ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: J. G. Endres, Kazuo Fukuzumi, J. Iavicoli, K. Kitsuta, F. A. Kummerow, Gladys Macy, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

A RAPID ANALYTICAL SYSTEM FOR DETERMINING SERUM LIPIDS. W. A. Krehl, A. Lopez-S, and Eleanor Good (Clinical Res. Center, Univ. of Iowa, College of Med., Iowa City, Iowa). *Am. J. Clin. Nutr.* 20, 968–77 (1967). A useful scheme has been developed for the semiautomatic determination of serum lipids, adapting previously described methods into this scheme. This scheme uses only a single isopropanolic extract requiring only 1-2 ml of serum. By this method, accurate and fast measurements are performed of total cholesterol, free cholesterol, cholesteryl esters, triglycerides, free fatty acids and esterified fatty acids. Using this scheme, a single, well-organized and trained person can determine the above mentioned lipid studies in 20–30 samples in 1 day; two persons could process about 100 samples daily. Due to the reproducibility and agreement with the classical methods together with the small amount of serum required and the speed of operation, this scheme of semiautomatic determinations of plasma lipids appears to be capable of fulfilling the needs of any laboratory involved in large numbers of lipid determinations.

POISONOUS PRODUCTS FROM EDIBLE OILS AND FATS. II. POISONOUS PRODUCTS AND THEIR TOXICITY FROM INSTANT CHINESE NOODLE. Toshiyuki Miura, Kagenori Matano and Kōmei Miyaki (Natl. Inst. Health, Tokyo). *Yukagaku* 16, 503–505 (1967). In general oil extracted from instant Chinese noodles that had been exposed to sunlight showed a tendency to increase in peroxide value and in acid value but to decrease in iodine value. Peroral injection of oil from noodle exposed to sunlight for 300 hours or longer on mice was accompanied with diarrhea.

SEED OIL OF ITACHISASAGE (LATHYRUS DAVIDII). Setsuko Endo (Tokyo Gakugei Univ.). *Yukagaku* 16, 524–526 (1957). The dried seeds contained 7.5% oil; oil properties follow: n_D^{20} 1.4764, iodine no. 130.0, saponification no. 187.0 and 0.5% of unsaponifiable matter. Content of each saturated and unsaturated fatty acids is given. Unsaponifiable matter contained 31.1% of β-sitosterol.

DETERIORATION OF FRYING OILS IN CONTINUOUS WATER-SPRAYING AND HEATING SYSTEM. IV. INFLUENCE OF TEMPERATURE, AMOUNT OF WATER SPRAYED AND TURNOVER RATE OF FAT. Etsuji Yuki (Food Ind. Expl. Station, Hiroshima Pref.). *Yukagaku* 16, 409–502 (1967). The deterioration of fatty oil by the thermal oxidation, measured by the rate of increase of viscosity and change of iodine number at 160, 180 and 200 ± 2C in the presence of air, indicated that the specific surface area exposed to air had greater influence than the temperature but that the rate of hydrolysis was much higher at 200C than the lower temperatures. The rate of deterioration of frying oil was reduced greatly by addition of 10% of fresh oil per hour for 7 hours. Water-spraying during the frying showed a tendency of increase in acid number while there was less influence on viscosity.

DETERIORATION OF OILS AND FATS OF HARDENED COCONUT SERIES. I. CHEMICAL CHANGE AND CRYSTAL GROWTH OF HARDENED COCONUT OIL AT DIFFERENT TEMPERATURES OF STORAGE. Masao Imamura, Isao Niiya, Kazuko Takagi, Masakazu Okada and Taro Matsumoto. *Yukagaku* 16, 506–511 (1967). Crude, purified, semi-hardened (hydrogenated) and hardened coconut oils were stored at −20, 5, 15 and 30C for 6 months. Acid value, peroxide value and carbonyl value were measured every month, and their correlation with crystal growth was examined by electron microscopical observation. The same tests were also made on a mixture of (a) hardened coconut oil with added hardened beef tallow and (b) hardened beef tallow mixed with non-hardened coconut oil or butter fat. The acid values increased in those samples stored at 15 and 5C in that order, and especially in the hardened oil while there was practically no change in those stored at −20 and 30C. Peroxide value was zero throughout the test period, while the carbonyl value increased with increased storage temperatures and less hardening. Hardened coconut oil mixed with hardened beef tallow showed marked rise in acid value while that mixed with cottonseed oil showed no change. The rate of increase in acid value of hardened beef tallow mixed with non-hardened coconut oil was about the same as that of hardened coconut oil. Electron microscopical observation of hardened coconut oil showed that the roughness of crystal surface increased in the order of storage temperature of 15, 5, 30 and −20C, the same order as the rise in acid values. The crystal surface of the oils stored at 5C showed the presence of whiskers. In the oil stored at 15C, single crystals showed great growth and there was a space between them and next single crystal. If a vapor were present in this space, absorptive reactions might occur on the singular face of the crystal. In the hardened coconut oil mixed with hardened beef tallow, the crystal surface became rough, while the lot of hardened coconut oil mixed with cottonseed oil was similar to the hardened coconut oil stored at −20C.

EFFECT OF AIR ON LIPID BINDING IN MECHANICALLY DEVELOPED DOUGHS. N. W. R. Daniels, J. W. Richmond, P. W. R. Eggitt and J. B. M. Coppock (Spillers Ltd., Cambridge, England). *Chem. Ind. (London)* 1967, 955–6. From previous studies on dough mixing processes it had been concluded that lipid binding, expressed as the percentage of bound lipids present in the total extractable lipid, increased with increasing rate of dough development. It has now been shown that lipid binding is also influenced by the gaseous atmosphere in the dough mixing chamber. While lipid binding in doughs mixed under nitrogen increased substantially as both work rate and total work level was raised, doughs mixed in the presence of air showed a decrease in lipid binding with increasing total work to an extent largely unaffected by the rate of work input.

COMPARATIVE STUDIES ON THE LIPIDS PRESENT IN SEEDS AND IN TUBERS. G. Lotti and V. Averna (Univ. of Palermo, Palermo, Italy). *Riv. Ital. Sostanze Grasse* 44, 297–305 (1967). The analytical characteristics and fatty acid composition of the fats obtained from seeds of 13 species, from the tubers of 22 species and from the tuberized roots of 4 vegetable species, belonging to 16 families, are reported. In general, the ether extract and total nitrogen is higher in the seeds than in the tubers or tuberized roots of the same plant, while the unsaponifiable is lower. The total fatty acid composition of the fat from tubers and tuberized roots is both qualitatively and quantitatively different from that of the seeds of the same plant. The mechanism of fatty acid formation appears to be substantially the same in seeds and tubers, but is different in the case of plants having tuberized roots.

SIGNIFICANCE AND IMPORTANCE OF ANIMAL FATS IN NUTRITION. L. Travia (Univ. of Rome, Rome, Italy). *Riv. Ital. Sostanze Grasse* 44, 306–11 (1967). A review is given of current knowledge of fat metabolism and its role in nutrition.

THE FATTY ACID COMPOSITION AND INTRAMOLECULAR STRUCTURE OF TRIGLYCERIDES DERIVED FROM DIFFERENT SITES IN THE BODY OF THE SHEEP. W. R. H. Duncan and G. A. Garton (Rowett Res. Inst., Aberdeen, Scotland). *J. Sci. Food Agr.* 18, 99–102 (1967). Triglycerides were isolated from a number of different tissues obtained from six adult sheep, the tissues including internal fat depots, subcutaneous fat depots and the subcutaneous region of the metatarsal part of the hind limbs and of the pinnae of the ears. Analytical determinations included fatty acid composition, intramolecular fatty acid distribution and amount of *trans* acids. It was found that triglycerides of the internal tissues contained a much higher proportion of saturated acids (particularly stearic) than did those of the external tissues. In the most exposed tissues (legs, ears) oleic acid accounted for as much as 60–70% of the total fatty acids. *Trans* fatty acid was, like stearic, found predominantly in the internal tissue triglycerides. Regardless of their location in the body, all the triglycerides examined showed a similar pattern of intramolecular distribution of their major component acids; saturated acids (palmitic and stearic) were for the most part esterified in the 1- and 3-positions, and oleic acid was found predominantly esterified in the 2-position. *Trans* unsaturated acid, when present, showed a similar degree of preferential esterification in the 1- and 3-positions to that observed for stearic acid. It was tentatively concluded that long chain fatty acids absorbed from the intestine influence primarily the composition of the triglycerides of internal adipose tissue.

OLEAGINOUS COMPOSITION AND METHOD FOR MAKING SAME. G. M. Nakel (Procter & Gamble Co.). *U.S. 3,336,138.* An edible oleaginous composition is claimed, containing as an additive from about 0.01 ppm to about 20,000 ppm Δ′ pyrroline.

MICRONIC FILTRATION AND ADSORPTION IN THE PURIFICATION OF FATS AND OILS. A. Paleni (Univ. of Bologna, Bologna, Italy). *Riv. Ital. Sostanze Grasse* **44**, 312–7 (1967). The adsorptive properties of Attapulgite, a clay mined in Georgia, and its usefulness in the purification and dehydration of edible oils are discussed.

SEED FATS OF SOME NEW ZEALAND JUNCACEAE. I. M. Morice (Dept. of Scientific and Ind. Res., Wellington, New Zealand). *J. Sci. Food Agr.* **18**, 129–32 (1967). The seed fats of nine species of *Juncus* L. and five varieties of *Luzula* DC., both of the family Juncaceae, have been shown to be somewhat similar to one another in fatty acid composition but are nevertheless distinguishable. They differ from those of the family Agavaceae in containing the following range of fatty acids: linoleic 28–58%, oleic 22–55%, palmitic 6–19%, stearic 1–4%, linolenic 0–7%, and small amounts of C_{12}, C_{14}, C_{15}, C_{17}, C_{19}, C_{20}, C_{22} and C_{24} fatty acids.

A STUDY ON THE DISTRIBUTION OF FATTY ACIDS IN TRIGLYCERIDES, II. THE GAS-CHROMATOGRAPHIC ANALYSIS OF PARTIAL GLYCERIDES. E. Fedeli and A. Tarenghi (National Center for Lipochem., Milan, Italy). *Riv. Ital. Sostanze Grasse* **44**, 293–6 (1967). The gas chromatographic analysis of a mixture of mono-, di- and triglycerides obtained by enzymatic hydrolysis of olive oil has demonstrated the complete absence of C_{16} acids (palmitic or palmitoleic) in the beta position of the glycerol molecule. Without regard to degree of unsaturation, the triglyceride composition of olive oil has been determined to be as follows: 18–18–18 66.7%, 18–18–16 29.6%, 16–18–16 3.7%, which corresponds to a partial random distribution.

OLEAGINOUS COMPOSITION AND METHOD FOR MAKING SAME. B. M. Dirks and G. M. Nakel (Procter & Gamble Co.). *U.S. 3,336,140.* A method for preparing a flavored oleaginous composition comprises the steps of adding the reaction product of piperidine, proline and dextrose to an oleaginous composition. The additive is prepared by a process comprising the steps of (1) reacting piperidine with dextrose, in a mol ratio ranging from 1:4 to 2:1, at a temperature of 140–250F, for 1.5 to 2.5 hours, to form a syrupy solution, (2) adding slowly, under continuous stirring, to the syrupy solution obtained in step (1), an acidic catalyst selected from the group consisting of acetic, phosphoric, boric, malonic, propionic, benzoic, succinic, citric, glutamic, tartaric and fumaric acids, to form a cherry red tinged solution, the mole ratio of catalyst to the dextrose used in step (1) being from 1:10 to 2.5:1, and (3) reacting the solution from step (2) with proline over 1–2 hours, the mole ratio of proline to the dextrose used in step (1) being from 1:10 to 1.5:1. The flavored oleaginous composition obtained by this method supplies a significantly enhanced crusty flavor to bland or lightly flavored bakery products.

FLUID MARGARINE EMULSION STABILIZED BY HARD FAT. M. J. Pichel (Swift & Co.). *U.S. 3,338,720.* A stable water-in-oil emulsion food product which remains pourable over a wide temperature range consists of about 60–90% of a liquid glyceride oil having a cold test in excess of eight hours, about 40–10% of an aqueous phase containing milk solids, an emulsifier and about 0.75–5% of a hard fat.

PROCESS FOR OBTAINING OIL FROM ANIMAL HIDES. L. R. Lyon (Lycoil, Inc.). *U.S. 3,338,931.* A process for treating animal hides to obtain low titer oil comprises the steps of scraping the flesh side of the hides to obtain raw fleshings, removing substantially ungrindable particles and then reducing the particle size of the fleshings, then sparging steam into them to raise their temperature to 180–200F. The reduced fleshings are then separated centrifugally into heavy solids and a flowable liquid fraction, which is subsequently reheated to 180–200F by steam sparging and finally separated centrifugally into oil, water and sludge.

COLOR IMPROVEMENT OF OILS AND FATS OBTAINED THROUGH SOLVENT EXTRACTION. R. W. Bates and J. G. Endres (Armour & Co.). *U.S. 3,338,932.* An improvement is claimed in the process of rendering animal tissue and blood by boiling in a polar solvent, thereby concentrating the originally present color bodies in the fat fraction resulting from the rendering operation and making them non-polar and non-responsive to treatment with bleaching clays. The improvement consists in adding 0.05 to 1.2% by wt. of 100% hydrogen peroxide along with 1–10% of water to the melted fat fraction obtained from the rendering operation, having the effect of making the color bodies polar and easily removable, partly by settling and partly by standard treatment with bleaching clays.

METHOD OF REFINING WOOL FAT. D. M. Nyman (Aktiebolaget Separator). *U.S. 3,338,933.* A method for refining wool fat comprises the steps of subjecting the wool fat to a first treatment with phosphoric or oxalic acid, then treating the wool fat with a bleaching agent, neutralizing with alkali lye and washing.

METHOD OF CONTINUOUSLY RECOVERING PROTEIN FROM FATTY ANIMAL MATERIAL BY EMPLOYING DIRECTLY ADMIXED FAT AT A TEMPERATURE OF FROM 70–120C. O. Kublien (Thrige-Titan A/S). *U.S. 3,345,353.* A method of continuously recovering protein and fat by low temperature melting of animal fat-containing material comprises the steps of (1) comminuting the material to particles up to 3 mm in size; (2) heating the comminuted material above the melting point of its fat content by direct admixing of fat at 70–120C, in such proportion that the average temperature of the mixture does not exceed the coagulation point of the protein content and is reached by all parts of the mixture within a few seconds; and (3) separating the liquid fat from the protein of the mixture.

SEPARATION OF FATTY MATERIALS. K. T. Zilch (Emery Industries, Inc.). *U.S. 3,345,389.* A process for the separation of higher fatty acids or of fatty acid glycerides having different degrees of unsaturation comprises dissolving the fatty materials in 2-nitropropane, cooling the solution to precipitate a portion of the more saturated constituents, filtering off the precipitate, and recovering the fatty material from the precipitate by evaporating the solvent.

COTTONSEED OIL DIRECT EXTRACTION METHOD. O. J. Jones and B. H. Page (Anderson, Clayton & Co.). *U.S. 3,347,885.* An improved method for directly solvent extracting oil from prepared cottonseed meats, comprises mildly cooking cottonseed meat flakes not exceeding 0.025 inches in thickness and whose H_2O content varies from 14–16% in the early stages to 13–15% in the final stages of cooking. Cooking proceeds for 30–40 minutes from an initial temperature of 160–185F to about 210–230F at the end of the process. The cooked cottonseed meat is then compressed to a thickness of 0.005–0.008 inch

between smooth flaking rolls, and finally subjected to solvent extraction by gravity percolation flow.

PROCESS FOR REMOVING THE HALPHEN-TEST RESPONSE FROM REFINED AND BLEACHED COTTONSEED OIL. E. T. Rayner, P. H. Eaves and H. P. Dupuy (U.S. Sec'y of Agr.). *U.S. 3,347,886.* A process for removing positive Halphen test response from a refined and bleached cottonseed oil containing cyclopropenoids comprises heating and steam sparging the oil at a temperature of 400–500F and at a pressure of 100 mm Hg, until the Halphen response of the cottonseed oil being treated becomes negative by test. The process can also be conducted in the presence of cottonseed oil fatty acids in a molar excess relative to the cottonseed oil cyclopropenoids.

• Fatty Acid Derivatives

PREPARATION OF HALOGENATED UNSATURATED ACIDS. I. L. Mador and J. A. Scheben (National Distillers and Chem. Corp.). *U.S. 3,338,960.* A process for the preparation of halogenated carboxylic acids comprises reacting an unsaturated hydrocarbon having 2 to 18 C atoms selected from the group consisting of dienes and alkenes with an alpha-halogenated, aliphatic monocarboxylic acid having the formula $R_kCH_m(Hal)_nCOOH$, where R is a C_1 to C_5 alkyl group, Hal is chlorine, bromine or iodine, n is an integer from 1 to 3, m and k are integers between 0 and 2, and k + m + n equals 3. The reaction is carried out in the presence of cuprous halide or ferrous halide catalyst and in the presence of a polar-type solvent, at temperatures between ambient and 150C.

PROCESS FOR THE ISOLATION OF ALPHA-GLYCERYL ETHERS FROM MARINE OILS. W. Chalmers and A. J. Shaw (Eversharp, Inc.). *U.S. 3,342,876.* A process for extracting alpha glyceryl ethers from a marine oil source comprises alcoholysing a marine oil with low free fatty acid content with a C_1–C_3 alkanol, in the presence of an alkaline catalyst, until the alcoholysis is substantially complete. The alcoholysis product is then dissolved in a polar solvent (such as methanol, ethanol, and their aqueous solutions containing up to 10% water); the resulting solution is then contacted with an immiscible solvent selected from the group consisting of herring oil, dogfish liver oil and hexane, and an enriched extract containing mixed alpha glyceryl ethers is recovered from the polar solvent phase.

• Biochemistry and Nutrition

EFFECT OF GLUCOCORTICOID HORMONES ON FATTY ACID MOBILIZATION AND RE-ESTERIFICATION IN RAT ADIPOSE TISSUE. B. Jeanrenaud (Univ. of Geneva, Geneva, Switzerland). *Biochem. J.* **103**, 627–33 (1967). The effect of dexamethasone and cortisol on fatty acid mobilization and re-esterification has been studied in intact adipose tissue and isolated fat cells of the rat. Dexamethasone added *in vitro* inhibited both the re-esterification of mobilized fatty acids and the esterification of palmitate in the medium. Under several conditions steroid-induced release of free fatty acids could be accounted for by decreased re-esterification only, overall lipolytic activity remaining unchanged. At higher concentrations of dexamethasone, however, stimulation of lipolytic activity also occurred. Decreased re-esterification produced by dexamethasone was observed in the total absence of glucose from the incubation medium. Also, dexamethasone stimulated the disappearance of ^{14}C-labelled glycogen from the tissue. The evidence presented suggests that mobilization of free fatty acids induced by glucocorticoid hormones under physiological conditions is primarily due to a decrease of the re-esterification rate rather than to lipase activation.

UTILIZATION OF ENDOGENOUS LIPID BY ISOLATED PERFUSED RAT HEART. R. E. Olson and R. J. Hoeschen (Dept. of Biochem., Univ. of Pittsburgh, Pa.). *Biochem. J.* **103**, 796–801 (1967). The lipids of the rat heart have been studied with regard to amount, classes present and fatty acid composition of free fatty acids, triglycerides and phospholipids. Myocardial lipid contained 300 μmoles of total fatty acid/g dry wt. of which only 2–4 μmoles were free; the remainder was esterified, chiefly as phospholipid. Neutral esters, of which triglyceride was the principal form, made up 15% of the total fatty acids. When normal hearts were perfused with a nutrient-free medium until exhaustion, the triglyceride concentration declined from 43 to 13 μmoles/g dry wt., while the content of phospholipids, partial glycerides and cholesteryl esters did not change. These experiments support the view that only a small fraction of the total cardiac lipid, principally triglycerides and to a smaller extent diglycerides, is available as a source of fuel in the absence of exogenous substrate.

THE EFFECT OF THYROIDECTOMY ON THE PATTERN OF FATTY ACIDS SYNTHESIZED BY MAMMARY GLAND FROM LACTATING RATS. A. L. Greenbaum, E. Walters and P. McLean (Dept. of Biochem., Univ. College, London). *Biochem. J.* **103**, 720–3 (1967). Thyroidectomy decreased the content of short-chain fatty acids and increased the content of long-chain fatty acids in the mammary glands of lactating rats. This effect was replicated in the glands of untreated rats limited to the same food intake as the thyroidectomized animals. Thyroidectomy decreased the incorporation of glucose-6-^{14}C into short-chain fatty acids and increased the incorporation into long-chain acids. Restriction of the food intake of untreated animals did not cause a similar shift of the incorporation pattern. The possibility is discussed that the thyroxine effect on lipogenesis is secondary to its effect on carbohydrate metabolism.

THE BIOLOGIC BEHAVIOR OF FATTY ACIDS CONTAINING TRIPLE BONDS. II. BEHENOLIC ACID. K. Bernhard, K. Yekundi and H. R. Greub (Univ. of Basel, Basel, Switzerland). *Helv. Chim. Acta* **50**, 713–6 (1967). Behenolic acid (C_{22} with one triple bond), fed to rats as a triglyceride, is incorporated into depot fat but not into liver lipids. The same metabolite (i.e. 5-decyne-dicarboxylic acid) can be isolated from the urine after feeding stearolic acid.

PLASMA FREE FATTY ACID UPTAKE AND RELEASE BY THE GOAT MAMMARY GLAND. C. E. West, E. F. Annison and J. L. Linzell (Unilever Res. Lab., Sharnbrook, England). *Biochem. J.* **102**, 23P (1967). Changes in concentration and composition of plasma FFA in arterial and mammary venous plasma of nine goats were measured. In all cases, there were marked changes in FFA composition across the gland. Plasma FFA are believed to be in equilibrium with a FFA pool produced by the hydrolysis of plasma triglyceride, which is almost certainly the first step in triglyceride uptake. Fatty acids synthesized in the mammary gland are not in equilibrium with plasma FFA, but oleic acid produced by the dehydrogenation of stearic acid is released into venous blood.

ANIMAL FATS IN HUMAN NUTRITION. G. Clement (Univ. of Dijon, Dijon, France). *Riv. Ital. Sostanze Grasse* **44**, 269–72 (1967). The role of animal fats in nutrition is reviewed. The conclusion is offered that a healthy diet must include approximately 30% fats, 60% of which can quite safely be of animal origin.

LIPID COMPOSITION AND METABOLISM IN TESTICULAR AND EJACULATED RAM SPERMATOZOA. T. W. Scott, J. K. Voglmayr and B. P. Setchell (Ross Animal Res. Lab., Prospect, N.S.W., Australia). *Biochem. J.* **102**, 456–61 (1967). Spermatozoa collected from the testis of the conscious ram contain 25% more phospholipid than ejaculated spermatozoa. The concentration of lecithin, phosphatidylethanolamine and ethanolamine plasmalogen was greater in testicular spermatozoa while both types had significant amounts of cardiolipin and alkyl ether phospholipid. The fatty acids in the phospholipid from testicular spermatozoa have a high content of palmitic acid, those in ejaculated spermatozoa had less palmitic but more myristic acid. Ejaculated spermatozoa contained less acyl ester and cholesterol. Testicular spermatozoa, when incubated with glucose-U-^{14}C, incorporated more radioactivity in the glycerol part of the phospholipids and neutral lipid fractions than did ejaculated cells. No radioactivity was detected in choline plasmalogen, which accounted for about 40% of the total phospholipid. The implications of these lipid changes in the process of spermatozoal maturation are discussed.

BINDING OF FATTY ACIDS BY PROTEINS. H. B. Bull and K. Breese (Univ. of Iowa, Iowa City). *Arch. Biochem. Biophys.* **120**, 303–8 (1967). Egg albumin has been titrated with acetic, propionic, *n*-butyric, *i*-butyric, *n*-valeric, *n*-caproic, and *n*-heptanoic acids, using the method of equilibrium dialysis. At low acid concentration, the binding at a given acid concentration is the same for all the acids. After a critical concentration is reached, depending on the molecular weight of the acid, the extent of binding increases geometrically with the length of the carbon chain of the acids. It is likely that the unionized acids are being bound at higher acid concentrations, and no limit to the binding has been observed. Several kinds of binding sites are probably involved, among these may be the peptide bonds.

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DENATURATION OF PROTEIN BY FATTY ACIDS. *Ibid.*, 309–15. Fatty acids are denaturants of egg albumin, and their effectiveness increases with the length of the carbon chain. The extent of denaturation is measured by the solubility of the protein at or near the isoelectric point in the presence of Na_2SO_4. The degree of denaturation depends on pH as well as the acid concentration. The rate of denaturation follows first-order kinetics with respect to protein but the order with respect to the fatty acid is much higher. The energy of activation in the presence of acetic acid is about 33,000 cal/mol. It is necessary to bind about 10 mols of the fatty acid per mol of protein before denaturation begins. Denaturation is accompanied by an increase in the viscosity of the protein solution and in the appearance of opalescence and gelation, gelation being greatly increased by 0.05M KCl.

THE PHOSPHOLIPIDS OF PORK MUSCLE, AND THEIR RELATION TO THE POST-MORTEM RATE OF GLYCOLYSIS. K. Krzywicki and P. W. Ratcliff (J. Sainsbury Ltd., London, England). *J. Sci. Food Agr.* **18**, 252–7 (1967). The phospholipids of pork *longissimus dorsi* muscle were investigated. The proportions of the major phospholipid components appeared to be constant in different regions of the same muscle, though the total lipid-P varied widely. Homogenates of the muscle were fractionated by differential centrifuging, 'myofibrillar,' 'mitochondrial,' 'reticular,' and 'final supernatant' muscle fractions being obtained. Sarcoplasmic reticulum appeared to be present very largely with the fibrils in the myofibrillar fraction, which contained 40–78% of the total lipid-P. The percentage composition of the phospholipids was similar in the first three subcellular fractions, while the fourth contained less of the kephalin component. During fractionation of the muscle, substantial losses of phospholipids occurred; the possible origin and cause of these losses are discussed. The sum of lipid-P in the first and third subcellular fractions, containing sarcoplasmic reticulum, showed a highly significant negative correlation with pH_1 (muscle pH 45 minutes after slaughter) which represents an approximate index of the rate of post-mortem glycolysis in the muscle. The significance of this correlation is discussed.

EFFECT OF CELL AGE ON ERYTHROCYTE FATTY ACID COMPOSITION IN RATS ON DIFFERENT DIETARY REGIMES. B. L. Walker and M. Yurkowski (Univ. of Guelph, Guelph, Canada). *Biochem. J.* **103**, 218–24 (1967). Rat erythrocytes were fractionated into young, mature and old cell fractions by centrifugation. The fatty acid composition of each fraction was determined by gas-liquid chromatography, under four different dietary conditions: with adequate linoleic acid in the diet, with a diet deficient in linoleic acid, and with the deficient diet supplemented with corn oil for 3 and 12 days. Significant differences were observed in the fatty acid composition of cells of different ages on all diets, the distribution pattern depending on the particular acid, on its concentration in the total erythrocyte sample and on the nature of the dietary fat. When corn oil was fed to rats that had been previously fed a deficient diet, the resulting changes in fatty acid composition depended on the acid and on cell age. For example, young cells were more active in incorporating palmitic acid and arachidonic acid but incorporated linoleic acid at a lower rate than older cells. These results are believed to indicate the presence in the erythrocyte of transacylases with different specificities, and to show that transacylase activity changes as the cells age.

STEROLS OF SOME MARINE RED ALGAE. G. F. Gibbons, L. J. Goad and T. W. Goodwin (Dept. of Biochem. and Agricult. Biochem., Univ. College of Wales, Aberystwyth, U.K.). *Phytochem.* **6**, 677–683 (1967). Cholesterol was identified as the major sterol of several marine red algae. In two species a second sterol, 22-dehydrocholesterol appeared. In the species *Rhodymenia palmata* and *Porphyra purpurea* desmosterol is the predominant sterol. Cholesterol or closely related C_{27} sterols are probably the only sterols to occur in the Rhodophyta.

SOME FACTORS WHICH INFLUENCE FATTY ACID ACCUMULATION IN LEAVES. D. W. Newman (Botany Dept., Miami Univ., Oxford, Ohio). *Phytochem.* **6**, 187–192 (1967). The effect of age, flowering and nitrogen deficiency on the fatty acid composition of lettuce leaves was studied. Nitrogen deficiency increased the ratio of saturated to unsaturated acids as well as decreasing the total amount present. Aging shows a more marked effect in the flowering shoots where the older leaves contain a higher proportion of saturated acids but lower overall totals. Squash leaf disks showed a higher incorporation of acetate-2-^{14}C into linoleate in the presence of UDPG than in its absence. UDPG-^{14}C was incorporated into two unidentified lipid components in lettuce leaves.

DEMONSTRATION OF STAPHYLOCOCCAL LIPASE AND CLOSTRIDIAL LECITHINASE ACTIVITIES BY THIN-LAYER CHROMATOGRAPHY. G. Scrimgeour, P. M. Keane and V. G. Alder (Dept. Pathol., St. George's Hosp., London, U.K.). *J. Path. Bact.* **93**, 688–690 (1967). A simple technique is described for distinguishing between the two types of lipolysis (lecithinase and glycerolester hydrolase) exhibited by various Staphylococcal strains. Culture supernate and egg yolk saline was incubated overnight at 37C. The lipid was extracted in a separatory funnel with chloroform-methanol (2:1) acidified with 0.017N H_2SO_4. The solvent phase was removed, concentrated and spotted on TLC plates which were developed in chloroform-glacial acetic acid (95:5). Lecithinase activity could be distinguished from lipase activity by the diminution of phospholipid in the former and the diminution of triglyceride and increase in free fatty acids in the latter.

EFFECT OF PREDNISOLONE ON LIVER DAMAGE IN RATS INDUCED BY AFLATOXIN. T. B. Madhavan (Dept. of Pathol., Nutr. Res. Labs., Indian Council of Med. Res., Tarnaka, Hyderabad-7, India). *J. Path. Bact.* **93**, 443–447 (1967). The effect of prednisolone on aflatoxin liver injury was studied using weanling rats on diets of 20 and 5% protein. Rats on the high protein diet showed only mild histological changes when given 70 μg of toxin per day for 20 days. Administration of 1 or 0.2 μg per day of prednisolone had no effect. Rats on the low protein diet developed typical lesions in less than 20 days with the same toxin dose. In the presence of the higher dose of prednisolone there was marked inhibition of bile duct proliferation and fat accumulation. The inhibitory effect was less with the smaller dose of steroid. The clinical signs and mortality due to the toxin were not influenced by the steroid.

THE α-OXIDATION OF LONG-CHAIN FATTY ACIDS AS A POSSIBLE COMPONENT OF THE BASAL RESPIRATION OF POTATO SLICES. G. G. Laties and Carol Hoelle (Div. of Plant Physiol., Dept. of Botanical Sci., Univ. of Cal., Los Angeles, Calif.). *Phytochem.* **6**, 49–57 (1967). Fresh potato slices evolve $^{14}CO_2$ from carboxyl-labeled palmitic and myristic acids. Except for propionate, shorter chain fatty acids are not metabolized. In contrast, aged potato slices vigorously oxidize fatty acids from C_2 to C_{16}. α-Oxidation appears to be responsible for overt degradation of fatty acids in fresh slices while β-oxidation gains ascendancy with aging. Labeling of citrate by carboxyl-labeled fatty acids in fresh slices indicates formation of acetyl-Co A; however, since the tricarboxylic acid cycle is inoperative, acetyl-Co A is not metabolized and β-oxidation not observed. In fresh tissue propionate is metabolized by a modified β-oxidation by initial decarboxylation ultimately to yield acetyl-Co A. With aging, the oxidation of propionate proceeds increasingly by CO_2 fixation via methyl malonyl-Co A and succinyl-Co A. Both propionate pathways are operative, the latter becoming more active with time.

INFLUENCE OF ATMOSPHERIC GASES ON AFLATOXIN PRODUCTION BY ASPERGILLUS FLAVUS IN PEANUTS. K. E. Landers, N. D. Davis and V. L. Diener. *Phytopathology* **57**, 1086–1090 (1967). Sound, mature kernels of Early Runner peanuts were inoculated with *Aspergillus flavus* under various concentrations of carbon dioxide, nitrogen and oxygen at high moisture levels for 2 weeks at 30C and 6 weeks at 15C. Observations were made of growth, sporulation and concentrations of aflatoxin and free fatty acids. No reduction in growth or sporulation of *A. flavus* was observed at CO_2 concentrations from 0.03 to 20%. Growth and sporulation decreased with each 20% increase to 80% CO_2, no growth occurred at 100% CO_2. No decrease in growth or sporulation was observed when O_2 was reduced from 20–5%. Marked reductions occurred, however, when O_2 was reduced from 5 to 1%. Aflatoxin production decreased with increasing concentrations of CO_2 from 0.03 to 100%. Reducing O_2 concentrations decreased aflatoxin production. Aflatoxin was lower in peanuts stored at 15C under 20% CO_2 for 6 weeks when O_2 was reduced from 20 to 5%. Aflatoxin was low in peanuts stored at 15C for 6 weeks under high concentrations of CO_2. Free fatty acid formation closely paralleled growth, sporulation and aflatoxin production by the fungus. Striking decreases in free fatty acids occurred when O_2 was reduced from 5 to 1%.

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ELECTROPHORETIC MOBILITY OF MILK FAT GLOBULES. III. CENTER CELL OBSERVATIONS AND EFFECT OF VISCOSITY, FIELD STRENGTH, DILUTING MEDIA, AND PH. R. Tjepkema and T. Richardson (Dept. of Food Sci. and Industries, Univ. of Wis., Madison). *J. Dairy Sci.* 50, 1566–71 (1967). Electrophoretic mobilities of milk fat globules were determined in various concentrations of lactose which provided a viscosity range of 1.060 to 1.493 centipoises in a synthetic salt solution. Throughout this range differences in electrophoretic mobilities between diluents were due to the viscosity of the solution, and average electrophoretic mobility multiplied by viscosity was constant. When the diluent was distilled water, the average mobility was much greater than would be expected from the lower viscosity alone. The field strength was varied to provide a velocity from 1.6 μ per second to 10 μ per second. Throughout this range the field strength had no significant influence on the average electrophoretic mobility until the fat globule velocity exceeded 7 μ per sec. The average electrophoretic mobility increased 0.35 μ/sec/v/cm when the pH of a synthetic salt medium was increased from 6.08 to 7.44. The increase in average mobility as the pH increased was linear. Mobilities at 21% and 79% of cell depth were compared with mobilities at 50% of cell depth. Mobilities were equal when the mobilities determined at the center of the cell were multiplied by 0.67.

EFFECTS OF INSULIN AND FATTY ACIDS ON GLUCONEOGENESIS IN THE RAT. Bernice Friedmann, E. H. Goodman, Jr. and S. Weinhouse (Fels Res. Inst., and the Dept. of Biochem., Temple Univ. School of Med., Philadelphia, Penna. 19140). *J. Biol. Chem.* 242, 3620–7 (1967). The present study was undertaken to examine the mechanism of insulin action on gluconeogenesis in the rat. Conversion of pyruvate to glucose was estimated by measuring the radioactivity of the blood glucose and liver glycogen at short intervals, usually between 5 min and 1 hr, after injection of pyruvate-3-^{14}C. On the basis of present knowledge of insulin action, taken in conjunction with known effects of long chain acyl coenzyme A esters and acetyl-CoA on intermediary metabolic reactions in liver, these results suggest that the high hepatic gluconeogenesis of fasting and diabetes is promoted by high hepatic acyl CoA levels, and that the prompt and marked suppression of hepatic gluconeogenesis by insulin is due to its antilipolytic action on adipose tissue.

ENZYMATIC HYDROLYSIS OF SPHINGOLIPIDS. VI. HYDROLYSIS OF CERAMIDE GLYCOSIDES BY CALF BRAIN β-N-ACETYLHEXOSAMINIDASE. Y. Z. Frohwein and S. Gatt (Lab. of Org. and Biol. Chem., The Hebrew Univ., and Dept. of Biochem., The Hebrew Univ.-Hadassah Med. School, Jersusalem, Israel). *Biochemistry* 6, 2783–7 (1967). Trihexosylceramide (GalNAc-β-1,4-Gal-β-1,4-Glc-β-1,1-(2-N-acyl)sphingosine) was prepared and used as substrate for calf brain β-N-acetylhexosaminidase. Two other glycosphingolipids, "globoside" from human erythrocytes stroma and the ganglioside which accumulates in brain tissue of patients with Tay-Sachs' disease, were also hydrolyzed. The rate of hydrolysis of the latter compound was much slower than those of the other two substrates. "Tay-Sachs' ganglioside" strongly inhibited the hydrolysis of trihexosylceramide. The possibility that this might be a cause for the accumulation of the latter compound in brain tissue of patients with Tay-Sachs' disease is discussed.

CHAIN ELONGATION, 2-HYDROXYLATION, AND DECARBOYXLATION OF LONG CHAIN FATTY ACIDS BY YEAST. A. J. Fulco (Lab. of Nuclear Med. and Radiation Biol., Dept. of Biophys. and Nuclear Med., and Dept. of Biol. Chem., Univ. of Calif. at Los Angeles School of Med. Los Angeles, Calif. 90024). *J. Biol. Chem.* 242, 3608–13 (1967). Chain elongation and 2-hydroxylation pathways, which are specific for very long chain fatty acids ($> C_{18}$), have been found in the yeast, *Candida utilis*. The chain elongation system acts specifically on fatty acids of chain length C_{20} to C_{24}; there is no detectable elongation of C_{18} and only trace activity with C_{19}. The product of the elongation enzyme or enzymes is C_{26} when C_{20}, C_{22}, or C_{24} is substrate and is a mixture of C_{25} and C_{27} when the substrates are C_{21} and C_{23}. The 2-hydroxylation enzyme converts C_{26} acid, formed *in situ* by chain elongation, to 2-hydroxyhexacosanoic acid. The enzyme seems quite specific for the C_{26} chain length, although there may be some activity for chain lengths C_{24}, C_{25}, and C_{27}.

THE EFFECT OF PROLACTIN ON LIPOGENESIS IN THE PIGEON. IN VITRO STUDIES. A. G. Goodridge and E. G. Ball (Dept. of Biol. Chem., Harvard Med. School, Boston, Mass. 02115).