SESSION A SPEAKERS, MONDAY—J. D. Lindsay, program chairman for the Houston meeting, is flanked on the left by Audrey T. Gros and on the right by Joan Hoffmann; standing are R. F. Paschke, E. F. Carlston, A. D. Payne, and A. J. Stirton.

Summary of 45 Papers Shows Program Values

FORTY-FIVE EXCELLENT TECHNICAL PAPERS were presented in concurrent sessions at the 47th Annual Meeting of the American Oil Chemists' Society held in Houston, Tex., April 23–25, 1956. The technical program was organized by J. D. Lindsay of the A & M College of Texas. Presiding at the six technical sessions were T. H. Hopper, W. D. Harris, H. E. Robinson, Carl Lyman, W. A. Peterson, and H. E. Seestrom, respectively.

The technical sessions were opened by Dupuy Bateman Jr., vice president of Anderson, Clayton and Company, who pointed out that although most people rightly regard the natural laws of science as inexorable, there are many who advocate the violation of the natural laws of human relations and economics. The effects of violating these natural laws, while not always immediate, are inevitable and usually have disastrous consequences. An example is the present farm surplus and its depressing effect on farm prices, which was caused by the governmental farm price support program. In closing, Mr. Bateman stated that the only salvation from war, destruction, and the forces of evil lies in developing greater respect for all of God's natural laws.

Highlighting the technical program was a symposium on the timely subject of "The Nutritional and Health Value of Fats in the Diet." Dr. Robinson of Swift and Company asserted that there were many statements, unfounded on facts, that were being made regarding the nutrition of fats in the diet. Present research in the metabolic field of fats, particularly as they relate to such abnormalities as atherosclerosis, are inadequate, confusing, and contradictory. He pointed out that there are many recognized causes of atherosclerosis, of which excess cholesterol in the blood stream is only one. Also it was shown that cholesterol occurs in all animal cells and is synthesized by the body even if no food fats containing cholesterol are ingested.

In a paper reporting a study of the digestion of acetylated monoglycerides, N. D. Embree of Distillation Products Industries reported that the mode of digestion is the same for ordinary fats and acetylated monoglycerides. High levels of acetylated fats were fed to laboratory animals with satisfactory results. The nutritional aspects of acetylated fats are of great importance in the development of these fats for human consumption.

R. S. Harris of the Department of Food Technology of the Massachusetts Institute of Technology outlined the functions of fats and oils in the diet and made the following important points. Fats act as carriers of essential fat-soluble nutrients. Fats increase the palatability and satiety values of meals and extend the time a meal remains in the stomach, thus delaying the development of hunger. All common food fats are highly digestible and, calorie for calorie, are no more fattening than carbohydrates, starches, and proteins.

In comparing the caloric requirements of fat, protein, and carbohydrate diets to maintain weight, Hans Kaunitz of the Department of Pathology and The Institute for Research in Animal Diseases at Columbia University found that high protein and high fat diets lowered the caloric requirements for weight maintenance. In addition, a study was made of the comparative nutritive value of fresh and autoxidized fats, which showed that fresh fats have a protective effect against the toxicity of autoxidized fats. This indicates that fresh fat is an essential nutrient. The study continues to see if chemically altered fats can reduce the efficiency of body utilization and still maintain the essential nutrients.

F. A. Kummerow of the Department of Food Technology, University of Illinois, in reporting the results of a study of the nutritional properties of various heated fats stated that except for butter oil there was a reduction in nutritional value after heating. The other oils tested were corn oil, cottonseed oil, coconut oil, and margarine oil. The oils were thermally oxidized by heating in the presence of oxygen at 200°C. for 24 hrs. It was reported that the heat stability of an oil depends upon the degree of unsaturation and the triglyceride structure. The effects on the animal of the heated fat were not permanent as a switch to a diet of fresh fat improved growth response.

In the ensuing discussion it was pointed out by Dr. Robinson that the edible oil industry should promote research on the nutrition of fats with regard to obesity, degenerative heart disease, and heated fats. This is needed to offset unfavorable public reactions to fats based on incomplete and often misleading data. When questioned, Raymond Reiser said that there are not enough data to relate fats in the diet to the level of cholesterol in the blood stream and thus to atherosclerosis although it should be kept in mind that all of the facts are not in.

THERE were eight papers presented on refining, degumming, and related analytical methods. In a review of cottonseed oil degumming J. K. Sikes of the Plains Co-operative Oil Mill at Lubbock, Tex., reported on a successful method of miscella degumming, also on the development of a laboratory method better suited to determining the refining loss of degummed cottonseed oil. In another paper, presented by W. D. Harris of the Cottonseed Products Research Laboratory of the Texas Engineering Experiment Station, the economics of the degumming process were discussed in relation to cottonseed oil gums as a source of lipid materials for adding to solvent processed cottonseed meals.

A comparison of various types of centrifuges for degumming, refining, and water-washing vegetable oils was presented by A. M. Gavin of Podbielniak Inc. The operation of a Duozon installation was described. A most interesting paper describing a novel method of refining soybean oil with acetic anhydride was presented by Hans Wolff of the A. E. Staley Manufacturing Company. This process is claimed to have economic advantages over alkali-refining in that over-all oil loss is reduced, no soapstocks are produced, and the deodorizer distillate obtained is potentially more valuable than soapstocks.

SESSION B SPEAKERS, MONDAY—In the front row are M. M. Mattikow, W. D. Harris, chairman, and T. A. Pickett; standing are Hans Wolff, J. H. Benedict, M. F. Stansbury, and J. K. Sikes.

SMALLEY WINNERS — Ranged in the Shamrock-Hilton lobby are E. R. Hahn, R. C. Pope, Horace Keith, and J. D. Neighbors (front row) and O. E. Wilkins, K. E. Holt, and (for L. R. Brown) P. W. Bateman (back row).

G. C. Cavanagh of the Rancher's Cotton Oil Company, presented an interesting paper, describing a new integrated process for the continuous production of high quality meal and salad oil from vegetable source-material. Some of the advantages of this process are the production of a dust-free solvent meal, the production of a light-colored, soap-free refined oil with low Baumé lye, and the continuous production of a solvent-winterized oil, giving yields and cold tests comparable to conventionally winterized oil. The elapsed time between seed in storage and deodorized salad oil in storage is only 18 hrs. at a production rate of 80,000 lbs. of salad oil per 24-hr. day. The oil is protected from light and air throughout the process, and the finished salad oil is protected by nitrogen in storage.

Three papers were concerned with analytical methods related to refining. A new method presented by Morris Mattikow of Refining Uninc. has been developed for the determination of total alkali in a sample of oil-alkali mixture, using a direct potentiometric titration with sulfuric acid. The method is sufficiently rapid to serve as a convenient control of the proportioners in continuous refining processes. A conductivity method for the determination of soap in refined vegetable oil was described by Howard Goff Jr. of the Sharples Corporation. A rapid alkali-wash method of refining cottonseed oil for the refined oil color determination was presented by B. D. Deacon of the Cottonseed Products Research Laboratory. Good agreement was obtained with the A.O.C.S. Official Method. The new method is rapid, requires simple techniques, and requires less oil than the official cup method.

FIVE interesting papers were presented on the subject of food antioxidants and the related subject of methods used for testing the oxidative stability of fats and oils. It was reported by M. E. Doyle of the Shell Chemical Corporation that butylated hydroxytoluene incorporated into paperboard was found to be particularly effective in prolonging the shelf life of food products packaged in such paperboard. The paperboard treated with BHT had remarkably good color and odor stability. As a means of comparing the effects of various types and concentrations of antioxidants on the oxidative stability of fats, an oxygen absorption method, using a modification of the ASTM bomb, was found to give more reproducible results than either the AOM stability test or the Schaal Oven Method according to W. M. Gearhart of Eastman Chemical Products. Another oxygen absorption apparatus designed to handle samples of sufficient size for taste panel evaluation of oxygenated fats and fatty foods was described by C. D. Evans of the Northern Utilization Research Branch. The activity of a new class of antioxidants, the reductones, was also reported. These compounds gave outstanding results in preventing oxygen absorption but were not so effective in flavor protection. They were not nearly so effective as BHA in the carry-through of antioxidant properties in baked products.

A new method of comparing antioxidant activity on an equimolar basis in terms of "catechol" units was reported by G. J. Miller of the Department of Biochemistry, Purdue University. This provides a quantitative measure of the relative effectiveness of various antioxidants. Several relationships between the structure and antioxygenic activity of phenolic antioxidants were pointed out. In another paper presented by Dr. Miller tests showed that position was more important than the nature of alkyl groups in substituted phenols in influencing antioxidant potency for lard.

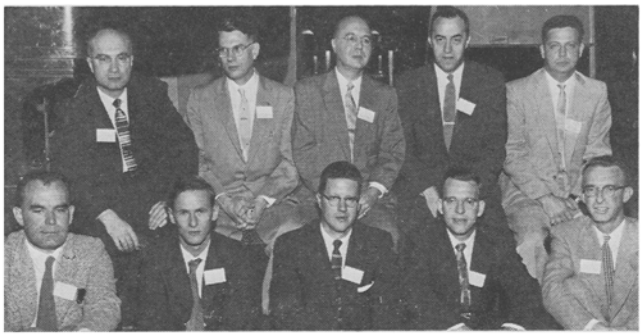
Several papers described interesting properties and characteristics of oil seeds. One study reported by M. F. Stansbury of the Southern Regional Research Laboratory involved the relations of oil, nitrogen, and gossypol content of cottonseed kernels from the seed of eight commercial varieties of cotton grown at 13 locations during three years. The ratio of nitrogen to gossypol was found to be negatively correlated with the oil content of the kernels. The effects of seasonal variation on the unsaturated and saturated glyceride content of Spanish peanuts was presented by T. A. Pickett of the Georgia Experiment Station. These were found to be practically constant over a wide range in weather conditions during four growing seasons. Two papers were presented concerning sesame seed technology. A wet mill method for the determination of oil in sesame seed was presented by J. M. Dendy of the Texas Research Foundation as a more adequate analytical procedure than present methods. In another paper evidence was presented by E. R. Ibert of the Texas Agricultural Experiment Station that there is a good correlation between the germination rate of sesame seed and the free fatty acid content of the oil recovered from the seed. A potentially valuable development was presented by Joseph Pominski of the Southern Regional Research Laboratory describing the satisfactory application of the filtration-extraction process on a bench scale to yield crude castor oils either meeting color specifications for a grade No. 1 oil or susceptible to bleaching to such a color. Solvent meals with residual lipids of 1.5% or less were obtained.

Four papers were given on the utilization of vegetable oils in resins and plasticizers. A general review of the modification of epoxy resins with drying oils and their fatty acid derivatives was presented by R. E. Dunbar of the Shell Chemical Corporation. Emphasis was placed on the commercial practicability of these coating vehicles from economic as well as performance viewpoints.

SESSION B SPEAKERS, TUESDAY—C. M. Lyman, chairman, at the podium is shown with V. L. Frampton *(left)* and B. P. Baliga.

NEW DEVELOPMENTS in isophthalic alkyd resins modified with oils derived from oil seeds as well as from tall oil were reported by E. F. Carlston of the California Research Corporation. Comparison of paint films made from isophthalic alkyd resins and phthalic anhydride alkyds shows that significant improvements are obtained in drying characteristics, flexibility, hardness, color and gloss retention, and alkali resistance with the isophthalic alkyds. Thermal stability was also improved. The reaction of acrylonitrile and fumaronitrile with butyl alpha- and beta-eleostearates obtained from tung oil was described by Mrs. Joan Hoffmann of the Southern Regional Research Laboratory. A comparison of the plasticizer properties of the adducts was given, which showed the fumaroanitrile adducts to be superior as primary plasticizers although the acrylonitrile adducts were satisfactory when used as secondary plasticizers with tricresyl phosphate. In a paper presented by R. F. Paschke of the General Mills Research Laboratories the aromatization of methyl linoleate in the presence of palladium as a catalyst was described.

Two studies of the nutrition of cottonseed meal were presented. One paper presented by V. L. Frampton of the Southern Regional Research Laboratory showed a good correlation between the nutritive value of the meal and the solubility of the cottonseed proteins in 6-Normal hydrochloric acid. A procedure was presented by B. P. Baliga of the Texas Agricultural Experiment Station whereby bound or inactivated gossypol



SESSION A SPEAKERS, WEDNESDAY — On the floor, from the left, are H. K. Mangold, K. U. Ingold, E. E. Macdonough, M. E. Doyle, R. R. Allen; behind are Raymond Reiser, C. D. Evans, W. A. Peterson, chairman, W. M. Gearhart, and Glenn Miller.

could be removed from cottonseed meal without the application of heat which might damage the protein. The removal of bound gossypol increased the nutritional value of the protein as determined by several tests.

Mr. Paschke also presented a novel use of fatty acid still pitch as a soil conditioner to improve the water-holding capacity of heavy clay soils. The soil-conditioning capacity of pitch was found comparable to that of the synthetic polyelectrolytes at only 15% of the cost. Further studies are needed to determine effective life in the soil and toxicity to plants. A. J. Stirton of the Eastern Regional Research Laboratory presented a comparison of the detergency of several combinations of synthetic detergents made from animal fats.

A very interesting paper was presented by C. W. Hoerr of Armour and Company concerning the physical structure of margarine. Mr. Hoerr advanced the theory that margarine is not a water-in-oil emulsion in the commonly accepted sense but is rather a polyphase colloidal dispersion of globular fat and droplets of water in a continuous phase of plastic fat. The texture, consistency, and melting characteristics of margarine were related to variations in the physical structure. From these studies Mr. Hoerr concluded that the manner of processing margarine has a far greater influence upon its structural characteristics than do variations in the oils used in its manufacture.

E. E. MacDonough of Chas. Pfizer and Company presented a comparison of the various coloring ingredients used in fatty food products. The color stabilities of the various coloring ingredients under various conditions of storage were discussed as well as a comparison of heat stabilities in frying oils and in baked goods. Information was presented on FD&C Yellows 3 & 4, natural and synthetic Beta-Carotene, annatto extractives, and ethyl bixin.

A continuance of the study of isomerization during hydrogenation was presented by R. R. Allen. In a study of the hydrogenation of methyl eleostearate it was found that the addition of two moles of hydrogen to the eleostearate produced equimolar quantities of 13, 12, 11, 10, and 9 monoenes.

SESSION B SPEAKERS, WEDNESDAY—At the edge of the swimming pool for an outdoor shot are *(seated)* E. R. Ibert, A. M. Gavin, H. E. Seestrom, chairman, A. K. Smith, and P. H. Eaves; *(standing)* H. E. Goff, J. M. Dendy, B. D. Deacon, and G. C. Cavanagh; *(in rear)* S. P. Clark, A. H. Burner, and Joseph Pominski.

A STUDY of the physical properties of aceto- and butyro-oleins, mono-olein, and di-olein was presented by Miss Audrey T. Gros of the Southern Regional Research Laboratory. Refractive indices, densities, melting points, points of transition from one polymorphic form to another, expansibilities in the solid and liquid states, and specific volume changes accompanying the transformations were reported.

Two papers were presented dealing with new analytical methods. H. K. Mangold of the Hormel Institute presented the results of the application of a paper chromatographic method for the separation of fatty acids, esters, alcohols, and glycerides to several specific problems. J. H. Benedict of the Procter and Gamble Company presented a method for the determination of trace quantities of ethylene oxide, ethylene glycol, and diethylene glycol in copra products. It was reported that deodorization of coconut oil removes all traces of ethylene oxide used in the fumigation of copra.

An example of the value of statistical experimental design was presented by S. P. Clark of the Cottonseed Products Research Laboratory. All of the steps taken to set up an experiment on cleaning cottonseed were described. The statistical procedures used enabled some small effects to be definitely determined that would not have become apparent with non-statistical procedures.

Recent developments in screw-press operations were reviewed by Andy Burner of the French Oil Mill Machinery Company. Mr. Burner reported that screw-press operations have been improved by the development of extension cages which increased the over-all time of drainage by 40%. This has resulted in a considerable reduction of the residual oil content in cottonseed meal.

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The first Arabic convention and the first Arabic exhibition for oils, soaps, detergents, and related products will be held October 12–15, 1956, at Cairo, Egypt, with the exhibition continuing to November 2. Correspondence should be addressed to the Egyptian Oil and Soap Technologists' Association, 23 Midan El Tahrir, Alexandria, Egypt.