to take place during prolonged exposure to heat but when all the precautions which have been recommended are employed, the resultant loss of unsaturation is very small. Thus an analysis of a whole oil may be quoted (2), from which the calculated iodine value of the original oil was 113.0, as compared with the observed figure of 115.2.

From the details in Table II (p. 148) of Kyte's paper (1) the calculated iodine value of the fatty acids of the salmon egg fat is 218, corresponding to an iodine value of about 209 on the original fat. Unfortunately no iodine value for the original fat is recorded, nor are those of the segregated groups of methyl esters; but the statement is made (p. 146) that "fat from salmon eggs has the very high iodine value of 220" (3). The loss of unsaturation (apparently about 5%), although possibly greater than necessary, is not so marked as might be inferred from the rather vague statements of the author referred to above.

As mentioned, some data relevant to the understanding of the author's results are missing from the paper, and no comparison has been made of the iodine value of the oil as calculated from the detailed fractionation analysis with its observed value, a matter which should always be looked into as a check on the general accuracy of ester-fractionation analyses.

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

• Oils and Fats

S. S. Chang, Abstractor
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Antioxidants and synergist inhibition of Hermatin-catalyzed oxidative fat rancidity. Y. T. Lew and A. L. Tappel(Dept. of Food Tech., Univ. of Calif., Davis, Calif.). *Food Tech.* 10, 285–9(1956). Manometric measurement of the oxidation of lard in aqueous emulsions and catalyzed by hemoglobin allows rapid evaluation of antioxidants and synergists. On the basis of the results of this research it is doubtful if there can be found nitrogenous inhibitors which inhibit by direct combination with hermatin compounds and which are suitable for use in meats. Of greater practical consideration for inhibiting oxidative rancidity in meats are synergistic mixtures of some of the approved food antioxidants. One such mixture evaluated in this study is that of NDGA, BHA and ascorbic acid.

Color changes of fats involved in the frying of a fritter-type batter. Marion Bennion and Flora Hanning(University of Wis., Madison, Wis.). *Food Tech.* 10, 290–2(1956). Color changes in lards and combination shortenings used for the deep fat frying of a fritter-type batter, measured with the Hunter Color Difference Meter, were similar. The general trend of changes involved a marked decrease in L values, or color lightness, and increase in the a and b scales, showing the development of reds and yellows. Color changes in lards varied according to the composition of the flour mixture fried. Batters without baking powder maintained higher L values but showed greater increase in yellow than other batter modifications. All color darkening was quite easily observed by sight but the values on the Hunter Color Difference Meter gave quantitative measurement for the components of the color, some of which could not be discerned visually.

The polymorphism of glycerides—an application of x-ray diffraction. E. S. Lutton(Procter and Gamble Co., Cincinnati, O.). *J. Soc. Cosmetic Chemists* 6, 26–34(1955). Methods used in the study of the modes of crystallization of a number of mono-, di-, and triglycerides are reviewed. (*C. A.* 50, 7481)

Obtaining easily refinable extracted cottonseed oil. I. V. Gavrilenko and I. E. Bezuglov. *Masloboino-Zhirovaya Prom.* 21, 8, 5–9(1955). Method of processing and characteristics of products are reported from operations at some Russian plants. In prepressing with an "FP prepress," oil in cake is reduced to 12% on 1–4 grade seed and to 15% for 5- and 6-grade seed. The gossypol content was 0.05–0.11% in the cake and 0.11–0.17% in the prepress oil. The cakes were extracted with benzene to yield miscella passed through 4 compartments of increasing temp. of 57–92° where it was concentrated from 9.35 to 81.42%, and final concentration was done in a 2nd single-step stage at 115°. Another factory uses a 3-stage distillation, the 1st 2 stages being each 4-compartment units as the 1st stage of the above. Characteristics of the crude oil and the oil after refining are given. (*C. A.* 50, 7481)

Mineral constituents of peanut oil. K. S. Srinivasa Varadan. *Indian Pharmacist* 10, 263–4, 271(1955). The peanut-oil sample was filtered in a hot funnel to remove suspended impurities. The minerals found (in terms of their oxides) were: P_2O_5 55.82, Fe_2O_3 8.76, CaO 6.5, CuO 5.18, MgO 2.85, and SiO_2 1.10%. The other minerals present were thought to be Na_2O and K_2O, but no data are given. Chlorides were found but only traces of sulfates were detected. The methods used are described in detail. (*C. A.* 50, 7481)

Continuous refining of rapeseed oil. A. M. Zharskii and T. E. Romanova(Fat Combine, Kharkov). *Masloboino-Zhirovaya Prom.* 21, 8, 12–13(1955). Rapeseed oils of acid no. 3.5–4.5 were refined by the continuous process of A. A. Schmidt. The oils were hydrated with steam, held 2 hrs., and centrifuged. Refining was with 100% excess lye solution of 130 g. per 1. concentration. Tests on 10 oils yielded refined oils containing 0.36–1.25% soap and 0.24–0.38% free fatty acids. The foots contained 9–12% soap and a saponified fatty acid:neutral oil ratio of 1:0.49 to 1:0.3. The refined oil was efficiently decolorized with 2% active earth when the moisture present was 0.5–1.5%. Above 1.5% moisture in the oil, efficiency of decolorization decreased. (*C. A.* 50, 7481)

The influence of aging on the physical properties of tung oil. P. Guimarães da Fonseca and B. Schneiderman(Escola politécn., São Paulo). *Bol. dept. quim. escola politéc.* (São Paulo) 1, 1–6(1955). During the process of aging both the density and the viscosity of tung oil increase, more probably due to an intramolecular rearrangement than to a large-scale polymerization. The constant *b* of Andrade's viscosity of formula might prove more valuable in characterizing a certain sample of oil than the viscosity itself. (*C. A.* 50, 6816)

Determination of glyceride composition in vegetable fats. M. Filajdic(Univ. Zagreb). *Kemija u Industriji*(Zagreb) 4, 235–48(1955). Methods for determining the glyceride composition of vegetable fats are reviewed, and the calculation of glyceride composition on the basis of analytical data is illustrated in detail in a number of examples. 21 references. (*C. A.* 50, 6813)

Turtle oil. Nadja Avalle. *Inds. parfum.* 10, 463–4(1955). The oil extracted from the muscles and genital organs of the Mexican giant sea turtle *(Chelonia athecae)* and purified, has the constants: $d^{25} = 0.911–0.919$, $n_D^{20} = 1.4599–1.4715$, saponification number 197–210, I number 89–97, acetylation number 3.5, Reichert-Meissl number 0.20, unsaponifiable matter 0.6%, slight animal odor, unsaturated fatty acids 65%. The oil gives excellent results in creams, or pure as a vehicle for vitamins. It is useful in cosmetic emulsions. (*C. A.* 50, 6815)

Castor oil—its uses and possibilities. M. A. Saboor. *West Bengal, Govt., Dept. Inds., Bengal Ind. Research Board, Bull.* 113, 9 pp.(1951). Tung-oil substitutes were prepared from castor oil by dehydration conducted with and without vacuum, also with and without catalysts. The castor oil used has an original I number of 84.0. The catalysts used were H_3PO_4 and H_2SO_4, Al_2O_3, SnO_2, fuller's earth, and Dhapa soil. The highest iodine number attained, 174.3, was obtained by dehydration with 1% H_3PO_4 as catalyst, under 25- to 30-inch vacuum, at 150° for 30 minutes. With liquid catalysts the viscosity decreased along with the degree of dehydration, reached a minimum when the I number was maximum and then increased owing to polymerization. The dehydrated oils were tried successfully in varnishes with Co linoleate driers. (*C. A.* 50, 6815)

Fatty-acid composition of Cololabis oil by spectrophotometric method. Y. Tsuchiya and M. Kayama(Tohoku Univ., Sendai). *Tohoku J. Agr. Research* 5, 269–76(1955). The fatty-acid composition of oils extracted from *C. saira* has been analyzed spectrophotometrically. The *n*, I value, acid value, and the fatty-acid composition by the fractionation of methyl esters were determined. Fats from fish caught in differing regions showed considerable variation in all characteristics. (*C. A.* 50, 6815)

Separation, identification, and determination of fatty acids volatile with steam. N. Coppens. *Mededel. Vlaam. Chem. Ver.* 17, 199–213(1955). Methods of separation of volatile fatty acids by steam distillation and analysis with chromatography are reviewed. Paper chromatography is recommended. (*C. A.* 50, 6815)

Molecular associations between lipides. I. Fatty acids and triglycerides. L. de Bernard and D. G. Dervichian(Inst. Pasteur, Paris). *Bull. soc. chim. biol.* 37, 943–55(1955). Characteristics of surface films of water of mixtures of myristic acid and trimyristin are discussed. (*C. A.* 50, 6814)

Analysis of crude methyl ricinoleate by partition chromotography. A. Bergier, *Compt. rend, 27e congr. intern. chim. ind.* (Brussels), 1954, 3; *Industrie chim. belge* 20, Spec. No. 681–4 (1955). The crude product obtained from the alcoholysis of castor oil was separated by partition chromatography in a silica column into 3 fractions by the use of MeOH, EtOH, and MeCN as mobile solvents; and ligroine 30–60° as eluent. The 1st fraction contained the methyl esters of oleic and stearic acids and glycerides 11.2% ± 0.7; the 2nd fraction yielded only methyl ricinoleate 82.2% ± 0.7; and the 3rd fraction contained glycerides and dihydroxy stearates 6.44% ± 1.14. This method permits a precise evaluation of methyl ricinoleate and it can be adapted to the fractionation of castor oil. (*C. A.* 50, 7013)

Absorption spectra of highly unsaturated fatty acids. T. Oikawa. *Science and Crime Detection*(Japan) 8, 3, 58–61(1955). Fat acid with acid number 175.4 and iodine number 175.4 is prepared by saponification of cuttlefish oil; fat acid is isomerized by heating with KOH-$HOCH_2$-CH_2OH of various concentrations of KOH for 5 minutes at 180°, and the absorption spectra of the product examined. Absorption coefficients longer than 2900 Å are increased with an increase of the concentration of KOH, while those shorter than 2900 Å are decreased with an increase of the concentration of KOH. (*C. A.* 50, 5402)

Studies in the Sphingolipids Series IV. Determination of the Configuration of the Amino Carbon Atom in Sphingosine. M. Prostenik, M. Munk-Weinert, and D. E. Sunko(Dept. of Chem., Medical Fac., Univ. Zagreb, and Dept. Biochem., Inst. "Rugyer Bóskovie"). *J. Org. Chem.* 21, 406(1965). The configuration of the amino carbon atom in sphingosine has been determined by a direct chemical method. On the basis of these results the D-configuration is assigned to the carbon atom 2 in sphingosine, which is in full agreement with that obtained by other authors. In connection with recent statements concerning the spatial structure of the ethylenic double bond, and the *erythro* relation of the C_2–NH_2 to C_3–OH, this investigation represents the final proof that natural sphingosine has the structure of *trans,erythro*-D-1,3-dihydroxy-2-aminoöctadecene-4.

Pyrolysis of esters. VII. Influence of acid portion. W. J. Bailey and J. J. Hewitt(Dept. of Chem., Wayne Univ.). *J. Organic Chem.* 21, 543–546(1956). In order to determine the effect of changes in the acid portion of esters on the pyrolysis, a series of twelve esters of methyl-isobutylcarbinol were pyrolyzed under identical conditions. It was found that the extent of pyrolysis is directly related to the Kα of the corresponding acid. The methyl carbonate ester was superior to the acetate in those esters that undergo serious side reactions at high temperatures. In most cases, however, the pyrolysis of the acetate is preferred for the production of olefins.

Reaction of β-carotene with N-bromosuccinimide: The formation and conversions of some polyene ketones. F. J. Petracek and L. Zechmeister(Gates and Crellin Lab., Calif. Institute of Technology). *J. Am. Chem. Soc.* 78, 1427–1434(1956). While the dehydrogenation of β-carotene, $C_{40}H_{56}$, with N-bromosuccinimide in CCl_4 solution yielded hydrocarbons, $C_{40}H_{54}$–$C_{40}H_{50}$, the use of commercial, i.e., ethanol-containing, chloroform as a solvent resulted, after dehydrobromination, in the isolation mainly of three ketones, viz. 4-keto-3′,4′-dehydro-β-carotene and lesser amounts of 4-keto-β-carotene and 4,4′-diketo-β-carotene. The structural clarification of these ketones is represented in Charts 1–3, and is based on the interrelationship with further carotene derivatives such as 4-keto-4′-hydroxy-β-carotene, 4,4′-dihydroxy- and 4,4′-dimethoxy-β-carotene, 4-hydroxy-3′,4′-dehydro-β-carotene, some alkoxy compounds, etc. A discussion of spectroscopic effects is given and some assays of vitamin A potencies are mentioned.

The market for fats in North Africa. P. Worms. *Oleagineux* 11, 155–158, 241–244, 329–334(1956). The author has a series of three articles with the first article in the March, the second in the April and the last article in the May issue of the above mentioned journal. The first article discusses the population, background, demand for fats at present and the future demand for fats in North Africa. Then the first article covers Tunesia from the viewpoint of domestic production of fats and its exports and imports of fats. The second article discusses Algeria in a similar manner. The third article discusses Morocco and at the end gives an overall summary of the economy of Tunesia, Algeria and Morocco from the viewpoint of fats.

Volatile solvents for the extraction of fats. A. Vallaud and P. Salmon. *Chimie & Industrie* 75, No. 4, 755–764(1956). The solvents for the extraction of fats may be classified into two main groups: inflammable and non-inflammable solvents. The two chief representatives of each group: B-gasoline for the first and trichloroethylene for the second, have been studied in great detail. Compared with trichloroethylene, B-gasoline has the following advantages: more selective dissolving power, no corrosive actions on metals used in extraction equipment, slightly lower thermal balance (about 15%), minimum toxicity, and lower cost. The trichloroethylene has an advantage because of its non-inflammable character and the speed of extraction may be higher than for gasoline. Finally, in warm countries, the losses by evaporation may be less with trichloroethylene than with gasoline.

Myristic acid monolayer at low surface pressures. G. P. Semeluk, J. W. V. Hahn, and J. L. Morrison(Dept. of Chem., Univ. of Alberta, Edmonton, Alberta). *Can. J. Chem.* 34, 609–616 (1956). The surface pressure-area relationships of gaseous myristic films at the air-aqueous interface have been measured at very low surface pressures. The acid was spread from petroleum ether solutions. The molecular cohesion was found to be about six times that of gaseous butane under comparable conditions. Some explanations of Moss and Rideal's "double molecule" phenomenon is given.

Antioxidants. M. Ruys. *Revue Française des Corps Gras* 3, 163–172(1956). The author discusses oxidation of fatty acids and the various antioxidants that may be used to prevent such oxidation. This article is based upon a talk given by the author before a group (Groupement Technique des Corps Gras on January 20, 1956), interested in antioxidants of use in fatty acids.

Study of the chemical discoloration of commercial tallows and of the corresponding soaps. M. Loury and C. Defromont. *Revue Française des Corps Gras* 3, 172–182(1956). The authors discuss the methods of measuring discoloration in soaps and the raw fats used to make the soaps; and, then consider some of the factors producing the discoloration. The 10 tables and 2 figures give the results of various determinations performed in their laboratories.

Recent trends in the utilization of fats and oils. Yoshiyuki Toyama(Nagoya Univ.). *Chem. and Chem. Ind.*(Japan) 6, 264–9 (1956). A review with 47 references. In Japan soap production is steadily increasing (150, 192, and 237 thousand tons in 1952, 1953, and 1954, respectively); the manufacture of surface-active agents is growing, but the absolute amount is not so large (23, 32, and 33 thousand tons in 1952, 1953, and 1954, respectively). Good soft water for laundry is easily available in Japan. Modern trends in other fields are discussed critically. It is pointed out that in Japan intensive studies must be made

on marine animal oils, rape, castor, tung, and rice-bran oils and wool fat, such as on utilization of specific fatty acids.

Tortelli-Jaffe reaction. Futara Ono and Yoshiyuki Toyama. *Research Rept. Nagoya Ind. Sci. Research Inst.* No. 8, 50–2 (1955). Dissolve 1 cc. sample oil in 6 cc. chloroform and 1 cc. acetic anhydride. Add 1 cc. 10% Br in chloroform. When the color is green, the Tortelli-Jaffe reaction is positive. This reaction was not specific for fish oils. Experiments with fish oils, their high- and low-boiling fractions, methyl esters of highly unsaturated fatty acids from sardine oil before and after heating, linseed and soybean oils, ethyl linolenate, etc. led to the conclusion that the component responsible for this reaction was conversion product from polyethenoid acids including linolenic acid.

Solid acids formed by the alkali fusion of methyl linoleate. (Preliminary report) Yoshiyuki Toyama and Yoshiaki Iwata. *Research Rept. Nagoya Ind. Sci. Research Inst.* No. 8, 48–9 (1955). The solid acids formed consisted of saturated acids (more stearic and less myristic) and conjugated linoleic acid. Thus simple Varrentrapp reaction did not occur.

Rendered oil and ether-extracted oil from the residue of rendering from the liver of Theragra chalcogramma. Yoshiyuki Toyama and Hideko Takai. *Research Rept. Nagoya Ind. Sci. Research Inst.* No. 8, 46–7(1955). The 2 kinds of liver oil were examined for *d*, *n*, acid no., saponification no. iodine no. (Wijs), fatty acid polybromide %, and unsaponifiable matter %. Other characteristics were similar, but only unsaponifiable matter content was distinctly different: the rendered liver oil contained less of it than the ether-extracted (and acetone-soluble) oil from the residue of rendering. According to the sample of liver the content was 0.81–1.40% in the former and 0.91–2.27% in the latter.

Crystalline deposit from soybean oil. Yoshiyuki Toyama and Hideko Takai. *Research Rept. Nagoya Ind. Sci. Research Inst.* No. 8, 44–5(1955). Soybean oil remains transparent even in the winter in Japan. However soybean oil of lower iodine no. (126–7) extracted with hexane from beans produced in the United States (Illinois) produced solid deposit. Fractional crystallization from cold acetone and determination of m.p., saponification no., iodine no., neutralization no. of fatty acid obtained after hydrolysis, etc. showed that the crystalline deposits consisted of small amounts of wax esters containing fatty acid higher than C_{22} and considerable amounts of diunsaturated and monounsaturated triglycerides containing stearic and higher acids as well as linoleic acid.

A new levo-rotatory alcohol in the liver oil of Paralithodes camtschatica. Yoshirô Abe(Keio Univ., Toyko). *J. Chem. Soc. Japan, Ind. Chem. Sect.* 58, 805(1955). This is $C_{12}H_{25}O\cdot CH_2\cdot CHOH\cdot CH_2OH$, m.p. 46.0–47.0°C. as revealed by chemical and physical (e.g. infrared absorption apectrum) methods.

Chemical studies of the whale body. II. Cis-Δ^{11}-n-octadecenoic acid in the baleen of Balaenoptera sibaldümusculus. Yoshirô Abe(Keio Univ., Tokyo). *J. Chem. Soc. Japan, Ind. Chem. Sect.* 58, 714–16(1955). The baleen contained 88.71% crude protein, 2.70% crude fat, and 5.63% ash on dry basis. The ether-extracted oil had acid no. 71.30, saponification no. 111.5, and iodine no. (Wijs) 93.9. This oil was saponified and octadecenoic acid was isolated. The structure was determined as in the title from *p*-bromophenacyl ester, hydrogenation, oxidation, and elaidinization.

Separation of fatty acids by formation of urea complex. III. Interchange reaction of fatty acid in urea complex. Hiroshi Sakurai(Osaka Univ., Sakai). *J. Japan Oil Chemists' Soc.* 4, 318–21(1955). More urea was contained in the linoleic acid-urea complex when urea in higher concentration was used and when cooling was more rapid. If stearic acid in benzene was mixed with linoleic acid-urea complex, stearic and linoleic acids interchanged only when the complex contained lower ratio of urea to linoleic acid. Presence of a trace of water in benzene affected this interchange.

Composition of skipper oil. I. Composition of saturated and monoethenoid fatty acids. Tohoru Hidaka and Seiichi Ueno (Kinki Univ., Osaka). *J. Japan Oil Chemists' Soc.* 4, 313–18(1955). The oil from the fish *Cololabis saira* had d_4^{15} 0.9358, n_D^{20} 1.4736, acid no. 24.6, saponification no. 183.6, iodine no. 126.4 (Wijs), unsaponifiable matter 4.14%. Solid acids comprised 22.5% of mixed fatty acids; palmitic acid was principal one (more than 60%) and stearic acid was next in the amount; C_{20}, C_{22}, C_{24}, and C_{14} acids were present. Among unsaturated acids monoethenoid ones prevailed; they were C_{18}, C_{20} (much), C_{16}, C_{22} (less), and C_{24} (slight) acids. Highly unsaturated acids were also present.

Rendering process for recovery of fat and gelatin. R. H. Sifferd and L. P. Anderson (Armour & Co.). *U. S. 2,748,152.* A process is described for rendering animal fat so as to obtain gelatin as a by-product. The comminuted animal material in the form of an aqueous slurry is heated and agitated by steam so as to liquefy the fat without hydrolyzing the collagen beyond the gelatin stage. The liquefied fat is then separated from the slurry.

Lubricating composition. P. H. Williams and L. B. Scott(Shell Dev. Co.). *U. S. 2,749,310.* A clear lubricating oil stable against phase separation consists of a mineral oil containing 0.1 to 2% by wt. each of boric acid, lecithin, and an oil-soluble 2-alkyl oxazoline compound.

Continuous hydrogenation of fatty material. V. deNora and E. de Bartholamaeis (Oronzio de Nora Impianti Elettrochimici). *U. S. 2,750,429.* An apparatus and procedure are described for the high pressure catalytic hydrogenation of fatty materials in a continuous manner.

Process for the production of molecularly modified lard. R. W. Bates, C. J. Davis, Jr., and C. E. Morris (Swift & Co.). *U. S. 2,751,304.* Lard in a liquid phase is treated with an alkaline interesterification catalyst in a continuous process. The reaction mixture is treated with hot water so as to kill the catalyst, hydrate the undesirable side products and form an emulsion. The emulsion is broken by heating to 160 to 180°F. and the aqueous phase containing the spent catalyst and side products is removed from the organic phase containing the modified lard.

Separation of solid and liquid fatty acids. N. V. Koninklijke Stearine Kaarsenfabrieken Gouda-Apollo. *Dutch 78,617.* A mixture of molten fatty acids is cooled in steps to give, in each step, a mixture of liquid and crystals which is filterable. After separation of the crystals by filtration, centrifuging, or settling, the mixture is cooled for the next step. The method is useful in the preparation of pure stearic acid from saponified raw technical fats. Compounds influencing the crystal form (habit) may be added, e.g. a mixture of asphaltenes obtained by extraction of stearin pitch with petroleum ether. (*C. A.* 50, 6819)

Separation of dibasic acids. I. Miwa and K. Ueno(Oriental High Pressure Industries Co.). *Japan 5520*('54). Oleic acid (100 g.) is nitrated with 4 times its weight of 70% HNO_3 and the oily portion removed while hot to obtain 63% HNO_3 containing dibasic acids, the solution treated with 300 g. 93% H_2SO_4, heated to 130°, and the distillate condensed to recover 200 g. (recovery 73%) HNO_3, leaving a residue containing 5% HNO_3 and dibasic acids. The residue is treated with NH_3 gas, 300 milliliters of water added to make 816 grams solution containing 285 grams $(NH_4)_2SO_4$ and 65 grams H_2SO_4, and the mixture let stand to separate 44.5 grams of a mixture of $HO_2C(CH_2)_7CO_2H$ and $HO_2C(CH_2)_6CO_2H$(6:4). (*C. A.* 50, 7126)

Separation and purification of crude dibasic acids. I. Miwa and K. Ueno (Oriental High Pressure Industries Co.). *Japan 5521* ('54). A crude dibasic acid (20 g.) containing 46% $HO_2C(CH_2)_6CO_2H$ and 54% $HO_2C(CH_2)_7CO_2H$ in 100 grams 89% AcOH is heated on a water bath, the precipitate filtered off while hot and the filtrate cooled to separate 7.75 grams crystals containing 93% $HO_2C(CH_2)_6CO_2H$ and 7% $HO_2C(CH_2)_7CO_2H$; the mother liquor is distilled to recover the AcOH, the residue in 30 milliliters of hot water let stand, the oily layer removed, and the solution cooled to obtain crystallin $HO_2C(CH_2)_7CO_2H$; the products are combined, taken up in C_6H_6 at 50°, 8.8 grams pure $HO_2C(CH_2)_6CO_2H$ filtered off, and the filtrate concentrated *in vacuo* and the residue recrystallized from water to give 9.9 grams pure $HO_2C(CH_2)_7CO_2H$. (*C. A.* 50, 7127)

FATTY ACID DERIVATIVES

The chromatography of fatty-acid anilides and accompanying problems. A. P. de Jonge(Unilever Research Lab., Vlaardigen, Neth.). *Chem. Weekblad* 52, 37–43(1956). A paper chromatographic method is described for the quantitative separation and determination of the C_1–C_{10} fatty acids in the form of their anilides. Two methods were employed for the formation of the anilides: (1) reaction of the acid mixtures with thionyl chloride followed by reaction with aniline; (2) preliminary formation of the esters followed by reaction with aniline magnesium bromide. After anilide formation, the acids were separated by the method of ascending paper chromatography. Cyclohexane was used as the mobile phase; for the ranges C_2–C_{10}, C_2–C_8, and C_1–C_6 the immobile phases 80% MeOH, 50% MeOH, and 20% PrOH, respectively, were used. The degree of separation was followed by means of ultraviolet spectrophotometry. The method is intended for use in the *d* microgram range and possesses an

accuracy and reproducibility of approximately 90%. (*C. A.* **50**, 7013)

The crystal structure of paraffin-cholic acids (fatty acids-deoxycholic acid complexes). H. Fischmeister (Univ. Graz., Austria). *Monatsh.* **85**, 182–95(1954). The model developed by O. Kratky, *et al.* of the deoxycholic acid-fatty acid complex is reexamined. On the basis of the results of a detailed structure analysis of the α-bromostearin-cholic acid complex the model is found to be correct. In the deoxycholic acid-fatty acid complex, the deoxycholic acid molecules are linked together by H bonds, but the fatty acid molecules and the deoxycholic acid molecules are held together by van der Waals-type bonds. Evidence is presented to support the idea that fatty acid molecules act as the backbone in the course of the formation of the deoxycholic acid-fatty acid complex. If the chain length of fatty acid molecules is shorter than the height of the deoxycholic acid molecules, as in formic or acetic acid, no structure, or a different structure, is assumed by the deoxycholic acid-fatty acid complex. In the case of propionic acid, only dimers of this acid can form the deoxycholic acid-fatty acid complex. (*C. A.* **50**, 6869)

N,N'-Di fatty pyrrolidinium halides. J. G. Erickson (General Mills, Inc.). *U. S. 2,748,143.* A process is described for the preparation of N,N'-di fatty pyrrolidinium halides by the reaction of a secondary C_{8-22} amine with 1,4-dichlorobutane in a low molecular weight alcohol.

Purification of acid chlorides. K. C. D. Hickman and E. E. Harris. *U. S. 2,748,151.* A crude saturated fatty acid chloride containing minor amounts of unsaturated compounds is purified by a process in which the first step is reaction with halogenating agent to give an iodine value below 1 by addition halogenation of the unsaturated impurity without substitution halogenation of the acid chloride. The resulting mixture is fractionated by distillation under reduced pressure.

Process for reducing alkyl esters of fatty acids. G. R. Wilson (Ethyl Corp.). *U. S. 2,748,175.* An alkyl ester of a fatty acid is reduced by reacting it with an alkali metal and a reducing alcohol in the presence of an inert hydrocarbon solvent and 2 to 20% of a pyridine based on the wt. of ester.

Non-lumping starch mixture. B. M. Winner (American Maize-Products Co.). *U. S. 2,749,244.* Powdered starch is mixed with a small amount of polyoxyethylene glycol monolaurate, monooleate, monopalmitate or monostearate. The resulting particles may be homogeneously dispersed in a liquid in about 30 sec. to form a smooth paste.

Dextran fatty acid ester lipstick. L. J. Novak and J. T. Tyree (Commonwealth Engineering Co. of Ohio). *U. S. 2,749,276.* A base for lipstick consists of dextran esters of saturated C_{8-18} fatty acids containing about 1 to 3 fatty acid radicals for each anhydroglucopyranosidic unit.

Composition and method for hydrophobizing textiles. D. M. Gagarine and H. Repokis (Deering Milliken Research Corp.). *U. S. 2,750,305.* Textile fabrics are made water repellent by a treatment with an ammoniacal aqueous emulsion containing 0.5 to 2% by wt. of an alkyl hydrogen polysiloxane silicone resin, 10 to 30% of the silicone resin of an ammonium salt of a C_{12-18} fatty acid, and 5 to 60% of a silicone resin of stannous hydroxide.

Mono-acyl derivatives of alkylene diamines. O. Turinsky (Armour & Co.). *U. S. 2,750,366.* Amidoamines are prepared by heating in a sealed system at temperatures of 300° or higher a mixture of C_{8-18} fatty acids, rosin acids, and an alkylene diamine having 2 to 6 carbons in the alkylene radical and 2 primary amine groups.

Complex ester base lubricating grease compositions. D. W. Young, A. J. Morway, and D. L. Cottle (Esso Research & Engr. Co.). *U. S. 2,751,351.* A complex ester-type lubricating oil is formed by the reaction of one mole of a 1,3-glycol (such as butanediol -1,3, methyl butanediol-1,3, or pentanediol-1,3) with two moles of a C_4 to C_{10} dibasic acid and two moles of a C_8 to C_{12} branched chain alcohol. A lubricating grease is prepared by thickening this oil by the addition of 2 to 20% of a lithium soap of a hydrogenated fish oil acid.

• Biology and Nutrition

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

Preliminary studies on the variations of pH and volatile fatty acid concentration of the rumen contents of the cow. M. Lampila (Agr. Research Center, Tikkurila, Finland). *Maatalous-tieteellinen Aikakauskirja* **27**, 142–53(1955) (in English). An *in vivo* technique was used to obtain pH measurements of the rumen contents of a fistula cow fed various diets. The probe used to obtain pH measurements is described. The pH values obtained were 0.15–0.65 pH units higher than those obtained in parallel *in vitro* experiments. Under normal feeding conditions the upper part of the ingesta is more acid than the lower part. The concentration of volatile fatty acids in the upper part of the rumen contents was in some cases more than 50% higher than in the lower part. (*C. A.* **50**, 7273)

Component acids and the probable glycerides of the milk fat obtained from cottonseed-fed buffaloes. V. V. Mhaskar and B. N. Banerjee (Indian Inst. Sci., Bangalore). *Indian J. Vet. Sci.* **24**, 93–104(1954). Cottonseed feeding resulted in an increase in palmitic, stearic, and oleic acids and a marked reduction in the percentages of C_4–C_{14} acids. This may be due to simple infiltration of the mixed glycerides of these acids and the linoleic acid being simultaneously bihydrogenated to oleic acid. (*C. A.* **50**, 7254)

The synthesis of dihydroxyacetone phosphate. C. E. Ballou and H. O. L. Fischer (Dept. of Biochem., Univ. of Calif., Berkeley). *J. Am. Chem. Soc.* **78**, 1659–1660(1956). A new method for the synthesis of dihydroxyacetone phosphate, as its stable dimethyl or diethyl ketal, is described. The ketal can be converted in a 95% yield to the free compound of mild acid hydrolysis. This synthesis, which makes this important glycolytic intermediate readily available as a pure substance for the first time should facilitate future studies on the role of this substrate in carbohydrate metabolism.

Persistent characteristics of the higher fatty acids from the lipides of the tubercle bacillus. C. F. Allen and J. Cason (Chem. Labs., Univ. of Calif., Berkeley). *J. Biol. Chem.* **220**, 407–414 (1956). The fatty acids from the lipides of two additional virulent strains of tubercle bacillus have been examined, and the same pattern of composition has been found as reported for strains previously investigated. The components are palmitic acid, C_{18} and C_{19} acids, and a complex mixture of dextrorotatory and levorotatory acids above C_{20}.

Enzymatic synthesis of β-D-galactosides of N-acetyl-D-glucosamine by various mammalian tissues. A. Alessandrini, E. Schmidt, F. Zilliken and P. György (Depts. of Biochem. and Pediatrics, School of Medicine, Univ. of Penna., Philadelphia). *J. Biol. Chem.* **220**, 71–77(1956). 3-O-β-D-Galactopyranosyl-N-acetyl-D-glucosamine has been synthesized for the first time upon incubation of lactose, N-acetyl-D-glucosamine, and cell-free tissue extracts from rat mammary gland, bull testes, and rat liver. The enzymatic synthesis led originally to a mixture of three isomeric β-D- galactosides of N-acetyl-D-glucosamine; namely 90 per cent of the 3-O-β-D-, approximately 9 to 10 per cent of the 4-O-β-D, and trace amounts of the 6-O-β-D-galactopyranosyl-N-acetyl-D-glucosamine. With rat mammary gland the formation of higher N-containing Morgan-Elson-positive oligosaccharides was observed.

Effect of oil in pilot plant fermentations. R. A. Anderson, E. G. M. Törnqvist, and W. H. Peterson (Dept. of Biochem., Univ. of Wisconsin, Madison). *J. Agr. and Food Chem.* **4**, 556–559(1956). Research was undertaken to determine the optimum conditions for stimulation of pencillin production by lard oil and to determine the fate of the added oil. Yields of penicillin in pilot plant fermentations were increased from 1400 to over 2000 units per ml. by intermittent addition of lard oil. The added oil lengthened the productive phase of the fermentation and maintained the pH at a more favorable level. The oil was utilized at a fairly constant rate and clearly served as a nutrient as well as a defoaming agent. The unsaturated fatty acids were used at a more rapid rate than the saturated fatty acids. The increased yields obtained in the pilot plant could undoubtedly be duplicated in large tanks, such as are used in the industrial production of penicillin.

Complexity of a chick growth response to egg yolk, animal fat, and fish solubles additions to the diet. G. H. Arscott (Dept. of Poultry Husbandry, Oregon State College, Corvallis, Oregon). *Poultry Sci.* **35**, 338–342(1956). Results are presented showing the unidentified growth factor activity of dried egg yolk, animal fat and fish solubles when added to a sucrose-soybean meal-type ration and fed to New Hampshire male x Delaware-female cross bred male chicks. Evidence is obtained indicating the complexity of the growth response obtained with the dried egg yolk supplement. The multiplicity of growth factors is discussed.

Studies on encephalomalacia in the chick. The effect of fish oil and diphenyl-p-phenylenediamine on the vitamin E metab-

olism of the chick. R. H. Bunnell, L. D. Matterson, and E. P. Singsen(Dept. of Poultry Sci., Storrs Ag. Experiment Station, Univ. of Conn., Storrs, Conn.) and H. D. Eaton. *Poultry Sci.* 35, 436–451(1956). It was proposed that DPPD may influence the metabolism of unsaturated fatty acids in such a manner as to increase their catabolism in the liver, thereby resulting in a possible decrease in the degree of unsaturation of the tissue lipids. If this premise is true, it explains the protective action of this compound against encephalomalacia, since only minimal amounts of vitamin E are then necessary for the protection of the tissues.

Complexity of the mixture of the higher fatty acids from the lipides of the tubercle bacillus. J. Cason and G. J. Fonken (Chem. Lab., Univ. of Calif., Berkeley). *J. Biol. Chem.* 220, 391–405(1956). Further investigation of the acids from tubercle bacillus, which contain more than 20 carbon atoms, has verified the extreme complexity of the mixture. Evidence has been presented for the presence of at least thirteen acids in this mixture, of which at least nine are unsaturated acids.

Feeding value of hydrolyzed vegetable fats in broiler rations. L. V. Curtin and J. T. Raper(Buckeye Cotton Oil Company, Cincinnati, Ohio) *Poultry Sci.* 35, 273–278(1956). With a 20% protein ration, approximately 3% to 4% added fat provides the maximum amount of energy that can be efficiently utilized. Higher levels of added fat did not produce any further improvement in feed utilization. Levels of added fat up to 6% of the ration had no detrimental effect on growth.

Evidence for a substance in fish solubles which enhances vitamin A storage in chick livers. R. H. Harms, A. A. Camp, B. L. Reid, E. L. Grant, B. G. Creech and J. R. Couch(Dept. of Poultry Husbandry, Texas A. and M. College System, College Station, Texas). *Poultry Sci.* 35, 285–291(1956). The supplementation of fish solubles in the diet has been shown to increase the vitamin A storage in chick livers. This increase in liver storage of vitamin A has been shown in chicks of three, four, nine and ten weeks of age. The unidentified factor(s) in fish solubles which enhances the storage of vitamin A in the liver has been found to be water soluble. The chemically determined vitamin A present in fish solubles was found to be very low in biological activity.

Diet and serum cholesterol in man: Lack of effect of dietary cholesterol. A. Keys, J. T. Anderson, O. Mickelsen, S. F. Adelson and F. Fidanza(University of Minnesota, Minneapolis). *Journal of Nutrition* 59, 39–55(1956). Two cross sectional surveys in Minnesota on young men and 4 on older men showed no relationship between dietary cholesterol and the total serum cholesterol concentration over most of the ordinary intake range characteristic of American diets. It is concluded that in adult men the serum cholesterol level is essentially independent of the cholesterol intake over the whole range of natural human diets. It is probable that infants, children and women are similar.

Effect of lipolytic activity and of mercuric chloride on the Babcock test for fat in composite milk samples. L. J. Manus and H. A. Bendixen(Dept. of Dairy Science, State College of Washington, Pullman). *J. Dairy Sci.* 39, 508–513(1956). Reductions in the fat tests of milk composites appear to be due to lipolytic hydrolysis. Mercuric chloride (in corrosive sublimate tablets) appears to increase lipolytic hydrolysis of butterfat. Twenty p.p.m. Cu, as copper sulfate, in the presence of mercuric chloride, slightly reduces the activating effect of $HgCl_2$. Heating the fresh milk to 160°F. for 30 to 60 seconds effectively prevents fat hydrolysis in composite samples preserved with mercuric chloride.

Determination of vitamin E in blood. P. P. Nair and N. G. Magar(Dept. of Biochem., Inst. of Science, Bombay, India). *J. Biol. Chem.* 220, 157–159(1956). A new color reaction between phosphomolybdic acid and vitamin E has been used in developing a method for the estimation of blood vitamin E. The method is highly sensitive and specific, concentrations up to 2 γ per ml. being estimated with ease and simplicity.

Lipid levels in migrating birds. E. P. Odum and C. E. Connell (Dept. of Zoology, Univ. of Georgia, Athens). *Science* 123, 892–894(1956). Although it is generally known that the body fat content of migratory birds increases greatly at the time of migration, few actual measurements of total lipids have been made. A third of the net weight, or nearly two-thirds of the dry weight of "overseas migrants" may be lipids, most of it in the form of huge subcutaneous and interperitoneal fat deposits. By contrast, nonmigratory species—that is, "permanent residents"—and migratory species during periods of nonmigratory activity proved to carry not more than 6 or 7 percent fat.

The effect of antioxidants and a vitamin B_{12} concentrate on the utilization of carotenoid pigments by the chicks. L. M. Potter, R. H. Bunnell, L. D. Matterson and E. P. Singsen(Dept. of Poultry Sci., Storrs Ag. Experiment Station, Univ. of Conn., Storrs, Conn.). *Poultry Sci.* 35, 452–456(1956). Two experiments were performed with chicks to determine the effect of antioxidants and vitamin B_{12} on the utilization of carotene and other carotenoid pigments. The addition of DPPD to a semipurified vitamin A-low ration with alfalfa leaf meal as the sole source of carotene produced substantial increases in the amounts of vitamin A and carotenoids in the blood plasma and liver, while the addition of BHT resulted in relatively small increases. The addition of a concentrate to supply 12 milligrams of vitamin B_{12} per ton of a practical type ration containing 64.2 per cent ground yellow corn and 5.0 per cent alfalfa meal did not promote consistent increases in vitamin A or carotenoids in the liver and blood plasma but did consistently increase the amount of carotenoids in the skin. The addition of DPPD to this ration produced small increases in vitamin A and carotenoid storages while the combination of DPPD and vitamin B_{12} produced substantial increases.

Biosynthesis of C^{14}-labeled cottonseed oil from D-glucose-6-C^{14} F. Shafizadeh and M. L. Wolfrom(Dept. of Chemistry, Ohio State University). *J. Am. Chem. Soc.* 78, 2498–2499(1956). Direct evidence is presented to indicate that in the maturing cotton boll, D-glucose (as D-glucose-6-C^{14}) is partially converted to the seed oils, possibly through breakdown by the glycolytic process.

Enzymatic synthesis of cholyl CoA and taurocholic acid. M. D. Siperstein and A. W. Murray(Lab. of Chem. Pharmacology, National Heart Institute, Bethesda, Maryland). *Science* 123, 377–378(1956). The enzyme responsible for cholic acid activation would appear to be distinct from those that catalyze the formation of coA derivatives of fatty acids, benzoic acid and *p*-aminobenzoic acid in that the intracellular distribution of the other activating enzymes and, in one case, the tissue localization as well, are quite different from that of the cholyl coA-forming enzyme. The bile acid activating enzyme is found only in the microsomes of liver.

Metabolism of essential fatty acids. Part IV. Incorporation of linoleate into arachidonic acid. G. Steinberg, W. H. Slaton Jr., D. R. Howton, and James F. Mead(School of Med., Univ. of Calif., Los Angeles). *J. Biol. Chem.* 220, 257–263(1956). Arachidonic acid from rats fed methyl linoleate-1-C^{14} was isolated as its octabromide, reduced to arachidic acid, and degraded by the non-oxidative procedure of Dauben, Hoerger, and Petersen. The distribution of the label indicates that arachidonate is synthesized in the rat by the condensation of linoleate (or one of its immediate C_{18} derivatives) with acetate.

Metabolism of cholesterol in the chick embryo. Part II. Isolation and chemical nature of two companion sterols. W. M. Stokes, W. A. Fish, and F. C. Hickey(Med. Res. Lab., Providence College, Providence, R. I.). *J. Biol. Chem.* 220, 415–429 (1956). When 12-day-old embryos are harvested 16 hours after injection with sodium acetate-1-C^{14}, 26 per cent of the digitonin-precipitable carbon activity is recovered in these two compounds, with an estimated 60 per cent in cholesterol. The structures and high specific activities of these compounds suggest that they are involved in cholesterol biosynthesis.

The effect of fats and fatty acids in chick rations. M. L. Sunde (Dept. of Poultry Husbandry, Univ. of Wis., Madison). *Poultry Sci.* 35, 362–368(1956). Representative types of inedible animal fats have been fed to chicks. Choice white grease, brown grease, prime tallow and No. 1 tallow were used in chick starting diets without deleterious effects at the five per cent level. All these materials improved feed utilization. Oleic acid, linolenic and linoleic acid did not affect the growth rate and improved feed utilization. The incorporation of five per cent hydrogenated fat or stearic acid in the diet did not improve the feed utilization. Apparently the chicks did not utilize the saturated long chain fatty acids provided by these materials. A comparison of a medium and a high energy formula was made and the addition of fat to either diet resulted in about the same improvement in feed conversion. Fatty acid fractions of crude tall oil preparations were toxic to the chicks probably because of the rosin acids which they contained. Chicks given access to feed with and without added fat ate twice as much of the feed with the added fat.

Degossypolized cottonseed meal as a substitute for soybean oil meal in a turkey growing mash. J. W. West(Mississippi Ag. Experiment Station, State College, Miss.). *Poultry Sci.* 35, 304–307(1956). Degossypolized solvent cottonseed meal was used to replace zero, 20, 40, 60, 80 and 100 per cent of the soybean oil meal in a practical-type turkey growing mash dur-

ing the period from 8 to 28 weeks. Approximately 80 Broad Breasted Bronze poults were used in each of six confinement pens that were equipped with raised slatted floors. Combinations of degossypolized cottonseed meal and soybean oil meal improved growth of the poults slightly but rather consistently over that obtained by either meal fed singly. The possibility of a complementary relationship between the two meals was thus indicated. Practical application of these findings was discussed briefly.

Vitamin A from fish-liver oils: methods of determination, units, concentrations, stability and stabilization. P. V. Creac'h. *Oleagineux* 11, 223–230, and 287–299(1956). This article discussed vitamin A from fish-liver oils from the viewpoints of methods of chemical and biological determination; units of measure; concentrations found and stability and methods of stabilization. The first of this valuable discussion is reported in *Oleagineux* 10, 801–811(1955). The total of 107 articles in the bibliography helps to show the completeness of this discussion.

Effect of ethionine on blood and depot lipids in experimental nephrotic hyperlipemia. W. Heymann and D. B. Hackel(Dept. Pediatries, Western Reserve Univ. School of Med.). *Proc. Soc. Exper. Biol. and Med.* 92, 41–43(1956). Dl-ethionine reduces the markedly increased plasma lipid concentration of nephrotic rats to normal or subnormal values within 3–5 days. The diminished liver fat values regularly noted in nephrotic rats increased to normal levels under ethionine administration while carcass fat values remain unchanged. The effect of ethionine on hyperlipemia and liver fat of nephrotic rats was noted in female as well as male rats and was not prevented by methionine. These results lend support to the view that the nephrotic hyperlipemia may be due to an inability of the liver to take up plasma lipids normally.

Studies of sebum. 6. The determination of the component fatty acids of human forearm sebum by gas-liquid chromatography. A. T. James and V. R. Wheatley(National Inst. for Medical Research, Mill Hill, London, N.W. 7). *Biochem. J.* 63, 269–273(1956). The fatty acids from human forearm sebum have been analyzed by gas-liquid chromatography of their methyl esters. Both odd- and even-numbered straight-chain fatty acids have been shown to be present as well as two types of branched-chain odd-numbered saturated acids. The principal unsatd. fatty acids contain 14, 16 and 18 carbon atoms.

Unesterified fatty acids and lipid transport in dogs. J. J. Spitzer and H. I. Miller(Div. of Labs. and Res., New York State Dept. of Health, Albany). *Proc. Soc. Exper. Biol. and Med.* 92, 124–126(1956). Plasma neutral fats and unesterified fatty acids were investigated in different conditions of increased lipid transport in the dog. During fat absorption in addition to the increase in neutral fats, unesterified fatty acid also increases. Heparin and protamine influence both transport mechanisms in the post absorptive state, the former increasing the unesterified fatty acids and decreasing the esterified fatty acids; the latter opposing this effect. Starvation for from 48 to 72 hours and acute CCl_4 poisoning raise the unesterified fatty acid level markedly. The results indicate the metabolic importance of unesterified fatty acids in lipid transport and the possible role of clearing factor in regulating lipid metabolism.

Oxidation of lecithin and sphingomyelin by tissue preparations. R. F. Witter, C. R. Shepardson, and Mary A. Cottone(Dept. Biochem., Univ. of Rochester Sch. of Med. and Dentistry, Rochester, N. Y.). *Proc. Soc. Exper. Biol. and Med.* 92, 77–80 (1956). Liver mitochondria and spleen were found to contain dehydrogenases which attacked lecithin and sphingomyelin and required ATP. Muscle and intestinal mucosa had dehydrogenase activity with lecithin or sphingomyelin if DPN was present whereas under the same conditions homogenates of spleen were active only with sphingomyelin. The dehydrogenase systems were obtained in soluble form from acetone powders of liver mitochondria or intestinal mucosa.

Heart disease and soybeans. P. S. Chen(Atlantic Union College, South Lancaster, Mass.). *Soybean Digest* 16(8), 22, 24(1956). The relationships between diet and blood cholesterol levels are reviewed briefly. The possibilities that the consumption of soybeans, lecithin and other soy products will increase at the expense of animal fats and meat products are discussed.

The relationship between chlorophyll and the carotenoids in the algal flagellate, Euglena. J. J. Wolken and A. D. Mellon(Biophys. Research Lab. of Molecular Biology, Eye & Ear Hospital and Univ. Pittsburgh Medical School, Pittsburgh, Pa.). *J. Gen. Physiol.* 39, 675–85(1956). The action spectrum for chlorophyll formation in *Euglena gracilis* was found to be similar to the absorption spectrum of protochlorophyll, and to coincide almost with that for carotenoid synthesis. Evidence is presented to support the hypothesis that two porphyrin-like systems are in operation simultaneously, one being concerned with carotenoid removal and the other with carotenoid and chlorophyll synthesis.

Fat in poultry nutrition. I. The chick from hatching to five weeks of age. A. L. Davidson(Biol. Testing Station, British Cod Liver Oils [Hull & Grimsby] Ltd., Hull). *J. Sci. Food Agr.* 7, 240–4(1956). Data are reported on the relationship between food conversion by young chicks and the total digestible nutrients to crude protein ratio in the feed. This ratio is the primary criterion in assessing the value of fat in the diet. Simple comparison of results obtained with a feed and with that feed plus fat leads to erroneous conclusions because of the high energy value of the fat. The true merits of fat in poultry nutrition can only be determined by comparing feeds of equivalent TDN:CP ratios. When that is done, high levels of fat consistently improve the efficiency of feed conversion and growth rate.

Mycological formation of fat. II. Synthesis of fat from various carbohydrates in surface cultures of Aspergillus nidulans, Penicillium javanicum and Penicillium spinulosum and the influence of the nitrogen source on the synthesis of fat from glucose. J. M. Garride and T. K. Walker(Div. Indus. Biochem., Faculty of Technology, Univ. Manchester). *J. Sci. Food Agr.* 7, 233–7(1956). Studies were made of fat production by *Aspergillus nidulans, Penicillium javanicum* and *P. spinulosum* grown on media in which one of the following carbohydrates was the only carbon source: arabinose, xylose, ribose, glucose, galactose, maltose, lactose, inulin, and starch. The greatest fat productions were obtained with xylose, glucose, maltose or inulin. Ammonium nitrate was found to be the best source of nitrogen during fat synthesis although sodium nitrate was also suitable for *A. nidulans*. Next to glucose (but exclusive of sucrose) the substrate found to be most effective for fat synthesis by these moulds was xylose. The highest rate was in *P. javanicum* which in 9 days metabolized 21.40 g. to produce 4.61 g. of felt containing 1.24 g. of fat. *A. nidulans* in the same period used 7.86 g. of xylose, and developed 3.61 g. of felt containing 0.69 g. of fat. However, the fat coefficient (g. fat/g. xylose) indicated that conversion by *A. nidulans* was more economical than that by *P. javanicum*.

III. Media conducive to formation of fat from sucrose by Penicillium soppii Zaleski in surface culture. Sheilah Murray and T. K. Walker(Div. Indus. Biochem., Faculty of Technology, Univ. Manchester). *J. Sci. Food Agr.* 7, 237–40(1956). A study was made of the effects of sodium dihydrogen phosphate, potassium sulfate, magnesium sulfate, ammonium nitrate, and corn steep liquor on the rate of fat synthesis from sucrose by *Penicillium soppii*. Best results were obtained when all of these factors were present. Optimum levels were determined. Some felts were harvested which contained slightly more than 40% of fat which was equivalent to about 12.5% of the sucrose metabolized.

• Drying Oils and Paints

Raymond Paschke, Abstractor

Non-flammable paint strippers. B. Berkeley, D Schoenholz(F. D. Snell, Inc.) and J. Adams. *Soap Chem. Specialties* 32(5), 175(1956).

An optical method for measuring film thickness of paint films. E. P. Brightwell(E. I. duPont de Nemours & Co., Wilmington, Del.). *Off. Dig.* 28(377), 412(1956).

Lecithin and its use in the paint industry. H. H. Hutt(J. Bibby & Sons Ltd., Liverpool, Eng.). *Oil Colour Chemists' Assoc. J.* 39, 399(1956). The composition, manufacture and general chemical and physical properties of commercial lecithin are described. Approximate yields of lecithin from various vegetable sources are recorded and the composition of the products is discussed.

The structures of the principal types of phosphatide (the surface-active components of lecithin) are considered with regard to the effects of constituent groupings on physical properties, especially in relation to pigment suspensions such as paints and printing inks. The examination of commercial lecithin is outlined and its uses and effects in paints and related products are reviewed.

Information is given on the application of lecithin in the industries concerned, and quantities are suggested for use in trials with various pigments for different purposes.

Recent developments in hydrocarbon resins. K. E. Jackson (Pennsylvania Ind. Chem. Corp., Clairton, Pa.). *Off. Dig.* 28 (376), 372(1956).

Anti-fouling paints progress-2. J. C. Kingcome(Royal Naval Scientific Service). *Paint Manuf.* 26, 206(1956). The mechanism is discussed.

Methods of evaluating surfactants in latex paints. F. J. Leonard(Nopco Chem. Co.). *Off. Dig.* 28(377), 441(1956).

Evaluation of synthetic latices in aqueous exterior paints. J. H. Musch(The Firestone Tire & Rubber Co., Akron.). *Off. Dig.* 28(376), 362 (1956).

Determination of the position of double bonds with the periodate-permanganate reagent. E. von Rudloff(Nat. Res. Council of Can.). *Paint Ind. Mag.* 71(4), 8(1956). Catalytic amounts of permanganate are regenerated by the periodate as used. At 20°C. no over-oxidation occurs even after 5 days' reaction time.

Esters of titanium. R. Sidlow(Peter Spence & Sons, Ltd., Widnes, Eng.). *Oil Colour Chemists' Assoc. J.* 39, 415(1956).

Fundamentals of paint, varnish, and lacquer technology. Chapter XXI—Paint troubles and how to cure them—Part 1. E. Singer(New York Univ.). *Am. Paint J.* 40(41), 80(1956).

The rheology of paint systems. N. Street(Univ. of Melbourne). *Oil Colour Chemists' Assoc. J.* 39, 391(1956). A mathematical treatment.

Developments in exterior house paints—oil type. W. G.Vannoy (E. I. duPont de Nemours & Co., Wilmington, Del.). *Am. Paint J.* 40(30), 80(1956). A discussion of pigments and mildew inhibitors.

A study of the permeability and blistering of five exterior house paints. W. R. Wirth II. *Am. Paint J.* 40(35), 72(1956). Free films of the paints used were tested, using standard permeability test procedures, in order to determine the vapor permeability of each paint.

A statistical evaluation of the data revealed no significant correlation between permeability and blistering.

Acrylic and chlorinated paraffin paints showed no significant blistering. Lead-free and standard house paints showed a high degree of blistering. A typical alkyd blister resistant paint formulation showed a high degree of blistering.

• Detergents

Lenore Petschaft Africk, Abstractor

Determination of triphosphate in commercial triphosphate and detergents built with triphosphate. H. J. Weiser Jr.(Procter & Gamble Co., Cincinnati 31, Ohio). *Anal. Chem.* 28, 477–481 (1956). Tris(ethylenediamine) cobalt (III) ion $[Co(en)_3^{+++}]$ has been shown to be a precipitant for triphosphate ($P_3O_{10}^{-5}$) ion in an acid solution. A tendency for pyrophosphate to coprecipitate was reported. Compensation for such interference is made in this method by use of a calibration curve and carefully controlled precipitation conditions. Based on analyses of mixtures containing known amounts of triphosphate, the method shows a standard deviation of 0.8% absolute. The reproducibility of the method was determined by carrying out replicate determinations on commercial triphosphate and triphosphate built anionic detergents.

Petroleum and surface active agents. Shôji Yamada(Nippon Petroleum Co., Tokyo). *J. Japan Oil Chemists' Soc.* 5, 69–77 (1956). A review with 29 references.

Future of detergent industry in relation to petrochemical industry. Toshiro Takei(Lion Fats and Oils Co., Tokyo). *J. Japan Oil Chemists' Soc.* 5, 140–4(1956). An address on production trends.

Corrosion of metals in the aqueous solutions of surface active agents. III. Jirô Mikimo, Haruhiko Tanaka, and Tôru Kusano. *Research Rept. Nagoya Ind. Sci. Research Inst.* No. 8, 53–5 (1955). A piece of soft steel (20 x 20 x 0.47 mm.) was immersed in solutions of surface-active agents and the rust formation was examined. Most agents were effective in preventing rust formation, except polyoxyethylene lauryl ether. Effectiveness of some additives (such as ethanolamines, Na salicylate, and K phthalate) was considerable. Further tests were made to examine the effect on soft steel immersed in 5 *N* hydrochloric acid.

A symposium on surface phenomena in chemical industries. Foam phenomena. Tunetaka Sasaki(Tokyo Municipal Univ.). *J. Chem. Soc. Japan, Ind. Chem. Sect.* 58, 809–14(1955). **Emulsification and solubilization.** Toshizô Isemura(Osaka Univ.) *Ibid.* 815–30. **Surface chemistry of emulsion polymerization.** Kisou Kanamaru. *Ibid.* 820–4. **Deformation and flow of surface film.** Taro Tachibana(Ochanomizu Univ., Tokyo). *Ibid.* 825–9. **Surface-chemical phenomena in lubrication.** Toshio Sakurai(Tokyo Inst. Technol.). *Ibid.* 829–34. **Application of surface active agents.** Jiro Mikumo(Nagoya Univ.). *Ibid.* 842–5. Reviews with references.

Fatty alcohols in detergents. Anon. *Soap and Chem. Specialties* 32(5) 93, 95, 97(1956). Detergents based on fatty alcohol sulfates and derivatives, such as ethylene oxide products and amides, gain greatly in surface active properties, foam stability, foam power, detergency, soil carrying properties and capacity by the presence of free fatty alcohols, or other additives.

Analysis of mixtures of surface-active quaternary ammonium compounds and polyethylene oxide type of non-ionic surface-active agents. A. Barber, C C. T. Chinnick and P. A. Lincoln (Milton Ind. Chemicals, London, Ltd.). *Analyst* 81, 18–25 (1956). For determining polyethylene nonionic agents the bromophenol blue method of Oliver and Preston has been improved by substituting phosphotungstic for phosphomolybdic acid. Two typical applications of the method are described. (*C. A.* 50, 5466)

Determination of detergency with the micro-launderometer. G. Carriere (Unilever Research Lab., Vlaardingen, Neth.). *Fette u. Seifen Anstrichmittel* 55, 448–50(1953). The equipment and its use in detergent evaluation is described. (*C. A.* 50, 7484)

Properties of the salts of primary unbranched alkyl sulfates and of their solutions with regard to their technical use. I. E. Gotte(Deut. Hydrierwerke, Dusseldorf, Ger.). *Fette u. Seifen Anstrichmittel* 56, 583–7(1954). A review with 40 references. (*C. A.* 50, 7484)

Some aspects of solvation of nonionic detergents. J. V. Karabinos, G. E. Kapella, H. J. Ferlin, and D. L. Sawhill(Blockson Chem. Co., Joliet, Ill.). *Euclides*(Madrid) 15, 243–9(1955). Nonylphenol, decanol, tetradecanol, and tall oil were condensed with ethylene oxide to give compounds containing approximately 2/3 of one oxyethylene group for each C atom in the hydrophobic portion of the molecule. Detergency (washing tests) in hard and soft water, with and without added builders, increased with increasing temperature up to 140°F., followed by a decrease at 180°F., particularly with hard water in the absence of builder. Polarimetric data indicated a parallel increase in hydration of these compounds with increasing temperature up to the cloud point, beyond which readings could not be obtained. The addition of NaCl up to 25% or phenol up to 5% concentration resulted in a progressive decrease in soil removal. Low values for soil removal were obtained when the solvent was anhydrous dioxane or MeOH; these values increased progressively on the addition of increasing amounts of water. It is concluded that both the solubility and detergency of these compounds are dependent on hydration of the polyoxyethylene units. (*C. A.* 50, 6074)

Viscoelasticity in aqueous soap solutions. N. Pilpel(Univ. of London, Engl.). *J. Phys. Chem.* 60, 779–82(1956). Aqueous solutions of sodium and potassium oleate develop viscoelastic properties when electrolytes are added. This is thought to be due to a change in the shape of the soap micelles from small, detached spheres, to long interlinked cylinders. A study has been made of the onset of viscoelasticity under the influence of electrolytes. It is shown that over a limited range of soap concentrations the law of Mass Action is obeyed and this is also true with small amounts of long chain alcohols present.

Effects of synthetic detergents on rapid sand filter performance. L. H. Sanford and C. D. Gates(Cornell Univ., Ithaca, N. Y.). *J. Am. Water Works Assoc.* 48, 45–54(1956). A series of laboratory tests are described with the alkyl benzene sulfonates as the surface-active substances. A stearato chromic chloride is used to produce a hydrophobic stearate coating on the sand. Clean and coated sand was used. In the tests described little difference in bacterial removal was noted in the results. (*C. A.* 50, 7355)

Choice of background for detergent efficiency evaluation. D. W. Stephens and C. B. Brown(Unilever Research Laboratories, Port Sunlight, Engl.). *ASTM Bull.* No. 214, 45–6(1956). This paper reports the results obtained in evaluation of detergency efficiency of four detergents by measuring the reflectance of cotton test pieces for five backgrounds. It was found that for standardization of detergency index evaluation, a white background is recommended.

Corrosive action of fluorescent bluing agents. O. Uhl. *Fette-Seifen-Anstrichmittel* **57**, 793–7(1955). The observation by Nieuwenhuis that in laundering, synthetic bluing agents derived from aminostilbene increase, in the presence of light, the corrosion of Cu and brass in washing machines was not confirmed by comprehensive tests carried out cooperatively by Unilever, Farbenfabriken Bayer, and Deutscher Wascherei Verband. The corrosive action of bleaches (0.5 g./l. active Cl) and rinses with $Na_2S_2O_3$ (0.2 g./l.) is also not affected by these agents (*C. A.* **50**, 6054)

Effects of synthetic detergents on water treatment. J. C. Vaughn, R. F. Falkenthal, and R. W. Schmidt(S. Dist. Filtration Plant, Chicago, Ill.). *J. Am. Water Works Assoc.* **48**, 30–42(1956). The nature of the problem is outlined. Efforts for removing the detergent involved the use of activated C, $Al_2(SO_4)_3$, $FeSO_4$, ClO_2, dolomite-limestone, bentonite, and many other materials including a primary amine acetate. These were used singly and in combination. The tests are described and the results plotted. Primary rosin amine acetate was most effective but cannot be used, as it is a strong skin irritant. The addition of settled sediment was most effective in removing detergents, but it soon loses that capacity. 13 references. (*C. A.* **50**, 7355)

Process for preparing detergent compositions. E. O. Korpi and D. D. Whyte(Procter & Gamble Co.). *U. S. 2,742,435.* An improved process for preparing detergents in solid granular form which do not cake on storage comprises sulfonating alkyl benzenes with an excess of a sulfonating agent, mixing the acid mixture from this reaction with a low molecular weight mono-hydroxy alcohol having from 1 to 6 carbon atoms whereby the residual sulfonating power of the excess acid remaining in the primary sulfonation acid mixture is utilized in sulfating such alcohol, neutralizing any acid left, and spray drying.

Preparation of non-dusting organic detergent compositions. R. L. Jenkins(Monsanto Chem. Co.). *U. S. 2,742,436.* A non-dusting detergent is prepared by spray drying an aqueous composition containing a normally-dusting, solid synthetic anionic organic detergent of the class consisting of sulfates and sulfonates and about 1.25% to about 12.5% by weight, based on total solids content, of a condensate of from 1 to 25 moles of ethylene oxide with 1 mole phenol.

Low foaming detergents. M. N. Fineman(Rohm & Haas Co.). *U. S. 2,746,927.* Low foaming detergents are based on mixtures of alkylphenols having alkyl groups of eight to ten carbon atoms and non-ionic surface-active agents which foam freely by themselves in one per cent aqueous solutions, including alkylphenoxypolyethoxyethanols having alkyl groups of 7 to 12 carbon atoms and having 8 to 30 ether groups and condensates of alkanols or alkylthiols having 9 to 15 carbon atoms and ethylene oxide in proportions yielding 8 to 40 ether groups.

Germicidal detergent compositions. J. L. Darragh and G. D. Johnson(California Research Corp.). *U. S. 2,746,928.* An effective germicidal detergent composition is prepared comprising as its active ingredient a major proportion of an organic anionic detergent and a minor proportion of a quaternary ammonium salt-halogen complex containing from about 0.01 to about 1.0 mols of physically-bound elemental halogen per mol of quaternary.

Synthetic detergent compositions. P. T. Vitale and Muriel E. Liftin(Colgate-Palmolive Co.). *U. S. 2,746,931.* It has been found that the simultaneous presence of higher aliphatic alcohols and of the higher aliphatic amide type compounds in minor proportions in synthetic detergent compositions of the alkylaryl sulfonate type give improved foaming and detergent properties to such compositions.

Synthetic detergent compositions. P. T. Vitale(Colgate-Palmolive Co.). *U. S. 2,746,932.* It has been found that the incorporation of minor amounts of saturated fatty alcohols of at least 14, and preferably about 16–18 carbon atoms, with alkyl aromatic sulfonate detergents are effective to achieve a significant and synergistic increase in detergency.

Manufacture of sulfate and sulfonate synthetic detergents. Colgate-Palmolive Co. *Brit. 745,189.* A bleached sulfate or sulfonate synthetic detergent is prepared by mixing a water-soluble silicate and a hypochlorite of an alkali metal with an aqueous slurry of a water-soluble salt of an organic detergent resulting in a synergistic bleaching action and a detergent with less corrosive properties and lower viscosity.

Improvements in soap compositions. Unilever Ltd. *Brit. 745,367.* A toilet soap tablet or bar which does not form insoluble precipitates in hard water consists of soap, a non-ionic detergent and a water-soluble surface-active alkali metal salt of a N-substituted amino acid such as N-coco-beta-alanine.