthrene injection. The activity of *S*-adenosylmethionine-phosphatidylethanolamine methyltransferase increased 12h after phenobarbitone injection, when incorporation of [^{32}P]orthophosphate into phosphatidylcholine was a maximum, but at other times, and after 20-methylcholanthrene injection, the activity of the enzyme did not correlate with the rate of phosphatidylcholine synthesis. It is concluded that phenobarbitone injection causes an increased rate of turnover of total phospholipids in the endoplasmic reticulum and an increased conversion of phosphatidylethanolamine into phosphatidylcholine, whereas 20-methylcholanthrene injection depressed both the turnover rate of total phospholipids and the formation of phosphatidylcholine.

STUDIES ON THE LIPID COMPOSITION OF THE RAT LIVER ENDOPLASMIC RETICULUM AFTER INDUCTION WITH PHENOBARBITONE AND 20-METHYLCHOLANTHRENE. *Ibid.*, 461–8. The cholesterol

content, proportions of different phospholipids and fatty acid components of phosphatidylcholine and phosphatidylethanolamine were studied in rat liver endoplasmic-reticulum membrane, after a single injection of 20-methylcholanthrene or injections of phenobarbitone for 5 days. A marked decrease in the proportion of cholesterol occurred 5 days after injection of 20-methylcholanthrene or phenobarbitone. The proportion of phosphatidylcholine was increased by injection of phenobarbitone and minor changes occurred in other phospholipids. Phenobarbitone caused the proportion of linoleic acid in phosphatidylcholine and phosphatidylethanolamine to increase to 120–125% of the control and the proportion of oleic acid, arachidonic acid and docosahexaenoic acid to decrease. 20-Methylcholanthrene caused an increase in the proportion of oleic acid in phosphatidylcholine and ethanolamine to 125–140% of the control, 1 day after injection. The increased proportion of linoleic acid in phosphatidylcholine after phenobarbitone injection occurs simultaneously with the increase of cytochrome P-450 concentration, the rate of oxidative demethylation of aminopyrine and the rate of hydroxylation of biphenyl.

MITOGENIC ACTIVITY OF STERCULIC ACID, A CYCLOPROPENOID FATTY ACID. D.G. Scarpelli (Dept. of Pathol. and Oncology, Univ. of Kansas Med. Ctr., College of Health Sci., and Hospital, Kansas City, Mo. 66103). *Science* 185, 958–60 (1974). Hepatocytes in rainbow trout and rat are stimulated to augmented DNA synthesis and cell division by low concentrations of cyclopropenoid fatty acids in the diet. Sterculic acid isolated as the methyl ester from *Sterculia foetida* oil has been identified as one of the mitogenic principles.

DETERMINATION OF MOLECULAR ASYMMETRY IN THE PHOSPHATIDYLETHANOLAMINE SURFACE DISTRIBUTION IN MIXED PHOSPHOLIPID VESICLES. B.J. Litman (Dept. of Biochem., Univ. of Virginia, Schl. of Med., Charlottesville, Va. 22903). *Biochemistry* 13, 2844–8 (1974). A method has been developed for selectively labeling the amino groups of phosphatidylethanolamine molecules located in the inner surface of mixed phosphatidylethanolamine-phosphatidylcholine vesicles. The results of these experiments demonstrate that as the mole fraction of phosphatidylethanolamine in the vesicle increases, phosphatidylethanolamine molecules preferentially distribute toward the inner vesicle surface. In addition, all the primary amino groups of phosphatidylethanolamine in the mixed phospholipid vesicles are reactive with trinitrobenzenesulfonic acid and can be localized in either the inner or outer vesicle surface. The mixed phospholipid vesicles are found to be impermeable to trinitrobenzenesulfonic acid at 20 and 37°, with essentially no change in the observed labeling pattern at these temperatures.

PLANT STEROL METABOLISM. ENZYMATIC CLEAVAGE OF THE 9β,19β-CYCLOPROPANE RING OF CYCLOPROPYL STEROLS IN BRAMBLE TISSUE CULTURES. R. Heintz and P. Benveniste (Lab. de Biochimie Vegetable, Univ. Louis Pasteur, Inst. de Botanique, 67083 Strasbourg-Cedex, France). *J. Biol. Chem.* 249, 4267–74 (1974). A cell-free enzyme preparation obtained from bramble tissues (*Rubus fruticosus*) grown in vitro was found to be capable of opening the cyclopropane ring of cycloeucalenol, producing obtusifoliol. The identification of this substance was based on the use of radiochromatography, formation of functional derivatives, and crystallization to constant specific radioactivity. A boiled preparation failed to mediate the reaction, proving that the opening of the 9β,19β-cyclopropane ring is enzymatic. Enzymatic activity was bound to the microsomal fraction and was not dependent upon the addition of exogenous ATP or NADH. Microsomes from other higher plant species (germinating peas and tobacco tissue cultures) were found to be active in transforming cycloeucalenol into obtusifoliol, but microsomes from rabbit liver were unable to perform this reaction. 24-Methylene cycloartanol, and cycloeuclaenol, which are ubiquitous constituents of higher plants, were tested as substrates for the enzymatic reaction. The 4,4-dimethyl sterols are very poor substrates, whereas cycloeucalenol is efficiently converted.

REL GENE CONTROL OF LIPID SYNTHESIS IN ESCHERICHIA COLI. EVIDENCE FOR ELIMINATING FATTY ACID SYNTHESIS AS THE SOLE REGULATORY SITE. W.D. Nunn and J.E. Cronan, Jr. (Dept. of Molecular Biophys. and Biochem., Yale Univ., New Haven, Conn. 06510). *J. Biol. Chem.* 249, 3994–6 (1974). Phospholipid synthesis in amino acid-starved stringent (*rel*$^+$) bacteria which require exogenous fatty acids for phospholipid synthesis (and growth) was examined. Under these conditions phospholipid synthesis remained under stringent control. These results indicate that control of lipid synthesis by the *rel* gene is not solely due to inhibition of fatty acid synthesis.

INFLUENCE OF FAT AND FLUORIDE ON GASTRIC EMPTYING OF RATS. E.L. McGown and J.W. Suttie (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisc.-Madison, Madison, Wisc. 53706). *J. Nutr.* 104, 909–15 (1974). The purpose of the study was to investigate the mechanism by which a high fat diet fed to rats enhances the toxicity of dietary fluoride. This phenomenon was pursued by giving ^{14}C-tripalmitin or ^{14}C-palmitate in various test meals. The appearance of $^{14}CO_2$ was greatly retarded when fluoride was included. By monitoring the passage of several ^{14}C-substrates through the gastrointestinal tract, fluoride in the presence of fat was found to cause delayed gastric emptying. This effect likely accounts for the increased toxicity of fluoride to rats fed high fat diets. Little or no effect of fluoride was observed on gastric emptying of fat-free test meals.

EFFECT OF VITAMIN A DEFICIENCY ON LIVER TRANSFER RNA METHYLASES. A.M. McCormick and R.F. Krause (Dept. of Biochem., Schl. of Med., W. Va. Univ., Morgantown, W. Va. 26506). *Proc. Soc. Exp. Biol. Med.* 146, 391–3 (1974). A comparison of the final extent of methyl incorporation by the enzymes from control and deficient liver on the basis of nmoles $^{14}CH_3$ incorporated into tRNA/mg protein/2 hr incubation reveals a 1.5-fold increase in the methylation of tRNA by deficient liver. These results may indicate that tRNA methylases from vitamin A-deficient livers are capable of methylating novel sites in heterologous tRNA which are not accessible to the control liver enzymes.

PHASE TRANSITIONS IN BILAMELLAR VESICLES. MEASUREMENTS BY PYRENE EXCIMER FLUORESCENCE AND EFFECT ON TRANSACYLATION BY LECITHIN: CHOLESTEROL ACYLTRANSFERASE. A.K. Soutar, H.J. Pownall, A.S. Hu and L.C. Smith (Marrs McLean Dept. of Biochem., Baylor College of Med., Houston, Tx. 77025). *Biochemistry* 13, 2828–36 (1974). Pyrene excimer fluorescence has been employed as a probe of the microviscosity of the hydrocarbon interior of a variety of phospholipid dispersions. The transition temperature, T_t, at which the nonpolar regions of these molecules undergo phase changes, was found to be 11, 24, 30, 41, and −3C for dilauroyl-dimyristoyl-, 1-palmitoyl-2-palmitoleyl-, dipalmitoyl-, and egg phosphatidylcholine, respectively. These values agree closely with values obtained by other methods. The activation energy for the transacylation by lecithin: cholesterol acyltransferase is changed at a temperature which coincides with the transition temperature of the phosphatidylcholine acyl donor in the phosphatidylcholine: cholesterol vesicle. This dependence is consistent with a preferential association of the enzyme and phosphatidylcholine.

FACTORS INFLUENCING THE QUANTITY OF ABDOMINAL FAT IN BROILERS. 3. DIETARY ENERGY LEVELS. L.F. Kubena, T.C. Chen, J.W. Deaton and F.N. Reece (U.S.D.A., A.R.S., South Central Poultry Res. Lab, Mississippi State, Miss. 39762). *Poultry Sci.* 53, 974–8 (1974). Three trials were conducted to study the effect of dietary energy level on the quantity of abdominal fat in broilers. The dietary energy level of the starter diet fed the first 4 weeks appeared to influence the quantity of abdominal fat at 7 and 8 weeks of age, but by 9 weeks of age this influence was no longer present. Within each dietary treatment, the abdominal fat in females was a higher percentage of body weight than in the males. Broilers fed the dietary starter/finisher M.E. value combinations had abdominal fat expressed as a percentage of body weight in the following order (high to low): 3306/3372, 3141/3372, 3306/3207, 3306/3042, 3141/3207 and 3141/3042.

DIFFERENT DEGRADATION RATES OF ALKYLATED RNA PROTEIN AND LIPIDS IN NORMAL AND TUMOR CELLS. M.I. Lerman, O. Yu Abakumova, N.G. Kucenco, L.B. Gorbacheva, G.V. Kukushkina and A.M. Serebryanyi (Inst. of Biol. and Med. Chem., Academy of Med. Sci., Moscow, USSR). *Cancer Res.* 34, 1536–41 (1974). Radioactivity detected in DNA, RNA, proteins and lipids 1 to 5 hr after *N*-methyl-*N*-nitrosourea-1-^{14}C administration is retained in hepatoma cells for long periods of time (at least for 48 hr) while it is rapidly eliminated from liver and spleen cells. A hypothesis is suggested that emphasizes the role of turnover processes in mechanisms responsible for the selective toxicity of alkylating agents and nitrosoureas towards tumor cells.

DEPRESSED FATTY ACID AND ACETATE OXIDATION AND OTHER METABOLIC DEFECTS IN HOMOGENATES FROM HEARTS OF HAMSTERS WITH HEREDITARY CARDIOMYOPATHY. K.J. Kako, M.J. Thorton and H.A. Heggtveit (Dept. of Physiol. and Pathol.,

Faculty of Med., Univ. of Ottawa, Ottawa Kin 6N5, Canada). *Circulation Res.* 34, 570–80 (1974). Metabolic changes in heart homogenate of Syrian hamsters with hereditary cardiomyopathy (BIO 14.6 strain) were examined. Oxidation of labeled fatty acids and acetate by myopathic homogenates was severely depressed; CO_2 production from labeled acetate was only one-fifteenth of the control value and butyrate oxidation was suppressed to one-fourth of the control value. Although the addition of carnitine enhanced the oxidation of palmitate and octanoate by homogenates from both healthy and cardiomyopathic hamsters, the magnitude of the depression of oxidation (60–80%) in the myopathic homogenates was not influenced by carnitine. No change occurred in the rate of formation of palmitoyl-CoA from palmitoyl-l-carnitine or in the activity of acyl-CoA synthetases; similarly, the one-step oxidation of [1-^{14}C] pyruvate, [1-^{14}C] α-ketoglutarate, and succinate was unimpaired in cardiomyopathy, and the oxidation of [2-^{14}C] pyruvate and [U-^{14}C] α-ketoglutarate was maintained at a relatively high level (63–71% of control).

MITOCHONDRIAL CYTOCHROME P_{150}. A COMPONENT OF CHICK KIDNEY 25-HYDROXYCHOLECALCIFEROL-1α-HYDROXYLASE. J.G. Ghazarian, C.R. Jefcoate, J.C. Knutson, W.H. Orme-Johnson and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisconsin-Madison, Madison, Wis. 53706). *J. Biol. Chem.* 249, 3026–33 (1974). A novel method employing the direct reduction of cytochrome oxidase in the presence of antimycin A has provided the means to reveal the presence of cytochrome P_{150} in chick kidney mitochondria as characterized by the carbon monoxide difference spectrum. This mitochondrial pigment has been found to have properties distinctly different from that of the kidney microsomal cytochrome P_{150}. The mitochondrial content of cytochrome P_{450} has been found to be about 0.20 nmole per mg of protein. Reconstitution studies with the solubilized cytochrome have indicated that this carbon monoxide-binding hemoprotein is involved in the activity of the renal 25-hydroxycholecalciferol-1α-hydroxylase. The reconstitution required an added flavor protein and iron-sulfur protein, as well as NADPH and the solubilized hemoprotein. Kinetic experiments on the competitive inhibition of 25-hydroxycholecalciferol-1α-hydroxylase activity of intact mitochondria by metyrapone and aminoglutethimide have shown that the inhibition constants, K_I, for the drugs are 1.6×10^{-4} M and 1.1×10^{-3} M respectively.

DNA REPAIR INHIBITION: A NEW MECHANISM OF ACTION OF STEROIDS WITH POSSIBLE IMPLICATIONS FOR TUMOR THERAPY. D. Gaudin, L. Guthrie and K.L. Yielding (Lab. of Molecular Biol., Univ. of Ala. in Birmingham, Univ. Station, Birmingham, Ala. 35294). *Proc. Soc. Exp. Biol. Med.* 146, 401–5 (1974). A number of steroids have been demonstrated to be inhibitors of DNA repair replication in normal human lymphocytes. This inhibitory capability is a previously unrecognized mechanism of action of these compounds. Because the alkylating agents and X-rays used in tumor therapy cause chemical alterations to cellular DNA of a type which can be repaired by the excision repair process, it is suggested that repair inhibitory steroids may be useful in conjunction with treatment involving alkylating agents or X-rays.

SERUM AND LIVER TRIGLYCERIDES IN MALNOURISHED JAMAICAN CHILDREN WITH FATTY LIVER. H. Flores, A. Seakins, O.K. Brooke and J.C. Waterlow (Tropical Metabolism Res. Unit, Univ. of the West Indies, Mona, Kingston 7, Jamaica, W.I.). *Am. J. Clin. Nutr.* 27, 610–14 (1974). Measurements were made of triglyceride concentrations in the liver, serum and serum lipoproteins in malnourished Jamaican children with fatty liver. The fasting serum triglyceride concentrations of the patients, before treatment, were highly variable, ranging from 55.6 to 353 mg/100 ml. The patterns of change for serum triglyceride concentration during treatment were also variable. Patients were grouped according to whether the concentrations of serum triglycerides after recovery were higher than, lower than, or unchanged from, the concentrations before treatment. The three groupings then exhibited concentrations before treatment that fell in descrete ranges, being respectively low, high or normal. There was no clinical difference among the three groups of patients. There was also no difference in the serum lipoprotein pattern nor in the composition of the serum very low density lipoprotein. The latter did not change during treatment. In most patients the fasting serum triglyceride concentrations before treatment appeared to be correlated with age. The differences between these findings and those reported from other countries are discussed.

THE RESPONSE OF THE SMALL INTESTINE TO VITAMIN D. ISOLATION AND PROPERTIES OF CHICK INTESTINAL POLYRIBOSOMES. J.S. Emtage, D.E.M. Lawson and E. Kodicek (Dunn Nutr. Lab., Univ. of Cambridge and Med. Res. Council, Milton Road, Cambridge CB41XJ, U.K.). *Biochem. J.* 140, 239–47 (1974). Undegraded polyribosome preparations may be obtained from chick intestinal mucosa if ribonuclease activity is strictly controlled. This is best achieved by homogenization of the mucosa directly in rat liver cell-sap. The extent of amino acid incorporation by chick intestinal polyribosomes is greatly influenced by the source of the cell-sap. Sephadex-treated intestinal cell-sap caused impaired incorporation and release of completed polypeptide chains, whereas Sephadex-treated rat liver cell-sap promoted the polymerization of up to 90 amino acids per ribosome. Under optimum conditions 30–35% of the nascent polypeptide chains are completed and released. The preparation of an antiserum against the calcium-binding protein formed in response to vitamin D is described. It is shown that the antiserum is highly specific for calcium-binding protein. This antiserum was used to investigate the ability of chick intestinal polyribosomes to synthesize calcium-binding protein. Only polyribosomes from chicks receiving vitamin D have the ability to synthesize calcium-binding protein. Moreover, the product formed in vitro has the same electrophoretic mobility as calcium-binding protein synthesized in vivo. It is concluded that one of the main functions of vitamin D in the small intestine is to induce the synthesis de novo of calcium-binding protein.

LIPID COMPOSITION AND METABOLISM OF THROMBOATHEROSCLEROTIC LESIONS PRODUCED BY CONTINUED ENDOTHELIAL DAMAGE IN NORMAL RABBITS. A.J. Day, F.P. Bell, S. Moore and R. Friedman (Dept. of Pathol., McMaster Univ., Hamilton, Ontario, Canada). *Circulation Res.* 34, 467–75 (1974). Thromboatherosclerotic and fibrous lesions were produced by endothelial damage with polyethylene catheters inserted into the aortas in rabbits on a normal diet. Two weeks after insertion of the catheters, the concentration of both free cholesterol and cholesteryl ester in the thromboatherosclerotic lesions was significantly greater than that in the adjacent normal intima. A further increase in the concentration of free cholesterol and particularly of cholesteryl ester occurred during the remainder of the 4-month study period. Gas-liquid chromatography indicated that the raised thromboatherosclerotic lesions contained more cholesteryl oleate and less cholesteryl linoleate than did either the normal intima or the fibrous lesions. The incorporation of [1-^{14}C] oleic acid into combined lipid in the aortas incubated in vitro showed that, by 2 weeks, two to three times more oleic acid had been incorporated into cholesteryl ester in the thromboatherosclerotic raised lesions than in the normal intima.

EFFECTS OF DIETARY VITAMIN D LEVELS ON THE IN VITRO MINERALIZATION OF CHICK METAPHYSES. M.A. Crenshaw, W.K. Ramp, W.A. Gonnerman and S.U. Toverud (Dental Res. Center and Dept. of Pharmacology, Univ. of N.C., Chapel Hill, N.C. 27514). *Proc. Soc. Exp. Biol. Med.* 146, 488–93 (1974). Chicks fed a rachitogenic diet became hypocalcemic and formed hypomineralized bones compared with chicks fed a control diet. Undemineralized metaphyseal slices from rachitic chicks incubated for five days in media with four different Ca-P concentration products had significantly less mineral deposited than slices from control chicks or chicks fed the rachitogenic diet supplemented with Ca. The latter chicks formed normally mineralized bones and had serum Ca values intermediate between those of the rachitic and control chicks. The data support the concept that hypomineralization of rachitic bone in vivo is mainly due to reduced serum Ca levels, but in addition show that hypomineralized rachitic bone, when tested in vitro, has lost some of its ability to serve as a calcification matrix.

BIOSYNTHESIS OF HYDROXYFATTY ACID POLYMERS. ENZYMATIC SYNTHESIS OF CUTIN FROM MONOMER ACIDS BY CELL-FREE PREPARATIONS FROM THE EPIDERMIS OF VICIA FABA LEAVES. R. Croteau and P.E. Kolattukudy (Dept. of Agr. Chem. and the Program in Biochem. and Biophys., Washington State Univ., Pullman, Washington 99163). *Biochemistry* 13, 3193–202 (1974). A particulate preparation from epidermal extracts of young *Vicia faba* leaves catalyzed the incorporation of palmitic acid, 16-hydroxypalmitic acid, and 10,16-dihydroxypalmitic acid into an insoluble material with adenosine triphosphate and coenzyme A as the required cofactors. Sequential treatment of the insoluble residue with hydrolytic enzymes, and chemical depolymerization studies, demonstrated that these acids were esterified to cutin, the hydroxyfatty acid polymer of plant cuticle. The apparent K_m values for palmitic acid were 2.0×10^{-5}, 6.7×10^{-5}, and 1.1×10^{-4} M, respectively. This is the

first report on an enzyme which catalyzes the formation of a hydroxyfatty acid biopolymer, cutin.

EXPRESSION OF THE FAMILIAL HYPERCHOLESTEROLEMIA GENE IN HETEROZYGOTES: MECHANISM FOR A DOMINANT DISORDER IN MAN. M.S. Brown and J.L. Goldstein (Dept. of Internal Med., Univ. of Tex. Southwestern Med. Schl., Dallas, Tex. 75235). *Science* **185**, 61–63 (1974). Studies in cultured fibroblasts indicate that the primary genetic abnormality in familial hypercholesterolemia involves a deficiency in a cell surface receptor for low density lipoproteins (LDL). In normal cells, binding of LDL to this receptor regulates cholesterol metabolism by suppressing cholesterol synthesis and increasing LDL degradation. In cells from heterozygotes, a 60 percent reduction in LDL receptors leads to a concentration-dependent defect in regulation, so that attainment of equal rates of cholesterol synthesis and LDL degradation in normal and heterozygous cells requires a two- to threefold higher concentration of LDL in the heterozygote. The identification of this genetic regulatory defect in fibroblasts of heterozygotes makes available an in vitro system for studying the effects of a dominant mutation on gene expression in mammalian cells.

CHOLESTEROL SULFATE: I. OCCURRENCE AND POSSIBLE BIOLOGICAL FUNCTION AS AN AMPHITATHIC LIPID IN THE MEMBRANE OF THE HUMAN ERYTHROCYTE. G. Bleau, F.H. Bodley, J. Longpre, A. Chapdelaine and K.D. Roberts (Depts. of Biochem., and of Med., Univ. of Montreal and Maisonneuve-Rosemont Hospital, Montreal, Quebec, Canada). *Biochim. Biophys. Acta* **352**, 1–9 (1974). Cholesterol sulfate is a normal constituent of human erythrocytes at a concentration which is approximately 2-fold higher than plasma cholesterol sulfate. In these cells, the major fraction of the cholesterol sulfate is firmly bound to the membrane. Cholesterol sulfate as well as certain analogs can protect the red blood cell against hypotonic hemolysis. This effect is produced in vitro at physiological concentrations of the sterol sulfate and both the sulfate moiety as well as the side chain of the molecule are necessary for biological activity.

CHOLESTEROL SULFATE: I. OCCURRENCE AND POSSIBLE BIOLOGICAL FUNCTION AS AN AMPHITATHIC LIPID IN THE MEMBRANE OF THE HUMAN ERYTHROCYTE. G. Bleau, F.H. Bodley, J. Longpre, A. Chapdelaine and K.D. Roberts (Depts. of Biochem., and of Med., Univ. of Montreal and Maisonneuve-Rosemont Hospital, Montreal, Quebec, Canada). *Biochim. Biophys. Acta* **352**, 1–9 (1974). Cholesterol sulfate is a normal constituent of human erythrocytes at a concentration which is approximately 2-fold higher than plasma cholesterol sulfate. In these cells, the major fraction of the cholesterol sulfate is firmly bound to the membrane. Cholesterol sulfate as well as certain analogs can protect the red blood cell against hypotonic hemolysis. This effect is produced in vitro at physiological concentrations of the sterol sulfate and both the sulfate moiety as well as the side chain of the molecule are necessary for biological activity.

EFFECTS OF VITAMIN E-DEFICIENCY ON GUINEA PIG LYSOSOMES. J.S. Bond and J.W.C. Bird (Dept. of Physiol., Rutgers—The State Univ., New Brunswick, N.J. 08903). *Proc. Soc. Exp. Biol. Med.* **146**, 608–12 (1974). The specific activities of cathepsins in whole homogenates, cell particles, or soluble fractions of muscle or liver were the same in guinea pigs given vitamin E-deficient diets as those on control diets. The proportion of total cathepsin activity in supernatant fractions (70,000*g* for 45 min) was not affected in animals given the deficient diet for 15 days. The proportion of total cathepsin activity in the supernatant fraction of liver was increased in animals given the deficient diet, compared with the supplemented diet, for 21 days. The sum of the activities found in the soluble plus particulate fractions of muscle from animals maintained on vitamin E-deficient diets for 21 days was greater than activity found in whole homogenates. An inhibitor of cathepsin activity may be present in muscle from the vitamin E-deficient animals.

METABOLIC ADAPTATIONS IN FATTY ACID AND LACTOSE BIOSYNTHESIS BY SHEEP MAMMARY TISSUE DURING CESSATION OF LACTATION. D.E. Bauman, R.W. Mellenberger and D.L. Ingle (Dept. of Dairy Sci., Univ. of Ill., Urbana 61801). *J. Dairy Sci.* **57**, 719–23 (1974). The effect of involution on fatty acid synthesis, lactose synthesis and carbon dioxide production by sheep mammary tissue was examined. Mammary tissue from lactating or nonlactating (9 days after weaning) sheep was used for measurements of biosynthetic capacities (in vitro incubations) and enzymatic activities. Termination of lactation decreased biosynthetic rates of fatty acid and lactose synthesis 99 and 97%. With the termination of lactation, the magnitude of alterations in rates of fatty acid synthesis and lactose synthesis compared most closely to decreases in acetyl-CoA carboxylase activity and lactose synthetase activity, respectively.

ABSORPTION AND PASSAGE OF FAT- AND WATER-SOLUBLE THIAMIN DERIVATIVES INTO ERYTHROCYTES AND CEREBROSPINAL FLUID OF MAN. H. Baker, A.D. Thomson, O. Frank and C.M. Leevy (Div. of Liver and Nutr., Dept. of Med. and Preventive Med., College of Med. and Dentistry of N.J.-N.J. Med. Schl., 88 Ross St., East Orange, N.J. 07018). *Am. J. Clin. Nutr.* **27**, 676–80 (1974). Oral administration of the lipid-soluble allithiamins, thiamin propyl disulfide and thiamin tetrahydrofurfuryl disulfide, caused a significant increase in thiamin activity in whole blood, red blood cells and cerebrospinal fluid equivalent to that produced by parenteral, water-soluble thiamin hydrochloride and thiamin pyrophosphate. In contrast, oral administration of the water-soluble thiamins did not significantly elevate thiamin activity in biological fluids; this was probably due to their rate-limited intestinal transport. The odor of thiamin propyl disulfide limits its usefulness in multivitamins and food fortification. Thiamin tetrahydrofurfuryl disulfide is odorless and is therefore more useful for such purposes. Orally administered allithiamin vitamers are recommended for prophylaxis and treatment of thiamin deficits because they have the same biological properties as parenterally administered water-soluble thiamins.

PLASMA FREE FATTY ACID AND NEUTRAL LIPID CONCENTRATIONS IN IMMATURE, LAYING AND BROODY TURKEY HENS. W.L. Bacon, M.A. Musser and K.I. Brown (Dept. of Poultry Sci., Ohio Agr. Res. and Dev. Center, Wooster, Ohio 44691). *Poultry Sci.* **53**, 1154–60 (1974). Free fatty acid (FFA) concentrations in blood plasma from immature, laying and broody turkey hens were re-examined following removal of phospholipids. A mean value of 0.21 ± 0.02 u. equiv./ml. plasma of FFA was found for immature hens and as they were stimulated into egg production, and no systematic increase was noted. Broody hens had the same concentration as laying and immature hens. Neutral lipids levels (mainly triglyceride) increased from about 3.5 mg./ml. plasma to about 18–25 mg./ml. plasma as the hens reached sexual maturity, then plateaued until a broody period began when they dropped to concentrations comparable to those in immature hens. No correlation was found between FFA and neutral lipid concentrations. Although FFA concentration is much lower than previously reported, 14% of the total daily amount cleared was calculated to be sufficient to account for egg yolk neutral lipid. The remaining 86% would be available for other metabolic functions.

IMMUNE DAMAGE TO LIPOSOMES CONTAINING LIPIDS FROM SCHISTOSOMA MANSONI WORMS. C.R. Alving, K.C. Joseph, H.B. Lindsley and M J. Schoenbechler (Depts. of Immunology and Med. Zoology, Walter Reed Army Inst. of Res., Washington, D.C. 20012). *Proc. Soc. Exp. Biol. Med.* **146**, 458–61 (1974). A protein-free lipid extract (F2), consisting mainly of glycolipids, a small amount of phospholipids and an unidentified brown pigment, was obtained from *Schistosoma mansoni* adult worms. F2 was tested for the presence of haptenic molecules by incorporation into liposomal model membranes containing trapped glucose. Sera from five infected monkeys were assayed for serological activity against the F2 in liposomes at different times following infection. Complement-dependent damage leading to liposomal glucose release was observed with sera from four out of five monkeys. Glucose release did not occur when the F2 was omitted from the liposomes nor when heat-inactivated complement was used. All of the activity was removed by adsorption of monkey serum with adult schistosomes. The IgM-containing fraction of serum accounted for all of the antibody activity. It was concluded that a complement-dependent immune response against lipids may be observed during the course of schistosomiasis in monkeys. The antibody activity can be detected by utilizing liposomal model membranes which contain schistosomal lipids.

THE CELL-ENVELOPE GLYCOLIPIDS OF BAKER'S YEAST. K. Työrinoja, T. Nurminen and H. Suomalainen (Res. Labs. of the State Alcohol Monopoly (Alko), SF-00101 Helsinki 10, Finland). *Biochem. J.* **141**, 133–9 (1974). Sphingolipids were found to dominate in the glycolipids from the cell envelope of baker's yeast. A relatively large quantity of ceramides was detected. Among the several complex phosphosphingolipids described, ceramide-(P-inositol)$_2$-mannose was the main component. About 55% of long-chain bases in sphingolipids con-

sisted of C_{18}-phytosphingosine (4D-hydroxysphinganine). Other bases, found in decreasing concentrations, were C_{20}-phytosphingosine, C_{20}-dehydrophytosphingosine, C_{18}-dihydrosphingosine (sphinganine) and C_{19}-dihydrosphingosine. The presence of sterol glycosides, sulpholipids, cerebrosides and acylglucoses was demonstrated.

A MONOLAYER AND FREEZE-ETCHING STUDY OF CHARGED PHOSPHOLIPIDS. I. EFFECTS OF IONS AND pH ON THE IONIC PROPERTIES OF PHOSPHATIDYLGLYCEROL AND LYSYLPHOSPHATIDYLGLYCEROL. J.F. Tocanne, P.H.J.Th. Ververgaert, A.J. Verkleij and L.L.M. Van Deenen (Biochem. Lab. and Biol. Ultrastructure Res. Unit, State Univ. Utrecht, The Netherlands). *Chem. Phys. Lipids* 12, 201–19 (1974). A comparative study of the ionic properties of phosphatidylglycerol (PG) and lysylphosphatidylglycerol (LPG) has been carried out using monolayer is strongly dependent on the subphase ionic strength. Mg^{++} and Ca^{++} induced a marked condensing effect. With Ca^{++} a typical cylindrical structure could be observed by freeze etching, this structure being assumed to be generated by Ca^{++} binding to PG. These phenomena were observed with bone didodecanoyl-PG and PG from *S. aureus*. With respect to LPG it has been shown that the anion $MoO_4^{=}$ gave a strong film condensation of didodecanoyl-LPG monolayers at pH 6 corresponding to a change in the bulk morphology from a transparent gel to a lamellar liposomal structure. A similar decrease in the molecular packing of *S. aureus* LPG was induced by $MoO_4^{=}$, without a change in the freeze etch morphology of the depression. Differential scanning calorimetric measurements demonstrated that the liquid-crystalline to gel transition of didodecanoyl-PG is strongly dependent on the cations in the suspension. These phenomena may be relevant to the physical state of lipids in biological membranes.

II. IONIC PROPERTIES OF MIXTURES OF PHOSPHATIDYLGLYCEROL AND LYSYLPHOSPHATIDYLGLYCEROL. *Ibid.*, 220–31. A comparative monolayer and freeze-etch study of mixtures of phosphatidylglycerol (PG) and lysylphosphatidylglycerol (LPG) has been made. A PG-LPG 1/1 mixture forms a much more condensed state than the theoretically expected when no interaction between the individual compounds is assumed. Both at the air-water interface and in the bulk situation, the PG-LPG 1/1 mixture behaves as a new system as a result of a specific interaction between the two molecules. This behaviour has been found for mixtures of both didodecanoyl-(PG/LPG) and for the naturally occurring compounds from *S. aureus*. In the gel condition a 1/1 mixture didodecanoyl-(PG-LPG) showed a bandpattern, while a 1/1 mixture of PG-LPG from *S. aureus* exhibited a coarse mosaic texture on the freeze fracture faces of the liposomes.

AN ELECTRON-CAPTURE GAS-LIQUID-CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF PROSTAGLANDIN $F_{2\alpha}$ IN BIOLOGICAL FLUIDS. A.J.F. Wickramasinghe and R.S. Shaw (Res. Labs., The Upjohn Co., Kalamazoo, Mich. 49001). *Biochem. J.* 141, 179–87 (1974). A sensitive electron-capture gas-liquid-chromatographic method for the determination of sub-nanogram quantities of prostaglandin $F_{2\alpha}$ was developed. The method is based on the sub-microgram scale conversion of the prostaglandin into the electron-capturing pentafluorobenzyl ester, and analysis of the latter as the tristrimethylsilyl ether. The lower limit of detection was 12.5 pg of the ester injected 'on-column' as the silylated product. The method was successfully applied to the determination of prostaglandin $F_{2\alpha}$ in monkey plasma. The specificity of the analytical procedure was increased by incorporating a thin-layer chromatographic fractionation before gas-liquid chromatography. The utility of the analytical methodology developed was demonstrated by its application to the determination of plasma concentrations of intact prostaglandin $F_{2\alpha}$ in a Rhesus monkey, after subcutaneous administration of a single dose of prostaglandin $F_{2\alpha}$. The electron-capture gas-liquid-chromatographic assay is compared with the radioimmunoassay and the gas-liquid-chromatographic-mass-spectrometry assay for the determination of prostaglandin $F_{2\alpha}$.

INFLUENCE OF MASTITIS ON PROPERTIES OF MILK. X. FATTY ACID COMPOSITION. H.E. Randolph and R.E. Erwin (Dept. of Animal Sci., Texas A&M Univ., College Station 77843). *J. Dairy Sci.* 57, 865–8 (1974). The effect of mastitis on the concentration of fatty acids in individual quarter milk samples was investigated. Wisconsin Mastitis Test positive (>20 mm) milks contained higher lipase activities and acid degree values and lower concentrations of phospholipids than the corresponding negative (<10 mm) milks. Positive milks contained higher concentrations of free fatty acids and short chain (4 to 12 carbons) fatty acids, and lower concentrations of the long chain (16 and 18 carbons) fatty acids. Total fatty acid content of the positive milks was approximately 4% lower while the free fatty acid content was approximately 47% higher than for the negative milks. Increases in the concentrations of individual free fatty acids ranged from approximately 5 to 80%.

ISOLATION AND ALIGNMENT OF THE TRYPTIC PEPTIDES OF ALANINE APOLIPOPROTEIN, AN APOLIPOPROTEIN FROM HUMAN PLASMA VERY LOW DENSITY LIPOPROTEINS. R.S. Shulman, P.N. Herbert, D.S. Fredrickson, K. Wehrly and H.B. Brewer, Jr. (Molecular Disease Branch, Natl. Heart and Lung Inst., Natl. Insts. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 249, 4969–74 (1974). Alanine apolipoprotein (apoLP-Ala) was prepared from the very low density lipoproteins of patients with familial type V hyperlipoproteinemia. Tryptic peptides of the succinylated and unmodified protein were isolated and characterized. Determination of the amino acid composition and terminal residues of each of the peptides permitted the alignment of all but two small basic peptides. Carbohydrate was demonstrated to be bound to the COOH-terminal tryptic peptide of apoLP-Ala, probably by an O-glycosidic bond to a threonine residue.

CHOLINE PHOSPHOTRANSFERASE AND PHOSPHATIDYL ETHANOLAMINE METHYLTRANSFERASE ACTIVITIES IN SPLEEN MICROSOMES OF MICE INFECTED WITH FRIEND VIRUS. D.N. Skurdal, D.J. Rytter and W.E. Cornatzer (Guy and Bertha Ireland Res. Lab., Dept. of Biochem., Univ. of North Dakota Med. Schl. Grand Forks, N. Dak. 58201). *Proc. Soc. Exp. Biol. Med.* 146, 844–8 (1974). Choline phosphotransferase and phosphatidyl ethanolamine methyltransferase enzymatic activities (nmoles phosphatidyl choline/min/mg protein) have been determined in spleen microsomes of Friend virus infected BALB/c male mice at 5, 10, 14 and 21 days following inoculation of the virus. There is marked stimulation of the choline phosphotransferase activity in the virus infected spleens. There is less stimulation of the phosphatidyl ethanolamine methyltransferase. The incorporation of 1,2-^{14}C-choline and 1,2-^{14}C-ethanolamine into the total phospholipid-P, total lecithin-P, and the phosphatidyl choline-P fractions of spleen microsomes at 1, 2 and 3 hrs after intraperitoneal injection of the isotopic compounds in 14 day old viral infected mice was studied. There was a greater incorporation of 1,2-^{14}C-choline into the total phospholipid-P, total lecithin-P and phosphatidyl choline fractions in the microsomes of the viral infected spleens than in control mice. Friend virus greatly stimulates the choline phosphotransferase which catalyzes the reaction of CDP-choline-α,β-diglyceride to form phosphatidyl choline.

GROWTH OF NOVIKOFF HEPATOMA CELLS IN THE PRESENCE OF LONG-CHAIN FATTY ACIDS. W. Steele and H.M. Jenkin (Univ. of Minn., Hormel Inst., Austin, Minn. 55912). *Proc. Soc. Exp. Biol. Med.* 146, 885–9 (1974). The growth characteristics of Novikoff hepatoma cells growing in culture can be differentially altered by the addition of long-chain fatty acids to the growth medium. The greatest reduction in growth rate was obtained by adding sodium stearate to the growth medium and the least was when sodium oleate was added; the effect of sodium petroselenate was intermediate. The addition of the methyl ester to the growth medium caused a smaller reduction in cell proliferation than the corresponding sodium salt of the fatty acid. When each of the long-chain acids in their triglyceride form was added to the growth medium, there was no reduction in the growth rate of the cells even at very high concentrations. Possible reasons for these changes are discussed.

TRITERPENOID CAROTENOIDS AND RELATED LIPIDS. THE TRITERPENOID CAROTENES OF STREPTOCOCCUS FAECIUM UNH 564P. R.F. Taylor and B.H. Davies (Dept. of Biochem. and Agr. Biochem., Univ. College of Wales, Aberystwyth SY23 3DD, U.K.). *Biochem. J.* 139, 751–60 (1974). The occurrence of an novel series of triterpenoid carotenes in *Streptococcus faecium* UNH 564P is reported. This series, which comprises the C_{30} analogues of phytoene, phytofluene, ζ-carotene, 7,8,11,12-tetrahydrolycopene and neurosporene, appears to be analogous to the C_{40} Porter-Lincoln series and a pathway of triterpenoid carotene dehydrogenation is proposed to account for the formation of these compounds. Two cis isomers of the C_{30} analogue of neurosporene are described. An appropriate system of nomenclature for these novel compounds is proposed.

TRITERPENOID CAROTENOIDS AND RELATED LIPIDS. TRITERPENOID MONOHYDROXY- AND MONOGLUCOSYLOXY-CAROTENOIDS FROM STREPTOCOCCUS FAECIUM UNH 564P. *Ibid.*, 761–9. The characterization of two novel triterpenoid xanthophylls occur-

ring in *Streptococcus faecium* UNH 564P is described. Both are derived formally, and probably biosynthetically, from the C_{30} analogue of neurosporene and have been identified as 4-hydroxy-4,4'-diaponeurosporene and its glucoside, 4-D-glucopyranosyloxy-4,4'-diaponeurosporene. Problems associated with the use of specific glucosidases in defining the anomerism of carotenoid glucosides are discussed.

INVOLVEMENT OF BINDING LIPOPROTEINS IN THE ABSORPTION AND TRANSPORT OF α-TOCOPHEROL IN THE RAT. O.V. Rajaram, P. Fatterpaker and A. Sreenivasan (Biochem. and Food Technol. Div., Bhabha Atomic Res. Ctr., Bombay-400 085, India). *Biochem. J.* 140, 509–16 (1974). Specific lipoproteins binding α-tocopherol but not its known metabolites have been isolated and identified from cytosol of rat intestinal mucosa and from serum. A time-study of the appearance of the orally administered α-[^{3}H]tocopherol with these lipoproteins indicates that very-low-density lipoprotein of serum acts as a carrier of the vitamin. The involvement of the mucosal lipoprotein in the absorption of the vitamin from the intestine has been inferred from observations on the amounts of α-tocopherol in serum of orotic acid-fed rats where release of lipoproteins from the liver to serum is completely inhibited. A considerable decrease in the association of α-tocopherol with serum very-low-density lipoprotein under this condition is interpreted to mean that serum lipoproteins are limiting factors for the transport of the vitamin across the intestine and that this is possibly effected by exchange of α-tocopherol between serum very-low-density lipoprotein and mucosal lipoprotein.

EFFECT OF SOY STEROLS ON INTESTINAL ABSORPTION AND SECRETION OF CHOLESTEROL AND BILE ACIDS IN THE CHICK. D. Sklan, P. Budowski and S. Hurwitz (Faculty of Agr., Hebrew Univ. of Jerusalem, Rehovot, Israel). *J. Nutr.* 104, 1086–90 (1974). Twenty-day-old chicks were fed for 7 days a diet containing 0.5% cholesterol, with or without 1% soy sterols. During the last 4 days, yttrium-91 was included in the diet to serve as a nonabsorbable reference substance for the determination of rats of net absorption and secretion of cholesterol and bile acids. Dietary soy sterols reduced the size of the liver plasma cholesterol pool, decreased the daily net absorption of both cholesterol and bile acids between the duodenum and the lower jejunum and also depressed their daily endogenous secretion into the duodenum. In addition, soy sterols exerted a marked inhibitory action on the absorption of steroids between the lower jejunum and the lower ileum. The reduced ileal absorption accounted entirely for the effect of soy sterols on the overall net absorption of cholesterol, which dropped from 22% in the cholesterol group to 6% in the group receiving soy sterols. Overall net absorption was less for phytosterols than for cholesterol, campesterol having taken up to a greater extent than stigmasterol and β-sitosterol. ■

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