TABLE II
Analytical Results on Commercial Products

Sample	Total Fatty Acid by Ion Exchange	Total Fatty Acid by Extraction and Titration	Solvent
Brushless Shave Cream No. 1 [a]	19.35	19.29	Ethanol-Benzene 1:1
Brushless Shave Cream No. 2 [b]	22.72	22.35	Ethanol-Benzene 1:1
Brushless Shave Cream No. 3 [c]	26.05	26.56	Ethanol-Benzene 1:1
Soap Facial Cleanser [d]	33.70	33.67	Ethanol
Shampoo No. 1	29.65	29.06	Ethanol
Shampoo No. 2 [e]	12.91	12.70	Ethanol
Commercial Soap Flakes [f]	87.85	87.92	Ethanol-Benzene 1:1

[a] Includes 15.50% free fatty acid.
[b] Includes 19.87% free fatty acid.
[c] Includes 21.90% free fatty acid.
[d] Includes 4.42% free fatty acid.
[e] Phosphate removed as alcohol insoluble before analysis.
[f] Corrected for 0.549% NaCl.

obtained from saponification of methyl esters distilled in this laboratory. The remaining fatty acids were obtained from commercial sources. Neutralization equivalents indicated the composition of all samples to be as represented.

Analysis of Commercial Soap Products

Products based on soap as the active ingredient or as an emulsifier were analyzed for total fatty acid by ion exchange conversion. The procedure was similar to that used for pure soaps; a single determination consumed less than 30 min. Table II presents the results obtained on shaving creams, shampoos, soap flakes, and a facial cleanser. It was found necessary to remove salt impurities, such as sulfates and phosphates, as alcohol-insoluble matter before passage through the resin. When chloride was present, the appropriate correction was made. Such additional steps increase the time required per determination.

Borax, which occurs in many shaving creams, is converted to boric acid by the cation exchange resin. This does not constitute an interference *per se,* but in the presence of glycerol, which is also a component of shaving products, the acidic complex is formed and high results are obtained.

A benzene-ethanol 1:1 mixture was found to be a suitable solvent for super-fatted products where complete solubility was not possible with ethanol alone.

Acknowledgment

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ABSTRACTS . . . . R. A. Reiners, Editor

• Oils and Fats

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The alkali-catalysed isomerization of unsaturated compounds. J. B. Davenport, A. J. Birch and A. J. Ryan (Dept. of Org. Chem., Univ. of Sydney). *Chem. and Ind.* **1956**, 136–7. The ultraviolet absorption curves of *cis*-unsaturated acids after isomerization by refluxing with a molar solution of potassium tert.-butoxide in tert.-butanol are considered as bases of an empirical estimation method for these acids. This reagent has advantages over the standard glycol reagent. The blanks are completely transparent and after maximum conjugation is achieved there is no destruction of product. The technique is also very simple. Application of this method to the kinetic study of isomerization of *cis*-unsaturated fatty acids shows the expected first order constants, and demonstrates also that the 1,4,7-trienes have a lower Arrhenius activation energy (approx. 13 k. cal. per mole) for conjugated diene production than do the 1,4-dienes (approx. 20 k. cal. per mole).

The structure and reactions of gossypol. III. Aliphatic anil derivatives of gossypol. D. A. Shirley and W. C. Sheehan (Dept. of Chem., Univ. of Tenn., Knoxville, Tenn.). *J. Org. Chem.* 21, 251–2 (1956). Stable anils of gossypol with primary aliphatic amines of 2, 5, 10, 14, 16, and 18 carbons were prepared. Their melting points were 251–255° (d), 218–221° (d), 164.5–165.5°, 126.5–127°, 116–116.5°, and 112.5–113°, respectively.

Constitution of isanic and isanolic acids. A. Seher (Univ. Münster, Ger.). *Ann.* **589**, 222–38 (1954). In studying the structures of isanic acid and isanolic acid isolated from Isano- (or Boleko) seed oil, a series of conjugated diene dicarboxylic acids were prepared and their properties studied. The collected data show unequivocally that isanic acid has the structure $CH_2=CH(CH_2)_4-C\equiv CC\equiv C(CH_2)_7COOH$. Based on the present data and those reported previously, the structure of isanolic acid is $CH_3(CH_2)_2CH=CHC\equiv CC\equiv CCH_2CH(OH)$-$(CH_2)_6COOH$. (*C. A.* 50, 1601)

Electrolysis of organic acids and the decomposition of diacyl peroxides. III. The electrolysis of free fatty acid and the decomposition of diacyl peroxides in pyridine. S. Goldschmidt and M. Minsinger (Tech. Hoch-schule, Munich, Ger.). *Chem. Ber.* **87**, 956–63 (1954). Acetic, propionic, and butyric acid were electrolyzed in pyridine or α-methylpyridine. The electrolysis of fatty acids in pyridine and the decomposition of acyl peroxides in pyridine produced similar results. The products of electrolyses were fractionated and characterized. (*C. A.* 50, 334)

Liver oil of Centrophorus grandulosus. I. Isolation of squalene from the unsaponifiable matter. F. Ramos Ayerbe and M. A. Albi Romero. *Grasas y aceites* (Seville, Spain), **6**, 141–3 (1955). The liver of *C. granulosus* constitutes about 23% of the weight of its body and contains 60–75% oil. The liver oil has the following characteristics: d^{25}, 0.8682; n_D^{25}, 1.4900; acid number, 1.3; saponification number, 29.0; iodine number, 260; hydroxyl number, 4. The unsaponifiable matter was a clear yellow liquid. By chromatography on an alumina column, a colorless liquid similar to squalene was separated from the unsaponifiable matter. A similar fraction was also obtained by distillation in vacuo of the unsaponifiable matter. (*C. A.* **50**, 2192)

Methods of differentiation between refined and unrefined fats and oils. S. H. Bertram. *Rev. fermentations et ind.* **10**, 165–6 (1955). This method for differentiating between refined and unrefined fats and oils is based on measurements of the electric conductance of the dry material at 100°. The electric conductances of several crude and refined fats and oil were determined by the method described. (*C. A.* 50, 2189)

23rd annual short course for oil mill operators. I. What's new in oil milling. M. C. Verdery, *et al. Oil Mill Gaz.* 60(4), 11–14, 16, 18–22 (1955). New devices applicable in milling are illustrated and described. **Cottonseed cleaning experiments.** S. P. Clark. *Ibid.* 22. **Separation of cottonseed by projection**

quality of fractions. L. L. Holzenthal, W. T. Gentry, Jr., H. L. E. Vix, E. L. D'Aquin, and E. A. Gastrock (Southern Regional Res. Lab., New Orleans). *Ibid.* 25–8. **Free gossypol and protein solubility.** M. F. Stansbury (Southern Regional Res. Lab., New Orleans). *Ibid.* 29–30. **II. Introduction to session on meal quality.** T. S. Pryor. *Ibid.* 60(5), 9–10. **Chemical methods of measuring nutritive value of cottonseed meal.** A. M. Altschul (Southern Regional Res. Lab., New Orleans). *Ibid.* 10–12. **Preparation of meats and processing controls for low free gossypol and high protein solubility.** E. A. Gastrock, H. L. E. Vix, and E. L. D'Aquin. *Ibid.* 12–15. **Meal additives.** *Ibid.* 15. **Pelleting in the cotton oil mill.** F. C. Vesey. *Ibid.* 15–17. **Improvement of seed cleaning and lint quality.** B. Page. *Ibid.* 17. (*C. A.* 50, 1340)

The manufacture and keeping quality of unwashed butter. L. L. Muller (Dept. Agr. and Stock, Brisbane). *Queensland J. Agr. Sci.* 12, 1–13 (1955). A serious flavor defect in unwashed butter was not related to oxidation of butterfat as judged by ferric thiocyanate extraction of peroxide values. Non-protein nitrogen tended to be higher in unwashed butter. (*C. A.* 50, 2087)

The synthesis of methyl cis-10, cis-12-octadecadienoate. R. R. Allen (Armour and Company, Chicago, Ill.). *J. Org. Chem.* 21, 143–4 (1956). Methyl *cis*-10, *cis*-12-octadecadienoate (m.p. 1.0°, n_D^{25} 1.4690) was prepared from 10,12-octadecadienoate by semi-hydrogenation in ethyl acetate solution in the presence of quinoline using Lindlar catalyst. The structure of the product was identified by its absorption spectrum in the infrared and ultraviolet regions. The structure was further proved by identification of the dibasic acids formed from oxidative cleavage with ozone.

Oxidative changes in fats during continuous processing. N. S. Drozdov and N. P. Materanskaya. *Myasnaya Ind. S.S.S.R.* 26 (5), 48–50 (1955). Effect of the rendering, drying, centrifuging, and solidifying stages in a continuous rendering system on the development of fatty acidity and peroxide value of lard was investigated. The temperatures in the above named stages were respectively: 110, 100, 90°, and cooler temperature. Stability was most adversely affected by the duration of the drying stage. (*C. A.* 50, 2991)

The catalysis of the autoxidation of unsaturated compounds. W. Kern and H. Willersinn (Univ. Mainz, Ger.). *Angew Chem.* 67, 573–81 (1955). The spontaneous oxidation of pure methyl linoleate is an autocatalytic process. The catalyst is the primary hydroperoxide of the ester. These findings are substantiated by the results of the catalytic action of numerous peroxides and of azodiisobutyronitrile. Metal compounds (Cu^{++}, Fe^{+++}) accelerate radicle formation from hydroperoxides, but other peroxides are not activated. Oxidation-reduction systems and metal-oxidation-reduction systems gave strong catalytic effects. Conjugated unsaturated fatty acid esters show a different behavior, forming polymeric peroxides in their autoxidation. (*C. A.* 50, 1431)

The autoxidation of unsaturated compounds. IV. The autoxidation of 2,3-dimethyl-1,3-butadiene and of the methyl ester of 10,12-octadecadienoic acid. W. Kern, A. R. Heinz, and J. Stallmann (Univ. Mainz, Ger.). *Makromol. Chem.* 16, 21–35 (1955). The study of the ratio of the number of moles of oxygen to the number of moles of unsaturated compound indicates that the autoxidation of 2,3-dimethyl-1,3-butadiene is an autocatalytic reaction. The product of the reaction is most likely a polymeric peroxide with the hydrocarbon and oxygen alternating in the chain. In the uncatalyzed reaction, it is assumed that oxygen adds directly to the butadiene with the formation of a diradical. The activation energy for spontaneous autoxidation is 17.5 kcal. per mole. The spontaneous autoxidation of the methyl ester of 10,12-octadecadienoic acid proceeds similarly with an energy of activation of 17.9 kcal. per mole. The addition of radical forming materials to 10–12-octadecadienoic acid accelerates the autoxidation (*C. A.* 50, 1431)

Coulometric determination of the iodine number with a polarometric indication. Z. Kućera Sborník I. Celostátuí Pracovní Konf. *Anal. Chemiků (Prague)* 1952, 231–3 (Pub. 1953). The iodine numbers of erucic acid, methyl oleate, and methyl linoleate were determined by coulometric titration with the dead-stop method for the end point. Best results were obtained in 80–93% acetic acid containing 0.2–1.2 *N* hydrochloric acid. (*C. A.* 50, 2991)

Testing the freshness of meat and fat of poultry. S. Shchennikov, E. Ptrovskaya, and K. Krasnitskaya. *Myasnaya Ind. S.S.S.R.* 26(5), 51–3 (1955). Spoilage tests based on bacteriological examination, pH, ammonia reaction according to Nessler, peroxide reaction of the fat, albumin precipitation with $CuSO_4$, H_2S, and acidity of the fat were compared with subjective organoleptic observations on the nonfrozen and frozen stored carcasses of chickens, turkeys, geese, and ducks. Some of the objective tests were useless and no individual test was satisfactory for all the various test materials. The authors recommend a combination of the following for evaluating freshness: organoleptic observations, bacteriological examination, ammonia (Nessler method), benzidine reaction for peroxides and determination of free fatty acids in the fat. (*C. A.* 50, 2887)

Accelerated kinetic method for determination of the stability of edible fat. N. M. Emanuel, D. G. Knorre, Yu. Lyaskovskaya, and V. Piul'skaya. *Myasnaya Ind. S.S.S.R.* 26(5), 44–8 (1955). The Arrhenius equation gives a quantitative relation between temperature and rate of oxidation of fat. The effect on the stability of fat when it is rendered under vacuum, in glass and iron equipment is illustrated by graphs on the course of development of the peroxide number. (*C. A.* 50, 2888)

Paper chromatographic analysis of mixtures of saturated and unsaturated fatty acids with 12 to 22 C atoms. H. Wagner, L. Abisch, and K. Bernhard (Univ. Basel, Switz.). *Helv. Chim. Acta* 38, 1536–41 (1955). The separation is described of mixtures of fatty acids on Schleicher and Schüll paper No. 2043b with a petroleum hydrocarbon fraction, b.p. 190–220°, as stationary phase and 90% acetic acid saturated with the hydrocarbon as mobile phase. After drying, the chromatograms are treated with $(CH_3COO)_2$ Cu and $K_4Fe(CN)_6$. The acids appear as brown-red copper complexes. The separations of mixtures of erucic, stearic, palmitic, oleic, and linoleic and oleic, linoleic, and linolenic acids are described. (*C. A.* 50, 2192)

Limitations of the periodic acid method for the determination of monoglycerides in oils. C. S. Martín Pérez and M. T. Santos Molero. *Grasas y aceites* (Seville, Spain) 6, 135–40 (1955). The periodic method for the determination of monoglycerides gave values abnormally high with fish-liver oils. Chemical and physical tests have indicated that the reduction of the periodic acid was not due solely to the monoglycerides. The unsaponifiable matter, especially vitamins A and E, reduced periodic acid but not enough to account for the high values obtained. It is suggested the excess reduction was due to some fatty acid fraction; probably to the oxidation at the double bonds of the highly unsaturated fatty acids. (*C. A.* 50, 2191)

Oil from the seed of Hippophae rhamnoides. I. The fatty acids. H. P. Kaufmann and A. Vázquez Roncero (Deut. Inst. Fettforschung, Munster, Ger.). *Grasas y aceites* (Seville, Spain) 6, 81–7 (1955). The flesh of the berries contains an oil and is also high in vitamin C. The dry seeds contain 8% oil. Hexane-extracted oil from the ground seeds had the following characteristics: d^{20} 0.914, n_D^{20} 1.4770, unsaponifiables 2.1%, phosphatides 0.19%, acid number 6.0, hydroxyl number 11.9, saponification number 186.6, iodine number 152.3, thiocyanogen number 96.0, diene number 0.0, total fatty acids 93.8%. The composition of the fatty acids was saturated acids 11.6, oleic 26.6, linoleic 34.7, and linolenic 27.0%. Paper chromatography tests indicated that the saturated acids were palmitic and stearic. (*C. A.* 50, 2191)

II. The unsaponifiable matter. *Ibid.* 129–34. The oil from the seeds of *Hippophae* contained 2.1% unsaponifiable matter. Zeaxanthin, cryptoxanthin, and β-carotene were present to the extent of resp., 58, 65, and 9 mg. per kg. of oil. γ-Carotene and lycopene were also probably present. Sitosterol was the only sterol present and occurred to the extent of 0.78% of oil. (*C. A.* 50, 2191)

Analysis of oil from Zakatal'sk tea seeds. I. I. Guseĭnov. *Doklady Akad. Nauk Azerbaĭdzhan. S.S.R.* 10(5), 347–9 (1954). The seeds contain 25.33% oil of nondrying type, n_D^{20} 1.4711, d_{20} 0.9200, f.p. —10 to —13°, acid number 0.1883, saponification number 2.9, Reichert-Meissl number 0.66, Polenské number 0.07, iodine number 89.51. The oil contains carotene and vitamin E. (*C. A.* 50, 2993)

Unsaturated-fatty-acid composition of the oil of Clupea pilchardus. Rose I. Cheftel, Jean Moretti, and J. Polonovski (Fac. Méd., Paris). *Bull. soc. chim. biol.* 37, 709–14 (1955). The approximate fatty-acid composition as determined by spectrophotometric method of this sardine oil is: saturated acids 16, oleic 48, linoleic 6, trienoic acids 2, tetraenoic acids 6, pentaenoic acids 9+, and hexaenoic acids 10%. (*C. A.* 50, 2993)

Chemical study of bacaba oil. G. P. Pinto. *Rev. quím. ind.* (Rio de Janeiro) 24, 72–5 (1955). The bacabá oil originating from the fruit of the Amazonic palm tree *Oenocarpus bacaba* is similar in its composition to patauá oil (from *Jessenia bataua*). Both oils are edible. The physical and chemical properties of the former have been determined and compared with those of the latter which has been already studied. Bacabá oil has: d^{25} 0.9102, n^{25} 1.4677, saponification value 196.4, unsaponifiable matter 1.2%, free fatty acids 5.7%, iodine value(Hanus) 81.4, acetyl value 21.4, saturated fatty acids 21.4%. The fatty acid composition is: palmitic 11.8, stearic 9.6, oleic 64.8, linoleic 13.8%. (*C. A.* **50**, 2991)

Fractionation of palmarosa oil. E. S. Shapiro(Synthetics Plant, Moscow). *Masloboino-Zhirovaya Prom.* **20**(5), 17(1955). In order to increase the yield of alcohol, crude palmarosa oil is vacuum fractionated in the presence of sodium hydroxide, which simultaneously hydrolyzes the ester, combines with acidic substances, and isomerizes the ketones. (*C. A.* **50**, 2191)

Effect of positive ion bombardment and heat-treatment on the activity of a nickel catalyst. R. F. Woodcock(Brown Univ., Providence, R. I.). *Univ. Microfilms*(Ann Arbor, Mich.), **Publ. No. 13,193**, 58 pp.(Microfilm, $1.00; paper enlargement $5.80); *Dissertation Abstr.* **15**, 1327(1955). (*C. A.* **50**, 1432)

Triglycerides in butterfat and other edible fats. V. R. Bhalerao (Univ. of Ill., Urbana). *Univ. Microfilms*(Ann Arbor, Mich.), **Publ. No. 13,455**, 54 pp.(microfilm, $1.00; paper enlargement, $5.40); *Dissertation Abstr.* **15**, 1825-6(1955). (*C. A.* **50**, 2088)

The stale flavor in sterile and dried whole milk. S. H. Lombard (Univ. of Ill., Urbana). *Univ. Microfilms*(Ann Arbor, Mich.). **Publ. No. 13,516**, 101 pp.(microfilm, $1.26; paper enlargement, $10.10); *Dissertation Abstr.* **15**, 1828(1955). (*C. A.* **50**, 2086)

A study of the almond and olive oils by use of the ultraviolet spectrophotometric method. J. P. Wolff. *Revue Francaise des Corps Gras* **3**, 17–24(1956). The discussion of the theory, techniques, and limitations of the use of the ultraviolet spectrophotometric method is given along with the advantages of such a method. The author points out that the production of each season has certain differences from those of the season before and after and that much useful information may be obtained by keeping this fact in mind.

Autoxydation, mesures de prevention, antioxydants. M. Vigneron(published by Societe d'Editions Pharmaceutiques et Scientifiques, 11, rue Edouard-Jacques, Paris(14^{e})-1955). The author discusses the use of antioxidants, methods of prevention of autoxidation, and some of the tests for measuring oxidation. The 14 chapters and 125 pages give considerable information concerning the entire field of antioxidants including those in use in the field of fatty acids. The bibliography of 281 references may be of value to those interested in the problems of oxidation.

Ultraviolet spectrophotometric study of olive oils. Its application in the estimation of the quality of the oil and research on the mixtures with refined oils. A. Uzzan. *Revue Francaise des Corps Gras* **3**, 9–17(1956). The author discusses the use of spectrophotometry in the ultraviolet region for the estimation of the quality of olive oils from the 1954–55 season. The author has studied the effect of acidity, degree of oxidation, and the geographical origin of the oils upon the specific extinction coefficients at 270 and 232 millimicrons.

Changes in composition of Aspergillus nidulans with age of culture. J. Singh and T. K. Walker(College of Technology, Univ. of Manchester). *Biochem. J.* **62**, 286–289(1956). The rate of formation of fat in surface cultures of *Aspergillus nidulans*, when cultured under the conditions stated, is slow during the first week of incubation, but becomes very rapid during the eighth and ninth day, when the maximal development of the mould is reached. After the ninth day the reserve of fat in the mould decreases in weight. In the early stages of fat synthesis the fat is more acidic and contains a larger percentage of unsaponifiable substances than at any later period. Until the stage of maximal activity of the mould is attained the actual amounts of both saturated and unsaturated component acids continue to increase, but in the subsequent phase of the life of the culture the weight of each of these components diminishes. The results are not in accord with the hypothesis that, for the biosynthesis of fat, unsaturated acids are provided by dehydrogenation of saturated acids.

The component fatty acids of Penicillium lilacinum fat. J. Singh, S. Shah, and T. K. Walker(College of Technology, Univ. of Manchester). *Biochem. J.* **62**, 222–224(1956). The fat produced by *Penicillium lilacium* grown in surface culture on a chemically defined medium of sucrose and inorganic salts is solid at room temperature and has a very low free acidity (0.2% as oleic acid). The component fatty acids of this fat are: myristic, 0.1; palmitic, 32.3; stearic, 9.4; arachidic, 1.4; hexadecenoic, 3.4; oleic, 38.6; linoleic 13.4; C_{20} unsaturated acids, 1.4%. The hexadecenoic acid content, like that of fats from other fat-rich micro-organisms, is low. The moderate content of linoleic acid in this fat implies low liability to oxidative rancidity.

The fatty acid composition of Indian turtle fat. S. P. Pathak and L. M. Dey(Dept. Industrial Chem., Banaras Hindu Univ., India). *Biochem. J.* **62**, 448-451(1956). The composition of the body fat from a turtle*(Erthmochelies imbricata)* has been studied. The acids and percentages found are: lauric, 0.1; myristic, 10.2; palmitic, 15.0; stearic, 7.2; arachidic, 1.1; behenic, 0.1; C_{14}(unsatd.), 1.3; C_{16}(unsatd.), 12.9; C_{18}(unsatd.), 23.9; C_{20}(unsatd.), 20.7; C_{22}(unsatd.), 4.6; and C_{24}(unsatd.), 2.9. Significant differences have been found in the proportions of saturated and unsaturated acids, when compared with those of other amphibian animal fats. Possible reasons for this deviation in fatty acid composition are discussed.

Determination of oleic acid and potassium oleate in white spirits. S. C. Mitchell and E. J. Davies(Dyers and Cleaners Research Organization, 4 Lifton Place, Leeds 2). *The Analyst* **81**, 121–122(1956). A procedure is given for the determination of oleic acid and potassium oleate in white spirits by use of a standard perchloric acid solution and a standard potassium hydroxide solution.

Extraction of lipids from wheat products. D. K. Mecham and A. Mohammad(Western Utilization Research Branch, Albany 10, Calif.). *Cereal Chem.* **32**, 405–415(1955). Of a number of solvents tried, water-saturated *n*-butyl alcohol was most effective in extracting lipid material from whole wheat, flour, bran, and gluten. For example, extraction of three wheat flours with water-saturated *n*-butyl alcohol at room temperature removed an average of 1.62% chloroform-soluble lipids compared to 1.43% extractable by the next best solvent, hot absolute ethanol in a Soxhlet extractor for 18 hours. With bran and whole wheat, differences were larger. From three bran samples, *n*-butyl alcohol removed an average of 6.19% lipid; ethanol 5.66%. Small amounts of non-lipid materials also were present in the water-saturated butyl alcohol extracts; more were found in extracts of flour and bran than in extracts from gluten. Following the *n*-butyl alcohol extraction, glutens could be washed free from the extracted flours and extracted glutens could be wetted to form a rubbery mass. Therefore, in contrast to other effective lipid extractants, the water-saturated butanol treatment does not entirely destroy the cohesive properties of the wheat proteins.

The estimation of 1-monoglyceride. C. M. Dowse and J. A. Saunders(Dept. Physiol., The Medical School, King's College, Newcastle upon Tyne 1). *Biochem. J.* **62**, 455–458(1956). A method for the estimation of 1-monoglyceride, based upon the estimation of formaldehyde formed during periodic acid oxidation of 1-monoglyceride, is described. The method eliminates uncertainties which arise in the titration method of Pohle and Mehlenbacher(1950) when used with unsaturated fats.

Cottonseed oil: extraction by solvent. Part III. Y. Bagot. *Oleagineux* **11**, 15–24(1956). In this portion the author discusses the various machinery used in solvent extraction of cottonseed oil. 40 references.

The synthesis of long chain fatty acid derivatives of pantothenic acid. T. Sakuragi and F. A. Kummerow(Dept. of Food Tech., Univ. of Ill.). *J. Am. Chem. Soc.* **78**, 838–39(1956). The long chain fatty acid derivatives of pantothenic acid, ethyl dipalmitoxypantothenate and ethyl monopalmitoxy-pantothenate, were prepared. The dipalmitoxy compound was obtained as an amorphous fatty powder with a m.p. of 57.0–58.5°, while the monopalmitate was a somewhat waxy substance which had a m.p. of 36.0°. Both derivatives were readily soluble in fats, and showed full activity for rats as a source of pantothenic acid. Evidence was presented to show that the reaction product of pantolactone with ammonia in an aqueous medium was pantamide instead of the ammonium salt of pantoic acid. The synthesis of dipalmitoxypantothenyl palmitate, which melted at 49.0–53.0°, was also reported.

The synthesis of long chain fatty acid derivatives of the vitamin B_6 group. T. Sakuragi and F. A. Kummerow(Dept. of Food Tech., Univ. of Ill.). *J. Am. Chem. Soc.* **78**, 839–42 (1956). The following long chain fatty acid derivatives of the vitamin B_6 group have been prepared: pyridoxine tripalmitate, pyridoxine trilinoleate, pryidoxine trioctanoate, pyridoxine tridecanoate, pyridoxal dipalmitate, pyridoxamine tripalmitate, pyridoxine 3,5-dipalmitate, pyridoxal 3-palmitate, pyridoxine 5-palmitate and 4-desoxypyridoxine dipalmitate. The ultraviolet spectra of these derivatives were essentially the same, having one maximum absorption peak in the neighborhood of 265–270 mμ or at 283 mμ (pyridoxine 5-palmitate) in diethyl ether as a solvent.

The field of oil chemistry. Petroleum and fats. Tsutomu Kuwada(Univ. Tokyo). *J. Japan Oil Chemists' Soc.* **5**, 2–6(1956). A review on the interrelation of the chemistry and industry of petroleum and fatty oils.

Petroleum industry from the viewpoint of fats and oils industry. Taiji Oohashi(Nihon Yushi Co., Tokyo). *J. Japan Oil Chemists' Soc.* **5**, 6–7(1956). A brief discussion of the interrelation of the 2 industries.

Color substance of oils. I. Rape oil. 1. Yosaburo Iwasa, Masao Inoue, Goro Kajimoto, Akira Hashimoto, and Katsunori Mukai (Univ. Osaka Pref.). *J. Agr. Chem. Soc. Japan* **29**, 844–6 (1955). The color substance of rape oil was easily adsorbed on activated clay. It could be extracted with 3% NaOH. When the alkaline solution was acidified to pH 4.3, the pigment was precipitated. The purified pigment contained 0.17% N.

The Twitchell reagent for fat hydrolysis. XXX. Properties of the negative catalyst produced during the storage of oils. Kyôsuke Nishizawa, Shunroku Kanno, Shôgo Tada, and Shirô Okuyama(Tôhoku Univ., Sendai). *J. Chem. Soc. Japan, Ind. Chem. Sect.* **58**, 578–82(1955). Experiments with rancid soybean and rape oils gave the following results. The oil difficult to hydrolyze due to storage and simultaneous rancidity could be hydrolyzed with the Twichell reagent, when the amount of the reagent was increased. Treatment of the oil with the solution of the reagent, or dilute mineral acid, or by heating removed the negative catalyst. The inhibitory action of the negative catalyst consisted in the combination with the splitting agent. The rancid oils showed increased surface tension by treatment with H_2SO_4. The waste liquor of splitting tended to lose surface activity when the oil was difficult to hydrolyze. Thus the negative catalyst for fat splitting agent(Nishizawa *et al.*, 1944) produced during the storage of oils was concluded to be oil-soluble surface-active matter, which inhibited the contact of the oil and the splittiing agent by forming stable film at the interface between oil particles and splitting agent solution.

Changes in the oil in the course of ripening and germination of rape seeds. Senjirô Maruta and Fumio Iwama(Yamanashi Univ., Kôfu). *J. Chem. Soc., Ind. Chem. Sect.* **58**, 605–7(1955). The oil content reached a maximum on the 45th day after blooming. Iodine no. of the oil increased remarkably between the 25th and 35th days after blooming, and it remained nearly constant afterwards. Acid no. and conjugated dienoic acid content decreased during the maturation of rape seeds. By germination oil content decreased, acid no., saponification no., and conjugated dienoic acid content of the oil increased, and iodine no. was nearly constant.

Microdetermination of vitamin A. II. Estimation of vitamin A and β-carotene in blood. Yoshikazu Sahashi, Akihiko Nakayama, and Keiji Harashima(Univ. Tokyo). *J. Agr. Chem. Soc. Japan* **29**, 715–19(1955). Some modifications were made on the microcuvette and reagents(kerosene and xylene) in the Bessey method for determining serum vitamin A. The extinction coefficient of β-carotene was 2420 at 460 mμ in kerosene-xylene, and so the conversion factor for calculation of carotene should be 413 rather than 480. β-Carotene and lycopene had no influence on the value of serum vitamin A measured by this method.

III. Absorption of vitamin A and β-carotene by vitamin A-deficient rats. Yoshikazu Sahashi, Akihiko Nakayama, Keiji Harasawa, and Hideo Iwamoto. *Ibid.* 719–21. Vitamin A-deficient rats contained no trace of vitamin A in blood serum. When administered as aqueous vitamin A dispersion stabilized with Tween 80, blood serum contained a maximal amount of vitamin A after 3 hours. This was not noted with 300 i.u. but with 1,000 i.u. of β-carotene administered orally.

Fat-globule membrane material of cow milk. I. Isolation of membrane protein and its electrophoretic properties. Rinjiro Sasaki, Susumu Koyama, and Michio Nishikawa(Univ. Tokyo). *J. Agr. Chem. Soc. Japan* **29**, 827–31(1955). Fat-globule membrane protein was prepared from the cream, separated from cow milk, after washing 4 times with 0.95% NaCl solution. Membrane protein was compared with casein, whey protein, and nonwashed cream protein by paper electrophoresis and the Tiselius electrophoresis. The membrane protein was presumed to be either whey protein other than β-lactoglobulin or similar to whey protein.

II. Adsorption of radioactive Ca^{45} caseinate and whey protein on milk fat-globules. Rinjiro Sasaki and Susumu Koyama. *Ibid.* 831–3. Ca^{45} caseinate was not detected on the surface of fat-globules after 2 washings. β-Lactoglobulin was washed out after 2 washings, but other components of whey protein were still adsorbed on the surface of fat-globules even after 4 washings. Thus the membrane protein did not contain casein, but consisted of whey protein components and further might contain some hitherto unknown component.

The phosphatide of aquatic animals. II. The brain lecithin of a sperm whale, Physeter catodon. Hisanao Igarashi and Koichi Zama(Hokkaido Univ., Hakodate). *J. Agr. Chem. Soc. Japan* **29**, 958–61(1955). Purified lecithin, prepared through $CdCl_2$ salt, contained N 1.68% and P 3.61%; I no. 71.5. The fatty acids consisted of palmitic 15.4, stearic 14.0, eicosanoic 6.4, docosanoic 3.5, tetracosanoic 5.3, oleic 23.7, eicosenoic 2.5, highly unsaturated (chiefly eicosatetraenoic) 25.2, and other acids 3.9%.

III. The brain lecithin of a pollack, Theragra chalcogramma. Koichi Zama and Hisanao Igarashi. *Ibid.* 961–4. This lecithin contained N 1.63% and P 3.69%; I no. 92.6. The fatty acids consisted of myristic 4.3, palmitic 19.5, stearic 8.9, arachidic a trace, physeteric 1.6, zoomaric 10.0, oleic 32.9, linoleic 0.4, arachidonic 6.9, and clupanodonic 14.6%.

Chromatographic determination of mole per cent butyric acid in fat. *J. Assoc. Off. Agr. Chemists* **39**, 88–90(1956). The first action method for the chromatographic determination of butyric acid in dairy products is described.

Variation of contact angle and structure with molecular length and surface density in adsorbed films of fatty acids. W. C. Bigelow and L. O. Brockway(Dept. Chem., Univ. Michigan, Ann Arbor). *J. Colloid Sci.* **11**, 60–8(1956). Films of fatty acids(lauric, myristic, palmitic, stearic, arachidic, or behenic) were prepared by adsorption on carefully cleaned glass microscope slides from cetane solutions. Variations in film density were achieved by (1) using a range of concentrations with a fixed short time of immersion and (2) by subsequent immersion of the most dense films in cetane. Electron diffraction patterns showed an increasing average tilt of the molecules relative to the surface-normal with decreasing chain length but no apparent change in tilt with variations in surface density. The contact angles of cetane on the films decreased from a maximum of 43–44° as the density of the adsorbed molecules decreased, but the angles were independent of variations in tilt and chain length. The probable orientation of the adsorbed molecules is discussed.

The role of lipids in baking. III. Some breadmaking and other properties of defatted flours and of flour lipids. M. A. Cookson and J. B. M. Coppock(British Baking Indus. Research Assoc., Chorleywood, Herts). *J. Sci. Food Agr.* **7**, 72–87(1956). Data in the literature support the hypothesis that flour lipids are connected with bread improvement by both oxidizing chemicals and shortenings, and contribute fundamentally to bread quality. The nature and properties of the flour lipids are reviewed in considerable detail. In the present study, the effects of different extracting solvents were determined. Alcohol-extracted flour was unique in that its dough had too low a ratio of extensibility to resistance to produce good bread. Flour extracted with ether, ether-alcohol mixtures or carbon tetrachloride yielded breads which were superior to those from undefatted flour in volume, texture and crumb color. Bread from light petroleum ether-extracted flour was very similar except that crumb color was slightly duller. Acetone-extracted flour yielded a bread with smaller volume. Defatted flour changed little in doughmaking quality during storage. Addition of shortenings had no measurable effect on dough properties except volume but had a pronounced effect on the bread. Bread from defatted flour had poorer volume and crumb softness than the controls whereas bread from undefatted flour was improved in these properties. The lipids were studied by means of countercurrent distribution and spectrophotometry. Oxidative improvers reduced the amount of extractable lipid in the flour, altered the amount and constitution of unsaponifiable matter in both the flour and bread, and increased the peroxide value of the bread lipid. Bread lipids differed from flour lipids in having a lower free acid content, greater content of unsaponifiable matter, higher peroxide values and a lower, more constant N:P ratio. Ultraviolet spectra of the flour lipids were changed by treatment of the flour with agene or chlorine dioxide, by extraction rate, and by baking. The probable state of the lipids in flour is considered briefly. 78 references.

The role of chemistry in the control of quality in dairy products. F. Hillig(Div. Food, Food & Drug Admin., Dept. Health, Education, & Welfare, Washington 25, D. C.). *J. Assoc. Off. Agr. Chemists* **39**, 49–57(1956). The history of the development of analytical means for determining the quality of dairy products, particularly non-fat dry milk solids and butter, is reviewed briefly.

The rate of evaporation of water through monolayers of esters, acids and alcohols. H. L. Rosano and V. K. LaMer(Dept. Chem., Columbia Univ., New York, N. Y.). *J. Phys. Chem.* **60**, 348–53(1956). The rate of evaporation of water through monolayers of ethyl palmitate, ethyl linoleate, ethyl elaidate, ethyl stearate, arachidic acid, stearic acid, 1-octadecanol, cetyl alcohol, and 1,1,13-trihydroperfluorotridecyl alcohol was studied. The surface area, resistance to evaporation and surface viscosity were measured for each compound as a function of the surface pressure. The monolayers could be divided into two types: compressible (ethyl palmitate, ethyl linoleate, ethyl elaidate and trihydroperfluorotridecyl alcohol) and relatively noncompressible. The compressible films were poor retardants of evaporation, whereas the incompressible films retarded by a large factor. The specific conductances(reciprocal resistances to evaporation) were additive for a mixed film composed of substances of similar compressibility, e.g., 50-50 mol. mixture of stearic and arachidic acids. A film composed of 80 mol. arachidic acid(incompressible) and 20 mol. ethyl palmitate(compressible) reduced the rate of evaporation. Additivity of the conductances was approached at very low pressures whereas under high pressures the resistance approached that of the incompressible component. No direct relationship was found between surface pressure, surface viscosity and specific resistance to evaporation. The correlation depended upon the compressibility of the film except for the fluorinated alcohol which was exceedingly viscous.

Fumigation of agricultural products. XII. Sorption of methyl bromide of groundnuts. H. M. B. Somade(Imperial College Field Station, Sunninghill, Berks.). *J. Sci. Food Agr.* **6**, 799–804(1955). Methyl bromide is an effective fumigant for groundnuts, both undecorticated and separated into husk, cotyledon and germ. Sorption in all cases increased with moisture content. Field trials in England and Nigeria showed that methyl bromide had no adverse effects on the germination of groundnuts having moisture contents of 5% or lower. Above this moisture level, too much methyl bromide was absorbed and germination was impaired. No evidence was found for a reaction of methyl bromide with either groundnut oil or ergosteryl acetate.

Marking composition. G. C. Le Compte and W. C. Ault(U. S. A., Secy. Agr.). *U. S. 2,735,780.* A marking composition is prepared by dispersing a pigment in a vehicle which is the fraction of wool grease that is soluble in lower aliphatic alcohols and ketones at 0 to 10°.

Stabilized lubricating oil additives. W. E. Waddey, M. W. Hill, and E. B. Cyphers(Esso Research & Engineering Co.). *U. S. 2,735,817.* The tendency of phosphorus sulfide-treated sulfurized sperm oil to evolve hydrogen sulfide during storage is reduced by treating the product with 1 to 5% by wt. of guanidine carbonate in aqueous solution at 210 to 300°F.

Method of making a prolonged action medicinal tablet. V. M. Hermelin. *U. S. 2,736,682.* A dry powdered drug is mixed to a dough-like consistency with confectioners' glaze, stearic acid and castor oil. The mixture is dried and ground. The granules are mixed with an additional quantity of glaze, stearic acid and castor oil, dried and ground. The resulting granules are compressed to form solid tablets.

Compressed cereal bars for emergency rations. J. Cryns(U. S. A., Secy. Agr.). *U. S. 2,738,277.* A method is described for the preparation of a homogeneous edible ration bar rich in fat and characterized by permanent freedom from fat particles on the surface. The bar consists of a baked mixture containing (as % by wt.): sugar, 10–23; shortening, 18–50; dry egg albumin or dried whole eggs, 9–50; salt and flavoring, 0.65–2.25; and flour, at least 13.

Catalytic interesterification. G. W. Holman, T. B. Laycock, Jr., and R. L. Wille(The Procter & Gamble Co.). *U. S. 2,738,278.* The molecular rearrangement of fatty esters is catalyzed by an alkali metal hydroxide. An aqueous solution of the hydroxide is added to the ester and the moisture content of the mixture is promptly reduced to less than 0.02% by wt. in order to activate the catalyst before significant saponification can occur.

Stabilization of edible fats and oils. J. A. Chenicek and R. H. Rosenwald(Universal Oil Products Co.). *U. S. 2,738,281.* Fats and oils are stabilized by the addition of a phenolic antioxidant and a synergist which is an alkylene polyamine.

Stabilization of fats and oils with 2,4,5-trihydroxybenzoic acid. A. Bell, M. B. Knowles, and C. E. Tholstrup(Eastman Kodak Co.). *U. S. 2,739,066.* Fats and oils are stabilized by the addition of 0.001 to 1.0% by wt. of 2,4,5-trihydroxybenzoic acid.

Method for recovering carotene, fiber and serum from vegetable material. H. M. Barnett. *U. S. 2,739,145.* Fresh carotene-containing vegetable material is pulped in the presence of additional serum. Fiber is removed hydraulically. Finally, the serum is separated from the carotene-protein particles.

Refining glyceride oils. H. M. Weber(Sherwin-Williams Co.). *U. S. 2,739,164.* Miscellas containing 10 to 30% glyceride oil and 70 to 90% of a solvent mixture containing 80 to 95% hydrocarbons and 5 to 20% of an aqueous aliphatic alcohol are first washed with acidified 50 to 90% aqueous alcohol, and then with 50 to 90% aqueous alcohol.

Synthesis of glycerin. A. E. Corey and J. N. Cosby(Allied Chemical and Dye Corp.). *U. S. 2,739,173.* A process is described for the synthesis of glycerine from allyl alcohol by reaction with formic acid and hydrogen peroxide.

FATTY ACID DERIVATIVES

Fatty acid derivatives of sugars and related compounds. S. S. Kalbag(Univ. of Ill., Urbana). *Univ. Microfilms*(Ann Arbor, Mich.). **Publ. No.** 13503, 54 pp.(microfilm, $1.00; paper enlargement, $5.40); *Dissertation Abstr.* **15**, 2157–8(1955). (*C. A.* **50**, 2437)

Oxidation of aliphatic hydrocarbons. Monsanto Chemical Co. *Brit. 721,240.* The oxygen oxidation of alkanes and alkenes in the presence of hydroperoxides gave higher yields of oxygenated products having an undegraded carbon skeleton and consisting mainly of alcohols and ketons instead of acids, when done in the presence of alkaline materials. Thus 743 g. of a natural gasoline fraction b.p. 102–65° with 40 g. $(CH_3)_3COOH$, 2 g. sodium bicarbonate, and 250 lb./sq. in. initial oxygen pressure took up 3.28 moles oxygen in 8 hours at 127–40°, giving 367 g. recovered hydrocarbons and 205 g. oxygenated product, b.p. about 70–103°. The latter was characterized only by the boiling range. These reactions were cited as an improved process for making fatty alcohols of 7-12 carbon atoms. (*C. A.* **50**, 2656)

Waxy diamides of fatty acids. E. Finck(Badische Anilin-And Soda-Fabrik Akt. -Ges.). *Ger. 932,965.* Fatty acids, preferably long chain, or their functional derivatives convertible to amides, react with cycloaliphatic *p*-diamines, the NH_2 radicals of which are directly linked to cycloaliphatic nuclei to give waxlike diamides of good electric properties and chemical resistance. They are useful as sealing compounds, cable waxes, and in the manufacture of electric condensers. The diamides of oleic, montanic acid, and fatty acids of fish and rapeseed oil were prepared. (*C. A.* **50**, 2194)

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• Biology and Nutrition

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

Studies on comparative absorption and digestibility of acetoglycerides. A. M. Ambrose and Dorothy J. Robbins(Western Utilization Research Branch, U. S. Dept. of Ag., Albany, Calif.). *J. Nutrition* **58**, 113–124(1956). The acetooleins appear to be better absorbed than the acetostearins over a 4-hour test period in rats. However, the acetostearins are absorbed at about the same rate as Crisco under experimental conditions.

Determination of 6-ethoxy, 1,2-dihydro,-2,2,4-trimethylquinoline in biological materials. E. M. Bickoff, J. Guggolz, A. L. Livingston, and C. R. Thompson(Western Utilization Res. Branch, U. S. Dept. of Ag., Albany 10, Calif.). *Anal. Chem.* **28**, 376–78(1956). A fluorometric method has been devised for measurement of the antioxidant 6-ethoxy-1,2-dihydro-2,2,4-trimethylquinoline in biological materials in the presence of fluorescing impurities also extracted from tissues by the same method. It is capable of detecting about 0.01 p.p.m. of the antioxidant in a solvent solution. The procedure has proved successful in obtaining approximate analyses of treated alfalfa meal as well as tissues of rats, chicks, and calves employed in chronic toxicity studies. With minor modification, it has been applied in analyses of milk, butter, and eggs from animals fed antioxidant-treated meal.

The effect of different dietary fats on liver fat deposition. D. A. Benton, A. E. Harper, and C. A. Elvehjem (Dept. of Biochem., U. of Wis., Madison, Wis.). *J. Biol. Chem.* **218**, 693–700(1956). When different fats were fed at a level of 20 per cent in a low protein diet (9 per cent casein), the level of liver fat in the rats was high when butter or lard was fed and was low when corn oil or margarine was fed. This effect was increased when the level of protein in the diet was decreased and when choline was omitted from the diet. The fatty acids of butter, which were isolated and fed as glycerides, caused liver fat to accumulate to same extent as did butter fat. The solid fatty acid fraction of butter caused a much greater accumulation of liver fat than did the liquid fatty acid fraction, and stearic acid caused a much greater accumulation of liver fat than did oleic acid. The unsaponifiable material of butter was without effect.

On the mechanism of dehydrogenation of fatty acyl derivatives of coenzyme A. II. The electron transferring flavoprotein. F. L. Crane and H. Beinert (Institute for Enzyme Research, Univ. of Wis., Madison). *J. Biol. Chem.* **218**, 717–731 (1956). The preparation and some properties of a new flavoprotein (ETF) which specifically catalyses the oxidation of the reduced forms of the green and yellow fatty acyl CoA dehydrogenases by indophenol, ferricyanide, or cytochrome c are described. The prosthetic group of ETF appears to be FAD. The riboflavin content of ETF is 0.45 per cent, and its minimal molecular weight is 83,500 according to this flavin content. The ability of ETF to interact with cytochrome c is very variable, in contrast to the consistent interaction with other electron acceptors. This variability can be accounted for in terms of protein interactions which occur in ETF preparations and which are reversed under specific conditions. The implications of the present work are discussed with respect to flavoprotein catalysis and electron transfer in general and with respect to the significance of cytochrome c as natural electron acceptor in the present system and the role of copper in butyryl CoA dehydrogenase.

On the mechanism of dehydrogenation of fatty acyl derivatives of coenzyme A. I. The general fatty acyl coenzyme A. dehydrogenase. F. L. Crane, S. Mii, J. S. Hauge, D. E. Green, and L. Beinert (Institute for Enzyme Research, Univ. of Wis., Madison) *J. Biol. Chem.* **218**, 701–716 (1956). The purification and properties are described of a yellow flavoprotein which catalyzes the α,β-dehydrogenation of fatty derivatives of CoA. The enzyme is obtained from an acetone powder of pig liver mitochondria. It is active on fatty acyl derivatives of CoA from C_4 to C_{16} and has the highest affinity for substrates of 8 to 12 carbons in the fatty acid residue. The enzyme has the spectral characteristics of a flavoprotein. Evidence is presented indicating the FAD is the prosthetic group. Small quantities of iron were found in preparations of the enzyme at a ratio of about 1 iron atom to 6 molecules of flavin. The significance of this metal content is undetermined.

Experiments of the comparative nutritive value of butter and vegetable fats. L. P. Dryden, J. B. Foley, P. F. Gleis and A. M. Hartman (Dairy Husbandry Res. Branch, U. S. Dept. of Ag., Beltsville, Maryland). *J. Nutrition* **58**, 189–201 (1956). Experiments have been described dealing with the relative nutritive value of butterfat and vegetable fats. Comparisons at 4 different fat levels have been made between butterfat and corn oil incorporated into lactose-containing diets fed to weanling rats. Growth on the butter rations increased with increasing fat level. Growth of the corn oil rations showed the same tendency but not to a significant degree. Only at the higher fat levels was there evidence to indicate that butter promoted weight gains superior to those obtained with corn oil. Supplementation of the butter diet with linoleate had no effect.

Italian cheese ripening. IV. Various free amino and fatty acids in commercial provolone cheese. W. J. Harper and J. E. Long (Dept. of Dairy Tech., Ohio State Univ., Columbus). *J. Dairy Sci.* **39**, 129–37 (1956). The free amino acid and free fatty acid content of commercial Provolone cheeses of the same age exhibited wide variations. The free fatty acid content varied in relation to the type of enzyme product used in its manufacture, whereas the free amino acid content was apparently related to the type of starter organism.

V. Various free amino and fatty acids in commercial romano cheese. *Ibid.* **39**, 138–45. Acetic and propionic acids were not associated with either the age of the cheese or flavor intensity, whereac both the higher acids and butyric acid were generally related to age and flavor intensity of cheese of the same age. In general, the free butyric acid and higher fatty acid contents were dependent upon the type of enzyme product used in the manufacture of the cheese, whereas the free amino acid concentrations were not associated with the lipase product added to the milk.

Toxicity of heated and aerated oils. *Nutrition Reviews* **14**, 28 (1956). The toxic substances formed in these experiments increased in the early stages of oxidation and declined as the oxidation proceeded past a maximum. This behavior parallels that of peroxide number, but the extent of polymerization should increase throughout the treatment. Final proof that the peroxides of these highly unsaturated acids are indeed toxic in themselves was tested by isolated peroxides free of other materials.

Enzymes of fatty acid metabolism. I. General introduction; crystalline crotonase. J. R. Stern, Alice delCampillo and I. Raw (Dept. of Pharmacology, N. Y. Univ. College of Medicine, N. Y., N. Y.). *J. Biol. Chem.* **218**, 971–983 (1956). Recent developments leading to the isolation and characterization of the enzymes of the fatty acid cycle are outlined. The preparation of crystalline crotonase from ox liver and some properties of the enzyme are described. Crotonase has a molecular weight of 210,000. Its activity is remarkably high. At optimal pH (~9.4) 1 mole of crystalline crotonase can catalyze the hydration of 1.4×10^6 moles of crotonyl-S-CoA per minute at 25°.

II. Properties of crystalline crotonase. J. R. Stern and Alice delCampilo. *Ibid.*, 985–1002. Crystalline crotonase acts on the CoA and pantetheine esters of ethylenic and β-hydroxy fatty acids. It hydrates both the *cis* and *trans* isomers of 2-ethylenic acyl-S-CoA compounds of chain length from C_4 to at least C_9. Substitution in the α or β position about the ethylenic bond decreases the reactivity of the substrate. Crotonase hydrates the 3-ethylenic acyl-S-CoA derivative and partly converts it to the 2-ethylenic acyl-S-CoA derivative.

The dietary fat level in the nutrition of the rabbit. E. J. Thacker (U. S. Plant Soil and Nutrition Lab., Ithaca, N. Y.). *J. Nutrition* **58**, 243–249 (1956). Under conditions of *ad libitum* feeding, rabbits fed a purified diet that contained at least 10% of fat made greater body gains than did animals fed a similar diet that contained 5% of fat or when fed a comercial rabbit ration. It is probable that the increased acceptability of the diets with higher levels of fat was a significant factor in the increased gains observed with *ad libitum* feeding.

A survey of United States butterfat constants. I. Reichert-Meissl, Polenske, and refractive index values. V. L. Zehren and H. C. Jackson (Dept. Dairy & Food Industries, Univ. Wisconsin, Madison). *J. Assoc. Off. Agr. Chemists* **39**, 194–212 (1956). Reichert-Meissl, Polenske, and refractive index values were determined monthly for one year on butterfat obtained from 42 sources from 6 geographical areas having a coverage of 25 states. The statistical analysis showed that the significance of the monthly variation of the average fat constant values was different for the individual areas. Although the average maximum and minimum fat constant values depend on the geographical area, it was found that the average maximum Reichert-Meissl and Polenske numbers generally occurred during the late winter. The average maximum refractive index values occurred during mid-summer. The average minimum Reichert-Meissl and Polenske numbers generally occurred during mid-summer while the minimum of the refractive index occurred during late winter. The significance of variation of fat constant values among locations within geographic areas was different for each geographical area. The Mountain region was the only geographical area which showed highly significant variations for all three butterfat constant values among the five locations. The significance of variation of the butterfat constant values among locations of the other geographical areas was not always the same. The statistical analysis further showed that the significance of the variation of the fat constant values among the geographical areas for the different months depended upon the fat constant measured and upon the month. The Reichert-Meissl and Polenske numbers generally showed highly significant variations among geographical areas for the different months. The variation of the refractive index among the geographical areas was less significant. The Reichert-Meissl, Polenske, and refractive index values ranged from 24.24 to 33.55, 1.12 to 2.95, and 1.4531 to 1.4557, respectively.

A survey of United States butterfat constants. II. Butyric acid. M. Keeney (Dairy Dept., Univ. Maryland, College Park, Md.). *J. Assoc. Off. Agr. Chemists* **39**, 212–25 (1956). Butterfat samples were obtained from Zehren and Jackson (see preceding abstract). The chromatographic procedure for butyric acid using a silicic acid column is described in detail. The range of butyric acid values in the 500 samples of butterfat was 9.6 to 11.3 mole per cent butyric acid. The arithmetic mean was 10.41 mole per cent and the standard deviation was 0.30 mole per cent.

Report on vitamin D. L. Friedman (Div. Nutrition, Food & Drug Admin., Dept. Health, Education, & Welfare, Washington 25, D. C.). *J. Assoc. Off. Agr. Chemists* **39**, 141–54 (1956). A collaborative study was made of the A.O.A.C. method adopted in 1937 for the determination of vitamin D in milk. The method passed all samples containing the labeled amount of vitamin D. Samples containing no more than 40% of the labeled amount failed. About half of the laboratories passed samples containing only 60% of the claimed vitamin D potency. A more accurate evaluation is obtained if the sample is saponified. Directions are given. Other recommendations are outlined.

Report on carotene. F. W. Quackenbush(Dept. Biochem., Purdue Univ., Lafayette, Ind.). *J. Assoc. Off. Agr. Chemists* 39, 139–41(1956). Lard added to alfalfa meal increased the variation between replicates in carotene analysis and tended to give higher results, but the effect is not great enough to warrant introducing a saponification step. Because a commercial source of a suitable grade of lime could not be found, work on a procedure for the separation of β-carotene isomers has been postponed. Wide variations were found between instruments used for carotene analysis in laboratories receiving monthly alfalfa meal check samples.

Report on vitamin A in mixed feeds. D. B. Parrish and H. A. Smith(Kansas Agr. Expt. Station, Manhattan, Kans.). *J. Assoc. Off. Agr. Chemists* 39, 126–39(1956). As a result of a collaborative study, it was recommended that the chromatographic method of analysis for vitamin A and carotene in mixed feeds be continued as first action. Further study must be made of a saponification method for use on feeds containing vitamin A in a form unextractable by hexane. Factors requiring particular attention are sampling, nature of eluting solvents, interfering substances including DPPD, and identification of feed samples that require saponification before analysis.

Comparison of the phasic and chromotographic methods for the analysis of carotene in dehydrated alfalfa. R. A. Moffitt and J. W. Mehl(Dept. Biochem. & Nutrition, Univ. S. California, Los Angeles 7, Calif.). *J. Assoc. Off. Agr. Chemists* 39, 255–9 (1956). Note. A chromatographic and spectrophotometric study was made of the pigments which are held in the epiphasic (hexane) fraction with β-carotene and which cause the phasic method to give higher values for β-carotene than the chromatographic method. These pigments were identified as (a) ''xanthophylls'' which are not completely removed by the phasic separation; (b) zeaxanthin- or zeaxanthin-like pigments from fresh alfalfa; and (c) neo-β-carotene B and neo-β-carotene from dehydrated alfalfa.

Report on nutritional adjuncts. O. L. Kline(Food & Drug Admin., Dept. Health, Education, & Welfare, Washington 25, D. C.). *J. Assoc. Off. Agr. Chemists* 39, 122–3(1956). The committees' work on analytical methods for vitamin B_6, vitamin A in feeds, carotene, vitamin D in milk, antibiotics and amino acids in feeds and foods is briefly summarized.

Nutritional adjuncts. *J. Assoc. Off. Agr. Chemists* 39, 111-14 (1956). A revised form of the official method for the determination of vitamin D in milk is described. The revised method was adopted as first action.

Nutritional and biochemical effects of irradiation. R. R. Becker, H. C. Kung, N. F. Barr, Constance S. Pearson, and C. G. King (Dept. of Chem., Columbia Univ., New York). *Food Technology,* 10, 61–4(1956). A long term feeding experiment with albino rats, in which the butterfat portion of the diet consisting of five-sixths whole ground wheat and one-sixth powdered whole milk, was irradiated from a Co^{60} source(dose $= 1.68 \times 10^6$ rep), has shown no evidence of carcinogenicity in three generations of animals. Growth rates of the test and control groups showed no significant differences, although slight differences tended to favor the control groups. Oxidative changes in several fats similar to those reported by other laboratories have been found, including a marked rise in peroxides and a slight increase in acetyl values.

Nutrient loss was greatest in ascorbic acid and in the fat soluble constituents, vitamin A, carotenes and vitamin E. Enzyme inactivation tends to be very slight, relative to nutrient destruction at sterilizing dosage, when radiation is compared with heat effects. Hence a relatively mild combination of both may offer advantages over either, alone, in specific products.

The digestion and absorption of fat. F. H. Mattson(Procter and Gamble Co., Cincinnati, Ohio). *Food Research* 21(1), 35–41(1956). From 25-40% of the calories in the American diet are normally supplied by fat. One must conclude that at present, the mechanism of fat absorption has not been established.

Influence of various levels of dietary cholesterol on the cholesterol content of certain organs and of bile of chicks fed fat-free diets and diets containing peanut oil. H. Dam, Inge Prange, and Ebbe Søndergaard(Polytech. Inst., Copenhagen). *Acta Physiol. Scand.* 34, 141–6(1955). The dietary cholesterol level above which accumulation could be demonstrated in liver, spleen, aorta, and bile was somewhere between 0.1% and 0.33% for diets containing 10% peanut oil. This limit also holds for fat-free diets as far as liver, spleen and probably aorta are concerned, whereas bile cholesterol increased significantly when the dietary cholesterol varied from 0.0 to 1%. These increases found with fat-free diets were in all cases much smaller than those found when the diet contained 10% peanut oil. The liver cholesterol corresponding to 0 to 0.1% cholesterol in the diet was higher when the diet was fat-free than when it contained 10% peanut oil. (*C. A.* 50, 2773)

Cholesterol studies. III. Effect of dietary fat on the intestinal cholesterol absorption and on the cholesterol metabolism in the liver of rats. Alexander Pihl(Univ. Oslo, Norway). *Acta Physiol. Scand.* 34, 183–96(1955). The absorption of cholesterol was studied in balance experiments in intact rats fed cholesterol together with different levels of arachis oil. Cholesterol was readily absorbed on a diet devoid of fat. Extensive deposition of cholesterol esters was found in the livers of rats given cholesterol in a fat free diet for 7 weeks. Dietary fat was present in large amounts as compared to cholesterol. The smallest ratio of fat to cholesterol where a fascilitating effect of fat was observed was 15:1. In rats with cholesterol deposited in the liver, dietary fat appeared to promote the removal of cholesterol from the liver, when the animals were given a cholesterol-free diet.

IV. The mode of action of fatty acids in cholesterol absorption. *Ibid.* 197–205. In balance experiments on rats, oleic acid (9% of diet) increased the absorption of cholesterol(1% of diet) while stearic acid had no effect. Cholesterol oleate or stearate were not absorbed to a greater extent than was cholesterol under comparable conditions. Cholesterol was readily absorbed when given as the acetate. Cholesterol esters were detected in the feces when cholesterol with stearic acid was fed, but not when cholesterol with oleic acid was fed, and the addition of bile salts did not alter the result. The present results demonstrate that the stimulating effect of free fatty acids on cholesterol absorption is not due to formation of cholesterol esters prior to absorption and the conditions in the intestinal tract of the rat favor hydrolysis of cholesterol esters.

V. The effect of bile acids on cholesterol absorption, deposition, and synthesis in the rat. *Ibid.* 206–17. Cholic, deoxycholic, and dehydrocholic acids were studied. Bile acid ingestion on a fat-free diet did not increase the absorption of cholesterol. The deposition of cholesterol in the liver was increased by bile salt ingestion, and the serum cholesterol levels reflected the increased deposition in the liver. The simultaneous measurement of cholesterol absorption and deposition indicated a post-absorptive effect of dietary bile acids on cholesterol metabolism. Cholic acid feeding in the presence or absence of dietary cholesterol did not increase the hepatic cholesterol synthesis *in vitro* as judged by the incorporation of $1\text{-}C^{14}$-acetate into cholesterol in liver slices. Thus, bile acid ingestion probably interferes with the catabolism of cholesterol in the liver. (*C. A.* 50, 2773)

Absorption of dihydrocholesterol and soya sterols by the rat intestine. A. C. Ivy, T. M. Lin, and Esko Karvinen(Univ. of Ill. Coll. Med., Chicago). *Am. J. Physiol.* 183, 79–85(1955). The intestine of the rat has a limited capacity to absorb cholesterol. It amounts to approximately 92 mg. for a 250-g. rat, or 370 mg. per kg. body weight per day. An increase in the formation and elimination of sterols which do not develop the Libermann-Burchard color reaction was not observed until cholesterol was added to the basal diet in excess of the capacity of the sterol absorptive mechanism. Dihydrocholesterol and soya sterols (93% sitosterol) decrease the absorption of cholesterol by competing for the total capacity of the sterol absorptive mechanism on the basis of their relative absorbabilities. (*C A.* 50, 2808)

Relation of dietary fat to the absorption and elimination of exogenous and endogenous cholesterol. T. M. Lin, Esko Karvinen and A. C. Ivy(Univ. of Ill. Coll. Med., Chicago). *Am. J. Physiol.* 183, 86–90(1955). Oleic acid definitely and tallow slightly decreased the endogenous elimination of cholesterol, whereas corn oil and triolein definitely increased it. An increase in indigestible bulk in the form of pectin and protopectin did not change the elimination of endogenous cholesterol. Tripalmitin, trielaidin, and palmitic acid actually decreased the absorption of cholesterol, the amount of absorption being 31, 18, and 20%, respectively, as compared to 40% when no fat was fed, and of the 50 mg. of cholesterol fed the rats daily, all but 8, 2, and 3 mg., respectively, was recovered in the feces. The percentage of dietary cholesterol absorbed varied directly with the percentage of utilization of the fat fed with cholesterol. (*C. A.* 50, 2808)

A new inhibitor of the esterification of serum cholesterol: the saponosides. F. Tayeau and R. Nivet(Centre recherche biol. preventive, Bordeaux, France). *Bull. soc. chim. biol.* 37, 634–42 (1955). When blood serum is incubated 72 hours at 37° the proportion of esterified cholesterol increases. This esterification is inhibited by bile salts and also by saponins of various plants added to the serum in very small amounts. (*C. A.* 50, 2783)

Value of animal fat in rations for milk production. O. H. Horton (Univ. of Ill., Urbana). *Univ. Microfilms*(Ann Arbor, Mich.). **Publ. No.** 13,498, 76 pp. (microfilm, $1.00; paper enlargement, $7.60); *Dissertation Abstr.* 15, 1957–8(1955). (*C. A.* 50, 2886)

The effect of certain fatty acids on the coagulation of plasma in vitro. J. C. F. Poole(Sir William Dunn School Pathol., Oxford, Engl.). *Brit. J. Exptl. Pathol.* 36, 248-53(1955). Stearic, palmitic, and oleic acids were added to human citrated plasma and incubated at 37° before recalcification. The time for the production of the clot (Ca time) was decreased with increasing incubation time, from 15% after 10 seconds to 50% after 5 minutes. Other common fatty acids were not effective. Changes of pH were not responsible for the results. The optimum concentration of fatty acid was about 3 meq./l. Measurement of thrombin generation indicated that sodium stearate markedly shortens the time necessary for thrombin formation, while sodium laurate increases the total amount of thrombin formed. (*C. A.* 50, 1938)

Optimum ratio of saturated to monounsaturated fatty acids in rat diets. C. Y. Hopkins, T. K. Murray, and J. A. Campbell (Dept. Natl. Health and Welfare, Ottawa). *Can. J. Biol. and Physiol.* 33, 1047–54(1955). Fat mixtures were prepared in which the content of linoleic acid was held constant at approximately 10% of the total fatty acids, but the ratio of saturated to monounsaturated acids was varied from 3.5:1 to 1:8. Best weight gains were made on the fat mixture in which the fatty acid ratio was close to that of normal rat depot fat, *viz.* 1 part of saturated acid to 2 parts of monounsaturated acid. Female rats did not show significant differences in weight gain on the various fat mixtures. Excretion of lipide in the feces showed a tendency to increase with increasing ratios of unsaturated to saturated fatty acids in the diet. (*C. A.* 50, 1144)

Fatty acid synthesis by soluble enzyme preparation from rabbit mammary gland. Priscilla Hele and G. Popjak(Hammersmith Hosp., London). *Biochim. et Biophys. Acta* 18, 294–6 (1955). A study was made of the synthesis of fatty acids from C^{14}-labeled acetate by rabbit mammary gland extracts in a system comprising adenesinetriphosphate, coenzyme A, and reduced diphosphopyridine nucleotide. The course of fatty acid synthesis, as measured by incorporation of label, followed closely the utilization of diphosphopyridine nucleotide. Intermediates in the synthesis were identified by analyzing samples at various times after the start of the reaction, and mechanisms of steps of the process were discussed. (*C. A.* 50, 2707)

Diet rich in fat in nutrition of premature infant. H. W. Ocklitz(Univ. Rostock, Ger.). *Monatsschr. Kinderheilk.* 103, 443–9(1955). Balance studies with infants on a high-fat diet showed a greater utilization and tolerance of fat than presumed. Artificial mixtures were as efficacious as enriched mother's milk. (*C. A.* 50, 2774)

The effect of isoniazid on lipides of the tubercle bacillus. H. P. Russe and W. R. Barclay. *Am. Rev. Tuberc.* 72, 713–17(1955). *Tubercle bacilli* exposed to isoniazid *in vitro* show a decrease in the amount of lipides which can be extracted with organic solvents, particularly methyl alcohol, when compared with untreated *tubercle bacilli.* Animal studies show that isoniazid treated nonacid-fast *tubercle bacilli* lose the ability to confer hypersensitivity to tuberculin in guinea pigs. (*C. A.* 50, 2733)

Breakdown of proteins and lipides during glucose-free perfusion of the cat brain. L. G. Abood and A. Geiger(Univ. of Ill. Coll. of Med., Chicago). *Am. J. Physiol.* 182, 557–60(1955). There is a disappearance of large amounts of proteins and lipides from particular structural elements of the cat brain, which may possibly serve as the undogenous substrate in the absence of exogenous substrates. (*C. A.* 50, 2713)

Liver deamidase action on halogenated fatty acid amides in rats fed on hepatic carcinogens. Sanji Kishi. Katsuhiko Haruno, and Bunichi Asano(Showa Med. School, Tokyo). *Gann.* 45, 59–65(1954). The enzymetric hydrolysis of the following haloacid amides in the liver of rats fed the hepatic carcinogens *p*-dimethylaminoazobenzene or 2-acetylaminofluorene has been investigated: α-bromopropionamide, α-bromo-n-butyramide, α-bromoisobutyramide, α-bromo-*n*-valeramide, α-bromoisovaleramide, α-bromo-*n*-caproamide, α-bromoisocaproamide, and α-chloro-*n*-butyramide. Aqueous homogenates of normal liver had a marked activity in evolving ammonia from the above substrates at pH 8–9. However, aliphatic straight chained compounds with long chains were decomposed easier than *iso* and lower fatty acid derivatives. Livers with hepatomas showed very low activity. (*C. A.* 50, 2698)

Incorporation of C^{14}-acetate into intestinal fatty acids of rats with cannulated bile ducts. R. G. Horn, F. R. Blood, and J. G. Coniglio(Vanderbilt Univ. School of Med., Nashville, Tenn.). *Proc. Soc. Exp. Biol. and Med.* 91, 258–260(1956). Deprivation of bile flow to the rat intestine by means of cannulation of the bile duct did not affect the ability of the intestine to accumulate normal amounts of highly labeled fatty acids after administration of C^{14}-acetate as shown by comparison with sham-operated, pair-fed controls. Total radioactivity in the biliary fatty acids amounted to only 5–16% of the amount found in the intestinal fatty acids in the time periods studied. Fatty acids of combined intestinal and fecal contents of cannulated animals contained more fatty acid but of a lower specific activity than those of control rats.

Observations on some nutritional factors that influence the lipotropic activity of methionine. A. E. Harper and D. A. Benton (Dept. Biochem., Univ. of Wisconsin). *Biochem. J.* 62, 440–447(1956). Some factors that influence the lipotropic activity of methionine in the young rat have been investigated. In experiments of less than 4 weeks' duration, fatty infiltration of the liver was evident in young rats when the choline in diets that permitted a satisfactory rate of growth was replaced by methionine. The greater fatty infiltration observed in rats receiving the diet containing gelation has been attributed to the content of threonine and the high content of arginine and glycine in gelatin. No abnormal accumulation of fat in the liver was found in rats fed on either diet for more than four weeks, which suggests that the capacity of the young rat to synthesize choline increases as it matures and that the effect of gelatin is of significance only during the period of early growth, when relatively high-protein diets containing additional methionine in place of choline are fed.

Effect of choline, heparin and aureomycin on fatty livers of dogs. N. R. Di Luzio and D. B. Zilversmit(Dept. of Physiol., Univ. of Tenn., Memphis). *Proc. Soc. Exp. Biol. and Med.* 91, 338–341(1956). The triglyceride concentration in livers of dogs maintained for 3 weeks on a high-fat, low-protein, choline-deficient diet was lowered by daily injections of heparin and by supplementation of the diet with choline. Oral administration of aureomycin increased liver triglyceride concentrations. Choline, heparin or aureomycin did not alter liver phosphatide or cholesterol concentrations of animals receiving the high-fat diet. Aureomycin, *per os*, did not affect *in vitro* synthesis of liver phosphatides but modified the response of liver slices to the *in vitro* addition of choline.

Stabilized oil-soluble vitamins. J. B. Conn(Merck & Co., Inc.). *U. S. 2,739,167.* A stabilized, dry vitamin preparation consists of crystalline particles of the oil-soluble vitamin in a matrix of a synthetic protein-like material which is produced by the chymotrypsin catalyzed condensation of a peptic digest of a protein. The product is prepared by mixing an aqueous solution of the peptic digest of the protein with crystalline vitamin A. Chymotrypsin is added. As the reaction proceeds, the vitamin particles are coated with a gel. The finished product is dried.

Treating fatty acid chlorides with proteins. H. L. Keil(Armour and Co.). *Brit. 736,584.* Proteins or their hydrolysis products are caused to react with an oxidizing agent which is capable of hydroxylating the free amino groups of the proteins or hydrolysis products. The mixture produced is treated with a fatty acid halide having 1–22 carbon atoms in its hydrocarbon radicle. The products are useful as paint additives, for waterproofing leather, and as paper sizes, and the products from partial hydrolyzates are suitable as detergents. (*C. A.* 50, 2994)

Apparatus for removing proteinaceous material from peanut and soybean extraction residues. C. G. Eckers(Aktiebolaget Separator and Imperial Chemical Industries Ltd.). *Ger. 839,594.* See *U. S. 2,628,022.* (*C. A.* 50, 2194)

Fixation of cottonseed pigment during extraction of oil. Minoru Maki. *Japan 6437.* Cottonseed flakes (100 g.) and 0.5 g. borax in 50–70 ml. water are mixed well and dried at a low temperature. The material thus treated gives a light-colored oil upon solvent extraction or pressing. (*C. A.* 50, 2193)

• Drying Oils and Paints

Raymond Paschke, Abstractor

New alkyd materials. Anon. *Paint Oil Chem. Rev.* 119(3), 8 (1956). The use of pyromellitic acid, chlorendic acid, 1,2,6-

hexanetriol, trimethylolethane, glycerol monooleate, itaconic acid, sorbic acid, and alkyd silicones is discussed.

Alkyd building blocks. Anon. *Paint Oil Chem. Rev.* **119**(2), 6 (1956). Isophthalic acid, phthalic anhydride, pentaerithritol, and glycerol are discussed.

Water based industrial coatings. G. Allyn(Rohm & Haas Co.). *Org. Finishing* **17**(3), 15(1956). A review.

Results of research of the Belgian Corrosion (Protective) Committee. D. Bermane. *Off. Dig.* 27(371), 1027(1955).

Film formation, film properties and film deterioration. P. O. Blackmore. *Oil & Colour Chemists' Assoc. J.* **39**, 9(1956). This paper reports the most important findings and conclusions of a nine-year research program conducted by the Federation of Paint and Varnish Production Clubs of the U.S.A.

Electron microscopy in paint formulation. E. G. Boblek, L. R. LeBras, W. von Fischer, and A. S. Powell. *Off. Dig.* **27**(371), 984(1955). Illustrations are provided to show the value of microscopy in studying variables of film formation such as gel structure of the binder, compatibility of mixed resins, solvent effects, non-homogeneous pigment distributions, and a variety of film defects. Examples are cited of how microscopic observations can upset traditional theories of paint formulation and how the new viewpoints can change direction and purpose of experimental programs in solving some practical problems of paint formulation and paint testing.

The influence of fineness of grind and aging of liquid paint upon stress-strain properties of alkyd paint films. W. Bosch and H. Y. Wong(N. Dak. Ag. Col., Fargo). *Off. Dig.* **27**(371), 996(1955). The elongation of the dried films decreased with time. This decrease was greater in the case of zinc oxide than for the films that were pigmented with chrome orange. Where titanium dioxide was used, the influence of age of the dried film upon the elongation and tensile strength was small. The elongation increased as the liquid paint aged. This increase could probably be attributed to a better wetting of the pigment on standing. There was some indication that coarser particles were responsible for a slightly greater tensile strength.

The chemistry of driers. W. Brushwell. *Am. Paint J.* **40**(8), 70; (10), 100; (12), 72; (14), 82(1955). Although cobalt is by far the most important of the driers, recent advances have shown how potential cobalt shortages can be circumvented by the use of auxiliary driers. Also the rare earth metal driers are of interest in this regard. Of potential importance is work which demonstrates that metallic driers may be complexed with certain organic compounds to make them more effective. The action of each drier is considered and the chemistry of driers is described. Although naphthenates are the most widely used driers, other types of driers such as octoates, tallates, linoleates and resinates are also important. The physical properties of commercial driers is considered and the mechanism of drier action is discussed. Drier formulation is stressed, particularly in relation to the vehicle employed.

A survey of novelty finishes. Part IV. H. Burrell(Interchemical Corp., Cincinnati, O.). *Org. Finishing* **17**(2), 19(1956). Graining is discussed. *Ibid.* **17**(3), 12(1956). This concluding installment discusses flock coatings. The advantages and disadvantages of the various novelty finishes are given.

Catalyzed silicone coatings. H. L. Cahn(Gen. Elect. Co.). *Ind. Finishing* 32(3), 42(1956). A brief discussion is given of the curing of silicone resins and of the catalysts used.

An evaluation of PVA, acrylic and styrene-butadiene emulsion paints. B. Farber(moderator) *et al. Off. Dig.* **27**(371), 933 (1956). A panel discussion.

Traffic paints—past, present, and future. H. W. George(Johns-Manville Corp.). *Off. Dig.* **28**(373), 112(1956).

Styrene butadiene latex paints for exterior masonry surfaces. J. L. Huffman(Dow Chem. Co., Midland, Mich.). *Am. Paint J.* **40**(20), 78(1956). Paints based on styrene/butadiene latexes are well suited for use on exterior masonry surfaces because: (1) Demonstrated durability over a wide variety of surfaces. (2) Failure by moderate chalking, presenting an ideal surface for repainting. (3) Resistance to alkali present in fresh masonry surfaces. (4) Excellent package stability (styrene/butadiene paints stored in metal containers are still in excellent condition after almost eight years' storage). (5) Simple and foolproof manufacturing techniques. (6) Easy application and quick drying—two coats can be applied the same day. (7) Low raw material cost.

Experiments on paint adhesion under moist conditions. D. M. James(International Paints Ltd., Felling-on-Tyne, Eng.). *Oil Colour Chemists' Assoc. J.* **39**, 39(1956). The tendency of water to weaken the adhesion between primer and finishing coat (in ships' boot-top and topsides systems), has been studied. Fresh water was found to be much more destructive of adhesion than sea-water. Usually the adhesion was unaffected if the primer were coated after less than 4 days' drying. The nature of the primer, particularly its medium, was found to be the most important factor in determining adhesion under moist conditions to an aged primer; generally adhesion to primers based on oil was good, to those based on oleoresinous media bad, and to those based on alkyds and epoxide esters variable. The adhesion behaviour of primers was found to correspond moderately well with their wetting characteristics by water, a low receding contact angle of water corresponding with bad, and a high with good adhesion of the finishing coat. The contact angles of linseed oil on the primers were measured but could not be correlated with the adhesion behaviour. The nature of the finishing coat was found to be less important than that of the primer in determining the adhesion of the system. The water-absorptions and permeabilities of finishing coats were measured but did not correspond with their adhesion properties. The loss of adhesion in these experiments occurred rapidly, and only so long as the system was wet, adhesion being regained on drying. The mechanism suggested is that water permeates the finishing coat and spreads out on the primer surface; loss of adhesion occurs if the affinity of the finishing coat for the primer is smaller than that of water for the primer. Swelling of the finishing coat in water is considered to be a minor factor, though, like water-permeability, it may be of importance in determining whether loss of adhesion shows in practice as peeling or blistering.

How research is preventing fungus from destroying paint films. J. F. Lang and P. F. Klens(Nuodex Products Co. Inc.). *Can. Paint-Varnish* 30(2), 16(1956).

Aluminum soap gels. F. J. Licata(Metasap Chemical Co.). *Off. Dig.* **28**(373), 121(1956).

Development in exterior house paints—alkyd type. F. A. Lilley (DuPont Co.). *Paint Ind. Mag.* **71**(3), 15(1956). A review covering history, blister and stain resistance, performance, coloring, and trim, porch and floor paints.

Traffic paints and their use in pavement marking. C. C. Rhodes (Mich. State Highway Dept.). *Org. Finishing* 17(2), 11 (1956).

Interior house painting-plaster. M. E. Schleicher(McDougall-Butler Co.). *Paint Ind. Mag.* **71**(2), 18(1956). Pretreatment, aging, sealing, and types of sealers are discussed.

Unsaturated esters of polyvinyl alcohol. A. J. Seavell(Smith & Walton Ltd., Haltwhistle, Eng.). *Oil Colour Chemists' Assoc.* **39**, 113(1956). Esterification of polyvinyl alcohol with linseed acids in phenol gives the polyvinyl esters in about 50 per cent yield. There is neither loss of unsaturation nor preferential esterification of the linseed fatty acids, and the available hydroxyl groups 50 to 60 per cent are esterified (i.e., one in three of the total hydroxyl groups carries a polyene acyl group). The unesterified hydroxyl groups may form internal or external ether linkages or remain unchanged. It is tentatively concluded that bodying treatment causes an over-all loss of unsaturation through the formation of acid-ester complexes; there is evidence that the paraffin skeleton of the polyvinyl alcohol is partly converted into a more complex structure, possibly of a polyene nature. The formation of the acid-ester complex is attributed to pyrolysis of some of the acyl groups, with a simultaneous linkage between free fatty acids and acyl groups in the polyvinyl ester. This leads to a considerable reduction in methanol-insoluble polyvinyl ester, owing to the development of polar centres, but there is no loss of unsaturation in the remaining polyvinyl ester, and no evidence of polymerisation occurring as between polyvinyl ester molecules.

Isophthalic in air drying paints. R. W. Stephenson(Oronite Chem. Co.). *Paint Ind. Mag.* **71**(2), 15(1956).

Collaboration and paint research in Europe. H. W. Talen(Paint Res. Inst. T.N.O., Netherlands). *Off. Dig.* **27**, 1013(1955).

Electron microscope study of paint surfaces. S. B. Twiss, D. M. Teague and W. L. Weeks(Chrysler Corp.). *Off. Dig.* **28**(373), 93(1956). The most satisfactory replication technique developed by earlier investigators for electron microscope study of paint surfaces appears to be the two-stage polyvinyl alcohol-silica method. Improvements in this method, such as shadowing the primary replica and a high shadowing angle for rough surfaces, improve replication speed and microstructure identification. Electron microscope observations indicate that pigment particles lying near the surface of the microscopically smooth, freshly painted surfaces are covered with a vehicle film. Intense ultraviolet radiation progressively degrades the organic vehicle causing loss of vehicle, shrinkage, and ultimate release of pigment particles lying in the surface. The loose particles are a major factor in loss of gloss by chalking. A ribbed structure, easily removed by polishing, is observed in the vehicle surface after intense ultraviolet exposure. Natural weathering produces a rougher surface than ultraviolet exposure, due to leaching and erosion of the vehicle by water. Polishing a chalked surface removes the degraded layer and loose pigment but leaves microscopic surface scratches and uncovered pigment particles. Waxing of polished surfaces partially fills in surface scratches and forms a discontinuous film over the rest of the surface.

Chemistry of the chromium oxide pigments. H. E. Weisburg (Mineral Pigments Corp.). *Paint Ind. Mag.* 71(2), 11(1956).

Analysis of oils and fats. C. Whalley(Paint Res. Station). *Paint Technol.* 19, 411(1955); *Ibid.* 20, 11(1956). Recent advances with special reference to microanalytical procedures.

The evaporation of binary and ternary solvent mixtures and their release from lacquer and resin films. P. D. Wright(Brit. Ind. Solvents, Carshalton, Eng.). *Oil Colour Chemists Assoc.* 39, 129(1956).

Printing ink and varnish therefor. A. Voet(J. M. Huber Corp., Locust, N. J.). *U. S. 2,720,461.* This ink varnish consists essentially of a salt of a water insoluble resin and an amine dissolved in a water miscible aliphatic solvent.

Air-drying organosilicon compositions containing a titanic acid ester. M. Kin(Dow Chem. Co.). *U. S. 2,721,855.* This patent covers a composition of matter comprising (1) a benzene soluble polymeric organosilicon composition having on the average from .9 to 1.5 monovalent hydrocarbon radicals per silicon atom and having on the average from .1 to 1.5 alkoxy groups per silicon atom, in which compound at least a major portion of the polymer linkages between the silicon atoms are SiOSi linkages, any remaining polymer linkages being of the group consisting of SiSi and SiRSi linkages where R is a divalent hydrocarbon radical, and (2) from .02 to 1.5 per cent by weight titanium based on the weight of the organosilicon compound, said titanium being in the form of a benzene soluble titanic acid ester of an aliphatic alcohol of less than 20 carbon atoms.

Production of drying oils. A. S. Bloch and R. C. Wackher (Universal Oil Products Co., Des Plaines, Ill.). *U. S. 2,726,272; 2,726,273;* and *2,726,274.* Drying oils are produced from olefinic hydrocarbons.

Color improvement of drying oils. R. E. Blauk and A. A. Arters(Sherwin-Williams Co., Cleveland). *U. S. 2,727,051.* This patent covers a process for producing a color stable, bleached vegetable oil which comprises heating under an inert atmosphere a vegetable oil selected from the group consisting of drying and semi-drying oils with an acylating agent selected from the group consisting of acid halides and acid anhydrides of aliphatic monocarboxylic acids containing from 2 to 18 carbon atoms in the acyl radicle at a temperature of from about 100° to about 325° for a period of from about 0.25 hour to about 20 hours.

Modified alkyd resins. E. M. Beaver and R. S. Urban (Rohm & Haas Co.). *U. S. 2,727,870.* This patent covers a process for preparing modified alkyd resins which comprises heating and polymerizing, in solution at a temperature about 100° and in the presence of a polymerization catalyst, a mixture of styrene, methyl methacrylate and a preformed alkyd resin, the styrene and methyl methacrylate being present in a ratio to each other of 3:1 to 1:3 and in a combined amount equal to 35 to 45% of the total weight of the mixture, and the alkyd resin having an acid number less than 25 and being the product of reacting (a) phthalic anhydride, (b) a polyhydric alcohol containing 3 to 6 hydroxyl groups, and (c) a member of the class consisting of dehydrated castor oil and the fatty acids of dehydrated castor oil, the amount of phthalic anhydride being 22–26% of the total weight of the materials (a), (b) and (c).

Hydrocarbon drying oil production. S. E. Jaros and A. H. A. H. Gleason(Esso Res. Eng. Co.). *U. S. 2,728,801.* This patent covers a continuous process for producing a hydrocarbon drying oil which comprises mixing 75 to 85 parts of butadiene, 25 to 15 parts of styrene, 200 to 300 parts of straight-run mineral spirits boiling between about 150 and 200°, 10 to 35 parts of dioxane, 1 to 3 parts of finely dispersed sodium metal and 10 to 20% of isopropyl alcohol based on the weight of sodium, heating the mixture to a reaction temperature between 65 and 95° and continuously passing the heated mixture through a narrow tubular zone to activate the mixture.

Poly-tert-alkyl substituted carbocyclic monocarboxylic acids in alkyd resins. R. W. H. Tess and T. F. Mika(Shell Dev. Co., Emeryville, Calif.). *U. S. 2,729,609.* This patent covers a resinous reaction product of a mixture comprising an acid component of the group consisting of polycarboxylic acids, polycarboxylic acid anhydrides and polycarboxylic acid halides, a polyhydric alcohol and a modifying agent comprising at least one poly-tert-alkyl-substituted carbocyclic monocarboxylic acid.

Air-drying resin made from allylic alcohol, an oxirane, and an unsaturated dibasic acid. R. A. Gregg(U. S. Rubber Co., New York). *U. S. 2,729,623.* The patent covers the method of making a soluble, unsaturated, air-drying, polymeric resin which comprises polymerizing, at a temperature of from 25° to 150° in the presence of allyl alcohol as a gelation suppressor and a free radical polymerization catalyst, a mixture of esters obtained by esterifying an aliphatic *alpha*-ethylenic-*alpha,beta*-dicarboxylic acid in amount such that the ratio of moles of alcohols furnished by the mixture of alcohols hereinafter mentioned to acid equivalents supplied by said acid is from 1.3:1 to 2.0:1 at a temperature of from 50° to 120° with a mixture of alcohols formed by reacting allyl alcohol and ethylene oxide in a molar ratio of alcohol to oxide of from 1:1 to 5:1 at a temperature of from 40° to 100° in the presence of an ionic catalyst, and continuing said polymerizing step until a major proportion of said mixture of esters has been converted to a soluble, unsaturated, air-drying, polymeric resin.

Decarboxylation of trimellitic acid. A. C. McKinnis(Union Oil Co., Los Angeles, Calif.). *U. S. 2,729,674.* Isophthalic acid is formed with less than stoichiometric amounts of alkali.

Drying oil product and method of producing. D. Aelony(Gen. Mills, Inc.). *U. S. 2,730,451.* This patent covers the process which involves heating a conjugated drying oil with a benzodioxane 1–3, substituted in the 6-position with a hydrocarbon substituent containing from 1–10 carbon atoms, at temperatures of from 200–250° for from 30 to 60 minutes, the substituted benzodioxane being employed in a concentration of 5% to 40% based on the combined weight of the substituted benzodioxane and the conjugated drying oil.

Drying composition resistant to gas checking and defrosting. H. Dannenberg(Shell Dev. Co., Emeryville, Calif.). *U. S. 2,730,510.* This patent covers a process for preparing a composition which is resistant to gas checking and frosting when hardened as a film. This is made by mixing about 0.1% to 4% by weight of an alkaline earth metal salt of an alkyl hydroxy aromatic monocarboxylic acid containing at least 6 carbon atoms in the alkyl substituent with a driving ester of polymeric polyhydric alcohols having alternating aliphatic chains and aromatic nuclei united through ether oxygen and olefinically unsaturated fatty acid of 12 to 20 carbon atoms and an iodine number of at least 90.

Phenol-formaldehyde resins esterified with higher unsaturated fatty acids and dimerized rosin. D. E. Floyd(Gen. Mills, Inc.). *U. S. 2,730,511.* This patent covers a *p*-t-butylphenol formaldehyde resin esterified with a mixture of an unsaturated higher fatty acid and dimerized rosin, the resin being esterified at least 50% and the dimerized rosin constituting from 10–50 equivalent percent of the acids esterified.

Copolymer of (unsaturated) fatty acid and rosin acid. K. E. McCaleb(Gen. Mills, Inc.). *U. S. 2,730,520.* A phosphoric acid-boron trifluoride catalyst and a temperature range of 75–100° are used.

Printing ink varnish. I. Williams and A. Voet(J. M. Huber Corp., Locust, N. J.). *U. S. 2,733,155.* This patent covers an ink varnish consisting essentially of a salt of a water insoluble resin dissolved in aqueous urea and a water soluble aliphatic solvent.

Preparation of isophthalic and terephthalic acids. A. C. McKinnis(Union Oil Co., Los Angeles, Calif.). *U. S. 2,733,266.* The two acids are separated by means of a preferential esterification of the isophthalic acid with a lower aliphatic alcohol.

Synthetic drying oils. D. F. Koenecke(Esso Res. Eng. Co.). *U. S. 2,733,267.* This patent covers a process for improving the hardness of film by first reacting the oil with a polycarboxylic acid, then with a compound containing both an amine and a hydroxyl group, and finally treating the product with a strong organic acid.

• Detergents

Lenore Petschaft Africk, Abstractor

Antibacterial agents in soap. C. L. Bechtold, E. A. Lawrence, and E. M. Owen(Colgate-Palmolive Co., Jersey City, N. J.). *Soap, Chemical Specialties* 32, 79, 81, 83, 85(1956). A new secondary, *in vitro*, screening test has been designed for antibacterial agents to give a reasonable forecast of the Cade handwashing test, and to speed up evaluation of new agents. This Protein Adsorption Test consists of measuring the amount of germicidal efficiency of a new compound left adhering to a photographic sheet film chosen as a protein carrier to represent skin protein. Fairly good correlation was obtained with actual Cade results.

Radioactive soil for testing laundering in home washers. Florence Ehrenkranz(Iowa State College). *Soap, Chem. Specialties* 32(3), 41–2, 197(1956). A method using a radioactive compound in a soiling agent for laundering tests in home washers is described. The data obtained by this method are a direct measure of the amount of the soiling agent removed in laundering. The soil employed was a fatty material with a radioactive component. The kind of soil in the amounts used gave a useful range of values for determining the relative effectiveness of the home laundering procedures investigated.

Investigations into the action of surface-active compounds during preparation and spinning of viscose. I, II. E. Elod, K. Gotze, and H. Rauch. *Reyon, Zellwolle Chemifasern* **No. 5**, 321–6, **No. 9**, 626–31(1955). A short review is made of the patent literature concerned with use of surface-active agents as additives to viscose. The chemical constitution of representative types of these compounds is described and experiments, carried out to study their effect on the interfacial tension of viscose during de-aeration, are reported. The authors discuss the light-permeability and filterability of viscose and the addition of surface-active agents (a) to the mash liquor, (b) at the beginning of xanthate dissolution and (c) after completion of the dissolution process, respectively. The types of surface agents to which reference is made comprise: sulfated oils, sodium salts of highly-sulfated fatty acids with and without addition of dissolution-promoting agents, alkylated (oxyethylated) quaternary ammonium salts, oxyethylated fatty amines and alcohols, and alkylated amine salts of sulfated fatty acids.

Petroleum displacement by detergent solutions. R. T. Johansen, H. N. Dunning, and Jeanne W. Beaty(Bureau of Mines, Bartlesville, Okla.). *Producers Monthly* 20(4), 26, 28–35 (1956). The efficiencies with which 89 detergents and 9 inorganic compounds displace petroleum from sand were determined. A total of 120 nonionic, 35 anionic, and 12 cationic detergents have been studied. The surface tensions and cloud points of the detergent solutions were determined. Values of displacement efficiency, surface tension, and cloud point are listed, together with the composition, trade name, and physical forms of the detergents. Except for heavy-duty anionic formulations and the Ethomeens, anionic and cationic detergents were generally ineffective. The silicates and polyphosphates were moderately effective. Nonionic detergents, because of their high displacement efficiencies in a pure form or in built formulations, appear to be the most promising as water-flooding additives.

Analysis of glycerol. L. Hartman(Fats Research Lab., Wellington, New Zealand). *Chemistry & Industry* **1955**, 1407–8. Glycerol was assayed by an iodometric titration of HCOOH. Errors caused by buffers or coloring matter were compensated by using the glycerol as both sample and blank. The sample was oxidized with $NaIO_4$, the excess reduced to $NaIO_2$ by reaction with propylene glycol, and the HCOOH titrated with standard I after addition of KI and $Na_2S_2O_3$. The blank was prepared by treating $NaIO_4$ with propylene glycol prior to addition of sample. Standard deviations of 0.014–0.045% were observed with crude and refined glycerol and spent soap lye. (*C. A.* **50**, 2370)

Rapid method for plotting soap diagrams. II. M. Loury and A. Prevot(ITERG, Paris). *Rev. franc. corps gras* 2, 859–62(1955). The basic tests necessary for tracing phase diagrams are demonstrated with Na soap made of 80 parts tallow and 20 parts coconut oil to which different quantities of NaCl and H_2O are added. The mixtures are enclosed in a sealed glass tube, placed in a thermostat, centrifuged, and rapidly cooled with a mixture of acetone and CO_2. The phases are dissolved in a mixture of ethylene glycol and iso-PrOH and examined by titration of the fatty acids with $HClO_4$ and of NaCl with $AgNO_3$. The values obtained in 35 runs are tabulated and graphically represented. (*C. A.* **50**, 3783)

Factors responsible for the stability of detergent micelles. I. Reich(Univ. Southern Calif., Los Angeles, Calif.). *J. Phys. Chem.* **60**, 257–62(1956). The theory of Debye, which ascribes micelle formation to the opposition between hydrocarbon-chain attraction and ionic repulsion, leads to grossly incorrect calculations of micelle size distribution. Theories which depend on ionic repulsion are also unable to account for the formation of micelles by nonionic detergents. A general theory for the formation of micelles by nonionic detergents is outlined. For ordinary solutes, the energy of the system decreases indefinitely as the degree of aggregation increases. For detergents, the energy of the system no longer decreases after aggregates reach a certain size. Consequently further aggregation does not occur, since that would involve an entropy decrease. A general equation for micelle size distribution is developed, and the modifications required for ionic detergents are discussed.

Colorimetric method for the quantitative estimation of ethylene oxide adducts. N. Schonfeldt. *Kolloid-Z.*, 142, 164(1955). The method is based on the affinity between ethylene oxide adducts and certain dyes. The dye is dissolved in an aqueous solution or dispersion of adduct, and an organic liquid, immiscible with the aqueous phase, is added to form a separate layer. A substance precipitating the adduct is added from a burette. The precipitate, which carries the dye with it, collects at the interface between the two layers. The addition of precipitant is continued until the aqueous layer is practically colorless. The amount of precipitant added is proportional to the quantity of adduct in solution, the exact relationship being obtained with solutions of known concentration. Azo dyes may be used. The amount of dye must not be such as to affect precipitation, and the dye should not be soluble in the organic liquid, which may be xylene or a paraffin hydrocarbon. Sulfuric and silicotungstic acids are suggested as precipitants.

Characterization of nonionic detergents. A. B. Steele and L. D. Berger, Jr.(Carbide & Carbon Chemicals Co.). *Soap, Chem. Specialties* 32(2), 48–50(1956). A novel approach to characterizing nonionics as to hydrophobic-hydrophilic balance and chemical nature of the hydrophobe has been achieved by relating the ''cloud point'' (the temperature at which nonionic agents separate from dilute aqueous solution as a second liquid phase) with the apparent density. Using representative samples of nonionic agents derived by the addition of ethylene oxide to known hydrophobic structures such as tall oil, resin alcohols, etc., apparent density values and the cloud points of 0.5 per cent solutions of nonionic in water were determined. A plot of cloud points in degrees, centigrade *vs.* apparent density, was then made. The values plotted for nonionics derived from a particular type of hydrophobe fall in a characteristic band which serves to differentiate the various nonionics.

New results on surface phenomena of carboxymethylcellulose. H. Stupel(Seifenfabric, Hochdorf, Switz.). *J. Polymer Sci.* **19**, 459–62(1956). Carboxymethylcellulose is an important builder for detergents increasing above all the whiteness retention. The mechanism of functioning of CMC as a dirt-suspending agent in the laundering process was based on adsorption by the textile. Fluorescence microscopy is an easy method for determining where CMC is adsorbed. It has been discovered that, in the laundering process, CMC is not adsorbed by the fiber, but becomes visible by being attached to the soil. At a high concentration in neutral media, but above all in acid media, CMC is brought onto the fiber.

Detergents in water supplies. J. C. Vaughn and R. F. Falkenthal(Dept. of Water and Sewers, City of Chicago, Ill.). *Ind. Eng. Chem.* **48**, 241–5(1956). The American Water Works Association classifies general problems of detergents as: foam on settling basins, tastes and odor, coagulation and sedimentation, presence of iron, foaming of finished waters, and quality deterioration in distribution systems. Recent work has shown that if the water is first treated with a rosin-acid amine, the detergent may be effectively removed by alumsilicate coagulation. Partially settled sediment from filtration plant settling basins added to water has been effective in detergent removal.

Preparation of cationic surface-active agents from higher fatty alcohols, formaldehyde, and acrylonitrile. Seizaburô Sakakibara, Tarô Ihara, Yutaka Utsuhara, and Saburô Komori (Osaka Univ.). *J. Chem. Soc. Japan, Ind. Chem. Sect.* **58**, 616-19(1955). Alkyl β-cyanoethylformals, $ROCH_2OCH_2CH_2CN$, were synthesized from HCHO, $CH_2:CHCN$, and one of saturated C_{10}–C_{16} fatty alcohols and oleyl alcohol. These formals were converted to surface-active HCl or CH_3COOH salt of alkyl γ-aminopropylformals by hydrogenation with Raney Ni in ammonical ethanol. The physical properties are tabulated.