Soaps and Detergents: Trends and Projections 1973-79
(in millions of current dollars except as noted)

	1973	1975	1977[2]	1978[3]	1979[5]
Value of shipments[1]	3,759	4,676	5,769	6.346	6,980
Value added	2,011	2,249	2,840	3,050	3,276
Value added per production worker-hour ($)	43.44	59.03	61.51	69.32	---
Total employment (000)	32.4	29.4	30.8	29.8	---
Production workers (000)	20.9	19.3	20.6	19.6	---
Capital expenditures	77.0	107.2	---	---	---
Producers price index (Dec.)[4]	116.7	155.0	169.7[3]	177.2	---
Product class(es):					
Soaps and Detergents (nonhousehold)	681	874	1,111	1,244	1,368
Detergents (household)	1,776	2,369	2,974	3,331	3,664
Soaps, except specialty cleaners (household)	447	584	711	782	860
Soaps and other detergents n.s.k.	7	55	159	242	265
Trade					
Value of exports	70.2	109.6	123.3[5]	127.9	---
Value of imports	4.4	5.3	7.7[5]	10.2	---

[1]Value of all products and services sold by the Soaps and Detergents industry.
[2]Estimated except for price indexes, and 1977 trade date.
[3]As of June 1979.
[4]1967 is base period for the producers price index.
[5]Forecast.
Source: Bureau of the Census (industry and trade data). Bureau of Labor Statistics (hourly earnings and price indexes). Estimates and forecasts by Industry and Trade Administration (BDBD).

The U.S. Department of Commerce's industrial outlook for 1979 forecasts the value of products and services sold by the nation's soap and detergent industry will rise to $6.98 billion in 1979 from $6.35 billion in 1978. Other details from the report are shown in the accompanying table, which covers 577 companies and 642 establishments for 1978. Exports totaled 2.2% of product shipments; imports totaled 0.2% of apparent consumption.

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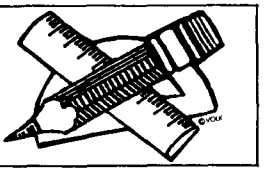

EDITOR: S. KORITALA • ABSTRACTORS: J.C. Harris, M.G. Kokatnur, F.A. Kummerow, G. List, B. Matijasevic, K.D. Mukherjee, D.B.S. Min, R.A. Reiners, and P.Y. Vigneron

• Detergents

SODIUM PERCARBONATE AS BLEACHING AGENT IN DETERGENT POWDERS. G. Toninelli. *Tenside Deterg.* 15(5), 252–8 (1978). Many detergent powders contain oxygen releasing compounds used as bleaching agents with the task of oxidatively eliminating colored stains. Comparative tests carried out under the same test conditions, between powders containing perborate and percarbonate gave almost similar results.

STRUCTURE-FUNCTION RELATIONSHIPS OF SURFACTANTS AS ANTIMICROBIAL AGENTS. J.J. Kabara. *J. Soc. Cosmet. Chem* 29 (11), 733–41 (1978). Structure-function relationships of various classes of surfactants as antimicrobial agents were reviewed. It was concluded that while polar groups of the biocide tend to predict activity against a given genera, the chainlength of the lipophilic group determines the most active agents. In general, cationic surfactants are more active than anionic and nonionic agents. Nonionics previously considered as not having antimicrobial activity, were shown to be active when the mono-esters were formed from lauric acid. Because of this new property, nonionics, particularly monolaurin (Lauricidin) may be useful germicides in addition to their surface active properties.

STYRENATION OF TOBACCO SEED OIL FOR SURFACE COATINGS. M.S. Saxena, *et al., Paintindia* 28(8), 23–6 (1978). Attempts were made to use tobacco-seed oil (Nicotiana Tobacum) in combination with tung, D.C.O. and stand oils, in surface coatings after copolymerization with styrene monomer. The combination gave better paint film with respect to drying time, protection against corrosion and resistance to water, acid and alkali, compared with unstyrenated tobacco-seed oil.

WATET-DISPERSIBLE URETHANE POLYESTERAMIDE COATINGS FROM LINSEED OIL. W.J. Schneider and L.E. Gast. *J. Coatings Technol.* 50(646), 76–81 (1978). Water-dispersible coatings from vegetable oils were easily prepared from products of the aminolysis reaction of linseed oil and diethanolamine, polybasic acid anhydrides, and tolylene diisocyanate. Polymers studied in detail were based on phthalic anhydride; but preliminary data indicate that pyromellitic and 3,3',4,4'-benzophenone tetracarboxylic dianhydrides or trimellitic, maleic, succinic, and glutaric anhydrides also give polymers that result in satisfactory water-dispersible systems.

EMULSIONS (PART 1). B. Dobias. *Tenside Deterg.* 15(5), 225–32 (1978). Review of theory of emulsion stability.

APPLICATIONS FOR THE SPINNING-DROP-TECHNIC FOR DETERMINING LOW INTERFACIAL TENSION. M. Burkowsky and C. Marx. *Tenside Deterg.* 15(5), 247–51 (1978). The spinning drop method permits a quick determination of the interfacial tension as a function of temperature. The insertion and dimensioning of the specimens is simple. Such measurements require only small specimens, which is advantageous for routine test series, in tertiary oil recovery testing.

EFFECTIVE CHAIN LENGTH AND STRUCTUTAL MODIFICATION OF

FLUOROCARBON SURFACTANTS. I.J. Lin and L. Marszall. *Tenside Deterg.* 15(5), 243–6 (1978). The effect of different types of structural modification on the c.m.c. and HLB is considered for the case of fluorocarbon surfactants. Use of the effective chain length concept permits correct calculation of the HLB and correlation of the c.m.c. and HLB values.

A SIMPLE, DIRECT METHOD OF DETERMINING SURFACE ACTIVE SUBSTANCES BY SQUARE-WAVE POLAROGRAPHY. M. Porubska. *Tenside Deterg.* 15(5), 241–3 (1978). A method for determining the content of nonionic surfactant, in this case an ethoxylated alkylaryl derivative, in polyethylene has been developed. This made use of the fact that surface active substances, anionic, cationic and nonionic, show an adsorption peak on the polarogram when applied in a suitable solution, because of their adsorption on mercury drop electrodes. The level of this peak is linearly dependent upon the concentration of the surfactant under investigation at a particular concentration range.

MICELLE FORMATION IN NONAQUEOUS DISPERSING AGENTS. H.-D. Dorfler. *Tenside Deterg.* 15(5), 232–4 (1978). The behavior of conductivity of Na-octylsulfonate and Na-decylsulfonate respectively in glycerine, ethylene glycol or 1,4-butanediol water and formamide-water mixtures was examined as a function of temperature (20–80 C) and the concentration of the surface active derivative.

ACTION OF SURFACE-ACTIVE SUBSTANCES ON BIOLOGICAL MEMBRANES. I. EFFECT OF CHEMICAL MODIFICATION OF MEMBRANES ON HEMOLYSIS OF ERYTHROCYTES BY SODIUM ALKYL SULFATES. N.N. Ossipov, *et al., Colloid Polym. Sci.* 256(11), 1105–9 (1978). The hemolytic action of a homologous series of sodium alkyl sulfates (C8–C15) on dog and human erythrocytes was measured. A new approach evaluating the hemolytic activity of ionic detergent is expressed as a ratio of a concentration providing 50% lysis to its CMC-value.

STUDIES ON THE EMULSIFYING BEHAVIOR OF SOME SURFACTANTS. L.R. Singh, *et al., Colloid Polym. Sci.* 256(11), 1102–4 (1978). Emulsifying powers of various surfactants have been determined by bringing the emulsion systems at isoelectric point by polyvalent inorganic ions. Several useful binding parameters have been calculated.

APPLANATION TONOMETRY IN THE ASSESSMENT OF EYE IRRITATION. R.M. Walton and R. Heywood, *J. Soc. Cosmet. Chem*, 29(6), 365–8 (1978). The measurement of intraocular pressure has been suggested for the objective assessment of eye irritation. Applanation tonometry is the method of choice. An evaluation of this method has been made in the rabbit using a calibrated Perkins tonometer. Results are shown following the irritation produced by instillation of sodium lauryl sulfate.

SODIUM-ALUMINIUM-SILICATES IN THE WASHING PROCESS. PART III. ION EXCHANGE AND DETERGENCY. M.J. Schwuger and H.G. Smolka, *Colloid Polym. Sci.* 256(10), 1014–20 (1978). SASIL (Na-Al-silicates) and sodium triphosphate ideally complement each other in laundry detergents, as the temperature dependancies of the calcium binding capacity and the electrolyte influences are of different sign or magnitude respectively. Particularly favorable conditions for the application of SASIL are found in the pH-range of 9.0–10.5 in systems in which the counter-ion content is as small as possible. The final calcium load resulting during the washing process should preferably not exceed 30% in the case of pure SASIL.

STUDIES ON THE ELECTROLYTE FLOCCULATION OF OIL/WATER EMULSION WITH SPECIAL REFERENCE TO CATIONIC BINDINGS AT ISOELECTRIC POINTS. M. Sharma and S.P. Jain, *Colloid Polym. Sci.* 256(10), 995–1001 (1978). Stable toluene-in-water emulsions were prepared using sorbitan monolaurate as emulsifier. The electrokinetic potentials of the system were measured electrophoretically. The energy profiles revealed the high degree of stability of the emulsion and reversible flocculation took place in secondary minima.

SULFATION OF UNSATURATED FATTY ALCOHOLS. M. Morak and K. Audiova, *Tenside Deterg.* 15(6), 299–306 (1978). When examining the reaction of unsaturated fatty alcohols with gaseous sulfur trioxide an addition of the primarily formed alkenyl hydrogen sulfates to double bonds was discovered. Sulphated products formed in this way, which contain dialkyl sulfate groups, can be converted into alkenyl sodium sulfates by means of alkaline hydrolysis. The by-product content was determined in the new products as well as in the products of sulfuric and chlorosulfonic acid sulfation, the quantitative proportion of by-products being related to the applicational properties.

INVESTIGATIONS INTO THE PHOSPHORYLATION OF 2-ETHYLHEXYL ALCOHOL AND THE SEPARATION OF DI-(2-ETHYLHEXYL) PHOSPHORIC ACID AS THE COPPER SALT. J. Perka and S. Ropuszynski, *Tenside Deterg.* 15(6), 295–8 (1978). The effect of reactant stoichiometry on the product composition during the phosphorylation of 2-ethylhexanol with $POCl_3$ in various systems.

ANIONIC SURFACTANTS IN THE RHINE 1971–77. SURFACTANT DEGREDATION AND DEGREDATION POTENTIAL IN THE RIVER. H. Hellmann, *Tenside Deterg.* 15(6), 291–4 (1978). In the period 1971 to 1977 the amount of anionic surfactants in the Rhine has decreased constantly. At present it is less than 5% of the amount used in the catchment area.

SODIUM-ALUMINUM-SILICATES IN DETERGENTS—TESTS OF THE ION EXCHANGE BEHAVIOR AGAINST HEAVY METAL IONS IN SEWAGE. W.-A. Roland and R.D. Schmid, *Tenside Deterg.* 15(6), 281–5 (1978). The ion exchange of synthetic aluminum-silicates of type A zeolite has been examined under environmental conditions in heavy metal-containing sewage by means of a pressure filter setup. Heavy metal uptake decreased in the following sequence: $Cd^{2} > Pb^{2} > Zn^{2} > Cu^{2} > Ag^{1} > Hg^{2}$.

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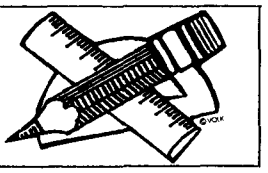

• Fats and Oils

INCREASED YIELD ON ND-1250 DUE TO MODERNIZATION OF EQUIPMENT AND PERFECTION OF TECHNOLOGY. I.V. Gavrilenko *et al.*, *Maslo-zhir. Promst.* 1978(1), 6–9. The principal rules for extraction of vegetable oils by immersion were determined and it was shown what the potential possibilities of increased yield of the vertical extractor ND-1250 are. On the basis of technical studies, modernization of the extractor was conducted and technology of extraction of the oil, distillation of miscella, and elimination of solvent from the meal, was improved. A daily yield of extraction installation ND-1250 of 500 t of sunflower seeds was established and verified in practice. (Rev. Fr. Corps Gras)

TREATMENT OF SOYA FOLLOWING PREPRESSING-EXTRACTION SCHEME. I.E. Koushnir *et al.*, *Maslo-zhir. Promst.* 1978(1), 11–13. The experience obtained by treatment of soybeans in the oil industry of Vinnitza is discussed. Description of the principal measures for the perfectioning of grinding, cooking, pressing, extraction, and purification of the oil is given. It was found that in the industrial conditions, by treatment of about 300 t of soybeans daily on the ND-1250 line, the total losses of the oil could be limited to 0.52% and the consumption of solvent to 9 kg/t. (Rev. Fr. Corps Gras)

INCREASED YIELD ON THE EXTRACTION INSTALLATION ND-1250. I.E. Koushnir *et al.*, *Maslo-zhir. Promst.* 1978(1), 9–11. To increase the yield on the extraction line ND-1250 up to 470–500 t of sunflower seeds daily, it is rational to increase the extraction column to a height which assures for free flow of the solvent during 15–19 min. It is rational to use the typical helicoidal sections which allow the use of the sections of the old extractor. (Rev. Fr. Corps Gras)

REFINING OF SUNFLOWER OIL IN MISCELLA. A.K. Mosyane *et al.*, *Maslo-zhir. Promst.* 1978(1), 28–30. In the literature on refining of oil in miscella, there is practically no data about sunflower oil. The experiments done with sunflower oil are described. The best results with the neutralization process were obtained with a miscella concentration of upto 35%, with a concentration of the alkaline solution of 16–25 g/l, a temperature of 40–50C, and with an obligatory excess of free alkali in the soap solution. This process was realized in the oil industry of Dnepropetrovsk. The scheme of the installation is given in the paper. (Rev. Fr. Corps Gras)

VARIATION OF THE FATTY PHASES OF MARGARINE DURING THE STORAGE. M.M. Merzametov *et al.*, *Pishch. Technol.* 1978(1), 67–9. Serine inhibits the accumulation of oxidation products in the fatty phase of margarine; tryptophane and aspartic acid had no effect on oxidation; cysteine shows prooxidant properties as much at 20C as at −5C. (Rev. Fr. Corps Gras)

THE STEROL CONTENT IN SUNFLOWER OIL AND IN SOME REFINING PRODUCTS. Ts. Milkova, *et al.*, *Maslo-Sapunea Prom.* 13, 224–34 (1977). Sterols (free sterols, esters or glucosides) in industrial samples of crude and refined sunflower oil as well as in the by-products of refining (technical lecithin, soapstock) were analyzed. The distillate obtained during the deodorization process was also analyzed. The by-products of refining are rich in sterols but the highest content is in the deodorization distillate (16% of total sterols in free form). The total sterol content in technical lecithins and in soapstock was 2.03% and 0.88%, respectively. (Rev. Fr. Corps Gras)

INFLUENCE OF THE VARIETY OF SEEDS, METHOD OF OBTAINMENT, AND REFINING OF THE OIL ON THE NATURAL STABILITY OF SUNFLOWER OIL. S. Ivanov, *Maslo-Sapvena Prom.* 13, 262–78 (1977). The influence of the varieties of seeds on oil stability is insignificant. On the other hand, the techniques of refining and production have a considerable influence. The extracted oil can be classified in the following order: oil extracted by Folch (690 min), in soxhlet (630 min ether), oil obtained by pressing at 115C (552 min, laboratory conditions), oil obtained by pressing at 115C (534 min, industrial conditions), oil extracted in soxhlet (486 min, petrol ether), at room temperature with ethyl-ether (470 min), oil obtained by pressing at 40C (462 min, laboratory conditions), at 115C and alkaline refining (426 min, industrial conditions). These researches show that the modification of technological processes which are applied allows the increase of stability of the oil against oxidation. (Rev. Fr. Corps Gras)

ABOUT TWO PRINCIPAL FACTORS DETERMINING THE OXIDATIVE STABILITY OF SUNFLOWER OIL AND THE POSSIBILITIES FOR ITS IMPROVEMENT. N. Yanichlieva, *et al.*, *Maslo-Sapvena Prom.* 13, 245–59 (1977). The two principal factors: composition of fatty acids and content of natural antioxidants, which have an influence on the oxidation stability of sunflower oil were studied in this work. The two following points were established: 1.—the increase of biologically important linoleic acid does not have an unfavorable effect on the oil stability against oxidation; 2.—addition of tocopherol to sunflower oil is not necessary, because this oil has an optimal quantity of natural antioxidants. A supplementary addition doesn't lead to better stability of the oil. (Rev. Fr. Corps Gras)

RESEARCH ON FATTY ACID COMPOSITION OF OIL EXTRACTED FROM SOME SPECIES OF THE HELIANTHUS FAMILY AND FROM SOME HYBRIDS. F. Tsvetkova *et al.*, *Maslo-Sapvena Prom.* 13, 303–14 (1977). Fatty acids composition of oils from 18 species and 47 generations of hybrids was analyzed by gas-liquid chromatography. The wild species of the Helianthus family, whose fatty acid composition is extremely varied, can be used to create new varieties with a higher oil content. Hybridization between species and choice of generations of hybrids, permits varieties with different linoleic and oleic acid contents. The heredity of the fatty acid composition in the hybrids is different according to the maternal or paternal line. (Rev. Fr. Corps Gras)

EFFECT OF AUTOXIDATION OF RAPESEED OIL ON DEVELOPMENT OF MELANOPHOSPHATIDES. I. Bratkowska, *Acta Aliment. Pol.* 4, 255–61 (1978). The results obtained in the present study suggest that carbonyl compounds developing in the course of autoxidation of rapeseed oil react with phosphatides, which, in turn, lead to development of coloured compounds, the so-called melanophosphatides, that reduce the quality of the phospholipids obtained from the oil.

COUPLING OF TWO-DIMENSIONAL THIN-LAYER CHROMATOGRAPHY WITH GAS CHROMATOGRAPHY FOR THE QUANTITATIVE ANALYSIS OF LIPID CLASSES AND THEIR CONSTITUENT FATTY ACIDS. S.S. Radwan, *J. Chromatogr. Sci.* 16, 538 (1978). The present communication describes a new system for the complete separation of lipid classes in natural mixtures by two-dimensional chromatography on thin layers of silica gel impregnated with ammonium sulfate to improve separations. For quantitative analysis an amount of 1 mg of total lipids is chromatographed, and the lipid classes resolved are then determined by gas chromatography of their constituent fatty acids with added internal standard. The patterns of the constituent fatty acids of the individual lipid classes are obtained simultaneously.

LIPID PROFILE AND FATTY ACID COMPOSITION OF FINGER MILLET (ELEUSINE CORACANA). V.G. Mahadevappa and P.L. Raina, *J. Food Sci. Technol.* 15, 100 (1978). Total lipids constituting 1.85–2.10% from seven breeding varieties of finger millet (ragi, *Eleusine coracana*) were extracted with chloroform-methanol, purified, resolved by silicic acid column chromatography and analysed for component fatty acids. The lipid consists of 70–72% neutral lipids, mainly triglycerides and small proportion of sterols, 10–12% of glycolipids and 5–6% of phospholipids. Chloroform-insoluble lipids constituted 8–10%. All classes of lipids contain 46–62% oleic acid, 8–27% linoleic acid, 20–35% palmitic acid, and traces of linolenic acid. Cultivars within a species exhibited identical lipid profiles.

A SINGLE-PHASE SYSTEM FOR TLC ANALYSIS OF AMINO ACIDS,

LIPOPEROXIDES, AND THEIR REACTION PRODUCTS. J.C. Kuck, A.J. St. Angelo and Robert L. Ory, *Oleagineux* 33, 507–12 (1978). A model thin-layer chromatographic system is described that utilizes a single-phase solvent to separate and identify the amino acid-lipoperoxide products formed between two amino acids (threonine and lysine) and linoleate hydroperoxide. The products were separated from the free amino acids and unreacted hydroperoxide on a thin-layer plate coated with Silica Gel G, developed in a one-phase mixed solvent system of petroleum ether-diethyl ether-glacial acetic acid, then sprayed with copper acetate-phosphoric acid solution to locate all spots. Results from mass and infrared spectroscopic analysis of the desolventized products formed between the amino acids and peroxidized lipids scraped from the preparative plates indicate that they are new reaction products.

• Biochemistry and Nutrition

FLUORINE-19 NUCLEAR MAGNETIC RESONANCE STUDIES OF LIPID PHASE TRANSITIONS IN MODEL AND BIOLOGICAL MEMBRANES. M.P.N. Gent and C. Ho, *Biochemistry* 17, 3023–38 (1978). Fluorinated fatty acids of the general formula $CH_3(CH_2)_{13-m}CF_2(CH_2)_{m-2}COOH$ are informative spectroscopic probes of the gel to liquid-crystalline phase transitions in phospholipid dispersions and in biological membranes. We present theoretical considerations to suggest that the ^{19}F nuclear magnetic resonance line shapes are very different for frozen and fluid lipid regions. Our studies confirm this expectation for mixed phospholipid multilamellar dispersions containing a trace of difluoromyristate.

CHAINLENGTH DEPENDENCE OF THE ^1H NMR RELAXATION RATES IN BILAYER VESICLES. M. Kainosho *et al., Chem Phys. Lipids* 21, 59–68 (1978). Proton spin-lattice relaxation rates ($1/T_1$) and linewidths have been measured for the methylene protons of 4 saturated lecithins in small bilayer vesicles. A systematic increase in the proton $1/T_1$ was observed as the fatty acid residue was varied from lauroyl through to stearoyl. In contrast, no such variation was noted for the values of $1/T_1$ of the choline methyl protons or the methylene linewidths at temperatures above the thermal phase transition temperature of the lipids. The present observations are consistent with the hypothesis that the rapid kink diffusion motions control the methylene spin-lattice relaxation rates whereas the slower chain fluctuations determine the methylene linewidths.

HYDROGEN BOND AMONG THE IONIC GROUPS OF AMPHOLYTIC PHOSPHOLIPID. T. Seimiya *et al., Chem Phys. Lipids* 21, 69–76 (1978). The nature of interaction among the ionic groups of lipids was studied by proton NMR measurements for ampholytic analogues of phospholipids, each differing in structural separation between PO_4^- and NH_3^+ groups. Single resonance lines observed for the ionic protons of lipids in deuterochloroform indicate the rapid exchange of protons between PO_4H and NH_3^+, and showed that the two groups interact intramolecularly and/or intermolecularly by forming a hydrogen bond.

THE FATE AND FIBROGENIC POTENTIAL OF SUBINTIMAL IMPLANTS OF CRYSTALLINE LIPID IN THE CANINE AORTA. QUANTITATIVE HISTOLOGICAL AND AUTORADIOGRAPHIC STUDIES. B.G. Brown and D.L. Fry, *Cir. Res.* 43, 261–73 (1978). To determine the histological reaction to, and the rate of absorption of, different pure crystalline lipids from the aortic subintimal space, cholesterol (Ch), cholesteryl palmitate (ChP), glyceryl tripalmitate (TP), palmitic acid (PA), and dipalmitoyl lecithin (DPL) were implanted in the inner media of the thoracic aorta of 37 dogs. Tiny crystalline rods were fabricated averaging 0.29 mm in diameter and 2.0 mm in length. Twenty such rods were placed with a needle inserter 113 ± 52 (SD) μm beneath the exposed endothelial surface during two separate operations in each dog. In seven dogs, the lipids were ^{14}C-labeled. The dogs were killed at intervals from 3 days to 20 months postoperatively and the implantation sites removed for quantitative histological and autoradiographic measurements. These observations provide one explanation for their observed persistence and their association with fibrosis and smooth muscle proliferation in atherosclerotic plaque.

EFFECTS OF 25-HYDROXYCHOLESTEROL ON RAT HEPATIC 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE ACTIVITY IN VIVO, IN PERFUSED LIVER, AND IN HEPATOCYTES. S.K. Erickson *et al., J. Biol. Chem.* 253, 4159–64 (1978) The effects of 25-hydroxycholesterol on 3-hydroxy-3-methylglutaryl coenzyme A reductase activity in rat liver have been investigated in intact rats, in perfused liver, and in isolated hepatocytes. When 25-hydroxycholesterol was fed to rats at a level of 0.1% of the diet for 18 h, reductase activity decreased to about 40% of the control value, but when the regimen was continued for 66 h, the degree of inhibition did not increase, suggesting the possibility that a partial tolerance to the drug had developed. The recovery of reductase activity in isolated hepatocytes and in the perfused liver after administration of 25-hydroxycholesterol in low concentration appeared to be due to rapid metaboliism of the sterol.

IN VITRO VITAMIN K-DEPENDENT CONVERSION OF PRECURSOR TO PROTHROMBIN IN CHICK LIVER. W.T. Garvey and R.E. Olson, *J. Nutr.* 108, 1078–86 (1978). Vitamin-K-deficient chicks accumulate prothrombin precursor in the hepatic endoplasmic reticulum to a lesser extent than the vitamin K-deficient rat. By *Echis carinatus* assay, deficient chicks accumulated 0.42 Iowa units/mg microsomal protein as compared to 0.70 units/mg microsomal protein in deficient rats. When expressed in terms of whole liver, the values were 17 Iowa units/g liver in the rat and only 4 Iowa units/g liver in the chick. Vitamin K was effective in catalyzing the conversion of prothrombin precursor to prothrombin in chick liver microsomes. It appears that continued ribosomal synthesis of precursor is required for the expression of vitamin K action in the vitamin K-deficient chick.

THE ANTIHYPERCHOLESTEROLEMIC PROPERTIES OF N,N′-DIACETYL AND METHYL ESTER DERIVATIVES OF CANDICIDIN IN COCKERELS. W.C. Hausheer and H Fisher, *J. Nutr.* 108, 1054–60 (1978). The antihypercholesterolemic properties of the orally administered N,N′-diacetyl and methyl ester derivatives of candicidin were studied in cockerels. In a 21-day feeding trial, candicidin or its derivative was fed at levels providing comparable amounts of candicidin activity as measured by a standardized microbiological assay. Plasma cholesterol concentration in control birds fed a diet made hypercholesterolemic by the inclusion of dried whole egg powder was not significantly different compared to birds fed the same diet supplemented with 0.04% candicidin methyl ester or 0.09% N,N′-diacetyl candicidin, but was significantly lower when the diet contained 0.04% candicidin. The results suggested that the amino and carboxyl moieties of candicidin play a role in imparting its antihypercholesterolemic properties.

SIZE AND SHAPE OF THE MODEL LIPOPROTEIN COMPLEX FORMED BETWEEN GLUCAGON AND DIMYRISTOYLGLYCEROPHOSPHOCHOLINE. A.J.S. Jones *et al., Biochemistry* 17, 2301–7 (1978). Glucagon forms water-soluble lipoprotein particles with dimyristoylglyceroprosphocholine at temperatures below the phase-transition temperature of the lipid. The shape and size of this lipoprotein particle were studied by viscometry, sedimentation velocity, sedimentation equilibrium, quasielastic light scattering, and electron microscopy using both negative-staining and freeze-fracture techniques. From these data, a model for the glucagon-dimyristoylglycerophosphocholine is proposed consisting of a single bilayer of phospholipid with the glucagon incorporated into the bilayer structure in such a manner as not greatly to disturb the average area occupied per phospholipid molecule.

RED CELL MEMBRANE GLYCOPHORIN LABELING FROM WITHIN THE LIPID BILAYER. I. Kahane and C. Gitler, *Science* 201, 351–2 (1978). Human red blood cell membranes were labeled from within the lipid bilayer by the apolar photosensitive reagent, 5-(^{125}I)iodonaphthyl-1-azide. Glycophorin, the major sialoglycoprotein of the red cell membrane, was purified by two different methods; it contained approximately half of the total label incorported into membrane proteins. The label was confined to the trypsin-insoluble peptide of glycophorin that includes a sequence of 20, mainly apolar, amino acids. These findings provide direct evidence that the labeled segment resides within the membrane in direct contact with the lipid bilayer, and support the suggestion that glycophorin spans the bilayer through its hydrophobic domain.

INFLUENCE OF DIETARY LIPID AND MEAL PATTERN ON BODY COMPOSITION AND LIPOGENESIS IN ADULT RATS. S.E. Carlson and L. Arnrich, *J. Nutr.* 108, 1162–9 (1978). An experimental model in which previously semistarved adult rats underwent rapid rate of lipogenesis served to 1) determine the influence of varied dietary and feeding regimens on body composition, 2) compare

total fat deposition in a 10 day refeeding period with rates of lipogenesis, and 3) justify the use of amount of epididymal fat as an indicator of total body fat. Rats were depleted by feeding a diet devoid of protein and fat. They were refed for 10 days with diets differing in amount (0% to 20% by weight) and degree of saturation of fat (safflower oil or beef tallow) as well as in protein concentration (4% or 17% of calories). Deposition of epididymal lipids was highly correlated with increased total carcass lipid after refeeding.

REGULATION OF LIPOPROTEIN SYNTHESIS. STUDIES ON THE MOLECULAR MECHANISMS OF LIPOPROTEIN. SYNTHESIS AND THEIR REGULATION BY ESTROGEN IN THE COCKEREL. L. Chan, R.L. Jackson, and A.R. Means, *Circ. Res.* **43**, 209–17 (1978). We used the estrogen-treated cockerel as a model to study the regulation of very low density lipoproteins (VLDL) at the molecular level. A single injection of estrogen induced marked elevation of plasma VLDL in the cockerel. Messenger RNA (mRNA) activity for a major VLDL apoprotein (apoVLDL$_{II}$) in hepatic polyribosomes was assayed in vitro, and increased at the same rate as plasma VLDL levels. Simultaneous determinations of mRNA activities for albumin and apoA-I (a major HDL apoprotein) showed that these were unchanged.

BRAIN EDEMA: INDUCTION IN CORTICAL SLICES BY POLYUNSATURATED FATTY ACIDS. P.H. Chan and R.A. Fishman, *Science* **201**, 358–60 (1978). The presence of polyunsaturated and saturated fatty acids in leukocytic membranes prompted study of their possible role in the induction of brain edema. Polyunsaturated fatty acids including sodium arachidonate, sodium linoleate, sodium linolenate, and docosahexaenoic acids induced edema in slices of rat brain cortex. This cellular edema was specific, since neither saturated fatty acids nor a fatty acid containing a single double bond had such effect.

THE INTERACTION OF HUMAN PLASMA GLYCOSAMINOGLYCANS WITH PLASMA LIPOPROTEINS. II. HEMAGGLUTINATION STUDIES. P.V. Donnelly, N. Di Ferrante, and R.L. Jackson, *Cir. Res.* **43**, 234–8 (1978). Formalinized, tannic acid-treated sheep erythrocytes coated with low density lipoproteins (LDL) or apoprotein B (apo-B) are agglutinated by anti-apo-B immunserum. Those coated with high density lipoproteins (HDL) or apoprotein A-I (apo-A-I) are agglutinated by anti-apo-A-I immunserum. These coated forocells have been used to study the interactions of lipoproteins and apoproteins with plasma glycosaminoglycans (GAG). These results suggest that the sulfate-rich plasma GAG, consisting of two glycan chains linked to a peptide backbone, cause agglutination by binding to two or more formocells. In contrast, the less-sulfated plasma GAG, consisting of single, short glycan chains, are incapable of causing agglutination but may prevent it by covering specific binding sites present on the coated cells.

REPLACEMENT OF ENDOGENOUS CHOLESTERYL ESTERS OF LOW DENSITY LIPOPROTEIN WITH EXOGENOUS CHOLESTERYL LINOLEATE. M. Krieger *et al., J. Biol. Chem.* **253**, 4093–101 (1978). The cholesteryl esters of human plasma low density lipoprotein (LDL) reside in a neutral lipid core surrounded by a polar shell consisting of phospholipids, unesterified cholesterol, and apoprotein B. In the current paper, we describe a procedure by which more than 99% of the core cholesteryl esters can be removed from the LDL particle by heptane extraction and replaced with an equal amount of exogenous linoleate. The availability of a method for replacing the endogenous cholesteryl esters of LDL with exogenous neutral lipid should be of value in further studies of the chemistry and metabolism of LDL.

CARNITINE PALMITOYLTRANSFERASE I. THE SITE OF INHIBITION OF HEPATIC FATTY ACID OXIDATION BY MALONYL-CoA. J.D. McGarry, G.F. Leatherman, and D.W. Foster, *J. Biol. Chem.* **253**, 4128–36 (1978). The effects of malonyl-coenzyme A on the activity of carnitine palmitoyltransferase (EC 2.3.1.21) and on the oxidation of palmitic acid, palmitoyl-CoA, and palmitoylcarnitine in rat liver mitochondria were studied. Of the total carnitine palmitoyltransferase activity about one-half was found to be extremely sensitive to inhibition by malonyl-CoA, while the remainder was totally resistant. The response of the suppressible fraction of carnitine palmitoyltransferase to increasing concentrations of malonyl-CoA was paralleled by the effect of the inhibitor on palmitate oxidation, *i.e.* 50 and 100% inhibition at 1.5 and 20 μm, respectively.

1α-HYDROXY-25-FLUOROVITAMIN D$_3$: A POTENT ANALOGUE OF 1α,25-DIHYDROXYVITAMIN D$_3$. J.L. Napoli *et al., Biochemistry* **17**, 2387–91 (1978). Chemically synthesized 1α-hydroxy-25-fluorovitamin D$_3$ was compared to 1,25-dihydroxyvitamin D$_3$ for potency in the chick intestinal cytosol-binding protein assay, induction of intestinal calcium transport, mobilization of calcium from bone, and epiphyseal plate calcification in the rat. No selective actions of 1α-hydroxy-25-fluorovitamin D$_3$ were noted. Since the 25 position of the analogue is blocked by a fluorine atom, it appears that 25-hydroxylation of 1α-hydroxylated vitamin D compounds in vivo is not an obligatory requirement for appreciable vitamin D activity.

STEROL SYNTHESIS. CHEMICAL SYNTHESIS, STRUCTURE DETERMINATION AND METABOLISM OF 14α-METHYL-5α-CHOLEST-7-EN-3β,15β-DIOL AND 14α-METHYL-5α-CHOLEST-7-EN-3β,15α-DIOL. T.E. Spike *et al., Chem. Phys. Lipids* **21**, 31–58 (1978). 14α-Methyl-5α-cholest-7-en-3β,15β-diol and 14α-methyl-5α-cholest-7-en-3β,15α-diol have been prepared by chemical synthesis. Unequivocal establishment of these structures was based upon x-ray crystallographic analysis of 3β-*p*-bromobenzoyloxy-14α-methyl-5α-cholest-7-en-15β-ol and was supported by other spectroscopic data. Studies of the metabolism of (16-^{3}H)-14α-methyl-5α-cholest-7-en-3β,15β-diol and (16-^{3}H)-14α-methyl-5α-cholest-7-en-3β,15α-diol in liver homogenates of female rats indicated that only the 3β,15β-diol was convertible to cholesterol.

STUDIES ON THE YEAST FATTY ACID SYNTHETASE. SUBUNIT COMPOSITION AND STRUCTURAL ORGANIZATION OF A LARGE MULTIFUNCTIONAL ENZYME COMPLEX. J.K. Stoops *et al., J. Biol. Chem.* **253**, 4464–75 (1978). A procedure for the isolation of highly active yeast fatty acid synthetase (specific activity 1,500 to 3,000 nmol of NADPH oxidized/min/mg of protein at 25°) was developed and the enzyme was found to be homogenous by the criteria of sodium dodecyl sulfate-polyacrylamide gel electrophoresis and analytical ultracentrifugation. The inclusion of protease inhibitors in the buffers used to isolate the enzyme is necessary to ensure the isolation of the native enzyme. Otherwise, variable degradation by proteolysis of the enzyme occurs. These observations suggest that the synthetase may undergo limited proteolysis with the resulting complex remaining intact. This finding was further supported by the fact that these "nicked" preparations exhibit full activity.

CONTROL OF FATTY ACID METABOLISM IN ISCHEMIC AND HYPOXIC HEARTS. J.T. Whitmer *et al., J. Biol. Chem.* **253**, 4305–9 (1978). The effects of whole heart ischemia on fatty acid metabolism were studied on the isolated, perfused rat heart. A reduction in coronary flow and oxygen consumption resulted in lower rates of palmitate uptake and oxidation to CO_2. This decrease in metabolic rate was associated with increased tissue levels of long chain acyl coenzyme A and long chain acylcarnitine. Although both substrates for lipid synthesis were present in higher concentrations during ischemia, compartmentalization of long chain acyl-CoA in the mitochondrial matrix and α-glycerol phosphate in the cytosol may have accounted for the relatively low rate of lipid synthesis.

PHASE BEHAVIOR OF LIPIDS FROM HALOBACTERIUM HALOBIUM. M.B. Jackson and J.M. Sturtevant, *Biochemistry* **17**, 4470–4 (1978). Mixtures of dipalmitoylphosphatidylcholine with purple membrane lipids, red membrane lipids, or total lipids of *Halobacterium halobium* have been studied with differential scanning calorimetry. A comparison of red and purple membrane lipids reveals no difference in their phase behavior, indicating that lipid phase behavior plays no role in the in vivo separation of red and purple membranes. The effects of variation of the salt content of the suspending solution have also been examined. Studies of the melting behavior of these mixtures as *H. halobium* lipid content is varied suggest that the gel to liquid crystal transition does not occur in the lipids of *H. halobium*.

FLUORESCENCE AND CALORIMETRIC STUDIES OF PHASE TRANSITIONS IN PHOSPHATIDYLCHOLINE MULTILAYERS: KINETICS OF THE PRETRANSITION. B.R. Lentz, E. Freire, and R.L. Biltonen, *Biochemistry* **17**, 4475–80 (1978). Discrepancies between calorimetric and fluorescence depolarization monitoring of the pretransition in multilamellar vesicles of synthetic phosphatidylcholines are shown to result primarily from the slow rate of this transition. The depolarization of fluorescence of the membrane-associated dye 1,6-diphenyl-1,3,5-hexatriene was used to determine the temperature of the pretransition for a series of heating and cooling scan rates. Slight differences between the calorimetrically and fluorimetrically determined main transition temperatures appear to result from perturbation of

the phosphatidylcholine bilayer by the fluorescent probe.

DISTRIBUTION OF NEGATIVE PHOSPHOLIPIDS IN MIXED VESICLES. S. Massari, D. Pascolini, and G. Gradenigo, *Biochemistry* 17, 4465–9 (1978). Positive metachromatic dyes (methylene blue and acridine orange) interact with mixed vesicles containing phosphatidylcholine and negative phospholipids. The following results have been obtained: (1) the interaction occurs only with external negative phospholipids; (2) the dye to negative phospholipid stoichiometry is 1:1; (3) the presence of the dyes does not perturb the lipid distribution on the external surface. The dye absorbance changes can be utilized to calculate the amount of paired negative phospholipids on the external surface. This value, compared with that obtained from the statistical analysis, gives the degree of association of these lipids.

HDL-CHOLESTEROL, APOLIPOPROTEINS A_1 AND B. AGE AND INDEX BODY WEIGHT. P. Avogaro, *et al.*, *Atherosclerosis* 31, 85–91 (1978). Some data of previous literature have emphasized a negative correlation between plasma apo A_1, HDL cholesterol and coronary heart disease. The present paper stresses a high negative correlation existing both in females and males between values of index body weight (IBW) and plasma levels of HDL cholesterol and apo A_1. No correlation has been found between age and, respectively, HDL cholesterol, apo A_1 and apo B.

RELATIVE INCREASE IN APOLIPOPROTEIN CII CONTENT OF VLDL AND CHYLOMICRONS IN A CASE WITH MASSIVE TYPE V HYPERLIPOPROTEINAEMIA BY NICOTINIC ACID TREATMENT. L.A. Carlson and G. Wahlberg, *Atherosclerosis* 31, 77–84 (1978). VLDL of fasting serum was fractionated into 4 fractions of decreasing particle size by preparative ultracentrifugation in a density gradient from a patient with massive type V hyperlipoproteinaemia before and after treatment with 12 g daily of nicotinic acid. Serum triglycerides fell from 58 to 9 mmol/l in response to treatment due particularly to reduction of larger VLDL particles. The results are consistent with the hypothesis that low amounts of apo CII may play a role for the development of hypertriglyceridaemia.

VITAMIN D: TWO DIHYDROXYLATED METABOLITES ARE REQUIRED FOR NORMAL CHICKEN EGG HATCHABILITY. H.L. Henry and A.W. Norman, *Science* 201, 835–7 (1978). When hens are raised to sexual maturity from hatching with 1,25-dihydroxyvitamin D_3 ($1,25(OH)_2D_3$) as their sole source of cholecalciferol (vitamin D_3), fertile eggs appear to develop normally but fail to hatch. When hens receive a combination of $1,25(OH)_2D_3$ and 24R,25-dihydroxyvitamin D_3 ($24,25(OH)_2D_3$), hatchability equivalent to that with hens given vitamin D_3 is obtained. These results suggest a biological role for $24,25(OH)_2D_3$ not previously recognized.

LECITHIN CONSUMPTION INCREASES ACETYLCHOLINE CONCENTRATIONS IN RAT BRAIN AND ADRENAL GLAND. M.J. Hirsch and R.J. Wurtman, *Science* 202, 223–5 (1978). Consumption of a single meal containing lecithin, the major source of choline occurring naturally in the diet, increased the concentrations of choline and acetylcholine in rat brain and adrenal gland. Hence, the concentration of acetylcholine in the tissues may normally be under direct, short-term nutritional control. ●

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