

Highlights of the 54th Spring Meeting -- Part II

Outstanding Technical Program Reviewed

Second and last of a series, beginning in the June issue, designed to offer a detailed review of the 54th AOCs Spring Meeting



Symposia Highlight Eight-Session Series

Forty-Two Papers Presented

Strong audience appeal, covering a wide range of subject matter, was the basic objective of E. J. Drobka in the preparation of the Technical Program for the 54th Annual Meeting of the American Oil Chemists' Society, held at the Biltmore Hotel, Atlanta, April 22-24. Success of the venture is shown in the following review. A Symposium on "Special Methods in Lipid Chemistry" highlighted the program. Such topics as X-ray diffraction, countercurrent distribution, isolation of pure fatty acids, acid-treatment flouricil, lipid composition of beef, and the sea anemone were discussed. A special program was presented by the Technical Safety and Engineering Committee.



E. J. Drobka
Technical Program
Chairman

Forty-two papers were presented at the eight technical sessions, presided over by: W. T. Coleman, R. W. Bates, R. O. Feuge, R. T. O'Connor, George Rouser, T. J. Potts, and M. H. Fowler—representing the 97 authors.

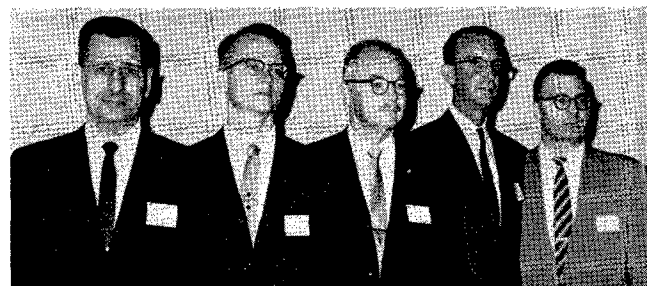
Technical Session A—W. T. Coleman, Presiding

Marked interest was shown in the papers and in the floor discussions in the first technical session, immediately following the opening business session of the Society.

J. J. Spadaro, Southern Regional Research Laboratory, reported on the results of pilot plant scale production of defatted peanuts for confectionery purposes. He demonstrated how process variables affected the taste and appearance acceptability of the product and its storage properties.

L. V. Lovegren, Southern Regional Research Laboratory, presented a theoretical explanation of the unique molding properties of cocoa butter and other confectionery fats, illustrated and supported by data obtained with dilatometric methods.

R. R. Allen, Anderson, Clayton & Co., Foods Division, reporting another in his series of studies of isomerization during hydrogenation, observed that in the hydrogenation of methyl *cis* 6-, *cis* 9-, and *cis* 12-octadecenoates, con-



OPENING TECHNICAL SESSION—W. T. Coleman, Presiding. Left to right: J. J. Spadaro, N. V. Lovegren, Mr. Coleman, R. R. Allen, and R. W. Miller.

trary to general belief, the position of the double bond with relation to the carboxyl group in long chain fatty acids did not affect the rate of hydrogenation.

R. W. Miller, Northern Regional Research Laboratory, described the fatty acid contents of oils from a wide area of unusual sources and speculated on possible industrial uses. He noted an indication of the presence of a hitherto unknown en-ynic acid, which comprises 60% of the total fatty acids in the seed oil of *Crepis foetida*.

Technical Session B—R. W. Bates, Presiding

J. J. McBride, Arizona Chemical Company, showed that all of the straight chain acids (odd and even) from C-9 to C-18 have been identified. Also C₁₄, C₁₅, C₁₆ and C₁₈ straight chain mono unsaturated acids have been found. There is evidence of the presence of C₁₃ and C₁₅ saturated iso-acids. Gas chromatography, hydrogenation and mercuric acetate adducts were used as techniques.

R. H. Stephens, Naval Stores Research Station, established a quantitative method for the measurement of the rosin acid content of maleic modified tall oil fatty acids and alkyds. A combination of preferential esterification and silicic acid column chromatography was used.



SESSION B—R. W. Bates, Presiding. Left to right: D. C. Malins, R. L. Stephens, Mr. Bates, J. J. McBride, Jr., and G. L. Feldman.

D. C. Malins, Bureau of Commercial Fisheries Tech. Laboratory, discussed reactions of acetyl nitrate with alcohol derivatives of fatty acids. Acetyl nitrate was found to be very effective for the nitration of fatty alcohols, hydroxy esters and d-glycols. The analysis of long chain nitrate derivatives of fatty acids by infrared spectroscopy and thin layer chromatography was also discussed.

Gerald L. Feldman, Baylor University, discussed the lipid composition of the human lens. This covered nor-



SESSION C—R. O. Feuge, Presiding. Left to right: T. L. Mounts, J. P. Friedrich, C. R. Scholfield, Wilma J. Schneider, E. N. Frankel, William Rosenblatt, L. D. Kirk, and Mr. Feuge.

(Continued on page 18)



Here, in proper sequence, is how your AOCS cameraman saw the speakers at the Atlanta Technical Program Sessions.

Atlanta Highlights . . .

(Continued from page 5)

mal lenses and diseased (cataract) lenses. The phospholipids were mostly saturated with palmitate being the most predominant. Oleate was the primary unsaturated acid. There was an increase in cholesterol in the diseased lenses. A diabetic cataract showed marked amounts of a C-17 acid and linolenic acid.

Technical Session D—R. T. O'Connor, Presiding

Dr. Carter Litchfield opened the session with an interesting report of the separation of *cis-trans* fatty acid iso-



SESSION D—R. T. O'Connor, Presiding. Left to right, lower row: C. C. Litchfield, R. S. Cooper, M. E. Ginn, and A. M. Mankowich. Top row: V. K. Babayan, Hans Kaunitz, E. W. Maurer, and Mr. O'Connor.

mers by gas chromatography, using nitrile silicone capillary columns. Discussing research conducted at the Department of Biochemistry and Nutrition, Texas Agricultural Experimental Station, with Raymond Reiser and A. F. Isbell with the collaboration of G. L. Feldman, Institute of Ophthalmology, Baylor University College of Medicine, on the use of polymers of dimethylsiloxane and beta-cyanoethylmethylsiloxane for the separation of geometric isomers of methyl oleate, methyl linoleate and methyl linolenate, Dr. Litchfield showed that a polymer of beta-cyanoethylmethylsiloxane was the most efficient. With this stationary phase and columns 200 ft in length and 0.01 inch inside diameter at 200C., oleate was separated from elaidate, the four geometric isomers of linoleate were resolved into three peaks, and the eight geometric isomers of linolenate into six peaks.

The next three papers dealt with detergents. R. S. Cooper and Allen Urfer from Victor Chemical Division, Stauffer Chemical Company, described physical and surface active properties of sodium salts of monoalkyl dihydrogen phosphate and dialkyl hydrogen phosphates and an evaluation of these materials for use in built detergents. Electrophoretic mobilities and zeta potentials were developed for triolein, nujol, and glass particles in aqueous detergent solutions by M. E. Ginn, R. M. Anderson, and J. C. Harris at the Monsanto Chemical Company. Mr. Ginn reported the relative effects of anionic and non-ionic

surfactants, concluding that electrokinetic effects are important for dispersion and emulsification, but not necessary nor sufficient conditions for removing oily soil from glass. A third paper on detergency was a further report of study of a linear detergency—miscellar solubilization function which has been proposed by the U. S. Army Coating and Chemical Laboratory, Aberdeen Proving Ground.

Two papers reported nutritional studies conducted collaboratively by the Drew Chemical Corp. and the Department of Pathology of Comparative Medicine, Columbia University. V. K. Babayan, Drew Chemical, described experiments conducted in cooperation with H. Kaunitz and C. A. Clanetz of Columbia, on the nutritional effects of glycerol esters of peanuts and cottonseed oils ranging from diglycerols to triconata glycerols fed to weanling male rats. Except for the triconata glycerol, all were completely utilized during the first week and from 80-90 utilized during succeeding weeks. At least 95% of the materials was absorbed. Animals fed lard, tetraglycerol hydrogenated cottonseed oil ester, and decaglycerol peanut oil and cottonseed oil esters had almost the same weights and were significantly heavier than those fed a fat-free diet. No deposition of polyglycerols was found in the depot fat. Dr. Kaunitz reported use of medium chain triglycerides in human diet. Saturated triglycerides ranging from C₆ to C₁₀ were used in treatments of obesity. Only rarely was the fat not well tolerated. Within three months, weight losses from 3-30 lb were recorded and serum cholesterol levels were lowered from 10-90 mg%.

E. W. Maurer concluded the session with a description of the preparation and properties of α -phosphono fatty acids at the Eastern Utilization Research and Development Division, ARS, USDA, with colleagues A. J. Stirton,



TECHNICAL SAFETY AND ENGINEERING COMMITTEE, left to right: H. M. Betzig, W. F. Bollens, A. Cool, and M. E. Woodworth.

Waldo C. Ault, and J. K. Weil. Details of the preparation of the α -phosphono fatty acids of chain lengths 9, 10, 12, 14, 16, and 18 and of their methyl, isopropyl and amyl esters were described and the properties of these compounds compared to the corresponding α -sulfo compounds.

Special Program—Technical Safety and Engineering Committee

Answers to the recent questionnaire on areas of interest were summarized: Solvent extraction—engineering and de-





sign; solvent refining of vegetable oil—engineering and design; handling of liquified petroleum gases—safety aspects; and hydrogen production—engineering and design. Plans are in progress for talks on these subjects at the Fall Meeting in Minneapolis. Miscella refining and hydrogen production is already scheduled.

M. E. Woodworth, Secretary, Flammable Liquids Committee of the NFPA, spoke on the Engineering Aspects of Normal and Emergency Venting for Tanks Containing Flammable Liquids. He reviewed the practices now being used and showed slides on tests made on storage tanks containing gasoline under actual fire conditions. The subject of venting is being restudied by the Sectional Committee responsible for this phase, and there will be some changes made in present standards. This committee is also studying the subject of venting tanks containing solvents and they hope to publish a revised standard within the next few months. It was noted, however, that the amount of venting required is dependent upon the possible amount of solvent-wetted surface exposed to a fire; whether or not the tank is protected by an automatic water spray system; and also whether or not the tank is insulated. Mr. Woodworth also remarked that it is hard to understand why many plants install solvent storage tanks above ground in a

inside of conveyors, elevators, and other equipment with methyl bromide about once every two weeks. Equipment must be shut down before fumigating. A relatively inexpensive fumigating system consists of a tank of methyl bromide located at a central spot and permanently installed manifold copper tubing connecting the tank to equipment requiring fumigation.

Earlier Payouts Through Tight Project Scheduling and Control was the subject of a paper presented by H. F. Betzif, Austin Co. Since money invested in new facilities is idle until a plant is in satisfactory production, management must be careful to minimize the time between the decision to build a new installation and its successful operation. Time-saving and, therefore, money-saving approaches were discussed as follows: efficient approval and decision-making techniques of management; need for well-defined project specifications; use of an experienced plant-location organization; need for competent and experienced design, procurement, and construction personnel; overlapping design, procurement and construction activities through careful planning; value of a turnkey contract with undivided responsibility; and use of various documents, schedules, and controls, including critical path and procurement analysis.

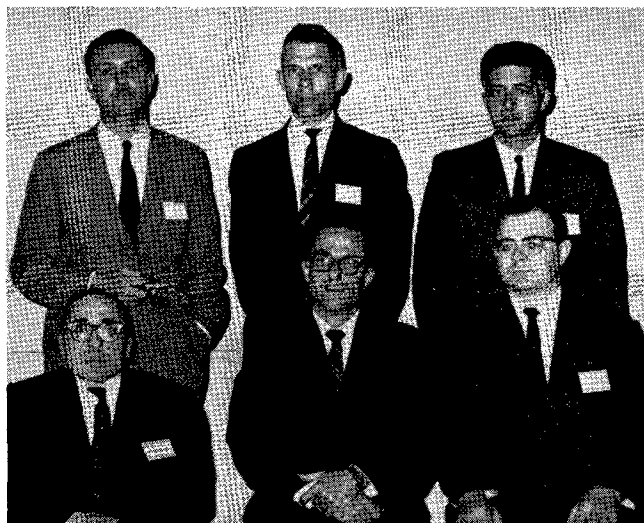
D. T. Mitchell, A. E. Staley Co., acted as leader on the question of safety in connection with the neutral oil determination, which is being proposed as a substitute for refining loss as a basis for soybean settlements. Since considerable quantities of ethyl ether are used, the handling and evaporation of this material without the formation of explosive mixtures becomes of prime importance. With the explosive range quite wide (1.7–48.0%), adequate ventilation must be provided. Recommended were: a ventilating hood under which the test is carried out; a spark-proof fan and explosion-proof electrical equipment; the heat source for evaporation should be a steam bath, also done under a hood. Detonations and their prevention should also be considered when working with ethyl ether. Further investigation will point up what cautions are required.

Technical Session E—George Rouser, Presiding

The Symposium on *Special Methods in Lipid Chemistry* brought together a number of relatively complex but useful methods and the results of their application to various problems in lipid chemistry. The Symposium emphasized new and original investigations carried out by the speakers and included literature reviews.

Nicholas Nicolaides, Department of Biochemistry, University of Oregon School of Medicine, described the use of X-ray diffraction for the study of urea and thiourea adducts of lipids. After presentation of a general introduction to methods for the formation of adducts and the use of X-ray diffraction, original work using X-ray diffraction of urea aducts of squalene to demonstrate the all trans nature of this biologically important substance was described. The X-ray diffraction patterns of adducts of fatty acids with substituents along the carbon chain were then shown to be useful for placement of the exact position of the substituents. This was illustrated by work on hydroxy palmitic acids (hydroxyl groups in positions 2 through 16).

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SYMPOSIUM: SPECIAL METHODS IN LIPID CHEMISTRY—Session E, George Rouser, Presiding. Standing, left to right: F. A. Vandenheuvel, K. K. Carroll, and D. G. Therriault. Seated: Nicholas Nicolaides, Dr. Rouser, and Nicholas Pelick.

horizontal position. Vertical tanks would be less costly to install, and would expose less surface in the event of fire.

A. E. Cool, Asst. Brewmaster, Carling Brewing Co., stressed the importance of housekeeping and sanitation control in the efficient operation of food processing regulations. He recommended a sanitarian for each plant, whose responsibility would be to see that each department is doing its job in keeping the plant clean and sanitary. To control vermin within equipment, it is necessary to fumigate the



(Continued from page 19)

D. G. Therriault, Army Institute of Environmental Medicine, reviewed general applications of countercurrent distribution to problems in the lipid field and described new procedures for the fractionation of brain lipids by countercurrent distribution.

Nicholas Pelick, Applied Science Laboratories, State College, Pennsylvania, described general methods for the preparation of extremely pure fatty acids suitable as standards for precise quantitative gas-liquid chromatography. The use of distillation, fractional crystallization, and other techniques to obtain appropriate concentrates prior to preparative gas-liquid chromatography was emphasized. Preparative gas chromatography as a major tool for obtaining standards suitable for gas-liquid chromatography was stressed as well as the necessity for use of other column chromatographic techniques as aids in the preparation of some very pure products. The necessity for control of the purity of the product by gas-liquid chromatography and paper and thin layer chromatography was made clear. Some impurities (including oxidation products) are not released from GLC columns but may be detected readily by thin layer chromatography and removed from the product by liquid-liquid or liquid-solid chromatography. The very large amount of work required for the preparation of very pure fatty acid standards and some C¹⁴-labeled lipids was readily apparent from this presentation.

K. K. Carroll, Department of Biochemistry, University of Western Ontario, described the preparation of a very coarse mesh silicic acid from commercial magnesium silicate (Florisol) by removal of the magnesium with hydrochloric acid. This coarse mesh silicic acid can be used for column chromatography as a substitute for commercial silicic acid preparations and has the advantage of giving very fast flow rates. The application of the new type of silicic acid to separations of liver and brain lipids indicated that separations similar to those obtained with commercial silicic acid are to be expected from the new preparation.

George Rouser, Department of Biochemistry, City of Hope Medical Center, described two new approaches to the quantitative chromatographic fractionation of complex lipid mixtures and the application of these approaches to the study of the lipid composition of beef brain, beef liver, and the sea anemone. The new approaches both involved the use of DEAE cellulose columns. The simplest approach involves fractionation of a complex lipid mixture on DEAE cellulose followed by paper and thin layer chromatographic examination of the fractions. The second and more extensive procedure involves the initial fractionation of a complex lipid mixture on DEAE cellulose columns followed by complete fractionation of the mixtures obtained from DEAE on silicic acid or silicic acid-silicate columns. A relatively complete analysis of beef brain lipid was reported, using the second procedure and about 98% of beef brain lipid was accounted for by characterized products with approximately 2% of uncharacterized acidic lipid remaining. The application of the simplest procedure to beef liver lipids demonstrated the presence of a variety of new, uncharacterized lipids and indicated the superiority of the new procedures over previous methods. The application of the more extensive multi-column procedure to the study of sea anemone lipids disclosed the presence of several new lipid classes. The isolation and complete characterization of a new lipid, ceramide aminoethylphosphonate, was described. This interesting new sphingolipid has a free amino group and a direct carbon to phosphorus bond. This is the first reported example of a phospholipid occurring in nature that has the usual C-O-P bond replaced by a direct C-P bond as well as the first isolation of a sphingolipid with a free amino group.

F. A. Vandenheuvel, Department of Agriculture, Ottawa, described new techniques for the construction of lipoprotein models. The general use of orthogonal projections in molecular model studies was described and various principals used to arrive at most probable configurations and

(Continued on page 43)

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SESSION F—T. J. Potts, Presiding. Left to right: J. R. Swartwout, J. R. Taylor, R. L. Gregory, E. T. Haebeler, and Mr. Potts.

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(Continued from page 39)

confirmations of molecules in such complex structures were considered in detail. A stepwise analysis from the simplest to the most complex type of structure terminated in the presentation of a molecular model for the myelin sheath.

Technical Session F—T. J. Potts, Presiding

Session F was essentially an analytical program by authors who displayed a thorough knowledge of their subjects. Triglycerides were measured using glass paper chromatography and elatography plus the unique method of nuclear magnetic resonance. Research men working with the epoxy and cyclopropanoid fatty acids were provided with a method of analysis. The lack of such an analysis has retarded some research in this field. The TBA method of measuring oxidative rancidity in fish oil was perfected at Oregon State University. Another report covered a quick plant control estimate for optimum alkali to be used in the alkali refining of vegetable oils which should prove valuable to the refining industry. The last report covered a relatively simple method of measuring soaps in the presence of free fatty acids that was developed at the ERRL.

Technical Session G—M. H. Fowler, Presiding

At this final session, a series of five papers on preparation and composition of fatty acids and fatty acid derivatives held the attention of a good audience to the very end.

R. A. Eisenhauer, Northern Regional Research Laboratory, described the preparation of cyclic fatty acids from the linolenic acid in linseed fatty acids. Cyclization to a 1,6 substituted 6 carbon ring in the chain was carried out at high temperature and controlled pH in the presence of sodium hydroxide and glycol solvent. Separation of the hydrogenated product by crystallization from acetone was reported. Extrapolated commercial costs of the process were presented.

The laboratory preparation of 9-trans, 12-trans-octadecadienoic acid from safflower fatty acids was described by Carter Litchfield of Texas Agricultural Experimental Station. HNO_2 was the catalyst of choice because it produced less side reactions than selenium and was easily removed from the product.

New information on the mechanism of ozonization of monoethenoid fatty acids and other simple olefins was presented by O. S. Privett of The Hormel Institute. Ozonizations of the methyl oleate were carried out at -65°C in pentane and methylene chloride and ethyl acetate.

D. H. Wheeler, General Mills Central Research Laboratories, used the mass spectrograph to demonstrate the structure of non-ring dimer acids prepared from methyl oleate. He said that dimerization is a coupling of the expected free radical forms rather than the splitting of the intact oleate molecule by the attack at its double bond by a free oleate radical.

Charles F. Krewson, Eastern Regional Research Laboratory, discussed the purification of the epoxy fatty acid fractions recovered from the oil of the seeds of *Veronia Anthelmintica*. This was an extension of previously reported work with this same oil. Purity of the isolates was demonstrated by thin layer chromatography.



SESSION G—M. H. Fowler, Presiding. Left to right: Mr. Fowler, D. H. Wheeler, R. A. Eisenhauer, O. S. Privett, C. F. Krewson, and C. C. Litchfield.

JAOCs wishes to express its deep appreciation to those presiding officers who reported on the Technical Sessions of this Annual Meeting. The foregoing highlights would have been impossible without their fine assistance.



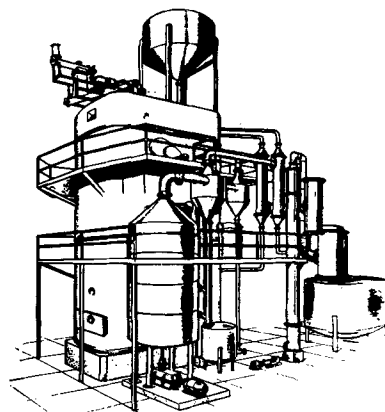
The Smalley Committee finds time in a busy schedule for a meeting. Left to right: D. J. Dowling, W. J. Johnson, P. D. Cretien, R. C. Pope, E. H. Tenent, Sr., K. A. Kuiken, F. D. Mathis, and G. C. Henry. Report begins on page 298.

• Obituary

A. C. Laughton (1947), Chairman and Managing Director of The Peerless Refining Co., Ltd., Liverpool, England, died in May, 1963.

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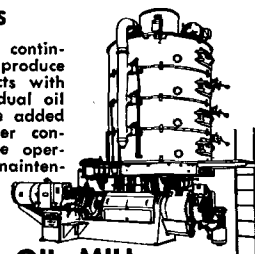


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