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70 speakers honored

Seventy speakers at the AOCS annual meeting held this past May have been cited for presentation of "outstanding papers."

Session chairmen nominated the speakers on the basis of each paper's technical quality, delivery and visual aids. Each speaker selected will receive a certificate from AOCS. The award is designed to encourage improved preparation and delivery of papers during the annual meeting.

Speakers selected in Dallas, and their topics, are:

J.R. Brooks, Clemson University, Clemson, SC, "Current Aspects of Soybean Fractionation and Nomenclature."

N.C. Nielsen, Purdue University, West Lafayette, IN, "The Structure and Complexity of 11S Polypeptides in Soybeans."

R.N. Beachy, Washington University, St. Louis, MO, "Biosynthesis and Processing of Soybean 7S Seed Storage Protein."

W.E. Marshall, Kraft Research & Development, Glenview, IL, "Evaluation of Some Physiochemical Properties of Chemically Modified Soy Glycinin."

A.M. Hermansson, The Swedish Food Institute, Goteborg, Sweden, "Gelation of Soy Proteins."

J.B. German, Cornell University, Ithaca, NY, "Characterization of the Film and Foaming Properties of Soy Protein Fractions."

S. Nakai, University of British Columbia, Vancouver, Canada, "Effects of Hydrophobicity, Charge and Molecular Structure on Solubility of Soy Proteins."

C.N. Pace, Texas A & M University, College Station, TX, "Effort of Protein Conformation on Proteolytic Digestibility."

O.S. Privett, The Hormel Institute, Austin, MN, "Quantitative Analysis of the Triglyceride Species of Vegetable Oils."

L.S. Silbert, USDA Eastern Regional Research Center, Philadelphia, PA, "Analysis of Alkynes and Alkynoic Acids by Ozone or Ruthenium Oxide Oxidation."

B.L. Madison, The Procter & Gamble Co., Cincinnati, OH, "Automated Solid Fat Content Measurement Using a Microcomputer-Controlled Robotic System."

J.D. Craske, Unilever Australia Ltd., Balmain, NSW, Australia, "The Application of Very High Accuracy GC Analysis as an Aid to Fast and Reliable Control of Oil Refinery Operation."

B. Babecki, Foxboro Canada Inc., La Salle, Quebec, Canada, "What Operations Management Should Know About Process Control."

R.R. Freeman, Hewlett-Packard, Avondale, PA, "Recent Advances in Fused Silica Column Technology."

M.L. Lee, Brigham Young University, Provo, UT, "Capillary Supercritical Fluid Chromatography."

R.D. Smith, Battelle Pacific Northwest Laboratories, Richland, WA, "Analytical Applications of Supercritical Fluids: Capillary Column Chromatography and Mass Spectrometry."

W.F. Lehnhardt, A.E. Staley Mfg. Co., Decatur, IL, "Analysis of Trypsin Inhibitors in Soy Products: Evaluation of Methodology and Improvements."

D.J. Sessa, USDA Northern Regional Research Center, Peoria, IL, "Are Toasted Soybean Flour Proteins Responsible for Trypsin Inhibitor Activity?"

K.A. Wilson, State University of New York, Binghamton, NY, "Proteolysis of Trypsin Inhibitors During the Germination of Legume Seeds."

L.G. Butler, Purdue University, West Lafayette, IN, "Recent Developments in the Assay and Characterization of Tannin in Sorghum Grain."

K.J. Prusa, University of Missouri, Columbia, MO, "Interaction Between Sodium Salts of Chloride, Phosphate and Nitrite and Turkey Muscle Proteins."

L.A. Berner, Cornell University, Ithaca, NY, "Effect of Protein on Iron Bioavailability."

E. Schweizer, Universität Erlangen Nürnburg, Germany, "Genetic Studies on Yeast Fatty Acid Synthase."

P.E. Kolattukudy, Washington State University, Pullman, WA, "Uropygial Gland Fatty Acid Synthase."

H.W. Sprecher, Ohio State University, Columbus, OH, "Incorporation and Metabolism of Long-Chain Polyenoic Fatty Acids by Platelets."

A. Sevanian, University of Southern California, Los Angeles, CA, "Membrane Cholesterol Oxidation and Cholesterol Epoxide Formation."

M. Jacobson, USDA Beltsville Agricultural Research Center, Beltsville, MD, "Neem Seed as A Natural Source of Pesticidal Compounds."

S. Lien, Solar Energy Research Institute, Golden, CO, "Algae as Sources of Oil."

A. Christophe, The Hormel Institute, Austin, MN,

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"Effect of the Chemical Form or the Mode of Administration of Essential Fatty Acids on Their Further Metabolism."

T.M. Rothgeb, The Procter & Gamble Co., Cincinnati, OH, "Analytical ^{14}N-NMR Spectroscopy of Quaternary Amines."

R.S. Cohen, Autoclave Engineers Inc., Erie, PA, "High-Pressure Equipment Selection and Capital Cost Considerations in the Design of Supercritical Extraction Pilot Plants and Commercial Units."

V. Krukonis, Phasex Corp., Nashua, NH, "Supercritical Fluid Fractionation of Fish Oils—Concentration of Eicosapentaenoic Acid."

A.C. Beynen, Agricultural University (Wageningen) and State University, Utrecht, The Netherlands, "Hypercholesterolemia Induced by Dietary Casein in Rabbits: Involvement of the Amino Acid Composition and Structure of Casein."

D.A. Diersen-Schade, Iowa State University, Ames, IA, "Tissue Cholesterol Concentrations of Young Pigs Fed Beef, Soy and Conventional Diets."

L.S. Walsh, Iowa State University, Ames, IA (Honored Student Presentation), "Plasma Cholesterol and Lipoproteins and LDL Clearance in Miniature Swine Fed Fats and Proteins of Vegetable and Animal Origin."

L. Uphouse, Texas Woman's University, Denton, TX, "Neurally Mediated Components of the Reproductive Failure Following Exposure to Persistent, Chlorinated Pesticides."

J.Y. Oldshue, Mixing Equipment Co., Inc., Rochester, NY, "Fluid Mixing Effects in Hydrogenation."

C.T. Zehnder, Cherry Burrell, Louisville, KY, "Physical Refining: A Puzzlement."

A. Tirtiaux, S.A. Fractionnement Tirtiaux, Fleurus, Belgium, "Winterization of Selectively Hardened Soybean Oil."

D.R. Taylor, Kaiser Aluminum & Chemical, Pleasanton, CA, "A Chlorophyll-Selective Bleaching Clay: Contrast in Chlorophyll Removal from Soya and Canola Oil."

C.M. Christensen, Monell Chemical Senses Center, Philadelphia, PA, "Effect of Color on Flavor Judgements of Food."

R.M. Saunders, USDA Western Regional Research Center, Albany, CA, "Preparation, Composition and Utilization of Rice Bran Oil and Its Potential Exploitation from Stabilized Rice Bran."

A.Ø. Utvik, Stord Bartz a.s., Bergen, Norway, "Modern Fish Oil and Meal Processing."

M.L. Shuler, Cornell University, Ithaca, NY, "Prospects and Problems in the Large Scale Production of Metabolites from Plant Cell Tissue Cultures."

B. German, Cornell University, Ithaca, NY, Cocoa Bean Cell and Embryo Culture."

L.H. Jones, Unilever Research, Sharnbrook, England, "Novel Palm Oils from Cloned Palms."

K.I. Mehta, Anderson Clayton Foods, Richardson, TX, "Production of Protein and Volatile Fatty Acids in the Fermentation of Blackstrap Molasses by *Eubacterium Rumantium.*"

T.J. Ahern, Massachusetts Institute of Technology, Cambridge, MA, "Plant-Derived Catalysts and Precursors for Use in Prostaglandin Synthesis."

L.H. Posorske, Novo Laboratories, Inc., Wilton, CT, "Industrial-Scale Application of Enzymes to the Fats and Oils Industry."

S.L. Neidleman, Cetus Corporation, Emeryville, CA, "Further Aspects of Wax Ester Biosynthesis by *Acinetobacter* Sp. H01-N."

N.C.C. Gray, University of Western Ontario, London, Ontario, Canada, "Role of Nitrogen in a Multiorganism Strategy for Biosurfactant Production."

L. Kravetz, Shell Development Company, Houston, TX, "Effect of Surfactant Structure on Stability of Enzymes Formulated Into Laundry Liquids."

D. Kochavi, Novo Laboratories, Wilton, CT, "Use of Enzymes to Improve Wash Performance at Low Temperatures."

M.K. Nagarajan, B.F. Goodrich Chemical Group, Avon Lake, OH, "Evaluation of Multi-Functional Benefits of Polyacrylate Polymers in Detergent Compositions."

E.C. Donaldson, University of Oklahoma, Norman, OK, "How Capillary Pressure Affects the Production Well."

T.C. Ryan, Michigan State University, East Lansing, MI (Ralph G. Potts Fellowship) "Oxidation of Cholesterol in Heated Tallow Systems."

J.W. Hagemann, USDA Northern Regional Research Center, Peoria, IL, "Computer Modeling of *a*- and *B*-Form Phase Transitions Using Theoretical Triglyceride Structures."

G. Kapusta, Southern Illinois University, Carbondale, IL, "Uses of Soybean Oil in the Application of Herbicides."

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R.W. Fulmer, Cargill Inc., Minneapolis, MN, "Trends in the Industrial Use of Vegetable Oils in Coatings."

E.J. Neufeld, Washington Unviersity, St. Louis, MO, "Role of Arachidonoyl-CoA Synthetase in Eicosanoid Precursor Uptake and Release."

H.W. Sprecher, Ohio State University, Columbus, OH, "Incorporation and Metabolism of Long-Chain Polyenoic Fatty Acids by Platelets."

J.M. Johnston, University of Texas Health Science Center, Dallas, TX, "The Regulation of Arachidonate Release and Human Parturition."

R.L. Wykle, Bowman Gray School of Medicine, Winston-Salem, NC, "Interrelationships in the Metabolism of Platelet Activating Factor and Arachidonic Acid in Neutrophils."

R.S. Sadowski, WEI, Woburn, MA, "How Successful is IBP's Dual Bed FBC?"

J.T. Farnsworth, Texas A & M University, College Station, TX, "An Economic Analysis of Milling Cottonseed with Different Residual Linters Contents."

D.T. Downing, University of Iowa, College of Medicine, Iowa City, IA, "Analysis of Waxes from Vertebrate Skin."

J.R. Sargent, Institute of Marine Biochemistry, Aberdeen, United Kingdom, "Analysis of Wax Esters in Marine Organisms."

H. Benson, Shell Development Co., Houston, TX, "The Development of an Optimized Heavy-Duty Liquid Containing Fabric Softener."

M.F. Cox, Conoco Inc., Ponca City, OK, "Interactions Between LAS and Nonionics."

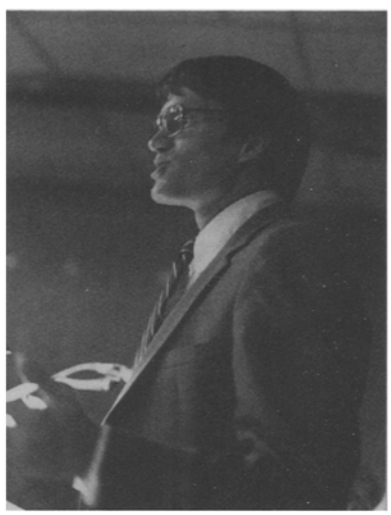
K.W. Dillan, Union Carbide Corporation, Tarrytown, NY, "Effects of Ethylene Oxide Distribution on Nonionic Surfactant Properties."

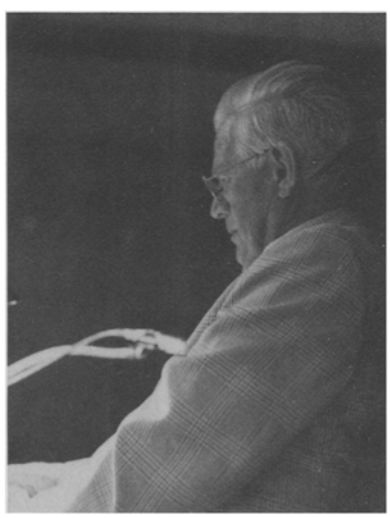
North Central meeting dates set

The North Central Section of the AOCS will begin its 1984/85 program year by meeting with the Chicago area chapter of the candy technologists society on Tuesday, Sept. 11, 1984.

Other tentative meeting dates through next spring are:

* Wednesday, Oct. 31, 1984, technical meeting.
* Tuesday, Dec. 11, 1984, technical meeting.
* Tuesday, Feb. 5, 1985, A.E. Bailey Award meeting.
* Tuesday, March 19, 1985, all-day symposium.
* Monday, April 23, 1985, social event.
* Monday, May 21, 1985, technical meeting and election of officers for 1985-86.





Norcal Summer Meeting

Ed Seguine (upper right), director of research and development for Guittard Chocolate Company, was speaker for the July 20 meeting of the Northern California section of the AOCS. Seguine described chocolate manufacturing from raw materials to finished products, including descriptions of the various confectionary fats and how they are used. Keith Boomer, lower right, is president of the NORCAL section. In the photograph at upper left are (from left) Prof. Jorge Mancini Filho of the University of Sao Paulo in Brazil, Dr. and Mrs. Lloyd Smith and Dr. and Mrs. John Bruhn. Smith and Bruhn are staff members at the University of California at Davis. The other two photographs show some of the persons who attended the meeting. Next meeting for the section is scheduled for Friday, Oct. 12, 1984.

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President's Club and Honor Roll

The members listed here have qualified for the 1984-85 AOCS President's Club or Honor Roll. Members who recruit at least one new member qualify for the President's Club; those recruiting 3 or more qualify for the Honor Roll. President's Club and Honor Roll members receive recognition at AOCS annual meetings. Forms for use in recruiting new members are available from AOCS Headquarters, 508 S. Sixth St., Champaign, IL 61820 USA.

Three

R.G. Krishnamurthy
M.D. Meiners
W.H. Tallent

Two

R.K. Arundale
M. Eijadi
F.H. Fryer
A.M. Gavin
H.P. Gormley
E.R. Hahn
H.A. Martin
F.C. Naughton
J. Nelson
W.C. Smith
L-S Wei
F.B. White
D.R. Worley

One

J. Beare-Rogers
S.G. Brooker
G.D. Brueske
J.R. Carroll
J. Chavez-Peraza
A.S. Csallany
J.W. Ebeling
L. Eyres
C. Farner
T.R. Fields
T.A. Foglia
L. Gildenberg
B.A. Greenwell
R.R. Hahn
H.L. Haynie
R.T. Holman
S.E. Jewett
R.W. Johnson
F.X. Kicken
K-Y Lai
T.K. Mag
R.J. Malley
T.P. Matson
L.D. Metcalfe
T.L. Mounts
E.J. Parker
N. Pelick
E.G. Perkins
J.B. Rattray
K.C. Rhee
H.H. Seifert
C-S J. Shen
F.C. Shook
P.W. Sleggs
I. Taussky
K.T. Zilch

New Members

The following persons had applied for membership in the American Oil Chemists' Society through mid-July 1984. If an applicant was invited to membership by an AOCS member, that member's name appears in parentheses at the end of the listing. The President's Club and New Member listings are published bimonthly.

Fouad Abdelrhem Ahmed, Giza Egypt Faculty of Agriculture, Cairo, Egypt.
Parroquín José Barrera, Industrias Parrmal S.A., Mexico City, Mexico.
John E. Blount, Pilot Industries of Texas, Houston, Texas (Shook).
Albert H. Bolger, Eagle Picher Industries Inc., Naperville, IL.
Johann Brandt, S.A. Oil Mills Ltd., Randfontein, South Africa.
C. Philipp Brundrett, W.R. Grace, Davison Chemical Division, Baltimore, MD.
Kathleen A. Bushue, Humko Products, Champaign, IL.
Walter M. Cheek III, W.R. Grace, Davison Chemical Division, Baltimore, MD.
Teoh C. Chuan, Sumitomo Corp., Kuala Lumpur Branch, Jalan Punchak, Kuala Lumpur, Malaysia.
Richard A. Clark, Central Soya Co. Inc., Fort Wayne, IN (Mounts).
Mark J. DeBaker, Anamax Corp., Green Bay, WI (Taussky).
Peter J. DeRosa, Lever Bros. Co., Edgewater, NJ.
James G. Elliott, Ralston Purina Co., St. Louis, MO.
Flavio Finardi Filho, Fac. Ciencias Farmaceuticas, Sao Paulo, Brazil (Shen).
Ileana Granados, CARE-Costa Rica, San Jose, Costa Rica (Wei).
William J. Graves, Eagle Picher Industries Inc., Cincinnati, OH (Ebeling).
Shyam K. Gupta, Armour-Dial, Scottsdale, AZ.
Shaw-Lin Han, Colgate-Palmolive Co., Piscataway, NJ (Lai).
Dale E. Holcomb, Ag Processing Inc., St. Joseph, MO (Nelson).
Laura U. Huston, Environmental Protection Laboratories Inc., St. Cloud, MN (Hahn).
Takashi Iwama, Nippon Oil & Fats Co. Ltd., Philadelphia, PA (Foglia).
Rashida A. Karmali, Cook College, Rutgers University, New Brunswick, NJ.
Lloyd M. Kunimoto, Calgene, Davis, CA.
Robert G. LaBarge, The Dow Chemical Co., Midland, MI.
Leopold Loeb, General Electric Co., Louisville, KY.
José E. Lopez, S.A.I.M., Montevideo, Uruguay.
Stephen A. Mann, Emery Industries, Cincinnati, OH (Zilch).
Ted P. Matson, Vista Chemical Co., Ponca City, OK.
Larry G. Melinsky, Environmental Protection Laboratories Inc., St. Cloud, MN.
Arlene W. Molly, United States Chemical Corp., Watertown, WI.
Frank C. Morley, Unichema Chemicals Inc., Paramus, NJ (Eijadi).
Deborah M. O'Day, Swift/Hunt Wesson Food Co., Fullerton, CA (Kichen).
Chris B. Petersen, A.E. Staley Manufacturing Co., Decatur, IL (Carroll).
Daniel P. Pugh, J. Bibby Edible Oils Ltd., Liverpool, England.
Elizabeth L. Pugh, University of Ottawa, Ottawa, Ontario, Canada.
Mohamed Rahmani, University of Minnesota, St. Paul, MN (Csallany).
K.J. Rashmawi, Henkel Corp., Kankakee, IL.
Guillermo Reyes, Proyectos Estudios y Asesoría, S.A., Panama City, Panama (Wei).
Eric Rothschild, Best Foods, CPC International Research & Engineering Center, Union, NJ (Martin).

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Thomas E. Russell, University of Arizona, Cotton Research Center, Phoenix, AZ.
Louis J. Scarfo, Recan Associates, Huguenot, NY (Meiners).
Richard J. Schomaker, Oldsmobile Division, General Motors, Lansing, MI.
Kenneth C. Scott, BASF Wyandotte, Wyandotte, MI (Parker).
H. Verity Smith, Geneva, Switzerland.
Christopher C. Stogsdill, Hudson Farms, Westville, OK (Worley).
Anton A. Vacinek, Ag Processing Inc., St. Joseph, MO (Nelson).
Peter D. Vail, USDA, Eastern Regional Research Center, Philadelphia, PA (Pelick).
Fernando A. Valente, Deten – Detergentes Do Nordeste S.A., Rio de Janeiro, Brazil.
Sharon C. Webster, Best Foods, Union, NJ (Martin).
Adie H. White, Henkel Corp., Hoboken, NJ (Smith).
Michael J. Wint, Church & Dwight Co. Inc., Piscataway, NJ.
Gordon Winward, Kaipara Edible Oils Refinery Ltd., Auckland, New Zealand (Eyres, Brooker).
Judy M. Worley, A&A Laboratories Inc., Springdale, AR (Worley).

Focus

The American Oil Chemists' Society was founded as an association of cottonseed product analysts, but today its membership comprises researchers in an array of disciplines whose link is their origins in fats and oils. During the past 75 years, the changing interests of AOCS members have been reflected in the content of the organization's publications.

Until the mid-1800s, the majority of U.S. edible fats and oils came from animals in the forms of butter, lard and edible tallow. While cottonseed was recognized as a potential source of oil and meal in the late 1700s, it was not until the invention of the linter, huller and separator during the 1850s that the cottonseed industry really began to develop. The industry grew rapidly in the last two decades of the 19th century, creating a need, in the early 20th century, for standardized analytical methodology.

The oil was used largely for making soap or for adulterating other fats. The hulls were used for fuel and the cake for fertilizer. A method of deodorizing cottonseed oil and removing the oxidized flavor was perfected around the turn of the century. This deodorized oil soon replaced olive oil on the market. Winterizing was being developed in laboratories about this time, resulting in high grade salad oils.

The Interstate Cotton Seed Crushers' Association formed after meeting July 16, 1897, in Nashville, Tennessee, and formally incorporated in 1898. Its purpose was to "protect and promote" the industry's producers and customers. In 1909, the year AOCS was founded, there were 321 mills owned by approximately 200 firms which belonged to Interstate. (In 1983, there were 62 mills represented in the membership of the National Cottonseed Products Association, as Interstate is now named.)

According to Bailey's book, *Cottonseed and Cottonseed Products,* published in 1948, 179 million pounds of cottonseed oil were used for cooking and baking in 1911-1912, and 446 million pounds were used in lard compounds. These two uses accounted for two-thirds of the cottonseed oil consumed in the U.S. that year. For the remainder, soap-making accounted for 19%, salad oil for 9%, margarine for 3%, sardine packing for 1% and other uses for 1%.

In 1917, the society began publishing technical papers and society meeting reports in a "Chemists' Section" in Interstate's publication, *Cotton Oil Press.* A July 1917 Chemists' Section article reported, "The Society of Cotton Products Analysts has been a very important factor in the development of the cotton oil industry during the past eight years. Its members and committee have given unstintingly of their time, and often of their means, in research work and cooperative work on methods of analysis. Some of its members have made trips to Washington to the Bureau of Standards and spent much time in conference on the methods being developed there for the color-reading of refined oils. These have been labors of love and have been without expectation of reward. The society, through its members, has worked unselfishly for the advancement of the industry of which it is a part. It was in recognition of these things that the Interstate Cotton Seed Crushers' Association specified that only analytical certificates of our members could be recognized by Arbitration Committees."

It was not long before society officials realized cottonseed was only a part of their future. One indication was the growing interest in soybeans. Although soy oil was introduced commercially to the U.S. between 1910 and 1919, there was little interest initially in growing soybeans as a source of oil and meal. Instead, they were grown for fodder and soil improvement. Most soy oil at this time was imported as crude oil and used for industrial purposes–soft soaps and paints–or refined and deodorized for such edible purposes as shortening and margarine.

The demand for soy oil and for all food grade and industrial oils increased dramatically following the outbreak of World War I. According to D. S. Bolley of Baker Castor Oil Company in a speech at AOCS' 50th anniversary meeting, "When the first gasoline engines were made, castor oil was rated as a 'par excellent' lubricating oil, combining high viscosity with a flat viscosity-temperature curve and low cold test. It was particularly valuable for the airplane engines used in World War I. All of us 'old-timers' remember the peculiar odor from the early racing automobiles as a result of the castor oil used." Meanwhile, America's main oilseeds–cottonseed and linseed–became even more scarce and expensive than they were before the war, with the boll weevil an important factor in reducing cottonseed supplies. During the war, large supplies of oil were needed to make glycerine for nitroglycerine, used in explosives.

About this time, the hydrogenation process was

commercialized, leading to a rapid increase in the use of hydrogenated vegetable oil for shortenings and margarine.

Most of the first soybeans crushed in the U.S. were handled at existing cottonseed mills.

"Peanuts, soybeans, copra and sesamum are all being crushed in cottonseed oil mills," a January 1918 Chemists' Section article reported. "It behooves the members of the Society to collect all the data possible concerning these materials and their products for discussion at the next convention. New methods for refining and testing their oils must inevitably be adopted sooner or later and we must be prepared. We believe that in the near future the crushing of cottonseed will occupy only a part of the attention of the Southern oil mills instead of their entire attention as in the past. The 'Cotton Oil Chemist' must, therefore, enlarge the field of his endeavors and fit himself for the greater demands made upon his knowledge and skill."

It was this recognition of other fats and oils that prompted the society to change its name to the American Oil Chemists' Society in 1920.

"While it is true that the majority perhaps are interested primarily in the cottonseed oil business, we already include within our ranks several chemists of the soap, paint and other technical branches

Margarine 'Interloper' successful despite obstacles

The production of margarine in the U.S. was greeted with dismay by hog producers and dairymen who saw this "interloper" as a threat to their lard and butter sales. Their opposition led to the Federal Oleomargarine Act of 1886, the first in a series of legislative actions to restrict or tax margarine sales on the federal and state levels.

In the 1920s, legislation was enacted imposing a 10 cents a pound tax on artificially colored margarine. J. S. Abbott of the Institute of Margarine Manufacturers wrote in a March 1926 article that such taxes "would of course be equivalent to an outright prohibition of the manufacture and sale of margarine." On Oct. 1, 1929, the government began collecting this tax on "artificially colored cooking compounds and nut shortenings."

Another effort to limit margarine sales and tax them further came in 1931 after the Bureau of Internal Revenue permitted the use of palm oil in margarine. This was a proposal to tax all yellow margarine.

Testifying before the U.S. House of Representatives Committee on Agriculture, David Wesson said, "I have listened with great interest to the talk which has been going on before your committee about the matter of color in butter and in margarine. There are one or two points, however, which have not been brought out. The color of natural butter varies from white in the wintertime from cows fed on grain, cottonseed hulls, straw and hay, to a beautiful golden color which you find in the June butter coming from cows fed on green pastures. It is a well known fact . . . that the white or nearly white butter of winter-fed cows is low in vitamins whereas the rich yellow June butter is richest in these important constituents. It is also a well known fact that the butter from Guernsey cows as a rule is richer in this golden color with which such vitamins are known to be associated than is the butter made from cows of scrub breeds fed on inferior food. Since I have been before this committee I have frequently heard the talk of a fraud, in connection with the use of yellow coloring used in oleomargarine. It has been stated by competent witnesses that leaving the nutrition question on one side . . . butter from . . . cows in June has a high vitamin value and for that reason is a more valuable food than the butter from winter-fed cows. Why in the name of common sense and fairness should the latter product be colored to imitate the more desirable June butter any more than the equally deficient margarine? The American consumer is going to be defrauded in one case just as badly as in the other. I know from the questions I have heard the gentlemen of this committee ask that they are opposed to fraud. Why then do they not see that justice is done in a case like this by taxing all artificially colored products whether made by the margarine manufacturers or the dairy farmers?"

Dr. Harvey Wiley, author of the Pure Food Law in the 1920s, also spoke on the issue. "While I believe in the largest possible consumption of milk and milk products, compatible with the purchasing power of our people, I fail to see either justice or dietary security in saying that the fats of other animals shall not be made and sold, provided no fraud is committed in the process. The same is true of vegetable oils. They are farm products. They have the same right to an open market as other oils and fats. . . . I have no objection to allowing a tax of 10 cents a pound on oleomargarine that is artificially colored, provided all fats that are artificially colored are included in the list. It is the discrimination of one kind of fat against another to which I must raise my voice in protest."

The bill, which took effect June 3, 1931, set a 10 cents a pound tax on all yellow margarine, not just artificially colored products.

Margarine's fight in the marketplace continued in one form or another for years. In 1950, the Federal Margarine Act abolished the former restrictions on the sale of colored margarine. But, it was not until much later that some states took similar action. In 1963, Minnesota finally legalized the sale of colored margarine while Wisconsin, the last hold-out, waited until 1967.

of the oil and fat industries," the first issue of the *Journal of Oil & Fat Industries* reported.

During these early years, AOCS members did extensive work to solve the difficulties in grading oil for color characteristics, standardizing laboratory refining procedures and achieving accuracy in chemical analysis. Its Referee Board was established in 1920 to maintain a high standard of performance among referee chemists.

In his 1924 president's address, H. B. Battle said Interstate officials "have decided to print in the Annual Rules Book of the Association the names of its Official Chemists, classifying them according to the lines in which they are certified. This will be a most direct and complete recognition of the American Oil Chemists' Society by the Interstate Association, and brings before all a very definite understanding of just what constitutes Official Chemists. . . . The Society is to be congratulated upon this very important recognition, and the further clarification of a very uncertain status in the past."

"Progress Through Fellowship," an editorial in the May 1930 journal, claimed, "The advance in quality of products produced and the reduction of operating costs which have been achieved in the milling and refining of oils, and in the manufacture of shortening, margarine, mayonnaise and allied products in this country during the past 20 years can be credited at least 85% to the American Oil Chemists' Society. The quality of analytical control work has been elevated to a plane of accuracy equal, if not superior, to that of any other branch of industry, and this has been achieved solely through the cooperative work between members and other oil and feed chemists, which work was started, fostered and developed, and is still continued by the Society."

In the 1920s, cotton was still the leading source for textile fiber and oil in the U.S. Meanwhile, scientists in Germany were working on a new technology—using solvents—to extract oil from Manchurian soybeans. At this time, American oilseeds were crushed in mechanical presses, although there were some batch solvent extraction efforts, including work on cottonseed. "Wesson and others used petroleum solvent under both low and high pressure between 1910 and 1925," according to an account in the September 1948 journal. The article noted that although these processes satisfactorily extracted oil, they caused mechanical difficulties, solvent losses and high operating costs. It was not until the 1940s that the U.S. oilseed industry converted to solvent extraction.

In a commentary, "The Vital 50 Years of the Oil and Fat Industry," published in 1959, A. E. (Doc) MacGee wrote, "Of signal importance to the oil and fat industry was a refinement in the processing of natural gas and crude oil that made

available solvents in tank-car quantities which had a quality beyond all previous experience in the petroleum industry. These extra pure, low-boiling industrial naphtha fractions, which permitted the preparation of oils and meals without foreign taste or odor, made it possible for the large-volume, continuous solvent extraction process, that began about 1930 in the United States, to achieve immediate commercial success and grow continuously until today the solvent extraction process is firmly established throughout the soybean, cottonseed, corn-germ, peanut, flaxseed, and other industries."

Journal articles of the 1920s reflect the topics of interest to the industry at that time. A 1926 article, for instance, focussed on Chinese wood oil, or tung oil. It reported, "For 15 years experiments have been made in an attempt to grow the tung oil in the United States and to find a suitable climate for its propagation." A report of AOCS' Seed Committee in 1926, meanwhile, called attention to a modification by Charles H. Cox of J. Malowan's method of treating cottonseed lint fibers with hydrogen chloride to make them friable and easily ground. Cox solved the problem of charring during exposure by fuming the seed in an oven with hydrochloric acid absorbed with porous earthenware pots containing the samples. This method, reported in detail in the April 1926 journal, later became the basis of the Official Method of Analysis and Grading Plan of the U.S. Department of Agriculture and was used in establishing the value of the cottonseed crop marketed.

In a 1928 article, "The Organic Oil Industry—The Romance of a Waking Giant," James H. Collins wrote, "If you buy a cake of soap in Chicago, it may be made from animal fat by-products of the packing industry. Bought in Paris, it may be made from coconut oil, in London from soybean oil, in Copenhagen from fish oil, in Barcelona from olive oil. Or it may be made of tallow, lard, cotton oil, peanut oil or palm oil. . . . Yesterday, fat was fat . . . suet, tallow or lard. Today . . . there are hundreds of varieties of organic fats. . . ."

Another 1928 article told of the European methods of crushing "soya beans": "Prior to 1908, soya beans were practically unknown to the European vegetable oil industry, but soon after the first experimental shipments of beans had been received from the Orient their great value as a source of excellent oil and meal was realized and it was not long before the prominent oil mills in most European countries were importing immense quantities. The war gave the soya bean oil industry great momentum, and record quantities were crushed between the years 1915-1920, both in Europe and the Orient, for during that period the latter was shipping very large quantities of crude oil to most of the European markets."

The author, Geoffrey Govier, explained that during World War I, soybean oil was refined and hydrogenated to be used in such edible products as margarine, lard and suet substitutes. Also, one English mill mixed soybeans with cottonseed prior to processing, resulting in soy-cot oil. He added that by 1928, the oil was used extensively by the soap industry, in preparing hard fat for candle manufacturing, for "boiling" for use in paints, in manufacturing linoleum, and that "During recent years, a very extensive trade in edible soya bean oil has been developed in the South American countries, where the product is used both as a cooking and salad oil."

In 1926, the largest cotton crop to that time was harvested. In a March 1930 article, Felix T. Pope of the U.S. Department of Commerce said world oilseed production in 1926 was about 35,900,000 short tons. Cottonseed led, with nearly 14,000,000 short tons. Other oilseeds, in the order of their production, were sesame seed, flaxseed and soybeans (peanuts weren't considered as a comparatively small proportion were crushed).

Meanwhile, animal and vegetable fats and oils were bringing their lowest prices since 1913, and competition from whale oil was hurting the industry. An article entitled "A Menace to Oil Crushing," published in May 1931, noted, "A serious menace to crushers and refiners of vegetable and animal oils the world over has come up out of the Antarctic seas in the form of a huge overproduction of whale oil." The editorial advocated suspending whaling for the next season.

In 1931, there was renewed interest in the problems of rancidity and consequent spoilage of edible fats and bakery goods. "Now, with the advent of new apparatus of various types for the measurement of the progress of oxidation and rancidification, investigators are viewing the problem with renewed hope of success," a journal article reported.

According to H. J. Harwood of Armour and Company at AOCS' 50th anniversary meeting in 1959, important developments in the industry included catalytic hydrogenation of fatty acids and their esters between 1920 and 1930, and fractional distillation (with corrosion-resistant alloy stills) of fatty acids and their esters between 1930 and 1940.

A look at soap history by R. A. Duncan of Procter and Gamble in 1959 showed only four kinds of soap when AOCS was founded: milled toilet soaps, white floating soaps, white laundry bars and yellow laundry bars. According to Duncan, phase diagrams were not available and there was a lack of scientific knowledge of soap-making techniques. However, in 1930, the batch-type process was replaced with a continuous soap-making process.

According to Foster Dee Snell, in a November 1952 article, "The Competition of Soaps and Syndets," "Soap had an unrestrained monopoly up to the early 1930s. Then, very quietly, Dreft appeared, a lauryl sulfate built with sodium sulfate. In very hard water areas it had substantial

acceptance, but the splash it made was not great. That was the first synthetic detergent so far as the public was concerned." He added, "In effect, the soap industry had a practical monopoly of the detergent field until 10 years ago. In a decade it has lost half its household market to an interloper, the syndets. . . . Instead of there being a strong demand from the soap industry for fats, they are necessarily looking for other markets."

In 1936, the U.S. surpassed Germany to become the leading soybean crushing country in the western world; by 1942, the U.S. was the leading soybean crusher in the world. The percentage of all soy oil used in foods in the U.S. grew from 30% in 1933 to 84% in 1936 and, by 1980, to 98%. It was still a minor oil in the U.S., in the 1930s, though, representing only 35% of all edible oils and fats in 1936.

A report by J. F. Moloney, economist for the National Cottonseed Products Association, showed that just before World War II, about 65% of total domestic cottonseed oil consumption went for shortening, with 8% for margarine and 18% for food products such as salad dressings, mayonnaise, salad oil and food packing oil. The balance, mostly off-grade oil and foots, went for inedible uses.

A July 1942 article said the small quantity of sunflower seeds grown in the U.S. was used mostly in poultry feeds, and that production had decreased from 8,000 tons in 1928 to 1,500 tons "in recent years." It pointed out that the oil was good for salad and cooking oil, and was used as an edible oil in Russia.

The changing focus of the oil and fats field was reflected in the types of industries represented by AOCS membership during the 1940s. Technologists representing the drying oils, vitamin oils, pharmaceutical, natural wax and other specialized fields sought AOCS membership during this time.

In his 1948 president's address, R. T. Milner pointed out, "At the fall (1947) meeting in Chicago, the Vitamin Committee held an open meeting to discuss new vitamin A standards. This was one of the most important events in recent years for the entire vitamin field and drew an extremely large attendance from all sections of this country."

Another milestone, Milner said, was the translation of AOCS' newly revised Methods of Analysis into Portuguese for use in Brazil. Milner said, "We may expect requests for translations into other languages, and indeed AOCS methods may become international and worldwide in scope. This is a direct result of the fine editorial revision that we owe to our Methods editor, V. C. Mehlenbacher. We must see to it that we maintain our gains in this all-important field of analysis and by cooperative study, careful testing and constant revision, maintain our high standards."

In the early 1940s, a new process called fractionation, physically separating soy oil into two fractions, was developed. By 1948, soybeans were the leading U.S. vegetable oil crop in terms of quantity. At this time there was much interest in solvent extraction research, particularly because of the high price of oil.

Other industry developments between 1940 and 1950 were the continuous splitting of triglycerides to produce fatty acids and glycerol, solvent crystallizations and preparation of nitrogen-containing derivatives of fatty acids. On the soap scene, according to H. T. Spannuth in a June 1948 article, "The fat and oil shortage has fostered the development of synthetic surface active agents from petroleum products."

Meanwhile, AOCS was beginning to sponsor short courses on topics of interest to the industry. The society held its first short course, on edible oils, in 1948. Subsequent courses included drying oils, soaps and detergents, engineering processes, industrial oils and analytical techniques.

The effects of fats on the human diet became a topic for research in the 1940s. This was reflected in the journal by such stories as "The Role of Fat in Human Nutrition," "The Effects of Fat Upon the Rates of Digestion in the Human Stomach of Meals of High Protein Content." Meanwhile, antioxidants were being developed to protect foods made with lard against rancidity. An article in the September 1949 journal focussed on "Butylated Hydroxyanisole as an Antioxidant for Animal Fats."

The postwar period saw an expansion of research and development for all fats and oils; AOCS membership by this time included greater academic participation.

By the early 1950s, food technology had developed as a separate science. In a November 1954 commentary, "Relation of Fat and Oil Chemists to Food Technology," Milner wrote, "Its parentage is reflected in its definition—the application of the basic principles of chemistry, physics, microbiology and engineering to the processing and preservation of foods. . . ." He added, "From the earliest legends and record to the present, fats and oils have been among the most important foods. Since 1931 the annual consumption of all fats and oils in the United States has grown from about 8 to almost 11 billion pounds. In the interval of 1931-1952, from 57% to 65% have gone for food use except during World War II when the proportion dropped to 51%. It seems that oil chemists and food technologists should have much in common." Milner said this trend had been recognized by educational institutions, which were beginning to offer courses and research training in fat and oil technology.

Technical papers during the 1950s included such topics as "Fat, Cholesterol and Atherosclerosis," "The Relationship of Diet to Life Expectancy and Atherosclerosis," and "Determination of the Extent of Oxidation of Fats."

R. J. Vander Wal, in a 1951 commentary, pointed out that a growing segment of the fats and

oils field—the fatty-acid industry—warranted attention. "This industry, which utilizes fats as raw materials for the manufacturer of new chemical products, is already of multi-million dollar proportions. As the use of fats and oils in this manner increases, more fats and oils must be produced on the farms and plantations, and more must be processed in our mills and packinghouses. New problems of production and processing will arise which must be solved by members of our Society."

While soaps, greases and candles were the chief inedible uses of fats and oils when AOCS was founded, major outlets by 1959 included rubber compounding, protective coatings, plasticizers, surface-active agents, lubricants and synthetic fibers. Developments in this industry between 1950 and 1959 included oxidative cleavage and derivative preparation. According to Don Bolley of Baker Castor Oil Company in 1959, inedible oils were first used as the prime component of protective coatings, then later used with phenolics. Still later, they were used to prepare alkyds. In the 1950s, Bolley said, they were used to prepare oil alkyds, for latex flat paints which were competing with water-thinned synthetic rubber-based latex paints. A Procter and Gamble spokesman in 1959 said synthetic soaps prepared from sulfated alcohols, alkyl and aryl sulfonates comprised 75% of soap sales.

The oilseed industry, meanwhile, was changing dramatically. In a 1952 article, Warren H. Goss wrote, "The outstanding trend at present is the enormous increase in production and world supplies of fats, oils and oilseeds. . . . Among the major increases were copra and coconut oil from the Philippines and Indonesia, soybeans exported in volume from Manchuria for the first time since the war, a bumper yield of olive oil in southern Europe, and record production of lard and other animal fats."

Goss said the soybean, linseed and cottonseed industries were converting to solvent extraction. "The trend appears more and more to be toward the combination of forepressing followed by solvent extraction," Goss noted, adding, "Coupled with this swing to extraction has been a decided westward shift of cottonseed processing, including a marked increase in California. The cottonseed industry has undergone a change almost overnight."

In 1971, J. E.Th.M. Randag, then president of the International Association of Seed Crushers, reported world oilseed crushings had grown from 39 million tons in 1952 to more than 84 million tons in 1970. Randag explained that soybeans had

accounted for 30 million tons of the 45 million ton increase, "and they now constitute almost half of the world's crush of oilseeds." In 1952, soybeans formed 20% of all oilseeds on the world export market; by 1970, their share was 71%. Randag noted that in 1952, a reasonably-sized mill handled 150,000 tons of soybeans a year; in 1971, mills were handling nearly a million tons annually.

Other trends during the 1960s were rapid growth in world fish meal production, a shortage of peanuts and sunflower oil, and an expanded Canadian rapeseed crop. Randag said rapeseed had become second in importance only to soybeans in the western European crushing industry.

Also noting trends, A. R. Baldwin, in his 1962 president's report, said, "Most AOCS members realize that profound changes are being made in the industries that we serve. Biochemical and nutritional research on the effects of various dietary fats on physiological responses has come to be one of the most important basic research programs all around the world. The results of these investigations may have significant effects upon the edible fat and oil industry. The downward trend in the use of drying oils in the protective coatings industry continues to be of concern as much research is being aimed at reversing the trend. We are all familiar with the decreased use of fats in soaps and the increased use of fats in feeds. The European Common Market will demand the use of uniform methods of analyses acceptable to traders in many countries. Oils are changing in relative significance—soybean oil has increased phenomenally, safflower oil is increasing in importance, there is much research on other new oilseed crops—and analytical methods must continually be reviewed for applicability."

Recognizing the growing interest in biochemistry and lipids, AOCS in 1961 sponsored a short course on biochemistry's emerging microanalytical methods and in January 1966 began publishing a second journal, *Lipids*. In the first issue, editor A. R. Baldwin wrote, "Two principal factors have effected great expansion in the kind and amount of research in the field of 'lipid' chemistry. The discovery of a possible relationship between the fat in the diet and cholesterol in the blood, and the development of new microanalytical techniques, have together breathed new life into what only a few years ago was considered a relatively exhausted and uninteresting field of research."

Other developments linked to lipid research during the 1960s included the implementation of mass spectroscopy as a tool for fatty acid and lipid chemists, and the establishment of the Burnsides Research Laboratory, University of Illinois, allowing for expanded research on lipids and lipid metabolism.

International conferences became another priority for the society. In his annual report in 1971, then AOCS Executive Director Carl Hauber wrote, "The Joint World Conference (AOCS-ISF) convened in Chicago last fall ranks (in my personal estimation) among the high points of the Society's history, along with the establishment of the Smalley Program, the Certification Program, the Official and Tentative Methods, assumption of responsibility for *JAOCS*, establishment of *Lipids*, establishment of the AOCS Foundation and purchase of a permanent homesite. If this unprecedented international event is 'kept alive' through a new sensitivity to the needs of our industries and our professional people around the world, the AOCS is sure to reach new levels of international recognition and leadership."

Topics in the industry during the early 1970s included concern over world hunger and ideas on how to close the "world protein gap." Efforts were undertaken to fortify cereals and foods with amino acids and to produce new protein foods. The strategy discussed was to put science and technology to work to develop food sources for underdeveloped countries and to help them make better use of what they already had. Research was undertaken to change the lipid and amino acid composition of such oilseeds as cottonseed, safflower and soybeans, with some efforts to improve oilseed yields and quality.

In the 1960s, petroleum-derived materials elbowed natural alcohols based on fats and oils out of a large share of the soap and detergent market. Ethylene chemistry enabled companies to turn out alcohols for making synthetic surfactants. During 1978-1980, this picture changed in part, as petroleum price hikes pushed the price of hydrocarbons to new highs while those of natural fats and oils remained relatively stable. Some industry watchers predicted that the fatty chemicals market eventually could switch back to using the renewable natural fats and oils.

During the past decade, plant breeders have expanded the production of traditional oilseed crops and experimented with some that are new to Western agriculture. With low oilseed prices, other uses are being explored, including blending vegetable oils in fuels and mixing them as carriers for pesticides and herbicides. Other industry advances include computer technology at processing refineries.

In 1980, a world conference on soy processing and use was held in Mexico. Prompting this was recognition of the soybean's dominance on the oilseed scene, not only in the U.S. but in Latin America. The conference was designed to transmit state-of-the-art knowledge and technology about the processing and use of soybeans, particularly for nations which could improve their diets by using soybeans. U.S. soybean oil production had more than tripled between 1960 and 1981, with

acreage growing from 20 million in 1960 to 70 million in 1981.

The early 1980s witnessed conflicting reports on the effect of fat on diet. Some, such as the American Heart Association, recommended low cholesterol, low saturated fats diets. For every study released, scientists in the field took differing stands. They agreed on one point, however: This topic needs more research.

A Journal article, "What's ahead for edible fats and oils in the 1980s?" published in January 1979, asked a number of specialists their views. They predicted: Consumption would continue to increase, spurred by a demand for more dietary fats and oils in developing nations; consumption in developed nations where fats and oils account for more than a third of dietary calories would stabilize or fall; there would be no new sources of fats and oils but increased use of soy oil, palm oil and sunflower oil; and research on and public awareness of the role of fats and oils in human nutrition would increase.

Early soy crushing

William Shurtleff and Akiko Aoyagi of The Soyfoods Center, in their forthcoming book *History of Soybeans and Soyfoods,* include the following in a chapter entitled "History of Soy Oil":

The first documented crushing of soybeans in the U.S. to obtain oil and meal took place in 1911 (probably not in 1910 as some accounts say) at Seattle, Washington. The soybeans were imported from Manchuria by the Albers Brothers Milling Co. and sold to Herman Meyer, who operated a small hydraulic press in Seattle. His establishment was later called Pacific Oil Mills. The crude soy oil was sold locally for use in making soap and paint, and the meal, brandnamed Proteina, was sold to farmers as a high-protein livestock fodder. It was found, however, that the oil and meal could be imported more cheaply than they could be produced domestically from imported soybeans. The crushing operations were, therefore, discontinued after the initial shipment of beans had been processed. Yet the pattern, based on the success of the European (and to a lesser extent, the Manchurian) patterns, was established from the very outset; it has dominated soybean utilization in the U.S. to this day.

The earliest recorded crushing of American-

grown soybeans took place in 1915 in North Carolina, which was then America's leading soybean producing state. At that time there was a surplus of soybeans in the state (many farmers had planted soybeans instead of cotton, since the latter's prices were often below production costs), a growing importation of and interest in soy oil nationwide, and the local cottonseed mills were searching for a way to prolong their operating season. From December 13 to 20, 1915, the cottonseed oil mill of the Elizabeth City Oil and Fertilizer Co. in Elizabeth City, North Carolina, did a test run in which 272 tonnes (10,000 bushels) of soybeans were crushed and the oil expelled in the mill's six Anderson expellers. Soon another run of the same quantity was completed under the direction of W. T. Culpepper, manager of the firm, as part of his efforts to encourage local soybean production. From each ton (2,000 pounds) of soybeans, the mill was able to obtain 247 to 270 pounds (32-35 gallons, weighing 7.72 pounds of each) of crude soy oil and about 1,650 pounds of meal; the balance was processing loss. Before the tests the mill had contracted to sell all of the oil to a leading manufacturer at reasonable prices. Most of the resulting meal, reported to be of excellent quality and containing 5.0 to 5.5% oil, was sold to a fertilizer manufacturer. The experiment was so successful that the mill continued to crush local soybeans. Other North Carolina cottonseed oil mills soon followed suit, and by the spring of 1916 mills in at least nine North Carolina cities and towns had crushed about 80,000 to 100,000 bushels (2,177 to 2,722 tonnes) of soybeans. By 1917 some 150,000 bushels (4,050 tonnes) of local soybeans were crushed. The USDA played an important role in coordinating and studying the operations. Many more soybeans would have been processed but for the extremely high price of seed, which was in demand for planting and food. In 1916, for example, German interests are reported to have bought and exported the entire local supply at prices as high as $4.50 per bushel.

Soon the idea of crushing locally grown soybeans spread to the southern states. By 1916 the boll weevil, which entered the U.S. in Texas in 1892 and rapidly spread eastward, had made cotton growing unprofitable in various parts of the south. Thus both soybeans and peanuts were welcomed by farmers and millers as alternative oilseed crops. In August 1916 *The New York Times* reported that the Louisiana Cottonseed Crushers Association had voted unanimously in favor of development of the soybean in that area for use as an oilseed, as soy oil was rapidly cutting into cottonseed oil sales. During the following months many cottonseed oil mills throughout the cotton belt, realizing the potential of the soybean as an oilseed, contracted with farmers for the seed of their 1917 crop; this led to a marked increase in southern soybean acreage. Soybeans imported from Manchuria were also processed in southern mills to meet the rapid growth in demand for oils.

Soybeans grown in the Corn Belt were first crushed for oil and meal in late 1917 or early 1918 by the Chicago Heights Oil Manufacturing Company (located just south of Chicago, Illinois), operated by George Brett and I. Clark Bradley. Using screw presses (expellers), which were generally used for crushing corn germs, they experimentally crushed a small amount of soybeans. In late 1920, since soybeans were in short supply and most of the crop was sold for planting, Brett and Bradley bought and crushed 10 carloads of soybeans from North Carolina and Virginia. Hydraulic presses were used for soy oil extraction in 1922 and 1923. The company sold the oil with some difficulty and had great difficulty selling the meal. Bradley noted that "In the three years from 1920 we coaxed and forced feeders to try the meal. We hauled meal all over the state, gave it to them free. We sent it to experiment stations. We exhibited it at state and county fairs; we made soybean flour and sent samples to bakers, had it blended at a flour mill with wheat flour, and gave five-pound bags to hundreds of grocery stores who would consent to accept it." Bradley and Brett continued their pioneering work toward the establishment of a soy oil processing industry in the Corn Belt until August 1923, when the company went out of business for lack of enough soybeans to keep the mill supplied.

These four early experiments with soybean crushing in Seattle, North Carolina, the Cotton Belt, and Illinois, laid the foundation for America's soybean crushing industry that would emerge during the 1920s and 1930s, and also served as a key stimulus to U.S. soybean production.