ABSTRACTS

R.A. REINERS, Editor. Abstractors: N.E. Bednarcyk, J.E. Covey, J.C. Harris, S.F. Herb, F.A. Kummerow, Biserka Matijasevic and E.G. Perkins

• Fats and Oils

THE VEGETABLE OIL REFINING PROCESS. 1. ALKALI REFINING. B. Braae (Alfa-Laval, AB, Tumba, Sweden). *Oléagineux* 28, 193–5 (1973). The processes of continuous neutralization by soda, in particular the Short-mix and Ultra Short-mix, are described. The advantages of hermetic separators and the new separators which are both hermetic and self-cleaning are described. Also the decomposition of the soapstock by the continuous soapstock splitting process is described. For oils containing large amounts of gums, the addition of some emulsion-breaking agent, such as casein, may be necessary. The pH can be measured and regulated by the automatic devices and it does not need to be lower than 3 to obtain a complete splitting of the soapstock.

II. BLEACHING AND DEODORIZATION. B. Braae. *Ibid.*, 249–52. The advantages of the continuous "autobleach" process is described; the amount of bleaching earth is reduced up to 40% compared to the amount necessary by batch bleaching. Due to the high degree of automation, the manual labor is considerably reduced. A deodorization technique is also described. Raising the deodorization temperature requires the use of stainless steel equipment, an improved vacuum and Dowtherm heating. Semi-continuous (Girdler-type) and continuous (Cross-Stream type) deodorizers are described in detail and compared.

PALM OIL PROCESSING. III. PHYSICAL REFINING. G.B. Martinenghi (Univ. of Milan, Italian Assoc. of Oil and Fat Ind. Technicians). *Oléagineux* 28, 189–91 (1973). Palm oil with about 4% FFA can easily and rapidly be refined by physical methods to a final acidity of 0.02%; deodorization is perfect and the degree of bleaching very satisfactory. The physical and chemical characteristics of the oil thus obtained, if one overlooks a very slight interesterification, are similar to those of oils refined by the standard processes. The fatty acids recovered by deacidifying-deodorising distillation are practically colorless.

THE SITUATION OF OIL CROPS IN SOUTH VIET-NAM. Ton-That-Trinh (Nat. Agr. Inst. of Viet-Nam). *Oléagineux* 28, 185–88 (1973). Before 1965, oil crops fluorished in South Viet-Nam, but the situation has changed in the last years. Reasons are the insecurity of the war and the competition of cottonseed and soybean oil imported from USA. The 5-year agricultural plan (1971–75) is designed to remedy this situation by reserving large areas for the development of coconuts, peanuts and soybeans. The situation regarding oil plants used primarily for industrial purposes (tung and castor) and those used for food (oil palm, sesame) is discussed. An overall view is given of growing conditions, varieties and their improvement for the three oil plants included in the development plan: soya, peanut and coconut.

THE FREE FATTY ACID CONTENT OF PALM KERNELS AS A FUNCTION OF THE MOULDY DISCOLORED KERNELS. W.D. Idem (Ministry of Trade and Cooperatives, Calabar, Nigeria). *Oléagineux* 28, 243–48 (1973). Fundamental factor causing the increase of free fatty acids in palm kernels is moisture which favours the growth of moulds. A large number of palm kernel samples was analyzed for FFA and mouldy-discolored kernels. Results showed that there is a highly significant exponential relationship between the FFA of a batch of palm kernels and the D-value, defined as the sum of the percentage of discolored kernels and twice the percentage of decay. Provided the decay content does not exceed 2.6%, the D-value can be used for predicting the FFA of palm kernels. A maximum D-value of 35 in palm kernels will ensure with 95% confidence, the maintenance of the current FFA standard for this commodity.

COCONUT RESEARCH IN JAMAICA. D.H. Romney (Coconut Industry Board, Jamaica). *Oléagineux* 28, 177–79 (1973). The agricultural and plant breeding research carried out from July 1970 to June 1971, regarding Lethal Yellowing disease of coconut is summarized. The Malayan Dwarf remains the only really resistant variety; furthermore, hybrids which have one Dwarf parent are less susceptible than the others. Spacing experiments lead to the conclusion that Dwarfs can be planted at densities greater than 285 trees/hectare. Numerous further studies should be made to verify that the mycoplasms are indeed the cause of the disease, to determine which insect is the vector and to search for efficient and practical means of control.

VEGETABLE FAT PRODUCTS BASED ON PALM OIL. P. Kalustian (P. Kalustian Associates, Boonton, N.J. 07005). *Oléagineux* 28, 141–43 (1973). In last four years, the production of palm oil has had a spectacularly high increase. Two principal producers are: Malasia and West Africa. With the development of palm oil production, an improvement in its quality has also been achieved. Given moderate hydrogenation, it is possible to prepare both an oil suitable for particularly delicate frying and a shortenings with excellent plastic properties. Finally, a palm stearin is proposed for the manufacture of monoglycerides and other food by-products. The principal physiochemical characteristics of these different categories of palm-oil based products, as well as their utilization are given.

THE EXPANSION OF OIL PALM PLANTING. C.W.S. Hartley. *Oléagineux* 28, 115–22 (1973). The ever-increasing world demand for oils and fats is the main cause of palm oil expansion in the last ten years. Research has played a vital part in assisting expansion. Good results have been obtained by the rehabilitation of existing plantings. Elsewhere the main problems and difficulties have been high capital costs, high wage rates, unskilled management, disease, low potential yield and, occasionally lack of suitable land. The criteria of climate and soil for expansion have been much studied and the systematizing of the information available has proved useful in yield estimation. A very wide range of bunch yields is acceptable owing to variations in economic circumstances. There will be a need to avoid steep land and to increase productivity through mechanization. It is significant that most of the more recent large developments have been on flat or undulating land. Fertilizer needs often form a high proportion of maintenance costs and progress in determining needs with more exactness may be expected.

AOCS active in international food education

Since 1968, AOCS has been active in a consortium of scientific societies which make up the League for International Food Education, or L.I.F.E. AOCS's representative to the League's Board of Directors is S. Jack Rini, president and technical director, Humko Products, Kraftco Corp.

The primary objective of the League is to serve as a technical clearinghouse between the Nutrition Office, Bureau of Technical Assistance of the Agency of International Development and the cooperating organizations. The participating organizations of the League act as prime resource centers for the executive director of the consortium.

The league was established to provide information and assist in solving technical problems in nutrition, food technology, and child feeding programs overseas. L.I.F.E. fills an important need in helping developing nations solve their problems in nutrition and food technology by providing technical assistance and publishing its Newsletter.

Since its formation, L.I.F.E. has received its operating funds, for the most part, from the U.S. Agency for International Development. Last January, the Board of Directors of L.I.F.E. voted to provide an opportunity for individuals to become Sustaining Associates of L.I.F.E. by contributing $5 or more a year for the support of the organization's operations.

Additional information on the League may be obtained by contacting Samuel M. Weisberg, Executive Director, League for International Food Education, 1155 16th St., N.W., Room 705, Washington, D.C. 20036. ■

PEANUTS RESISTANT TO SEED INVASION BY ASPERGILLUS FLAVUS. A.C. Mixon and K.M. Rogers (ARS, USDA, Auburn, Alabama). *Oléagineux* 28, 85–6 (1973). Seeds of peanuts are highly vulnerable to contamination by *Aspergillus flavus* under certain environmental conditions, especially as the seed and pods approach maturity and during harvesting or storage. An ideal solution to this problem would be the development of varieties which produce seed that are resistant to the fungus or that inhibit development of aflatoxins even though invasion by the fungus occurs.

THE MULTIPLICATION OF PEANUT SEED IN WEST AFRICA. A. Bockelee-Mervan (Inst. de Recherches pour les Huiles et Oléagineux, IRHO, Paris). *Oléagineux* 28, 73–83 (1973). Using peanut seed of high quality is the best way for producers in Africa to better production. A basic plan for the production of a first level of high quality seed (Level I certified seed) adapted to West African conditions has been worked out and gives satisfactory results. About 400–800 farmers are starting with Level I seed. In the light of experience gained, it is possible to envisage a second level multiplication by specialized producers for oil mill peanuts. For edible peanuts, it is necessary that all the seed used should be certified Level I.

PALM OIL QUALITY. IMPROVEMENT OF STABILITY OF CRUDE PALM OIL DURING TRANSPORT AND STORAGE. B. Jacobsberg and D. Jacqmain (Inst. des Industries de Fermentation—Inst. Meurice-Chimie (CERIA), Bruxelles). *Oléagineux* 28, 25–32 (1973). At present, the world production of palm oil is increasing sharply, and the demand for better definition of quality of palm oil is growing. Until recently, FFA content was the only means used by the producers for evaluating palm oil. Only occasionally was a test for good bleachability required. In the paper, analytical results on samples of crude palm oil are given. Samples drawn at different times during transport were analyzed for FFA, copper and iron contamination, carotene and tocopherol content. The degree of oxidation was assessed by measuring primary and secondary oxidation products, such as hydroperoxide, anisidine value and U.V. absorbance at 233 and 269 nm. The impact of the age, FFA, pro- and anti-oxidant content on the different oxidation products was computed statistically by multiple regression analysis and a clear picture of the relative influence of each was obtained. Samples can be categorized according to the degree of oxidative deterioration and the oxidative evolution during normal transport and storage can be forecast.

PALM OIL IN MALASIA. Ho Sim Guan (Oil Palm Growers Council of Malasia). *Oléagineux* 28, 37–40 (1973). During the last ten years, palm oil became a very important economic factor in Malasia. The production is growing every year: in 1960, the production was 90,000 tons (from 54,000 ha), in 1971 581,000 tons (364,000 ha) and it is estimated that in 1975 1,400,000 tons (from 552,000 ha) will be produced. More improvements are necessary, especially regarding harvesting and industrial treatment. Research in this field is continuous and it can be expected that in the next year, the quantity and the quality of palm oil and palm kernel oil will increase.

THE COCONUT IN INDONESIA. Y. Frémond (Inst. de Recherches pour les Huiles et Oleagineux, Paris). *Oléagineux* 28, 15–19 (1973). Coconut is the most important oil culture in Indonesia regarding the area planted with it (nearly 2 million hectares) as well as from the economic point of view. The mediocre yields obtained in spite of the good quality of the soils and climate are ascribed to low planting density, which is a consequence of aging and insufficient replanting, to excessive food crops and to generally poor maintenance. Restoration should be undertaken gradually, starting with regions where the coconut is the main source of revenue. The creation of seed fields associated with the setting up of a few large industrial plantations is considered as an economical means of providing Indonesia with high-yielding, fast-growing hybrids.

PROCESSING OF INDIAN TEA SEED. G. Venugopal, C. Krishna Doss, R.K. Viswanadham, S.D. Thirumala Rao and B.R. Reddy (Oil Technological Res. Inst., Anantapur, India). *Oléagineux* 27, 605–9 (1973). Indian tea seed contains up to 24% of oil. The data on the characteristics and composition of tea seed are given. The seed (hull to kernel ratio 30:70) can easily be dehulled in a groundnut decorticator. Tea seed oil resembles olive oil in its physical and chemical characteristics. The stability of crude, refined and bleached oil has also been examined. The tea seed oil is very good for frying and the food fried in this oil has excellent acceptability and storage stability.

SALAD OIL AND EDIBLE FATS FROM PALM OIL BY A NEW FRACTIONAL CRYSTALLIZATION METHOD IN ISOPROPYL ALCOHOL. L. Koslowsky (HSL Ltd. Industrial Engineering Co., Petah-Tikva, Israel). *Oléagineux* 27, 557–60 (1972). The HLS had elaborated a new method for fractional crystallization of palm oil. The solid fraction is separated with simple decantation and without filters or centrifuges. Isopropyl alcohol, containing a permitted natural food additive is used and the losses are extremely small. The problem of very special conditions of crystal growth during the crystallization, necessary in the other methods, is completely eliminated. The crystallization temperature needed in double stage fractionization is 10–15C and the equipment is fully automated. By the new method, the yields of the fractions are: liquid fraction 85% for single stage and 74% for double stage fractional crystallization.

PALM OIL PROCESSING. II. BLEACHING. G.B. Martinenghi (Univ. of Milan, Associazione Italiana tra i Tecnici dell' Industria degli Oli, Grassi e Affini (AITOGA), Milan). *Oléagineux* 27, 553–55 (1972). Different methods for bleaching palm oil are discussed. Experiments have been done under the following conditions: bleaching at 140C with bleaching earth; at 140C with bleaching earth and H_3PO_4; at 180C without and with bleaching earth; bleaching at 240C without and with bleaching earth and the same experiments at 260C. From the results, it can be seen that the ideal conditions for achieving satisfactory bleaching are: temperatures between 240 and 260C, a 5 to 15 min. processing time, a vacuum of less than 1 mm Hg and a supplementary treatment by about 1% earth at about 100C. For determination of color, the spectrophotometric method (470, 520 and 660 nm) was used.

THE PRODUCTION OF HYBRID COCONUT SEED BY ASSISTED POLLINATION. M. de Nucé de Lamothe and F. Rognon (Station IRHO Cocotier de Port-Bonet, Cote d'Ivoire). *Oléagineux* 27,

539-44 (1972). Controlled natural pollination is a rather inelastic method for the mass production of high-yielding interorigin hybrid coconut seed. Assisted pollination, on the other hand, enables a large number of crosses to be made in a given seed field, according to the pollens brought in. IRHO research in this field gave very good results and the elaborated technique, which guarantees a high yield of hybrid nuts, is described. The results show the advantage and value of this method. Research to improve this technique continues.

NOBLE METAL CATALYSIS. II. HYDRATOCARBONYLATION REACTION OF OLEFINS WITH CARBON MONOXIDE TO GIVE SATURATED ACIDS. D.M. Fenton (Union Res. Center, Union Oil Co. of Cal., Brea, Cal. 92621). *J. Org. Chem.* 38, 3192-8 (1973). A process study of the hydratocarbonylation reaction of olefins with carbon monoxide to give saturated acids is described. The catalyst is probably a zero valent palladium-phosphine complex. Effects of changes in temperature, pressure and concentrations of the three reactants and the complex catalyst system were studied. The rate of reaction depends approximately in a linear manner on the concentration of olefin and the pressure of carbon monoxide, while the rate reaches a maximum with a water concentration of 5-10%. The catalyst system undergoes a complex number of changes between the zero and plus two valence states, probably some involving the carbon moieties attached to the phosphine ligand.

THE USE OF A SOLID SUPPORT FOR THE EXTRACTION OF CHLORINATED PESTICIDES FROM LARGE QUANTITIES OF FATS AND OILS. W.M. Rogers (Food & Drug Admin., 900 Madison Ave., Baltimore, Md. 21201). *J. Assn. Off. Anal. Chem.* 55, 1053-7 (1972). A solid support with a large surface area and a high affinity for oils has been used as a vehicle to suspend extracted fats and oils on its surface. Extraction of the fat-coated particles with an acetone-acetonitrile solvent mixture allows a quantitative isolation of chlorinated pesticide residues with a co-extraction of only about 1 gram fat from a 30 gram original sample. Recoveries of 5 chlorinated pesticides added to corn oil and butterfat samples ranged from 83 to 100%. Satisfactory agreement between the proposed method and the official AOAC method is obtained for various high-fat products containing incurred chlorinated pesticide residues.

CAMPESTEROL AND β-SITOSTEROL CONTENT OF SOME VEGETABLE OILS. C.W. Thorpe (Div. of Chem. & Physics, FDA, Washington, D.C. 20204). *J. Assn. Off. Anal. Chem.* 55, 1085-7 (1972). The free and total campesterol and β-sitosterol content of 48 samples of crude and refined corn oil, cottonseed, soybean and peanut oils are reported. The results show that the ratio of β-sitosterol to campesterol may be used to identify an individual oil and tend to confirm that sterols are lost during refining of the crude oils. It is recommended that the official method, 28.081-28.088, modified for the analysis of campesterol and β-sitosterol, be collaboratively studied.

FATTY ACID COMPOSITION OF SOME MINOR OILS. M.R. Raikar and N.G. Magar (Dept. of Biochem., Inst. of Sci., Bombay-32, India). *J. Indian Chem. Soc.* 50(1), 59-62 (1973). The oilseeds selected for this work were *Bombax malabaricum* (Savar), *Buchanania lanzan* (Charoli), *Mesua ferrea* (Nahor), *Michelia champaca* (Champha), *Terminalia catappa* (Janglia badam), *Thespesia populnea* (Bhendi) and *Xanthium strumarium* (Gokhru). Moisture and oil content of the seed kernels were determined. The oils were solvent extracted from the kernels and analyzed for their physical and chemical characteristics. The methyl esters of the oils (freed from unsaponifiable matter) were analyzed for their fatty acid composition by gas-liquid chromatography. The major components of all the oils were palmitic, oleic and linoleic acids. Stearic acid was a minor component. The fatty acid composition of the oils are compared with the values reported by earlier workers.

A GAS-CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF LOW CONCENTRATIONS OF ACRYLIC ACID IN MIXTURES OF C_2 TO C_5 FATTY ACIDS IN BIOLOGICAL MATERIALS. R.C. Noble and J.W. Czerkawski (Hannah Res. Inst., Ayr, Scotland, KA6 5HL). *Analyst* 98, 122-5 (1973). The presence of acrylic acid in mixtures of shortchain (C_2 to C_5) fatty acids can be determined by gas chromatography by using a composite

Call for Nominations Award in Lipid Chemistry

Sponsored by Applied Science Laboratories

In April 1964 the Governing Board of the American Oil Chemists' Society established an Award in Lipid Chemistry under the sponsorship of the Applied Science Laboratories Inc., State College, Pa. Previous awards were presented as follows: Erich Baer, August 1964; Ernest Klenk, October 1965; H.E. Carter, October 1966; Sune Bergstrom, October 1967; Daniel Swern, October 1968; H.J. Dutton, October 1969; E.P. Kennedy, September 1970; E.S. Lutton, October 1971; A.T. James, September 1972; and F.D. Gunstone, September 1973.

The award consists of $2500 accompanied by an appropriate certificate. It is now planned that the 11th award will be presented at the AOCS Fall Meeting in Philadelphia, September 29-October 3, 1974.

Canvassing Committee Appointees

Policies and procedures governing the selection of award winners have been set by the AOCS Governing Board. An Award Nomination Canvassing Committee has been appointed. Members are: C.D. Evans, Chairman; C.W. Williams; D.L. Berner; G. Fuller; and R.J. Buswell. The function of this committee is to solicit nominations for the 11th award. Selection of the award winner will be made by the Award Committee whose membership will remain anonymous.

Rules

The rules prescribe that nominees shall have been responsible for the accomplishment of original research in lipid chemistry and must have presented the results thereof through publication of technical papers of high quality. Preference will be given to individuals who are actively associated with research in lipid chemistry and who have made fundamental discoveries that affect a large segment of the lipid field. For award purposes, the term "lipid chemistry" is considered to embrace all aspects of the chemistry and biochemistry of fatty acids, of naturally occurring and synthetic compounds and derivatives of fatty acids, and of compounds that are related to fatty acids metabolically, or occur naturally in close association with fatty acids or derivatives thereof. The award will be made without regard for national origin, race, color, creed or sex.

Letters of nomination together with supporting documents must be submitted in octuplicate to C.D. Evans, Northern Regional Research Center, 1815 N. University, Peoria, Ill. 61604 before the deadline of April 1, 1974. The supporting documents shall consist of professional biographical data, including a summary of the nominee's research accomplishments, a list of his publications, the degrees he holds, together with the names of the granting institutions, and the positions held during his professional career. There is no requirement that either the nominator or the nominee be a member of the American Oil Chemists' Society. In addition, letters from at least three other scientists supporting the nomination must be submitted in octuplicate.

Remember the DEADLINE, April 1, 1974

column technique. By varying the proportions of the total column length occupied by non-polar and polar liquid phases, the acrylic acid peak could be "moved" to a predetermined position on the chromatogram and complete separation from the other acids could be achieved. Suitable placing of the peak enabled the concentration of acrylic acid to be accurately and quickly determined.

ESTIMATION OF TOTAL CHOLESTEROL IN GHEE PREPARED FROM MILK OF COWS AND BUFFALO. M.P. Bindal and M.K. Jain (National Dairy Res. Inst., Karnal, Haryana, India). *J. Indian Chem. Soc.* 50(1), 63-5 (1973). Reinhold and Shiels' modification used in the estimation of cholesterol in blood has been successfully applied to estimate cholesterol in ghee. Twenty-six samples each of cow and buffalo ghee have been analyzed for their total cholesterol content and the data treated statistically. Highly significant differences between the cholesterol levels of cow and buffalo ghee have been observed. Cow ghee contains higher levels (0.31%) of cholesterol than buffalo ghee (0.27%).

NEGATIVE FINDING OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN IN COOKED FAT CONTAINING ACTUAL AND FORTIFIED RESIDUES OF RONNEL AND/OR 2,4,5-TRICHLOROPHENOL. R.R. Watts and R.W. Storherr (Registration Div., Environmental Protection Agency, Washington, D.C. 20460). *J. Assn. Off. Anal. Chem.* 56, 1026–7 (1973). Beef fat containing residues of ronnel and its metabolite 2,4,5-trichlorophenol at 46.0 and 2.8 parts per million, respectively, was examined before and after cooking for presence of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin. Fat samples fortified at 2000 parts per million with 2,4,5-trichlorophenol or its sodium salt were cooked at 500F for periods of 6 to 22 hours. No tetra-dioxin was found in any of the samples, using a method with a sensitivity limit of 0.05 parts per million.

FLAME IONIZATION GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF ANTIOXIDANTS IN VEGETABLE OIL. E.E. Stoddard (Food and Drug Directorate, 55 St. Clair Ave., E., Toronto 290, Ontario, Canada). *J. Assn. Off. Anal. Chem.* 55, 1081–4 (1972). A procedure is described which is suitable for the analysis of the 2 isomers of butylated hydroxyanisole, butylated hydroxytoluene, mono-tert.-butylhydroquinone, n-propyl gallate, and nordihydroguaiaretic acid. The method described is sensitive to 0.05 micrograms. The antioxidants are extracted from n-hexane with acetonitrile and 80% ethanol. Butylated hydroxytoluene is eluded from Florasil with n-hexane saturated with acetonitrile and containing 2% ethanol. Quantitation is performed by GLC analysis of the TMS derivatives, using an internal standard. Recoveries range from 67 to 100%.

HIGH-PROTEIN BREAD FROM WHEAT FLOUR FORTIFIED WITH FULL-FAT SOY FLOUR. C.C. Tsen and W.J. Hoover (Kansas State Univ., Manhattan, Kan. 66502). *Cereal Chem.* 50, 7–16 (1973). Fortifying wheat flour with full-fat soy flour in making bread can raise protein content, balance essential amino acids, and increase bread's caloric value. Such fortification, however, can adversely affect both rheological properties and baking quality of wheat flour. Sodium stearoyl-2 lactylate (SSL) could increase the stability of dough containing 12 to 28% soy flour. The effect was enhanced with increased additions of SSL (0.25 to 2.0%). All breads with 12 to 28% soy flour exhibited a small loaf volume and poor grain score. When 0.5% SSL was added, acceptable bread resulted from wheat flour fortified with soy flour up to 24%. Ethoxylated monoglycerides also gave a larger loaf volume but a lower grain score than SSL. Baking quality of defatted soy flour was inferior to that of full-fat soy flour, even compared on an equivalent protein basis. SSL also helped stored breads (soy and control) retain softness.

THE ROLE OF FLOUR LIPIDS IN BAKING. F. MacRitchie and P.W. Gras (CSIRO Wheat Res. Unit, North Ryde, N.S.W., Australia). *Cereal Chem.* 50, 292–302 (1973). Certain lipid-extracting solvents, including water-saturated butanol, are unsuitable for studying the role of lipids in baking since they alter the functional properties of flour protein. Other solvents, such as chloroform and petroleum ether, do not affect them. About three-fourths of the flour lipid may be removed by cold solvent extraction. Most of the remaining lipid occurs in the starch granules and does not appear to play an important role in baking. Curves of loaf volume as a function of lipid content for several flours with a range of properties all showed minima at lipid contents intermediate between those of the defatted and whole flours. Polar and nonpolar lipid fractions have different effects on loaf volume. These variations become apparent only during the baking stage.

CHEMICAL EXAMINATION OF THE FIXED OIL FROM THE SEEDS OF HYPTIS SUAVEOLENS POIT. B.G.V. Narasimha Rao and S.S. Nigam (Dept. of Chem., Univ. of Saugar, Sagar (M.P.) India). *Indian Oil & Soap J.* 37(12), 295–300 (1972). Chemical composition of the seeds was found to be: moisture 7.81%, ash content 4.03, crude proteins 20.66, fixed oil 15.00, fibre 30.30 and nitrogen free extract 22.00. Seeds yielded characteristic smelling oil in 25% yield. Saponification gave mixed fatty acids 88% and unsaponifiable matter 1.1%. The mixed fatty acids consisted of 9.40 saturated and 90.60% unsaturated acids. Fatty acids were palmitoleic, oleic, linoleic and linolenic.

MASS TRANSFER COEFFICIENTS IN MIXER-SETTLERS. K. Sreenivasan and D.S. Viswanath. *J. Appl. Chem. & Biotech.* 23, No. 3, 169–74 (1973). Mass transfer coefficients have been determined for transfer into a highly viscous phase in a stirred tank involving high Schmidt numbers. The results have been used to compute mass transfer coefficients in the extraction of free fatty acids from oils using alcohol and show good agreement with experimental results. (World Surface Coatings Abs. No. 373)

GLYCEROLYSIS OF METHYL ESTERS OF FATTY ACIDS USING MOLECULAR SIEVES. R.M. Barrer and J.L. Lopez Ruiz. *J. Appl. Chem. & Biotech.* 23, No. 3, 189–94 (1973). Glycerolysis of the methyl esters of oleic and stearic acids has been investigated in presence and absence of zeolite 4A. By removing the methanol produced, this zeolite improved the yield of glyceride substantially. Other factors studied which influenced the yields were temperature reactant concentrations and proportions, and catalyst. (World Surface Coatings Abs. No. 373)

SUPPORTED COPPER CHROMITE CATALYST. J.R. Frazee, B.R. Martin and C.P. Brundrett (W. R. Grace & Co.). *U.S. 3,756,965.* The catalyst is produced by reactively forming basic ammonium cupric chromate in the pores of the support followed by calcination. The resultant product is a supported catalyst having the support pores loaded with copper chromite. Supports which may be used are silica, alumina, silica-alumina mixture or aluminosilicate. The catalyst is useful in hydrogenation reactions.

DIRECTED INTERESTERIFICATION OF GLYCERIDES. G. Barsky. *U.S. 3,758,530.* By conducting interesterification under high pressure, the distribution of the fatty acid radicals can be directed away from the random.

IMPROVING THE COOKING STABILITY OF SOYBEAN OIL. W.P. Gibble (Hunt-Wesson). *U.S. 3,758,532.* Unhydrogenated or partially hydrogenated refined soybean oil is degassed under vacuum to remove a substantial proportion of the air dissolved in the oil. The oil is then gassed with carbon dioxide and heated to over 100C in the presence of a copper chromite catalyst, optionally in the presence of activated charcoal. After the heat treatment, the oil is cooled, filtered, bleached and deodorized to yield the finished treated oil, which has improved frying and odor stability.

TREATMENT OF TALLOW AND LIKE FATTY MATERIALS. S. Lee (Colgate-Palmolive). *U.S. 3,758,533.* Fatty materials contaminated by synthetic polymeric impurities such as polyethylene are purified by adjusting the temperature to above the melting point of the fatty material but not above 95C. The impurities thus become insoluble in the fatty material and can be separated therefrom.

PROCESS FOR THE QUANTITATIVE DETERMINATION OF TRI, DI, AND MONOGLYCERIDES. H. Stork and F. H. Schmidt (Boehringer Mannheim GmbH). *U.S. 3,759,793.* Lipoproteins and/or protein free neutral fats present in body fluids are determined completely enzymatically by using the lipase obtained from *Rhizopus arrhizus* to split the glyceride. The product is con-

verted to pyruvate and then to lactic acid with NADH, which is determined photometrically as a measure of the initial glyceride content.

• Biochemistry and Nutrition

INTERACTION OF PROPIONATE AND LACTATE IN THE PERFUSED RAT LIVER. EFFECTS OF GLUCAGON AND OLEATE. J.B. Blair, D.E. Cook and H.A. Lardy (Inst. for Enzyme Res., Univ. of Wisconsin, Madison, Wisc. 53706). *J. Biol. Chem.* 248, 3608–14 (1973). The uptake of propionate by the isolated perfused rat liver is not influenced by oleate or glucagon. However, glucagon does stimulate glucose production in the presence of 10 mM propionate and increases the incorporation of isotope from [^{14}C]propionate into glucose. These observations have been interpreted to indicate a sparing of the metabolism of propionate in the citric acid cycle by endogenous materials. As others have noted, propionate inhibits gluconeogenesis from lactate in the perfused liver. Studies of the influence of glucagon and oleate on glucose production from a mixture of propionate and lactate suggest that glucagon is acting at some point in common with the metabolism of propionate and lactate, whereas oleate selectively stimulates gluconeogenesis from lactate.

COMPARATIVE STUDIES ON THE 25-HYDROXYLATION OF VITAMIN D_3 AND DIHYDROTACHYSTEROL$_3$. M.H. Bhattacharyya and H.F. DuLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisc.-Madison, Madison, Wisc. 53706). *J. Biol. Chem.* 248, 2974–7 (1973). Liver homogenates hydroxylate dihydrotachysterol$_3$ in position 25 equally well whether they are prepared from rats low in vitamin D or from rats treated with vitamin D_3. This contrasts with the liver homogenate 25-hydroxylation of vitamin D_3 which is markedly reduced by pretreatment with vitamin D_3. In addition, the rate of appearance of 25-hydroxy[^{3}H]dihydrotachysterol$_3$ in the blood following a dose of [^{3}H]dihydrotachysterol is not reduced by prior treatment with unlabeled vitamin D_3 or dihydrotachysterol in contrast to the effect of prior vitamin D_3 treatment on in vivo vitamin D_3 25-hydroxylation. Futhermore, the rate of appearance of 25-hydroxy-vitamin D_3 in the blood increases only about 2-fold with a 100-fold increase in vitamin D_3 dose, while the rate of appearance of 25-hydroxydihydrotachysterol$_3$ increases 100-fold with a 100-fold increase in dihydrotachysterol$_3$ dose. These results strongly suggest that the 25-hydroxylation of dihydrotachysterol is not regulated in vivo as is the 25-hydroxylation of vitamin D_3. They also support the idea that the regulation of calciferol-25-hydroxylase activity functions to maintain a low circulating level of 25-hydroxyvitamin D_3 in the blood even when large amounts of vitamin D_3 are being ingested.

THE INTERACTION OF BACTERIAL LIPOPOLYSACCHARIDE WITH PHOSPHOLIPID BILAYERS AND MONOLAYERS. D.A. Benedetto, J.W. Shands, Jr. and D.O. Shah (Dept. of Immunology and Med. Microbiol. and Dept. of Anesthesiology, Univ. of Florida, College of Med., Gainesville, Fa. 32601). *Biochim. Biophys. Acta* 298, 145–57 (1973). The association of bacterial lipopolysaccharide with artificial membranes was studied in an attempt to understand the mechanism of binding of lipopolysaccharide to cell surfaces and to look for an effect on membrane stability. The membrane models used were phospholipid bilayers and monolayers. As measured by survival time, lipopolysaccharide was found to decrease the stability of bilayers at a concentration of 300 μg/ml. When assayed by dielectric breakdown, an effect of lipopolysaccharide was noticeable at concentrations of 50 μg/ml. In studies involving the penetration of monomolecular films of various phospholipids, native and alkali-treated lipopolysaccharide both caused increases in surface pressure, and therefore penetrated the films. However, alkali-treated lipopolysaccharide was at least ten times more efficient than the native product in penetration. Alkali-treated lipopolysaccharide had a greater degree of surface activity than native lipopolysaccharide, since alkali-treated lipopolysaccharide formed monomolecular films by itself, whereas native lipopolysaccharide did not. The changes in the surface pressure and surface potential of phospholipid films produced by lipopolysaccharide in the subsolution suggested that the interaction of lipopolysaccharide with phospholipid monolayers was by a combination of penetration and adsorption to the undersurface.

PHASE TRANSITIONS AND HETEROGENEITY IN LIPID BILAYERS. R.E. Pagano, R.J. Cherry and D. Chapman (Dept. of Chem., Univ. of Sheffield, Sheffield S3 7HF, England). *Science* 181, 557–9 (1973). The optical reflectivity of several well-characterized lipid bilayer systems has been correlated with calorimetric studies of the membrane components. There is a large increase in mean membrane thickness when a bilayer is cooled below the transition temperature of the membrane lipid. Similar studies on membranes generated from a mixture of two lipids possessing different degrees of unsaturation suggest that between the characteristic transition temperatures of the two lipids, the bilayer contains clusters of gel and liquid crystalline lipid which coexist within the plane of the membrane.

TRANSBILAYER ASYMMETRY AND SURFACE HOMOGENEITY OF MIXED PHOSPHOLIPIDS IN COSONICATED VESICLES. D.M. Michaelson, A.F. Horwitz and M.P. Klein (Lab. of Chem. Biodynamics, Lawrence Berkeley Lab., Univ. of Cal., Berkeley, Cal. 94720). *Biochemistry* 12, 2637–45 (1973). Cosonication of equimolar quantities of phosphatidylglycerol (PG) and phosphatidylcholine (PC) results in bilayered vesicles the outer surface of which contain, on the average, twice as many PG as PC molecules. Within the surface these two lipid classes are not spatially segregated into "patches." These results were obtained by exploiting the effects of paramagnetic ions on the proton and phosphorus nuclear magnetic resonances. The ^{31}P resonances of PG and PC sonicated separately have different chemical shifts and broaden differently upon addition of Mn^{2+}. At Mn^{2+} concentrations less than 10^{-4} M, these ions do not permeate the vesicles, permitting a distinction of the signals originating on the outer surface from those on the inner surface. For pure dispersions of PG and of PC, Mn^{2+} and Eu^{3+} reside closer to the phosphate than to the choline $N(CH_3)_3^+$ protons and the residence time of Mn^{2+} is short, less than 10^{-4} sec. The integrated and asymmetric arrangement of the phospholipid molecules in the cosonicated dispersions is discussed in the context of the structure and biosynthesis of biological membranes.

MAGNETIC RESONANCE STUDIES ON MEMBRANE AND MODEL MEMBRANE SYSTEMS. III. FATTY ACID MOTIONS IN AQUEOUS LECITHIN DISPERSIONS. A.F. Horwitz, D. Michaelson and M.P. Klein (Lab. of Chem. Biodynamics, Lawrence Berkeley Lab. Univ. of Cal., Berkeley, Cal. 94720). *Biochim. Biophys. Acta* 298, 1–7 (1973). Magnetic resonance spectra and relaxation rates of sonicated and unsonicated vesibles of egg yolk lecithin are reviewed and compared. The NMR relaxation rates differ by about two orders of magnitude while the ESR order parameters show no such variation. The apparent contradiction may be removed by proposing that the ESR data reflect positional fluctuations. Macroscopic vesicular tumbling contributes insignificantly to the relaxation rates. Resonance and non-resonance data converge on a dynamic model in which the fatty acid molecules are configurationally mobile yet relatively ordered.

FATTY ACID INHIBITION OF SULFATION FACTOR-STIMULATED $^{35}SO_4$ INCORPORATION INTO EMBRYONIC CHICKEN CARTILAGE. H.K. Delcher, G.S. Eisenbarth and H.E. Lebovitz (Div. of Endocrinol., Dept. of Med. and Physiol., Duke Univ. Med. Center, Durham, N.C. 27710). *J. Biol. Chem.* 248, 1901–5 (1973). The effect of fatty acids and ketones on $^{35}SO_4$ incorporation into the chondromucoproteins of embryonic chicken cartilage was studied in vitro. Both the nonstimulated incorporation (that occurring in media without added serum) and sulfation factor stimulated incorporation (that occurring in

(Continued on page 541A)

• Obituary

Fredrick H. Gayer, a member of AOCS since 1938, died on October 5 in Detroit, following a long illness. He was 80 years old.

Dr. Gayer received his Ph.D. from the Technical University of Budapest, Hungary, in 1933. After coming to the U.S., he joined General Motors Research Laboratories, where he undertook catalyst investigations.

Moving to Chicago, he worked extensively on paper mill by-products and was granted many patents on tall oil refining. This led to the organization of his consulting laboratory in Chicago Heights, where his work focused on drying oils, resins, coatings, and adhesives.

He is survived by his wife, Florence, a daughter, Annmarie, and a son, Fredrick Elliott. ■

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media with 5.0% rat serum added) were investigated. Butyrate and octanoate, from 0.01 mM to 1.0 mM, had minimal effects on nonstimulated $^{35}SO_4$ incorporation. The data suggest that fatty acids may regulate the synthesis of chondromucoproteins in cartilage and in this way dissociate the lipolytic and glucose mobilizing effects of growth hormone from its stimulation of growth. Though the locus of action of fatty acids on $^{35}SO_4$ incorporation is unknown, it may be at the site of the action of sulfation factor.

ISOLATION AND CHARACTERIZATION OF A LYSOLECITHIN-ADENOSINE TRIPHOSPHATASE COMPLEX FROM LOBSTER MUSCLE MICROSOMES. D.W. Deamer (Dept. of Zoology, Univ. of Cal., Davis, Cal. 95616). *J. Biol. Chem.* 248, 5477–85 (1973). The ATPase of lobster abdominal muscle microsomes may be partially purified by addition of lysolecithin (1 to 2 mg per mg of protein) followed by differential centrifugation. The pellet contains most of the ATPase activity and the specific activity is increased 2-fold. The ATPase composes half the protein of the crude microsomes and 70 to 80% of the protein of a purified microsome fraction. Lysolecithin displaces much of the lipid of the microsomes and represents 65% of the lipid phosphate in the lysolecithin-ATPase complex. Polyacrylamide gel analysis of the ATPase preparation shows a single major band of 105,000 daltons. This band is not affected by reduction with mercaptoethanol. Freeze-etch microscopy of the microsomes reveals numerous 70- to 80-Å particles within the plane of the membranes. In the lysolecithin-ATPase complex similar particles compose essentially all of the membrane fracture surface as viewed by freeze-etching. These results are in agreement with an earlier suggestion that the freeze-etch particles of the microsomes are correlated with calcium transport ATPase sites.

DIET-INDUCED CHOLESTEREMIA AND ATHEROSCLEROSIS IN WILD RODENTS. R.A. Dieterich, R.W. Van Pelt and W.A. Galster (Inst. of Arctic Biol., Univ. of Alaska, Fairbanks, Alaska 99701). *Atherosclerosis* 17, 345–52 (1973). Five diverse species of wild rodents were fed a high-fat-high-cholesterol diet for one year. *Microtus pennsylvanicus, Calomys ducilla,* and *Peromyscus maniculatus* had an approximate 2-fold increase, *Acomys cahirinus* had a 4-fold increase, and *Dicrostonyx groenlandicus* had a 11-fold increase in serum total cholesterol above pre-diet levels. Some evidence of atherosclerosis was observed in all species but the most severe lesions were found in *A. cahirinus* and *D. groenlandicus.* The outstanding pathologic finding in those rodents not surviving one year on the diet was an advanced fatty degeneration of the liver.

FATTY ACID ACTIVATION AND ACYL TRANSFER IN RAT LIVER DURING CLOFIBRATE FEEDING. L.N.W. Daae and M. Aas (Inst. of Clinical Biochem., Univ. of Oslo, Rikshospitalet, Oslo, Norway). *Atherosclerosis* 17, 389–400 (1973). The activities of fatty acid activating enzymes and acyl transferring enzymes have been measured in liver homogenate from normally fed rats and rats fed 0.30% clofibrate in the diet for 1, 2, 4 and 6 weeks. The activity of long-chain acyl-CoA synthetase was more than doubled when calculated in relation to body weight while the short-chain acyl-CoA synthetases did not change. The carnitine palmityltransferase activity in the clofibrate-fed rats increased to 260% while the glycerophosphate acylating enzymes reached 150% of the activity in the control livers, a little more than the increase in protein content. How these enzyme activity changes may take part in the regulation of the metabolism of fatty acids and influence the serum level of triglycerides is discussed.

INTERACTION OF CANCANAVALIN A AND WHEAT GERM AGGLUTININ WITH THE INSULIN RECEPTOR OF FAT CELLS AND LIVER. P. Cuatrecasas (Dept. of Pharmacol. and Exptal. Therapeutics and Dept. of Med., Johns Hopkins Univ. School of Med., Baltimore, Md. 21205). *J. Biol. Chem.* 248, 3528–34 (1973). Wheat germ agglutinin enhances the specific binding of insulin to isolated fat cells and to liver cell membranes at a concentration of about 1 μg per ml. Wheat germ agglutinin increases insulin binding by increasing the rate of insulin-receptor complex formation; the protein does not alter the rate of dissociation of the insulin-membrane complex or the total number of binding sites for insulin. These studies indicate that the insulin-binding macro-molecules of liver and fat cell membranes are proteins of complex carbohydrate composition which have several chemically distinct sites capable of binding plant lectins in a manner which perturbs the insulin-receptor interaction.

EFFECT OF THYROIDECTOMY ON CONVERSION OF CHOLESTEROL INTO BILE ACIDS. S.O. Byers and M. Friedman (Harold Brunn Inst., Mt. Zion Hosp. and Med. Center, San Francisco, Calif. 94115). *Proc. Soc. Exp. Biol. Med.* 143, 551–5 (1973). Analyses of the bile of thyroidectomized rat following the injection of labeled cholesterol indicated that this type of animal exhibited a defect in its ability to catabolize cholesterol into bile acids. It is suggested that this decreased catabolic transformation of cholesterol is the chief cause of the hypercholesterolemia observed after thyroidectomy.

NEGATIVE FEEDBACK IN STEROL BIOSYNTHESIS AND LIPOPROTEIN RELEASE BY THE PERFUSED RAT LIVER. L.A. Bricker, L. Kozlovskis and M.G. Goodman (Dept. of Med., Univ. of Miami Schl. of Med., Biscayne Annex, Miami, Fla. 33152). *Proc. Soc. Exp. Biol. Med.* 143, 375–8 (1973). A high cholesterol diet (5%) given to rats over a 3- to 4-wk period markedly suppressed incorporation of acetate-2-^{14}C in the perfused liver into both stored hepatic cholesterol and into sterol released into the perfusion medium. Perfused livers from low cholesterol-fed rats incorporated radioacetate into sterols at rates at least 50 times those observed in livers of high cholesterol-fed rats. In all animals, during the 3-hr perfusion period, only a small fraction of newly synthesized sterol was released from liver, the remainder being stored within it. Newly synthesized sterol was not detectable in the circulating perfusate until 45-55 min had elapsed. The data demonstrate the cholesterol feedback phenomenon in the perfusion fluid of the perfused rat liver, the quantitative relationship between stored and released new sterols, and the minimal appearance time required for newly synthesized lipoprotein to appear in the circulation of this perfused system.

THE BIOLOGICAL ACTIVITY AND METABOLISM OF 24,25-DIHYDROXYVITAMIN D_3. I.T. Boyle, J.L. Omdahl, R.W. Gray and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisc.-Madison, Madison, Wisc. 53706). *J. Biol. Chem.* 248, 4174–80 (1973). 24,25-Dihydroxyvitamin D_3 (24,25-$(OH)_2D_3$) gives a marked increase in intestinal calcium transport and serum calcium concentration of vitamin D-deficient rats fed a diet containing adequate calcium and phosphorus. These responses occur after a considerable time lag following administration of the metabolite. The 24,25-$(OH)_2D_3$ on a long term basis and at low doses has striking activity in the stimulation of intestinal calcium transport but not bone calcium mobilization. Radioactive 24,25-$(OH)_2D_3$ is metabolized to a more polar compound which increases in concentration in serum, intestinal mucosa, and bone over a 48-hour period. Nephrectomy or the feeding of a high calcium diet abolishes the stimulation of intestinal calcium transport by 24,25-$(OH)_2D_3$ and the in vivo genesis of the more polar compound from tritiated 24,25-$(OH)_2D_3$. It is concluded that 24,25-$(OH)_2D_3$, the usual dihydroxy metabolite of vitamin D_3 in normal rats, has potential physiological importance through its conversion to a more polar metabolite. This metabolite possibly acts to facilitate intestinal calcium absorption without stimulating bone calcium mobilization.

STUDY OF THE KINETICS OF [26-^{14}C]CHOLESTEROL METABOLISM IN CHICKENS WITH ALIMENTARY HYPERCHOLESTEROLAEMIA. P. Bobek, E. Ginter, J. Cerven, V. Chorváthová, V. Peter and V. Chrappa (Inst. of Human Nutr. Res., Bratislava, Ivánka pri Dunaji, Czechoslovakia). *Atherosclerosis* 17, 435–43 (1973). The die-away curve after a single intravenous injection of [26-^{14}C]cholesterol was studied in normal chickens (standard diet) and in chickens with hypercholesterolaemia (0.5% cholesterol added to diet). The course of the curves indicates that plasma cholesterol turnover in chickens corresponds to the two-pool model. A kinetic analysis of the plasma cholesterol die-away curves in the terms of this model showed that a raised cholesterol intake led in chickens to a decrease in the plasma cholesterol half-life (control: 23, cholesterol-fed group: 13 days), an increase in the amount of cholesterol in the body pool with a rapid cholesterol turnover, an increase in the fractional cholesterol turnover rate in this pool and an increase in the total body cholesterol turnover.

A COMPARATIVE STUDY OF THE EFFECTS OF CHEMICAL MODIFICATION ON THE IMMUNOCHEMICAL AND OPTICAL PROPERTIES OF HUMAN PLASMA LOW-DENSITY LIPOPROTEIN(S) AND APOPROTEINS. A.M. Gotto, Jr., R.I. Levy, S.E. Lux, M.E. Birnbaumer and D.S. Fredrickson (Molecular Disease Branch, Natl. Heart and Lung Inst., Natl. Inst. of Health, Bethesda, Md. 20014). *Biochem. J.* 133, 369-82 (1973). The structure of human plasma low-density lipoprotein(s) [LD lipoprotein(s)] was investigated by several immunological and optical techniques. The effects of delipidation and of chemical modification by 3-carboxypropionylation, acetylation, diazotization and amidination were examined. A sensitive double-antibody radioimmunoassay for human LD lipoproteins is presented and is used to assess the extent of immunochemical modification. A computer best-fit analysis is used to analyse circular-dichroism (c.d.) spectra. These methods permit comparisons of the relative effects of chemical modification and delipidation of LD lipoprotein under similar experimental conditions. 3-Carboxypropionylation, acetylation or diazotization produces qualitative and quantitative changes in the immunochemical properties of LD lipoprotein. Amidination causes minor changes detected by radioimmunoassay but not by double-diffusion experiments. In general, the order of effectiveness in displacing ^{125}I-labelled LD lipoprotein is amidinated > diazo or acetyl > 3-carboxypropionyl derivatives. The order of the extent of conformational alteration induced in apoLD lipoprotein and LD lipoprotein as judged by c.d. analyses, was 3-carboxypropionyl > diazotization > acetylation or amidination. There is parallelism between the alteration of the charge of LD lipoprotein and apoLD lipoprotein and the extent of immunochemical and conformational changes.

ENDOGENOUS TRIGLYCERIDE AND GLYCOGEN IN PERFUSED RAT HEARTS. S.L. Gartner and G.V. Vahouny (Dept. of Biochem., School of Med., George Washington Univ., Washington, D.C. 20005). *Proc. Soc. Exp. Biol. Med.* 143, 556–60 (1973). The depletion of cardiac glycogen during perfusion with buffer alone (45 min.) was partially prevented, and depletion of cardiac triglyceride was completely abolished when glucose (9.2 mM) or albumin-bound palmitate (0.5 mM) were added to the perfusate. Perfusion with heparin resulted in a decrease in cardiac glycogen but did not affect triglycerides. The results suggest that cardiac triglycerides provide a secondary endogenous source of energy to the heart in vitro, only after marked depletion of glycogen; phospholipid fatty acids may be utilized following exhaustion of these other endogenous energy sources.

EXTERNAL LABELING OF CELL SURFACE GALACTOSE AND GALACTOSAMINE IN GLYCOLIPID AND GLYCOPROTEIN OF HYMAN ERYTHROCYTES. C.G. Gahmber and Sen-Itiroh Hakomori (Dept. of Pathobiol. and Microbiol., Univ. of Washington, Seattle, Wash. 98195). *J. Biol. Chem.* 248, 4311–7 (1973). Treatment of erythrocytes with galactose oxidase (EC 1.1.3.9) followed by reduction with tritiated sodium borohydride (NaB^3H_4) at pH 7.4 allowed the labeling of galactosyl and N-acetylgalactosaminyl residues on external surfaces of cells with tritium (^{3}H). Labeling patterns and specific activities of galactose and galactosamine in glycolipids and glycoprotein were determined after separation with gel electrophoresis and thin-layer chromatography. The labeling patterns of normal adult cells differed greatly from fetal cells, and were significantly altered when cell surfaces were modified by proteases and neuraminidase.

INCREASED PARTIAL PRESSURES OF OXYGEN AT NORMAL BAROMETRIC PRESSURE ON LIPOGENESIS IN RAT TISSUES. D.D. Feller and E.D. Neville (Biochem. Endocrinology Branch, Ames Res. Center, NASA, Moffett Field, Calif. 94035). *Proc. Soc. Exp. Biol. Med.* 143, 582–8 (1973). Male rats, fed *ad libitum*, were exposed to 30% and 47% oxygen environments (balance, N_2) at 1 atm for periods of time varying from 1 to 4 days. The rats exposed to increased oxygen tensions for 3 or 4 days gained more weight than controls. Fatty acid contents of liver and adipose tissue of the experimental group at 4 days of exposure were higher than the fatty acid contents found in these tissues for the control group. Conversion of acetate to fatty acids was found to be significantly higher in liver and adipose tissue of oxygen enriched animals. The conclusion is drawn that these findings are the result solely of an increase in alveolar oxygen tension.

ACETYL COENZYME A CARBOXYLASE. PROTEOLYTIC MODIFICATION OF BIOTIN CARBOXYL CARRIER PROTEIN. R.R. Fall and P.R. Vagelos (Dept. of Biol. Chem., Washington Univ. Schl. of Med., St. Louis, Mo. 63110). *J. Biol. Chem.* 248, 2078–88 (1973). The biotin carboxyl carrier protein (BCCP) component of *Escherichia coli* acetyl coenzyme A carboxylase has been previously isolated in multiple active forms, ranging in molecular weight from 45,000 to 9,100. Since the apparent native form of BCCP is the largest of these species, the isolation of the small forms was attributed to proteolysis during the purification procedures employed. We have now shown that native BCCP is very susceptible to subtilisin hydrolysis. Limited proteolysis of crude or purified preparations of native BCCP with subtilisin Carlsberg produces a mixture of BCCP species analogous to those previously noted. Efforts to isolate the peptide fragment lacking biotin from subtilisin-treated BCCP have been unsuccessful, suggesting that it is rapidly degraded by subtilisin.

STIMULATION OF $^{32}P_i$ INCORPORATION INTO PHOSPHATIDYLINOSITOL AND PHOSPHATIDYLGLYCEROL BY CATECHOLAMINES AND β-ADRENERGIC RECEPTOR BLOCKING AGENTS IN RAT PINEAL ORGAN CULTURES. J. Eichberg, H.M. Shein, M. Schwartz and G. Hauser (Res. Lab., McLean Hospital, Belmont, Mass. 02178). *J. Biol. Chem.* 248, 3615–22 (1973). The effect of norepinephrine, other catecholamines, phenylethylamines, and β-adrenergic receptor blocking drugs on the incorporation of $^{32}P_i$ into phospholipids of intact rat pineal glands was studied in organ culture. Individual pineal phospholipids were assayed for radioactivity after separation by two-dimensional thin layer chromatography. These findings indicate that the increase in phospholipid radioactivity is not related to the formation of melatonin which in the cultured pineal is stimulated by either norepinephrine or N^6, $O^{2'}$-dibutyryl adenosine 3′,5′-monophosphate. This conclusion is also supported by the fact that propranolol fails to block enhanced phospholipid labeling whereas it blocks enhanced melatonin formation. The data further indicate that the stimulation of phospholipid metabolism caused by drugs with β-adrenergic receptor blocking activity is not brought about through interaction with β-adrenergic receptors.

CHOLESTEROL ESTER METABOLISM IN RAT BRAIN. A CHOLESTEROL ESTER HYDROLASE SPECIFICALLY LOCALIZED IN THE MYELIN SHEATH. Yoshikatsu Eto and Kunihiko Suzuki (Dept. of Neurology, Univ. of Pennsylvania School of Med., Philadelphia, Pa. 19104). *J. Biol. Chem.* 248, 1986–91 (1973). The cholesterol ester hydrolase with a pH optimum of 6.6, that we previously reported in rat brain, consists of two distinct cholesterol ester hydrolases, one localized in microsomes and the other in the myelin sheath. The microsomal hydrolase has a pH optimum of 6.0 and is highly activated by both sodium taurocholate and Triton X-100. The myelin hydrolase has a pH optimum of 7.2 and is activated by taurocholate but slightly inhibited by Triton X-100. Together with the most acidic cholesterol ester hydrolase localized in the crude mitochondrial fraction, we have demonstrated three distinct cholesterol ester hydrolases in rat brain.

STUDIES OF LIPID A FRACTIONS FROM THE LIPOPOLYSACCHARIDES OF PSEUDOMONAS AERUGINOSA AND PSEUDOMONAS ALCALIGENES. D.T. Drewry, J.A. Lomax, G.W. Gray and S.G. Wilkinson (Dept. of Chem., Univ. of Hull, Kingston upon Hull HU6 7RX, U.K.). *Biochem. J.* 133, 563–72 (1973). Lipid A fractions from *Pseudomonas aeruginosa* and *Pseudomonas alcaligenes* have similar compositions and structural features. By means of hydrazinolysis of the parent lipopolysaccharides and partial hydrolysis of the deacylation products, it was established that both lipids are derived from the β-(1 → 6)-linked disaccharide of glucosamine. Phosphorylated derivatives of the disaccharide from *Ps. aeruginosa* were also characterized. The lipids differ mainly in the absence of hexadecanoic acid and 2-hydroxydodecanoic acid from the lipid from *Ps. alcaligenes*. Evidence that in *Ps. aeruginosa* these acids are ester-linked to residues of 3-hydroxyalkanoic acids (including 3-hydroxydecanoic acid) was obtained. Heterogeneity of lipid A fractions was indicated by tlc and by gel filtration of de-O-acylation products from mild alkaline methanolysis of the lipids.

ON THE RELATIONSHIP BETWEEN FATTY ACID SYNTHESIS AND THE TOTAL ACTIVITIES OF ACETYL COENZYME A CARBOXYLASE AND FATTY ACID SYNTHETASE IN THE LIVER OF PRENATAL AND EARLY POSTNATAL CHICKS. A.G. Goodridge (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto 101, Ontario, Canada). *J. Biol. Chem.* 248, 1932–8 (1973). Fructose and lactate markedly stimulated fatty acid synthesis from [1-^{14}C]acetate in isolated cells prepared from the livers of unfed neonatal chicks (21 or 22 days of incubation). In liver cells obtained from unhatched chicks (19 days of in-

cubation) fructose and lactate had very small stimulatory effects on fatty acid synthesis. The increase in fructose- and lactate-stimulated fatty acid synthesis during hatching was about 20-fold. Pulmonary respiration began on the 20th day and the chicks were hatched by the 21st day. Fatty acid synthesis from [1-^{14}C]acetate (plus citrate) or [1,5-^{14}C]-citrate in a cytosol fraction of liver increased about 20-fold during the hatching period. Concomitantly, there were 6.5- and 4-fold increases in the total activities of acetyl-CoA carboxylase and fatty acid synthetase, respectively. The results suggest that acetyl-CoA carboxylase and fatty acid synthetase are not part of an "operon" or its eukaryote equivalent, and that changes in their total activities did not initiate changes in the rate of fatty acid synthesis.

REGULATION OF FATTY ACID SYNTHESIS IN THE LIVER OF PRENATAL AND EARLY POSTNATAL CHICKS. HEPATIC CONCENTRATIONS OF INDIVIDUAL FREE FATTY ACIDS AND OTHER METABOLITES. *Ibid.*, 1939–45. A normal mash diet or a single glucose injection stimulates fatty acid synthesis and increases the total activities of acetyl coenzyme A carboxylase, fatty acid synthetase and malic enzyme in the livers of neonatal chicks. Feeding and glucose injection caused a decrease in the concentration of free fatty acids and fatty acyl-CoA and an increase in α-glycerophosphate and free CoA. These concentration changes are appropriate for intermediates which may regulate both the rate of fatty acid synthesis and the concentration of the lipogenic enzymes. The hepatic concentrations of citrate and acetyl-CoA were unaffected by feeding or glucose injection.

REGULATION OF FATTY ACID SYNTHESIS IN ISOLATED HEPATOCYTES. EVIDENCE FOR A PHYSIOLOGICAL ROLE FOR LONG CHAIN FATTY ACYL COENZYME A AND CITRATE. *Ibid.*, 4318–26. In isolated hepatocytes prepared from unfed neonatal chicks, stimulation of fatty acid synthesis by fructose or dihydroxyacetone required acetate or octanoate in the medium, suggesting that the stimulatory effect of these compounds required the enhanced production of intramitochondrial acetyl coenzyme A. Stimulation of fatty acid synthesis by lactate or pyruvate did not require a supplementary substrate. Distribution of acetyl-CoA synthetase was 80% intramitochondrial and 20% cytosolic. However, sufficient acetate could be activated in the cytosol to accommodate the most rapid rates of fatty acid synthesis observed in isolated cells. This was shown experimentally by an undiminished rate of incorporation of [1-^{14}C]acetate plus [^{12}C]acetate or [^{12}C]fructose into fatty acids when ATP-citrate lyase was inhibited by (−)-hydroxycitrate. Inhibition of fatty acid synthesis by medium free fatty acids was accompanied by an increase in the fatty acyl-CoA level. Fatty acyl-CoA may inhibit fatty acid synthesis by directly inhibiting acetyl-CoA carboxylase or by inhibiting the mitochondrial citrate carrier and, thereby, reducing the activation of acetyl-CoA carboxylase caused by citrate.

THE ROLE OF LIPID-PHASE TRANSITIONS IN THE REGULATION OF THE (SODIUM + POTASSIUM) ADENOSINE TRIPHOSPHATASE. C.M. Grisham and R.E. Barnett (Dept. of Chem., Univ. of Minnesota, Minneapolis, Minn. 55455). *Biochemistry* **12**, 2635–7 (1973). The (sodium + potassium) adenosine triphosphatase (($Na^+ + K^+$)-ATPase) purified from lamb kidney outer medulla undergoes a large change in activation energy near 20C. Above 20C the activation energy is 15.2 kcal/mol while below 20C it is 32.6 kcal/mol. The membrane lipids of the ATPase have been labeled with methyl 6-(4′,4′-dimethyloxazolidinyl-*N*-oxyl)heptadecanoate. The order parameter for the label undergoes a sharp break at the same temperature as the change in activation energy for the ATPase. When the lipids are extracted from the membrane and labeled the transition is still observed, and so the change in enzyme activity that occurs at 20C is due to a change in state of the lipids. The temperature studies suggest that the ATPase must be in a "fluid-like" environment to function. When the purified membrane fragments containing the ATPase are compared with the crude plasma membrane fraction using a series of spin-labeled fatty acid esters, it is found that the purified fragments are similar in the head-group region of the phospholipids but that the interior of the membrane is considerably more fluid, further supporting the suggestion that the membrane lipids must be fluid for the ATPase to function.

CHOLESTEROL METABOLISM IN RATS BEARING MORRIS HEPATOMA 7777. M.R. Grigor, M.L. Blank and F. Snyder (Med. Div., Oak Ridge Assoc. Univs., Oak Ridge, Tenn. 37830). *Cancer Res.* **33**, 1870–4 (1973). Plasma levels of cholesterol, both free and esterified, were significantly increased over control levels in rats bearing Morris hepatoma 7777. This difference was also reflected in the plasma lipoprotein patterns of the tumor-bearing animals; the plasma from the tumor-bearing rats contained increased amounts of lipoproteins with a density between 1.019 and 1.060 and a pronounced decrease in the amount of lipoproteins with a density of <1.006. No major differences were found in the acyl composition of the cholesterol esters within a given lipoprotein fraction of the control or tumor-bearing animals. In contrast, the acyl moieties of the cholesterol in the low-density lipoprotein fraction of the plasmas (high in dienoic and tetraenoic acids) did not resemble those esterified to cholesterol in the hepatoma. On the basis of these experiments we propose that the increased levels of cholesterol and cholesterol esters found in the plasma of the rats bearing hepatoma 7777 are due to release of cholesterol from the tumor into the blood. The presence of the tumor also appears to increase the capability of the host liver to remove cholesterol from the plasma, but not at a rate sufficient to maintain normal levels of blood cholesterol.

MECHANISM OF 25-HYDROXYCHOLECALCIFEROL 1α-HYDROXYLATION. INCORPORATION OF OXYGEN-18 INTO THE 1α POSITION OF 25-HYDROXYCHOLECALCIFEROL. J.G. Ghazarian, H.K. Schnoes and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisconsin, Madison, Wisc. 53706). *Biochemistry* **12**, 2555–8 (1973). All of the oxygen enzymatically inserted as a hydroxyl function by chick kidney mitochondria into the 1α position of 25-hydroxycholecalciferol to give 1,25-dihydroxycholecalciferol is derived from $^{18}O_2$. None could be detected as arising from water demonstrating that the 25-hydroxycholecalciferol-1α-hydroxylase system is a "mixed-function oxidase."

THE METABOLISM OF GLYCEROL BY HYPOTHALAMIC AND PITUITARY TISSUES IN VITRO IN THE RAT. C.J. Goodner, J.T. Ogilvie and D.T. Koerker (R.H. Williams Lab. for Clin. Investigation, Dept. of Med., Harborview Med. Center, Univ. of Wash. Schl. of Med., Seattle, Wash. 98104). *Proc. Soc. Exp. Biol. Med.* **143**, 616–22 (1973). The metabolism of labeled glycerol in vitro and the activity of glycerol kinase (EC 2.7.1.30) were measured in rat tissues. Although glycerol was actively oxidized and converted to lipids by hypothalamus, the rates were low compared to liver and kidney. The activity of anterior pituitary was significantly greater than hypothalamus which was in turn greater than cerebral cortex. After infusion of glycerol-^{14}C iv, label was recovered in phospholipids of brain tissues; direct assay of glycerol kinase provided similar results with the same order of activity among the tissues tested. Because glycerol kinase was present in hypothalamus, it is concluded that glycerol could potentially function as a signal for hypothalamic control systems. Anterior pituitary metabolism of glycerol was sufficiently active to classify glycerol as an energy substrate in this tissue.

THE EFFECT OF DIFFERENT FATTY ACID AND STEROL COMPOSITION ON THE ERYTHRITOL FLUX THROUGH THE CELL MEMBRANE OF ACHOLEPLASMA LAIDLAWII. B. De Kruyff, W.J. De Greef, R.V.W. Van Eyk, R.A. Demel and L.L.M. Van Deenen (Lab. of Biochem., State Univ. of Utrecht, Utrecht, Netherlands). *Biochim. Biophys. Acta* **298**, 479–99 (1973). A technique is described whereby the [^{14}C]erythritol equilibrium flux through the *Acheloplasma laidlawii* cell membrane is measured. It is indicated that the permeation of glycerol through the *A. laidlawii* cell membrane at temperatures in the transition of the membrane lipids predominantly occurs via those parts of the membrane where the fatty acid chains of the membrane lipids are still in the liquid crystalline state. At temperatures below the phase transition of the membrane lipids. *A. laidlawii* cells are damaged when mechanical forces such as ultrafiltration or osmotic swelling are applied. The 3β-hydroxy sterols with a flat steroid nucleus cholesterol, cholestanol and ergosterol all decrease the [^{14}C]erythritol flux.

Stigmasterol does not influence the [^{14}C]erythritol flux to a marked extent. For the reduction in permeability of the *A. laidlawii* cell membrane a 3β-hydroxyl group and a planar configuration of the sterol molecule are essential requirements. This is in good agreement with similar studies using liposomes and monolayers. It is demonstrated that the liquefying effect of cholesterol on the membrane lipids of *A. laidlawii* can be very important in maintaining proper membrane functioning in growing cells. A 3β-hydroxyl group on the sterol molecule is an absolute requirement for this liquefying effect.

EFFECT OF CHANGES IN FATTY ACID COMPOSITION OF PHOSPHOLIPID SPECIES ON THE β-GALACTOSIDE TRANSPORT SYSTEM OF ESCHERICHIA COLI K-12. M. Kito, S. Aibara, M. Kato, M. Ishinaga and T. Hata (Res. Inst. for Food Sci., Kyoto Univ., Kyoto, Japan). *Biochim. Biophys. Acta* 298, 69–74 (1973). On lowering the growth temperature of *Escherichia coli* K-12 from 37 to 17C, the cells resumed growth after a lag period of 40 min. During the lag period, the transition points in Arrhenius plots of the preinduced β-galactoside transport system were not changed while the saturated/unsaturated fatty acids ratio decreased gradually in phosphatidylethanolamine, rapidly in phosphatidylglycerol and little in cardiolipin.

CHARACTERIZATION OF A FATTY ACID SYNTHETASE FROM CORYNEBACTERIUM DIPHTHERIAE. H.W. Knoche and K.E. Koths (J.B. Conant Labs., Harvard Univ., Cambridge, Mass. 02138). *J. Biol. Chem.* 248, 3517–9 (1973). A fatty acid synthetase from *Corynebacterium diphtheriae* has been purified to a specific activity of 450 nmoles of malonyl coenzyme A incorporated per min per mg. The enzyme is optimally active in 0.5 M phosphate buffer. *C. diphtheriae* appears to be the most primitive organism having a multienzyme complex for fatty acid synthesis.

EFFECT OF MEDIUM CHAIN TRIGLYCERIDES AND DIETARY PROTEIN ON CHOLESTEROL ABSORPTION AND DEPOSITION IN THE CHICKEN. J.J. Kenney and H. Fisher (Nutr. Dept., Thompson Hall, College of Agr. and Environmental Sci., P.O. Box 231, Rutgers Univ., New Brunswick, N.J. 08903). *J. Nutr.* 103, 923–8 (1973). The effects of cholic acid, medium-chain triglycerides (MCT) and corn oil on the absorption and disposition of cholesterol were studied in chicks fed different sources and levels of dietary protein. In chicks fed MCT, absorption of dietary cholesterol was appreciable, but less than with corn oil. Plasma and liver cholesterol levels were higher on low protein as compared to high protein intakes, despite a similar rate of cholesterol absorption and a greater intake of dietary cholesterol on the high protein diets. Growth efficiency differences may partially explain this observation. Dietary cholic acid increased the cholesterol pool in comparison to birds not given this bile acid; however, there was little, if any, effect of cholic acid on cholesterol absorption. Chicks fed methionine-supplemented soybean meal had generally lower plasma and liver cholesterol concentrations than chicks fed casein (supplemented with arginine, glycine and methionine) as the source of dietary protein. The soybean meal-fed chicks eliminated considerably more cholesterol in their excreta than the casein-fed birds, resulting in an increase in the apparent retention of cholesterol for the latter; this retention could account for the elevated plasma and liver cholesterol levels observed.

FEMALE SEX HORMONES: EFFECT ON THE KINETICS OF CHOLESTEROL METABOLISM IN RABBITS. Kang-Jey Ho and C.B. Taylor (Dept. of Pathol., Univ. of Alabama in Birmingham Med. Center, Birmingham, Ala. 35233). *Proc. Soc. Exp. Biol. Med.* 143, 810–5 (1973). Thirty-two castrated adult female rabbits were divided equally into four groups treated with no hormone, progesterone alone, estrogen alone, and weekly alteration of estrogen and progesterone, respectively. An additional nine intact female rabbits served as normal controls; 25 μCi of cholesterol-7α-^{3}H was given to each rabbit intravenously six weeks after the commencement of hormonal treatment. The subsequent disappearance curves of serum cholesterol specific activity were analyzed and various kinetic parameters were obtained. The results indicated that castration removed the inhibitory effect on cholesterol biosynthesis and prolonged its mean transit time with consequent expansion of body exchangeable cholesterol pool size. Such effects could be reversed by administration of estrogen alone or with progesterone but not by administration of progesterone alone.

A COMPARISON OF THE MAJOR APOLIPOPROTEIN FROM PIG AND HUMAN HIGH DENSITY LIPOPROTEINS. R.L. Jackson, H.N. Baker, O.D. Taunton, L.C. Smith, C.W. Garner and A.M. Gotto, Jr. (Depts. of Med. and Biochem., Baylor College of Med. and The Methodist Hosp., Houston, Tex. 77025). *J. Biol. Chem.* 248, 2639–44 (1973). High density lipoproteins (HDL) were isolated from pig plasma by ultracentrifugal flotation between densities 1.063 and 1.210 g per ml. After delipidation, the apolipoproteins were fractionated by chromatography on Sephadex G-150 and DEAE-cellulose in 5.4 M urea. One major apolipoprotein was isolated and characterized. From its chemical and physical properties, this major apolipoprotein appears very similar to apoLP-Gln-I from human HDL. Pig HDL appears to differ from human HDL in a marked decrease in the relative content of apoLP-Gln-II in the pig lipoprotein family. These studies demonstrate that the major apolipoprotein from human and pig HDL have similar chemical, immunological, physical and physiological properties.

ABNORMAL CHOLESTEROL UPTAKE, STORAGE AND SYNTHESIS IN THE LIVERS OF 2-ACETYLAMINO-FLUORENE-FED RATS. B.J. Horton, J.D. Horton and H.C. Pitot (Dept. of Oncology and Pathol., McArdle Lab. for Cancer Res., Univ. of Wisc., Madison, Wisc. 53706). *Cancer Res.* 33, 1301–5 (1973). Rat livers were tested for both rate of cholesterol synthesis and uptake of a p.o. dose of cholesterol-^{3}H after rats were fed 0.06% 2-acetylaminofluorene (AAF) for either 1 or 2 weeks. For the 2 days prior to the assay, all rats also received 5% cholesterol in the diet. In the control group, the high-cholesterol diet caused almost complete inhibition of cholesterol synthesis, but after AAF treatment the levels of cholesterol synthesis were markedly higher, with considerable variation between individual rats. Uptake of cholesterol-^{3}H given p.o. was significantly lower in the AAF group and was also variable, but there was no correlation with sterol synthesis, indicating that impairment of cholesterol uptake is not the critical factor in loss of control. However, liver cholesterol levels in the AAF-fed rats were significantly lower than those in control animals, and there was a highly significant inverse correlation between liver cholesterol levels and sterol synthesis. Therefore, the lack of regulation of cholesterol synthesis induced by AAF appears to be a result of a defect in intracellular storage of cholesterol rather than defective uptake.

ISOLATION AND CHARACTERIZATION OF INTRACELLULAR LIPID DROPLETS FROM BOVINE MAMMARY TISSUE. L.F. Hood and S. Patton (Dept. of Food Sci., Cornell Univ., Ithaca, N.Y. 14850). *J. Dairy Sci.* 56, 858–63 (1973). Intracellular lipid droplets were isolated by differential centrifugation from mammary tissue homogenates from three cows. Several isolation techniques were evaluated. Tissue and milk fat globules from one of the cows were analyzed. Electron microscopy of the intracellular lipid droplet fraction revealed droplets 0.5 to 6 μ in diameter which were partially enveloped by a discontinuous osmiophilic layer. There was no evidence of a lipoprotein bilayer membrane. Phospholipids comprised 0.7 to 2.0% of the total lipids. Phosphatidylcholine accounted for 53.7 to 64.0% of the total phospholipid. The phosphatidylcholine:phosphatidylethanolamine ratios for intracellular lipid droplets, tissue and milk fat globules were 3:1, 2:1, and 1:1, respectively. Cholesterol accounted for 0.4% of the total lipid. The ratio of unesterified to esterified cholesterol was 3.5:1. Intracellular lipid droplets are stabilized within the cytoplasm by a phospholipid-cholesterol film with a small amount of protein adsorbed at the droplet:cytoplasm interface. Similarity between the phospholipid composition of endoplasmic reticulum and intracellular lipid droplets suggests that phospholipids of the droplets were derived from the reticulum.

INCORPORATION IN VIVO OF LABELED PLASMA CHOLESTEROL INTO AORTAS OF YOUNG AND OLD RABBITS. D.B. Zilversmit and L.B. Hughes (Grad. Schl. of Nutr. and Sect. of Biochem., Molecular and Cell Biol., Div. of Biol. Sci., Cornell Univ., Ithaca, N.Y. 14850). *Atherosclerosis* 18, 141–52 (1973). Male and female rabbits from 3 to 36 months of age were fed tracer amounts of labeled cholesterol for 2 days. Incorporation of plasma cholesterol into cardiac ventricular and skeletal muscle as well as into aorta was measured. In addition, the cholesterol specific activities of liver, lung, heart, skeletal muscle, skin, adipose tissue and aorta were compared to that of unesterified cholesterol in plasma. Liver was the only tissue that contained relatively large amounts of labeled esterified cholesterol Aorta and skeletal muscle contained small amounts of labeled cholesterol ester and studies with ^{51}Cr-labeled red blood cells showed that nearly all of this was due to contamination of these tissues with small amounts of labeled blood.

INFLUENCE OF DIETARY LIPIDS ON PLASMA AND HEPATIC LIPIDS

AND ON BLOOD CLOTTING PROPERTIES IN RATS FED ORAL CONTRACEPTIVES. M.H. Tabacchi and A. Kirksey (Dept. of Foods and Nutr., Purdue Univ., West Lafayette, Ind. 47907). *J. Nutr.* 103, 1270–8 (1973). Effects of three oral contraceptives (OC): En, Pr and Ov, on plasma and hepatic lipids and blood clotting properties were studied in intact and ovariectomized rats fed diets containing 20% (by weight) safflower or coconut oil with and without cholesterol (0.5%). Diets were fed ad libitum from weaning until 6 months of age. Oral contraceptives were mixed with the diet during the last 28 days of the experiment. Rats fed En and Ov ate less than others but only animals fed coconut oil weighed less at the end of the experiment. Food intake and body weight increased as a result of ovariectomy. Plasma fibrinogen was increased by Pr, En, cholesterol and by the interaction of Ov and ovariectomy whereas fibrinolytic activity was depressed by coconut oil, Ov and ovariectomy. Prothrombin rate was elevated by ovariectomy and the interaction of cholesterol, coconut oil and any OC. Plasma triglycerides were elevated by the interaction of any OC and coconut oil whereas plasma cholesterol was depressed by any OC and elevated by dietary cholesterol. Liver lipids were increased by the interaction of cholesterol, all OC and safflower oil and by ovariectomy. Dietary lipids significantly influenced certain actions of OC on blood clotting properties and on plasma and hepatic lipids.

EXOGENOUS CHOLESTEROL TRANSPORT IN RABBIT PLASMA LIPOPROTEINS. L.L. Rudel, J.M. Felts and M.D. Morris (Banting and Best Dept. of Med. Res., Univ. of Toronto, Toronto, Ont., Canada). *Biochem. J.* 134, 531–7 (1973). The appearance of exogenous cholesterol in free cholesterol and ester cholesterol of plasma chylomicra, very-low-density (VLD), low-density (LD) and high density (HD) lipoproteins was studied in unanaesthetized rabbits after ingestion of a meal containing 5% fat and 0.08% [^{3}H]cholesterol. The specific radioactivity of ester cholesterol of VLD lipoproteins reached the highest value of any lipoprotein fraction and for each lipoprotein it increased at a faster rate and reached a higher maximum than that of free cholesterol; the maximum in VLD lipoproteins occurred later than in chylomicra. These results support the concept that during absorption the major portion of exogenous cholesterol is transported in VLD lipoproteins as ester cholesterol. Since cholesteryl esters are thought not to exchange between lipoproteins, this observation supports the hypothesis that a result of VLD lipoprotein and chylomicron metabolism is the formation of LD and HD lipoproteins. Results in vivo showed that the free cholesterol of individual plasma lipoproteins does not equilibrate within a period of 24h.

RELATIONSHIP BETWEEN PLASMA AND MUSCLE CONCENTRATIONS OF KETONE BODIES AND FREE FATTY ACIDS IN FED, STARVED AND ALLOXAN-DIABETIC STATES. O.E. Owen, H. Markus, S. Sarshik and M. Mozzoli (Dept. of Med. and Fels Res. Inst., Temple Univ. Schl. of Med., Philadelphia, Pa. 19140). *Biochem. J.* 134, 499–506 (1973). Concentrations of ketone bodies, free fatty acids and chloride in fed, 24-120h-starved and alloxan-diabetic rats were determined in plasma and striated muscle. Plasma glucose concentrations were also measured in these groups of animals. Intracellular metabolite concentrations were calculated by using chloride as an endogenous marker of extracellular space. Only intracellular 3-hydroxybutyrate concentrations rose during starvation whereas concentrations of both 3-hydroxybutyrate and acetoacetate were elevated in the alloxan-diabetic state. The intracellular ketosis of starvation and the stability of free fatty acid intracellular concentrations suggests that neither muscle membrane permeability nor concentrations of free fatty acids *per se* are major factors in limiting ketone-body oxidation in these states.

A FEEDING STUDY OF A USED, PARTIALLY HYDROGENATED SOYBEAN OIL, FRYING FAT IN DOGS. G.A. Nolen (Procter and Gamble Co., Miami Valley Lab., P.O. Box 39175, Cincinnati, Ohio 45239). *J. Nutr.* 103, 1248–55 (1973). Partially hydrogenated soybean oil (IV 107) was used for deep fat frying under commercial conditions until it reached the end of its useful frying life. This used fat, or a fresh fat control, was fed to two male and two female dogs at levels of 15% in a semipurified diet. Their effects were compared to those of a commercial dog feed from shortly after weaning until the dogs were 54 weeks old. There was no apparent difference in the growth of female dogs fed all three diets. The male dogs fed the diet with used fat grew about the same as those fed the commercial dog feed, but both groups had reduced growth compared to dogs fed the diet with fresh fat. As in the rat studies, this reduced rate of growth for males was attributed to the lower absorbability of the used fat compared to the fresh. Otherwise, histopathological and clinical examinations showed that all of the dogs fed the three diets were in good health.

PURIFICATION AND CHARACTERIZATION OF A LECITHIN-D(−)-β-HYDROXYBUTYRATE DEHYDROGENASE COMPLEX. H.M. Menzel and G.G. Hammes (Dept. of Chem., Cornell Univ., Ithaca, N.Y. 14850). *J. Biol. Chem.* 248, 4885–9 (1973). A complex between partially purified D(−)-β-hydroxybutyrate dehydrogenase from beef heart mitochondria and soybean lecithin was purified. The active complex contains a single type of polypeptide chain of molecular weight 32,000 as determined by sodium dodecyl sulfate-acrylamide gel electrophoresis. The amino acid composition of the polypeptide chain is similar to that of many soluble enzymes, despite the very strong interaction with lecithin vesicles which was demonstrated. Cross-linking experiments with dimethyl suberimidate dihydrochloride failed to disclose any polypeptide aggregates in the enzyme-lecithin complex. The apparent Michaelis constants for all four substrates and the temperature dependence of the initial velocity were determined for the purified complex.

EFFECT OF PHENYLPYRUVATE ON ENZYMES INVOLVED IN FATTY ACID SYNTHESIS AN RAT BRAIN. J.M. Land and J.B. Clark (Dept. of Biochem., St. Bartholomew's Hosp. Med. College, Univ. of London, Charterhouse Square, London EC1M 6BQ, U.K.). *Biochem. J.* 134, 544–55 (1973). The activities of, and the effects of phenylpyruvate on, citrate synthase (EC 4.1.3.7), acetyl-CoA carboxylase (EC 6.4.1.2) and fatty acid synthetase derived from the brains of 14-day-old and adult rats were investigated. The brain citrate synthase from 14-day-old rats had a K_m for oxaloacetate of 2.38 μM and for acetyl-CoA of 16.9 μM, and a V_{max} of 838 nmol of acetyl-CoA incorporation/min per mg of mitochondrial protein. From adult rat brain this enzyme had a K_m for oxaloacetate of 2.5 μM and for acetyl-CoA of 16.6 μM and a V_{max} of 1070 nmol of acetyl-CoA incorporated/min per mg of mitochondrial protein. Phenylpyruvate inhibited the enzyme from adult and young rat brains in a competitive fashion with respect to acetyl-CoA, with a K_i of 700 μM. These results are discussed with respect to phenylketonuria, and it is suggested that the inhibition of the brain fatty acid synthetase and possibly the citrate synthetase by phenylpyruvate could explain the defective myelination characteristic of this condition.

FRACTIONATION OF THE C-APOPROTEINS FROM HUMAN PLASMA VERY LOW DENSITY LIPOPROTEINS. ARTIFACTUAL POLYMORPHISM FROM CARBAMYLATION IN UREA-CONTAINING SOLUTIONS. P.N. Herbert, R.S. Shulman, R.I. Levy and D.S. Fredrickson (Molecular Disease Branch, Natl. Heart and Lung Inst., Natl. Inst. of Health, Bethesda, Md. 20014). *J. Biol. Chem.* 248, 4941–6 (1973). The use of urea in gel and ion exchange chromatography is shown to facilitate greatly the fractionation of the C-apolipoproteins from human plasma very low density lipoproteins. However, it is demonstrated that the use of urea at room temperature can lead to the production of artifactual polymorphism through carbamylation of the C-apolipoproteins. The bead column technique of Sachs and Painter has been adapted for use with superfine Sephadex gels and urea solutions for the rapid and reproducible fractionation of the very low density apolipoproteins.

INHIBITION BY FLUORIDE ION OF HORMONAL ACTIVATION OF FAT CELL ADENYLATE CYCLASE. J.P. Harwood and M. Rodbell (Sect. on Membrane Regulation, Natl. Inst. of Arthritis, Metabolism and Digestive Diseases, Bethesda, Md. 20214). *J. Biol. Chem.* 248, 4901–4 (1973). The adenylate cyclase system in a plasma membrane-rich fraction termed "ghosts" from rat adipocytes is activated by epinephrine, adrenocorticotropic hormone, glucagon and secretin, and is also stimulated in the presence of fluoride ion. Studies of the temperature dependency of activation by these agents showed that whereas hormonal activation occurs down to 10C, activation by fluoride ion is minimal below 25C. When the enzyme system is incubated at temperatures below 25C with combinations of fluoride and each of the hormones, no hormonal activation is observed. At higher temperatures, enhanced activity observed in the presence of combinations of fluoride and hormones is probably due to fluoride alone. Thus fluoride abolishes hormonal activation of the adenylate cyclase system. The inhibitory effect is also independent of the concentration of either ATP or magnesium ion in the assay system. The concentration dependency of the inhibitory effect is similar to that required for fluoride activation of the system. These observations provide the first evidence that fluoride exerts some effect on a process related to hormone action on adenylate cyclase. It is suggested that fluoride acts at some point on the pathway by which hormonal interaction with the receptor leads to an increase in the catalytic activity of the enzyme. This process may involve the "coupling" between the receptor and catalytic components of this complex enzyme system.

RECEPTORS OF 1,25-DIHYDROXYCHOLECALCIFEROL IN RAT INTESTINE. T.C. Chen and H.F. DeLuca (Dept. of Biochem., College of Agr. and Life Sci., Univ. of Wisc.-Madison, Madison, Wisc. 53706). *J. Biol. Chem.* 248, 4890–5 (1973). Following a 62.5-pmole dose of 1,25-dihydroxy-[^{3}H]-cholecalciferol, 80% of the ^{3}H in intestinal mucosa of vitamin D-deficient rats is located in the crude nuclear debris fraction. Of the radioactivity associated with the crude nuclear debris fraction, 30 to 45% is found associated with pure chromatin while more than 50% of the radioactivity is either extranuclear or loosely bound to the nuclei. A low density protein fraction which apparently contains this radioactivity was isolated from the nuclear debris fraction. Both chromatin and this lipoprotein complex have highly specific binding activity for 1,25-dihydroxycholecalciferol.

EFFECT OF TREATMENT WITH NICOTINIC ACID FOR ONE MONTH ON SERUM LIPIDS IN PATIENTS WITH DIFFERENT TYPES OF HYPERLIPIDEMIA. L.A. Carlson and L. Oro (King Gustav V Res. Inst. and Dept. of Int. Med., Karolinska Hosp., Stockholm, Sweden). *Atherosclerosis* 18, 1–9 (1973). The effect of 3 g of nicotinic acid daily for one month on fasting serum lipid levels was studied in 130 male and 58 female patients with different types of hyperlipoproteinemia. Tht best lipid-lowering response was obtained in patients with Type V hyperlipoproteinemia, where serum cholesterol and triglycerides were lowered by about 70 and 90% respectively, followed by Type III where the corresponding figures were 50 and 60%. In the remaining groups both cholesterol and triglycerides were reduced; the magnitude of the percentage reduction was most pronounced in patients with "severe" Type IV and Type IIB hyperlipoproteinemia, followed by "moderate" Type IV, "moderate" Type IIA and "severe" Type IIA. The least response was obtained in the group of patients having "normal" serum lipid levels, where the reduction of serum lipid levels was between 10 and 20%. Nicotinic acid reduces the levels of the following lipoprotein families: chylomicrons, very low density (pre-β) and low density (β) lipoproteins and "broad" ("floating") β.

ROLE OF OLEATE IN THE REGULATION OF "NEUTRAL" RABBIT LIVER FRUCTOSE 1,6-DIPHOSPHATASE ACTIVITY. C.W. Carlson, R.C. Baxter, E.H. Ulm and B.M. Pogell (Dept. of Microbiol., St. Louis Univ. Schl. of Med., St. Louis, Mo. 63104). *J. Biol. Chem.* 248, 5555–61 (1973). Homogeneous rabbit liver fructose 1,6-diphosphatase (specific activity of 35 at pH 7.3 and 30C) was activated by various fatty acids, of which oleate was the most effective. In the absence of oleate or other activators, the enzyme had a pH optimum at 8.4 with either Mn^{2+} or Mg^{2+}. The addition of oleate imposed additional "neutral" activity onto the activity observed in its absence: activation by oleate was half-maximal at a concentration of 4 μM and had a pH optimum of 7.1 with either metal. Oleate or 3-phosphoglycerate protected the enzyme from inactivation by ATP and ADP. Half-maximal protection against inactivation by 1.5 mM ATP was found with either 9 μM oleate or 90 μM 3-phosphoglycerate. AMP inhibition of the oleate-protected or untreated enzyme was cooperative, with 50% inhibition observed at 17 μM AMP. In contrast, the ATP-inactivated enzyme showed non-cooperative AMP inhibition with a K_i of 7 μM. Physical interaction of fructose 1,6-diphosphatase and oleate was supported by demonstration of the solubilization of [^{14}C]oleic acid adsorbed on Celite. Fatty acids appear to be unique among physiologically occurring effectors of fructose 1,6-diphosphatase in that they serve as potent activators and also protect the enzyme from ATP inactivation.

CATALYSIS BY ADSORBED ENZYMES. THE HYDROLYSIS OF TRIPROPIONIN BY PANCREATIC LIPASE ADSORBED TO SILICONIZED GLASS BEADS. H.L. Brockman, J.H. Law and F.J. Kezdy (Dept. of Biochem., Univ. of Chicago, Chicago, Ill. 60637). *J. Biol. Chem.* 248, 4965–70 (1973). The reaction of porcine pancreatic lipase B (EC 3.1.1.3) with the soluble triglyceride, tripropionin, shows substantial stimulation in the presence of hydrophobic surfaces. The enhancement of the enzymatic rate can be correlated with the reversible binding of the enzyme to the hydrophobic surface with a dissociation constant $K = 1.3 \times 10^{-8}$M. The binding of the enzyme to the surface is diffusion controlled with a rate constant of $1.8 \times 10^6 M^{-1}S^{-1}$. At saturation of the surface with enzyme each protein molecule occupies an average area of 6000 A^2 per molecule. The hydrolytic reaction on the surface is first order with respect to the amount of adsorbed enzyme and the concentration of tripropionin at the solution-solid interface. The second order rate constant of the reaction is 1.3×10^{13} cm^2 mole^{-1}-S^{-1}. The surface reaction requires a basic group on the enzyme with a pK of 5.85. The enhancement of the velocity on the surface as compared to the homogeneous reaction can be ascribed to an increased local concentration of the substrate at the liquid-solid interface.

ISOLATION AND PROPERTIES OF CHOLESTEROL ESTER-STORAGE GRANULES FROM OVARIAN TISSUES. D.T. Armstrong and A.P.F. Flint (Depts. of Obst. and Gynaec. and of Physiology, Univ. of Western Ontario, London, Ont., Canada). *Biochem. J.* 134, 399–406 (1973). Cholesterol ester-storage granules were isolated from luteinized rat ovary and rabbit ovarian interstitial tissue by centrifugal flotation and were investigated with regard to their structure and function. Cholesterol ester, protein, phospholipid and unesterified cholesterol accounted for the dry weight of granules from luteinized rat ovary. Luteinizing hormone administered in vivo increased the phospholipid and unesterified cholesterol contents of isolated granules relative to their cholesterol ester content, and also tended to raise their protein content. This treatment decreased the ability of isolated granules to act as a substrate for cholesterol esterase in vitro and increased the activity of cholesterol esterase. Cycloheximide in vivo also raised the unesterified cholesterol/cholesterol ester ratio of isolated granules, and when administered with luteinizing hormone acted synergistically to bring about a further increase. These results are considered compatible with evidence obtained by microscopy which suggests that granules may be surrounded by a membrane, that they arise by pinching off from the endoplasmic reticulum and that they shrink on trophic stimulation of the tissue.

AFFINITY LABELING OF STEROID BINDING SITES. STUDY OF THE ACTIVE SITE OF 20β-HYDROXYSTEROID DEHYDROGENASE WITH 6β- AND 11α-BROMOACETOXYPROGESTERONE. F. Arias, F. Sweet and J.C. Warren (Dept. of Obst. and Gynec. and Dept. of Biol. Chem., Washington Univ. Schl. of Med., St. Louis, Mo. 63110). *J. Biol. Chem.* 248, 5641–47 (1973). 6β- and 11α-Bromoacetoxyprogesterone were synthesized to further characterize the active site of 20β-hydroxysteroid dehydrogenase from *Streptomyces hydrogenans*. Both of the affinity-labeling steroids react with cysteine, histidine, methionine and 2-

mercaptoethanol in 0.05 M phosphate buffer at pH 7.0, 25C, and are substrates for the enzyme, with apparent K_m values of 2.0×10^{-5} and 2.78×10^{-5} M, respectively. 6β- and 11α-Bromoacetoxyprogesterone inactivate 20β-hydroxysteroid dehydrogenase (EC 1.1.1.53) in an irreversible and time-dependent manner. Inactivation follows pseudo-first order kinetics with $t_{1/2}$ values of 22 min and 12 hours, respectively. 6β-[2-^{3}H] Bromoacetoxyprogesterone and 11α-[2-^{3}H]bromoacetoxyprogesterone were synthesized in order to radiolabel the enzyme active site. The amount of radioactivity incorporated during inactivation indicated that each steroid labels a single amino acid. Amino acid analysis of acid hydrolysates of the radiolabeled enzyme revealed that 6β-bromoacetoxyprogesterone reacts with a cysteine residue and 11α-bromoacetoxyprogesterone reacts with a methionine residue within the active site. The degree of mobility of a steroidal substrate at the active site is discussed on the basis of our earlier and present affinity-labeling experiments.

• Edible Proteins

ENRICHMENT OF SUNFLOWER MEAL PROTEINS BY MECHANICAL MEANS. A. Prevot, C. Bloch and C. Defromont (Inst. for Fats and Oils—ITERG, Paris, France). *Rev. Franc. Corps Gras* 20, 33–43 (1973). The high cellulose content diminishes the nutritional value of sunflower seed meals. Dehulling the seed before the oil extraction reduces the cellulose content but this involves a loss of oil. Bolting carried out after the extraction process valorises the meal by decreasing the amount of cellulose. In the paper, a technique which includes grinding of seed without hulling, the extraction of oil and bolting is recommended. In this way a flour containing more than 50% of protein and very little cellulose is obtained.

FOOD USES OF SOYA FLOUR IN RELATION WITH ITS PROTEIN VALUE. M. Engrand and R. Duterte (Societe Industrielle des Oleagineux, Arras, Pas-de-Calais). *Rev. Franc. Corps Gras* 20, 193–202 (1973). The authors recall the beginning of soybean crushing in France, and more particularly at SIO in 1931. Different problems dealing with food uses are discussed. The evaluation of nutritive and functional properties is described for different flours: determination of low content trypsin inhibitors, tegument determination in a dehulled flour. Nutritional value is also inferred from the amino-acid composition and the solubility of proteins by PDI (Protein Dispersibility Index) and NSI (Nitrogen Solubility Index).

PRODUCTION OF EDIBLE PROTEIN FIBER. T. Sakita, M. Ebisawa and H. Mimoto (Nisshin Oil Mills, Ltd.). *U.S. 3,749,581.* The process comprises preparing a spinning solution containing protein as the main ingredient with pH 5.5–11.0 from edible protein materials, and continuously extruding the solution in a coagulation bath in the form of filaments. An additive selected from the group consisting of polyacrylic acid and its alkali salts is used in any step of the process.

EXTRACTION OF NONPROTEIN NITROGEN FROM OILSEED MEALS WITH DIFFERENT SOLVENTS. R.S. Bhatty (Crop Dev. Centre, Dept. of Crop Sci., Univ. of Saskatchewan, Saskatoon, Canada) and A.J. Finlayson. *Cereal Chem.* 50, 329–36 (1973). Nonprotein nitrogen was directly extracted from oil-free meals of rape, sunflower and soy with seven solvents. Trichloroacetic acid, sulfosalicylic acid, acetic acid, ethanol, chloroform-methanol, acetone and perchloric acid were used. Some of the solvents also extracted large amounts of protein nitrogen, with various solvents extracting different quantities of certain amino acids. It was concluded that nonprotein nitrogen content of the meals varies with the method and solvent of extraction.

MODIFIED RAPID SCREENING METHOD FOR AFLATOXIN IN CORN. G.M. Shannon, R.D. Stubblefield and O.L. Shotwell (NRRL, ARS, USDA, Peoria, Ill. 61604). *J. Assn. Off. Anal. Chem.* 56, 1024–5 (1973). A rapid screening method for detecting aflatoxin in cottonseed products was investigated to determine if it was applicable to corn. Other aflatoxin-extracting solvents and protein-precipitating agents were tried with white and yellow corn. When acetone-water and a saturated solution of ammonium sulfate were substituted for acetonitrile-water and lead acetate in the cottonseed method, fewer interferences and more compact fluorescent zones were observed on the developed minicolumns. The modified method for corn was applicable to samples containing 10 parts per billion or more aflatoxin.

COLLABORATIVE STUDY OF THREE SCREENING METHODS FOR ALFATOXIN IN CORN. O.L. Shotwell and R.D. Stubblefield (NRRL, ARS, USDA, Peoria, Ill. 61604). *J. Assn. Off. Anal. Chem.* 56, 808–12 (1973). The three rapid screening methods studied all involved chromatography of partially purified extracts on minicolumns. In one method acetonitrile-water is used to extract aflatoxin and lead acetate precipitation removes impurities. The second method specifies acetone-water as extracting solvent and ammonium sulfate as precipitant. The third method is based on acetone-water as the extracting solvent and ferric gel as the precipitant. This third method was the most sensitive (5 parts per billion) but the second method was faster and had a sensitivity of 10 parts per billion. These 2 methods have been adopted as official first action.

RAPID DETECTION OF AFLATOXIN CONTAMINATION IN AGRICULTURAL PRODUCTS. W.A. Pons, Jr., A.F. Cucullu, A.O. Franz, Jr., Louise S. Lee and L.A. Goldblatt (Southern Reg. Res. Lab., ARS, USDA, New Orleans, La. 70179). *J. Assn. Off. Anal. Chem.* 56, 803–7 (1973). A method for detecting aflatoxin contamination in cottonseed products was modified for application to a variety of agricultural products. The new method involves blender extraction of the sample with aqueous acetonitrile, treatment of an aliquot of the filtrate with lead acetate solution and partition of aflatoxins into benzene. A portion of the benzene extract is adsorbed onto the bottom of a small column filled with zones of acidic alumina and silica gel. The column is developed in chloroform-acetonitrile-2-propanol (93 + 5 + 2). Aflatoxin contamination is characterized by a sharp blue fluorescent band when the developed column is viewed under longwave UV light. The method was successfully applied to the following oilseeds: cottonseed, soybean, peanut, flax seed and sunflower seed as well as a number of grains and nuts.

FAST SCREENING METHOD FOR DETECTION OF AFLATOXIN CONTAMINATION IN COTTONSEED PRODUCTS. A.F. Cucullu, W.A. Pons, Jr. and L.A. Goldblatt (Southern Reg. Res. Lab., ARS, USDA, New Orleans, La. 70179). *J. Assn. Off. Anal. Chem.* 55, 1114–9 (1972). The detection method incorporates a 3 minute blender extraction of the sample with aqueous acetonitrile, followed by partition of aflatoxins from an aliquot of the extract into benzene to effect a 4-fold concentration of the aflatoxins. A small glass column filled with zones of acidic alumina and silica gel is placed in a portion of the benzene extract and the column is developed 5 minutes in chloroform-acetonitrile-2-propanol. Aflatoxins are detected by the presence of a sharp blue fluorescent band about 1 centimeter above the alumina zone when the developed column is examined under longwave ultraviolet light. Total analysis time is 15 minutes.

PROCESS FOR TEXTURIZING MICROBIAL CELLS. C. Akin (Standard Oil Co.). *U.S. 3,751,260.* Protein-containing single cell microorganisms are prepared into texturized products by a process in which an aqueous slurry of cells is first mixed with a surface active agent to promote partial leakage of the inner cell components through the cell walls. Next the leaked cell components are separated from the protein-containing cell debris. This debris is treated with a gelatinizing agent and then with a precipitating agent to induce texture formation. The products thus prepared are suitable for use as additives to or substitutes for natural foods and for use in biodegradable containers, packaging materials or utensils.

PRODUCTION OF SOY-CONTAINING BREAKFAST CEREALS. W.T. Bedenk and D.E. O'Connor (Procter & Gamble). *U.S. 3,753,728.* Soy protein is made more palatable by subjecting it to partial hydrolysis in the presence of a specific mixture of proteolytic enzymes, including papain and at least one other enzyme. This mixture of enzymes is more efficient in the hydrolysis than a single enzyme at the same addition level.

METHOD FOR TEXTURIZING PROTEIN MATERIAL. P.K. Strommer and C.I. Beck (General Mills, Inc.). *U.S. 3,754,926.* The method involves treating the protein material in the presence of steam at an elevated gaseous pressure and an elevated temperature.

DETOXIFICATION AND ISOLATION OF RAPESEED PROTEIN. D.F. Owen. *U.S. 3,758,452.* A bland, non-toxic rapeseed protein is produced by contacting rapeseed presscake with an aqueous saline extraction medium. The protein is isoelectrically precipitated, washed and then spray dried. The extracted presscake has a low level of toxic materials and is suitable for use as a feed supplement for animals.

HIGH PROTEIN FOOD PRODUCT. M.P. Burkwall (Quaker Oats Co.). *U.S. 3,759,714.* The product comprises specified amounts

of a flavoring agent, pregelatinized starch, a high protein binding agent, water and either sugar, sugar equivalents or mixtures thereof.

PROCESS OF MAKING A TEXTURED, EXPANDED FOOD PRODUCT. S.F. Loepiktie and R.J. Flier (Ralston Purina Co.). *U.S. 3,759,715.* A product having the resiliency, chewiness, and mouthfeel characteristics of real meat and further characterized by excellent rehydration properties is produced from a vegetable protein source by forming a dough, confining a major surfacial portion of the dough, and subjecting it to high temperature and pressure (80–120 p.s.i.) followed by release of the pressure. The dough is controllably expanded along the axis of the unconfined surfacial portions to produce the food product.

COCONUT PROCESSING FOR THE PRODUCTION OF COCONUT OIL AND COCONUT PROTEIN FOOD AND FEED PRODUCTS. D.A.V. Dendy and B.E. Grimwood (Tropical Products Inst. Culham, Abingdon, England). *Oléagineux* **28**, 93–8 (1973). The fresh or "wet" processes which use fresh "undried" coconut meats for immediate processing into oil and protein flour offer the potential for obtaining coconut protein good for human consumption as well as coconut oil of superior quality. To date, no one of wet coconut processes is in commercial use. The principal reason for this appears to be that yield of oil from the wet processes is, at best, 10–15% lower than by other processes used today. In terms of yield of oil per unit weight of fresh nuts, the wet processing techniques compare favourably with copra processing. A brief outline is given of the various processes for wet treatment: the Chayen, Robledane, ICAITI, Krauss-Maffei, Roxas and Sugarman processes, integrated processes, methods used by the Texas A&M University and the Tropical Products Institute in London. The problem of obtaining cheap protein-based food products is then examined: coconut milk and cream, frozen milk, etc. A few indications are given regarding the nutritive and chemical aspects of coconut protein.

• Drying Oils and Paints

SOME ASPECTS OF DRYING OIL TECHNOLOGY. G.H. Hutchinson (A. B. Fleming & Co. Ltd., Caroline Works, 170 Glasgow Road, Edinburgh EH12 9BE). *J. Oil & Color Chem. Assn.* **56**, 44–53 (1973). A brief review of current theories on the autoxidation of drying oils is followed by a discussion on the chemistry of volatile products of autoxidation of polyunsaturated oils and the use of GLC for these studies. Trends in the modification of unsaturated vegetable oils for surface coating purposes are reviewed and simple molecular models constructed from pipe-cleaners are used to illustrate film-forming properties of various drying oil based media. In efforts to find new outlets for drying and semi-drying oils in the surface coatings industry, some emphasis has been laid on the use of polyunsaturated oils as raw materials for oleochemical intermediates and for the synthesis of novel film-forming polymers.

A REPRODUCIBILE PYROLYSIS GAS-CHROMATOGRAPHIC SYSTEM FOR THE ANALYSIS OF PAINTS AND PLASTICS. R.W. May, E.F. Pearson, J. Porter and M.D. Scothern (Home Office Central Res. Establishment, Adlermaston, nr. Reading, Berkshire, England). *Analyst* **98**, 364–71 (1973). A system is described that will permit inter-laboratory comparisons of pyrograms, a method rarely used in the past owing to difficulty in obtaining satisfactory reproducibility. After investigation of various pyrolysers and column packings, a Curie point pyrolyser and a solid-phase packing, Porapak Q, were chosen as being the most suitable.

ROLE OF WATER IN WATER-REDUCIBLE PAINT FORMULATIONS. I.H. McEwan (Canadian Ind. Ltd.). *J. Paint Technol.* **45**(583), 33–44 (1973). The unique role of water as a solvent compared to organic solvents is reviewed. The consequences of using water as solvent are deduced. The effect of water as a "carrier" for soluble or dispersed vehicles is demonstrated for air-dry coatings. A soluble fatty acid modified resin is described and the effects of solubilizing base, co-solvent and pigment on stability are shown. Application properties are compared with conventional paints. Formulating parameters for glossy latex coatings are discussed. Also evaporation rate data are presented for aqueous solvent blends of various compositions.

ON THE DETERMINATION OF THE WEATHERING OF ALKYD RESIN PAINT COATS PIGMENTED WITH TiO_2 BY MEANS OF ^{32}P-PHOSPHATE ADSORPTION. G. Mende (Central Inst. for Nuclear Res., Rossendorf, Dresden). *Farbe u. Lack* **79**(8), 756–61 (1973). Using the ^{32}P-phosphate adsorption on alkyd resin paints pigmented with TiO_2 as an example, it is shown for the first time how the pigment concentration on the surface of weathered paints may be determined using the radionuclide adsorption from aqueous solutions. The data are used as a criterion for comparing the weatherability of various paints.

A THOUSAND YEARS OF PAINT: WHAT DO WE KNOW ABOUT THE DRYING PROCESS? J. Petit. *Pitture e Vernici*, **48**, No. 1, 3–8 (1973). A plenary lecture to the FATIPEC 1972 Congress not published in the Congress book. The mechanisms of drying of autoxidative drying media are discussed. A new suggested mechanism involves the stages of: formation of peroxides; scission of the peroxides to aldehydes; peroxidation of the aldehydes to peracids; reaction of the peracids with double bonds to give α-glycol monoesters. (World Surface Coatings Abs. No. 373)

OIL MODIFIED ALKYD COMPOSITIONS. R.L. Formaini and Y.D. Kim (Allied Chem. Corp.). *U.S. 3,759,853.* The compositions are produced by reacting a polycarboxylic acid, a polyhydric alcohol, a tris-2-hydroxyalkyl isocyanurate wherein the 2-hydroxyalkyl group contains 2–4 carbon atoms, with an oily modifier selected from the group consisting of vegetable oils, marine oils and fatty acids derived from these oils. The resulting reaction product is then blended with an amino resin.

• Detergents

THE COHESIVE FORCE OF A COPOLYMER AT OIL/WATER INTERFACE. B.C. Chatterjee and K. Ghosh (Dept. of Physical Chem., Univ. College of Sci. & Technol., Calcutta-9, India). *J. Indian Chem. Soc.* **49**, 751–5 (1972). It was generally believed that cohesive force or cohesive surface pressure between the CH_2 groups of the neighbouring hydrocarbon chains does not exist at oil/water interface. In some recent publications, it has been shown such force exists at oil/water interface in the case of long-chain electrolytes. In the present study, experimental evidence in favour of the latter view has not only been cited but also been extended to polymer systems, which have not yet been studied.

THE ANALYTICAL DETERMINATION OF SMALL AMOUNTS OF NONIONIC TENSIDE. R. Wickbold (Marl). *Tenside Detergents* **10**(4), 179–82 (1973). A review. Discussed are the following methods: cobalt thiocyanate; phosphomolybdic acid; potassium mercury iodide; barium bismuth iodide; thin-layer chromatography; surface tension and polarographic.

RESEARCH ON THE ELECTROSORPTION ANALYSIS OF NONIONIC TENSIDES. P. Dietrich, G. Hager, H. Jehring and E. Horn (Central Inst. for Organic Chem., Dept. of Surface Active Materials, Berlin-Adlershof and Central Inst. for Physical Chem., Dept. of Physical Methods for Analytical Chem., Berlin-Adlershof). *Tenside Detergents* **10**(4), 173–8 (1973). The electrosorption behavior of pure n-dodecanol polyglycol ether (4–10 ethylene oxide units) as well as some industrial products on the market was examined by means of alternating current polarography according to Breyer. Influencing factors included the electrode potential, concentration, drop time, conducting electrolyte concentration and foreign substances such as polyethylene glycol and fatty alcohol. Comparison was made between the breaks in the curve showing concentration dependence of the capacity maxima with the critical micelle concentrations determined by the Du Nouy method.

AMIDE DETERMINATION IN TENSIDE CHEMISTRY. G. Krusche (Ludwigshafen/Rh). *Tenside Detergents* **10**(4), 182–5 (1973). With the known fact that carbonamide groups can be titrated as bases in acetic anhydride using perchloric acid, it was demonstrated by two examples, namely fatty acid/amino acid condensation products and amide ethoxylates, that the main and secondary constituents of even complex surfactant mixtures can be quantitatively determined by a combination of this amide titration with other simple methods. Condensation products of fatty acids and amino acids contain residual amino acids, non-amidised fatty acids and NaCl, besides the required amide. The free acids are formed with the help of cation exchangers, the amino acids being separated at the same time. The individual components are potentiometrically titrated in the separate exchanger fractions, and their strength calculated. Fatty acid amide ethoxylates contain polyglycol, amino ethoxylates and fatty acid aminoethoxylate esters in addition to the principal product. The amide content is determined by the potentiometric titration. After group separation into basic and nonionic constituents, the bases are determined by titra-

tion and polyglycol by extraction using ion exchangers.

DETERMINATION OF NONIONIC TENSIDES BY THE WICKBOLD METHOD IN BIOLOGICAL DEGREDATION RESEARCH AND IN RIVER WATER. P. Gerike and R. Schmid (Biochem. Labs. Henkel & Cie GmbH, Düsseldorf). *Tenside Detergents* 10(4), 186–9 (1973). Application of the Wickbold method for the determination of nonionic surfactants in tests of biological decomposition described as in the closed-bottle test and the OECD Confirmatory Test. Results of some analyses of surfactants in the water of the Rhine are discussed.

THE SYNERGISTIC EFFECTS OF NONIONIC SURFACTANTS UPON CATIONIC GERMICIDAL AGENTS. I.R. Schmolka (BASF Wyandotte Corp., Wyandotte, Mich. 48192). *J. Soc. Cosmet. Chem.* 24(9), 577–92 (1973). The mechanism by which cationic surfactants are believed to kill microorganisms is reviewed. A number of published reports on the antagonistic effect of nonionic surfactants on germicidal compounds are examined, and the mechanism for this inactivation explained. Some examples of synergistic effects are reviewed. Despite the method by which these activities are measured, the importance of explaining results in terms of micelles and critical micelle concentration (cmc) is explained. Suggestions are made as to how the cmc can be increased and thereby lessen the possibility of reducing the activity or even obtaining synergistic germicidal activity of a cationic surfactant in the presence of nonionic surfactants.

THE INTERPRETATION OF DROPLET COALESCENCE DATA USING THE LOG NORMAL DISTRIBUTION. S.S. Davis and A. Smith (Pharmaceutics Res. Group, U. of Aston in Birmingham, Gosta Green, Birmingham 4, England). *Koll.-Z. u. Z. Polymere* 251, 337–42 (1973). The rest times of hydrocarbon oil droplets have been measured at the oil/sodium dodecyl sulfate solution interface. Existing equations, both physically derived and empirical, have been applied to the data obtained. In most cases the expressions used were not suitable for general application to these data. From a consideration of the distribution of droplet rest times about the mean, it is concluded that the log normal distribution would be most suitable. Graphical test of this distribution was a good fit in each case. The method is useful in analysis of stability data; results for each system can be characterized by the two parameters M and O_g.

THE DETERMINATION OF CLEANLINESS IN DOMESTIC DISHWASHING MACHINES. J.F. Dankworth (Joh. A. Benckiser GmbH, Ludwigshafen). *Seifen-Öle-Fette-Wachse* 99(16/17), 455–60 (1973). Present technical state in the development of domestic dishwashing machines and their accompanying detergents guarantees an almost perfect washing performance. Experience and standardized testing methods based on natural soiling agents have heretofore provided only general guidelines for the evaluation of both machines and detergents. In order to avoid the subjective evaluation of test results, this article discusses an objective analytical testing procedure similar to that currently in use in textile washing operations, e.g., standard soiled fabrics. The subtle differences between various individual machines on the one hand, and several detergents on the other, are illustrated.

THE EFFECT OF SOAP UPON CERTAIN ASPECTS OF SKIN BIOCHEMISTRY. C. Prottey, P.J. Hartop and T.F.M. Ferguson (Unilever Res. Lab., Colworth House, Sharnbrook, Bedford). *J. Soc. Cosmet. Chem.* 24(8), 473–92 (1973). Rats have been topically treated with soap solutions and distinct morphological changes in the skin have been observed histologically. Samples of the treated tissues have been cultured in vitro in the presence of specific precursors of DNA and lipids, when it was seen that DNA and phospholipid metabolism was stimulated in mildly irritated cases, but in more severely irritated tissues, which had received greatly exaggerated soap treatments compared with routine tests for irritancy or normal user conditions, both of these biochemical reactions were greatly diminished. Triglyceride synthesis, on the other hand, appeared to increase as the degree of irritation response increased. The most irritant component of the soap was sodium laurate, and this compound similarly caused the most marked biochemical alterations. The enhanced triglyceride synthesis in skin, which was severely damaged from exaggerated soap treatment, more than replaced the inhibited phospholipid synthesis; indeed, severely irritated skin was seen to synthesize greatly increased amounts of radioactive lipids compared with the water-treated controls.

ANTIMICROBIALS: EXPERIMENTAL CONTACT SENSITIZATION IN MAN. F.N. Marzulli and H.I. Maibach (Div. of Toxicol., FDA, Washington, D.C. 20204 and U. of California, San Francisco Med. Center, San Francisco, Cal. 91422). *J. Soc. Cosmet. Chem.* 24(8), 399–421 (1973). Predictive contact skin sensitization data developed for 23 antimicrobial agents using the Draize procedure on normal human test subjects. In some cases results are exploratory and involve about 50 subjects; in most cases 100 or more subjects were used and more meaningful sensitization indices were obtained. Data were developed on antimicrobials currently in use or contemplated for use as cosmetic or drug preservatives or for their germicidal properties when used on the skin. The data show that organic and inorganic mercurials, formalin, bronopol, mafenide, captan and chloroacetamide have relatively stronger skin sensitization potential (>5% sensitization index (SI)). Propylene glycol, triclocarban, chlorinated phenolics such as hexachlorophene, chloroxylenol and dichlorphene, and parabens and tribromosalicylanilide and possibly sorbic acid appear to be relatively lower grade sensitizers (0–0.5% SI). Furacin, neomycin and dibromsalicylanilide appear to have an intermediate standing, SI around 1. Triclosan (DP-300) failed to sensitize and photosensitize; however, a larger test population is needed to confirm this finding. Tribromsalicylanilide has some capacity for photosensitization and cross-sensitization to chemically related materials; the significance of these findings is not entirely clear.

BIOLOGICAL CLEANING PREPARATION. Y. Demangeon (Colgate-Palmolive). *U.S. 3,753,915.* The preparation contains a proteolytic enzyme and a salt of an organic hydroperoxide.

PREPARATION OF SPRAY DRIED BLENDED DETERGENTS. H.H. Weldes, W.L. Schlayer and E.W. Vessey (Philadelphia Quartz Co.). *U.S. 3,753,930.* The compositions are prepared by addition of a portion of the total formulation to the remainder of the ingredients after these have been spray dried. Specifically, blending composites of hydrated alkali metal silicate glass and sequestering agents with the spray dried granules of the other detergent ingredients yields formulations with improved properties. This process allows more uniform distribution of minor components, higher alkali metal silicate levels, and decreases or even eliminates the formation of insolubles. Also increased production rates can be achieved.

INHIBITION OF OVERGLAZE DAMAGE BY AUTOMATIC DISHWASHING DETERGENTS. A.E. Austin (Colgate-Palmolive). *U.S. 3,755,180.* The detergent contains, as an essential ingredient, a precipitated silico-aluminum compound.

DETERGENT COMPOSITION CONTAINING 1–2 GLYCOL BORATE ESTER. J.A. Henricks. *U.S. 3,755,181.* Borax forms 1–2 glycol borate esters which are excellent chelating agents in alkaline detergent formulas. These borate esters can be used to replace phosphates in detergent formulations.

CLEANING TEFLON COATED COOKWARE. W.G. Mizuno (Economics Laboratory, Inc.). *U.S. 3,755,184.* The cleansing agent contains a lower chlorocarbon (e.g., trichloroethylene), preferably in admixture with a thickening agent (e.g., aluminum stearate) and a cooking oil.

LAUNDRY PRODUCT CONTAINING MIXED DYE BLUING AGENTS. R.H. Trimmer, W.F. Gross, Jr. and W.J. Gangwisch (Colgate-Palmolive). *U.S. 3,755,201.* The dyes employed are used in very small quantities, have little effect on the color of the laundry product, if it is in solid particulate form, are stable in alkaline media, such as crutcher mixes, and are readily bleachable by hypochlorite bleaches, so that objectionable overbluing effects are not obtained on repeated washings. Preferred dyes employed are those of Index Numbers 24410 (Geigy, C.I. Direct Blue 1) and 29120 (Geigy, C.I. Direct Violet 66).

DETERGENT SLURRY COMPOSITIONS. F.E. Bentley and H.G. Waddill (Jefferson Chem. Co.). *U.S. 3,755,203.* The slurry composition, also known as a crutcher slurry, comprising alpha-olefin sulfonates is provided by incorporating significant amounts of sulfonated vinylidene olefins. The resulting composition is characterized by reduced viscosity.

DETERGENT COMPOSITIONS. D. Verdier (Colgate-Palmolive). *U.S. 3,755,206.* There is described a liquid detergent system having a controllable viscosity and clarity, including a water soluble paraffin sulfonate and a water soluble higher alkane ether sulfonate. Control of the viscosity and clarity is accomplished by using a system comprising a lower aliphatic alcohol and urea.

PREPARATION OF SULFONATED DETERGENT COMPOSITION. H.C. Smitherman (Procter & Gamble). *U.S. 3,755,429.* The process comprises, as the first step, reacting each mole of alpha olefin starting material with 1.0–1.25 moles of sulfur trioxide in a film reactor under the following process conditions: 12–50 seconds, 32–180F, and a pressure of 8–20 p.s.i.g. at the top of the reactor. This reaction mix is immediately reacted with a lower alcohol and is then neutralized and hydrolyzed to produce the detergent composition.

N-(2-HYDROXY-HIGHER HYDROCARBYL)-N-LOWER HYDROCARBYL-AMINOCARBOXYLATES. B. Sundby, E.J. Kenney and H.E. Wixon (Colgate-Palmolive). *U.S. 3,755,435.* These compounds are surface active, and many exhibit excellent substantivities to fibrous materials, especially cotton. They are useful as detergents and function effectively as softening agents. The carboxylates may be converted to the corresponding N-oxides which are also effective detergents and exhibit the same properties as the parent compounds.

HIGH LATHERING CONDITIONING SHAMPOO COMPOSITION. G.T. Hewitt (Colgate-Palmolive). *U.S. 3,755,559.* This disclosure relates to a stable, creamy-foam shampoo comprising a tertiary amine oxide, a higher alkyl betaine or sulphobetaine and a soap in the ratio of 2:1:1, respectively.

BLEACHING PROCESS AND COMPOSITION. K.T. Nordfalt (Procter & Gamble). *U.S. 3,756,775.* The bleaching agent is an aqueous solution containing benzoyl glutaryl peroxide and an inorganic perhydrate. Bleaching compositions containing such peroxides and perhydrates with detergent salts and/or surface-active agents are also described.

BLEACHING PROCESS AND COMPOSITION. P.R.H. Speakman and D.G. Stewart (Procter & Gamble). *U.S. 3,756,776.* The bleaching agent is an aqueous solution containing benzoyl glutaryl peroxide.

FABRIC SOFTENING COMPOSITIONS. B.A. Gluck (Lever Bros.). *U.S. 3,756,950.* The composition incorporates a cationic fabric softening agent and a water soluble acid salt of an amphoteric amino carboxylic acid chelating agent. The chelating agent decreases fabric yellowing caused by the presence in the water used of dissolved or suspended metal compounds.

SULFOSUCCINATE DERIVATIVES OF CARBOHYDRATES AS BUILDERS FOR DETERGENT COMPOSITIONS. V. Lamberti (Lever Bros.). *U.S. 3,756,966.* Sulfosuccinate derivatives of carbohydrates such as starches, sucrose, cellulose, glycogen, hemicellulose and gums, are useful as biodegradable builders for detergents. These compounds can be effectively substituted for conventional builders.

NON-YELLOWING DETERGENT FORMULATION. P. Ramachandran and J.A. Yurko (Colgate-Palmolive). *U.S. 3,758,408.* A method for reducing or eliminating the yellow discoloration associated with the repeated laundering of cotton fabrics with detergents containing a substantial amount of sodium carbonate builder is disclosed. The method comprises the inclusion of titanium dioxide into the carbonate-containing detergent system in a ratio of about 1:4 with the builder.

CLEANING AND BLEACHING LIQUID COMPOSITION. Y. Nakagawa, I. Iwasa and I. Kinoshita (Kao Soap Ltd.). *U.S. 3,758,409.* A transparent liquid detergent composition consists of a surface active agent, an alkali metal hypochlorite and an alkali agent dissolved in water. The hypochlorite contains less than 0.1 mol of alkali metal chloride per mol of the hypochlorite. The available chlorine content of the composition is 0.5–13%.

CLEANSING AND LAUNDERING COMPOSITIONS. J.W. Hayden, R.T. Holm and R.C. Morris (Shell Oil Co.). *U.S. 3,758,419.* Biodegradable detergent formulations contain as builders water soluble polycarboxylate telomers terminated with certain oxygenated groups.

DETERGENT COMPOSITION. D.S. Connor and H.K. Krummel (Procter & Gamble). *U.S. 3,758,420.* There is provided a detergent composition comprising a water soluble organic synthetic detergent and, as a detergency aid, a sequestering agent which is a water soluble salt of a homogeneously polyfunctionally-substituted aromatic acid.

DETERGENT. V. Lamberti and H. Lamaire (Lever Bros.). *U.S. 3,758,595.* The detergent is a sulfur analog of a polyolether or polyolpolyether.

DETERGENT COMPOSITIONS. D. Bannerman, J. Easton, G.K. Rennie and C.C. Storer (Lever Bros.). *U.S. 3,759,833.* The composition incorporates 1–60% of a water soluble or dispersible salt of a heterocyclic dicarboxylic acid. The salt acts as a detergency builder and may also act as an inhibitor for the decomposition, caused by heavy metal catalysis, of any peroxy compounds such as perborates, in the detergent composition.

DETERGENT COMPOSITION. J.P. Parke and R.J. Wilde (Lever Bros.). *U.S. 3,759,834.* A translucent, non-brittle detergent flake having improved properties contains 70–95% of an alkali metal C-8 to C-22 (preferable C-14 to C-16) alpha olefin sulfonate and 5–11% of water. The flake can optionally contain minor amounts of other non-soap detergent active agents, soaps and detergency builders, particularly trisodium nitrilotriacetate.

DETERGENT COMPOSITION. D.J.M. Robb and J.R. Samuel (Lever Bros.). *U.S. 3,759,846.* Improved fabric softening properties are imparted to the composition by a water insoluble soap in a finely divided form. During manufacture of the composition, the water insoluble soap is formed in situ in a slurry in the presence of a dispersing agent prior to spray drying.

CLEANING COMPOSITIONS. J. Martineau and F.J. Biechler. *U.S. 3,759,847.* The compositions contain, as an active ingredient, at least one fatty acid amide in a free or complexed form.

OPTICAL BRIGHTENING AGENTS. W. Horstmann (Bayer Ag.). *U.S. 3,759,900.* The brighteners are formed from salts of sulfonic acids with guanidines. Compared with the free sulfonic acid or the alkali metal salts of the stilbene-sulfonic acids, the salts with guanidines have advantages with respect to their sensitivity to hardness, in the brightening of mixed fabrics and in simultaneous high quality finishing and optical brightening.

PREPARATION OF PHOSPHINE OXIDES BY CATALYTIC OXIDATION OF TERTIARY PHOSPHINES. J.D. Curry (Procter & Gamble). *U.S. 3,760,000.* The process for preparing trialkyl and triaryl phosphine oxides employs zero valent palladium complexes of ditertiary phosphines as catalysts. The resulting phosphine oxides are useful as surfactants and in skin preparations.

POLYELECTROLYTE BUILDER AND DETERGENT COMPOSITIONS. C.J. Lancelot and D.G. MacKellar (FMC Corp.). *U.S. 3,761,412.* The polyelectrolytes are poly-β-ketoacids.

PHOSPHATE-FREE SYNTHETIC DETERGENT BASED CLEANSING COMPOSITION. L.P. Gould (Aspen Ind. Inc.). *U.S. 3,761,415.* The composition comprises the addition of a water soluble synthetic detergent and a water soluble alkalizing agent to relatively hard water containing significant quantities of calcium and magnesium ions. A water soluble source of citrate ions is added to the water in such a form that the ions are released prior to the release of anion from the alkalizing agent in quantities sufficient to inhibit the formation of water insoluble salts from the anions of the alkalizing agent.

(Continued on page 555A)

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• Abstracts. . .

(Continued from page 550A)

ANTIMICROBIC WASHING AGENTS, WASHING ADJUVANTS, AND CLEANING AGENTS. H.G. Nosler, R. Wessendorf and H. Bellinger (Henkel & Cie). *U.S. 3,761,419.* The compositions comprise (a) 0.2–30% of a nitroalkyl-N-phenylcarbamate, (b) at least 5% of an alkaline builder having calcium carbonate binding capacity in the Hampshire test of not more than 230 mg/g of builder, and (c) other common components of washing compositions.

STABILIZED LIQUID ENZYME STAIN REMOVER. R.E. Bogardus (A.E. Staley Mfg. Co.). *U.S. 3,761,420.* The composition is dispersed in an aqueous solution and is suitable for removing stains from fabrics, including cottons and permanent press synthetic-cotton blends.

CLEANING AGENT FOR REMOVAL OF STICKY MATERIAL. T. Yamano and Y. Ito. *U.S. 3,761,429.* The cleaning agent is made by adding to water and an an organic solvent such as propylene glycol, hexylene glycol and ethyl acetate a nonionic surfactant represented by an ester of propylene glycol and a fatty acid, polyoxyethylene nonyl phenyl ether, and a cationic surfactant such as lauryl trimethyl ammonium chloride.

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