

TABLE II
Gossypol Schiff Bases

Schiff base	Yield	Recrystallized from	M.P. (dec.)	Analyses ^a					
				Carbon		Hydrogen		Nitrogen	
				Calc'd	Found	Calc'd	Found	Calc'd	Found
	%		°C.	%	%	%	%	%	%
Bis (furfurylimino)gossypol.....	100	.....	264-265	70.99	70.94	5.96	5.98	4.14	4.19
Bis (cyclohexylimino)gossypol.....	100	.....	314-315	74.09	73.55	7.70	7.76	4.12	4.05
Bis (oleylimino)gossypol.....	97	Propanol-2	106-109	77.91	77.63	9.91	9.78	2.75	2.75
Bis (n-octylimino)gossypol.....	93	.....	196-198	74.56	74.72	8.71	8.57	3.78	3.80
Bis (dehydroabietylimino)gossypol.....	95	Abs. ethanol	212-214	79.81	79.34	8.42	8.60	2.66	2.62

^a Analyses calculated on basis of two moles of amine condensing with one mole of gossypol and with the elimination of two moles of water.

Results and Discussion

From Table I it can be seen that aniline and p-aminobenzoic acid do not bind gossypol tightly enough to prevent its incorporation into the yolk. The bis(p-carboxyphenylimino)gossypol is alkali-soluble, which may account for the high AGU value found for eggs from hens fed this substance; this value (35.5) is about nine times as great as that obtained with bis(phenylimino)gossypol, which is not alkali-soluble.

Dehydroabietylamine and cyclohexylamine were also not effective in preventing egg discoloration when their gossypol Schiff bases were fed at the 0.5% equivalent gossypol level. It is unlikely that benzylamine, or furfurylamine, would be worthwhile studying at the 0.5% level since the aromatic group in the Schiff base is isolated from the azomethine linkage by a methylene group, and this would not be expected to change the stability of the linkage very greatly. In other words, these compounds would be expected to be similar to aniline with regard to the ease of hydrolysis of the Schiff base and the liberation of gossypol.

Some of the gossypol Schiff bases derived from the n-alkylamines of varying chain lengths, C₈ to C₁₈, were chosen for study at the higher level when it was found that little or no available gossypol was produced when these compounds were fed at the 0.2% level. n-Octyl-, n-decyl-, n-dodecyl-, n-tetradecyl-, and n-octadecylamine were particularly effective in reducing gossypol availability when their gossypol Schiff bases were fed at the 0.5% level (see Table I). Eggs from birds fed these compounds were indistinguishable from normal eggs with respect to color and structure, and no discoloration was observed in the ammonia test.

Since some of the long-chain aliphatic amines show promise as gossypol binders, extended feeding-studies with selected members of the series are being carried out. Also preliminary experiments with n-octadecylamine-treated cottonseed meal have given indication of sufficient gossypol binding capacity to permit feeding such meal to laying hens in unlimited amounts.

Summary

Eggs from hens fed gossypol Schiff bases derived from various aromatic and aliphatic amines were examined spectrophotometrically for gossypol-cephalin.

Aniline, p-aminobenzoic acid, dehydroabietylamine, and cyclohexylamine were not effective gossypol binders when the Schiff base was fed at the 0.5% equivalent gossypol level in the diet whereas the long chain aliphatic amines were very effective. Hens produced normal eggs when fed the 0.5% level of gossypol Schiff bases derived from these amines.

Acknowledgment

The authors wish to express their appreciation to L. E. Brown of the Analytical, Physical Chemical, and Physics Section (SRRL) for the elemental microanalyses of the new gossypol Schiff bases.

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[Received July 12, 1957]

ABSTRACTS . . . R. A. REINERS, Editor

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• Oils and Fats

The determination of iodine number. A. Seher and W. Arends. (Univ. Münster/Westfalen, W. Ger.). *Mitt. Gebiete Lebensm. u. Hug.* **48**, 1-4(1957). Methods for the determination of the iodine number are discussed and the results of the Wijs method as modified by Stähli and of Kaufmann's procedure are compared for olive, castor, rape, soybean, linseed, and cod-liver oils, and elaidinic and oleic acids. Stähli's method always gives higher values than Kaufmann's. The iodine numbers by

Kaufmann's method agree with the hydrogenation numbers after a 2-hour reaction period, and after a 24-hour reaction period increase far less than the values obtained by Stähli's method. (*C.A.* **51**, 12511)

Hydrogenation of rapeseed oil. Kimitoshi Nakazawa, Shinji Mitsunaga, and Kyujiro Tada (Nihon Yushi Co., Tokyo). *Abura Kagaku* **5**, 292-6(1956). Hydrogenation was carried out with reduced nickel under the following conditions: (a) 180°, 10 lb./sq. in.; (b) 150°, 30 lb./sq. in.; (c) 130°, 30 lb./sq. in. and (d) 110°, 60 lb./sq. in., respectively. The reaction velocity

was 100:71:54:39 for (a) through (d). The melting point was increased from (a), the most selective, through (d), the most nonselective. The decrease in linoleic acid was highest with (a) and lowest with (d). Fats from (d) showed the broadest plastic range and that of (a) the narrowest. Fat from (a) was most suitable for margarine base; that of (b) and (c) was suitable for shortening. (C.A. 51, 12511)

Yield and properties of fractions separated from butterfat by cold crystallization. K. G. Weckel and J. A. Stein (Univ. of Wisconsin, Madison). *Milk Prods. J.* 47(5), 22-4, 51-2 (1956). Butterfat was separated into four fractions by means of cold fractional crystallization. The yield of the various fractions was greatly affected by the season in which the butterfat was produced and by the type of ration which the cows received. It was shown by means of penetration and dilation measurements that the butterfat and the fractions separated from it differ much in consistency and in melting characteristics. Similarly, the degree of unsaturation of the fat in the fractions was shown to vary. (C.A. 51, 11607)

Triglycerides of milk fat. Z. Seitov (Zoovet. Inst., Alma-Ata). *Molochnaya Prom.* 18(4), 34-5 (1957). A description is given with data of some of the physical chemical properties of four fat fractions obtained by temperature crystallization of summer and winter milk fats from absolute alcohol at 20° and 5° for 24 hours, respectively, and as observed during 12 months' storage. (C.A. 51, 11605)

Effect of metals and their oxides on the development of rancidity in sesame oil. Om Prakash, T. R. Sharma and Amanullah Khan (H. B. Technol. Inst., Kanpur). *J. Proc. Oil Technologists' Assoc., India, Kanpur* 12, 1-12 (1956). CuO, Cu, brass, Fe₂O₃, and Fe were found to exert, in a decreasing order, a pro-oxidant effect on sesame oil; stainless steel had practically no effect, whereas Al, Sn, and Al₂O₃ showed slight anti-oxidant properties. CuO, Fe₂O₃ and Al₂O₃ exerted actions similar to those of the corresponding metals. The oxides acted slightly quicker than the metals owing to the larger surface exposed by the former. (C.A. 51, 11739)

Chemical examination of the oil from the seeds of Cucurbita maxima (squash gourd or red gourd). Ram Das Tewari and Purna Chandra Gupta (Allahabad Univ.). *J. Proc. Oil Technologists' Assoc., India, Kanpur* 10, 25-9 (1954). On extraction of the seeds with ligroine, 42.1% of a yellow semidrying oil was obtained having d_{20}^{20} 0.9124, n_D^{20} 1.4800, acid number 1.4, saponification number 198.5, acetyl number 1.82, iodine number (Hanus) 131.4, unsaponifiable matter 0.6%, Hehner number 94.2%, and thiocyanogen number (24 hours) 74.0. The fatty acid composition of the oil was 9,12-octadecadienoic 59.2, cis-9-octadecenoic 28.3, hexadecanoic 3.2, and octadecanoic 9.3%. The unsaponifiable matter contained two phytosterols, one m. 162-3 and the other m. 210-12. (C.A. 51, 11739)

Fatty acid composition of fat from the seed of Shorea robusta. Om Prakash, A. C. Gupta, and S. Rai (H. B. Technol. Inst., Kanpur). *J. Proc. Oil Technologists' Assoc., India, Kanpur* 12, 47-52 (1956). The seed consisted of shell 23.4 and kernel 76.6%, and the latter on extraction with petroleum ether yielded 14% of a pale-green fat. The fatty acids of the fat consist of palmitic 8.3, stearic 34.7, arachidic 12.3, oleic 41.9 and linoleic 2.8%. Their composition is somewhat similar to that of cocoa butter. (C.A. 51, 11739)

Fats and isotopes. Michio Hiraoka (Nippon Soda Co., Nihongi, Niigata). *Abura Kagaku* 6, 127-35 (1957). A review with 172 references. (C.A. 51, 12511)

Seed fat of the Euphorbiaceae. II. The chemical composition of the seed fats from Bischofia javanica and Antidesma diandrum. S. Sarkar and M. M. Chakrabarty (Univ. Coll. Technol., Calcutta). *Sci. and Culture (Calcutta)* 22, 336-7 (1956). Fat extracted from the seeds of *B. javanica* and *A. diandrum* had the following characteristics, respectively: oil content 21.4, 10.2%; saponification equivalent 299.9, 301.2; unsaponifiable matter 0.4, 0.4%; iodine number 174.6, 165.3; hydroxyl value nil, nil; and n_D^{20} 1.4800, 1.4750. The composition of the isolated mixture of fatty acids was, respectively: linolenic 50.98, 47.53; linoleic 11.82, 13.91; oleic, 23.44, 13.11; and saturated acids 13.76, 25.45%. (C.A. 51, 12511)

Colorimetric determination of sulfur in rape oil. Zdeněk Kucěra and Miloš Hejtmánek (Tech. Univ., Prague). *Průmysl potravin* 8, 199-200 (1957). Nascent hydrogen produced by immersing an aluminum strip into a mixture of rape oil and 2 N hydrochloric acid in a stoppered Erlenmeyer flask reduces the isothiocyanate to hydrogen sulfide. A strip of filter paper pretreated with 1% methyl alcohol solution of lead acetate containing 1% glycerol and fastened in the neck of the flask is colored by the hydrogen sulfide evolved. The color is compared with standard strips

colored by known amounts of sulfur. The method detects 1 gamma sulfur in 3 g. oil with an error $\pm 20\%$. The content of sulfur in rape oil is 0.04-0.05%, decreases about 50% on bleaching, to 10% by acid refining, and to 15% by deodorization or hydrogenation. (C.A. 51, 12511)

Development of oil in peanuts. B. G. Prasad (Govt. Agr. Coll., Kanpur) and B. Biswas. *J. Proc. Oil Technologists' Assoc., India, Kanpur* 12, 23-8 (1956). A study of a late-maturity variety of peanut indicated that the moisture decreases and the oil increases up to a maximum at between 65 and 70 days after blooming. Harvesting can be done after this number of days. (C.A. 51, 12511)

Liver oil of Laemonema. III. The components of low boiling fractions of unsaponifiable matter. Saburo Komori, Toshio Agawa, Yoshio Hirao and Koji Kumata (Osaka Univ.). *Abura Kagaku* 5, 284-7 (1956). The unsaponifiable matter consisted of about 10% hexadecyl alcohol, small amounts of octadecanol and eicosanol, about 50% 11-docosen-1-ol, a considerable amount of 9-eicosanol and a smaller amount of 9-octadecenol. Cholesterol was identified and the presence of poly-ethylenic alcohols was presumed. (C.A. 51, 12512)

Stabilization of food by means of nordihydroguaiaretic acid (NDGA) and other antioxidants. F. Mihelic (Fac. farm., Zagreb, Yugoslavia). *Farm Glasnik* 13, 56-61 (1957). Chemical properties of NDGA as well as its use as an antioxidant in food are described. Autoxidation processes occur more readily in pure fat than in fat containing NDGA. The inhibitory effects, as measured by peroxide values, are stronger in darkness than in light, although the samples were kept at room temperature under the same conditions. (C.A. 51, 12369)

Isolation of phosphatides from butter serum. J. Kooops (Nederlands Inst. Zuivelonderzoek, Ede). *Neth. Milk Dairy J.* 11, 43-52 (1957). Butter was centrifuged at 40° and defatted by recentrifuging. The butter serum was dropped into 6 volumes of a mixture of 96% ethanol and carbon tetrachloride 4:1 at 28° and after 24 hours decanted and filtered. The filtrate was concentrated in vacuo to the original volume of the serum and extracted twice with carbon tetrachloride at 28°. The extracts were concentrated in vacuo, filtered, and the phosphatides precipitated with 12 volumes acetone at 24°. This resolution and precipitation was repeated 4 times. The yield of phosphatides was 60-75% with 3.64-3.93% phosphorus and 1.67-1.88% nitrogen. (C.A. 51, 12372)

The influence of copper on the iodine value of phosphatides and fat. J. Kooops (Nederlands Inst. Zuivelonderzoek, Ede). *Neth. Milk Dairy J.* 11, 53-7 (1957). The observations of Sommer that addition of 3 p.p.m. copper accelerates the lowering of the iodine value of milk phosphatides, but not milk fat, are confirmed. (C.A. 51, 12373)

Quantitative determination of the antioxidants propyl, octyl and dodecyl gallate in oils and fats. H. J. Vos, H. Wessels, and C. W. Th. Six (Central Inst. Nutritional Research, Utrecht, Neth.). *Analyst* 82, 362-7 (1957). The oil or fat plus gallate-free arachis oil is taken up in 40-60° petroleum ether. By extended washing with water the propyl gallate is extracted and then determined by adding ferrous tartrate and buffer and measuring at 530 μ . Further extraction with absolute methanol removes octyl and dodecyl gallates, which are determined in the same way with concentration of the color by extraction into 1:1 isoamyl alcohol-petroleum ether and measured at 550 μ . With sufficient attention to details, recoveries of 98% are obtained. (C.A. 51, 12373)

Fatty acids of Indian fish fats. S. P. Pathak and V. N. Ojha (Dept. Ind. Chem., Banaras Hindu Univ.). *Biochem. J.* 66, 193-195 (1957). The compositions of the body and visceral fats from belgagra (*Rita buchanani*) and the body fat of hilsa (*Chupondon ilisha*) have been studied. Lithium salt-acetone and lead salt-ethanol fractionations were used to separate the fatty acids. Their compositions were studied by methyl ester fractionation. Values are given for the fatty acids as moles percentage in the body fats for these fish. The first values listed are for belgagra and the second for hilsa: myristic, 5.0 and 6.8; palmitic, 22.2 and 26.8; stearic, 8.9 and 9.0; arachidic, 0 and 1.7; for unsaturated acids C₁₄, 1.7 and 2.4; C₁₆, 14.3 and 13.9; C₁₈, 34.9 and 28.1; C₂₀, 7.9 and 5.3; C₂₂, 5.1 and 10.1; C₂₄, 0 and 2.5.

Determination of the structure of unsaturated fatty acids on a micro scale with the gas-liquid chromatogram. A. T. James and J. Webb (Nat. Inst. for Med. Res., Mill Hill, London, N.W. 7). *Biochem. J.* 66, 515-520 (1957). The separation of the methyl esters of mono- and di-carboxylic acids on the gas-liquid chromatogram is described. Oxidation with permanganate in acetic acid followed by identification of the split products on the gas-liquid chromatogram is used to establish the structure

of some naturally occurring mono- and di-unsaturated acids. The presence of vaccenic acid in human plasma is confirmed by this technique and cow's milk is shown to contain a variety of mono-unsaturated octadecenoic acids. The isolation of an unsaturated acid present as a major component in human red cells and plasma is described, and is shown by reduction and oxidation to be arachidonic acid.

Use of phthalocyanines as autooxidation catalysts for methyl oleate. C. Paquot and Miss C. Galletaud. *Olivii Minerali-Grassi E Saponi-Colori E Vernici* 34, 330-332(1957). A study has been made on the use of phthalocyanines as autooxidation catalysts for methyl oleate. The Fe, Ni and Mg phthalocyanines have proved good catalysts and the Fe in particular are the most active and capable of decomposing the formed peroxides. It was noted furthermore that in the autooxidation process which takes place at 60° in the presence of phthalocyanines, the only peroxides are hydroperoxides.

Urea adducts with fatty compounds. XII. Complexes with potassium soaps. J. M. Martinez Moreno, A. Vazquez Rancero and Miss C. Janes del Valle. *Grasas y Aceites* 8, 107-108 (1957). Urea formed inclusion compounds with the potassium soaps of the following fatty acids: palmitic, stearic, arachidic, behenic, oleic, linoleic and linolenic. The method for making the complexes is described and the composition of such complexes determined by analysis for nitrogen.

The structure of urea inclusion compounds with potassium soaps. I. L. Bru, M. Perez Rodriguez, M. Cubero, I. Barragan and J. Diaz. *Grasas y Aceites* 8, 109-111(1957). X-ray techniques were applied to study the structure of crystalline complexes of urea with potassium palmitate and potassium linoleate. Both showed a hexagonal lattice formed by urea molecules. The soap molecules are included in the "tubes" formed by the urea lattice, but in a different way for each soap studied. Potassium palmitate enters the complexes as a dimer, forming a unidimensional lattice with spacing of c equal to 47 Å. In the potassium linoleate complex, each -COOK group is followed by the -CH₂ of the next molecule. The long spacing of the lattice is c equal to 26 Å corresponding to a single soap molecule. Single crystals of each complex were employed for these studies.

Antioxidant substances and their application for preservation of fats. H. S. Hebbel. *Archivos Venezolanos de Nutricion* 7, 131-143(1956). The possible mechanisms of rancid decomposition of fats, the oxidative reactions involved, the methods used for their inhibition, methods for the determination of antioxidants, and the use of the latter for the preservation of foods and medicines, are discussed.

Fatty acid oxidation by means of ascorbic acid and oxygen. R. P. Geyer, Sally Kydd and Marion Ryan (Harvard Sch. Public Health). *Arch. Biochem. Biophys.* 70, 129-140(1957). Under conditions normally used in physiological experiments, carboxyl-labeled long-chain saturated fatty acids were oxidized to C¹⁴O₂ in the presence of ascorbic acid and oxygen. The reaction rate was greatly increased in the presence of ferrous and ferric ions. Ethylenediaminetetraacetic acid inhibited both ascorbate oxidation and C¹⁴O₂ formation. Cysteine and folic acid, on the other hand, decreased ascorbate oxidation but not C¹⁴O₂ formation. Approximately half as much C¹⁴O₂ was formed from the 2- and 3-carbons of stearic acid as from the carboxyl carbon. Hydroxylamine inhibited C¹⁴O₂ formation from stearic acid-2-C¹⁴ but not from the carboxyl-labeled material. Carboxyl-labeled oleic and elaidic acids were also oxidized but to a lesser extent than stearic acid, while octanoic acid-1-C¹⁴ formed little C¹⁴O₂.

Chromatographic determination of oxidized acids in fats. M. Burnet and P. Desnuelle. *Olivii Minerali-Grassi E Saponi-Colori E Vernici* 34, 321-327(1957). A new technique is suggested based on reversed phase partition chromatography using gasoline impregnated rubber as the fixed phase and aqueous acetone as the mobile phase. By such methods all the oxidized acids migrate more rapidly than the non-oxidized acids, except for lauric acid and the lower molecular weight fatty acids. It is thus possible to evaluate volumetrically or by weighing the amount of oxidized acids whenever the substance (such as copra, palm, butter) does not contain lauric acid or lower molecular weight fatty acids.

Seed oils from seven species of Japanese plants. Yoshito Koyama and Yoshiyuki Toyama (Nagoya Univ.). *J. Japan Oil Chemists' Soc.* 5, 359-61(1956). The plant, crude fat content of dried seeds; d²⁰, n_D²⁰, acid no., saponification no., iodine no., unsaponifiable matter (%) of the seed oil (extracted with hexane); neutralization no., iodine no., acetyl no., ether-insoluble bromide (%) of fatty acids; and % for saturated, oleic, linoleic, and linolenic acids are as follows: *Quamoclit angulata*,

13.7%; 0.9240, 1.4736, 3.3, 189.2, 115.1, 2.24; 199.6, 120.1, 2.0, 8.0; 33.6, 11.5, 43.7, 11.2. *Frangula crenata*, 30.5%, 0.9185, 1.4726, 1.3, 189.4, 115.8, 0.84; 195.3, 122.1, 1.8, 1.0; 15.6, 37.6, 42.9, 3.9. *Daphniphyllum glaucescens*, 44.5%; 0.9201, 1.4709, 1.2, 189.6, 97.7, 0.93; 194.7, 101.4, 4.4, 0; 10.2, 67.1, 22.7, 0. *Cocculus trilobus*, 18.8%; 0.9227, 1.4745, 3.1, 187.1; 127.5, 1.26; 198.5, 133.6, 4.1, 0; 10.0, 32.3, 57.7. *Mirabilis jalapa*, 4.3%; 0.9106, 1.4713, 3.1, 181.7, 100.9, 3.76; 194.6, 107.9, 3.5, 12.0; 24.4, 46.9, 13.6, 15.1. *Polygonum perfoliatum*, 3.3%; 0.9250, 1.4737, 2.9, 184.6, 105.9, 4.93; 195.2, 110.2, 19.4, 1.0; 22.1, 38.0, 35.7, 4.2. *Broussonetia papyrifera*, 31.7%; 0.9242, 1.4767, 2.4, 189.0, 145.3, 2.67; 197.7, 151.1, 2.6, 0; 9.0, 15.0, 76.0, 0. Some crystalline compounds were obtained from unsaponifiable matter, most of which gave color reaction for sterols, but a few of which did not.

Spectrophotometric studies on the purification of fats and oils. I. Soybean oil. Kiyoshi Kurita (Nikka Fats & Oils Co., Wakamatsu, Fukuoka). *Abura Kagaku* 5, 347-9(1956). Soybean oil was extracted with petroleum naphtha, and its purification products in n-hexane were measured for absorption spectra at 210-700 mμ. The raw oil showed absorption maxima at 232 (corresponding to conjugated dienoic acids), 260-280 (conjugated trienoic acids), 420, 445, 475 (these 3 to carotenoids), 535 (anthocyanins), 610, and 670 mμ (these 2 to pheophytin A). Deacidification produced little change in the spectrum with only slight decrease in absorption. Decolorization produced a great change in the spectrum: absorption maxima decreased at 232 mμ and increased clearly at 258, 268, 280, 300, 315 mμ (the last 2 due to conjugated tetraenoic acids). Absorption due to carotenoids disappeared and that due to chlorophyll derivative considerably decreased and shifted to 600 and 650 mμ. Deodorization increased absorption slightly at 232 mμ and decreased at 300 and 315 mμ.

The decolorization of rice oil. Taketoshi Yamada and Zenko Komatsu (Mizusawa Ind. Chem. Ltd., Tsuruoka, Yamagata). *J. Japan Oil Chemists' Soc.* 5, 296-8(1956). Decolorization of highly acidic raw rice oil could be accomplished by adding concentrated H₂SO₄ at 0.5% of the oil at 70°, stirring, and treating with active clay. The change of the color of oil with concentrated H₂SO₄ was partly due to the decomposition of iron soap contained in the raw oil.

Polarographic behavior of fatty acids in nonaqueous solutions. Teruzo Asahara and Shigeo Hayano (Univ. Tokyo, Chiba). *J. Japan Oil Chemists' Soc.* 5, 352-5(1956). Polarographic properties were determined on acetic, lauric, myristic, and oleic acids, and methyl caprylate and laurate with 0.1 M LiCl in acetone-water (9:1) as the standard liquid. These acids showed maximum waves. The calibration curves could not be obtained for higher acids presumably due to the reaction product formation. The esters showed no waves. Gelatin and polypropylene glycol could not inhibit the maximum wave formation. With 0.1 M tetramethyl ammonium iodide (or bromide) in methanol-benzene (3:1) as the standard liquid, maximum potentials shifted to negative side. The calibration line was nearly linear. Experiments with added HCl showed that polarographic waves of higher acids were due to nondissociated molecules of acids.

Liver oil of Squalus suckleyi. I. Decomposition products formed by steam distillation. Shinji Mitsunaga, Umajiro Shimamura, Junsaku Tsuji, and Tadaaki Okada (Nihon Yushi Co., Tokyo). *J. Japan Oil Chemists' Soc.* 5, 355-8(1956). Saponification of this shark oil at 200° did not decompose its unsaponifiable matter, which was subjected to steam distillation at 250-300° under reduced pressure of 30-40 mm. Hg. In the distillate oleyl alcohol and octadecyl alcohol were identified; these were presumed to be produced by hydrolysis of selachyl alcohol and baehyl alcohol. Only small amounts of aldehydes and ketones and no hydrocarbons were detected in the distillate.

Conjugated lipides. VI. Isolation and properties of phrenosine. Yasuhiko Fujino (Obihiro Zootechn. Univ. Hokkaido). *J. Agr. Chem. Soc. Japan* 30, 764-7(1956). The isolation of phrenosine is described in detail from ox spinal cord through sphingolipides. This phrenosine showed m.p. 212°, iodine no. 30.8, and [α]_D²⁰ +4.55° (c 2.0, pyridine). Hexamethylphrenosine, m.p. 66-7°, and hexacetylphrenosine, m.p. 34.5-35.5°, were prepared.

VII. Configuration of the double bond in phrenosine. *Ibid.* 767-9 (1956). The double bond was proved to have *trans* configuration. Dihydrophrenosine, m.p. 220-22°, and hexaacetyldihydrophrenosine, m.p. 37.5-38.0°, were prepared.

Some problems of oil production. Shûchirô Kimoto (Yoshiwara Oil Mills, Ltd., Nishinomiya, Hyôgo-ken). *J. Agr. Chem. Soc. Japan* 30, A, 21-5(1956). The progress in oil pressing and solvent extraction culminated in the expeller method and continuous solvent extraction system. However, there might be

some possibilities in newer system, which cannot be classified into one of the above 2 methods. The methods of A. Skipin and W. Iljin of Russia and impulse rendering of I. H. Chayen of England are explained as the examples. The necessity of studying appropriate techniques suitable for Japan is emphasized.

Automatic receiver for continuous vacuum distillation. W. J. Humphlett (Research Lab., Eastman Kodak Co., Rochester, N. Y.). *Anal. Chem.* 29, 1241-1242 (1957). A glass receiver for continuous vacuum distillation has been designed for collecting distillate automatically without disturbing the pressure or ebullition in the distilling apparatus.

Production of carbonyl compounds during irradiation of meat and meat fats. O. F. Batzer, M. Sribney, D. M. Doty, and B. S. Schweigert (Am. Meat Institute Foundation and Dept. of Biochem., Univ. of Chicago, Chicago, Ill.). *Agr. and Food Chem.* 5, 700-703 (1957). Investigation of the chemical changes that occur when meat and meat products are subjected to gamma radiation for sterilization indicated the formation of carbonyl compounds. Extraction procedures and the behavior of the compounds with various chromatographic solvent systems suggested that those obtained from irradiated meat differ from those obtained from irradiated fat. Carbonyl compounds increase in both meat and fat with increasing irradiation dosages.

Hydrogenation and Hydrogenolysis. J. T. Bradbury (Div. of Nat. Cylinder Gas Co., The Girdler Co., Louisville, Ky.). *J. Ind. Eng. Chem.* 49, 1523-1531 (1957). Nickel catalysts monopolize the hydrogenation processes in which saturation is the object. Most commercial users mention precipitated nickel on a carrier or nickel from the decomposition of nickel formate. Copper chromite catalysts dominate the processes in which hydrogenolysis of the glyceride is intended. One cadmium-promoted copper chromite catalyst is described.

Chromatographic separation of 2,4-dinitrophenylhydrazones. E. L. Pippen, E. J. Eyring and M. Nonaka (U. S. Dept. of Agr., Albany 10, Calif.). *Analytical Chemistry* 29, 1305-1307 (1957). Chromatography of 2,4-dinitrophenylhydrazones of aliphatic aldehydes and ketones on silicic acid-Celite columns was studied. Column packed to a height of 75 cm. permitted separation of hydrazone mixtures of adjacent members of the homologous series of saturated normal aldehydes as high as C₁₁. In addition, the feasibility of separating various combinations of the derivatives of 34 aliphatic aldehydes and ketones is described.

Infrared spectra of α,β -unsaturated esters. W. L. Walton and R. B. Hughes (Insulating Materials Section, Chem. and Metallurgy, Div. of Gen. Elec. Co., Schenectady, N. Y.). *J. Am. Chem. Soc.* 79, 3985-3992 (1957). A number of ester families have been shown to have characteristic absorptions in the 10-15 μ region. These absorptions are quite constant in wave length for all members of the ester family (i.e., esters derived from the same acid). The esters which show such absorptions are those that have unsaturation α,β - to the ester group.

Interface enrichment of methylene blue by fatty acids with microanalytic applications. C. M. Coleman and G. Middlebrook (Dept. Res. and Lab., Nat. Jewish Hospital at Denver, Denver, Colorado). *Science* 126, 163 (1957). The authors have observed that thionine dyes are attracted by fatty acids to the interface between alkaline water and water-immiscible fatty-acid solvents. This attraction provides the basis for a convenient new method of measuring very small amounts of certain long-chain fatty acids. In particular, palmitic, oleic, stearic, elaidic, and linoleic acids, separately or in mixtures, have been shown to cause the basic dye, methylene blue, to become enriched at the interface of a two-phase system consisting of a heptane mixture (Skellysolve D) plus methylene blue in ammonia water. The loss of dye from the aqueous bulk phase is a logarithmic function of the amount of such fatty acids in the system. Thus, total concentration of the aforementioned fatty acids may be determined by application of this method.

The adsorption of n-nonadecanoic acid on mechanically activated metal surfaces. H. A. Smith and R. M. McGill (Dept. Chem., Univ. Tenn., Knoxville). *J. Phys. Chem.* 61, 1025-36 (1957). When fresh surfaces of metals more electropositive than silver are prepared by machining the metal under a dilute cyclohexane solution of n-nonadecanoic acid, one monomolecular layer of acid is rapidly adsorbed. Silver and the less electropositive metals do not form a full monolayer. The hypothesis is considered that the adsorption of the fatty acid results in the formation of the corresponding metallic soap. Analysis of the desorbed monolayers supports this hypothesis. Furthermore, the rates of desorption are proportional to the solubilities of the soaps. Kinetics of the adsorption are discussed.

Physical properties of monolayers adsorbed at the solid-air interface. I. Friction and wettability of aliphatic polar com-

pounds and effect of halogenation. O. Levine and W. A. Zisman (Georgetown Univ. and U. S. Naval Research Lab., Washington, D. C.). *J. Phys. Chem.* 61, 1068-77 (1957). Condensed monolayers were adsorbed at the interface of polished glass and air. Details of the procedures are described. Wettability and friction data are reported for monolayers of fatty amines, fatty acids, fatty alcohols, and terminally halogenated fatty acids. Evidence is given in support of the hypothesis that the ability of a paraffinic derivative to adsorb as a solid monolayer is the result of intermolecular cohesive energy between the paraffinic chains. The transition from a solid to a liquid condensed film takes place at the lower values of N when the energy of adhesion of the polar group to the glass substrate is high.

The reactions of hydrocarbon radicals on metal surface. G. C. Bond (Hull Univ.). *Paint Technol.* 21, 269-71 (1957). The mechanisms of catalytic hydrogenation are reviewed briefly.

Progress in soybean research. J. C. Cowan (N. Utilization Research and Dev. Div., Agr. Research Service, U.S.D.A., Peoria, Ill.). *Soybean Digest* 17(11), 64-6 (1957). Recent work in this laboratory relating to soybean oil is reviewed briefly. The toxic factor in trichlorethylene-extracted soybean oil meal (TESOM) has been found to result from the reaction of this solvent with a sulfur amino acid in the protein. With the current interest in essential fatty acids, there is a growing need for a liquid edible soybean oil stabilized against flavor reversion. Iron, linolenic acid and tocopherol have been shown to be contributing factors in the lower stability of liquid soybean oil as compared to other food fats. Polymerized vinyl ethers from soybean fatty alcohols have considerable merit as ingredients for protective coatings, particularly for can coatings. Soybean phosphatides have been found to contain 16 to 20% of a phytosphingosine-inositide.

Fat processing methods. C. A. S. Thorstenson-Rydberg (J. R. Andersson & Co., Akt.). *U. S. 2,803,529*. A lump of fat, which has been produced from an emulsion, is worked by tumbling so that air is expelled and the lump becomes homogeneous.

Apparatus and method for recovering fat. I. H. Chayen (C.C.D. Processes [N. Y.] Ltd.). *U. S. 2,803,634*. Fat is freed from fatty tissues or solids by subjecting a suspension of the tissue in water to intense impacts in a hammer mill.

Process of removing color from cottonseed oil. P. A. Williams. *U. S. 2,803,636*. In a continuous process, color is removed from a previously refined vegetable oil by instantaneously blending the oil with a small amount of concentrated caustic by forcing the mixture in a stream less than one-quarter inch thick through a space between moving abrasive surfaces. Subsequently, the oil is separated.

Method and apparatus for deodorizing oils and fats. J. F. Suriano. *U. S. 2,804,427*. A tower is described for the continuous treatment of fats or oils. The preheated fat flows over trays countercurrently to a stripping vapor.

Desolventizer. R. P. Hutchins (The French Oil Mill Machinery Co.). *U. S. 2,806,297*. A desolventizer for solvent extracted material of loose small particles is described as a series of closed steam jacketed kettles arranged in a vertical row so that solid may be passed downward in portions countercurrently to the flow of steam.

Stabilization of oil-containing compositions with reductones. J. E. Hodge and C. D. Evans (U.S.A., Secy. Agr.). *U. S. 2,806,794*. Fats and oils may be stabilized against oxidative deterioration by the addition of an amino-glycose reductone or anhydro-amino-glycose reductone.

Process for recovering rolling oil. L. Kovacs. *U. S. 2,806,868*. Fatty oils used in emulsions for the cooling and lubricating of steel during cold rolling are recovered by breaking the emulsion with a mineral acid.

Apparatus for electrolytic condensation of fatty acids. S. A. Voitkevich, O. K. Sladkova and G. E. Svadkovskaya. *U. S. S. R. 101,078*. An apparatus is described which is primarily for the synthesis of macrocyclic fragrant substances by electrolytic condensation of fatty acids. (C.A. 51, 12513)

Intermittently acting apparatus for extracting bone tallow. V. I. Safronov. *U.S.S.R. 101,365*. (C.A. 51, 12513)

Apparatus for continuous preliminary defatting of oleagenous seed before pressing or extraction. N. P. Kovalenko. *U.S.S.R. 101,265*. (C.A. 51, 12514)

Recovery of higher fatty alcohols from wastes from manufacture of synthetic rubber. P. A. Moshkin, B. M. Kuindzhi and M. A. Gol'dman. *U.S.S.R. 105,130*. Higher fatty alcohols are recovered from the waste products from synthetic-rubber manufacture after first driving off butyl alcohol by extraction

with aqueous solutions of methanol and ethanol. (*C.A.* 51, 11741)

Apparatus for saponification of esters. N. I. Gel'perin and K. N. Solopenkov. *U.S.S.R.* 105,233. The apparatus also provides for separation of the products according to their specific gravity. (*C.A.* 51, 11741)

FATTY ACID DERIVATIVES

Force-area and potential-area relations of monolayers of terminally fluorinated octadecylamine and octadecanoic acid. H. W. Fox (Chem. Div., U. S. Naval Research Lab., Washington 25, D. C.). *J. Phys. Chem.* 61, 1058-62(1957). Force-area and potential-area relations are reported for monolayers of $\text{CF}_3(\text{CH}_2)_{16}\text{COOH}$ and $\text{CF}_3(\text{CH}_2)_{17}\text{NH}_2$ spread on water at various pH values. Curves are compared with those for stearic acid and octadecylamine on the same substrates. The fluorinated compounds form films which do not support high pressures and whose molecular areas at closest packing are, under some conditions, too large to be accounted for by the extra bulk of the $-\text{CF}_3$ group. This behavior is attributed to the intermolecular repulsions of the strong dipoles associated with the $-\text{CF}_3$ group.

Monolayers of dicetyl fumarate and dicetyl maleate, and their interaction with bromine and iodine. J. L. Shereshefsky (Chem. Dept., Howard Univ., Washington, D. C.). *J. Phys. Chem.* 61, 1053-8(1957). Surface pressures and surface potentials are reported for monolayers of dicetyl maleate and dicetyl fumarate. Bromine, iodine and acidified iodides lower the potentials of the maleate ester monolayers but have no effect on the fumarate monolayers. The orientation of polar groups in the monolayers is discussed.

The adsorption on platinum and wettability of monolayers of terminally fluorinated octadecyl derivatives. E. G. Shafrin and W. A. Zisman (U. S. Naval Research Lab., Washington 25, D. C.). *J. Phys. Chem.* 61, 1046-53(1957). Condensed monolayers were prepared on platinum surfaces by adsorption from solution and isolation by the withdrawal method. Comparisons were made of the adsorptive behavior of ω,ω,ω -trifluorooctadecylamine with that of octadecylamine, and between ω,ω,ω -trifluorostearic acid and stearic acid. Much longer times were required for film formation by trifluorooctadecylamine than by the other three compounds. Hydrophobic monolayers of the fluorinated amine were isolated readily from aqueous solution but application of the same methods to the fluorinated acid were not successful. Monolayers of trifluorooctadecylamine were somewhat more wettable by organic liquids than were those of trifluorostearic acid; whereas the former monolayer was hydrophobic, the latter was hydrophilic. The mechanism of adsorption of the film and the relation of constitution to wettability are discussed.

Gamma ray polymerization of unsaturated esters. J. F. Black and W. C. Hollyday, Jr. (Esso Research & Engr. Co.). *U. S.* 2,803,598. A polyester for use in lubricating oils is obtained by exposing a solution of monoester to gamma-radiation in the range between 1×10^4 and 2×10^7 roentgens per hr. until a molecular weight of 2,000 to 50,000 Staudinger is attained. The monoester is an unsaturated organic ester having about 8 carbon atoms per carboxyl group, and is prepared from aliphatic C_8 to C_{20} acids and C_1 to C_{30} alcohols.

Alcohols derived from safflower oil. G. R. Wilson (Ethyl Corp.). *U. S.* 2,803,671. A mixture of alcohols is produced by reducing safflower oil with an alkali metal and alcohol.

Corrosion prevention in oil wells. P. W. Fischer (Union Oil Co.). *U. S.* 2,805,201. A corrosion inhibiting composition for use in oil wells is a solution of an ester of a dimerized C_{16} to C_{22} polyunsaturated fatty acid and an alkanolamine.

Stick corrosion inhibitors. C. C. Nathan (The Texas Co.). *U. S.* 2,805,202. A bonded solid corrosion-inhibiting composition is prepared from a thiourea derivative, a high molecular weight polyethylene glycol fatty acid ester, and an N-primary aliphatic amide having 6 to 18 carbon atoms in the aliphatic acid radical.

Method of treating wool. L. W. Davis and J. P. Redston (E. F. Drew & Co.). *U. S.* 2,806,804. Wool fibers are impregnated with a soap-free mixture consisting of an aqueous emulsion of paraffin oil with a polyethylene glycol monoester of C_{12} - C_{22} fatty acid, liquid triglycerides of C_{12} - C_{18} fatty acids, and a condensation product of an ethanolamine with a higher fatty acid. The treated fibers are then contacted with an alkoxypolyethylene glycol monoester of a fatty acid.

Method of reacting sugar cane wax with a calcium compound. E. A. Wilder (S. C. Johnson & Son, Inc.). *U. S.* 2,806,827. De-oiled or deoiled-deresinated sugar cane wax is heated to 80-150°, blown with an oxygen-containing gas until the acid num-

ber is between 22 and 38, then mixed with 1 to 5% of calcium oxide or hydroxide, and heated until the oil-retention-penetration value is no greater than 140.

Process for the conversion of soaps of unsaturated into soaps of saturated fatty acid. W. Stein and H. Hartmann (Henkel & Cie. G.m.b.h.). *U. S.* 2,806,869. Saturated fatty acids are obtained by the reaction of alkali metal soaps of unsaturated acids with a caustic alkali solution at 300 to 450° under a pressure of at least 100 kg./sq.cm.

Alpha-(o-Aminoaryloxy) fatty acids. J. G. Geigy. *Swiss* 305,118. 2-(Halo acetamido)-1-alkoxybenzenes are treated with Friedel-Crafts reagent at >60°. Subsequent use of strong alkali splits off the alkyl halide and gives the alkali salt of (2-aminophenoxy) acetic acid which is hydrolyzed by dilute hydrochloric acid to the free acid. (*C. A.* 51, 12514)

Epoxydation of fatty acids. Food Machinery and Chemical Corp. *Brit.* 769,127. A method is described for the epoxydation of higher fatty acids containing an ethylenic double bond, in particular those fatty acids obtained from oils containing oleic acid. The reaction is carried out by means of hydrogen peroxide, acetic acid and a small amount of sulfuric acid in an organic solvent and at a relatively high temperature. The usual method, with peracetic acid solution, results in a waste of as much as 20% of the available active oxygen (*C. A.* 51, 12513)

Organic acids and esters. Compagnie de produits chimiques et electrometallurgiques Alais, Froges et Camargue. *Fr.* 1,011,938. In the manufacture of organic acids by hydrolysis or esters by alcoholysis, basic anion exchange resins are used as catalysts. Preferably, the reaction is conducted in the presence of an excess of water or alcohol. (*C. A.* 51, 11741)

• Biology and Nutrition

Protein level as a factor in egg production. P. A. Thornton, L. G. Blaylock, and R. E. Moreng (Dept. of Poultry Husb., Colorado Ag. Exper. Station, Fort Collins, Colorado). *Poultry Sci.* 36, 553-557. The effect of protein level on egg production, feed efficiency, maintenance of body weight, egg weight, and incidence of small eggs was determined in S. C. White Leghorns using 17, 15, 13, and 11 percent protein levels in a high energy type ration. The effect on these factors, of DL-methionine, L-lysine, and a combination of these two amino acids supplemented at all protein levels was also determined.

Changes in specific blood serum protein levels associated with parturition in the bovine. B. L. Larson and K. A. Kendall (Lab. of Biochem., Dept. Dairy Sci., Univ. of Ill.). *J. Dairy Sci.* 40, 659-666(1957). Beginning about 14 weeks before parturition, the level of serum proteins in the blood of the bovine started increasing, to reach a maximum about four weeks before parturition; and then started decreasing, to reach a minimum at parturition. The drop at parturition was caused by a loss of immune β_2 - and γ_1 -globulins and some α -globulins from the blood; the level of serum albumin and the β_1 and γ_2 globulins did not change appreciably. The drop corresponded with the time the colostrum was being formed in the mammary gland.

Genetic covariation between milk yield and fat percentage in dairy cattle. B. R. Farthing and J. E. Legates (Dept. Animal Industry, N. C. State College, Raleigh, N. C.). *J. Dairy Sci.* 40, 639-646(1957). The genetic correlation between milk yield and fat percentage for 5,458 Holstein daughters and dams was -0.38 ± 0.06 , and 1,825 Guernseys, -0.57 ± 0.10 . The genetic variance in fat percentage for Holsteins was about one-half that for Guernseys, but for milk production it was larger for Holsteins than for Guernseys. There was no consistent trend in the negative genetic correlation between milk production and fat percentage for either breed, when fat production increased from 300 to 480 lb.

An in vitro effect of vitamin D on citrate oxidation by kidney mitochondria. H. F. DeLuca and H. Steenbock (Dept. Biochem., College of Ag., Univ. of Wis., Madison, Wis.). *Science* 126, 258(1957). The possibility that an *in vitro* effect of vitamin D may be demonstrable appears evident from the effects on citrate metabolism which have been reviewed in recent publications. The possibility that the resulting accumulation of citrate in kidney, and possibly in other tissues, may be an important factor in calcium transport and deposition appears increasingly alluring.

Insect nutrition and metabolism of sterols. S. D. Beck and G. G. Kapadia (Dept. of Ent., Univ. of Wis., Madison, Wis.). *Science* 126, 258-259 (1957). The importance of cholesterol and related sterols in insect nutrition was first demonstrated in 1935, and it is now well established that insects in general require a dietary sterol. The insects' nutritional requirement for sterols is indicative of an inability to synthesize the steroid nucleus, at least in physiologically adequate amounts. This characteristic is in direct contrast to that of the higher animals, in which sterols are apparently synthesized from simple compounds such as acetate. The specificity of the insect requirement for sterols has been subjected to detailed investigation by a number of workers, and some of the important configurational requirements have been elucidated.

The use of vitamin A protected by DPPD (diphenyl-p-phenylenediamine) for the growth of chickens. I. Ascarelli (Faculty of Ag., Hebrew Univ., Rehovot, Israel). *Poultry Sci.* 36, 549-551 (1957). Vitamin A supplied as a stabilized concentrate at a level of 400 I.U./100 g. feed, was found to be much better utilized than vitamin A supplied as fish oil. DPPD did not appear to influence the utilization of either form of vitamin A.

Studies on the protein quality of high-oil, high-protein corn. G. Reussner, Jr. and R. Thiessen, Jr. (Research Center, General Foods Corporation, Tarrytown, New York). *J. Nutrition* 62, 575-584 (1957). Two high-oil, high-protein corn varieties (13.0% protein with 8.6% oil and 11.5% protein with 7.0% oil) gave significant increases in growth and protein quality over that obtained from regular corn (9.3% protein with 5.1% oil) in *ad libitum* feeding with rats.

A rapid method for the bulk isolation of β -lipoproteins from human plasma. J. L. Oncley, K. W. Walton, and D. G. Cornwell (Department of Biological Chem., Harvard Medical School). *J. Am. Chem. Soc.* 79, 4666-4671 (1957). A simple and rapid method for the concentration and isolation of β -lipoproteins from human serum or plasma is described. The method involves the use of a dextran sulfate of large molecular weight as a specific complexing agent for the lipoproteins. Dissociation of the complex by ultracentrifugation in a salt density gradient yields β -lipoproteins of varying density and of high purity. The chemical and physical properties of material prepared in this fashion from pooled normal human plasma are described in detail. The analyses of lipoprotein flotation patterns by means of a distribution function is proposed.

Effect of vitamin B₁₂ deficiency and fasting on the incorporation of P³² into nucleic acids and phospholipides of infant rats. B. L. O'Dell and J. H. Bruemmer (Department of Agricultural Chemistry, University of Missouri, Columbia, Missouri). *J. Biol. Chem.* 227, 737-743 (1957). Radioactive phosphorus was administered to fasted new born rats and to the offspring of vitamin B₁₂-deficient dams. The brains and livers were fractionated and the specific activities of phosphorus in the various fractions were compared to similar fractions from control animals. The acid-soluble phosphorus had a higher specific activity in both the deficient and the fasted animals. The relative specific activities of the lipide-soluble phosphorus, deoxyribose nucleic acid (DNA) P, and pentose nucleic acid (PNA) P, related to acid-soluble fraction, were markedly lower in the fasted animals.

Fat supplementation of chick starting rations containing cottonseed meal. E. C. Naber and C. L. Morgan (South Carolina Agr. Experiment Station, Clemson, S. C.). *Poultry Sci.* 36, 727-732 (1957). Degossypolized cottonseed meal can replace substantial quantities of soybean oil meal in chick starting rations without impairing growth. Efficiency of feed utilization, however, is generally impaired when cottonseed meal is substituted for the soybean oil meal. Studies were undertaken to investigate these observations. White grease and poultry grease improved efficiency of feed utilization on the cottonseed meal ration making it comparable from the standpoint of both growth and feed utilization to the basal ration. Crude cottonseed oil and crude cottonseed soapstock were found to be approximately equivalent to the greases used.

The transport of fatty acids in the blood. J. F. Mead and Dorothy L. Fillerup (Atomic Energy Project, School of Medicine, University of California, Los Angeles, California). *J. Biol. Chem.* 227, 1009-1023 (1957). At various intervals after ingestion of carboxyl-labeled methyl stearate, oleate, and linoleate, the plasma and erythrocyte lipides of rats were separated chromatographically into sterol ester, triglyceride, sterol, and phospholipide fractions which were weighed and counted. Ingested stearate and oleate appeared mainly in the triglyceride fraction during the first 2 hours. After this time, in the case of stearate, the label appeared mainly in phospholipide. Ingested linoleate appeared largely as phospholipide and sig-

nificantly as sterol ester. Labeled fatty acids appeared rapidly in the erythrocytes, but their distribution did not seem to bear any simple relationship to that in the plasma. The plasma mono- and diglyceride fractions, after separation and purification, were shown to contain about 20 percent of the newly ingested fatty acids.

The metabolism of the essential fatty acids. Part VI. Distribution of unsaturated fatty acids in rats on rat-free and supplemented diets. J. F. Mead (Atomic Energy Project, School of Medicine, University of California, Los Angeles, California). *J. Biol. Chem.* 227, 1025-1034 (1957). By the use of a reverse-phase chromatographic method, unsaturated fatty acids from depot and organ fats of rats on a fat-free diet or this diet supplemented with methyl linoleate or linolenate were separated, identified, and estimated. In all three groups, there was a large decrease in linoleic acid and a corresponding increase in palmitoleic acid. In the linolenate-fed animals, no linolenic acid could be found, but a docosapentaenoic acid appeared. By the appearance of a typical eicosatrienoic acid and by other signs, it was apparent that, although growth had resumed in the supplemented groups, their fatty acid distribution was still typical of the state of fat deficiency.

Effect of an arsenical, fat, and antibiotic upon the reproductive performance of chickens. R. J. Lillie, J. R. Sizemore and C. A. Denton (U. S. Dept. of Agr., Animal, and Poultry Husbandry Research Branch, Agr. Research Service, Beltsville, Maryland). *Poultry Sci.* 36, 755-759 (1957). Studies were conducted over a 3-year period with dual-purpose breeds of chickens to determine the nutritional significance of an arsenical, fat, and antibiotic upon the laying house performance and progeny performance. The incorporation of fat in laying diets, irrespective of arsenical or antibiotic, lowered the feed requirement per dozen eggs. Generally speaking, the body weight maintenance was improved by the addition of an arsenical, fat and antibiotic singly or in combination.

A study of lipides of *penicillium chrysogenum*. W. L. Gaby, C. Hadley, and Z. C. Kaminski (Div. of Microbiol., Hahnemann Med. College and Hospital, Philadelphia, Pa.). *J. Biol. Chem.* 227, 853-860 (1957). The rate of oxidation of glucose and saturated fatty acids by *Penicillium chrysogenum* Q-176 is markedly increased when the mold is grown in the presence of oleic acid or other unsaturated, long chain fatty acids. The analogous saturated fatty acids are ineffective in this respect.

Studies on the occurrence of pink whites and salmon colored yolks in stored eggs from hens fed crude cottonseed oil or cottonseed meal. R. J. Evans, Selma L. Bandemer, J. A. Davidson and P. J. Schaible (Depts. of Agr. Chem. and Poultry Husbandry, Michigan State Univ. of Agr. and Applied Sci., East Lansing, Mich.). *Poultry Sci.* 36, 798-807 (1957). Hens fed rations containing 2.5 percent of crude cottonseed oil produced eggs that after six months of cold storage had pink colored whites and enlarged salmon colored yolks. Some pink discoloration of the whites occurred in eggs from hens fed cottonseed meal, but olive yolk discoloration was more common especially with solvent-extracted meals. The material causing pink whites and salmon yolks was found in the crude cottonseed oil, and the pink discoloration caused by cottonseed meal was due to the oil left in the meal. Olive yolks were more often observed in stored eggs from hens fed cottonseed meal than in those from hens fed the crude oil.

Potentiating effects of materials of plant and animal origin on symptoms of hypervitaminosis A in the rat. B. H. Ershoff, H. J. Hernandez and Joan M. Muckenthaler (Dept. of Biochem. and Nutrition, Univ. of Southern Calif., Los Angeles, and Nutrilite Products, Inc., Buena Park, Calif.). *J. Nutrition* 62, 527-538 (1957). Immature rats were fed a purified ration containing a massive but relatively non-toxic dose of vitamin A. Supplements of alfalfa meal and other succulent plants resulted in a significant potentiation of the symptoms of hypervitaminosis A. Both the dried alfalfa juice and the water-washed pulp remaining after the extraction of the juice were active in this regard. Desiccated liver, yeast, a product derived from fermentation sources and aureomycin HCl also showed activity. In contrast to the above, supplements of all the known nutrients had little if any potentiating effect.

The addition of non-ionic surface-active agents of the polyoxyethylene type to the diet of the hamster, the mouse and the dog. Miriam K. Brush, J. R. McCoy, H. L. Rosenthal, L. A. Stauber and J. B. Allison (Bureau of Biological Research, Rutgers University, The State University of New Jersey, New Brunswick). *J. Nutrition* 62, 601-619 (1957). The addition of Myrj 45, Myrj 52 or Tween 60 at varying concentrations to the diet of hamsters, mice or dogs did not alter growth or food efficiency. These results indicate that 5% of Myrj 52 is near

the upper limit for feeding this surface-active agent to hamsters. No other histopathologies were observed while feeding Myrj 52 or Tween 60 to hamsters.

Carotenoids in man. Part II. Fractions obtained from atherosclerotic and normal aortas, serum, and depot fat by separation on alumina. David H. Blankenhorn (Metabolism Laboratory, Department of Internal Medicine, College of Medicine, University of Cincinnati, Cincinnati, Ohio). *J. Biol. Chem.* **227**, 963-973 (1957). A method for microanalysis of carotenoids in human blood serum, depot fat, and arterial wall has been described. The occurrence of ζ -carotene, cryptoxanthin, prolycopene, and an unresolved mixture of *cis* isomers of lycopene in human tissue is reported.

Comparative value of x-ray diffraction and infrared spectrophotometry in identifying certain sterols and their digitonides. W. T. Beher, J. Parsons and G. D. Baker (Henry Ford Hospital, Detroit 2, Mich.). *Anal. Chem.* **29**, 1147-1151 (1957). Sterols in the C₂₇ to C₃₀ series can be easily differentiated by x-ray diffraction powder methods, but cannot be identified by infrared spectrophotometry. Sterol digitonides cannot be identified by either method. X-ray diffraction definitely establishes sterol digitonides as chemical compounds.

Nutritional value of fats and oils. Takashi Kaneda (Tokai Regional Fisheries Lab., Tokyo). *Abura Kagaku* **6**, 2-9 (1957). A review with 29 references. (*C. A.* **51**, 12374)

The biochemical characteristics of sunflower oils presently in industrial use and of some prospective varieties. N. F. Dublyanskaya and L. G. Astakhova. *Kratkii Otchet Nauch.-Issledovatel. Rabote za 1952g; Vsesoyuz. Nauch.-Issledovatel. Inst. Maslich. Kul'tur, Krasnodar 1953*, 145-50; *Referat. Zhur. Khim., Biol. Khim.* **1955**, No. 14510. Results are presented for acidity, sp. gr., refraction coefficient, iodine number and thiocyanogen number and content of fatty acids, nonsaponifiable substances, and vitamin E of 9 varieties of sunflower seeds. Linoleic acid glycerides predominate over those of oleic acid. (*C. A.* **51**, 11739)

Deposition of lipide in calf aorta maintained in vitro. J. P. Story, H. C. McGill, Jr. and M. A. Nyman (Louisiana State Univ., New Orleans). *Circulation Res.* **5**, 294-7 (1957). The tissues of isolated calf aorta, perfused with defibrinated blood and White's solution, retained their characteristic reactions to biological stains and their basic histologic architecture for up to 12 days. Sudanophilic granules occurred in the inner layers of the aortic wall, confirming the biosynthesis of cholesterol, phospholipide and fatty acids, but there was a lag of 24-48 hours between the chemical and morphological appearance of lipide. (*C. A.* **51**, 11533)

Steroid color reactions in strong acid. J. H. Linford (Manitoba Cancer Inst., Winnipeg). *Can. J. Biochem. and Physiol.* **35**, 299-325 (1957). Steroids react with acid reagents to produce compounds with intense absorption bands in the visible and ultraviolet spectral regions. These bands were correlated with the existence of specific groups in the steroid molecule. An attempt was made to deduce the type of resonant system responsible for the absorption of light. The results indicate that the steroid nucleus, through induction or resonance effects, permits intercoupling between specific groups at the C₃, C₂₁, and C₁₇ positions in a particular environment. (*C. A.* **51**, 11449)

Phospholipid labelling in brain dispersions. W. C. McMurray, K. P. Strickland, J. F. Berry, and R. J. Rossiter (Univ. Western Ontario, London, Can.). *Biochem. J.* **66**, 621-628 (1957). Dispersions of rat brain, prepared in water and suitably "reinforced" have been shown to incorporate inorganic P³² into lipid phosphorus. Omission of cytochrome c or fumarate from the medium, or replacement of the oxygen of the gas phase with nitrogen, did not inhibit the incorporation. Various factors necessary for the reaction as well as certain possible inhibitors of the reaction were studied.

Phospholipid labelling in brain mitochondria. W. C. McMurray, J. F. Berry, and R. J. Rossiter (Univ. Western Ontario, London, Can.). *Biochem. J.* **66**, 629-633 (1957). Phospholipid was labelled from inorganic P³² in mitochondria separated from dispersions of rat brain prepared in isotonic sucrose. The labelling was best observed under optimum conditions for oxidative phosphorylation. The addition of adenine nucleotide, Mg⁺⁺ ions, diphosphopyridine nucleotide and cytochrome c was necessary for optimum P³² incorporation. The labelling was supported by the addition of glutamate, and certain tri-carboxylic acid cycle intermediates, but not by the addition of citrate. The authors conclude that there are two systems capable of supporting P³² labelling in rat-brain dispersion: an anaerobic glycolytic system and an aerobic system.

P³²-labelled intermediates and phospholipids. W. C. McMurray, K. P. Strickland, J. F. Berry, and R. J. Rossiter (Univ. Western Ontario, London, Can.). *Biochem. J.* **66**, 634-644 (1957). In suitably "reinforced" water dispersions of rat brain the anaerobic labelling of lipid phosphorus from inorganic P³² was increased by the addition of coenzyme A, glutathione, or cytidine triphosphate to the incubation medium. The labelling was not significantly affected by the addition of α -glycerophosphate, glycerol, choline, serine, ethanolamine or inositol. The results are discussed in relation to the biosynthesis of phospholipids in brain.

Production of fats by microorganisms. R. P. Garcia and J. M. Garrido Marquez. *Revista de Ciencia Aplicada* **56**, 221-228 (1957). This article is a study of the influence of phosphates, magnesium, and potassium in the use and synthesis of fats by *Penicillium lanosum* Westling. They found the optimum values to be 0.068 g./100 ml. for KH₂PO₄ and 0.0375 g./100 ml. for MgSO₄·7 H₂O.

Cholesterol biosynthesis: the starvation block. J. F. Scaife and B. B. Migicovsky (Can. Dept. Agri., Ottawa). *Can. J. Biochem. & Physiol.* **35**, 615-623 (1957). Partial localization of the metabolic block in cholesterol biosynthesis from acetate by starved rat liver homogenates has been achieved. Experimental evidence indicates that this block is located in the biosynthetic pathway between β -hydroxy- β -methyl glutamic acid and squalene. Fractionation and comparative chromatographic examination of incubated homogenates from starved rats as well as normal rats failed to reveal any accumulation of an appreciable evidence indicates that this block is located in the biosynthetic pathway in the starved animal. A strongly labelled acidic compound has been isolated in minute amounts from incubated homogenates of both starved and normal animals. This is readily incorporated into cholesterol by liver homogenates from normal, but not from starved rats. Its identity has not yet been established.

Possible mechanism for fatty acid inhibition of cholesterol synthesis. J. D. Wood, B. B. Migicovsky (Can. Dept. Agri., Ottawa). *Can. J. Biochem. and Physiol.* **35**, 645-653 (1957). Further investigations have been carried out on the fatty acid inhibition of cholesterol biosynthesis in rat liver homogenates. A correlation appears to exist between cholesterol inhibition and the elongation of the carbon chain of saturated fatty acids containing an even number of carbon atoms. Neither saturated nor unsaturated fatty acids interfere with the formation of acetyl CoA by liver homogenate. The stage where acetoacetate is formed from acetyl CoA is suggested as a possible site for inhibition of cholesterol synthesis by fatty acids.

Phospholipids: the determination of amino nitrogen in unhydrolyzed phospholipids. L. W. Wheeldon and F. D. Collins (Australian National Univ., Canberra, Australia). *Biochem. J.* **66**, 435-441 (1957). 1-Fluoro-2:4-dinitrobenzene was shown to react in the presence of triethylamine with the free amino groups of phospholipids dissolved in benzene. This reaction serves as the basis of a method for the quantitative estimation of the free amino groups in the phospholipids. The method is considered to be more reliable than the ninhydrin method in that the reagent is stable, the blank negligible and the need for a standard is eliminated. As little as 0.02 μ -mole can be estimated, and 0.1-2.5 μ -moles represent the usual range. Lecithin and other lipides do not interfere but with low concentrations of kephalin special precautions are necessary.

Phospholipids: 2,4-dinitrophenylkephalins. F. D. Collins and L. W. Wheeldon. *Ibid.*, 441-450 (1957). Diazomethane reacts with dinitrophenylkephalins to form the corresponding methyl esters, while lecithin is unaffected. By the use of chromatography or countercurrent distribution various methylated dinitrophenylkephalin fractions were obtained. It is concluded that the methylated dinitrophenylkephalins with maxima at 345 m μ and at 355 m μ represent hitherto unrecognized forms of kephalins. Procedures are described both for the determination of these forms of kephalin and for their separation from each other and from choline-containing phospholipids.

A study of the carotenoids of the guava fruit by spectrophotometric methods. A. Mosqueda Suarez and R. Diaz Cadavieco (Instituto Nacional de Nutricion, Venezuela). *Archivos Venezolanos de Nutricion* **7**, 211-221 (1956). Some of the carotenoids of the guava fruit are studied by chromatographic and spectrophotometric methods. Quantitative values for β -carotene are given.

The nutrients to be considered when the fat content is increased in the diet. I. The effect of riboflavin, choline, and protein on the nutrition of the high fat diet. Tatsuo Koyanagi and Teizo Katsumata (Iwate Univ., Morioka, Japan). *J. Agr. Chem. Soc. Japan* **30**, 683-6 (1956). Feeding experiments with young rats

showed that the addition of soybean oil (19.1 or 32.3 wt. %) to the diet consisting of brown rice, casein, and inorganic salts gave seborrhea, and ill effect on the growth compared to the control without added fat (containing starch instead). Addition of riboflavin improved the above ill effect. Further addition of choline, and choline and more casein, to the above mixture gave better results.

II. The effect of dietary fat on the choline content, succinic oxidase, and choline oxidase of the liver and kidney. T. Koyanagi, Kôichi Nakadate, and Junko Watanabe. *Ibid.* 686-90 (1956). When starch in the diet consisting of polished rice, casein, starch, and inorganic salts was replaced with butter, soybean or sardine oil, the rats' liver contained less choline and showed lower activity of succinic oxidase. When less soybean oil was added, the choline content showed no change in the liver and kidney, but it decreased in the muscle; in this case choline oxidase activity decreased but succinic oxidase activity of the liver showed no change. Addition of choline or methionine prevented the decrease of choline content due to the addition of soybean oil.

The phosphatide of aquatic animals. IV. The lecithin, cephalin, neutral fat, and unsaponifiable matter of the heart of a rorqual (*Balaenoptera borealis*). Hisanao Igarashi, Koichi Zama, and Muneo Katada (Hokkaido Univ., Hakodate). *J. Agr. Chem. Soc. Japan* 30, 111-15 (1956). The isolated fractions were analyzed with the following results. The lecithin contained 4.13% P, 1.76% N, and 14.57% choline; iodine no. 91.6. The cephalin contained 2.66% P, 1.37% N, 4.90% ethanolamine, and 2.52% serine; iodine no. 122.3. The neutral fat (acetone-soluble fraction) had acid no. 1.0, saponification no. 127.8, iodine no. 130.5, and 43.8% unsaponifiable matter. The component fatty acids of the 3 fractions were determined spectrophotometrically after conversion to conjugated acids by KOH-glycol reagent.

V. Phosphatidic acid of the heart of a rorqual. *Ibid.* 116-19. This contained 3.96% P and 0.07% N; iodine no. 112.1. Glyceroltriglycerophosphoric acid was isolated as Ba salt from its hydrolyzate. The skeletal structure of the phosphatidic acid was presumed to be similar to cardiolipin.

VI. The brain cephalins of pollacks (*Theragra chalcogramma*). K. Zama and H. Igarashi. *Ibid.* 433-5. The so-called cephalin fraction prepared from acetone-treated brain of pollacks contained 1.86% N, 4.06% P, 1.74% amino-N, and 10.03% ash; iodine no. 95.8. It contained 1.75% serine, and 1.83% 2-aminoethanol, and showed positive reaction for inositol. Thus it was not a single phosphatide, but consisted of some phosphatides containing inositol, serine, and 2-aminoethanol. Fractionation with chloroform and ethanol was examined.

VII. The brain cephalins of sperm whale (*Physeter catodon*). *Ibid.* 435-8. The cephalin fraction prepared from acetone-treated brain of a sperm whale contained 1.58% N, 4.04% P, 1.32% amino-N, 10.91% ash, 1.38% serine, and 2.78% 2-aminoethanol; it showed positive reaction for inositol. This was found to consist of diphosphoinositide, phosphatidyl serine, and phosphatidyl ethanolamine.

VIII. The egg lecithins of pollacks (*Theragra chalcogramma*). H. Igarashi, K. Zama, and M. Katada. *Ibid.* 566-8. Component fatty acids of lecithin from pollack's eggs were examined. An alumina adsorption column was used to purify the lecithin.

IX. Cephalin, neutral fat, and unsaponifiable matter of the eggs of pollacks. *Ibid.* 568-72. Only serine was found (12.97%) in the cephalin of these eggs. This contained 1.93% N, 3.68% P, 10.76% glycerol; iodine no. 92.9. Component fatty acids were examined. Cholesterol was identified, and saturated and unsaturated alcohols with 14 C atoms and other alcohols were presumably present.

X. Cephalins and phosphatidic acids of unfertilized and fertilized eggs of crabs (*Paralithodes camtschatica*). *Ibid.* 31, 4-8 (1957). Cephalin was prepared from both eggs. The yield was 0.091% from unfertilized eggs, while it was only 0.027% from fertilized ones. The cephalin of unfertilized and fertilized eggs contained, respectively, P 3.31, 3.22%; N 1.60, 1.64%; glycerol 9.89, 9.78%; iodine no. 76.8, 66.5; saturated acids 45.3, 34.6; monoethylenic acids 29.5, 45.2; dienoic 2.5, 3.7; trienoic 3.3, 5.2; tetraenoic 9.5, 8.5; pentaenoic 6.5, 2.3; hexaenoic 3.4, 0.5%; serine 9.52%, none; 2-aminoethanol none, 6.05%. The yield of phosphatidic acid was 0.0057% from unfertilized eggs and 0.0027% from fertilized ones. There were no great differences in properties of phosphatidic acid from both eggs.

XI. Lecithins from unfertilized and fertilized eggs of crabs. *Ibid.* 8-11. Lecithins from unfertilized and fertilized eggs gave the following data: yield 2.57, 0.091%; iodine no. 108.7, 72.3; P 3.57, 3.62%; N 1.64, 1.68%; glycerol 11.01, 10.95%; choline 13.85, 13.85%; myristic 1, — (not determined); palmitic 9, —; stearic 10, —; saturated 20, 37.7; hexadecenoic 5, —; octadecenoic 30, —; eicosenoic 14, —; monoethylenic 49, 37.8; dienoic —, 2.1; trienoic 10, 8.8; tetraenoic 13, 9.8; pentaenoic 8, 3.4; and hexaenoic acids —, 0.4%. Only minute amounts of sphingolipide fraction were obtained from both eggs. The crab eggs seemed to contain little sphingomyelins and cerebrosides.

XII. Cephalins and lecithins of the brain of a rorqual (*Balaenoptera borealis*). Koichi Zama and Hisanao Igarashi. *Ibid.* 582-5. Phosphalipides extracted from the brain were fractionated into cephalin fraction and lecithin fraction; the former was refractionated into subfractions rich in inositol-phosphatide, phosphatidylserine, and phosphatidylethanolamine, and the latter was purified by the method of Pangborn (*J. Biol. Chem.* 188, 471 [1951]). The cephalin (before fractionation) and purified lecithin gave the following data: N 1.83, 1.68; P 3.14, 3.63; serine 4.72, 0; 2-ethanolamine 4.55, 0; inositol pos., —; choline 0, 14.3%; iodine no. 85.4, 70.73; saturated 46.7, 49.0; monoethylenic 33.2, 33.4; dienoic 3.3, 3.0; trienoic 3.6, 3.5; tetraenoic 5.1, 4.3; pentaenoic 2.7, 2.4; and hexaenoic acid 5.4, 4.4%. The subfractions of cephalin were also analyzed.

Characteristics of a factor protecting the viability of lyophilized *Brucella abortus* cells. D. E. Bergmann, F. E. Halleck, B. J. Mechals and R. I. Tenney (Wahl-Henius Inst., Chicago, Ill.). *J. Bacteriol.* 74, 101-5 (1957). A viability protective factor that enhances the survival of *Brucella abortus* during freeze drying was extracted from the supernatant of aged cultures and from young and aged cells. The properties (chemical, enzymological, and spectrophotometric) indicate that the active material is a lecithin containing at least one unsaturated fatty acid.

Method of preserving fleshy comestibles. R. S. Iki (C. A. Ragan and J. G. Liebert). *U. S. 2,806,795*. Before being canned, disks of precooked frozen fleshy food are coated with not more than 10% by weight of oil.

• Drying Oils and Paints

The influence of humidity on the rate of drying of drying oils. H. P. Kaufmann and E. Gulinsky. *Deut. Farben-Z.* 11, 90-5 (1957). Mixtures of raw chinawood oil and raw linseed oil in the proportions of 1:2 and 2:1 were investigated as to drying speed under varying conditions. The results indicated (1) fast driers were Pb-Mn, Pb-Mn-Co and Co-Pb. In this case, at temperatures above 20° the relative humidity has little effect on drying. (2) Intermediate strength driers were Co, Co-Mn and Co-Mn-Zn. In this case, at 20 to 30°, relative humidity is important on rate of drying. At 40° the humidity is not important. (3) Weak driers were Pb, Pb-Zn, Mn-Zn and Co-Zn. Here the rate of drying depends a great deal on the relative humidity. (*C. A.* 51, 12505)

Improvement of drying oils. I. Reaction of 2,6-bis(hydroxymethyl)-p-cresol with unsaturated fatty oils and some properties of the product. Akira Misonou, Tsutomu Kuwata and Ikuo Ogata (Univ. Tokyo). *Abura Kagaku* 5, 275-81 (1956). Commercial p-cresol with 20% aqueous sodium hydroxide and 35% formalin gave 2,6-bis(hydroxymethyl)-p-cresol which when combined with cuttle-fish oil showed drying properties superior to those of linseed oil. The combination was assumed to be of chroman type. (*C. A.* 51, 12504)

Tobacco-seed oil. III. Ultraviolet absorption of raw and stand oil. Mualla Tugtepe (Istanbul Univ.). *Rev. fac. sci. univ. Istanbul* 21c, 157-80 (1956). The ultraviolet absorption between 2200 Å and 2800 Å with butanol as solvent of samples of raw and heated tobacco-seed oil was measured with a Hilger Unispek spectrophotometer. Conditions of heating were at 280° and 310° in air, at 310° under carbon dioxide and at 310° with air passing through the oil. (*C. A.* 51, 12505)

Dehydrated castor oil. I. Dipti Kalyan Chowdhury and B. K. Mukherji (Univ. Coll. Sci. Technol., Calcutta). *Proc. Natl. Inst. Sci. India* 22A, 190-8 (1956). The mechanism of formation of conjugated isomers and the influence of the constituent fatty acids on conjugation, isomerization, and polymerization during the process of dehydration and subsequent

bodily have been investigated. The 9-*cis*, 12-*trans* nonconjugated linoleic acid, which is one of the products of dehydration during the first 60 minutes of treatment, seems to play a more important role in bringing about polymerization reaction than the conjugated dienoic acid originally present and also formed during the course of the reaction. The higher the content of ricinoleic acid in the original sample, the larger is the proportion of the conjugated dienes in the product and the higher the degree of polymerization.

II. Effect of temperature on polymerization and isomerization of dehydrated castor oil. *Ibid.* 199-203. An attempt has been made to regulate the polymerization of dehydrated castor oil during bodying and to enrich the product with conjugated isomers. At 250° and above, polymerization predominates over isomerization. The optimum temperature for the formation of 9,11-linoleic acid at the expense of 9,12-linoleic acid is 200°. So, by maintaining the product after the dehydration stage at 200° for 90 minutes, it has been possible to increase its conjugated isomer content by 3.6%. (*C.A.* 51, 12505)

Foots in raw linseed oil and its determination. H. Fähnrich. *Farbe u. Lack* 63, 65-70(1957). Quantitative volumetric measurement of sediment or "foots" in raw linseed oil is difficult because of the composition: waxes, saturated glycerides, phosphatides. It is proposed to determine (a) sedimentation at 20° for 96 hours (British standard specification), (b) sedimentation at 40° for 96 hours, and (c) precipitation by acetone and acid saturated calcium chloride solution at room temperature (Dutch specification N 600) after the oil has been clarified or centrifuged, a minus b gives the amount of heat-soluble substances, c gives the latent sediment important for refined-oil processing. (*C.A.* 51, 12506)

The acetone number of stand oils. R. Montequi, A. Doadrio and J. Lopez Morales (Alonso Barba Inst., Seville). *Grasas y Aceites* (Seville, Spain). 8, 11-13(1957). Drying oils of the same kind, e.g., all linseed oils, show a constant relation between viscosity and acetone number, irrespective of the manner of preparation. Other kinds of drying oils have a different relation between viscosity and acetone number. Thus the determination of viscosity and acetone number provides a means of identifying the oil. (*C.A.* 51, 12506)

The value of extenders. Results of recent investigations. L. A. Sonsthagen. *Olii Minerali-Grassi E Sapori-Colori E Vernici* 34, 337-341(1957). The influence of extenders on the viscosity and storage stability of paints has been extensively investigated together with the effect on exposure stability and the results of the work are discussed in this paper. In particular the value of certain forms of talc in preventing the formation of hard settlement and of carbonates in improving exposure stability is brought out in this article.

Organic peroxides. VI. Allyl hydroperoxide. S. Dykstra and H. S. Mosher (Dept. Chem. and Chemical Eng., Stanford Univ.). *J. Am. Chem. Soc.* 79, 3474-3475(1957). Allyl hydroperoxide has been prepared in purified form by the reaction of allyl methanesulfonate with hydrogen peroxide and methanolic potassium hydroxide. This is the first member of the series of allylic type hydroperoxides which are the primary intermediates in the air oxidation of unsaturated compounds. Allyl hydroperoxide detonates on heating and decomposes on prolonged exposure to light at room temperature but is relatively stable in the cold and dark.

Protective coatings. F. Scofield (Nat. Paint, Varnish and Lacquer Assoc., Washington, D. C.). *Ind. Eng. Chem.* 49, 1639-1642(1957). The past two years of development in the paint industry have produced a larger array of "new" materials and coatings than is usually the case. Few of these are new but their properties have become better known and more information is uncovered about their formulation and uses; instead of an unusual and rare material they have become part of the equipment of the paint formulator.

Argentimetric method for epoxides. G. A. Stenmark (Shell Development Co., Emeryville, Calif.). *Anal. Chem.* 29, 1367-1369(1957). The α -epoxide group is usually determined by reaction with hydrochloric acid and measuring the acid consumed as indicated by acid-base titration. When readily hydrolyzable materials or substances of high buffer action are present in a sample, they interfere in the acidimetric methods for epoxide. These interferences have been overcome in a new method which employs the same hydrochlorination reaction but measures the disappearance of chloride ions rather than the consumption of acid. The method is especially useful for analysis of materials containing amines.

Determination of melamine-formaldehyde resins in coatings. M. H. Swann and G. G. Esposito (Coating and Chemical Lab.,

Aberdeen Proving Ground, Md.) *Anal. Chem.* 29, 1361-1362(1957). The insolubility of acid hydrolyzed melamine resins in dioxane provides a rapid gravimetric method for their determination in modified alkyds, epoxy and other coating resins. **Process for dehydrating castor oil.** O. J. Grummitt (Sherwin-Williams Co.). *U. S. 2,804,467*. Esters and fatty acids of the ricinoleic acid series are dehydrated by heating at 250° to 302° for 2.5 to 8.5 hours, with a drying oil-maleic acid adduct.

• Detergents

Determination of sodium laurate in sodium N-lauroyl-sarcosinate. D. C. Cullum (Colgate-Palmolive Ltd., Manchester, Engl.). *Analyst* 82, 120-2(1957). The determination of Na laurate is based on chromatographic separation of the acids and titration of the lauric acid with NaOH. A 5-g. sample treated with HCl forms the free acids which are extracted into Et₂O. A column is prepared by mixing 25 g. kieselguhr and 12.5 ml. 10% Na₂HPO₄ · 12 H₂O adjusted to pH 8.50 and wetting with Et₂O. On passage of Et₂O followed by more Et₂O down the column the lauric acid comes through first and is measured by collecting 10-ml. fractions, evaporating to dryness, dissolving in EtOH neutralized to phenol red, and titrating with 0.01 N NaOH by using a 10-ml. buret. (*C.A.* 51, 9413)

Alcohol-ethylene oxide and related nonionic surfactants. R. D. Fine (Atlas Powder Co., Wilmington, Del.). *Soap & Chem. Specialties* 33 (9), 50-3, 113, 115(1957). An important class of nonionic surfactants is produced by reacting alcohols with ethylene oxide to form ethers. The ethers formed from lipophilic alcohols of natural or synthetic origin are valuable as alkali stable detergents, wetting agents, dyeing assistants and emulsifiers. Ether esters formed by reacting hydrophilic alcohols with ethylene oxide and fatty acids are used extensively as emulsifiers and as lubricants and softeners for textiles. The functions, physical properties and prices of the ethers and ether-esters cover a sufficiently broad range to make them worthy of consideration wherever nonionic surfactants can be used.

Surfactants in fertilizers. E. J. Fox and W. A. Jackson (U. S. Dept. of Agr., Beltsville, Md.). *J. Agr. & Food Chem.* 5, 578-86(1957). Surface active agent adsorbed on the equipment used in measuring the surface tension of aqueous surfactant solutions was found to be a source of error in attempting to determine the extent of surfactant adsorption on the surface of suspended phosphate rock particles. The equipment used to measure surface tension of solutions by the drop-weight method was modified to overcome this, and a new procedure was adopted. Anionic surfactants were more readily adsorbed on acidic surfaces, while cationic surfactants were more readily adsorbed on basic materials. Differences in the amounts of a typical cationic surfactant adsorbed on different types of surfaces and by different kinds of solid materials associated with phosphate rock are described. Experimental results are compared with commercially floated phosphate rock.

Analysis of detergents; new method applicable to sodium salts of long-chain primary alcohol sulfates. J. A. Gautier and J. Renault. *Chim. Anal.* 39, 189-92(1957). The tetraamine Ni salt (I) of the long-chain alcohol sulfate is precipitated from 2.5 N NH₃ solution with a measured excess of Ni, and the excess Ni is titrated to a murexide end point with di-Na (ethylenedinitrilo)tetraacetate. I can be dried at 35° for 48 hours and weighed. NaCl and NH₄ salts cause low results. Sulfates and N(C₂H₄OH)₂ have little effect. The addition of NaOH minimizes the effect of NH₄ salts. The alcohol sulfate must have at least 10 C atoms to reduce the solubility of I. (*C.A.* 51, 12512)

Systematic scheme of semimicroqualitative analysis for anionic surface-active agents. H. Holmes and W. R. Stone (South-West Essex Tech. Coll., London). *Analyst* 82, 166-76(1957). This scheme permits the identification of members of 21 groups of anionic surface-active agents in mixtures. Two special indicator mixtures are described to distinguish anionic from cationic reagents. (*C.A.* 51, 10313)

Physical chemistry of textile scouring. W. Kling. *S. V. F. Fachorgan.* 12, 62-79(1957). The following points are discussed—the nature of the soiling medium, the textile material which is soiled, the type of water and scouring agent employed, the influence of surface activity in scouring, wetting out of the material and penetration, and subsequent removal of solid soil from the fabric surface.

The physicochemical and biological properties of nonionic surface-active agents. E. Neuzil (Imprimerie E. Drouillard 3, Place de la Victoire, Bordeaux, France) 1954, 174 pp. (Separate). An extensive study was made of the polyoxyethylene derivatives of the fatty acid esters of sorbitol anhydride (Tweens) as regards (a) their stability and that of the solutions, (b) the molecular associations resulting from their dissolving power (in aqueous and water-alcoholic media) and from their chelating action on ionized detergents; (c) the formation of swelling images, when they are in contact with water; (d) their toxicity. 228 references. (C.A. 51, 10188)

Diagrams of some commercial soaps of peanut-oil base. A. Prevot (ITERG, Paris). *Rev. franc. corps gras* 4, 263-267 (1957). The phase diagrams at 90° of 3 household soaps prepared in the laboratory from (a) peanut oil, (b) 80% peanut oil and 20% coconut oil, and (c) 90% peanut oil and 10% rosin are traced. In comparison with diagrams where tallow replaces peanut oil the soap according to (a) requires less salt for graining out while the soap (b) differs very little.

Absorption of water by and drying of untreated, laundered, and used and laundered cotton and linen toweling. Florence E. Petzel (Oregon State College, Corvallis, Ore.). *Am. Dyestuff Repr.* 46, 569-74, 576 (1957). An investigation was made to determine how the absorption of water by plain weave cotton and linen toweling were affected by 20, 40, and 60 laundering cycles only and of use and laundering. After repeated launderings, cotton toweling decreased relatively little in breaking strength and generally took up moisture more readily than linen toweling during the early part of the absorption period. However, when the toweling absorbed water to a point approaching saturation, linen toweling generally took up more moisture than cotton. The linen toweling also had the advantage of increasing in absorbency with increasing laundering up to a certain point, after which it decreased in absorbency as the fabric decreased in weight. Linen toweling had the disadvantage of decreasing more markedly in breaking strength than cotton toweling as a result of laundering and use.

Foam stabilizing additives for synthetic detergents, interaction of additives and detergents in mixed micelles. M. J. Schick and F. M. Fowkes (Shell Development Co., Emeryville, Calif.). *J. Phys. Chem.* 61, 1062-8 (1957). Addition of small amount of certain non-ionic surface agents to anionic detergents has been shown to enhance foam stability. The causes of the specificity and the structural relationship of effective combination of additives and detergents were investigated by a study of their mixed micelles. The effect of additives on the critical micelle concentration of various detergents was determined in salt-free solutions at 55° by the dye titration method. The additives which lowered the critical micelle concentration the most were in general the most effective for enhancing foam stability; these were compounds having an unbranched paraffin chain equal in length to the detergent, and with highly hydrophilic non-ionic polar groups at one end. It is concluded that the more effective foam stabilizing additives are solubilized into the palisade layers of detergent micelles or into surface films whereas the less effective additives are solubilized into the interior of the micelles. The incorporation of non-ionic additives into the palisade layer of mixed micelles lowers the activity of the detergent molecules and increases the attractive van der Waals forces between the molecules so that the micelles form at lower detergent concentrations. Furthermore, it is suggested that an analogy exists between the mode of packing in the palisade layers of the micelles and the surface layers of the foam lamellae.

Carboxymethylcellulose as a preventive of soil redeposition in detergency. H. Stupel (Seifenfabrik Hoehdorf, Hoehdorf, Switzerland). *Soap, Perfumery, Cosmetics* 30, 933-8 (1957). The various theories behind the action of CMC on dirt are reviewed and reevaluated. On the basis of experimental work, the author believes the classical theory that CMC is adsorbed by the fiber

is incorrect. He refutes the theory as follows: The molecular structure and physical state of CMC in aqueous solutions make adsorption tendencies improbable. Experiments have shown that acridine orange is a suitable indicator for CMC in high concentrations using ultraviolet microscopy. However, the author has not been able to detect large quantities of CMC on fibers, but considerable concentrations on different kinds of dirt, irrespective of whether the latter were dispersed in the detergent suds or adsorbed in fibers. The conclusion must therefore be drawn that CMC in the washing process prevents dirt from resettling on the fibers through its intimate contact with the dirt itself. This is further proved by experiments with radioactive carbon which so far have shown there is no CMC/fiber adsorption.

Difference in the composition and the relation between the viscosities of the two-sided film and the surface layer of a soap solution. A. A. Trapeznikov (Inst. Phys. Chem. Acad. Sci. U.S.S.R., Moscow). *Kolloid-Zhur.* 19, 252-5 (1957). When a solution of Na palmitate and Na oleate (1:9) was heated to 40° and then rapidly cooled to 18°, a sediment slowly formed. When, during this process, the viscosities of the surface layer of the solution and of a foam film of the same liquid were compared, the former was greater than the latter for about an hour. Thus, the composition of free films was not identical with that of a surface layer. (C.A. 51, 13423)

The adsorption of sodium lauryl sulfate and lauryl alcohol at the air-liquid interface. A. Wilson, M. G. Epstein and J. Ross (Colgate-Palmolive Co., Jersey City, N. J.). *J. Colloid Sci.* 12, 345-55 (1957). Measurements have been made of the changes in concentration accompanying formation of large surface areas from solutions of pure sodium lauryl sulfate. The adsorption rises until the critical micelle concentration is reached and then remains constant with a maximum area per molecule of 40Å². In the three-component system, sodium lauryl sulfate, lauryl alcohol, and water, no distinction could be shown above or below the surface transition temperature for the adsorption of lauryl alcohol and sodium lauryl sulfate. Only a monolayer of the two adsorbed materials is necessary to give slow draining films below the transition temperature.

Soap-making and bleaching process. N. A. Hurt (Lever Brothers Co.) *U. S. 2,802,848*. A process of preparing light-colored soap consists of contacting an oil, containing free fatty acid and from which the soap is to be formed, with a chlorite, then saponifying the chlorite-treated oil with alkali and bleaching the resultant soap with a hypochlorite without undue agitation.

Detergent compositions for laundering textile fabrics. G. P. Toney and H. W. Coover, Jr. (Eastman Kodak Co.). *U. S. 2,805,205*. A detergent composition which comprises a detergent selected from the group consisting of the non-ionic detergents and the organic anionic detergents and a copolymer of acrylonitrile and an acrylamide selected from the group consisting of acrylamide and the lower alkyl acrylamides has been found to prevent redeposition of soil on textile fibers.

Soap deaeration. L. Sender (The Sharples Corp.). *U. S. 2,804,172*. Soap, having air entrained therein as a discontinuous phase, is deaerated by flowing the soap in molten condition through a chamber, subjecting the soap in attenuated form to reduced pressure while in the chamber to liberate the air, and then contacting the surface only of the soap with steam to displace from the surface of the soap, the air thus liberated.

Process of bleaching sulfated and sulfonated anionic synthetic detergent compositions. J. V. Schurman (Colgate-Palmolive Co.). *U. S. 2,804,466*. It has been discovered that when a non-soap anionic surface active detergent such as a sulfate or sulfonate is treated with a hypochlorite such as sodium hypochlorite followed by a peroxide, a new and improved synthetic detergent results which exhibits all the desirable properties of the original detergent and also has excellent color retention properties.