from the bottoms of deep brush marks. This was again found principally near both sides of the black dividing line.

6. On the basis of general appearance the six coatings can be placed in the following order of decreasing merit: PRA-1, PRA-3, PRA-2, PRA-4, PRA-5, PRA-6.

Acknowledgment

The authors wish to express their gratitude to E. W. Bell of the Northern Utilization Research Branch for preparation of the Hysoy used in this investigation.

Conclusions

Hysoy and blends of Hysoy and soybean oil can be used successfully in the formulation of white exterior paints. Such paints compare favorably in outdoor weathering tests with similar paints made with linseed and soybean oils. The principal advantage shown by paints formulated with Hysoy is a decrease in drying time.

REFERENCES

1. Bell, E. W., and Teeter, H. M., J. Am. Oil Chemists' Soc., *27*, 102-5 (1950).
2. Sanderson, J., Proc. Am. Soc. Testing Materials, *26*, Pt. II, 556-62 (1926); *ibid.*, (Preprint) No. 49, 1-9 (1925).
3. Teeter, H. M., U. S. Patent 2,598,729 (June 3, 1952).
4. Teeter, H. M., Bachmann, R. C., Bell, E. W., and Cowan, J. C., Ind. Eng. Chem., *41*, 849-52 (1949).
5. Teeter, H. M., Bell, E. W., and Woods, L. C., J. Am. Oil Chemists' Soc., *29*, 401-2 (1952).
6. Teeter, H. M., and Cowan, J. C., U. S. Patent 2,557,159 (June 19, 1951).
7. Teeter, H. M., and Myren, R. A., J. Am. Oil Chemists' Soc., *29*, 367-70 (1952).

[Received on December 10, 1954]

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

• Oils and Fats

Ralph W. Planck, Abstractor
Dorothy M. Rathmann, Abstractor
Sin'itiro Kawamura, Abstractor

The influence of metallic impurities on the stability of palm oil. V. P. Rams. *Oleagineux* 10, 177-178(1955). The relatively low stability of palm oil as determined by the Swift or Schaal tests is very probably due in part to the presence of appreciable quantities of iron which originate from the attack of the free fatty acids on the containers. The addition of citric or phosphoric acid increases the stability of the oil presumably by forming inactive complexes with the iron compounds. The action of these deactivators is particularly noticeable for the fluid portion of the oil which contains less iron than the solid fraction. The addition of ascorbic acid produced no stabilizing effect.

The application of thermal methods of analysis to the detection of adulterated cocoa butter. S. V. Vaeck. *International Chocolate Review* 10, 1-7(1955). The standard method of Pichard and a new method of crystallization delay permit certain detection of an addition of 20% of any of the substitutes which have been investigated except for Borneo tallow. To determine the crystallization delay approximately 1 gram of fat is melted to a temperature of 50° to 60°C. and is then filtered through a small filter at the same temperature. A clean "U" shaped capillary tube is half filled with liquid fat by immersing one end and sucking on the other end. The tube is then sealed off at both ends. For a determination of the curve of crystallization delay, the whole tube is first placed in a bath of hot water (80°C. or more). The hot tube is transferred as expeditiously as possible to a controlled temperature water bath, the temperature of which is known to the nearest 0.1°C. This temperature is selected so as to be in the neighborhood of the melting point of the least stable polymorphic form of the fat (16° to 18°C. in the case of cocoa butter). The time that elapses before distinct clouding of the sample occurs is recorded (this requires powerful side lighting and a black background). The time is reckoned from the moment of plunging the tube into the water bath. The clouding must commence at the same instant along the whole length of the tube and not just at specific places. Should clouding not occur simultaneously at all points along the length of the tube, the tube has not been sufficiently cleaned or the fat contains traces of solid impurities; in either case, the result must be discarded. By repeating this test at different cooling temperatures (usually between 10° and 20°C.), one obtains a curve showing the crystallization delay as a function of cooling temperatures. This curve is also characteristic for the particular fat. It is sufficient in practice to determine the curve for delays of up to 20 seconds, as the reproducibility of values obtained at higher temperatures than are represented by this delay is not very satisfactory. Although the method of Pichard appears to be more sensitive in certain cases than that of crystallization delay, the latter test offers the advantages of a smaller sample requirement and more rapid determination of adulteration.

Extraction of carotene from palm oil. I. R. H. O. procedure. M. Servant and Miss Argoud. *Oleagineux* 10, 15-20(1955). The palm oil is preferably separated first into a liquid fraction and a fraction that is solid at ordinary temperatures by crystallization at 19° with the former fraction being enriched in carotene by this treatment. One hundred kilograms of the whole neutral oil or the liquid fraction described above is dissolved in methanol and transesterified. The washed esters are distilled in a molecular still, preferably of the centrifuge type, at a temperature of 80°-100° and a vacuum of 0.001 mm. The esters distill while about 2 kilograms of a concentrate containing about 115 grams of the carotenoids, 2% of the oil that did not undergo methanolysis and other unsaponifiables remain as the residue. This residue is saponified with 4 kilograms of an alcoholic solution of potassium hydroxide at a maximum temperature of 60° in an inert atmosphere. The mixture is dried and extracted with petroleum ether or dichlorethane. The solvent is evaporated under vacuum to give a new concentrate of unsaponifiables containing 25-30% of carotene. This concentrate is dissolved in benzene and precipitated by the addition of methanol. Further purifications of the crystallized carotene may be effected by chromatography. A semi-industrial run using essentially the above conditions is described. Possibilities of recovering the glycerine resulting from the methanolysis are discussed briefly.

Isopropyl myristate and its uses for pharmaceutical and other purposes. 1. Sources for preparation and application. 2. Its preparation starting from ucuuba fat. J. R. da Silva Jardim. *Olearia* 8, 193-202, 243-249(1954). Ucuuba fat is shown to be a rich source of trimyristin. This triglyceride is obtained in a yield of 30% and a high degree of purtiy by refluxing 200 grams of the crude ucuuba fat with 3.5 liters of ethanol allowing the mixture to crystallize at room temperature, filtering off the trimyristin and recrystallizing it successively from ethanol and isopropyl ether. Myristic acid is obtained from the trimyristin by saponification, acidification with hydrochloric acid and benzene extraction of the resulting product from the acidified mixture. The myristic acid is converted to the isopropyl ester by refluxing it with an excess of isopropanol in the presence of sulfuric acid as a catalyst. The excess isopropanol and the mineral acid are separated by water washing and the resulting crude ester is purified by treatment with decolorizing carbon in ethanol or by vacuum distillation. Formulations are given to illustrate the uses of isopropyl myristate in pharmaceutical and cosmetic preparations.

Molecular distillation and its applications in the fat industry. C. Paquot. *Olii Minerali–Grassi e Saponi–Colori e Vernici* 31, 205-211(1954). The theory and equipment used in molecular distillation are discussed. Uses of this technique in the fat industry for isolating vitamins and monoglycerides, distilling glycerides and deacidifying and deodorizing oils are reviewed.

A method for the estimation of glycerides in blood. R. D. Stewart (Dept. Biochem., Dalhousie Univ., Halifax, N. S.). *Can. J. Biochem. & Biophys.* 32, 679-683 (1954). A method has been devised by which neutral glycerides may be determined in 0.1 ml. of whole blood. Lipid is extracted from the blood with alcohol-ether, dissolved in chloroform, and saponified. The liberated glycerol is then oxidized with periodic acid and the resulting formaldehyde distilled into sodium sulphite solution. The distillate is then reacted with chromatotropic acid and the resulting color measured with a photoelectric colorimeter. A correction for formaldehyde derived from phospholipid may be applied if the blood lipid phosphorus level is known. The results of some typical analyses of blood from normal and diabetic subjects are given.

Some natural glyceride oils analyzed for n-eicosenoic acid. C. Y. Hopkins and Mary J. Chisholm (National Res. Council, Ottawa, Canada). *Can. J. Chem.* 32, 1033-1038 (1954). Analyses of *n*-eicosenoic acid (as acid or ester) yielded the following percentages (as % of total fatty acids): rutabaga seed (*Brassica napobrassica Mill.*) 6, frenchweed seed (*Thlapsi arvense L.*) 7, dogfish liver (*Squalus acanthias L.*) 11, and blubber of the beluga or white whale (*Delphinapterus leucas* [*Pallas*]) 4. The eicosenoic acid from each of these materials was found to have the unsaturation in the 11,12-position. The best sources, in respect to yield and purity, were frenchweed seed and rutabaga seed. Frenchweed seed oil had the following fatty acid composition (% of total fatty acid): saturated acids 3, oleic 16, linoleic 25, linolenic 12, eicosenoic 7, and erucic 37. 9-Hexadecenoic acid was identified as a constituent of dogfish liver oil and beluga oil.

The influence of lipids on self dispersion and on ease of dispersion of milk powder. W. K. Stone, T. F. Conley, and J. M. McIntire (Quartermaster Food & Container Inst. for the Armed Forces, Chicago, Ill.). *Food Tech.* 8, 367-71 (1954). Tempering dry whole milk to temperatures which cause melting of milk fat increased self-dispersion, while slow cooling from 120°F. to 76°F. decreased self-dispersion. Milk powder in which 20% corn oil was substituted for the milk fat, showed a gradual increase in self-dispersion with increase in temperature but no sharp increase in the melting range of milk fat. As the milk fat content of milk powder was increased, self-dispersion decreased. Whole milk powder tempered to 120°F. dispersed more rapidly by manual stirring in water at 75°F. than did powder tempered to 72°F.

Adsorption of fatty acids from olive oil by ion-exchange resins. I. Adsorption capacity of four resins for oleic acid in alcohol solution and for free acids in olive oil without using a solvent. A. O. Gomez and A. S. Cartava (Univ. Seville, Spain). *Grasas y aceites* (Seville, Spain) 4, 176-87 (1953). Adsorption of oleic acid from solution in 85% EtOH and of free fatty acids from olive oil of varying acidities was determined for 4 commercial ion-exchange resins. Resins dried at 100° did not adsorb acid, but those dried at room temperature did. Data indicate that the method is not commercially feasible for deacidifying olive oil. Increase of temperature greatly increased adsorption by one resin but had little effect on adsorption by the others. (*C. A.* 48, 10357-8)

Estimation of fat peroxides in meat. L. Hartman, C. M. Hooker and Hannah E. Watt (Dept. Sci. Ind. Research, Wellington). *New Zealand J. Sci. Technol.* 35B 307-10 (1954). The dichlorophenol-indophenol method of S. Hartmann and Glavind has been modified by the substitution of a PrOH-xylene mixture containing 5% AcOH as fat solvent and calibration of the results against ferric thiocyanate. An extinction of 0.77 was found to denote 1 microequivalent of peroxide oxygen in 10 ml. of solvent. This enables a quick test to be made on wet meat tissues with no interference from phosphatides but the reproducibility is not as good as obtained using the original method. (*C. A.* 48, 10249)

Difference between olive oil and olive-seed oil. Jaime Gracián y Tous. *Grasas y aceites* (Seville, Spain) 4, 58-62 (1953). The iodine value of the unsaponifiable matter determined by the Rosenmund-Kuhnhenn method is proposed as a means of distinguishing olive-pulp oil from olive-seed oil. The values for pulp oil average about 175 and for seed oil about 110. The differences in the iodine value of the unsaponifiable matter of the two oils persists even after hydrogenation. (*C. A.* 48, 10359)

Trace elements and the development of rancidity in edible oils. A. Vioque (Inst. grasaa, Seville). *Grasas y aceites* (Seville, Spain) 5, 62-5 (1954). Samples of olive, pumpkinseed, and rapeseed oils were analyzed for unsaponifiable matter, Fe, Cu, Zn, and Mn. None of the Mn and Zn, only about 2% of the Fe, and 15-24% of the Cu remained in the unsaponifiable matter. It was assumed that the metals remaining in the unsaponifiable matter were organically combined. (*C. A.* 48, 13120)

Hydrogenation of linseed oil on nickel catalyst on silica gel promoted by platinum and palladium. A. V. Burkham and D. V. Sokol'skiĭ. *Izvest. Akad. Nauk. Kazakh. S.S.R.* No. 123, *Ser. Khim.* No. 7, 9-19 (1953). Rapid and successful hydrogenation of linseed oil is possible in EtOH with Ni catalyst promoted with Pt and Pd. The apparent activation energy for such catalysts is about 6,000 cal./mole, that for unpromoted catalysts 12,000 cal./mole. The promoting effect of Pd exceeds that of Pt, but its effect disappears completely at temperature of 120° or higher. With Pt promoter successful hydrogenations are readily run at 40°. Solvents like EtOH, toluene, or glycerol can be used to reduce the viscosity of the original oil. (*C. A.* 48, 6145)

Determination of the peroxide number. H. Hadorn and R. Jungkuntz (Lab. VSK., Basel, Switzerland). *Mitt. Lebensm. Hyg.* 44, 495-500 (1953). A simplified method for the determination of the peroxide no. by adding a smaller quantity of KI and working in the same container from beginning to end is described. The displacement of air in the reaction vessel by CO_2 or N_2 is indispensible. The following standard specifications are recommended: (a) fats with a peroxide no. of 0-3 are storable, (b) fats with a peroxide no. of 3-6 can be stored for a limited time; (c) fats with a peroxide no. of 7-10 are tallowy and must be refined. An exception is made for olive oil for which peroxide nos. of from 8 to 10 are considered normal. (*C. A.* 48, 6143)

Analysis of binary mixtures of oils by the Bellier index and color reaction and the refractive index. M. de Mingo and Carmen Lucía (Univ. Madrid). *Rev. real acad. cienc. exact., fis. y nat. Madrid* 47, 249-75 (1953). The use of Bellier's index and *n* as a means of determining the oils in binary mixtures was studied. It was concluded that these determinations were of great value in identifying the components of binary mixtures, and can even be used to determine the proportion in which two oils are mixed. (*C. A.* 48, 6144)

A critical study of the national and foreign methods used to determine the acidity of vegetable oils, and the proposing of a new method. Isabelo Vargas Fuentes. *Inform. quim. anal.* (Madrid) 6, 181-99 (1953). In Spanish commercial transactions acidity of vegetable oils is determined by a rapid and inaccurate method instead of the official method. The methods employed in France, Italy, Spain, and Germany are discussed. A proposed method is given in which the solvents in the official method (alcohol and ether) are replaced with CS_2, ether and water. (*C. A.* 48, 6144)

Factors relating to the formation of a fat-ring on homogenized milk. B. J. Demott, G. M. Trout, and J. R. Brunner (Mich. Agr. Expt. Sta., E. Lansing). *Food Res.* 19(6), 603-9 (1954). A defect of homogenized milk which causes deposition of ring of de-emulsified fat in the neck of the bottle was present to a greater extent in milks homogenized at temperatures below 110°F. than in milk homogenized at higher temperatures. Repeated warming and cooling of freshly bottled homogenized milk accelerated the separation of fat and formation of "fat-ring."

Oil-extracting solvents. III. Peanuts and rapeseeds. C. Paquot and C. Galletaud. *J. recherches centre natl. recherche sci., Labs. Bellevue* (Paris) 24, 120-1 (1953). 1,2-Dichloroethane gave higher yield and faster extraction than $CHCl{:}CCl_2$ or petroleum ether. (*C. A.* 48, 6143-4)

Low-temperature hydrogenation of vegetable oils in solvents. D. V. Sokol'skiĭ and L. S. Melekhina. *Izvest. Akad. Nauk. Kazakh. S.S.R.* No. 123, *Ser. Khim.* No. 7, 20-9 (1953). Hydrogenation of linseed and cottonseed oils at 30-60° with Raney Ni catalyst is more rapid in nonpolar or weakly polar solvents (benzene or toluene) than without solvent. In benzene the optimum temperature is 30°; in toluene it is 60-70°. (*C. A.* 48, 6145)

Hydrogenation of cottonseed oil in the presence of Raney nickel catalyst promoted by platinum and palladium. N. I. Shcheglov and D. V. Sokol'skiĭ. *Izvest. Akad. Nauk. Kazakh. S.S.R.* No. 123, *Ser. Khim.* No. 7, 30-8 (1953). With unpromoted Raney-type Ni catalyst cottonseed oil is hydrogenated best at 60-80°.

Higher temperatures lower the apparent activation energy: at 25.40° it is 10,000-11,000 cal./mole; at 80-100° it is 2000-3000 cal./mole. On promotion with Pt the reaction rate rises with the amount of promoter up to 0.009 g. per 0.56 g. Ni; such promotion raises the temperature optimum to 80-100°. Ni promoted with Pd is somewhat more active than that with Pt, and promotion with Pd lowers the optimum temperature to 40-60°. Addition of Pt increases the strength of bonding of H to the catalyst surface, while Pd has the opposite effect. (*C. A.* **48**, 6145)

Carotenization of margarine. I. Jampoler. *Przemsyl Rolny i Spozywczy* **8**, 115-20(1954)(English summary). In concentrations up to 10 I. U./mg. and under normal temperature and light conditions, β-carotene does not influence in any way the oxidation of margarine. Higher concentrations of carotene and high temperature of storage result in proöxidative properties of carotene. The losses of vitamin A are 7% higher in the presence of carotene. The losses of carotene are about 15% lower in presence of vitamin A. (*C. A.* **49**, 1985)

Characteristic values of Brazilian cocoa fat. J. Wurziger (Staatl. chem. Untersuchungsanstalt, Bremen, Germany). *Zucher- u. Sussearenwirsch.* **6**, 589-91(1953). The *n*, refractive value, I no., and m.p. of the fat extracted from various types of cocoa beans and cocoa butter are given. (*C. A.* **49**, 1988)

The possibilities of a more effective conservation of some ointment bases. J. Stejskal and J. Novotny. *Ceskoslov. farm.* **2**, 165-8(1953). A review. Various lard preservatives are discussed. (*C. A.* **49**, 2030)

Stabilization of fats by antioxidants. Oskar Bauer. *Deut. Lebensm.-Rundschau* **50**, 109-15, 146-9, 173-9, 192-200, 218-25, 259-66(1954). A review.

Glyceride structure of natural fats. X. Crystallization analysis by azelaoglyceride estimation methods. A. R. S. Kartha (Maharaja's Coll., Ernakulam). *J. Sci. Ind. Research*(India) **13A**, 273-9(1954). Methods are discussed for the determination of the glyceride-type composition of natural fats. The fractional crystallization technique (*C. A.* **48**, 10625) is said to be free of the errors which may occur in low-temperature crystallization. (*C. A.* **49**, 2095)

Some attempts to produce compounded fats and the estimation of their technological value. A. Rutkowski (Univ. Paznan, Poland). *Przemysl Rolny i Spozywczy* **8**, 87-9(1954)(English summary). The mixtures of 60% of beef tallow with 40% rapeseed oil are very similar to lard and may be used for the production of doughnuts. The physico-chemical properties of the mixtures of several oils and fats are recorded. (*C. A.* **49**, 2097)

Animal fatty acids. E. S. Pattison. *Soap & Chem. Specialties* **30**(12), 54-5, 235(1954). Review covering manufacture and uses.

Refining of nagkassar (Mesua ferrea) seed oil. T. R. Kasturi, N. L. Narayana Murty, and B. H. Iyer(Indian Inst. Sci. Bangalore). *J. Sci. Ind. Research*(India) **13A**, 453-4(1954). The powdered kernels of nagkassar, when extracted with CCl_4, yielded a red viscous malodorous oil. The concentrated, dehydrated, and filtered extract was chromatographically purified by passing it over an alumina column. The resulting colorless, odorless, and tasteless oil was free of unsaponifiable matter and suitable for soap manufacture. The following data were given for the crude oil: d^{27}_{27} 0.9598; n^{27}_{D} 1.4780; acid no. 6.08; saponification no. 208.6; iodine value (Wijs) 88.4; acetyl no. nil; Reichert-Meissl no. 4.81; Polenske no. 0.52; unsaponifiable matter 2.92%. The fatty acids were myristic 0.22, palmitic 13.58, stearic 13.24, oleic 59.09, and linoleic 13.9 mole %. The component glycerides were trisaturated 6.39; disaturated, monounsaturated 18.35; monosaturated, diunsaturated 25.36; and triunsaturated 50.0 mole %. (*C. A.* **49**, 2098)

Composition of para-rubber-seed oil. Angelita M. Tuason and Aurelio O. Cruz(Inst. Sci. Technol., Manila). *Philippine J. Sci.* **82**, 341-4(1953). The seed of *Hevea brasiliensis*, grown in the Philippines, consists of 41.8% shell and 58.2% kernel. The kernel contains 47.9% oil (dry basis). The cold-pressed oil, after refining with fuller's earth and activated carbon, was clear yellow and showed: sp. gr. (30.6°) 0.9123, $n^{29.5}_{D}$ 1.4730, sapon. no. 181.2, acid no. 5.1, iodine value (Hanus) 133.3, thiocyanogen value 85.6, and unsaponifiable matter 1.1%. The composition of the oil as glycerides is: oleic 29.2, linoleic 40.8, linolenic 14.3, and saturated acid 14.6%. The kernel meal composition is: H_2O 7.0, oil 8.0, protein 30.5, crude fiber 6.1, ash 4.9, and carbohydrates (by difference) 43.5%. (*C. A.* **49**, 2099)

Lipophanerosis in cereal flours and brewers' yeast. José Giral and Laura Ortega. *Mem. congr. cient. mex., IV Centenario Univ. Mex.* **2**, 177-81(1953). Flours from corn, wheat, rice, and parota seeds (*Enterolobium cyclocarpius*) were extracted with ether to remove the free fats, the residue digested with pancreatin, the product dried, and again extracted with ether to yield the bound fat which amounted to 0.5% of the sample. (*C. A.* **49**, 1982)

Removal of high acidity in ghee. M. Sanyasi Raju and S. Varadarajan. *Madras Agric. J.*, **41**, 64-70(1954). Treatment of ghee with lime retarded acidity up to 3 months but it did not improve the quality of ghee in taste or aroma and tended to produce a ghee which gave a burnt taste to fried foods. (*C. A.* **49**, 1983)

Lipides of chloroform extracts of diphtherial microörganisms. I. A. A. Kanchukh(State Med. Inst., Rostov-on-Don). *Ukrain. Biokhim. Zhur.* **26**, 186-202(1954). Diphtheria bacteria yielded 4.9% of lipides extractable with ether and benzene and 1.7% with $CHCl_3$. The latter solution contained a new alcohol (*d*-3-octadecanol), hard, saturated, optically inactive acids ($C_{16}H_{32}O_2$ and $C_{22}H_{44}O_2$), and dextrorotatory acids (proposed formulas $C_{31}H_{60}O_3$, $C_{33}H_{64}O_3$, and $C_{36}H_{72}O_3$). (*C. A.* **49**, 1142)

Seed fat of Anamirta cocculus. T. R. Kasturi and B. H. Iyer (Indian Inst. of Science, Bangalore. *J. Ind. Chem. Soc.* **31**, 623-7(1954). Dried *Anamirta cocculus* kernels were extracted with CCl_4 in soxhlet extractor for 24 hrs. yielding 62% of their weight of a pale yellow, solid fat having a characteristic agreeable odor and the following properties: d^{45}_{45} 0.9057; $n^{49.5}_{D}$ 1.4522; acid value 39.9; sapon. value 187.5; acetyl value 20.3; I value (Wijs) 38.05; thiocyanogen value 35.05; Reichert-Meissl value 4.2; Polenske no. 0.567; specific rotation (in $CHCl_3$) 1.607; Hehner value 90.62; unsaponifiable matter 0.68%; m.p. 44-6°. Saponification of the fat with KOH-EtOH, acidification with dilute H_2SO_4, and fractionation by the Twitchell lead salt method gave 55% of a solid, pale red acid having an I value of 4.2 and 45% of a red oil with an I value 90.8. The solid and liquid acids were separately converted to methyl esters and fractionally distilled. Component fatty acids, determined by ester fractionation and thiocyanogen value, resp., were (wt. %): palmitic 6.1, —; stearic 47.5, —; oleic 46.4, 40.4; linoleic nil, 3.9. The probable individual glycerides are: palmitodistearin 3.66, tristearin 6.10, palmito-stearo-olein 10.37, distearo-olein 31.20, palmito-diolein 6.12, and stearo-diolein 42.63.

The best butter. D. R. Strobel. *Foreign Agr.* **18**(12), 225-7 (1954). Butter exported from Denmark, Netherlands, Sweden, Belgium, France and Switzerland must meet high standards of quality established and enforced by each exporting country and must be labeled with a national trade mark. The prestige of U. S. butter in foreign markets could be improved if U. S. exports consisted only of the highest quality butter and bore a single national brand.

The development of high acidity in wheat flours upon storage at normal moisture contents. Frode Lausten(Toldbodmollen Ltd., Copenhagen). *Trans. Am. Inst. Assoc. Cereal Chemists* **12**, 280-5(1954). On storage of cereal products, fatty acids, acid phosphates, and amino acids are formed as the result of enzyme action on fats, phytin and proteins.

Rancidity of fat and its laboratory estimation. Z. Hájek. *Prumysl Potravin* **4**, 437-40(1953). Discussion and methods. (*C. A.* **49**, 1345)

Component fatty acids of the body fat from male and female buffaloes. D. R. Dhingra, S. N. Kapoor, Ganesh Chandra, and R. C. Sharma(Harcourt Butler Technol. Inst., Kanpur). *J. Indian Chem. Soc., Ind. & News Ed.* **16**, 172-4(1953). Kidney-region fat of the male and female buffaloes had, resp., color grayish-white, white; odor both unpleasant; acid value 4.03, 3.6; sapon. value 196.3, 197.4; I. no. 30.6, 35.1; unsaponified 0.30, 0.31%; d_{35} 0.853, 0.913; n^{30}_{D} 1.4250, 1.4350. The component fatty acids are, resp., myristic 1.42, 0.91; palmitic 36.44, 32.95; stearic 31.52, 21.83; arachidic —, 0.73; oleic 28.32, 42.74; octadecenoic 2.30, 0.84%. (*C. A.* **49**, 1345)

A new rapid method for determination of fat content of cacao cake and its application to other oils. P. Philipp(Escola politec., Bahia, Brasil) and E. Z. Raimann. *Univ. Bahia escola politec. Publ.* No. **12**, 13 pp.(1953). Cacao cake is extracted with acetone and the extract titrated with water to the point of turbidity.

The Indian cottonseed and cottonseed oil—their composition and technology. II. Preliminary studies. C. R. Desikan and K. S. Murti(Oil Technol. Inst., Ananatapur). *Oils & Oilseeds J.* **6** (10), 11-15(1954). An extensive study of Indian cottonseed and cottonseed oils and their processing has been started at the Oil Technological Institute. Tabulated data give moisture, oil and lint contents, variety and locality where grown for 60 cottonseed samples from all parts of India. Results are given for the alkali refining and re-refining of several dark Indian cottonseed oils.

Final Agmark grade designations and definitions of quality for vegetable oils. *Oils & Oilseeds* 6(10), 20-21(1954). Official Indian specifications for various grades of groundnut (peanut) and castor oils.

Increased oilseeds production. P. S. Desmukh. *Oils & Oilseeds J.* 7(5), 7, 8(1954). Oilseed production in India increased in 1953-54 but further increases are needed.

Production, utilization and exports of groundnuts in the main producing countries of Asia. Anon. *Oils & Oilseeds J.* **7**(6), 8, 12(1953). A review.

Studies on the fatty oil from the seeds of Sterculia foitida Linn. J. P. Verma, Bhola Nath, and J. S. Aggarwal(National Chemical Lab., Poona). *Oils & Oilseeds J.* **7**(6), 10, 11(1954). Extraction of seed kernels of *Sterculia foitida* Linn. with petroleum ether at 15° gave a yellow, viscous oil having the following properties: d_{40} 0.9239; n_D^{40} 1.4658; Browne heat test 4¼ min.; acid value 6.5; saponification value 179.4; I value (Wijs, ½ hr.) 74.5; acetyl value 2.5; unsaponifiable 1.3%. Sterculic acid ($C_{19}H_{32}O_2$), the major constituent acid, was isolated by low temperature fractionation of the mixed acids in acetone.

The cooking of cottonseed meat. J. W. Dunning(V. D. Anderson Co., Cleveland, O.). *Oil & Soap*(Egypt) **1954**(4), 32-31, 28. The recommended procedure involves cooking cottonseed meats containing no less than 12% moisture for 15-20 minutes at 200-205°F. The cooked meats may then be dried at 220-230°F. Advantages include less foots, higher press capacity, and less red color in oil.

Application of paper chromatography for foodstuff chemistry. V. Microdetermination of the phosphatide components inositol, ethanolamine, serine, and choline. H. Sulser(Eidg. Gesundheitsamt, Berne, Switzerland). *Mitt. Lebensm. Hyg.* **45**, 251-94 (1954). Various methods are reviewed and new procedures are given for determining inositol, ethanolamine, serine, and choline by paper chromatography. Purified rapeseed and egg phosphatides were examined and found to contain several unknown substances. (*C. A.* **49**, 1227)

Mono- and diglycerides and their industrial importance. F. Mazuelos Vela. *Grasas y aceites*(Seville, Spain). **4**, 188-90(1953). (*C. A.* **48**, 10357)

Distillation of fatty acids. F. R. Ayerbe and J. M. M. Suarez (Inst. grasa, Seville, Spain). *Grasas y aceites*(Seville, Spain) **4**, 191-6(1953). (*C. A.* **48**, 10357)

Dehydration of castor-bean oil. J. Huesa and A. F. Lissén. *Grasas y aceites*(Seville, Spain) **5**, 24-9(1954). A review, 51 references. (*C. A.* **48**, 10359)

Kinetics and selectivity of fat hydrogenation. A. A. Zinov'ev and M. A. Potapova. *Nauch. Chteniya* **1952** g.(Ministerstvo Legkoi i Pishchevoi Prom. S.S.S.R. Tekhnicheskii Sovet Gizlegpishcheprom, Moscow **1953**, 37-62); *Referat. Zhur., Khim.* **1954**, No. 15638. On the basis of experimental hydrogenations of fats, the authors developed a formula for calculating the rate; i.e., $K=2.303(t_2-t_1)^{-1}\log IN_1/IN_2$; wherein K is the rate of hydrogenation, IN_1 and IN_2 are the iodine numbers of the fat at times t_1 and t_2. (*C. A.* **49**, 2097)

The keeping quality of mustard oil. M. R. Sahasrabudhe(Div. Food Processing, C.F.T.R.I., Mysore). *Bull. Central Food Technol. Research Inst., Mysore* 3, 89(1954). A study was conducted on crude and refined mustard oils and the protective effect of antioxidants and gallates against oxidation. The crude oil was refined according to the A.O.C.S. method for soybean oil. Butylated hydroxyanisole imparted the best keeping qualities with no appreciable difference between crude and refined oil. Thirteen antioxidants were screened. (*C. A.* **49**, 1988)

A study of the volatile fraction isolated from oxidized milk fat. I. Isolation, preliminary characterization, and chromatographic separation of the volatile fraction. A. F. Tamsma (Dairy Industry Section, Iowa Agricultural Exp. Station, Ames). *J. Dairy Sci.* **38**, 284-91(1955). The results of this study indicated that carbonyl compounds appeared to be related to the oxidized flavor in milk fat. The volatile fraction concentrated in Skellysolve that possessed the oxidized flavor contained carbonyl compounds, but no peroxides or epoxy compounds were present. Only part of the carbonyl compounds from oxidized milk fat was recovered in these concentrates; the other parts of the carbonyl compounds remaining in the fat and in the distillate involved in the procedure did not appear to contribute to the oxidized flavor.

Vertical umbrella-type agitator to promote smooth boiling in vacuum distillation. A. Rose and W. W. Sanders(The Pennsylvania State University, State College). *Anal. Chem.* **27**, 331-32 (1955). An umbrella-type agitator has been developed to promote smooth boiling in vacuum distillation. All the fatty acid esters and many of the acids and alcohols with an even number of carbon atoms from C_6 to C_{18}, inclusive, have been boiled successfully at high rates of vaporization and for long periods of time, at pressures that varied from 1.0 to 735 mm. of mercury. Water was present in some instances. The device has made possible the smooth steady boiling of methyl oleate and similar mixtures at a head pressure of 1 mm. of mercury for 170 hours.

Mono-α-aminoacyl and mono-α-dipeptide triglycerides. W. F. Huber(Research and Development Dept. of The Procter & Gamble Co., Cincinnati 31, Ohio). *J. Amer. Chem. Soc.* **77**, 112-16 (1955). 2-α-Aminoacyl-1,3-dilaurins, -dipalmitins, and -distearins have been prepared representing a combination of the acidic constituents of protein and fat in one molecule. They were obtained as the acetate salts by hydrogenation of the corresponding 2-α-azidoacyl glycerides in glacial acetic acid. Hydrolysis of the acetate salts by water-washing yielded free bases with fat-like properties. Treatment of the free bases with an α-azidoacyl chloride, followed by hydrogenation, produced mono-α-dipeptide glycerides. Due to ease of hydrolysis of the aminoacyl ester linkage, pure 1-mono-α-aminoacyl glycerides and di- or tri-α-aminoacyl glycerides were not obtained.

The X-ray diffraction and infrared spectra of molecule compounds of acetamide and long-chain saturated fatty acids. R. T. O'Connor, R. R. Mod, Mildred D. Murray, and E. L. Skau (So. Regional Res. Lab., New Orleans, La.). *J. Am. Chem. Soc.* **77**, 892-95(1955). Infrared spectra and X-ray diffraction data have been obtained for the four molecular compounds formed between acetamide and lauric, myristic, palmitic and stearic acids. The infrared spectra in the rock salt region resembled those of the constituent molecules and like the spectra of the saturated fatty acids, were identical for all members of the homologous series. Infrared spectra were not useful for the identification of the individual molecular compounds. From X-ray diffraction patterns "long" and "short spacings" have been measured. The "long spacings" of the molecular compounds have been shown to correspond in length to two molecules of saturated fatty acid and two molecules of acetamide.

Effect of antioxidants in the control of oxidized flavor development in stored frozen cream. II. Use of ethyl hydrocaffeate. A. J. Gelpi, Jr., E. W. Bryant, and L. L. Rusoff(Dept. of Dairying, Louisiana Agr. Exp. Station, Baton Rouge). *J. Dairy Sci.* **38**, 197-201(1955). In glass containers a 0.004% level of ethyl hydrocaffeate was effective in delaying oxidized flavor development in stored frozen cream for a period of 12 months. In the presence of 0.5 p.p.m. of copper in glass containers, 0.04% and 0.02% concentrations of the antioxidant were effective through a 12-month period, but the 0.004% concentration was effective for a period of only 1 month. In metal containers the antioxidant was not as effective as in glass, and in the presence of copper only the 0.04% concentration of ethyl hydrocaffeate prevented the oxidized flavor for a 12-month period. Ascorbic acid at levels of 20, 25, and 40 mg. per liter not only was ineffective in preventing the development but actually accelerated the oxidized flavor. Ascorbic acid added to ethyl hydrocaffeate produced a synergistic effect, so that a 0.004% concentration of ethyl hydrocaffeate and 25 mg. per liter of ascorbic acid prevented the development of the oxidized flavor in cream stored in tinned cans, with and without 0.5 p.p.m. of copper, for a 12-month period.

West Germany continues to offer large market for fats and oils. *Soybean Digest* **15**(4), 22(1955). A report by W. F. Doering is reviewed.

Identification of fats by urea fractionation. W. F. Shipe(Dept. Dairy Indus., Cornell Univ., Ithaca, N. Y.). *J. Assoc. Off. Agr. Chemists* **38**, 156-65(1955). Fats were hydrolyzed with alcoholic potassium hydroxide. The fatty acids were fractionated by treatment with 10% or 20% solutions of urea in methyl alcohol. Refractive indexes were determined at 50° for total fatty acids, fraction soluble in urea solutions, fractions precipitated by 10% urea and by 20% urea solutions. In 10% urea, butyric, caproic and caprylic acids were not precipitated, and capric acid was only partially precipitated. All except butyric were partially precipitated by 20% urea. Increasing amounts of oleic acid were precipitated as the urea concentration was increased. No separation of 1:1 mixture of oleic and lauric acids was achieved by the use of 20% urea solution. In a study of fatty acids from hydrogenated soybean oil, hydrogenated coconut oil and butterfat, characteristic differences were found for the refractive indexes of the fatty acids. Relationships between urea concentration and refractive indexes are shown graphically. Data are tabulated for samples of butter, various hydrogenated oils (coconut, cottonseed, herring, whale, seal, soybean) oleomargarine and mixtures of butter with vegetable and animal fats. Results indicate that fractionation of fatty acids with urea may be a means of detecting adulteration of butterfat with other fats.

A study of the use of a small panel to estimate consumer judgments. J. H. Prentice and D. Sheppard (National Inst. for Res. in Dairying, Univ. Reading, Shinfield, Reading, Berks.). *J. Sci. Food Agr.* 6, 24-30 (1955). Two methods of validating judgments of a small panel in tests on butter, compound fats and margarine are described. In both cases, judgments of the panel were compared intermittently with those of a larger consumer group. In the first method, the averages of panel members' ratings were compared with averages of the consumers' group ratings. Significant regression coefficients were found for flavor, spreadability and firmness but the panels did not agree about texture or overall quality. In the second method, individual panel members' judgments were examined for self consistency and possible drift with time, and multiple regression equations were calculated for the estimation of consumer judgments for panel members' judgments for each attribute.

The component acids and glycerides of Indian crocodile (Gavialis gangeticus) fat. S. P. Pathak and G. D. Pande (College of Tech., Banaras Hindu Univ., Banaras-5, India). *J. Sci. Food Agr.* 6, 48-53 (1955). Fatty acids obtained by hydrolysis of crocodile depot fat were analyzed by the lead-salt-alcohol and methyl ester distillation methods. Fractions obtained by crystallization of the neutral fat from acetone were analyzed by distillation of the methyl esters. The fat contained the following percentages of saturated fatty acids: lauric 0.2, myristic 4.2, palmitic 25.8, and stearic 8.7; and unsaturated fatty acids: C_{14} 2.0, C_{16} 11.6, C_{18} 35.5, C_{20} 10.0, and C_{22} 2.0. These values are compared with those reported for fats from frog, lizard and turtles. The fat consisted of 7.5% fully saturated, 27.7% disaturated-monounsaturated, and 64.8% monosaturated-diunsaturated glycerides. Probable compositions of the individual glyceride fractions are tabulated.

See tighter oil situation in 1955. P. M. Hedge. *Soybean Digest* 15(5), 34 (1955). Domestic and foreign fat and oil markets are discussed briefly.

Rapid method for water insoluble acids (WIA) in butter. L. G. Ensminger (Food and Drug Admin., Dept. of Health, Education and Welfare, Cincinnati 2, Ohio). *J. Assoc. Off. Agr. Chemists* 38, 183-4 (1955). Results of a comparison of the Official Method and the Ensminger method for WIA are tabulated. The essential features of the Ensminger method are extraction of the butter with hot water, transfer of the washed fat to ether, and titration with 0.05 *N* sodium ethylate. This short method is claimed to be more rapid and simpler than the Official Method and to give comparable results. Because of interference by proteins, the short method is not suitable for cream samples.

The movement of higher fatty acids under electrophoresis on filter paper strips. A. J. G. Barnett and D. K. Smith (Div. Agr. Biochem., Dept. Biol. Chem., Univ. Aberdeen). *J. Sci. Food Agr.* 6, 53-7 (1955). A procedure is described for the electrophoretic chromatography of higher fatty acids on Whatman No. 1 filter paper strips wet with 3 *N* ammonia solution at a voltage of 6 v/cm. Under these conditions R_f values were: palmitic acid 0.05, myristic 0.17, lauric 0.46, and capric 0.60. Stearic acid moved too slowly to be measured. The method is not applicable to the separation of the various C_{18} acids, and acids lower than C_{10} cannot be differentiated. By this procedure oleic acid (B.P.) was found to contain 1.5 to 2% lauric acid, 0.04% myristic acid, and an unidentified acid having an R_f of 0.06 and an ionic mobility between those of C_{16} and C_{14} acids.

Separation and structure determination of eicosatetraenoic acid from ox liver lipide. Tsutomu Shimooka and Yoshiyuki Toyama (Nagoya Univ.). *J. Oil Chemists' Soc. Japan* 3, 161-3 (1954). The ethyl ester of this acid isolated from ox liver lipide was oxidized with $KMnO_4$ in acetone solution. It gave butyric and succinic acids. Thus it was concluded to be 4,8,12,16-eicosatetraenoic acid. This disproves the former structure (5,8,11,14-eicosatetraenoic acid) reported by Arcus and Smedley-Maclean [*Biochem. J.* 37, 1 (1943)].

The influence of antioxidants on metals. Tadaaki Bitô (Nagoya Inst. Technol.). *J. Chem. Soc. Japan, Ind. Chem. Sect.* 57, 718-20 (1954). The amounts of Cu or Fe dissolved in castor oil were measured in the presence of 30 compounds (singly or in mixture) currently proposed as antioxidants. In general the antioxidants prevented the formation of Cu or Fe soap.

Fatty acids of cuttle-fish oil. Minoru Yamada. *Bull. Research Inst. Fisheries Hokkaido Univ.* 3, 86-93 (1954); *Compl. Chem. Abst. Japan* 29, 182 (1955). The mixed fatty acids had neutralization no. 188.8, iodine no. 193.3, and ether-insol. bromides 77.81%. They were fractionated by the Pb salt alc. method into solid acids 23.5% (iodine no. 18.2) and liquid acids 76.5% (iodine no. 241.7). Highly unsaturated acids comprised 38.4% of total fatty acids and showed neutralization no. 168.5, iodine no. 338.2, and n_D^{20} 1.4966. Methyl esters of saturated acids comprised 24.5-26.0% of methyl esters of mixed fatty acids. It was presumed that the mixed fatty acids consisted of about 25% saturated acids, about 25% oleic acid series, and about 50% more unsaturated acids. Saturated acids consisted of, in the decreasing order of existence, palmitic, myristic, arachidic, and behenic acids. Oleic acid series consisted of $C_{16}H_{30}O_2$, $C_{18}H_{34}O_2$, $C_{20}H_{38}O_2$, $C_{22}H_{42}O_2$, and $C_{24}H_{46}O_2$. More unsaturated acids consisted of $C_{18}H_{28}O_2$, $C_{18}H_{30}O_2$, $C_{20}H_{32}O_2$, $C_{22}H_{34}O_2$, $C_{22}H_{36}O_2$, and possibly $C_{24}H_{38}O_2$.

Thermal decomposition of castor oil. Jiro Araki. *Bull. Fac. Liberal Arts, Tottori Univ. (Natural Sci.)* 4, 8-11 (1953); *Compl. Chem. Abst. Japan* 29, 182 (1955). Castor oil was thermally decomposed under atmospheric pressure at various temperatures with 4 kinds of silica catalysts to give enanthol and undecylenic acid. This decomposition did not occur below 400°, and the yields of the 2 products were maximal (25.5-30.5, 24.5-35%, respectively) at 600-650°. The mechanism of decomposition was discussed.

Wool grease. V. Measurements of saponification and iodine values of wool grease and the origin of disagreement of formerly reported measurements. Takaharu Mivakawa and Shozo Oomori (Osaka Ind. Research Ind.). *J. Oil Chemists' Soc., Japan* 3, 195-9 (1954). A constant saponification value, 107, could be obtained by reacting over 5 hrs. with 1 *N* alc. KOH. Difficultly saponifiable matter was not fatty acid but some resin acid. Iodine value varied (20-43) under different conditions when measured with the pyridine bromide reagent; it was 28-30 with 0.05-0.08 *N* pyridine bromide in 150-180% excess for 15 min. at 20° (or, with 0.06-0.08 *N* reagent in 160-180% excess for 15-60 min. at 0°). The source of this variance in iodine value was isocholesterol.

Dibasic acid glycerides of Japan wax. Yoshiyuki Toyama and Hiroshi Hirai. *Research Rept. Nagoya Ind. Sci. Research Inst.* 7, 46-8 (1954). Glycerides containing 37.7% (A) and 26.8% (B) dibasic acid were isolated. Comparison of the data (mol. wt., saponification no., acetyl no., and dibasic acid content) with calculated values showed that (A) corresponded with the glyceride composed of 2 glyceryl groups, 1 mole dibasic acid [$C_{20}H_{40}(COOH)_2$], 3 or 2 moles palmitic acid, and 1 or 2 free OH, and that (B) also was composed of 2 glyceryl groups.

Moisture content of fatty oils, especially castor oil. Futara Ono and Yoshiyuki Toyama. *Research Rept. Nagoya Ind. Sci. Research Inst.* 7, 43-5 (1954). The determination of moisture in castor oil was satisfactory when made by the Karl Fischer method and by weighing water absorbed by $CaCl_2$ after heating oil sample for 1 hr. at 135-140°. The value obtained by the former method was slightly higher than that by the latter method, the greatest difference being 0.04%. Castor oil contained higher water than other oils. Moisture content and the temperature of turbidity were, 0.61%, −7.0°; 0.75%, 6.5°; and 0.92%, 25.0°. Coconut, camellia, rapeseed, cottonseed, cod-liver, cuttle-fish, sperm whale brain, and sperm whale skin oils contained 0.07-0.18% moisture, while rice-bran oil with acid no. 105.3 contained 0.51%.

Polarographic study of the autoxidation of methyl oleate. C. Paquot and J. Mercier. *J. recherches centre natl. recherche sci., Labs. Bellevue* (Paris) 24, 113-19 (1953). The method previously described (*C. A.* 47, 9816) was used. The polarograms of the unoxidized Me oleate were identical with that of the supporting LiCl electrolyte. The polarograms of the peroxide of Me oleate at various concentrations showed that the current was a straight-line function of the peroxide value. Curves of the peroxide value were given as function of the duration of oxidation for the temperatures, 40°, 80°, and 110°. The peroxide formed consisted of hydro- and epoxy-peroxides. Only the hydroperoxide could be detected polarographically. (*C. A.* 48, 5673)

Estimation of argemone in mustard oil by the bromide-bromate test. Interference due to sesame oil. S. N. Mitra. S. C. Chakravarti, and A. B. Som(All India Inst. Hyg. Public Health, Calcutta). *Science and Culture*(India) 19, 503-4(1954). In the bromide-bromate method of Chakravarti for colorimetric estimation of small quantities of argemone in mustard oil, the presence of peanut, linseed, nigerseed, or mineral oil does not interfere but sesame oil does. The approximate amount of sesame oil must first be determined by using the Baudouin test, and then the Chakravarti method can be used by setting up sample curves as blanks. (*C. A.* 48, 13242)

Utilization of rice oil of high acidity. I. General examination of the problem. G. B. Martinenghi(Inst. oleos, Rio de Janeiro). *Chimica e industria*(Milan) 36, 264-74(1954). A review on the utilization of the highly acid oil from rice bran. 186 references. (*C. A.* 48, 13242)

Coefficient of diffusion of normal alcohols and fatty acids in solution. V. A. Marinin(A. A. Zhadanov State Univ., Leningrad). *Zhur. Fiz. Khim.* 27, 1823-6(1953). The diffusion coefficients of butyl, octyl, decyl, dodecyl, tetradecyl, cetyl, octadecyl, and ceryl alcohols and of butyric, caproic, pelargonic, palmitic, and stearic acids were determined by the optical-polarization method of Tsvetkov(*C. A.* 46, 3356). (*C. A.* 48, 9775)

Melting-point diagrams of saturated fatty acids. A. Kofler. *Mikrochim. Acta* 1954, 444-52. With the aid of the microscope, the m. p. diagrams of the system palmitic acid-stearic acid was found to contain 3 different solid solutions. It was formerly thought that the solid solution of the middle concentration represented a compound, but it appears to be a stable intermediate phase. Similar diagrams are found with all systems of saturated compounds of even numbers of C atoms which differ in chain length by 2 to 4 C. (*C. A.* 48, 9798)

Determination of absolute fat in herring. C. H. Brandes and R. Dietrich(Inst. Meeresforsch., Bremerhaven, Germany). *Veroffentl. Insts. Meeresforsch. Bremerhaven* 1, 232-5(1952). Since the fat is unevenly distributed in the herring, fat can only be determined exactly when the entire filet gills are analyzed, which for analytical reasons is not always feasible. These can be turned without loss into an emulsion-like paste by the use of the "Multimix" machine at 12,000 r.p.m. (*C. A.* 48, 13120-1)

The phase states of cacao butter. C. Keil and A. Hettich(Inst. Lebensmitteltechnol. u. Verpackung, Munich, Germany). *Rev. intern. chocolat.* 8, 265-70(1953). Cacao butter in the solid state forms 4 phases which are interconvertible and in the order of increasing stabilities are designated γ, α, β_1, β. The various phases have been characterized chiefly by their m.p. The author has used the x-ray diffraction technique in combination with a calibrated goniometer to characterize them more accurately. The stable phase β, and 2 unstable phases, α and β_1 can be distinguished by their characteristic diffraction patterns. The phases present in commercial chocolate preparations can be determined in this way after a 3-hr. aqueous extraction to remove the interfering sugar. The presence of foreign fats in cacao butter can also be detected by the differences in their respective diffraction patterns. (*C. A.* 48, 6046)

Cold-storage defects in butter. F. D. Tollenaar(Centraal Inst. Voedingsonderzoek, Utrecht, Netherlands). *Conserva* 2, 304-7 (1954). A series of antioxidants were tested. Gallates retarded the formation of peroxides but did not prevent the fishy odor. This proves that the correlation is not close between these properties. Vitamin C retarded peroxide formation but adversely impaired taste. Tetramethylthiuram disulfide and tetraethylthiuram disulfide had a favorable influence at a concentration of 5 p.p.m. (*C. A.* 48, 6041)

Physicochemical properties of milk. III. Determination of size distribution of fat globules in milk by the application of Stokes' law. B. R. Puri, M. L. Lakhanpal, and S. C. Gupta(Punjab Univ. Hoshiarpur). *Indian J. Dairy Sci.* 5, 189-99(1952). Buffalo milk contains the coarsest and goat milk the finest globules, the globule size of cow milk being intermediate. Globule size is not such a variable factor as composition of the milk, and there is evidence that it is independent of the fat content of the milk. Globule-size distribution curves may be of some use in differentiating between the milk from different species of animals.

IV. Adsorption of benzene vapor. B. R. Puri, M. L. Lakhnapal, and R. P. Katyal. *Ibid.*, 139-46. Absorption of benzene vapor by milk is almost entirely due to its fat content. The magnitude of adsorption varies with temperature, globule size, and amount of fat. Many absorption values were: for various samples of whole milk 5.06-12.10%, skim milk 0.40%, and water 0.048%. Homogenizing increased adsorption from 9.65% to 11.90% in the case of one sample of milk. Adsorption values per g. of fat varied in the milks of different animals as follows: buffalo 1.05, cow 1.13, and goat 1.22. It seems possible to estimate the fat content of milk by determining the benzene vapor absorption under specified conditions. (*C. A.* 48, 2942)

Alcohol extraction of cottonseed. B. C. Satyan and Y. K. Rao. *Bull. cent. Food Tech. Research Inst., Mysore,* 2, 305-6(1953). Extraction of dried, ground cottonseed with ethanol gave an oil of excellent color and refining characteristics. Using Indian seed and ethanol the process is inexpensive.

The detection of trichloroethylene in cottonseed oil. G. A. Wiese. C. L. Jesina. *Drug Standards* 22, 105-7(1954). A simple method for the qualitative detection of trichloroethylene and other chlorinated hydrocarbons in cottonseed oil is sensitive to about 1:200,000 parts of trichloroethylene in cottonseed oil. *Food Tech.* 8(10), 16(1954).

Peanut butter. VI. The effect of roasting on the palatability of peanut butter. Nelle J. Morris and A. F. Freeman(Southern Utilization Research Br., U. S. Dept. of Agr., New Orleans, La.). *Food Tech.* 8, 377-380(1954). Peanut butters prepared in a pilot plant from peanuts roasted to various extents were evaluated periodically to determine the effect of extent of roasting on the flavor during 2 years of storage. Taste panel data indicate that peanut butters from medium roasted peanuts possessed best flavor and flavor retention.

Treatment of fatty material. M. Mattikow and D. Perlman(B. Clayton, Refining, Uninc.). *U. S. 2,704,764.* Deodorizer sludge is heated at 64° to 150° with a strong, nonoxidizing acid in a lower alcohol. The product consists of fatty acid esters of the alcohol and unsaponifiables. Unreacted alcohol is removed by distillation. The product is washed with water. Sterols are precipitated by cooling the mixture and removing. Fatty acid esters are then distilled off. Finally, the residue is washed with alcohol at 0° to 20° so as to extract tocopherols and precipitate the remaining sterols.

Fat food. C. Monti. *Italy 478,754,* Mar. 4, 1953. A palatable fat food, to be used especially in pastry, is obtained by thorough mixing of 66 parts lard with 33 parts of a natural gelatin from squash, with or without sugar, and coloring or aromatic matters. (*C. A.* 48, 13126)

• Biology and Nutrition

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

Sample preparation in the bioassay for vitamin D. L. Friedman and G. M. Shue(Food and Drug Admin., Dept. Health, Education and Welfare, Washington, D. C.). *J. Assoc. Off. Agr. Chemists* 38, 165-72(1955). Details are given for saponification of samples of evaporated milk or stabilized animal feed supplements with potassium hydroxide prior to extraction with ether. Vitamin D assays of such samples are compared with those prepared by the U.S.P. procedure which does not include a saponification step. Results show that saponification overcomes the difficulties encountered in assaying foods low in vitamin D potency, pharmaceutical preparations and animal feed supplements that contain stabilized forms of vitamin D which cannot be extracted quantitatively by trituration with oil or extraction with ether.

Steroids. L. F. Fieser(Harvard Univ.). *Scientific American* 192, 52-60(1955). Historical developments in the chemistry of sterols, vitamins D, sex hormones, cortisone and other steroids are reviewed.

Stability of carotene from dried grass meal and of synthetic vitamin D_3 in chick mash. V. H. Booth(Dunn Nutritional Lab., Univ. Cambridge and Med. Res. Council, Milton Road, Cambridge), M. E. Coates, C. P. Cox, S. Y. Thompson and M. J. R. Healy. *J. Sci. Food Agr.* 6, 10-14(1955). Two series of experiments were conducted to determine the stability of carotenes from dried grass meal at a level of 5% and of synthetic vitamin D_3 at a level of one I. U./g. in chick mashes for periods up to 16 weeks under normal commercial storage conditions. Initial carotene concentrations in the grass meals varied from 93 to 377 p.p.m. Loss of carotene in grass meals stored alone was 0.5% per week; in mashes the loss averaged 1% per week and the variations between samples were wide. Bioassays showed that these levels of grass meal and synthetic vitamin D_3 satisfactorily replaced codliver oil as a source of vitamins A and D in chick mashes.

Interrelationship between vitamin E and phosphorus in preventing perosis in turkeys. S. J. Slinger, W. F. Pepper and I. Motzok (Depts. of Poultry Husbandry and Nutrition, Ontario Agr. College, Guelph, Canada). *J. Nutrition* **55**, 395-403 (1955). Groups of turkeys were fed mashes containing all combinations of 0.3, 0.5 and 0.7% inorganic phosphorus and 0, 2.5, 5.0 and 7.5 I. U. of vitamin E per pound from hatching through 24 weeks of age. Grain was fed with the mash for the 8- through 24-week period. Based upon the growth data, there appeared to be little or no interrelationship between vitamin E and phosphorus.

Essential fatty acids and human nutrition. I. Serum level for unsaturated fatty acids in healthy children. Hilda F. Wiese, R. H. Gibbs, and A. E. Hansen (Dept. of Pediatrics, University of Texas Medical Branch, Galveston). *J. Nutrition* **55**, 355-65 (1955). On a dietary intake comprising about 3% of the total calories as linoleic acid, the mean serum levels of two, three and four double-bond fatty acids for 60 healthy control children 4 to 15 years of age were, respectively, 30.3, 1.5 and 10.2% of the total fatty acids. On the basis of these blood levels, the data indicated that there was no dietary requirement for arachidonic acid for healthy children when linoleic acid was supplied.

Animal fat in combination with various other ingredients in broiler rations. T. D. Runnels (Dept. of Animal and Poultry Industry, Univ. of Delaware, Newark). *Poultry Sci.* **34**, 140-44 (1955). The results from a broiler feeding experiment using 3 percent animal grease, 1.5 percent dried sardine fish solubles, 6 percent condensed hydrolyzed whey and 2.5 percent dehydrated alfalfa meal combined with a corn-soybean oil meal type basal mash individually and in all combinations were reported. The results from this experiment added additional data to that already published from other sources which indicated that high grade, inedible animal fat now in surplus supply was a practical ingredient for use in commercial broiler mash.

The effect of sodium acetate feeding on milk and fat yield, blood sugar, and blood ketones of dairy cows. W. J. Miller and N. N. Allen (Dept. of Dairy Husbandry, Univ. of Wisc., Madison). *J. Dairy Sci.* **38**, 310-312 (1955). The effects of feeding 1 lb. of sodium acetate daily for 10-day periods on milk and fat production, milk fat test, blood glucose, and blood ketones of normal cows receiving normal diets were determined. There were no significant differences ($P = 0.05$) in any of the values studied, between the cows receiving acetate and the controls. The sensitivity of the experiment was sufficient to detect average differences of 0.1% in fat test, 0.06 lb. of fat, or 0.8 lb. of milk per day, 0.6 mg. % blood glucose or 0.18 mg. % blood ketones.

Studies on the effect of sodium bisulfite on the stability of vitamin E. R. F. Miller, G. Small, and L. C. Norris (Agricultural Experiment Station and School of Nutrition, Cornell University, Ithaca, N. Y.). *J. Nutrition* **55**, 81-95 (1955). Evidence has been obtained in studies with chicks that the inclusion of sodium bisulfite in a purified diet containing iron, manganese and copper salts accelerated the development of oxidative rancidity in unsaturated fat and increased the incidence and severity of vitamin E deficiency. Both encephalomalacia and exudative diathesis were observed. Encephalomalacia appeared to be the more acute form and exudative diathesis the more chronic form of vitamin E deficiency. The results showed, in agreement with evidence reported by other workers, that actively developing oxidative rancidity in unsaturated fat was directly concerned in the destruction of vitamin E and indicated that one of the functions of the vitamin was the maintenance of the integrity of unsaturated fatty acid molecules.

Metabolic channeling in experimental nephrosis. II. Lipide metabolism. J. B. Marsh and D. L. Drabkin (Dept. of Physiological Chem., Grad. School of Med., Univ. of Penn., Philadelphia). *J. Biol. Chem.* **212**, 633-39 (1955). Cholesterol and fatty acid metabolism have been studied in experimentally nephrotic rats in an attempt to elucidate the mechanism of the hyperlipemia which accompanies this condition. It was found that the incorporation of acetate-1-C^{14} into cholesterol and fatty acids *in vitro* was greatly diminished in nephrotic rat liver and unchanged in nephrotic rat kidney. In the case of cholesterol, the liver of the nephrotic rat responded to the high level of serum cholesterol by a diminution in the rate of cholesterol synthesis. This behavior appeared to be analogous to that previously observed with the feeding of cholesterol. The diminished incorporation of acetate into liver fatty acids was related to the low level of liver glycogen in the nephrotic rat.

Fat studies in poultry. 3. Folic acid and fat tolerance in the chick. B. E. March and J. Biely (Poultry Nutrition Lab., The Univ. of British Columbia, Vancouver, B. C., Canada). *Poultry Sci.* **34**, 39-43 (1955). A series of experiments has been conducted to study the effect on the chick of different levels of folic acid and fat in the diet. It was observed that: The chick was able to tolerate a higher level of fat than is normally present in practical rations. The response of chicks to folic acid was modified by the level of fat in the diet. The depressing effect on growth sometimes obtained upon the addition of oil to a ration containing a sub-optimal level of folic acid was dependent on the quality of the oil, and in the above experiments was completely counteracted by fortification of the diet with folic acid. There was no evidence that folic acid aided fat absorption or had a lipotropic effect.

Calculation of the moisture and protein content of market chickens from the fat content. E. H. McNally (U. S. Dept. of Agr., Agricultural Res. Service, Animal and Poultry Husbandry Res. Branch, Beltsville, Md.). *Poultry Sci.* **34**, 152-55 (1955). The crude chemical components, fat, protein, moisture, and ash of poultry meat showed an interrelation of values. The moisture and protein content of poultry meat on a fat-free basis was fairly constant. Linear regression lines might be calculated for the relation of the fat content to the moisture, protein and ash content of poultry meat. The fat as a component of the tissue reduced the moisture and protein content in proportion to their quantity in the fat-free material. The crude chemical composition of the total edible meat and leg muscle of poultry might be calculated from the regression equations of the fat content.

Non-deleterious effects of polyoxyethylene esters in the nutrition of rats and cats. W. A. Krehl, G. R. Cowgill and A. D. Whedon (Dept. of Biochemistry, Yale Univ. School of Medicine, New Haven, Conn.). *J. Nutrition* **55**, 35-61 (1955). Polyoxyethylene mono- and di-stearates, mono- and di-oleates, and mono- and di-laurates were fed to groups of rats at a level of 6% of the diet. Polyoxyethylene-8-mono-stearate (Myrj 45) was fed to rats and cats at levels of 10% and 20% of the diet, respectively. The polyoxyethylene moiety of Myrj 45 was fed to rats at a dietary level of 6%. These experiments were of the long-term type extending over one and a half years for the rats and over one year for the cats. There were no significant differences between the groups fed the control diets and those given the same diets supplemented with these various polyoxyethylene esters. It was concluded that under the experimental conditions employed, no reasonable doubt existed concerning the safety of the polyoxyethylene stearates even when fed at levels up to 20% of the diet.

Relation of protein and fat intake to growth and corneal vasculatization in galactoflavin-produced ariboflavinosis. H. Kaunitz, H. Wiesinger, F. C. Blodi, Ruth E. Johnson and C. A. Slanetz (Dept. of Pathology, College of Physicians and Surgeons, Columbia University, New York, N. Y.). *J. Nutrition* **55**, 467-482 (1955). The influence of dietary casein levels ranging from 5 to 74% and of fat levels ranging from 0 to 20% upon rats on high and low riboflavin intakes with and without galactoflavin supplementation was studied with regard to growth, food consumption, survival time and corneal vascularization. On riboflavin-high diets containing 20% lard, weight increases ran roughly parallel to the protein level up to 30%. With 74% casein, the weights were similar to those on 18%. The daily caloric intakes were about 28 cal. for the animals on 5% casein, eventually about 50 for those on 18 or 30%, and about 40 for those on 74%.

Essential fatty acids and human nutrition. II. Serum level for unsaturated fatty acids in poorly-nourished infants and children. A. E. Hansen and H. F. Wiese (Dept. of Pediatrics, Univ. of Texas Medical Branch, Galveston). *J. Nutrition* **55**, 367-74 (1955). There were no significant differences in the amount of the total fatty acids in serum of children in fair and poor nutritional states as compared with well-nourished children. Dienoic, tetraenoic and hexaenoic acid levels in the serum of inadequately nourished children were significantly lower than in healthy children. The trienoic acid level in the serum of inadequately nourished children was significantly higher than in healthy children.

The Vanderbilt cooperative study of maternal and infant nutrition. VII. Tocopherol in relation to pregnancy. Mary E. Ferguson, E. Bridgforth, Mary L. Quaife, Margaret P. Martin, R. O. Cannon, W. J. McGanity, Josephine Newbill and W. J.

Darby(Division of Nutrition and Dept. of Biochem., Medicine, Preventive Medicine and Obstetrics and Gynecology, Vanderbilt University School of Medicine, Nashville, Tenn. and Distillation Prod. Ind., Division of Eastman Kodak Co., Rochester, N. Y.). *J. Nutrition* **55**, 305-319(1955). The variations in plasma tocopherol levels during pregnancy were described based upon (a) 1,575 single determinations of tocopherols and (b) a group of serial estimations on 39 women. It may be concluded that no support has been obtained for the thesis that tocopherol deficiency accounts for the unexplained complications of pregnancy which are encountered in a ''normal'' obstetrical population as represented by our sample.

The role of vitamin E in regulating the turnover rate of nucleic acids. J. S. Dinning(Dept. of Biochem., School of Medicine, Univ. of Arkansas, Little Rock). *J. Biol. Chem.* **212**, 735-739 (1955). Vitamin E deficiency in the rat resulted in an increased incorporation of formate into the nucleic acids of liver and of skeletal muscle. This was considered to reflect an increased turnover rate of nucleic acids in these tissues as a result of vitamin E deficiency. It was suggested that the regulation of turnover rates of nucleic acids was a preliminary metabolic function of vitamin E.

The effect of fat level of the diet on general nutrition. XIV. Further studies of the effect of hydrogenated coconut oil on essential fatty acid deficiency in the rat. H. J. Deuel, Jr., R. B. Alfin-Slater, A. F. Wells, G. D. Kryder and L. Aftergood(Dept. of Biochem. and Nutrition, Univ. of So. California School of Medicine, Los Angeles). *J. Nutrition* **55**, 337-46(1955). The effect of the addition of hydrogenated coconut oil to the otherwise fat-free diets of rats has resulted in the depletion of essential fatty acids in a shorter time interval and at a lower animal weight than when the rats were fed a fat-free diet alone. In rats receiving diets deficient in essential fatty acids, there was an increased cholesterol concentration in the liver and a decreased cholesterol content in the plasma after one week. However, although the condition was further aggravated thereafter in the animals on the fat-free diets, cholesterol levels of the rats receiving hydrogenated coconut oil in the diets gradually returned to normal. This effect may be due to the availability of short-chain fatty acids contained in the hydrogenated fat for esterification of cholesterol.

The effect of No. 2 tallow in poultry rations on the flavor of fresh and stored eggs. D. S. Carver, E. E. Rice, R. E. Gray and P. E. Mone(Research Laboratories, Swift and Co., Chicago, Illinois). *Poultry Sci.* **34**, 131-132(1955). The flavor of fresh or stored eggs was not adversely affected by the inclusion of 3 percent of No. 2 tallow in the diet of the hens.

Tissue preferences for fatty acid and glucose oxidation. A. Allen, B. Friedmann, and S. Weinhouse(Temple University, Philadelphia, Penn.) *J. Biol. Chem.* **212**, 921-933(1955). Various tissues of the rat in the form of slices or whole homogenates were allowed to oxidize added C^{14}-labeled fatty acids, both in the absence and in the presence of non-labeled glucose, and the degree of substrate oxidation was measured by the incorporation of C^{14} in respiratory CO_2. Under no circumstances did the presence of glucose lower the oxidation of the added fatty acids, even when its concentration was far higher than that of the fatty acid. The oxidation of endogenous palmitic acid of tissue lipides was likewise little affected by the presence of glucose. The data were taken to indicate that there was a basal fatty acid catabolism occurring generally in tissues, which was not suppressed by the abundant presence of carbohydrate.

Milk lipase. T. W. Albrecht and H. O. Jaynes(Dept. of Dairying, Tenn. Agricultural Experiment Station, Knoxville). *J. Dairy Sci.* **38**, 137-46(1955). Two general lipase systems have been demonstrated in raw skim milk within the pH range of 5.0 and 6.6, with optima at pH 5.4 and 6.3 Based upon formaldehyde sensitivity and substrate specificity, four lipase enzymes have been observed, two in each general system. An esterase was observed within the pH range of 5.7 and 6.0 which was inactivated by the addition of formaldehyde. The lipase can be quantitatively removed by precipitation of the skim milk with rennet or acid (to the isoelectric point).

The inhibition of trypsin. II. The effect of synthetic anionic detergents. T. Viswanatha, M. J. Pallansch, and I. E. Liener (Dept. of Ag. Biochem., Univ. of Minn., St. Paul, Minn.). *J. Biol. Chem.* **212**, 301-09(1955). The effect of five synthetic anionic detergents on the proteolytic activity of crystalline trypsin has been studied. Trypsin was inactivated by alkyl sulfates in the following order of increasing effectiveness: potassium octyl sulfate, sodium decyl sulfate, and sodium dodecyl sulfate. Depending on the relative proportions of detergent and enzyme which interact, potassium octylbenzene sulfonate and sodium decylbenzene sulfonate displayed two points of inactivation between which an appreciable portion of the original activity was retained. Enzymatic activity in the latter region, though highly resistant to self-digestion, was readily lost upon the addition of Ba^{++} or Ca^{++}.

Studies of rape-seed meal and its goitrogenic effect in pigs. A nutritional and histopathological study. S. Norfeldt, N. Gellerstedt, and Sture Falkner (Univ. Upsala, Sweden). *Acta Pathol. Microbiol. Scand.* **35**, 217-36(1954). The effect of the goitrogenic principle of commercial Swedish rapeseed meal upon growth in 105 pigs was studied, and weight increase and histological changes of different organs recorded. Levels of 10-20% of the meal in the diet caused decreased growth, but an increase in the weight of the liver, kidney, and thyroid. The thyroid showed marked epithelial hyperplastia. By repeated extractions of the meal in water in vacuo at 100°, the goitrogenic principle (*l*-5-vinyl-2-thiooxazolidinone) was largely removed or inactivated. (*C. A.* **49**, 1897)

Vitamin A in mare milk. N. Barabanshchikov and N. Frolova. *Konevodsvo* **1953**(4), 43-5; *Referat. Zhur., Khim.* **1954**, No. 10756. Determination of vitamin A in mare milk was started in April coinciding with first days of lactation and with the end of stall feeding. In April there was no vitamin A in the milk. Vitamin A appeared some time after turning out the mares to pasture. At the end of May there was a sharp inincrease in vitamin A content (0.0832 mg. %), then it dropped. Toward the end of June there was 0.0786 mg. % and at the end of November 0.0125 mg. %. The addition of vitamin-containing foods to the rations of lactating mares is recommended. (*C. A.* **49**, 1894)

Action of lipotropic factors upon the changes of the fat metabolism induced by carbon tetrachloride. II. Changes of the phospholipides. G. Cimino and A. Bernardini(Univ. Catania). *Boll. soc. ital. biol. sper.* **28**, 1246-8(1952). Changes in phospholipides after a hyperlipide diet and after CCl_4 poisoning are more pronounced in the liver than in the brain. Lipotropic factors counteract the action of CCl_4 to a certain extent in the liver but not in the brain. (*C. A.* **49**, 1894)

Paper chromatography of α-tocopherol. A. De Cicco and R. Rendi(Univ. Rome). *Boll. soc. ital. biol. sper.* **30**, 672-4(1954). α-Tocopherol and its acetate cannot be separated by chromatography in most solvents but they can be separated satisfactorily in 80% EtOH plus 0.5% NH_4OH or in 70% MeOH plus 0.5% NH_4OH. (*C. A.* **49**, 1859-60)

Modifications in the chain of fatty acids induced by pancreatic extracts. S. Pontremoli and G. Ivaldi(Univ. Genoa). *Boll. soc. ital. biol. sper.* **30**, 519-21(1954). Extracts of beef pancreas with 0.1 *M* $NaHCO_3$ buffer were incubated with Me palmitate 2-9 hrs. Analysis of the products revealed that the fatty acids had been broken down to shorter fragments. Extract heated 3 min. at 100° was without effect. (*C. A.* **49**, 1846)

Role of membrane potentials in fat transport. C. S. Hocking and J. H. Schulman(Univ. Cambridge, England). *Konikl. Vlaam. Acad. Wetenschap., Letter en Schone Kunsten België, Kl. Wetenschap., Intern. Colloquium Biochem. Problem. Lipiden* **1953**, 39-48(in English). Fat transport through porous cellulose membranes was studied. An emulsion of 0.25% paraffin and 0.01% stabilizing detergents was placed in a beaker-and-test-tube arrangement with filter paper as the membrane. Particle charge, membrane potential and zeta potentials were measured. The product of the zeta potential and the membrane potential reached its maximum at an electrolyte concentration of 0.1 *M* for both positive and negative particles. It is at this concentration that the maximum rate of migration through the membrane was attained. The fast rate of absorption of fat particles is probably associated with a membrane potential across the intestinal wall. (*C. A.* **49**, 1840)

Chemical composition of the fat deposits of the fish Prochilodus lineatus. III. Liver fat. R. R. Brenner(Fac. cienc. exact., Buenos Aires.). *Anales assoc. quim. argentina* **41**, 265-71(1953). The liver fat of the fresh-water fish, *P. lineatus,* contains on an average 15% nonsaponifiable matter. The ultraviolet spectrophotometry of this unsaponifiable matter has characteristics attributable to the presence of substantial proportions of vitamin A_2. The vitamin A content, spectrophotometrically estimated at 325 mμ, varies from 1170 to 18,070 U.S.P. units per g. of oil, being higher in summer and autumn. (*C. A.* **48**, 6077)

Absorption of fat from the intestine. A. C. Frazer, W. F. R. Pover, and H. G. Sammons(Univ. Birmingham, England). *Kon-*

inkl. Vlaam. Acacd. Wetenschap., Letter. en Schone Kunsten België, Kl. Wetenschap., Intern. Colloquium Biochem. Problem. Lipiden **1953**, 137-73(in English). A review with conclusions and some new data on bile salt and fatty acid concentration effect on lipolysis and also the distribution of fatty acid between oil and H_2O phase. Triglycerides need not be completely hydrolyzed to fatty acid and glycerol before absorption can occur and water-soluble fatty acid is not the only form of absorbable lipide derived from glycerides. The resynthesis of fatty acid and glycerol through intermediate phospholipides is not the obligatory path for triglyceride synthesis in the intestinal cell. The lipolytic hypothesis must be discarded. The essential steps in fat absorption probably are: partial hydrolysis of glycerides to fatty acids and lower glycerides; fine emulsification of the glyceride residue in the presence of bile; removal of water-soluble molecules from the oil into the water phase in accordance with their partition coefficients; entry of the water-soluble and lipide-soluble fractions into the intestinal cells; modification of the absorbed lipides in the cell, involving the reformation of triglycerides and the synthesis of lecithin; transport of particular lipide in the chyle to the systemic blood and of the water-soluble fraction, at least in part, in the portal blood. (*C. A.* **49**, 1913)

Vitamin A content in the livers of Black-Sea fish. Z. A. Vinogradova. *Vitaminy, Akad. Nauk. Ukr. S.S.R.* **1**, 82-99(1953); *Referat. Zhur., Khim.* **1954**, No. 10757. Vitamin A content was studied in the livers of 41 species of Black-Sea fish, a total of 1200 specimens. In most cases the vitamin A content increased with the age of the fish. There was observed a seasonal variation in vitamin A content depending on the sex and maturity of the fish. The total vitamin content of benthonic fish was higher than that of pelagic fish. The fat content of the liver of most benthonic fish was more than twice that of pelagic fish. The amount of vitamin A in 1 g. of plankton organisms was on the average 136 I. U. The liver of commercial fish with a large content of vitamin A can be utilized for the production of vitamin A preparations. (*C. A.* **49**, 2030)

Influence of the degree of unsaturation of substrate on the course of triglyceride hydrolysis by pancreatic juice. G. Clément, J. Clément-Champougny, and S. Michon-Rajon. *J. Physiol.* (Paris) **46**, 303-5(1954). Lipase is more active on fats which possess a low rather than a high degree of unsaturation. (*C. A.* **49**, 1113)

Reduction of serum cholesterol with the use of diets high in vegetable fat. L. W. Kinsell(Highlands Alameda County Hosp., Oakland, Calif.). *Modern Nutrition* **7**(9), 6-8(1954). A marked reduction in serum cholesterol and phospholipide resulted when patients were switched from a diet high in animal fat to one high in vegetable fat. (*C. A.* 49, 1160)

Relation of fat and caloric intake to atherosclerosis. J. W. Gofman, A. Tamplin and B. Strisower. *J. Am. Diet. Assoc.* **30**, 317-26(1954). Restriction of dietary fat lowers levels of certain classes of lipoproteins and atherogenic index values. It has not been established whether this change is due to the restriction of the fat itself or of some unidentified dietary factor associated with the fat.

The formation of fatty acids in oil seeds. T. P. Hilditch. *Oleagineux* **10**, 83-88(1955). The results of numerous investigators are cited to show that saturated and unsaturated acid in fatty materials of vegetable origin are produced by independent mechanisms. The predominating unsaturated acids are formed by a process which leads to the most unsaturated acids or their precursors, to the less unsaturated and finally to oleic acid; stearic acid is not formed during this biosynthesis. The unsaturated acids belong to only one or two homologous groups with the C_{18} acids being encountered most frequently. Their constitution and that of the corresponding hydroxy acids suggest that they may be formed from C_3 units which originate from hexose. The quantities of saturated acids in vegetable fatty materials remain comparatively constant while the amounts of unsaturated acids vary considerably depending on the climatic conditions during cultivation. When one of the members, frequently palmitic acid, predominates over the other saturated acids it is invariably found along with the lower and higher saturated homologous acids. These facts are in accord with the hypothesis that the higher fatty acids are synthesized by the condensation of C_2 units from hexose.

The content and distribution of cytochrome c in the fatty liver of rats. M. U. Dianzana and I. Viti(Inst. of General Pathology, Univ. of Genoa, Genoa, Italy). *Biochem. J.* **59**, 141-145 (1955). The content of cytochrome *c* is lower in the liver of rats and rabbits treated with either carbon tetrachloride or phosphorus than in normal animals. Mitochondria separated from a liver which has undergone fatty degeneration contain a smaller amount of cytochrome *c* than those obtained from a normal liver.

The role of glycerylphosphorylcholine and glycerylphosphorylethanolamine in liver phospholipid metabolism. R. M. C. Dawson(Dept. of Biochem., Univ. of Oxford). *Biochem. J.* **59**, 5-8 (1955). The specific radioactivities of the free glycerylphosphorylcholine and glycerylphosphorylethanolamine in rat liver have been measured by isolating them chromatographically at various times after the injection of labelled phosphate. A comparison of their specific radioactivities with those of liver phosphatidylethanolamine and phosphatidylcholine has suggested that they cannot act as major isotopic precursors of these phospholipids. Liver phosphatidylcholine obeys the correct radioactive criteria for being the precursor of glycerylphosphorylcholine, while similarly liver phosphatidylethanolamine fulfills the isotopic conditions necessary for being the precursor of glycerylphosphorylethanolamine.

◆

• Drying Oils

Raymond Paschke, Abstractor

Preparation of drying oils by oxidation and dehydration of nondrying oils. J. M. M. Moreno and J. M. H. Lope(Inst. Grasa, Seville). *Grasas y aceites* (Seville, Spain) **5**, 66-75(1954). In the oxidation of cottonseed oil by air, with 0.5% MnO_2 as catalyst and a temperature of 120° the acid value gradually increased with time, the iodine number decreased, the hydroxyl value increased rapidly at first then more slowly, and the peroxide value rose to a maximum then sharply declined. For studying oxidation and dehydration of oils, the use of a "potential iodine number," which is equivalent to the total unsaturation of a fatty acid if all the hydroxyls could be converted to double bonds, is proposed. The factor for converting hydroxyl value to equivalent iodine number is $0.44(M + 18)/M$, where M is the molecular weight of the fatty acid after dehydration. When the potential iodine value decreases during oxidation it means that polymerization is taking place faster than oxidation. The effect of time, temperature, and catalysts on change in the hydroxyl value of cottonseed oil are given in tables and graphs. Of the temperatures used, 120° was found most favorable for increase in hydroxyl value; the most active catalyst was SeO_2, but MnO_2 was best from an economic viewpoint. (*C. A.* **49**, 1341)

Polymer distribution in drying-oil modified alkyd resins. R. Wilson and A. H. Robson(Resinous Chemicals, Ltd.). *Off. Dig. Federation Paint Varnish Production Clubs,* 27, 111(1955). In the alkyd system there is a wide distribution of polymer sizes from low molecular weight species having no film-forming properties to very high molecular weight species approaching the gel state. High free glycerol content at the time of addition of the phthalic anhydride leads to an increase in the amount of very high molecular weight material in the resin product. A high alcoholysis temperature or the pre-polymerization of the oil, both lead to the formation of polymer species which approach the gel state in their complexity. These highly complex polymers would appear to lead to improved gloss retention in clear films, but in pigmented systems, they can be responsible for loss of gloss and instability on storage. The degree to which these effects are noticeable depends on the oil length of the alkyd. The highly complex polymers reduce the wrinkling tendency of long oil alkyds. It would appear desirable to avoid the formation of either very low molecular weight material which has little drying power or very high molecular weight material. Low molecular weight fractions which are capable of drying to yield a rather soft film may, however, be a very necessary part of an alkyd system, in acting as plasticizers for the more highly polymerized material present.

Recent advances in polymerization of vegetable oils. R. P. A. Sims(Dept. of Agriculture, Ottawa, Canada). *Can. Chem. Processing* **39**(2), 56(1955). This paper discusses the recent studies which have elucidated the reactions occurring during thermal and catalytic polymerization. Important in thermal polymerization have been (1) studies of the effects of amount and type of unsaturation on the rate of polymerization of pure methyl esters; (2) confirmation of the importance of polycondensation reactions of the Diels-Alder type; (3) assessment of the contribution of vinyl-type polymerization; (4)

demonstration of the unimportance of intraglyceride reaction in the early stages of thermal polymerization; (5) a better understanding of the viscosity of bodied oils. Catalytic polymerization has been advanced by (1) further studies on the behavior of catalysts and monomers, (2) the spectroscopical and chemical examination of dry oil films, and (3) the demonstration of importance of conjugation, catalysis, and monomer reactivity ratios in copolymerization.

Glycerol monoleate in alkyd base paints. W. J. Maxey and J. P. Hardiman(Kessler Chemical Co., Philadelphia). *Off. Dig. Federation Paint Varnish Production Clubs* 27, 93(1955). GMO acts as a solubilizing agent, a viscosity reducing agent, and a viscosity stabilizing agent for alkyd resin solutions. It is effective with long, medium, and short oil alkyds in odorless mineral spirits and in a mixture of regular mineral spirits and xylol. It is suggested that GMO be considered as a modifying agent not only for odorless systems but for the whole range of resins and solvents used in paints.

Six years of progress in tall oil. Louise C. Mann. *Am. Paint J.* 39(No. 3), 36(1954). The amount of tall oil consumed by the paint, varnish and resin industry is evidently much greater than reported by the Bureau of the Census. It is exceeded in volume only by linseed, soybean, and tung oils.

Ultraviolet spectrophotometric determination of polymerized styrene in styrenated fatty acids and alkyd resins. R. C. Hirt, R. W. Stafford, F. T. King, and R. G. Schmitt(American Cyanamid Company, Stamford, Conn.). *Anal. Chem.* 27, 226 (1955). A rapid method for the determination of polymerized styrene in styrenated fatty acids and alkyd resins has been made desirable by the increased use of styrene for modifying alkyd resins. An ultraviolet spectrophotometric method has been developed, which makes corrections for the overlapping absorption of conjugated triene fatty acids and residual monomeric styrene. The method as tested on a variety of styrenated fatty acids is superior in both speed and accuracy to the chemical method based on saponification value.

1954 Review of the paint industry. Anon. *Paint Varnish Production* 45(No. 2, Part II), 1-238(1955). A comprehensive review containing 51 chapters, many of which concern drying oils and all of which are of importance to the paint industry.

New synthetic resins and derivatives. Anon. *Paint Tech.* 19 (209), 63(1955). Interpolymers with resin acids are said to be more compatible with oils and solvents if made using Friedel-Crafts catalysts; while a combination of two catalysts, a peroxide and a heavy-metal drier, makes styrenated drying oils more solvent-resistant. A continuous process for styrenating fatty acids and their esters is especially recommended for its flexibility. A more generally applicable polymerization process, also continuous, yields dense styrene-maleic anhydride copolymers. Improvements in the emulsion polymerization of olefinic unsaturated compounds are also outlined. Organosilicon amides are said to combine the properties of both siloxanes and polyamide resins. Seven isomeric triphenylols, which are fusible resins, have been isolated. Alkyds modified with tert.-butylbenzoic and related acids are particularly recommended for use in cellulose lacquers.

Polyesters. W. H. Gardner(Allied Chemical and Dye Corp., N. Y.). *Am. Paint J.* 39(5), 70(1954). A review of the polyesters used in the paint and varnish industry. 32 references.

Drying oil technology. Part III. Methods of modifying oils. Anon. *Paint Varnish Production* 45(3), 34(1955). This is a short discussion of the upgrading of drying oils by (1) fractionation of fatty acids, (2) molecular distillation, (3) solvent extraction and segregation, (4) removal of antioxidants, (5) catalyzed modifications, and (6) ester interchange.

Oil base paint composition. W. G. Fisher. *U. S. 2,692,208.* This patent covers an additive composition for varnishes and oil-based paints consisting essentially of a mixture containing from about 0.8 percent to about 2.2 percent benzol, from about 1.6 percent to about 4.4 percent methyl alcohol, from about 0.2 percent to about 2.2 percent glycerol, from about 8.8 percent to about 9.5 percent turpentine, and from about 82.4 percent to about 88.0 percent pure raw linseed oil.

• Waxes

R. L. Broadhead, Abstractor

Report on wax from several species of Tillandsia and from Ananas comosus (L.) Merr. S. D. Feurt and Lauretta E. Fox (Dept. of Pharmacognosy and Pharmacology, College of Pharmacy, Univ. of Florida, Gainesville). *Science* 121, 42(1955). A hard wax melting at 79° to 80°C., was extracted with organic solvents from *Tillandsia usneoides* L., Spanish moss. This wax imparted a glossy finish to woodwork and leather and has been utilized in automobile polishes on an experimental basis.

Macrocyclic compounds from pine-needle wax. S. T. Tong. *Soap, Perfumery & Cosmetics* 27, 58-61(1954). Pine needle wax was obtained by extracting with EtOH needles of *Pinus sylvestris*, common pine, dried in current of warm air 14 days; the yield was 1.75-2%. Three crystallizations gave products m. 78°, mean equivalent weight of acid by saponification 205. Saponification with alcoholic KOH and acidification gave juniperic acid (I), $HO(CH_2)_{15}CO_2H$, and sabinic acid (II), $HO(CH_2)_{11}COOH$. Heating and depolymerization of I or allowing a 10% solution of the 16-Br fatty acid in EtCOMe to flow slowly from a Herschberg funnel through a reflux condenser into vigorously boiling solvent and K_2CO_3 gives 65% cyclohexadecanolide, $CO\cdot(CH_2)_{15}\cdot O$, m. 34°, $b_{0.5}$ 124°, with musk-amber odor. A dimeric lactone (3%) was also isolated. Dibasic acids were prepared by direct oxidation of I with $KMnO_4$ to give $HO_2C(CH_2)_{14}CO_2H$ and by hydrolysis of the derived $NC(CH_2)_{15}CO_2H$ to give $HO_2C(CH_2)_{15}CO_2H$ from which were obtained the corresponding macrocyclic ketones: 17.5% cyclopentadecanone, m. 63°, $b_{0.5}$ 130° (semicarbazone, m. 179°), with a musk odor. Reduction of I, heating with Bu_2CO_3 in the presence of NaOBu, and depolymerization with $CoCl_2$ catalyst yielded hexadecamethylene cyclic carbonate monomer, m. 31°, $b_{0.5}$ 135°, with a weak civetone odor. No dimeric carbonate was isolated. II converted to the 12-Br deriv. and condensed with the Na deriv. of $HO(CH_2)_3OH$ gave a HO ether acid which was converted to a linear polymer, and depolymerized catalytically to yield 45% lactone of $HO(CH_2)_3O(CH_2)_{11}CO_2H$, b_1 152°, n_D^{20} 1.4644, with a sweet musk odor. II was converted to the 12-NC deriv., hydrolyzed, and esterified with $(CH_2OH)_2$ to a linear polymer; depolymerization gave ethylene glycol cyclic brassylate, b_1 140°, n_D^{20} 1.4702, with musk, slightly fatty odor. (*C. A.* 49, 2339)

Aqueous resin-wax floor coating dispersions. A. C. Pabst, R. J. Holzinger, and Elizabeth J. Gavin(Socony-Vacuum Oil Company, Inc.). *U. S. 2,695,277.* A low-viscosity aqueous dispersion of a hard natural wax, such as carnauba, ouricury, or candelilla, and a wax-immiscible resin made by emulsion polymerization is used as a nonslip, nontacky floor coating. The wax-immiscible resin can be polymethacrylic acid, polystyrene, or a copolymer of vinyl acetate and methacrylic acid. The particle size of the wax and the resin is preferably 0.01–0.03 μ. (*C. A.* 49, 2754)

Boot grease and leather preservative. H. C. Schmid. *U. S. 2,668,773.* A preservative water repellent contains 3 parts dark menhaden oil, 4 parts pine tar, 6 parts unrefined beeswax, and one drop of rosewood oil for each 7 oz. of compounded material. (*C. A.* 49, 2766)

• Detergents

Lenore Petschaft Africk, Abstractor

The mechanism of detergents. H. L. Rosano. *Teintex* 19, 577-87(1954). Physico-chemical factors affecting the detergency mechanism were studied (1) tensiometrically and (2) by observing the behavior of drops of oil on a solid immersed in water and in an aqueous detergent solution, respectively. The results obtained show (a) that, for detergents in aqueous solutions, the mechanical action seems to be reduced to an emulsifying activity facilitated by the presence of the detergent (decrease of tension at the oil/aqueous detergent solution interface as compared with that of oil/pure water). The physical action of the detergent itself is limited, a macroscopic layer of residual dirt being left which can be displaced only by the chemical action of the mineral salts in the detergent composition. (b) The ionic sign of the detergent plays an important role in the redeposition of the emulsified dirt.

The effect of perfumery chemicals on emulsified products. J. Pickthall(Polak & Schwarz, Engl.). *Soap, Perfumery, Cosmetics* 28, 69-75(1955). Aqueous solutions of certain surface-active agents of interest to the cosmetic industry are affected in various ways by many perfumery chemicals. The viscosities of certain anionic agents (sodium oleate and sodium lauryl sulfate, for instance), and non-ionic agents in aqueous solution increase when selected perfumery chemicals are added. This is due to a swelling of the micelle as the perfumery chemical penetrates. The degree of penetration will depend upon the chemical structure of the material in question.

Detergency studies with sulfated tallow alcohols. L. Osipow, Dorothea Marra, Cornelia T. Snell, and F. D. Snell(Foster D. Snell, Inc., New York). *Ind. Eng. Chem.* 47, 492-6(1955). Sodium tallow-alcohol sulfates are not sufficiently soluble by themselves for use in liquid detergents. Solubility of the unsaturated tallow-alcohol sulfate is increased somewhat by combination with other syndets. Saturated tallow-alcohol is a low foamer while the unsaturated tallow-alcohol sulfate is a moderate foamer in comparison with dodecyl sulfate. Although tallow-alcohol sulfates are fairly good emulsifiers of mineral oil, they are improved by combination with other syndets. Saturated tallow-alcohol sulfate appeared to be somewhat more effective than unsaturated from manual dishwashing, particularly when combined with nonionic surfactants. For both cotton and wool detergency, a 1 to 1 combination of unsaturated and saturated tallow-alcohol sulfates in heavy-duty formulations proved very effective in these tests, and was superior to combinations with other syndets. Without builders, the saturated tallow alcohol sulfate was a better wool detergent than the unsaturated.

Observations on the perfuming of toilet soaps. F. Harlan (Etabs. de Revise, Courbevoie, Seine, France). *Soap, Perfumery, Cosmetics* 28, 183-6(1955). Some of the properties of a good perfume for toilet soap are reviewed. These include good persistence, resistance to rancidity, stability to alkalinity and oxidation, freedom from color reaction with optical blueing agent and ability to withstand modification during storage or use. Other factors discussed include psychological aspects.

Studies in detergency—X-electron microscopy. E. Gotte, W. Kling, and H. Mahl. *Melliard Textilber.* 35, 1252-7(1954). Cleansing can be observed as a reduction in the number of particles, e.g. of iron oxide and natural soil on cotton, visible under the electron microscope when the number or duration of washings is increased. Increasing fineness of the soil particles renders washing more difficult, especially below 0.2 u. When no further particles are visible under the electron microscope, the fibers are macroscopically clean.

Biochemical degradation of synthetic detergents I. Preliminary studies. R. H. Bogan and C. N. Swayer(Mass. Inst. Technol., Cambridge, Mass.). *Sewage and Ind. Wastes* 26, 1069-80 (1954). The biochemical oxidation of commercial syndets was followed by means of the Warburg respirometer and by standard B.O.D. dilution techniques with acclimated activated sludge and domestic sewage as seed. Results led authors to conclude that: (1) all the principal anionic and nonionic syndet types are susceptible to some degree of biological degradation; (2) there is considerable variation in this susceptibility, both among members of the same chemical type and among different classes; (3) the observed resistance of syndets to biochemical oxidation is a property of the biological medium. A relatively brief adaptation period of 48-60 hrs. generally resulted in an increase in oxidizability of the more resistant syndets; (4) certain syndet types (alkyl sulfates, sulfonated fatty acid amides and esters, and certain derivatives of low molecular weight polyethylene glycols) are readily available as bacterial food, and therefore, are subject to rapid biological stabilization; (5) the alkylaryl sulfonates, alkylphenoxy polyglycols, and derivatives of high molecular weight polyethylene glycols are biochemically stabilized at a relatively slow rate; (6) classification of syndets as ionics or nonionics has little biochemical significance in sewage treatment or stream sanitation; (7) the biochemical degradation of syndets is a function of their chemical constitution and can be strongly influenced by seemingly small changes in the nature of certain molecular components. (*C. A.* 49, 3451)

Comprehensive analysis of sodium alkyl aryl sulfonate detergents. F. T. Weiss, A. E. O'Donnell, R. J. Shreve, and E. D. Peters. *Anal. Chem.* 27, 198-205(1955). As the result of this investigation, which involved a survey of available techniques, a suitable modification of the ASTM D 855/46T method for the analysis of petroleum sulfonates was developed. Reliable values are obtained for the content of sodium sulfonate, inorganic salts, neutral oil, sodium carboxylate, free acid or alkali, water, and for the average combining weight of the sodium sulfonates. The method is applicable to sodium alkyl aryl sulfonate detergents containing organic and inorganic builders and, with minor modifications, can also be applied to sodium alkyl sulfate detergents.

The influence of some surfactants upon the self-dispersion and churning of whole milk powder. D. W. Mather and H. A. Hollender(Dairy Dept., Purdue Univ., Lafayette, Ind.). *J. Dairy Sci.* 38, 217-23(1955). The addition of certain surface-active compounds to concentrated milk before spray drying increased the rate of self-dispersion of the milk powder. Surface-active compounds which are polyoxyethylene fatty acid esters have been found the most effective but cause churning at certain concentrations. Sorbitan fatty acid esters were found to be effective in controlling the churning of the butterfat when the powder was reconstituted. When the proper hydrophilic-lipophilic balance of surfactants was present in the whole milk powder, a powder was made that was self-dispersible and yet did not churn when reconstituted.

Detregents from cottonseed oil. III. Preparation of fatty alcohols with different degrees of unsaturation—their sulfonation. Bahi-El-Din Aly Gebril(Univ. of Alexandria, Egypt). *Oil & Soap*(Egypt) 1954(4), 36-33(1954). Fatty alcohols prepared by hydrogenation of cottonseed oil vary in unsaturation depending on the conditions of hydrogenation. Hydrogenation proceeded more rapidly at 330° than at 350° and gave a more saturated product. Changes in H_2 pressure influenced the rate but not the course of the reaction. Changing the molar ratio of Cu:Cd in the catalyst from 1:1 to 1:2 did not change the yield or saturation of the product. Saturation of alkene linkages, but not the conversion of oil to alcohol, is inhibited by increasing Cd content of the catalyst until a maximum effect is obtained. A Cd-modified Cu-Cr oxide catalyst prepared by coprecipitation gave alcohols of higher unsaturation than did a catalyst prepared by mixing Cd-Cr oxide with Cu-Cr oxide. Concentrated H_2SO_4 reacts both with hydroxyl groups and at double bonds giving detergents whose properties depend on the degree of unsaturation of the fatty alcohol used.

Detergent compositions. P. W. Kinney(General Aniline & Film Corp). *U. S. 2,702,277.* A liquid detergent composition of improved detergent properties is prepared by adding a water-soluble salt of an interpolymer of an alkyl vinyl ether with maleic anhydride to a water-soluble synthetic non-ionic surface-active polyethylene glycol derivative containing at least 4 ethenoxy groups.

Synthetic detergent compositions. Colgate-Palmolive-Peet Co. *Brit. 720,195.* A high foaming detergent having a relatively high content of organic sulfonate active ingredient is prepared by monosulfonating an alkylated aromatic compound containing 8 to 26 carbon atoms in the alkyl group with an excess of a sulfonating agent and neutralizing the reaction mixture, and which includes adding a fatty alcohol having at least 8 carbon atoms at any stage prior to neutralization.

The Brabender semi-automatic moisture tester. Its use in the soap plant. C. N. Karpitsky(Nile Ginning Co., Minia, Egypt). *Oil & Soap*(Egypt) 1954(4), 30-28. A discussion of the characteristics and advantages of the Brabender instrument when used for determining the moisture content of soap products.

Detergent compositions having improved foam persistence. M. E. Cupery and G. O. Funderburk(Du Pont & Co.). *U. S. 2,702,278.* A detergent composition adapted for emulsifying greasy soil and maintaining adequate foam consists of an intimate admixture of a non-ionic or anionic foaming detergent and from 20 to 60% by weight of N-dodecylacetamide.

Detergent compositions having improved foam persistence. G. O. Funderburk and V. R. Hurka(Du Pont & Co.). *U. S. 2,702,279.* A composition useful for cleansing greasy articles consists of a detergent such as a betaine compound selected from the group of C-alkyl betaines and N-alkyl betaines, the alkyl radicals containing from 10 to 16 C-atoms, and an adjuvant such as the water-insoluble condensation product of 1 mole of dodecyl alcohol with substantially 1 mole of ethylene oxide, the quantity of adjuvant being not less than 10% by weight of the betaine compound.

Improvements in or relating to the treatment of soap solutions. Unilever Ltd. *Brit. 719,472.* Aqueous soap solutions are treated to obtain fatty matter therefrom to avoid a prolonged treatment of the fatty layer and the resultant darkening thereof by mixing the aqueous soap solution with an acidic substance in such a manner as to avoid substantial formation of acid soaps, shattering substantially all the water-in-oil emulsion clots dispersed in the resultant mixture thereby to convert the mixture to an oil-in-water dispersion and separating the fatty phase from the aqueous phase in the oil-in-water dispersion.