holding-time upon the percentage of solid removed. The behavior of crude peanut oil is very similar to that of the refined oil in the same solvent except that a slightly lower chilling temperature is required and that the crystals tend to form a little more slowly and do not settle out as readily. The advantage of winterizing hexane-extracted peanut oils before refining is discussed.

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[Received January 12, 1954]

Letter to the Editor

Effect of X-ray Irradiation on Seasamum Seeds

JACOB and his group (1) are carrying out extensive studies on the effect of X-ray irradiation on seasamum seeds with the idea of getting an active mutant strain which will have earlier flowering time with greater yield of fruit. We have analyzed some of these X-ray irradiated seeds for their oil content as well as the lipase and esterase activities, and we wish to record the results in this note.

Seasamum Indicum control T12, T12.140 (irradiated with 140 m.a.H.), T16 control T16.36 (irradiated with 36 m.a.H.), T.16.50 (irradiated with 50 m.a.H.) were used for the experiments. The oil was extracted from these seeds, using the soxhlet ether extraction method, and analyzed. Crude powder possessing lipase and esterase activities was prepared by the usual method, and the lipase and esterase activities were determined, using fresh peanut oil as the substrate in the former case and ethyl butyrate as substrate in the latter case (2). The results are given in Table I.

TABLE I

Type	Free acid,%	Saponification value	Iodine value	Peroxide value	Oil obtained, %	Difference in cc. of N/10NaOH between the sample and blank	
						Lipase activity	Esterase activity
T.12.control	0.08	185.6	106.1	5.04	37.0	1.1	1.0
T.12.140.m.a.H	0.20	186.6	105.7	5.90	35.0	0.7	1.3
T.16.control	0.05	187.1	103.6	5.86	36.0	0.7	1.0
T.16.36.m.a.H	0.05	185.8	105.0	5.78	36.0	0.7	1.0
T.16.50.m.a.H	0.05	186.3	105.2	2.05	36.0	0.9	1.0

From Table I it appears that oil extracted from T.16.50.m.a.H. has low peroxide value. The field experiments showed that seeds T.16.50.m.a.H. have earlier flowering time and yield more fruit.

It is found that in the case of T.12.140.m.a.H., the lipase activity is less and the esterase activity is more, which indicates the possibility that by studying the irradiation process in greater detail a strain devoid of one of these enzymes may be secured and this would help us to separate these two groups of enzymes.

A detailed study of this problem may yield interesting results.

The authors wish to thank the government of West Bengal for having kindly supplied the control seeds; M. Chakravarthy, lecturer in oil technology, University of Calcutta, for analyzing the oil samples; and D. M. Bose, director, for the keen interest he has shown in the problem.

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[Received November 24, 1953]

ABSTRACTS . . . . . E. S. Lutton, Editor

• Oils and Fats

Ralph W. Planck, Abstractor
Dorothy M. Rathmann, Abstractor

Characterization of selectivity of the process of fat hydrogenation. B. N. Tyutyunnikov and B. Fraĭer (Kharkov Polytech. Inst.). *Masloboĭno Zhirovaya Prom.* 18(2), 14-18(1953). It is suggested that the index for the determination of selectivity of hydrogenation be the amount of H utilized under specified conditions for saturation of 1 double bond in linoleic, or generally highly unsaturated acid; this amount is expressed as a percentage of total consumption of H needed for saturation of the oil or fat specimen. At fully selective conditions all H (100%) is utilized for saturation of a particular acid. (*C. A.* 47, 7233)

A method of examining oils. A specific reaction of rapeseed oil. Jean Vizern and Leon Guillot. *Compt. rend.* 236, 813-4(1953). Methods are given for detecting additions of other oils to peanut oil. Copra oil can be detected by examining the traces of fatty acids on the surface of the distillate in the determination of volatile soluble and insoluble acids; in the absence of copra oil these acids crystallize at 22°, and in the presence of 2.5% or more copra oil crystallization does not occur at 22°. The K salts from various samples of peanut oil yield approx. the same quantity of precipitate in acetone containing 10% water

by cooling from 50° to 14°; the presence of other oils alters the quantity of precipitate. The test solutions are filtered, and the filtrate is cooled to 5°. Large crystals are obtained from peanut oil and mixtures of peanut oil with olive oil; mixtures of peanut oil with semidrying oil, except rapeseed, yield small crystals. An emulsion is formed with peanut oil and 5% or more rapseed oil, emulsion formation being specific for rapeseed oil. (*C. A.* **47**, 7238)

Tung and abrasin oils. Y. Bagot. *Oleagineux* **8**, 581-593, 689-697, 761-771, 861-864(1953). The production, consumption, seed treatment, extraction, characteristics, and uses of the two oils are discussed. 59 references.

Dielectric constant and absorption coefficients of linolenic acid. L. I. Bogdanov and N. N. Stepanenko (Zagorsk. Pedagog. Inst.). *Zhur. Fiz. Khim.* **27**, 1481-4(1953). The dielectric constants ϵ of linolenic acid are 2.55, 2.76, 2.97, and 3.01 at −10°, 20°, 60°, and 100°, resp. The absorption coefficient is 0.03, 0.07, and 0.06 at −10°, 40-60°, and 80-100°, resp. For stearic, oleic, linoleic, and linolenic acids, ϵ is a linear function of the iodine no. The Drude-Coolidge method, with 64-cm. waves, was used for the measurements. (*C. A.* 48, 3086)

Examination for the proportional content of fat in milk by the Sadokowa method. Marian Brodacki. *Ann. Univ. Mariae Curie-Sklodowska, Lublin-Polonia Sec. DD*, **5**, 311-15(1950) (English Summary). To 10 ml. of a stock solution containing 10 g. borax in 1 l. H_2O and 82 ml. amyl alcohol (b. 128-32°) ni 600 ml. 96% EtOH was added 11 ml. fresh milk containing 1% chloramine as a preservative in a butyrometer. This was stoppered, shaken, placed in a 65° water bath for 10 min., centrifuged for 5 min. at 1,000 r.p.m., and again placed in a 65° water bath for 5 min., finally to be read for fat content in %. The method was used for milk containing 7.0-12.0% S. H. (0.16-0.30% lactic acid) at which range a complete agreement was observed with the method of Gerber. (*C. A.* **48**, 3582)

Coulometric titration of long-chain unsaturated fatty acids with chlorine. František Cůta and Zdeněk Kucera (Vysoká škola chem., Prague, Czechoslovakia). *Chem. Listy* **47**, 1166-72 (1953). A coulometric method is proposed for determining the I value of unsaturated fatty acids containing 1 double bond. Cl generated with 1-10 ma. of d.c. from 0.2 to 1.2 N HCl in 80-90% AcOH adds to the double bond, and the end of the addition is indicated by the formation of a current in an indicator circuit with imposed 0.36 v. potential. From the time of addition and from the generating current, the amount of Cl added is calculated. Similar addition of Br. is less accurate, I does not add at all. The results of this method agree within 0.1 units with those obtained by the Hanuš or Wijs method with compounds containing no more than 1 double bond. More unsaturated compounds give lower values. (*C. A.* **48**, 3850)

The National Research Council studies on milk regulations and milk quality. A. C. Dahlberg (Cornell Univ., Ithaca, N. Y.). *Proc. Ann. Conv. Milk Ind. Foundation, Lab. Sect.* **46**, 44-52 (1953). In the phase of the study dealing with composition and nutritional value samples representing 8,000,000 quarts of milk from 8 cities had the following average composition: fat 3.81; total solids 12.43; protein 3.25; lactose 4.64; and ash 0.73%. The average fat content of the milk for the individual cities varied between 3.52 and 4.24%. (*C. A.* **48**, 3583)

Effect of plant antioxidants in retarding the oxidative deterioration of samna (ghee). A. M. El-Sokkary and M. A. Ghoneim (Fouad Univ., Cairo, Egypt). *Indian J. Dairy Sci.* **4**, 123-8 (1951). To keep butterfat edible in the form of ghee effective additions to bolster the natural antioxidants were found to include the flours of soybean, safflower, fenugreek, and carob bean, although 0.5% of any one of these was not as effective as 0.02% of gallic acid, based on increase in peroxide value with aging. Wheat flour was not effective. (*C. A.* **48**, 3585)

Determination of the refractive index of unimolecular fatty acid layers. E. Hofmeister (Univ. Munich, Germany). *Z. Physik* **136**, 137-51(1953). The *ns* of films of myristic, palmitic, stearic, behenic, and pentacosanoic acids spread over a water surface were determined from the ellipticity of the polarization of reflected light derived from natural light incident under the angle of polarization. Assuming the molecules to stand vertically on the water surface the film thicknesses are 17.5, 20.0, 21.42, 26.45, 30.24 Å and the *ns* 1.359, 1.390, 1.409, 1.426, 1.429, resp. For the molecules inclined by an angle of 63°38′ from the water surface the corresponding values are 15.7, 17.9, 20.2, 24.6, 28.0 Å and 1.362, 1.396, 1.418, 1.436, 1.439. At this angle the structure of the layer is most similar to that of the crystal (Müller, *Proc. Roy. soc.* **A120**, 437 [1929]). The *ns* so determined are lower than those in the solid phase. (*C. A.* **48**, 3757)

Aca-catechin. A new antioxidant for vegetable oils. I. S. M. Husaini and S. A. Saletore (Central Labs. Sci. Ind. Research, Hyderabad). *J. Sci. Ind. Research* (India) **12B**, 408-10(1953). A large no. of synthetic and naturally occurring compounds were tested for their antioxidant properties in peanut oil. Aca-catechin prepared by the method of Perkin and Yoshitake (*J. Chem. Soc.* **81**, 1160[1902]) from crude katha obtained locally, was found to be highly efficient and the best with crude katha next. The protection factor with as aca-catechin increased with increase in concentration; 0.05, 0.10, and 0.20% concentrations gave factors of 2.4, 4.0, and 6.0, resp. A mixture of aca-catechin and H_3PO_4 (0.10 and 0.05%, resp.) gave a factor of 6.6. A mixture of aca-catechin and oleic acid (0.10 and 0.05%, resp.) gave a factor of 6.0. The factor with katha (2.6) increased when used with oleic acid (3.8). Storage tests with aca-catechin incorporated into the oil in alcoholic solution gave as induction periods and protection factors for 0.1 and 0.2% concentration of the antioxidant 122 days, 3.1, and 132 days, 3.4, resp. (*C. A.* **48**, 3709)

Physical ripening of cream. M. Kazanskiĭ and G. Tverdeokhleb. *Molochnaya Prom.* **14**(11), 33-7(1953). The type and thermostability of milk-fat crystals formed as influenced by the rates of agitation and cooling of cream, the polymorphism and monotropy of triglyceride crystals, and consistency and storage stability of the resulting butter are mainly discussed. It is concluded that rapid cooling of cream promotes growth of large crystals having greater thermostability than the small crystals, prevents fractional crystallization of fat and formation of small crystals, and improves the storage stability of butter. In butter made from cream ripened for a short time polymorphism is largely responsible for the increase in hardness during storage. Rapid cooling of cream to the lowest possible temperature and agitation of cream during the ripening period are recommended. (*C. A.* **48**, 3585)

Detection of foreign fats—a review. Mark Keeney (Univ. of Maryland, College Park). *Proc. Ann. Conv. Milk Ind. Foundation, Lab., Sect.* **46**, 21-32(1953). As a result of reviewing available methods for determining the presence of foreign fats in butterfat, tests based upon the solubility of fats in alcoholic solvents appear to be the best possibilities for detecting suspicious samples. Analysis of the suspicious samples by the Reichert-Meissl and Polenske methods or by chromatographic methods for butyric acid appear to indicate the approximate degree of adulteration. Analysis for tocopherols indicates whether the adulterant is vegetable or animal fat. (*C. A.* **48**, 3586)

Stability of nigerseed oil. M. Narayana Rao and M. Swaminathan (Central Food Technol. Research Inst., Mysore). *J. Sci. Ind. Research* (India) **12B**, 454(1953). Stability tests showed that crude nigerseed oil stored in Al, tinned brass, and glass containers for 90 days at 25-30° and 37° is not as stable as peanut oil. (*C. A.* **48**, 3709)

Problems related to the quality of market cream. G. Malcolm Trout (Michigan State College, East Lansing, Mich.). *Proc. Ann. Conv. Milk Ind. Foundation, Plant Sect.* **46**, 25-33(1953). Properties, analyses, keeping quality, and organoleptic evaluation of cream are given. (*C. A.* **48**, 3585)

Microbiological synthesis of fat. Preliminary survey of the fat-producing molds. Malcolm Woodbine, Margaret E. Gregory and Thomas K. Walker (Univ. Manchester, England). *J. Exptl. Botany* (London) **2**, 204-11(1951). A survey of potential fat-producing molds showed that at least 40 strains from 10 species are of interest. When grown on 5 different media, *Aspergillus nidulans, Penicillium spinulosum, P. Javanicum, P. piscarium, P. flavocinereum, P. oxalicum, A. flavus,* and *A. flavipes* showed the most promise. The maximum fat content on felt for *A. flavipes* and *Fusarium lini* was 39.7 and 34.6%, resp., while for that on used sugar for *A. nidulans* and *A. flavipes* was 6.7 and 9.3%, resp. (*C. A.* **48**, 3445)

Displacement analysis of lipids. IX. Products of the oxidation of methyl linoleate. N. A. Khan, W. O. Lundberg and R. T. Holman (Hormel Institute, Univ. of Minnesota). *J. Am. Chem. Soc.* **76**, 1779-84(1954). The peroxides formed by six different means of oxidation of methyl linoleate have been isolated, reduced to the corresponding hydroxy compounds and subjected to displacement analysis. The products obtained *via* autoxidation at −10° in the dark, with copper catalyst, with visible light irradiation, or with ultraviolet light irradiation are qualitatively similar. The two major dienoic reduction products exhibit *cis-trans* and *trans-trans* conjugation. With chlorophyll photoöxidation, four major reduction products were found. One was found to exhibit no conjugation, and to

have hydroxyl groups and isolated *trans* double bonds. It was found to have two double bonds and one hydroxyl group per molecule. This compound could be 11-hydroxylinoleate derived from the non-conjugated peroxide. The products of oxidation produced by lipoxidase oxidation to a level of 25% were found to consist of at least six substances distinguishable by a displacement chromatography diagram. It is concluded that displacement analysis is a sharp analytical tool for the study of the products of fat oxidation.

Flavor studies, origin of chicken flavor. E. L. Pippen, A. A. Campbell, and I. V. Streeter. *J. Agr. and Food Chem.* 2, 364-7 (1954). Poultry flavor was studied to increase knowledge of its chemical nature. Such information will provide a sound basis for measures that assures maximum retention and development of flavor, particularly in commercially produced poultry products where processing and storage condition may affect flavor. Determination of the relative contribution of gross parts or fractions of the carcass to flavor of broth showed that fat contributes to the aroma of broth, but is otherwise of minor importance to its flavor. Meat was a better source of flavor than bones, skin, or a composite of all three parts. Precursors of flavor are readily extracted from cut-up raw meat by cold water. Conclusion concerning the practical implications of these laboratory results must await an extension of the study to include other variables that would be encountered under practical conditions.

Identification of polyhydric alcohols in polymeric esters. J. F. Shay, S. Skilling, and R. W. Staffor (American Cyanamid Co., Stamford, Conn.). *Anal. Chem.* 26, 652-6(1954). By a modified saponification procedure, the polyhydric alcohol fraction of a polyester resin can be separated. The component alcohols can be identified by infrared spectral analysis, using the spectra of commercial alcohols as comparative standards. The method provides an effective means of identification for individual polyhydric alcohols and for binary mixtures.

Thermal isomerization of gum rosin. J. S. Stinson and R. V. Lawrence (Southern Regional Research Lab., Olustee, Fla.). *J. Ind. Eng. Chem.* 46, 784-6(1954). One of the effects of moderate heating (155° to 250°C.) on rosin was to increase its tendency to crystallize. Gum rosin ordinarily is noncrystalline but as the heat isomerized some of the other acids present into abietic acid, the rate of crystallization increased. Under more drastic conditions the abietic acid present was disproportionated and polymerized to form a noncrystalline product.

Chemistry of epoxy compounds. XV. Oxidation of linoleic acid with peracetic and performic acid. D. Swern and G. B. Dickel (Eastern Regional Research Lab., Philadelphia, Pa.). *J. Am. Chem. Soc.* 76, 1957-8(1954). The oxidation of linoleic acid with peracetic and performic acid proceeds normally, contrary to earlier conclusions. With peracetic acid, epoxidation is the predominating reaction. When two moles of peracetic acid is used per mole of linoleic acid, 9, 10, 12, 13-diepoxystearic acid is the main product. With one mole of peracetic acid, monoepoxyoctadecenoic acid is obtained. With performic acid and excess formic acid, the expected hydroxyformoxy compounds, resulting from the opening of the oxirane rings of diepoxystearic acid with formic acid, are obtained. Hydrolysis of the hydroxyformoxy compounds, diepoxystearic acid or the hydroxyacetoxy compounds formed on opening the oxirane rings of diepoxystearic acid with acetic acid results in poor yields of the expected tetrahydroxystearic acids. The failure to obtain good yields of tetrahydroxystearic acid on hydrolysis of these intermediates has been reported by others, and differs from the usual experience with monoepoxy compounds or their corresponding hydroxyacyloxy compounds, in which quantitative yields of dihydroxy compounds (α-glycols) can be obtained.

Fatty acid esters of 3-butene-1,2-diol. II. The copolymerization of erythryl dilinoleate with styrene. George A. Weisgerber and Elizabeth Dyer (Univ. of Delaware). *J. Am. Chem. Soc.* 76, 1784-7(1954). Erythryl dilinoleate was polymerized with styrene by heating under nitrogen at 80° in the presence of benzoyl or *p*-chlorobenzoyl peroxide to give low yields of linear, soluble polymers containing from 2.8 to 28 mole % of erythryl dilinoleate units. Limiting viscosity numbers varied from 7.6 to 12.6. The ester did not homopolymerize to high polymers. Saponification of two of the polymers and analysis of the main chain indicated that approximately nine-tenths of the linkages by which the ester was attached to styrene involved the erythryl rather than the linoleic unsaturation. Polymers containing more than 12 mole % of the ester were cross-linked by heat treatment.

A comparative study of the seasonal variations of the iodine number of Norman and Alsatian butters. M. Bejambes and S. Savoie. *Chimie et Industrie* 71, 501-506(1954). The I nos. of pasteurized butter from two regions (Bayeux in Normandy and Riedseltz in Alsace) of France were determined monthly over a four-year period. The I nos. of the butter from each region followed a characteristic reproducible seasonal cycle. The I nos. of the products from Bayeux were found to be generally higher than those of the butter from Riedseltz. During the summer the values were found to be quite close while during the winter there was a marked difference. It is suggested that the difference in diet of the cattle in the two regions is a prime factor in explaining these differences.

The utilization of ucuuba fat. G. B. Martinenghi and E. S. Leite. *Olearia* 7, 291-299(1954). Ucuuba has long been valued as a source of myristic acid but use has been limited by the costly processes of isolation and purification. Experimental results are given to show that there is the possibility of using the fat in a more extensive and economical manner, if the usual methods, used in the seed crushing industry to isolate and purify lipids, are followed.

Fatty materials in the leather industry. R. Nivert and J. Pore. *Oleagineux* 9, 29-33, 187-191(1954). The uses of animal and vegetable oils and fats, mineral oils and greases and synthetic fatty products in the leather industry are reviewed.

Heat transformation products of cottonseed oil. J. G. Chalmers (Cancer Research Dept., Royal Beatsen Memorial Hospital, Glasgow, Scotland). *Biochem. J.* 56, 487-492(1954). An analysis has been made of cottonseed oil heated *(a)* at 350° for 4 hr. and *(b)* 320° for 2.5 hr. in the presence of iron. These products, which have been reported to induce tumours of the forestomach of mice, were fractionated by treatment with acetone and by distillation in an alembic-type still. Product *(a)* contained polymeric material in both the acetone-soluble and acetone-insoluble fractions. The major component of *(b)* was unsaponifiable material. Subcutaneous injections into mice of these products and also of polymerized and peroxidized cottonseed oil have not so far, after more than a year, induced any tumours at the site of injection.

The metabolism of short-chain fatty acids in the sheep. 2. Further studies with rumen epithelium. R. J. Pennington (Rowett Research Institute, Bucksburn, Aberdeenshire, England). *Biochem. J.* 56, 410-416(1954). The rate of metabolism of propionic acid by sheep rumen epithelium increased with the proportion of CO_2 in the atmosphere up to about 20% CO_2/80% O_2. This level of CO_2 has no influence upon the rate of metabolism of acetic or butyric acid. The effect of malonate was studied, as well as the action of ammonium ion and propionate. The uptake of acetic, propionic and butyric acids, and production of ketone bodies by ox-rumen epithelium paralleled that of the corresponding tissue of the sheep.

The resolution of mixtures of C_{16}-C_{24} normal-chain fatty acids by reversed phase partition chromatography. M. H. Silk and H. H. Hahn (National Chem. Research Lab., South African Council for Scientific and Industrial Research Pretoria, South Africa). *Biochem. J.* 56, 406-410(1954). The reversed-phase partition chromatographic method of Howard and Martin (1950) has been carefully extended to cover the resolution of mixtures of even-numbered fatty acids from C_{16} to C_{24}, in fulfillment of a need for an analytical method capable of identification of acids above 18 carbon atoms in chain length. The article outlines the exact procedure required and gives data showing the accuracy to be expected.

First complete filtration-extraction plant installed in Mississippi oil mill. Anon. *Oil Mill Gaz.* 58(7), 12-13(1954). A brief description of the process is given.

Screw press operation. H. P. Keahey (French Oil Mill Mach. Co., Piqua, Ohio). *Oil Mill Gaz.* 58(10), 21-23(1954). The mechanical screw pressing of cottonseed is described.

New varieties insure a place for safflower among oil crops. J. M. Smith. *Crops & Soils* 6(4), 15(1953). The development of rust resistant varieties has established safflower as an important crop in the Sacramento Valley.

Sinitiro Kawamura, Abstractor

Preparation of dibasic acids from fatty oils. III. Alkali fusion of hydrogenated castor oil. Masaru Kobayashi (Municipal Inst. Technol., Osaka). *J. Oil Chemists' Soc., Japan* 2, 183-5 (1953). The alkali fusion of hydrogenated castor oil (chief component, 12-hydroxystearic acid) gave at 300-330° decamethylenedicarboxylic, nonamethylenedicarboxylic, caproic, heptanoic, and capric acids. Other saturated and unsaturated fatty acids of C_{12}-C_{18} were obtained besides those identified.

Preparation of oil-soluble vitamins by molecular distillation. III. Concentration of tocopherol from rice germ oil. Saburo

Komori, Yoichi Nishimura, and Kosaku Yasuda. (Osaka Univ.). *J. Oil Chemists' Soc., Japan* 2, 190-3(1953). Rice germ oil was proved to be an excellent source of tocopherol. Molecular distillation of crude rice germ oil was not suitable owing to high acid no. of the distillate and low recovery of tocopherol. Rice germ oil could be safely deacidified with NaOH under N_2, and then deacidified rice germ oil gave the distillate containing 39-52 mg. tocopherol/g. Hydrogenation of the distillate increased the stability of tocopherol.

Preparation of higher alcohols by reduction of fats and oils. Saburo Komori and Ryoichi Toyota. *J. Oil Chemists' Soc., Japan* 3, 84-92(1954). A review with 137 references.

Low-temperature interesterification of cuttle-fish oil. Hideo Marumo and Shin'ichi Tomiyama (Lion Fat and Oil Co., Tokyo). *J. Oil Chemists' Soc., Japan* 2, 232-5(1953). Industrial conditions were studied for interesterification of cuttle-fish oil (cloud point 2.0°, solid acids 24.56%, saturated acids 19.45%) with Na methylate dispersed in xylene as the catalyst. The optimum reaction conditions were 10° with 0.5% catalyst for 80 hrs. (in the air with 45% humidity) after which the cloud point was 35° (the rate of reaction 77.2%). The relation between mol. % of trisaturated glycerides (x) and cloud point (T° K) was $\log x = 12.35 - 3427.14/T$.

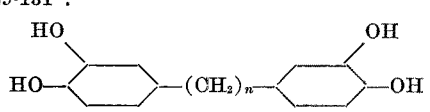
Fractionation of glycerides of fish oils by interesterification followed by winterization. Hideo Marumo and Shin'ichi Tomiyama. *J. Oil Chemists' Soc., Japan* 2, 235-9(1953). When interesterified fish oil is warmed to 120°, then cooled to 10-5°, and filtered or centrifuged, saturated glycerides can be removed to give better drying oils than the original ones. Data are presented on the experiments with cuttle-fish oil and oil of *aburazame (Heptranchias perlo)*. The esters of dihydric alcs. (selachyl and bachyl alcs.) contained in the latter oil behaved like monoglycerides.

Chromatography of fats. Shinroku Masuyama (Municipal Inst. Technol., Osaka). *J. Oil Chemists' Soc., Japan* 3, 27-31, 41 (1954). A review on adsorption chromatography and partition chromatography of fats with 67 references.

Chemical constituents and utilization of cuttle-fish oil. I. Properties of cuttle-fish oil. Masayasu Takao and Shin'ichi Tomiyama (Lion Fat and Oil Co., Tokyo). *J. Agr. Chem. Soc. Japan* 27, 692-4(1953). This oil is obtained from viscera of *Ommastrephes solani pacificus*. It showed d^{15} 0.9277-0.9299, n^{20} 1.4823-1.4843, sapon. no. 174.8-184.2, I no. 189.6-200.6, unsapon. 2.51-3.98%.

Chemical constituents and utilization of cuttle-fish oil. II. Fatty acid composition. Masayasu Takao and Shin'ichi Tomiyama. *J. Agr. Chem. Soc. Japan* 27, 737-45(1953). The fatty acids of this oil consisted of about 22% saturated fatty acids (13.6% palmitic, 4.8% stearic, 3.6% myristic, and small amounts of arachidic, lauric, and capric), about 33% monoethenoid acids (14.3% oleic, 9.8% gadoleic, 5.8% zoomaric, and small amounts of docosenic and tetradecenoic acid), and about 45% highly unsaturated acids (20% eicosatetraenoic, 6.2% docosapentanoic, 4.4% docosahexaenoic, 3.5% docosatetraenoic, 2.0% tetracosapentaenoic, and small amounts of eicosapentaenoic, octadecatetraenoic, and hexadecatrienoic acids).

Inhibition of the autoxidation of oils and fats. VI. Syntheses of some ω, ω'-bis-(3,4-dihydroxyphenyl) alkanes. (1). Saburo Tamura, Kazuhiko Okuma, Hiroshi Akabori, and Kiyohiko Kanezaki (Univ. Tokyo). *J. Agr. Chem. Soc. Japan* 27, 491-7 (1953). NDGA-like compounds were synthesized to see the relation between chemical structure and antioxidant activity. The no. of n of the general formula, name, and m.p. are, respectively, 3, 1,3-bis-(3,4-dihydroxyphenyl)propane, 117-119°; 4, 1,4-bis-(dihydroxyphenyl)butane, 138-139°; 6, 1,6-bis-(3,4-dihydroxyphenyl)hexane, 133-134°; 9, 1,9-bis-(3,4-dihydroxyphenyl)nonane; and 10, 1,10-bis-(3,4-dihydroxyphenyl) decane, 129-131°.



Inhibition of the autoxidation of oils and fats. VII. Syntheses of some ω, ω'-bis-(3,4-dihydroxyphenyl) alkanes. (2). Saburo Tamura, Kazuhiko Okuma, Kohei Miyao, and Osamu Haramaki. *J. Agr. Chem. Soc. Japan* 27, 877-81(1953). The no. of n in the preceding abstract's formula, name, and m.p. are, respectively, 0, 3,4,3',4'-tetrahydroxybiphenyl, 225-7°; 1, bis-(3,4-dihydroxyphenyl)methane, 145°; and 5, 1,5-bis-(3,4-dihydroxyphenyl)pentane, 128-9°.

Antioxidants for lard and soap. Kaoru Yoshikawa and Masao Nonaka (Mitsuwa Chem. Lab., Tokyo). *J. Oil Chemists' Soc., Japan* 2, 186-90(1953). Judged from the peroxide values of lard aerated at 80°, alkyl gallates (ethyl, propyl, isoamyl, and lauryl), N.D.G.A., hydroquinone, Sustane 1-F, and Sustane 3-F showed excellent antioxidant activities upon addition of 0.01 and 0.05%. Alkyl phenols (*p*-nonyl, *p*-lauryl, *o*- and *p*-lauryl mixed) and 6-tert-butyl-*m*-cresol showed lower antioxidant activities. Amine derivatives colored lard and were not suitable. Among S-containing compds., β,β'-thiodipropionic acid was slightly effective, while thiourea and N, N'-diphenylthiourea were ineffective. The antioxidant effect for soap was evaluated by observing coloration of soap with 0.01 and 0.05% addition to small pieces (4 x 3 x 1 cm.) of soap (a) after 5 and 10 hrs. of ultraviolet radiation from the distance of 8 cm. at 38-40°, and (b) after 6 months of storing under ordinary scattered light in the room with surface coating of *N*/30 Cu acetate aq. soln. (as oxidation promoter). Na thiosulfate, Na silicate, maleic acid, citric acid, 6-tert-butyl-*m*-cresol, anthraquinone, ethylenediamine derivatives, *o*-toluylbiguanide, and β, β'-thiodipropionic acid were effective by the method (a), while Na silicate, *p*-lauryl phenol, *o*- and *p*-lauryl phenol mixture, 6-tert-butyl-*m*-cresol, Versene (tetrasodium salt), triethanolamine, and β, β'-thiodipropionic acid were effective by method (b).

PATENTS

Recovery of cholesterol from tallow. Colgate-Palmolive-Peet Co. *Brit. 697,007* Sept. 16, 1953. *U. S. 2,610,195.*

Method of preparing stable emulsions of lipoidal substances in water. Engbert Harmen Reerink and Jacob Van der Vliet (by mesne assignment to Hartford National Bank and Trust Co.). *U. S. 2,588,290;* reissue *23,815.* In particular, fat soluble vitamins are emulsified in water by the use of esterified cholesterol as the emulsifying agent.

Color stabilization of fatty materials. Robert J. Hlavacek (Swift & Co.). *U. S. 2,673,868.* Color reversion of a fat which has been decolorized with a liquefied, normally gaseous hydrocarbon is prevented by the addition of a small amount of hypophosphorus acid.

Process for distilling tall oil. Ralph H. Potts (Armour & Co.). *U. S. 2,674,570.* A mixture of tall oil fatty acids, rosin acids, volatile unsaponifiables and pitch is fractionally distilled under reduced pressure and in the presence of steam. Tall oil is introduced at an intermediate zone of the fractionation column. The upper zones of the column are maintained at lower pressure than the lower zones. Rosin and pitch are withdrawn from the lower zone and the volatiles are flash-distilled off *in vacuo*. During this treatment at least part of the rosin acids are vaporized. The residue is stripped with steam in order to vaporize more of the rosin acids. The resulting acid fraction has a low content of volatile unsaponifiables and pitch.

Treatment of ricinoleic acid and the derivatives thereof with caustic alkali. George Dupont and Oscar Kostelitz (Societe Organico, Paris, France). *U. S. 2,674,608.* Sebacic acid or 10-hydroxy-decanoic acid is produced by treating an aqueous solution of ricinoleic acid or derivatives with alkali and an alkali metal phenoxide at temperatures high enough to cause the formation of the desired product by the reaction between ricinoleic acid and alkali.

Deodorization process. Robert E. Beal and Earl B. Lancaster (U.S.A., Secy. Agr.). *U. S. 2,674,609.* Glyceride oils are refined by degumming, alkali refining, bleaching, and a deodorization at 190-250°C. and pressures of 20-60 microns.

Supersaturated oil solutions of steroid hormones. Slaughter Warren Lee and Emanuel Richard Dichter (Schering Corp.). *U. S. 2,675,342.* An injectable composition is obtained by dissolving hormone in an injectable oil containing another nontoxic steroid compound. The concentration of the hormone in this solution is greater than in a saturated solution in oil alone.

Emulsion-forming liquid product. Harold A. Clymer and Mary Cecelia Ginkiewicz (Smith, Kline & French Labs.). *U. S. 2,675,343.* A pharmaceutical carrier, in which a medicinal agent can be stored and which forms a semi-solid emulsion with water at room temperature, consists of a mixture of a polyoxyethylene sorbitan fatty acid derivative, lauryl alcohol, and/or a liquid ester of lauric acid in which the alcohol portion of the ester is a lower alkylene glycol or diglycol.

Fractional liquid extraction of vitamins. Edward George Scheibel and Andrew E. Karr (Hoffmann-LaRoche Inc.). *U. S. 2,676,903.* Vitamin A alcohol and esters are separated from nonactive impurities by two stage, countercurrent liquid-liquid extraction.

• Biology and Nutrition

F. A. Kummerow, Abstractor
Joseph McLaughlin, Jr., Abstractor

Studies on vitamin B_6. V. Chronological sequence of biochemical defects in the vitamin B_6-deprived rat. J. R. Beaton, J. L. Beare, G. H. Beaton, E. F. Caldwell, G. Ozawa, and E. W. McHenry (Univ. of Toronto, Toronto, Canada). *J. Biol. Chem.* **207**, 385-90(1954). An investigation of the time of onset of biochemical defects in the vitamin B_6-deprived rat has been carried out. Differences in carcass total crude fatty acids and tissue total vitamin B_6 levels were evident within 1 week of deprivation. Significant alterations in nitrogen metabolism were not evident until at least 4 weeks, when body weight, carcass total crude fatty acids, and tissue total vitamin B_6 values had attained constant levels. Activity of liver transaminase of vitamin B_6-deprived rats did not decrease, but failed to increase with time, as in control animals. The results of this study indicate that disturbances in nitrogen metabolism in the vitamin B_6-deficient rat may be secondary to a primary effect on energy production which deprives the animal of surplus food for storage as fat.

The effect of fat-free diets on young dairy calves with observations on metabolic fecal fat and digestion coefficients for lard and hydrogenated coconut oil. H. M. Cunningham and J. K. Loosli (Cornell Univ., Ithaca, New York). *J. Dairy Sci.* **37**, 453-461(1954). Studies were carried out with 16 1- and 2-day-old dairy calves to determine whether there is a dietary requirement for fat. It was found that calves receiving a fat-free synthetic milk developed leg weakness and muscular twitches within 1 to 5 weeks and died unless a source of fat was supplied. The condition could be cured by feeding an artificial milk containing 4% lard and prevented with one containing 1 to 2% lard. However, the fact that a milk containing 2% of hydrogenated coconut oil also prevented the appearance of these symptoms indicated that the early death of the fat-deficient calves was not the result of an essential fatty acid deficiency. The results suggest that body storage of essential fatty acids at birth may be adequate to last a calf several months but that dietary fat may be necessary during the first few days. Plasma total lipid levels were found to vary directly with the quantity of fat in the diet, whereas linoleic and arachidonic acid levels were much lower in calves receiving the hydrogenated coconut oil or fat-free diets. Dietary fat had no apparent effect on plasma linolenic acid values. Digestibility studies were conducted every second week on calves receiving diets containing 2% lard or coconut oil. The coconut oil was 86.4, 89.7, 85.5, and 71.9% digested, and the lard was 72.6, 77.0, 92.5, and 93.7% digested during the second, fourth, sixth, and eleventh weeks, respectively. Metabolic fecal fat excretion of three calves receiving a fat-free diet during the seventh and eighth weeks amounted to 19 to 29 mg. per kilogram of body weight per calf per day.

Studies on the phosphatide content of human serum. Menard M. Gertler, Jacob Kream, and Omar Baturay (Home for Aged and Infirm Hebrews, New York, N. Y.). *J. Biol. Chem.* **207**, 165-73(1954). Micromethods for the separation and estimation of serine, ethanolamine, and choline by means of filter paper chromatography as applied to the study of crude human serum phosphatide extracts are described. The 48-hour acid hydrolysis of crude extracts yields maximal amounts of choline, serine, and ethanolamine, whereas the liberation of inorganic phosphorus is incomplete. A few representative analyses of various serum phosphatide extracts demonstrate that choline-containing phosphatides represent the major constituent.

The action of lecithinase D on lecithin. The enzymatic preparation of D-1,2-dipalmitolein and D-1,2-dipalmitin. Donald J. Hanahan and Robert Vercamer (Univ. of Washington). *J. Am. Chem. Soc.* **76**, 1804-6(1954). The action of lecithinase D of *Cl. perfringens* type A toxin on pure lecithins in 98% ether-2% alcohol has been studied. When (dipalmitoleyl)-L-α-lecithin was used as substrate, D-1,2-dipalmitolein and phosphorylcholine were obtained as products. When the substrate was (dipalmitoyl)-L-α-lecithin, D-1,2-dipalmitin and phosphorylcholine were found. The yield of products was 90% or greater. The reaction proceeded smoothly and reproducibly in this solvent system and was followed by a direct titration of the phosphorylcholine in the reaction medium.

Essential fatty acids and human nutrition. II. Serum level for unsaturated fatty acids in poorly-nourished infants and children. A. E. Hansen and H. E. Wiese (Univ. of Texas Medical Branch, Galveston). *J. Nutrition* **52**, 367-73(1954). The blood serum levels for the total fatty acids, dienoic, trienoic, tetraenoic and hexaenoic acids, were determined on 57 poorly-nourished infants and children. There were no significant differences in the amount of the total fatty acids in serum of children in fair and poor nutritional states as compared with well-nourished children. Dienoic, tetraenoic and hexaenoic acid levels in the serum of inadequately nourished children were significantly lower than in healthy children. The trienoic acid level in the serum of inadequately nourished children was significantly higher than in healthy children. Absorption data indicate the presence of a small amount of pentaenoic acid in the serum of all children; this did not vary with nutritional *status*.

Specificity of esterases. IV. Behavior of horse liver esterase towards a homologous series of n-fatty acid esters. B. H. J. Hofstee (Palo Alto Med. Research Foundation, Palo Alto, Calif.). *J. Biol. Chem.* **207**, 219-24(1954). The behavior of a purified horse liver esterase toward a homologous series of *n*-fatty acid esters as the substrates has been investigated. It was found that the K_M values of the systems are only slightly influenced by the carbon chain length of the fatty acid moiety of the substrate from C_3 to C_9 or higher, with the exception of a considerable difference between the K_M values for the C_6 and C_7 compounds. The first order catalytic constant (V_m/K_M), on the other hand, increases exponentially with increase of the number of carbon atoms from the C_3 to the C_6 compound inclusive (factor 2.5) and from the C_6 to at least the C_9 ester (factor ≈ 2). At low substrate concentrations the maximal rate of hydrolysis occurs with at least 12 C atoms in the fatty acid.

Butyrated lard in the ad libitum feeding of "filled milk" for veal production. J. H. Hopper, K. E. Gardner, and B. C. Johnson (Univ. of Illinois, Urbana). *J. Dairy Sci.* **37**, 431-5(1954). In experiments involving 34 three-day-old male calves from the five major dairy breeds, it was found that ad libitum feeding of an emulsified filled milk containing butyrated lard gave average daily gains of 2.16 lb. over an 8-week experimental period. These gains, which averaged 241% of Morrison standards, were equal to those obtained on whole milk and were significantly better than the gains obtained on a filled milk containing lard. On the basis of this work, it appears that the short chain fatty acids are important for the calf and that such a butyrated lard-filled milk can satisfactorily replace whole milk in the feeding of dairy calves.

Relation of protein and fat intake to growth and corneal vascularization in galactoflavin-produced ariboflavinosis. Hans Kaunitz, Herbert Wiesinger, Frederick C. Blodi, Ruth Ellen Johnson, and Charles A. Slanetz (Columbia Univ., New York, N. Y.). *J. Nutrition* **52**, 467-81(1954). The influence of dietary casein levels ranging from 5 to 75% and of fat levels ranging from 0 to 20% upon rats on high or low riboflavin intakes with and without galactoflavin supplementation was studied with regard to growth, food consumption, survival time and corneal vascularization. On riboflavin-high diets containing 20% lard, weight increases ran roughly parallel to the protein level up to 30%. With 74% casein, the weights were similar to those on 18%. The daily caloric intakes were about 28 cal. for the animals on 5% casein, eventually about 50 for those on 18 or 30%, and about 40 for those on 74%. Corneal vascularization occurred equally in all animals on 5% casein, regardless of riboflavin or galactoflavin intake. Higher protein levels delayed the development of the condition. On fat-free diets its onset was further delayed. The conclusion was drawn that the possibility cannot be ruled out that riboflavin deficiency plays a more specific part in this type of corneal vascularization than is often believed.

Lipid deficiency in the calf. M. R. Lambert, N. L. Jacobson, R. S. Allen, and J. H. Zaletel (Iowa Agr. Expt. Station, Ames). *J. Nutrition* **52**, 259-71(1954). The dietary essentiality of lipids for young dairy calves was studied by feeding a "lipid-free," semi-synthetic milk containing casein, lactose, minerals, and vitamins. Responses to various lipid supplements were evaluated. Weights and clinical observations were recorded daily for each calf. Weekly blood plasma samples were analyzed for total fatty acids, "Allen fat," phospholipids and for linoleic, linolenic, and arachidonic acids. Marked retardation of growth (weight gain) was observed after calves were fed the lipid-free diet for approximately three weeks. Other lipid deficiency symptoms which were quite severe in approximately 50% of the calves at 8 weeks included scaly dandruff; long, dry hair; excessive loss of hair on the back, shoulders, and tail; and diarrhea. Blood plasma "Allen fat," total fatty acids, phospholipids and linoleic acid were significantly lower in the calves receiving the lipid-free milk than in calves

receiving lipids. Differences among the various dietary groups in the blood plasma linolenic and arachidonic acid contents were small and the values for the former were low in all instances.

The investigation of a cholesterol esterase in rat liver. M. C. Schotz, L. I. Rice, and R. B. Alfin-Slater (Univ. of Southern California, Los Angeles, Calif.). *J. Biol. Chem.* **207**, 665-9 (1954). Rapid hydrolysis of cholesterol acetate by rat liver homogenates has been demonstrated. The system responsible for this activity has been shown to be enzymatic in nature, with optimal activity at pH 8. A quantitative distribution of the hydrolytic activity within the liver cell is reported. The activity is associated almost exclusively with the microsomal fraction. The possible significance of this system in cholesterol metabolism *in vivo* is discussed. The similarity between this enzyme and a vitamin A esterase reported by other investigators is indicated.

The unsaturated fatty acids of milk fat. I. Methyl ester fractionation and isolation of monoethenoid constituents. L. M. Smith and E. L. Jack (Univ. of California, Davis). *J. Dairy Sci.* **37**, 380-9(1954). The concentrations of the unsaturated fatty acids of a typical California milk fat were calculated from methyl ester distillation data obtained by conventional methods. Methyl esters of milk fat were prepared conveniently by a methanolysis procedure employing mild reaction conditions and pentane as solvent. This solvent was more satisfactory than ethyl ether or methanol in low temperature fractionation of methyl ester mixtures. Low temperature crystallization *from* pentane was more convenient and efficient than extractive crystallization with urea for the separation of saturated and unsaturated methyl esters. The methyl esters of the monoethenoid fatty acids of milk fat from decenoic to octadecenoic were isolated by vacuum distillation and partially purified by low temperature crystallization techniques.

The unsaturated fatty acids of milk fat. II. Conjugated and nonconjugated constituents. L. M. Smith and E. L. Jack (Univ. of California, Davis). *J. Dairy Sci.* **37**, 390-7(1954). Uutraviolet absorption curves for milk fats before and after alkali isomerization showed the presence of conjugated and nonconjugated polyethenoid constituents. The amounts of these polyunsaturated fatty acids in representative California milk fats were estimated by spectrophotometry and compared with other published data. Methyl esters of the polyethenoid fatty acids were concentrated by combinations of vacuum distillation, preferential urea complex formation, and low temperature crystallization procedures. The latter technique was superior to the urea complex method for the concentration of polyethenoid esters by removal of saturated and monoethenoid components. Although individual conjugated and nonconjugated polyunsaturated constituents were not isolated in a pure state from a mixture of C_{18-12} methyl esters by fractional distillation in vacuum, appreciable fractionation was achieved. The results showed that the milk fat contained small amounts of conjugated and nonconjugated dienoic, trienoic, and tetraenoic fatty acids with carbon chain lengths of 18 or longer. Spectrophotometric evidence also indicated the presence of a nonconjugated pentaenoic constituent.

The unsaturated fatty acids of milk fat. III. Geometrical isomerism. L. M. Smith, E. L. Jack, and N. K. Freeman (Univ. of California, Davis). *J. Dairy Sci.* **37**, 399-405(1954). Infrared absorption spectra were recorded for C_{18}, C_{16}, C_{14}, C_{12}, and C_{10} monoethenoid methyl ester fractions of milk fat and for three C_{18-20} fractions, each containing different distributions of polyethenoid constituents. The spectrograms were compared with the available spectral data for pure saturated and unsaturated esters of long chain fatty acids. The presence of only minor absorption at 2.8 to 2.9 μ in all curves was interpreted as evidence that sample preparation occasioned no appreciable oxidation with concurrent hydroperoxidic hydroxyl formation and geometric isomerism. The C_{18} to C_{12} monoethenoid fractions showed an absorption band near 10.35 μ which is attributed to the presence of trans isomers. Approximate concentrations of trans components ranged from 14 to 27% of the monoethenoid methyl esters. An absorption peak characteristic of a terminal double bond in the C_{10} fractions provided strong evidence that the unsaturated bond of decenoic acid occurs between the ninth and tenth carbons. Absorption bands at 10.35 μ were observed in the C_{18-20} fractions containing polyethenoid methyl esters, but it was not clear whether the trans component(s) were isomeric forms of one or more of the nonconjugated polyethenoid esters or of the methyl oleate present. In one of the C_{18-20} fractions, which contained approximately 15% conjugated dienoic constituent, the infrared spectrum showed the configuration of the conjugated double bonds to be principally cis-trans.

The precursors of sphingosine in brain tissue. David B. Sprinson and Andrée Coulon (Columbia Univ., New York, N. Y.). *J. Biol. Chem.* **207**, 585-91(1954). The synthesis of sphingosine in nervous tissue was investigated with the aid of glycine-1-C^{14}, glycene-2-C^{14},N^{15} ethanolamine-2-C^{14}, and L-serine-3-C^{14}, 2,3-D,N^{15}. It was found that carbon atoms 3 and 2 and nitrogen of serine are utilized for carbon atoms 1 and 2 and nitrogen of sphingosine, respectively, while the carboxyl group is lost. Ethanolamine is not used for this portion of the molecule, while the α-carbon and nitrogen of glycine are incorporated probably by way of serine. The incorporation of label into carbon atoms 3 to 18 of sphingosine was compared with that of the fatty acid and D-galactose moieties of cerebrosides, and with brain cholesterol. Ethanolamine is effectively utilized for C-3 to C-18 of sphingosine, and fatty acids and cholesterol via conversion to acetate. The galactose had only low activity, although several of the compounds administered are effective glycogen formers in liver.

Stearolic acid, an essential fatty acid? H. J. Thomasson. *Nature* **173**, 452(1954). Stearolic acid has vitamin F activity since this acid, when mixed throughout the diet in the form of its ethyl ester, prolongs the life of vitamin F-deficient rats. The activity of stearolic acid has now been investigated by means of our new method for the standardization of vitamin F. The stearolate did not give any improvement in the body weight, but quite the reverse, for a significant decrease in weight was found. It is clear that stearolic acid is not able to improve the survival time, tail lesions, or growth of vitamin F-deficient animals; on the contrary, it affects them adversely.

Studies on the fatty acid oxidizing system of *animal tissues*. V. Unsaturated fatty acyl coenzyme A hydrase. S. J. Wakil and H. R. Mahler (Univ. of Wisconsin, Madison, Wisconsin). *J. Biol. Chem.* **207**, 125-31(1954). A hydrating enzyme preparation specific for unsaturated acyl derivatives of CoA has been isolated and purified from beef liver mitochondria. This preparation catalyzes the hydration of α,β-unsaturated and β,γ-unsaturated acyl CoA derivatives. It is specific for the trans isomer. At equilibrium, the ratio of β-hydroxy to total unsaturated acyl CoA derivative equals 1.4 ± 0.2. Hydrase can be activated with GSH and cysteine and is inhibited by *p*-chloromercuribenzoate, iodoacetamide, and iodosobenzoate.

Studies on the fatty acid oxidizing system of animal tissues. VI. β-hydroxyacyl coenzyme A dehydrogenase. Salih J. Wakil, D. E. Green, S. Mii, and H. R. Mahler (Univ. of Wisconsin, Madison, Wisconsin). *J. Biol. Chem.* **207**, 631-8(1954). The enzyme catalyzing the oxidation of β-hydroxyacyl CoA derivatives with DPN as electron acceptor has been isolated, and partially purified, from beef liver mitochondria. The enzyme acts on all β-hydroxyacyl CoA derivatives tested from C_4 to C_{12} and is optically specific for the product of the unsaturated acyl CoA hydrase, *i.e.*, α-β-hydroxyacyl CoA. Under the assay conditions used maximal activity is obtained at pH 10.0. At this pH the reaction proceeds completely from left to right, while at lower values the equilibrium can be shifted in favor of β ketoacyl CoA formation by the use of Mg^{++} as complexing agent.

Essential fatty acids and human nutrition. I. Serum level for unsaturated fatty acids in healthy children. H. F. Wiese, R. H. Gibbs, and A. E. Hansen (Univ. of Texas Medical Branch, Galveston). *J. Nutrition* **52**, 355-65(1954). The blood serum levels for dienoic, trienoic, tetraenoic, and hexaenoic acids were determined on 93 well-nourished infants and children. The serum levels for two, three, and four double-bond fatty acids are in the same range for both well-nourished hospitalized children and healthy non-hospitalized children. There appears to be a slightly lower level for dienoic and tetraenoic acids in the serum of infants than in children two to 15 years of age. The trienoic acid content of the serum for healthy children is relatively low. On a dietary intake comprising about 3% of the total calories as linoleic acid, the mean serum levels of two, three, and four double-bond fatty acids for 60 healthy control children four to 15 years of age were, respectively, 30.3, 1.5, and 10.2% of the total fatty acids. On the basis of these blood levels, the data indicate that there is no dietary requirement for arachidonic acid for healthy children when linoleic acid is supplied. The hexaenoic acid content of the serum of healthy children shows wide variations. The significance of pentaenoic and hexaenoic acids in the serum of healthy children is not known.

Formation of acetoacetate from fatty acids by particular systems of rat liver. Robert F. Witter, Mary A. Cottone, and Elmer Stotz (Univ. of Rochester, Rochester, New York). *J. Biol. Chem.* **207**, 671-7(1954). The effect of chain length on the acetoacetate yield from each of a series of fatty acids

ranging in chain length from C_2 to C_{17} was investigated with particulate preparations from rat liver which did not require the addition of activators for the maximal rate of oxidation. The systems studied included washed particles, mitochondria prepared in isotonic sucrose, and mitochondria prepared in hypertonic sucrose. With the exception of acetic and propionic acids, the acids were oxidized at vigorous rates. The carbon chains of acids with an even number of carbons, with the exception of acetic acid, were converted quantitatively to acetoacetate, whereas those with an odd number of carbons yielded slightly more than 1 mole of acetoacetate per mole of fatty acid oxidized. The fatty acid oxidase activity of the mitochondria prepared in isotonic sucrose was relatively stable to freezing and storage at low temperature.

Determination of fatty oils in citronella oil. A. I. Biggs (Dept. of Chem., Univ. of Malaya, and Govt. Dept. of Chem., Singapore, Malaya). *Anal. Chem.* 26, 602-603(1954). The method found desirable for the determination of amounts as low as 0.1% of fat in oil of citronella is based on the estimation of the small amount of glycerol formed from the fat. The test involves a modification of the method of Malaprade for glycerol.

Potentiometric nonaqueous titration of substituted fatty acids. Jack Radell and E. T. Donahue (ERRL, Philadelphia, Pa.). *Anal. Chem.* 26, 590-591(1954). Application of the potentiometric nonaqueous titration method to mixed wool wax acids has made possible the determination of neut. equivs., which usually were unattainable or highly inaccurate. The compounds used demonstrate the feasibility of titrating fatty acids containing substituted bromine or an amino, epoxy, dihydroxy, alpha-sulfonic acid, and ammonium alpha-sulfonate group. This work indicates that lactone, lactam, and epoxy functional groups do not interfere in the determination of the neutralization equivalent even in wool wax with an acid no. as low as 17.

Influence of a prolonged secretion of noradrenaline or a prolonged exposure to low temperature on liver lipides of the rat. Colette Aujard (Inst. recherches cancer, Paris). *Compt. rend. soc. biol.* 147, 965-8(1953). One group of male rats received 14 injections of 50 γ-noradrenaline/rat in 21 hrs.; another group was given 14 injections of 5 mg./rat of diethylmethylphosphonate in 21 hrs. to stimulate continuous secretion of noradrenaline by the adrenal medulla; and a third group was simply kept in a room at 4° for 25 hrs. There was little change in the liver cholesterol or phosphatides in any group. Liver fat increased in the first 2 groups, especially in the first. Irregular changes up or down were observed in the liver fat of the third group. (*C. A.* 48, 4073)

The nutrition of the young Ayrshire calf. XIII. The toxicity of unsaturated acids of codliver oil. K. L. Blaxter, F. Brown, and A. M. MacDonald (Glasgow Univ., Scotland). *Brit. J. Nutrition* 7, 287-98(1953). Calves were given a basal ration of dried skim milk with small supplements of α-tocopherol acetate and added codliver oil or its fractions. Severe muscular dystrophy developed in calves given codliver oil or the total unsaturated acids of the oil. Slight dystrophy occurred in calves given the highly unsaturated acids of the oil. Calves which received the nonsaponifiable residue of the oil or the saturated fatty acid fraction did not develop dystrophy. Calves which received the less unsaturated acids did not develop dystrophy but their musculature was pale. Muscles of both dystrophic and normal calves contained approximately the same amount of total tocopherols. Dystrophic muscles contained the same amount of tocopherols as contiguous normal muscles, or more. The toxicity of codliver oil to calves is caused by its polyunsaturated fatty acids and not by hypervitaminosis A or D, and the toxicity may be a general effect of polyunsaturation rather than of a single polyethenoid acid.

XIV. Some effects of natural and synthetic antioxidants on the incidence of muscular dystrophy induced by codliver oil. *Ibid.* 337-49. Muscular dystrophy was induced by a diet of dried skim milk and codliver oil. *dl*-α-Tocopherol acetate given by mouth increased the tocopherol concentration in the blood serum and protected the animal against toxic action of the codliver oil unsaturated acids; intramuscular injection caused no increase in tocopherol concentration and resulted in only slight protection. Ascorbic acid in massive doses by mouth or by intravenous injection had no effect on blood or tissue tocopherol concentrations and gave no protection. Large daily doses of Et gallate by mouth caused a systemic disturbance but gave no protection. Biotin, intramuscularly, had no effect on the muscular dystrophy. Daily administration of one g. methylene blue protected against the codliver oil toxicity, but there was no increase of tocopherols in serum, muscle, liver, or perinephric fat. The concentration of blood serum tocopherols at the beginning of the experiment was correlated with the amount of colostrum the calves had been given. 32 references. (*C. A.* 48, 3497-8)

Effect of a high-fat rice diet on the deposition and fatty-acid composition of liver fat of albino rats. S. M. Bose and V. Subrahmanyan (Central Food Technol. Research Inst., Mysore). *Ann. Biochem. and Exptl. Med.* (India) 12, 93-102(1952). A poor rice diet supplemented with 30% cow ghee induced a poor but steady growth in rats. Liver-fat content was found to be above normal level, although the livers were not very fatty. The major-component fatty acids of the liver were found to be oleic, palmitic, and linoleic, the minor components being myristic, hexadecenoic, stearic, and arachidonic, while lauric and arachidic acids were present in traces. The lower fatty acids of the dietary fat were not deposited in the liver of rats. (*C. A.* 48, 4068)

The nutritive value of fats. Pedro Cattáneo (Fac. cienc., exactas y nat., Buenos Aires). *Ciencia e invest.* (Buenos Aires) 9, 258-64, 308-12(1953). A review with 72 references. (*C. A.* 48, 4067)

Biosynthesis of linolenic acid in the egg during incubation. E. Cielēns (Acad. Sci., Riga, Latvia). *Latvijas PSR Zinātnu Akad. Vēstis* 1950, No. 10 (Whole No. 39) 57-9. Relative contents of linolenic acid were determined in the egg and in chicken meat (just after hatching). No linolenic acid was found in egg albumin and only traces in egg yolk, but a measurable amount in chicken meat, and still higher amounts in brain, liver, and kidney. Linolenic acid is formed during incubation of the egg. (*C. A.* 48, 3505-6)

Lipide changes in the interstitial gland of the rabbit ovary at estrogen formation. Lennart Claesson, Nils-Ake Hillarp, and Bertil Högberg (Histol. Inst., Lund, Sweden). *Acta Physiol. Scand.* 29, 329-39(1953). The changes in cholesterol were studied for the interstitial gland of the rabbit ovary in order to elucidate the biosynthesis of steroid hormones under gonadotropin stimulation. The mobilization of cholesterol esters is rapid and begins before changes appear in other lipides. Considerable quantities of cholesterol are thus transformed, a decrease of 17-36 mg. per g. ovarian tissue occurring in the first 6 hrs. A much smaller decrease in free cholesterol occurs much later. The fate of the fatty acids (FA) set free is not known. The residual FA do not begin to decrease until the esterified cholesterol has been mobilized, indicating that the processes of synthesizing FA from cholesterol esters utilize the residual FA fraction when the former has been exhausted; the evidence also supports the view that the residual FA are utilized for the increase in phospholipides. The latter increase begins at the time the ovarian weight increases, and both proceed simultaneously, but are not due to increase in the number of the interstitial cells. (*C. A.* 48, 3515)

Influence of the rations of cows on the properties of milk fat and the quality of butter. R. Davidov and V. Aristova (Timiryazev Agr. Acad., Moscow). *Molochnaya Prom.* 14(10), 31-4 (1953). The effects of the addition of linseed cake to a diet consisting of hay, straw, turnips, mangelwurzel, and bran on milk and fat production, physical chemical properties of fat, and quality of butter was studied. The optimum amount of linseed cake in the diet for milch cows during 95 days' feeding trial was 2.5 kg. per day (140 g. of linseed cake per kg. of milk produced). The addition of 5 kg. of I caused significant changes in the physical-chemical properties of fat and the palatability and storage stability of the butter. (*C. A.* 48, 3497)

Clinical studies in blood-lipide metabolism. VIII. Disturbed serum-lipide partitions in liver diseases with and without jaundice. A. Allen Goldbloom, Harold B. Eiber, and Linn J. Boyd (New York Med. College, New York, N. Y.). *Am. J. Digest. Diseases* 20, 354-61(1953). Lipide fractions, *i.e.*, cholesterol with its partitions, lipide P, neutral fats, and total lipides, were determined in patients with malignancy of the liver without jaundice, cirrhosis with and without jaundice, and infectious hepatitis with jaundice. Normal serum total-lipide values with increased phospholipide and esterified cholesterol fractions were associated in patients having cirrhotic livers without jaundice. The serum-lipide partitions observed in cases of nonjaundiced cirrhosis simulated the hypolipemia of dietary origin. (*C. A.* 48, 4093)

Differences in fat content between morning, noon, and evening milks. Johannes O. Gütte (Univ. Göttingen, Germany). *Milchwissenschaft* 8, 321-4(1953). A theory and related experimental supporting data were advanced to account for the following observations: in 2-stage milking, evening milk is richer in fat than morning milk; in 3-stage milking, noon

milk is richer than evening, and evening milk is richer than morning; and in a single milking, the 1st portion is richer than the last. Milk in its passage from the alveoli to the cistern of the udder encounters a filtering action resulting in fat depletion. During the preparation of the udder, oxytocin is secreted which stimulates the passage of fat-rich milk out of the alveoli. During the single milking, the first portion represents fat-poor cistern milk, the last portion fat-rich alveoli milk. The morning milking augmented the quantity of fresh milk lodged in the udder during the morning-noon interval, to account for the high experimental yield in the noon milking. (*C. A.* **48**, 4080)

Utilization of carotene and vitamin A by rats deficient in essential fatty acids. A. W. Halverson and A. L. Moxon (S. Dakota State Coll., Brookings). *Univ. S. Dakota Bull. 31, Proc. S. Dakota Acad. Sci.* No. 203-7(1952). Measurement of carotene digestion and of vitamin A liver storage in rats with and without essential fatty acid supplementation (Wesson oil) indicated no impairment of carotene and vitamin A metabolism in unsaturated fatty acid deficiency. (*C. A.* **58**, 3491)

The effect of a cholesterol-free brain fraction against diet-induced atherosclerosis. R. C. Jones, S. C. Kraft, S. Huffman, E. L. Balter, and R. B. Gordon (Univ. of Chicago). *Circulation Research 1*, 530-3(1953). The feeding of a lipide-poor and virtually cholesterol-free residue of mammalian brain mitigated the hypercholesteremia and atherosclerosis in cholesterol-fed chicks. This effect could be sustained for at least 5 weeks. The degree of reduction in hypercholesteremia was roughly proportional to the dose of brain extract (given as 5, 10, and 15 g./100 g. diet). The probable mechanism depends upon the capacity of oral cerebrosides to convert a large proportion of fecal sterols into unabsorbable coprosterol, thus rendering the intestinal cholesterol unavailable. (*C. A.* **48**, 3499)

Vitamin A in milk. IV. Seasonal variation in the vitamin A potency in the milk of cows and buffaloes. M. G. Kalyanakrishnan, T. M. Paul, C. P. Anantakrishnan, and K. C. Sen (Indian Dairy Research Inst., Bangalore). *Indian J. Dairy Sci.* **4**, 143-9(1951). Carotene and vitamin A potency increased in seasons when carotene was more available from green fodder. The average vitamin A potency of the milk did not differ widely between different breeds or cross-breeds of cow. On a pure fat basis cow milk is slightly richer than buffalo milk, but the higher fat content of the latter gives it much higher vitamin A potency.

V. Vitamin A content of buffalo colostrum. K. M. Narayanan, T. M. Paul, C. P. Anatakrishnan, and K. C. Sen. *Ibid.* **5**, 45-50(1952). A sharp decline in the yield of colostrum, and increase and then a decrease in fat and a steady decrease in vitamin A in the colostrum were observed as lactation advanced.

VI. The influence of continued intake of shark-liver oil on the vitamin A content of milk and butterfat. K. M. Narayanan, C. P. Anantakrishnan, and K. C. Sen. *Ibid.* **6**, 67-74(1953). Feeding cows and buffaloes 100,000-200,000 international units (I.U.) of vitamin A as shark-liver oil per head per day for 7 weeks and for 22 weeks had no effect on milk yield or fat %. In a green-fodder regime with carotene intake at 1241-1385 mg. per head per day shark-liver oil produced no increase in vitamin A of the milk fat of the animal. At a lower carotene intake of 300 mg. per head per day, shark-liver oil showed a temporary increase in the vitamin A content of the milk fat. Supplementation with shark-liver oil slightly decreased the carotene content of the milk fat of the cows. In a dry-fodder regime, supplementation with shark-liver oil increased the vitamin A content of the milk fat of both animals, a dose of 200,000 I.U. per day resulting in a maximum average total vitamin A potency of 1066 I.U. and 1155 per lb. of milk, resp., representing vitamin recoveries of 4.5 and 6.7%, resp. (*C. A.* **48**, 3501)

Calf nutrition. II. Feeding colostral fat. T. M. Paul, C. P. Anantakrishnan, A. J. Lazarus, and K. C. Sen (Indian Dairy Research Inst., Bangalore). *Indian J. Dairy Sci.* **5**, 91-4 (1952). Results indicate that colostral fat at 3% level in skim milk is a good substitute for whole milk in the raising of newborn calves. (*C. A.* **48**, 3501)

The storage of estrogens in the animal body. II. Hormonally fattened pigs. Walter Koch and Gerda Heim (Univ. Munich, Germany). *Endokrinologie* **30**, 395-8(1953). Five pigs weighing 120-200 kg. received 1 g. dienestrol. Less than 20 γ/kg. were found in the musculature and 20-60 γ/kg. in the fat of 3 of the animals. When more hormone was administered, up to 20 mg. estrogen/kg. was found in the fat. (*C. A.* **48**, 3518)

Vitamin A and essential fatty acids in the production of cutaneous lesions in the rat. Najoo K. Kolah and M. V. Radhakrishna Rao (Haffkine Inst., Bombay). *Current Sci.* (India) **22**, 207-8(1953). Albino rats maintained on a fat-free diet developed cutaneous lesions resembling those developed on a vitamin A -deficient diet. The epithelial lining of the hair follicles and sebaceous glands of rats fed a fat-free diet were not affected while those of rats fed a vitamin A-deficient diet atrophied. The keratin materials formed in rats fed the fat-free diet were deposited in dense masses while that of rats fed the vitamin A-deficient diet was deposited in loose lamellae. The addition of gingelly oil (a rich source of essential fatty acids) prevented the appearance of lesions in rats fed the fat-free diet. (*C. A.* **48**, 3493)

The alteration of the lipemia-clearing effect of heparin following the intravenous injection of thorium dioxide (thorotrast). Virgil S. LeQuire, Mary E. Gray, and Cully A. Cobb (Vanderbilt Univ. Med. School, Nashville, Tenn.). *Circulation Research* **1**, 523-9(1953). In the normal dog made lipemic by feeding olive oil, soybean oil, or corn oil, the intravenous injection of 30 mg. heparin cleared the plasma approximately 77%. Protamine sulfate restored the lipemia. Thorotrast lowered the response to heparin but not to protamine. (*C. A.* **48**, 3560)

Mechanism of the β-oxidation of fatty acids. Feodor Lynen (Univ. Munich, Germany). *Bull. soc. chim. biol.* **35**, 1061-83 (1953). A lecture reviewing present knowledge of the enzyme systems involved. 45 references. (*C. A.* **48**, 4012)

Analytical constants of the butterfat from different quarters of the udder. G. K. Murthy, K. R. Lalitha, and N. N. Dastur (Indian Dairy Research Inst., Bangalore). *Indian J. Dairy Sci.* **4**, 129-33(1951). A statistical analysis from 35 animals showed no significant difference in analytical constants of the butterfat from different quarters of the udder of either cows or buffaloes. (*C. A.* **48**, 3585)

Normal tocopherol content in the blood. Clara Claros Navarrete. *Anales fac. farm. y bioquím., Univ. nacl. mayor San Marcos* (Lima, Peru) **2**, 504-15(1951). Healthy men had 0.03-0.14 mg. (av. 0.09) vitamin E in 100 cc. blood, women 0.12-0.17 mg. (av. 0.14). (*C. A.* **48**, 4081)

Influence of prolonged administration of cortisone and adrenocorticotropin on the glycogen in the tissues (liver, muscle, heart, and kidneys) of the guinea pig. Influence on the lipide metabolism. Antonia Notaria and Roberto Caspani (Univ. Pavia, Italy). *Arch. sci. med.* **96**, 656-69(1953). Adrenocorticotropin is more active than cortisone in mobilizing peripheral fat, as is evidenced by the more pronounced loss in body weight and increase in the plasma lipide fraction and total liver fat. The adrenal cortex produces steroids which are more active in lipide catabolism than cortisone. (*C. A.* **48**, 4081)

Experiments on synthesis of cow milk in the perfused udder. G. Peeters, R. Coussens, and G. Sierens. *Rev. Pathol. gén. et comparée* **53**, 1434-40(1953). The excised udder is bisected, so that each half may be perfused independently with heparinized and oxygenated cow blood to which any substrate may be added. O, CO_2, and metabolized products may be assayed in the tissues or outflowing blood. NaOAc is actively metabolized (with respiration quotient > 1): if tagged in the carboxyl group it confers high radioactivity to milk and butterfat. It is used for biosynthesis of lipides via the tricarboxylic acid cycle; adding first fluoacetate, then, one hr. later (when fluoacetate has been changed to fluocitrate), adding acetate, results in accumulation of citric acid in blood, milk, and tissues. If both fluoacetate and acetate are introduced concomitantly, no such inhibition of citric acid metabolism is observed. (*C. A.* **48**, 4072)

Quantitative changes in brain lipides in total tetanus. M. Sh. Promyslov (Inst. Pathophysiol. and Exptl. Therap., Acad. Med. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* **92**, 1003-5(1953). In total tetanus in rabbits there is a decline in the amount of cerebrosides but no change in total protein or phospholipides of the brain and no change in the concentration of cerebrosides in the spinal cord. (*C. A.* **48**, 4095)

Serum lipides in the infrared region. Spectrophotometric study of diabetics and normals. K. O. Renkonen and Rolf Koulumies (Univ. Helsinki). *Ann. Med. Exptl. et Biol. Fenniae* (Helsinki) **31**, 248-53(1953). The serum lipides from 9 cc. of blood were concentrated in CCl_4 and the infrared absorption curve was determined for 4 normal humans, 9 young diabetics, and 11 old diabetics. These were compared with the curves for pure lipides. The lipides of diabetics and especially old diabetics seemed to contain more N and P lipides than those of the normals; those of young diabetics, contained fewer amide

groups. Great variability was found among individuals. (*C. A.* **48**, 4095)

Volatile fatty acids in laboratory and field silage. A. John G. Barnett and R. E. B. Duncan (University of Aberdeen). *J. Sci. Food Agric.* **5**, 120-6(1954). The formation of volatile fatty acids in aqueous slurries of minced grass or kale or field silage was studied by means of paper chromatography. The effect of fermentation temperatures, aeration, or anaerobiosis for varying periods of time on the yield of volatile fatty acids was determined. In general, the yield increased with a rising pH and the disappearance of lactic acid. However, acetic, propionic and butyric acids were present in all field silage samples. Acetic acid was predominant. Other straight chain acids from C_4 to C_8 were formed but isovaleric acid seemed to be the only lower branched chain acid. If a high total volatile fatty acid content indicates a poor quality silage, the best method of preventing such formation is by chopping the crop and compressing the mass to exclude air, or by sterilizing with sulfur dioxide.

Toxicity studies on hydroquinone. A. J. Carlson and N. R. Brewer (Univ. Chicago). *Proc. Soc. Exp. Biol. Med.* **84**, 684-87(1953). Chronic toxicity experiments with hydroquinone in dogs, rats, and men at dose levels greatly exceeding those expected if hydroquinone were utilized commercially showed that this compound could be used safely as a food preservative. No evidence of cumulative toxicity was found.

Sinitiro Kawamura, Abstractor

Urinary excretion of riboflavin by rats as influenced by fatty acid intake. Tatsuo Koyanagi and Harunobu Noro (Iwate Univ.). *J. Agr. Chem. Soc. Japan* **27**, 670-2(1953). It has been shown that the fat intake increases the riboflavin requirement. The effect of microflora of the intestine was excluded by adding homosulfamine to the basal diet. Starch of the diet was replaced with equicaloric fatty acids such as oleic, palmitic, caproic, caprylic, capric, laurie, myristic, linoleic, and stearic acids. Every fatty acid decreased the riboflavin output. Thus the oxidation of fatty acid used more riboflavin than that of starch. Oleic acid required the smallest amount of riboflavin, and linoleic acid the largest.

Bioassay of fat-soluble vitamins. III. Effect of vitamin B_{12} on the determination of vitamin D with rats fed with synthetic diets. Akihiko Nakayama (Univ. Tokyo). *J. Agr. Chem. Soc. Japan* **27**, 395-8(1953). No effect of vitamin B_{12} was observed on the analytical value of vitamin D obtained by bioassay with rats. No anemia was recognized in rats with completely vitamin B_{12}-free diets. It seemed to be due to the biosynthesis of vitamin B_{12} in rats.

The volatile fatty acids produced by Penicillium roqueforti from cheese curd. Tomokichi Tsugo and Tsuneaki Imamura (Univ. Tokyo). *J. Agr. Chem. Soc. Japan* **27**, 838-42(1953). Changes of volatile fatty acids were observed in whole milk curd, skim milk curd, goat milk curd, and cream inoculated with *P. roqueforti* and/or *Streptococcus lactis*. Most of the volatile fatty acids was in the form of salt and those in ester form were acetic and butyric. Caproic, caprylic, and capric acids were not produced with *S. lactis*.

The low boiling fractions obtained by industrial molecular distillation of basking-shark-liver oil. Isami Tsujino and Kiyokazo Kikuchi (Hokkaido Univ., Sapporo). *J. Agr. Chem. Soc. Japan* **27**, 437-9(1953). The low boiling fractions (0.06% at 120-130° under 0.001 mm. Hg, and 1% at 200-250° under 0.001 mm. Hg) consist mainly of pristane, squalene, and free palmitic acid.

• Drying Oils

Raymond Paschke, Abstractor

1953 Annual Review of the Paint Industry. Published by *Paint and Varnish Production*. Discusses the field very broadly. 228 pages, 1337 references.

Curing agents for epoxy resins. Anon. *Off. Dig. Federation Paint Varnish Production Clubs* **26**, No. 349, 109(1954). An open forum discussion of a paper by Harold Witteoff which appeared *Ibid.* **25**, 825(1953).

Oxycat nips air pollution. Anon. *Paint, Oil Chem. Rev.* **117**, No. 6, 17(1954). This catalyst burns waste hydrocarbon vapors to CO_2 and H_2O. It has been successful in solving pollution problems in the metal coating, oil refining and powdered metal industries.

Continuous styrenation of drying oils. C. Boelhouwer, T. S. Tjoan, and H. I. Waterman (Technical Univ. DELFT). *Chemistry and Industry* **1954**, 240. In these experiments only 12% of styrene was taken up by linseed oil, a poor result compared to the batch process (*Ibid.* **1953**, 1287). Tung oil added 18% styrene which is comparable to the batch experiments.

Factors limiting general application of the Mackey test for spontaneous heating and ignition. P. C. Bowes. *J. Appl. Chem.* **4**, 140(1954). The test is considered as general method for assessing the spontaneous heating and ignition hazards of materials that are subject to atmospheric oxidation at ordinary temperatures.

Glycerine alkyds tailored to need. C. R. Bragdon. *Am. Paint J.* **38**, No. 28, 76(1954). A discussion of how alkyds are formulated for specific needs.

The absorption of water, swelling, and solubility of free films of paint. F. L. Browne (Forest Products Lab., Madison, Wis.). *J. Forest Products Research Soc.* **3**, 108(1953). Fresh unsupported paint films absorb varying amts. of moisture, depending on oil content and chem. nature of the pigment. The accompanying increase in area may be as much as 50%. The effect decreases slightly with weathering. When bonded to a lesser-swelling substrate (wood), the imposed restraint produces a swelling stress which may be responsible for some paint failures. If the pigment contains rod-shaped particles, the films may have a "grain" detd. by the direction of the last brush stroke. Such grain dets. the pattern of cracking. (*C. A.* **48**, 3703)

These remarkable epoxys. C. A. Cerami. *Org. Finishing* **15**, No. 3, 15(1954). By combining epoxy resins with urea resins, phenolic resins, or fatty acids, etc., a whole range of air drying and baking vehicles can be produced. The field has just begun to be explored. The future will bring remarkable new applications.

The chemistry of polymerized oils. Part IV. Thermal polymerization of some long-chain unsaturated fatty esters. A. L. Clingman, D. E. A. Rivett, and D. A. Sutton (National Chemical Res. Lab., Pretoria, S. Africa). *J. Chem. Soc.* **1954**, 1088. A formal structural proof is given that addition of the Diels-Alder type takes place during thermal dimerization of methyl β-eleostearate. The method employed has also been applied to the thermal dimers of some unconjugated unsaturated fatty esters.

Historical outline of the development of paints. J. H. de-Vlieger. *Verfkroniek* **26**, 202(1953). A general, industrial, chem., and educational discussion of the history of paints in the 19th century. 118 references. (*C. A.* **48**, 3703)

Trends and factors affecting fatty acid usage in alkyd resins. K. A. Earhart (Allied Chemical & Dye Corp., Toledo). *Am. Paint J.* **38**, No. 27, 74(1954). Discussion of some of the more important trends in the uses of alkyds; trends in the formulation of alkyds; economic trends affecting the use of fatty acids; the effect of other chemicals, especially polyhydric alcohols and acids on the use of fatty acids; trends in the use of various fatty acids through the years; and trends in specifications for fatty acids. The author suggests four research projects: (1) cheap ways of removing linolenic acids, (2) the color producing power of pure fatty acids, (3) efficient isomerization to conjugated isomers, and (4) alkyds prepared from pure acids.

Compatibility of polymeric materials. W. J. Hanau. *Paint Varnish Production* **44**, No. 3, 31(1954). A review covering industrial importance, compatibility requirements, types, tests, and factors governing compatibility.

Some analytical problems in drying oil and resin research. N. W. Hanson (Imperial Chemical Industries, Ltd., Slough, Bucks, Eng.). *Oil & Colour Chemists' Assoc. J.* **37**, 143(1954). The author discusses some of his studies on newer analytical procedures and compares the results with those of other workers. Specifically considered are (1) ring analysis by the method of Waterman in which fatty acids are converted to hydrocarbons, (2) the analysis of stand oil for monomer, dimer, and higher polymers, (3) the analysis of marine oils by urea segregation, distillation, and solvent crystallization of their methyl esters, and (4) the measurement of unsaturation of some hydrocarbon resins.

Growth of fungi on paint films. K. Meier and H. Schmidt (Univ. of Berlin, Ger.). *Paint Varnish Production* **44**, No. 3, 20(1954). (The German version appeared in the May, 1952, issue of *Deutsche Farben-Zeitschrift.*) Destruction of paint films is due more to fungi than to moisture, heat, cold, sunlight, or mechanical influences. Almost any vehicle can be attacked. Moisture and moderate heat favor fungi growth.

Low temperatures and dryness retard growth. The action of pigments is due to mechanical resistance as well as to specific toxic reactions. Fungi damaged films are softer, less pliable and swell more readily. Growth can be prevented by (1) eliminating favorable conditions and by (2) addition of toxic material, which do not interfere with desirable film properties.

Partition chromatography in the examination of natural resins. J. S. Mills and A. E. A. Werner (National Gallery, London). *Oil & Colour Chemists' Assoc. J.* **37**, 131(1954). A method of reversed-phase partition chromatography for the examination of natural resins is described. Each natural resin gives a distinctive chromatogram characterised by the number, colour, and R_f values of the zones corresponding to the components separated. The method can be used for the identification of natural resins alone or when mixed with oils as in varnishes and paint media. It has also proved a convenient method for following the course of the separation of the constituents of dammar when chromatographed on an alumina column. A few synthetic resins have also been examined. A system of reversed-phase partition chromatography on kieselguhr (rendered unwettable by treatment with dichlorodimethyl silane) has been adapted for the separation of the acidic constituents of resins. Acids differing in their degree of unsaturation can be separated. This method has been applied to the qualitative examination of rosin and certain modified rosin materials.

Acetone tolerance of catalytically bodied and blown oils. D. M. Noack and R. E. Dunbar (N. Dak. Agr. Coll., Fargo). *Proc. N. Dakota Acad. Sci.* **7**, 54(1953). cf. *J. Am. Oil Chemists' Soc.* **28**, 141(1951). (*C. A.* **48**, 3705)

The measurement of the dielectric constant in the paint and plastics laboratory. F. Oehme. *Farbe W. Lack* **59**, 475(1953). Devices for measuring dielec. const. of liquids, plates, films, and powders are described. (*C. A.* **48**, 3707)

Kauri reduction—its prediction and interpretation. T. C. Patton (Baker Castor Oil Co.). *Off. Dig. Federation Paint Varnish Production Clubs* **26**, No. 349, 116(1954).

Organosols from vinyl resins. G. M. Powell, T. E. Mullen, K. L. Smith, and D. E. Hardman (Carbide and Carbon Chemicals Co.). *Off. Dig. Federation Paint Varnish Production Clubs* **26**, No. 349, 94(1954). Various commercial resins are compared briefly and some general principles of formulation are discussed.

The use of lecithin in the manufacture of paints and analogous products. J. Remond. *Rev. prod. chim.* **56**, 425(1953). A review with 21 references. (*C. A.* **48**, 4227)

Vinyl resins for industrial coatings. C. O. Schwahn (Bakelite Company). *Off. Dig. Federation Paint & Varnish Production Clubs* **26**, 180(1954). A review.

The meaning and assessment of light fastness in relation to pigments. F. M. Smith and D. M. Stead (James Anderson & Company, Hawkhead, Paisley, Eng.). *Oil & Colour Chemists' Assoc. J.* **37**, 117(1954). The authors contend that the light fastness of a pigment has no significance and that it is only the light fastness of a pigmentation that can be measured and has any value. The wide differences in light fastness shown by using the same pigment at the same concentration in different media are described. The adoption of the Blue Wool Scale B.S. 1006 in conjunction with the International Geometric Scale is strongly advocated. The facors to be defined in the assessment of the light fastness of a pigmentation are enumerated and discussed.

Cohesive properties of soya-alkyd unpigmented and pigmented protective coating films. W. J. Snoddon and L. L. Carrick (Univ. of Mich.). *Off. Dig. Federation Paint Varnish Production Clubs* **26**, 195(1954). The mechanical properties of paint films are discussed, and classical theories of viscoelastic behavior are applied to the stress relaxation of the unpigmented material, good agreement between theory and observed results being obtained with the help of generalized Maxwell model. A theory for the increase in stiffness due to the addition of inelastic dispersed spheres to a viscoelastic matrix is applied to the pigmented alkyd film with poor results. The factors causing these deviations are discussed. 97 references.

The effect of pigmentation on modern flat wall paints. F. B. Stieg and D. F. Burns (Titanium Pigment Corp.). *Off. Dig. Federation Paint Varnish Production Clubs* **26**, No. 349, 81 (1954).

Thermal isomerization of gum rosin. J. S. Stinson and R. V. Lawrence (Naval Stores Research Div., Olustee, Fla.). *Ind. Eng. Chem.* **46**, 784(1954). The increase in the softening point, the change in optical rotation from positive to negative, and the increased tendency for the rosins to crystallize that occur with moderate heating are caused principally by the increase in abietic acid content of the rosin. As this heating is continued or as the temperature is increased, all of these changes are reversed. The optical rotation becomes more positive, there is less tendency to crystallize, and there is a gradual decrease in softening point. Decarboxylation increases with both temperature and time.

Cashew nut shell liquid. IX. The chromatographic separation and structural investigation of the olefinic components of methylcardanol. W. F. Symes and C. R. Dawson (Columbia Univ.). *J. Am. Chem. Soc.* **75**, 4952(1953). Cardanol, the monophenolic component of commercial cashew nut shell liquid, has an olefinic unsaturation of about two double bonds and possesses the carbon skeleton of 3-pentadecylphenol. It has been found that the methyl ether can be separated by chromatography on alumina into four pure components which vary only in their degree of unsaturation in the side chain. A monoolefin, diolefin, and triolefin account for about 95% of the methylcardanol. The fourth component has the saturated side chain. There is no evidence of a component containing more than three double bonds. The structures of the three olefins have been established by methods of oxidative degradation.

How to evaluate paint odors. H. L. Wampner (Reichhold Chemicals, Inc.). *Can. Paint Varnish* **28**, No. 3, 24(1954). A simple test for determining the odor level of paint as if it were drying on the wall.

Electro-osmotic examination of paint films. Part II. J. K. Wirth and W. Machu. *Paint Oil Chem. Rev.* **117**, No. 5, 26 (1954). This part is concerned with electrolytic conductance in diaphragms.

Thirty years' experience in testing aluminum paint performance. R. I. Wray (Aluminum Research Labs., New Kensington, Pa.). *Corrosion* **10**, 50(1954). (*C. A.* **48**, 2703)

PATENTS

Wrinkle finish coating composition containing a vinyl chloride-vinyl acetate-vinyl alcohol terpolymer and an alkyd resin. W. A. Waldie (to New Wrinkle, Inc., Dayton, Ohio). *U. S. 2,671,062.*

Vinyl resin-alkyd wrinkle composition. W. A. Waldie (to New Wrinkle, Inc., Dayton, Ohio). *U. S. 2,671,063.*

Separation of tall oil acids. J. Harwood, C. W. Hoerr, and R. A. Reck (to Armour and Co., Chicago). *U. S. 2,672,458.* A process for precipitating the resin acid components of tall oil from the fatty acids in aqueous acetonitrile contg. 5 to 25% H_2O by wt.

2,2-Bis(hydroxymethyl)-1-heptanol and its derivatives. Societe Organico. *Fr. 979,551.* 110 g. of abietic acid and 20 g. of the bis-heptanol are heated to give a diabietate suitable as a resin for varnishes or paints. (*C. A.* **48**, 3388)

Coating composition. Council of Scientific and Industrial Research. *Indian 47,382.* Cashew nut liquid is slowly heated to 1,800 in the presence of ferric oleate for ½ hour and then air blown at 180° for 14 hours. (*C. A.* **48**, 3708)

Removing acid from polymerized oil prepared from highly acid rice oil. Ryosei Koyama. *Japan 1680('53).* Rice oil (1 kg.) with an acid no. of 87.6 is polymerized by heating for 3 hrs. at 260-70° to obtain 890 g. polymerized oil. The polymerized oil is heated for 30 min. at 80° with 15 ml. of 50% H_2SO_4 contg. 3.6 g. $K_2Cr_2O_7$ washed with water, treated twice with 2.1 l. of 95% MeOH to give 620 g. oil with an acid no. of 5.6. (*C. A.* **48**, 3712)

• Waxes

R. L. Broadhead, Abstractor

Plant wax. II. Constituents of the wax of mogusa. Atsushi Fujita and Toshiyoshi Yoshikawa (Univ. Kumamoto). *J. Pharm. Soc. Japan* **73**, 464-5(1953); cf. *C. A.* **46**, 1783d. Extn. of mogusa (hairy layer on leaves of *Artimisia vulgaris*) with $(Me_2CH)_2O$ yielded 2.3% wax (I), m. 65°; sapon. of I with 10% alc. KOH gave hentriacontane m. 68.5°, 1-eicosanol (II), m. 70-1° (oxidation of II with CrO_3 gives eicosanoic acid, m. 79°; anilide, m. 84-5°), 12-tricosanol (III), m. 74-5°, acetate, m. 66-6.5° (oxidation of III with CrO_3-AcOH gives a ketone, $C_{23}H_{46}O$, m. 79.5°); the fat acids consist of capric, palmitic, and stearic. (*C. A.* **48**, 3252)

Floor polish in the U. S. A. A. Kroner. *Seifen-Ole-Fette-Wachse* **80**, 115-116, 139-141(1954). The waxes and resins

used in the formulation of aqueous emulsion polishes are discussed. Some utility tests for the products are described.

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Waxed, solid, fibrous products. Willem M. Mazee and Hendrikus J. Loois (to Shell Development Co.). *U. S. 2,659,683,* Nov. 17, 1953. A wax paper of cardboard is manufd. by coating a solid, fibrous product with molten wax and then rapidly cooling the wax by immersing the wax-coated paper or cardboard in Hg at a temp. less than the m.p. of the wax, preferably at 0-20°. (*C. A.* **48**, 3690g)

Refined sugar-cane wax. Albert C. Henn and Harry W. Peterson, Jr. (to Standard Oil Development Co.). *U. S. 2,662,907,* Dec. 15, 1953. Sugar-cane mud is extd. with 99% iso-PrOH (I) at 40-50° to remove fatty acids and then re-extd. with boiling I to sep. the hard, light-colored wax with a high m.p. A 95-7% recovery of extractable material is obtained with I, which is greater than the recovery with hexane. (*C. A.* **48**, 3715)

• Detergents

Lenore Petchaft, Abstractor

Toxicity of soaps and detergents. Dr. Louis C. Barail. *Soap, Sanit. Chemicals* **30**, No. 4, 52-5(1954). A study of the external toxicity of soap products shows that most soap products cause very little skin irritation. Crudely made, cheap hand cleaners cause most of the cases assigned to soaps and alkali cleaners. The use of patch testing to screen irritant materials is advocated.

Influence of organic compounds on soaps and phosphatide coacervates. XVIII. The influence of pH on the action of fatty acids on soap coacervates (with some notes on the germicidal action of detergents). H. L. Booij and A. M. van Leeuwen (Univ. Leiden, Neth.). *Proc. Koninkl. Ned. Akad. Wetenschap.* **56**, 255-67(1953) (in English). The salt sparing (I) or salt demanding (II) action of fatty acids containing 8-22 C atoms was measured. In Na oleate at pH 12 all fatty acids are II with a minimum at C_{16} to C_{18} acids; at pH 9.6 (borate buffer) C_{16} and C_{18} acids are I, all other fatty acids are II. In Na cetyl sulfate, minima of II as a function of chain length occur in various buffers between pT 5.8 and 12. At pH 8.3 C_{18} to C_{22} acids are I. I is attributed to uptake of neutral molecules of fatty acids by micelles of coacervate with maximum effect when the length of the fatty acid gives the best fit. *o*-Cresol forms unstable coacervates with Na oleate in approximately 0.2 *N* KOH. Maxima in the biological activity of detergents are discussed. 15 references. (*C. A.* **48**, 3711)

The chemistry and physics of detergent solutions. Kenneth G. A. Pankhurst. *Roy. Inst. Chem. Lectures, Monographs and Repts.* **1953**, No. 5, 21 pp. This lecture covers history and definition of wetting and detergency; classification of detergents into anionic, cationic, and nonionic; micelle formation; and physical properties such as osmotic pressure, electrical conductivity, solubility, solubilization, interfacial activity, foaming, and emulsification. No single property suffices as a criterion of detergency. The products can be tailor-made for the purpose. (*C. A.* **48**, 4232)

Detergent tablets. Their development, production and marketing. W. B. Reinisch. *Soap, Perfumery, Cosmetics* **27**, 385-7, 404(1954). The possible uses of detergent tablets are reviewed. The chief problems involved in manufacture consist of the disintegration of the anionic synthetics, usually in the bar, and the cost. A suitable filler or binder should be compatible with the active detergent and not inhibit its lathering properties. It should reduce or control the solubility of the detergent, should be economical, should be of such a physical form as to enable the composition to be processed on conventional equipment, must be mild, have a soap-like feel and should be of a specific gravity comparable to that of soap. Problems of formulation and perfuming are discussed.

Glycerol losses during the concentration of soap lyes. II. G. Reutenauer (Lab. Iterg, Paris). *Bull. mens. inform. ITERG* **7**, 542-7(1953). The losses caused during concentration of diluted glycerol solutions because of the presence of the compounds examined previously are exactly the same with soap lyes under the same conditions. The quality of the concentrated raw glycerols was investigated in both cases. Concentrates from solutions containing 0.5% of $FeCl_3$ (I) upon analysis with the International Standard Method had 94.0, 96.0, and 92.5% glycerol but only 91.0, 92.6, and 90.0% with the periodate method. The difference may be attributed to presence of glycols. The 2 methods applied to raw glycerol from solutions containing 0.5% of Al sulfate (II) furnish practically identical results. Volatile matters are lowest with II (from 0.3 to 0.5%) and sensibly higher in samples refined with I at 0.9, 1.0, and 1.5%, respectively. The same is true for the ash contents which are 0.2-0.4% against 0.9-1.4% upon purification with II or I. Soap lyes produced from fats containing oxidized acids (III) after concentration have as much as 1.1, 1.4, 3.6, and 7.1% volatile matter if the original fat mixture of 20% coconut oil and 80% tallow contained, respectively 0.2, 0.8, 2.0, and 4% of III. There is no influence on the ash content and practically no coconut oil is replaced by rosin. (*C. A.* **48**, 3711)

Refined tall oil products for the soap industry. Max Stein. *Seifen-Ole-Fette-Waschse.* **79**, 543-5(1953). This is a review of the production of fatty acids and resin acids from tall oil and their application in the soap industry. 25 references. (*C. A.* **48**, 3711)

Behavior of several high molecular weight phosphates in the laundering process. O. Uhl. *Fette u. Seifen.* **55**, 109-12(1953). Laundering experiments showed that the same phosphate will not act the same with every type of surface-active agent. For industrial applications, a preliminary wash in aqueous polyphosphate is suggested. (*C. A.* **48**, 4233)

Rapid cooling-extrusion plant for household soap production. J. M. Vallance. *Soap, Perfumery, Cosmetics* **27**, 382-4(1954). The cooling-extruder of the Mecchaniche Moderne soapmaking plant is described. Cooling and solidification take place in a zone totally free from air and by means of a cooling extruder, which in a single operation sucks, cools, and compresses the soap into a solid bar. This extrusion takes place when the soap is still plastic, thus assuring a uniform texture of the bar in its molecular and crystalline composition.

New antiseptic for soap. L. J. Vinson (Lever Brothers Co., Edgewater, N. J.). *Soap, Sanit. Chemicals* **30**, No. 4, 44-7, 103(1954). Tetramethylthiuram disulfide (TMTD) at a one percent level contributes significant antiseptic and deodorant properties to soap. *In vitro* and actual usage data indicate that, in general, TMTD has greater practical value as a soap antiseptic than the bisphenolics currently in use. This conclusion is based on the findings that TMTD 1) exhibits activity against a wider spectrum of bacteria and fungi, 2) has a greater substantivity to skin, 3) compares favorably in mildness to pure soap, and 4) has no discoloring effect on soap.

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Improvement in patterned detergent. Procter & Gamble Co. *Brit. 699,394.* Bars of solid aerated detergent normally susceptible to damage are formed by extruding the detergent in a shape-retaining, pasty-cohesive form through an orifice designed to produce a pattern of surface contours extending the length of the resulting detergent strip, and then cutting the detergent strip into lengths corresponding to individual bars.

Improvements relating to synthetic detergent compositions. Peter Tamburo Vitale and Muriel Eileen Liftin (Colgate-Palmolive-Peet Co.). *Brit. 704,390.* Detergents having improved lathering and detergency properties are prepared by adding to higher alkyl aryl sulfonates, phosphates, and fatty acid amides having synergistic effects. *Brit. 704,391.* Detergents having improved lathering and detergency properties are prepared by adding to higher alkyl aryl sulfonates, a mixture of minor proportions of an aliphatic monohydric or dihydric alcohol having at least 8 carbon atoms in the molecule and a fatty acid amide having synergistic properties.

Detergent compositions. Colgate-Palmolive-Peet Co. *Brit. 704,576.* A detergent composition consisting of synthetic organic detergents and water-soluble inorganic polyphosphate compounds will not tarnish German silver upon the addition of dibutyl thiourea.

Alkaline detergent composition. Charles E. Wheelock and William B. Reynolds (Procter & Gamble Co.). *U. S. 2,673,186.* A solid form detergent composition of alkaline nature having an enhanced whiteness in sunlight consists of an alkaline detergent selected from either water soluble alkali metal salts of higher fatty acid or non-soap anionic synthetic organic detergents and a small proportion of a heat stable and alkaline stable coumarin derivative such as 3-iso-propyl-4-methyl-7-hydroxycoumarin.

Detergent compositions. Earl L. Brown (Monsanto Chemical Co.). *U. S. 2,673,842.* A detergent having improved lathering properties is prepared by mixing varying proportions of the alkali metal or ammonium sulfates of the 2-butyloctanol-1-polyglycol ethers with alkali metal or ammonium salts of N-alkyltaurines in which the alkyl radical has 12 carbon atoms.