Report from Poland: Lipid Research[1]

Research work in the field of fat chemistry and technology in Poland commenced in the postwar period. In 1950, a Fats Technology Department was established at the Gdańsk Technical University; and, in 1952, the first scientific work began to be published in this field by that department, as well as by the Central Institute for Food Industry, a section of which was first established at Gdańsk for the investigation of fats. During consecutive years, both those institutions cooperated and were engaged mainly in solving problems connected with the reestablishment of the fats industry.

Based upon the fat oils laboratories in this Institute, the Institute for Fat Industry was established in Warsaw in 1954.

At that time, more and more work was being devoted to basic research and development studies: oilseed protein and waste fats and the Universities in Olsztyn, grain oils at Poznan, and animal fats at Warsaw. Later, problems connected with fats became the subject of investigation, although to a much lesser extent, at various departments of agricultural universities, medical academies, and other universities. During the past 25 years, research was contracted on the subjects discussed below.

Rapeseed Chemistry and Technology

These studies have been carried out in accord with the extensive work in agricultural centers, both in growing, cultivating, and fertilizing varieties of the plant and in providing forage for animals.

Investigation on the nutritional value has been carried out at Ministry of Health and Social Welfare centers. The results of these investigations were combined with modifications in the edible oil fats technology and their recipes.

Proper studies on the rape plant included objectives aimed at explaining the chemical composition of that raw material, its oil, and extracted meal, with extensive consideration given, not only to glycerides, but also to the accompanying substances.

Many of the subjects referred to new or especially adapted analytical methods. As far as technology itself is concerned, many problems have been solved in the field of improving all the stages of storing and processing of the rapeseed or oil obtained from it.

A considerable achievement was improvement of margarine produced from a base which is composed mainly of that kind of oil. This also has been one of the main reasons why the consumption of margarine has become 10 times higher now in Poland than in the prewar period.

For many years, studies on unembittering the extracted meal were based upon thorough investigation into sulphur containing compounds that appear in the seeds and have led to a considerable improvement of the value of the fodder from that plant.

Because of Poland's interest and work with the rape plant, the first world-wide symposium devoted to the chemistry and technology of the rapeseed and other oils from eruciferae plants took place at Gdańsk in 1967 with the participation of scientists from 17 countries. Consecutive symposia on the same subjects took place in France and Canada.

Deterioration of Fats, Their Chemistry, and Processing

It is the mechanism of antioxidants that mainly has been investigated. The course of the autoxidation process of fatty acids has been explained on the basis of a detailed analysis of the reaction kinetics and thermodynamics. Results also have been presented upon the amount of accompanying substances in the oil deterioration processes.

In this field initiative also has been taken regarding the international exchange of information by organizing symposia. One such symposium took place at Gdańsk in 1971 with the participation of representatives from 15 countries.

Transformation of Minor Substances

Transformation of such minor substances as lipochromes, sterols, phospholipids, etc., taking place at the time of technological processes was studied, with special consideration given to their final forms contained in the edible fats. An important achievement was the proof of the presence of steroid hydrocarbons in margarines.

Analytical Methods

Development of analytical methods and, above all, instrumental ones by the adaption of known techniques have been carried out for specific requirements connected with fats. The greatest progress was achieved in gas chromatography. An entirely new gas chromatograph of an original design was worked out. This achievement has been enhanced by the fact that its production has been taken up by a Polish industry. This prototype has been the basis for further construction by another branch of industry. In the framework of this subject, gas chromatography has been introduced to many fields of investigation on a wide scale. A synthesis of new stationary phases has been worked out by introducing a new method for the determination of their thermostability.

Among the methodical achievements are included various experiments upon animals in the investigation into the nutritional value of plant oil used as food and of extracted meal for fodder.

In addition to the achievements described above, much work has been devoted to the improvement of our industrial production by developing a raw material base, improving the nutritional value of final products, reducing losses, eliminating imports, and reducing costs. Because of cooperation between research centers and the oil industry, it has been possible to attain a high level of production which has brought about a considerable increase of the consumption of plant fats in Poland.

Institutions in Fats Chemistry

After the reorganization of the higher educational system in 1969, the following institutions are now in the field of fats chemistry and technology in Poland: (A) Technical University in Gdańsk, Institute of Organic and Food Chemistry and Technology, Department of Fat Chemistry and Technology (edible and nonedible fats); (B) Industrial Fat Institute in Warsaw and its branch at Gdańsk (edible fats); (C) Agricultural Academy in Warsaw, Institute of Food Technology (animal fats); (D) Institute of Food

[1]This information is published as a result of the creation of the European Club of Centers for Lipid Research, January 1972, in Paris. For details regarding this new club, see *JAOCS* 49:236A (1972). Reports from six other countries have been published to date: Belgium, *JAOCS* 49:330A (1972); Germany *JAOCS* 49:372A (1972); Spain, *JAOCS* 49:374A (1972); France, *JAOCS* 50:4A (1973); The Netherlands, *JAOCS* 50:136A (1973); and Italy, *JAOCS* 50:530A (1973).

and Nutrition, Warsaw, Department of Nutrition Physiology of Man; (E) Institute of Industrial Chemistry in Warsaw, Department of Detergents and Cosmetics; (F) Marine Fisheries Institute, Department of Fish Technology (fish oils); and (G) Agricultural-Technical Academy in Olsztyn, Institute of Engineering and Biotechnology of Food (fatty raw material).

The Department of Fats Chemistry and Technology at Gdańsk is not only a research center. It also is a teaching institution. It is engaged in specializing chemistry students in their fourth and fifth year of studies in the field of technology of edible and nonedible fats and leads to postgraduate doctoral studies. At present, the Food Chemistry and Technology Committee (with H. Niewiadomski as chairman and Z. Sikorski as secretary) of the Polish Academy of Sciences is now located at Gdańsk also. This Committee coordinates work in the field of food technology, inclusive of studies on fats, throughout the entire country.

Congress of Polish Sciences

During the preparatory period for the second Congress of Polish Sciences, which took place in 1973, future directions for research work were proposed. As far as the chemistry and technology of edible fats are concerned, the following subjects of research were included in that program.

Basic research: (A) Transformation of lipids and of the complexes in which they appear at ripening, harvesting, and storing of the seeds; (B) transformation of lipids at the time of storing and processing oils; (C) fatty acid autoxidation mechanism in the molecules of glycerides and of by-substances; (D) fatty acid and glyceride hydrogenation mechanisms in homo- and heterogeneous systems; and (E) complex optimation of productional cycles.

Implementation research: (A) Cooperation with agricultural centers on defining formation of the country's raw material base and possibly of introducing other oilyielding plants in addition to the rape plant; (B) simplification of the productional cycles, as well as of extraction and refining of oils; (C) introduction of additional continuous methods; (D) modernization of apparatus and their control systems; (E) automation of quality control; (F) prevention of the fats deterioration process during processing and storing; (G) enlargement of facilities in line with the needs of the population; (H) selection of formulations in accordance with the requirements of nutrition; and (I) better use of by-products.

Beside its research work and teaching, the Department of Fat Chemistry and Technology at Gdańsk organized, in addition to the above mentioned international meetings, an ISF Congress in 1960 and is now planning to organize a symposium on the cheniurgie of fats.

Polish scientists take part in the works of the IUPAC Fats Section and are now engaged in preparing its next meeting in Warsaw in August 1974. There also is the intention of bringing in representatives to Gdańsk for a meeting of the European Club of Centers for Lipid Research.

The development of research work in this subject area is possible only due to extensive financial and organizational assistance from the appropriate ministries, above all the Ministry of Higher Education and the Ministry of Food Industry. Because of their assistance, the centers at Gdańsk and in Warsaw are provided with excellent libraries, and the Gdańsk center has a set of pilot apparatus, with which all industrial processes can be carried out on a laboratory scale.

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Executive Committee votes to prepay $20,000 on headquarters

AOCS 1973 income exceeds expenses by $40,000

In his report before the regular winter meeting of the Executive Committee, James Lyon, AOCS executive director, announced that AOCS's 1973 income had exceeded expenses by $40,143.65.

In view of the current cash situation, the Committee voted to prepay ca. $20,000.00 to the National Council of Teachers of English on the contract for purchasing the AOCS headquarters building in Champaign, Ill.

Lyon also reported that the newly updated edition of *AOCS Official and Tentative Methods* and the first AOCS monograph, *Tumor Lipids: Biochemistry and Metabolism* were off the presses and in inventory.

In discussing the work of the AOCS Examination Board in certifying referee chemists, the Executive Committee voted to provide for distribution of lists of AOCS referees to those firms most likely to use referee services. The list will be published in a brochure describing the referee program and its benefits to the profession.

Discussion of the work and future of several AOCS committees was the topic of considerable discussion at the meeting. The Executive Committee discussed ways in which the Governing Board might provide more help and direction to AOCS committees and to open communication between the Board and committees.

The Committee focused particularly on a few committees with retiring chairmen and on the possibilities of the new Local Section Committee (formerly Communications Committee) as a source of closer cooperation between the Society and its sections. It was agreed that the AOCS president schedule visits to all AOCS sections at least once during his tenure.

The Society's relationship with other professional organizations also was discussed. The Committee was pleased with the cooperative effort with the American Soybean Association to publish proceedings of the World Soy Protein Conference and looked forward to efforts by the Society Improvement Committee to establish contacts with other groups holding common areas of interest with AOCS.

The Executive Committee is composed of the AOCS president, vice-president, treasurer, immediate past-president, director of publications, and the executive director (ex-officio). The Committee meets twice a year between meetings of the entire Governing Board. ■

Foss America introduces automated Kjeldahl process

An automatic high-speed adaptation of the Kjeldahl method of nitrogen determination has been developed by Foss Electric, Hillerod, Denmark, the parent company of Foss America Inc., Fishkill, N.Y.

Working on exactly the same principle as the standard Kjeldahl method, the Kjel-Foss Automatic combines the basic method with a sophisticated automatic control system and can produce the first result within 12 min, followed by a new test result every 3 min.

This major reduction in the time it normally takes for each test is achieved by the acceleration of the digestion, cooling, distillation, and titration process of the sample under carefully controlled conditions resulting in an automatic digital display on the unit's control panel.

Each test stage has a highly sensitive built-in safety device to reduce the hazards of the traditional Kjeldahl method substantially. By keeping the whole process enclosed and by using automatic dispensing systems, the handling of dangerous chemicals is avoided. The entire unit takes up no more space than an office desk and can be housed in any convenient room without special laboratory facilities.

Development of the Kjel-Foss Automatic means that highly skilled personnel are not required to test samples, even at the rate of up to 150/day. The electronic control system ensures a high, consistent level of accuracy. Designed to work with macrosamples, the possibility of sampling errors is reduced even further. ■

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In addition, both those centers possess complete, modern equipment which is indispensable for carrying out all kinds of analyses of fats. Further, they can receive assistance from neighboring centers which are located in the same buildings and which provide most apparatus for investigating the structure of organic compounds and their properties. ■