

ABSTRACTS

R. A. REINERS, Editor. ABSTRACTORS: N. E. Bednarczyk, J. E. Covey, J. G. Endres, J. Iavicoli, F. A. Kummerow, E. G. Perkins, T. H. Smouse, J. A. Thompson and R. W. Walker

• Fats and Oils

ISOLATION AND IDENTIFICATION OF NEW CONSTITUENTS IN MILK FAT. C. R. Brewington, E. A. Caress and D. P. Schwartz (Dairy Products Lab., Eastern Util. Res. and Development Div., Agr. Res. Serv., USDA, Washington, D.C. 20250). *J. Lipid Res.* 11, 355-61 (1970). After removal of cholesterol on a digitonin column, the unsaponifiable matter of milk fat was examined for alcoholic substituents. Derivatization with pyruvic acid chloride 2,6-dinitrophenylhydrazone and fractionation of the derivatives gave four main fractions. The second, the hexane-benzene fraction, was shown by thin-layer chromatography to have a mobility similar to many common sterols. The hexane-benzene fraction was saponified and gave rise to free alcohols, which were then analyzed on a combination gas-liquid chromatograph-mass spectrometer. Dihydrolanosterol, previously unreported in milk fat, and lanosterol, previously identified but never confirmed, were characterized. The sterols which were precipitated on the digitonin column were removed, and by the use of the combination gas-liquid chromatograph-mass spectrometer β -sitosterol was identified. In addition, lanosterol and dihydrolanosterol were isolated from the unsaponifiable matter by chromatography on Florisil.

SOME EFFECTS OF ANTIOXIDANTS IN DOUGH SYSTEMS. L. K. Dahle and P. R. Murthy (Corporate Res. Dept., Peavey Co., Minneapolis, Minn.). *Cereal Chem.* 47, 296-303 (1970). A number of antioxidants, including five fat-soluble materials, were tested in a continuous-doughmaking system. With varying magnitude, all effected a lower mixing requirement. Hydroquinone and *p*-benzoquinone caused a weakening of the farinograph curve. That this could be caused by SH-blocking action was suggested by the reactivity of *p*-benzoquinone to glutathione. Neither hydroquinone nor ascorbic acid weakened a synthetic dough system of starch, gliadin and glutenin. No evidence was obtained for SS cleavage as a mechanism of the action of antioxidants in dough systems.

BY-PRODUCTS YIELD MEAT CONCENTRATE AND EDIBLE FAT. E. Levin (VioBin Corp., Monticello, Ill. 61856). *Food Technol.* 24, 19-24 (1970). By-products of meat processing now converted to "tankage" with attendant pollution can be input to a process that yields meat protein concentrate (MPC) and edible fat. The process is economically practical, produces salable products and presents a rational approach to pollution control for meat processing plants.

FATS AND OILS, FATTY ACID COMPOSITION AND PHYSICAL PROPERTIES. *Food Eng.* 42(5), 99 (1970). Various characteristics of common fats and oils, including fatty acid distribution, iodine numbers, saponification values and melting points are displayed on a chart.

FUNCTIONAL (BREADMAKING) AND BIOCHEMICAL PROPERTIES OF WHEAT FLOUR COMPONENTS. VI. GLIADIN-LIPID-GLUTENIN INTERACTION IN WHEAT GLUTEN. R. C. Hoseney, K. F. Finney and Y. Pomeranz (Hard Winter Wheat Quality Lab., Dept. of Grain Sci. & Ind., Kansas State Univ., Manhattan, Kansas). *Cereal Chem.* 47, 135-40 (1970). Free polar lipids (principally glycolipids) are bound to the gliadin protein by hydrophilic bonds and to the glutenin protein by hydrophobic bonds. In unfractionated gluten, the lipid apparently is bound to both protein groups at the same time. The simultaneous binding of polar lipids to gliadin and glutenin may contribute structurally to gas-retaining complexes in gluten in a manner not previously proposed.

FUNCTIONAL (BREADMAKING) AND BIOCHEMICAL PROPERTIES OF WHEAT FLOUR COMPONENTS. VII. PETROLEUM ETHER-SOLUBLE LIPOPROTEINS OF WHEAT FLOUR. R. C. Hoseney, Y. Pomeranz and K. F. Finney. *Ibid.*, 153-60. Two protein fractions were isolated by a relatively simple solvent system from the petroleum ether-soluble oil of wheat flour. One protein fraction (about 0.7% of the total free lipids) contained 60% protein

and 35% carbohydrate. The second protein fraction (22% of total free lipids) contained 30% protein, 7.5% carbohydrate, and about 62.5% lipid. Neither protein fraction had a significant role in breadmaking. The lipoproteins apparently were soluble in salt solution as well as in petroleum ether. Extracting flour with 6% salt (NaCl) yielded a globulin protein fraction containing 32.5% lipid. Proteins were detected in petroleum ether extracts of the globulin fraction.

WATER CONTENT AND STABILITY OF LOW-MOISTURE AND INTERMEDIATE-MOISTURE FOODS. T. P. Labuza, S. R. Tannenbaum and M. Karel (Dept. of Nutr. and Food Sci., M.I.T., Cambridge, Mass. 02139). *Food Technol.* 24, 543-50 (1970). Results on effects of water content on the controlling deteriorative reactions in several food systems are presented. Among the deteriorative reactions studied were non-enzymatic browning, oxidative pigment changes, peroxidation of esters and triglycerides of linoleic acid, non-enzymatic hydrolysis of sucrose and degradative changes in proteins exposed to oxidizing lipids. The potential significance of these findings on the design of storage conditions for low-moisture foods is discussed.

THE USE OF "DURAPAK" COLUMN PACKINGS FOR THE GAS CHROMATOGRAPHIC SEPARATION OF METHYL ESTERS OF SHORT AND LONG CHAIN FATTY ACIDS, FREE FATTY ACIDS AND FATTY ALDEHYDES. V. Mahadevan, and R. Decker (Radioisotope Service, Minneapolis Veterans Hospital, Minneapolis, Minn. 55417). *J. Chromat. Sci.* 8, 279-81 (1970). The use of "Durapak" OPN/Porasil, and Carbowax 400/Porasil, packings in which the liquid phase is permanently bonded to the core material, is illustrated by the separation of mixtures of methyl esters of short and long chain saturated fatty acids and fatty aldehydes. A partial separation of the methyl esters of the C₁₈ saturated and unsaturated fatty acids occurred on the OPN column. The permanently bonded "Durapak" column packings are suitable for GLC analysis of some lipids since they obviate the necessity for long periods of column conditioning due to bleeding phenomena usually associated with substrate-loaded packings.

DETERMINATION OF MONG IN PLACE OF ORGANIC RESIDUE FOR GLYCERINE ANALYSIS. L. V. Cocks (Soonglal, Earle Drive, Neston, Wirral, Cheshire, England), J. Devine, and F. B. Gibbs. *Analyst* 95, 278-83 (1970). Analyses of hydrolyser and soap lye crude glycerines for the known constituents show a number of anomalous results. It is suggested that this determination of organic residue, which is cumbersome and unreliable, should be replaced by the calculated value of MONG (Matter Organic Non-Glycerol), which is defined as 100 less the sum of the percentages of glycerol, ash, and water. In the experience of refineries in the U.K., where these latter determinations are standard practice, MONG gives more reliable information than the organic residue determination and with less effort.

OUTLINE/UNIT AREA CHROMATOGRAPHY: II. EFFECTS DUE TO DYE STRUCTURE. D. W. Poxon (Dept. of Chem., Univ. Technol., Loughborough, Leicestershire, England). *J. Oil & Colour Chemists' Assoc.* 53, 15-23 (1970). A mixture of oleic and palmitic acids, the carrier liquid, gives a single outline/area index peak at 17.6C, when chromatographed with petroleum spirits on paper impregnated with the dye C.I. 11110, Disperse Red 1. Other peaks appear at fixed temperatures, characteristic of the polar group, when compounds having other polar groups are dissolved in the above mixture. The effect of using other dyes having structures related to that of the above dye has been investigated for similar mixtures of compounds. A tentative theoretical explanation is proposed for the effects of the hydroxyl group, and to some extent other groups on the dye molecule.

FAT ANALYSIS OF BONED MEAT BY THE SPECIFIC GRAVITY METHOD. R. C. Whitehead (Honeywell Inc., Industrial Div., Fort Washington, Pa.). *Food Technol.* 24, 469-73 (1970). Problems involved in accurately measuring the weight, volume and temperature of a meat sample have been considered and solved. Variations on the specific gravity to fat content relationships of various meats have been investigated and suitable calibrations developed. The problem of frozen meat has been studied and means to minimize errors from this source are described. The results of these studies led to the development of an instrument capable of measuring the fat content of a 750 gram meat sample in less than a minute.

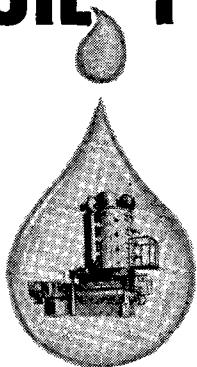
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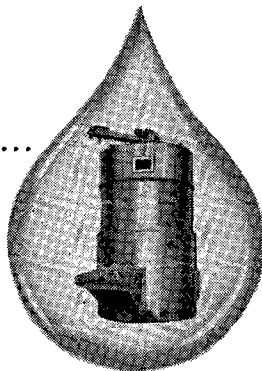


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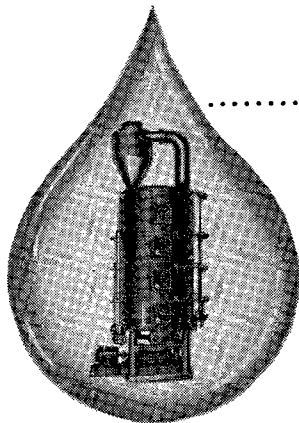
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SYNTHESIS OF FATTY ACIDS FROM PARAFFINS BY LIQUID PHASE OXIDATION. THE RELATION OF THE COMPOSITIONS OF THE RAW MATERIAL AND THE PRODUCT. Shiro Ishida and Jiro Hirano (Nippon Oil & Fats Co., Amagasaki, Hyogo-ken, Japan). *Yukagaku* 19(2), 101-8 (1970). This review cites 24 references (including 17 in Russian). Topics include the production of synthetic fatty acids in Russia, the mechanism of oxidation of *n*-paraffins and oxidation of paraffins with and without isomerization of radicals.

FATTY SUBSTANCES FROM MUSHROOMS, FOMES FORMENTARIUS, TRAMETES ORIENTALIS, AND A. TABESCENS. Yumiko Ishida and Tatsuo Mitsuhashi (Tokyo Gakugei Univ., Koganei, Tokyo, Japan). *Yukagaku* 19(2), 93-6 (1970). The dried mushrooms, *F. formentarius*, *T. orientalis*, and *A. tabescens*, contained 2.7, 0.6, and 5.7% lipids, respectively. The main fatty acids in the saponifiables were, respectively, 16:0 and 18:2, 16:0 and 18:2, and 18:0 and 18:2. The unsaponifiable matter contained 4.2, 11.5, and 21.0% $\Delta^5,7$ -sterol, respectively. The main sterol was presumed to be ergosterol in all cases, but *A. tabescens* contained 31% 22,23-dihydroergosterol. The unsaponifiables of *F. formentarius* contained higher alcohols, of *T. orientalis* and *A. tabescens* contained hydrocarbons, and of *T. orientalis* contained a carbonyl compound, mp 246C.

UREA ADDUCT FORMATION IN SOLID PHASE REACTIONS. I. GENERAL ASPECTS OF UREA ADDUCT FORMATION. Hidesuke Tanaka (Gunma Univ., Kiryū, Gunma-ken, Japan). *Yukagaku* 19(3), 145-8 (1970). This process was studied by differential thermal analysis, x-ray diffraction, and microscopy. The urea adduct is irreversibly formed from the mixture of urea and solid fatty acid, and exothermic reactions occurred in adduct formation at a temperature below the mp of the both starting materials. The rapid development of hexagonal prism crystals of the adduct was observed under the microscope. Fatty acids studied were lauric, myristic, palmitic and stearic acids.

OILS OF BASIDIOMYCETES. V. OILS OF DAEDELOPSIS CONFRAGOSA AND D. TRICOLOR. Hiroko Yokokawa (Tachikawa Coll. Tokyo, Akishima, Tokyo, Japan). *Yukagaku* 19(2), 97-100 (1970). *D. confragosa* and *D. tricolor* contained 0.5 and 0.8% ether extractibles, which contained 23.5 and 23.0% unsaponifiable matter, respectively. Fatty acids of hydrolyzate of neutral fat consisted, respectively, of 10:0 3.1, -, 12:0 1.5, -, 14:0 11.1, 8.7, 14:1 3.8, -, 16:0 21.8, 21.2, 16:1 3.8, 9.1, 18:0 22.5, 11.4, 18:1 7.3, 15.7, 18:2 18.1, 33.9, 18:3 5.1, -, and 20:0 1.1, -%, as determined by gas chromatography. The unsaponifiable matter contained, respectively, 54.8 and 17.1% sterols, of which 51.2 and 11.2% was $\Delta^5,7$ -sterol, 24.7 and 8.9% was 22,23-dihydroergosterol and 30.1 and 8.2% was ergosterol.

ISOMERIZATION OF FATTY OILS WITH THIONYL CHLORIDE CATALYST. Hisako Shiina and Tetsutaro Hashimoto (Govt. Chem. Ind. Res. Inst. Tokyo, Shibuya-ku, Tokyo). *Yukagaku* 19(3), 153-7 (1970). Isomerization was studied of soybean oil, methyl oleate, and methyl linoleate with thionyl chloride (SOCl_2). The amounts of conjugated dienes formed were relatively small and were of *trans-trans* form as revealed by infrared spectra. The thermal decomposition of SOCl_2 was examined by infrared spectra. The effects of possible products from SOCl_2 , such as Cl_2 , SO_2 , and S_2Cl_2 , were examined upon isomerization of soybean oil. The results showed that a greater part of SOCl_2 remained unchanged below 220C.

NUCLEAR MAGNETIC RESONANCE SPECTRA OF METHYL RICINOLEATE AND METHYL RICINELAIDATE. Osamu Suzuki, Tetsutaro Hashimoto and Kikuko Hayamizu (Govt. Chem. Ind. Res. Inst. Tokyo, ShiShibuya-ku, Tokyo, Japan). *Yukagaku* 19(3), 140-4 (1970). The chemical shifts for OH occurred to the lower field, as the concentration in CCl_4 increased. The chemical shifts of olefinic protons were determined for concentrations 2.5, 4.5, and 9.0 mole % for both methyl esters in CCl_4 .

SEED OILS FROM TWO SPECIES OF ROSACEAE. Setsuko Endo (Tokyo Gakugei Univ., Koganei, Tokyo, Japan). *Yukagaku* 19(4), 254-7 (1970). The two species studied were *Chaet-*

nomeles sinensis and *C. lagenaria*. The following data were reported for them, respectively: oil content 23.1, 23.0%, acid no. 1.4, 4.3, saponification no. 189.7, 197.6, I no. 98.1, 80.6, fatty acid composition: 10:0 1.7 4.3, 14:0 0.9 0.8, 14:1 0.3 0.5, 16:0 13.5 7.3, 16:1 — 0.6, 18:0 1.3 1.2, 18:1 22.5 50.7, 18:2 50.5 26.7, 18:3 1.1 1.0, 20:0 2.6 3.4, 20:1 3.1 3.5, 22:0 2.5 —%. The main sterol in both seed oils was β -sitosterol.

SEED OILS FROM FIVE SPECIES OF JAPANESE PLANTS. Yoshito Koyama, Yasuji Okada (Food Res. Inst. Aichi Pref., Nagoya, Japan), and Yoshiyuki Toyama. *Yukagaku* 19(4), 251-4 (1970). The 5 species studied were *Pterocarya stenocarpa*, *Morus bombycis*, *Ficus pumila*, *Humulus japonicus* and *Distylium racemosum*. They showed the following data, respectively, in this order: hexane-soluble oil content 11.5, 34.3, 25.9, 22.5, 24.4%, acid no. 0.7, 5.8, 3.0, 2.4, 0.9, saponification no. 190.2, 192.3, 191.2, 196.0, 193.8, I no. 194.9, 146.4, 193.9, 140.2, 157.4, unsaponifiable matter 1.64, 2.76, 3.37, 1.49, 1.06%. Fatty acid compositions were analyzed by gas chromatography.

POLYMERIZATION OF UNSATURATED FATTY ACIDS. IV. POLYMERIZATION OF METHYL LINOLEATE IN THE PRESENCE OF ALUMINUM HALIDES. Keizo Tanabe and Tetsutaro Hashimoto (Govt. Chem. Ind. Res. Inst. Tokyo, Shibuya-ku, Tokyo, Japan). *Yukagaku* 19(4), 222-6 (1970). Only AlI_3 among the halides (others studied include AlBr_3 and AlF_3) promotes the polymerization. The increase of AlI_3 concentration from 1 to 2 or 4 mole % at 300C decreased the time required for the polymer content to reach 70%. In the range 250-325C, the amount of polymer formed increased as the temperature increased. The polymer content reached 75% on heating at 325C for 10 hrs in the presence of 2 mole % AlI_3 . Polymerization involves mainly the Diels-Alder reaction.

DIFFERENTIAL THERMAL ANALYSIS OF EDIBLE FATS AND OILS. IV. HARDENED COCONUT OIL FRACTIONATED BY SOLVENT OR MOLECULAR DISTILLATION, AND RANDOMIZED BY INTERESTERIFICATION. Isao Niiya, Takenori Maruyama, Masao Imamura and Taro Matsumoto (Japan Margarine Shortening Makers Assn., Nihonbashi-ku, Tokyo, Japan). *Yukagaku* 19(3), 135-9 (1970). The curves of differential thermal analysis (DTA) of oils of lauric acid series showed complicated changes according to the degree of hardening and the temperature and duration of standing. The DTA curve of the fraction sparingly soluble in acetone showed little changes according to the temperature of standing, while the DTA curve of the filtrate showed some changes when allowed to stand at 20C. The DTA curve of the fraction obtained by molecular distillation showed little change with temperatures and duration of standing, indicating a considerable difference from the original hardened coconut oil. The DTA curve of the oil randomized by ester exchange showed little changes. Thus the uniqueness of the DTA curve of coconut oil may be due to its special glyceride structure.

V. CONTINUOUS COOLING AND HEATING DIFFERENTIAL THERMAL ANALYSIS OF LIQUID VEGETABLE OILS. *Ibid.* 210-14. The differential thermal analysis (DTA) of subtitle was carried out at a low temperature at the rate of 5C/min on vegetable oils such as cottouseed, rice, corn, safflower, soybean and rapeseed oils of 2 or 3 grades of purification. DTA curves differed considerably from one oil to another. They were also different according to the grade of purification.

VI. DISCRIMINATION OF FOREIGN FATS IN BUTTER OIL BY DTA. Isao Niiya, Takenori Maruyama, Emiko Morise, Masao Imamura, and Taro Matsumoto. *Ibid.* 215-22. Three samples of pure butter fat were used as well as two samples each of coconut (i), palm kernel (ii), palm oils (iii) and beef tallow (iv). In heating DTA from 0C, the presence of other fats in butter fat could not be detected unless mixed in the ratio more than 30% in case of i and ii, more than 20% in case of iii and iv. In continuous cooling and heating DTA, presence of more than 5% of i and ii could be detected, but it was not possible to differentiate i from ii. The presence of 5% iii or iv could be detected by these methods.

DETERMINATION OF THE OIL IN EXTRACTED RAPESEED PRESS-CAKE. I. A. Jakubowski *et al.* *Thussce Jadalne* 14(3), 120-6 (1970). This work was undertaken in order to develop a standard method for oil determination. Presscake (11g) was ground for 2 minutes in a mill and 5 g of this material was extracted in two stages with petroleum ether and with ethyl ether. The first stage lasted for 3 hours and the second for 45 hours. Both extracts were weighed separately. The amount of lipid extracted by petroleum ether was 2.95% on a dry

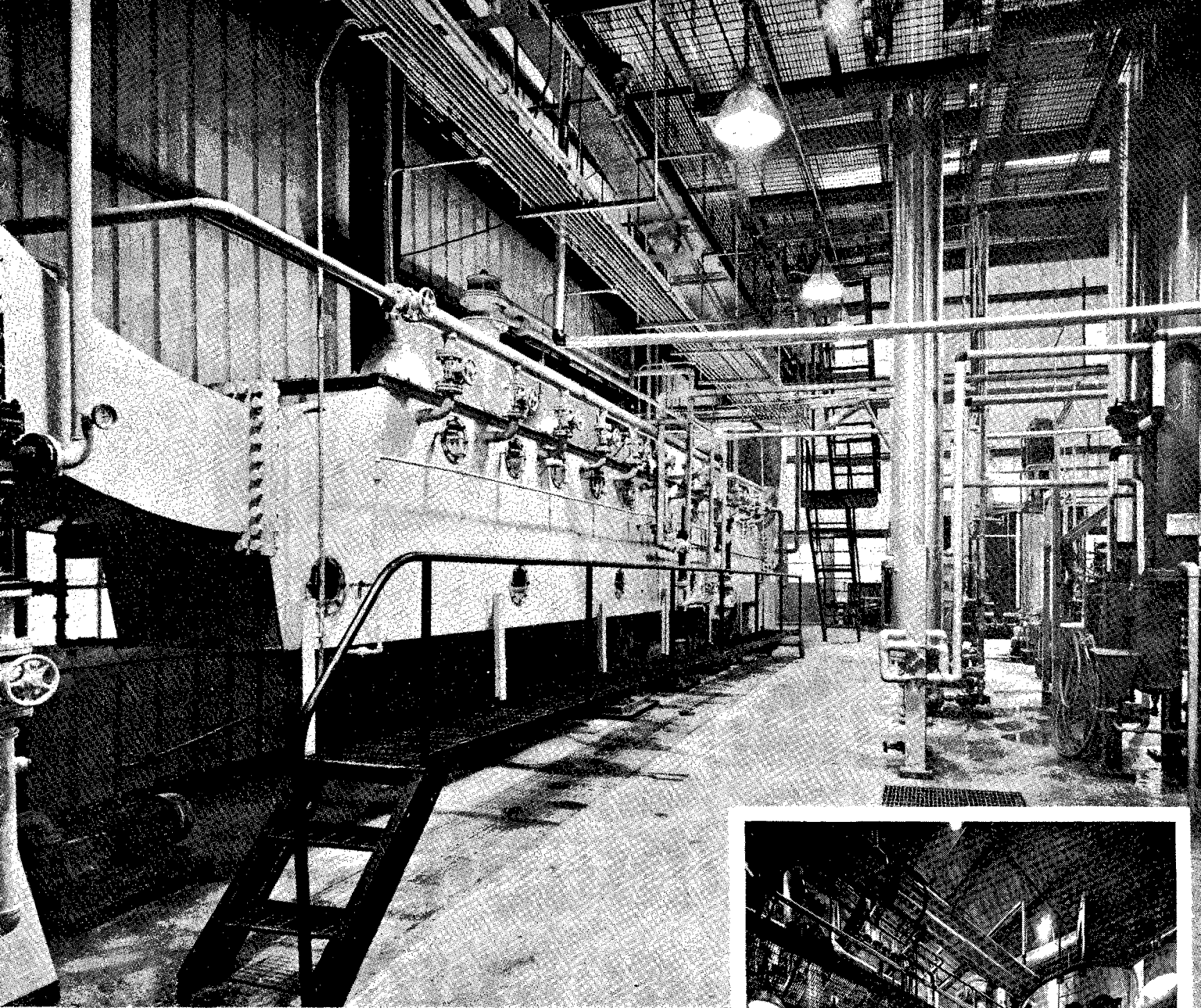
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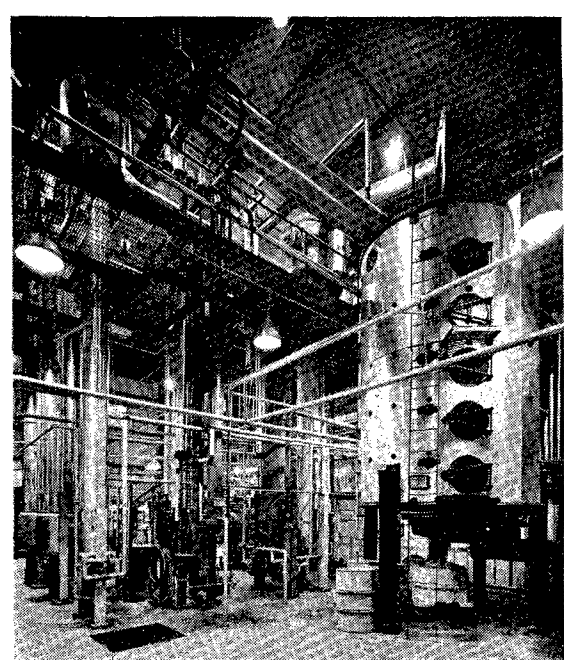
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Membrane Model Systems

*A Symposium of the American Oil Chemists' Society
held at San Francisco on April 22-24, 1969*

A year is past, new meetings have dissolved, numberless journals have rolled new questions into the hands of the incessant librarians, and the San Francisco meeting is still resounding with the echoes of the discussions and the spirit of the proceedings.

In welcoming speakers and guests to the "San Francisco Membrane Festival," Giuseppe Colacicco said "we gather not only to report on our professional achievements but also to honor the landmarks and the celebrities." With the outline of the methods that would not miss a lipid, in 1963 George Rouser opened the lipid shop in which we tool up differently to isolate and study the properties of membrane lipids. As we observe the behavior of lipids at water interfaces, we appreciate the vision of Danielli (1935), the measurements of Robertson (1955), and the elegant reflections of Vandenheuvel (1966), but we also stare gratified at the revolt of the non-Danielli's: Sjostrand (1963), Benson (1966), Lenard and Singer (1966), and Green (1966).

In the general introduction, Dr. Sjostrand remarked that the complexity of membrane structure may make it an awesome task for one to discern any of its neutral details. However, studies of membrane functions may suggest and reveal to us the principles of corresponding structures.

In the absence of Dr. Tien, Colacicco made some points concerning lipid monolayers, black lipid films and lipid vesicles. The usefulness of these models rests on the concept that they may mimic the most important feature of the molecular organization of membranes *in vivo*, namely the orientation of membrane components at water interfaces. Thus we can probe the interaction of the latter with ions, organic molecules, sugars and proteins. Monolayers are more versatile for we can measure and work at any surface concentration or film pressure including the ones which may be more relevant to biological systems, and we can introduce soluble protein, and membrane proteins as these become available. The classical black lipid films at the orifice between two water compartments can provide useful information about the electrical and some transport properties of the lipid-water interface. However, because of the high film pressure, this bilayer is impotent for studying penetration of protein into the lipid film, which is a fundamental postulate of the non-Danielli models and probably of the membrane itself. The discovery of the spherical bilayer in Dr. Thompson's laboratory opens new horizons in the bilayer field. Vesicles thus far could mimic a more natural state of lipid in water. However, studies of lipid-protein interactions in vesicles have not yet materialized except for those regarding the destructive action of lytic agents. But they could become useful systems for revealing specific vesicle-protein interactions and for studying tissue and membrane lipoproteins of the type found presumably in lysosomes, mitochondria, osmiophilic bodies.

Surface science is the science of impurities. First we clean the surface, water, lipids and proteins, otherwise we cannot make meaningful measurements; then we must add impurities to our purest specimen in order to peek into the finest mechanisms of biological surfaces. Some components which occupy strategic positions on the membrane surface are in such small quantities that we either lose them, cannot measure them, or we throw them away. When we can study them we may marvel at the revelations. For instance the lactose moiety of ceramide lactosides extends into the aqueous phase from mixed films with phosphatidyl choline and interacts specifically with an antilactoside antibody. The latter is so inhibited in the penetration of the lipid monolayer. When lactose, however, was present in the subphase, it interacted with the antibody, which lost its specificity and behaved as an ordinary γ -globulin in the penetra-

tion of the lipid film.

Against Colacicco's emphasis of the hydrophilic specificity of both lipid and protein in this and other interactions at water interfaces, Dr. Cadenhead remarked that most substrate additions influence the physical state of lipid films such that, in the presence of glycerol the alkane-glycerol interactions were favored by increasing glycerol concentrations of the subphase. A modification of the original Danielli-Davson membrane model is called for, to include lipid-protein hydrophobic interactions.

The message of Danielli (in absentia) to the Symposium, "Phospholipid Membranes are Necessarily Bimolecular," stimulated the discussion of phenomena of film penetration resulting in hydrophobic lipid-protein association typical of the non-Danielli models. In this regard, S.J. Singer pointed out that the problem is not if the bilayer exists, but how it interacts with protein.

Unless lipids are properly purified, measurements of surface potential may be misleading. A few per cent of an acidic impurity lowers the surface potential of neutral phospholipids on water and raises it on $\text{NaCl} < \text{CaCl}_2$. The Ca^{++} effect disappears after removal and reappears after readdition of the anionic impurity. A fraction of 1% of some contaminating amines confers sphingomyelin a cationic character, which raises its surface potential. Under no circumstances did surface potential measurements show an interaction of dipalmitoyl lecithin, several other lecithins, or sphingomyelins with Ca^{++} at 25 C. The effects that were attributed to ion-dipole interactions are instead due to the interaction of Ca^{++} with the acidic impurities which are present in ordinary preparations of such lipids.

While reporting studies on black lipid films with Dr. Ohki, Papahadjopoulos showed that cholesterol reduces the permeability of phospholipid vesicles to Cl^- and Na^+ and enhances the d.c. resistance and capacitance of phospholipid bilayers. Interaction of cholesterol with the phosphate group (?) of phosphatidic acid inhibits the ability of the latter to bind Ca^{++} .

The electron-microscopy images of freeze-fracture of bulk-phase lipid by Daemer showed that fractures in lipid systems may occur along non polar planes and produce complex crystalline structures. Lecithin, stearic acid, Ca-stearate and oleic acid reveal lamellar structures; lecithin-cholesterol mixtures, Sr-laurate, and cardiolipin showed hexagonal phases.

Physical Chemistry of Lipid-Protein Interactions

The second session dealt with the physical chemistry of lipid-protein interactions and was chaired by S.J. Singer. After discussion of the relevant theory of optical rotatory dispersion and circular dichroism, Dan Urry presented evidence for the fact that some ORD data and the red shift in circular dichroism mean light scattering by aggregating particles rather than pure rotatory power of simple protein structures. The results of the above considerations indicate that in membranous systems there is a higher degree of ordered protein than previously thought.

Reinforcing Urry's conclusions, Dr. Singer reassured the curious audience that Urry's discovery of artifacts in the red shift of CD spectra of membrane protein would not change things much. The spectra of intact red blood cell membranes are clearly not markedly distorted by such artifacts and the helical content, about 30% to 40%, calculated from the CD spectra cannot be far from right. Concerning lipid-protein arrangements in membranes, NMR studies in collaboration with Glaser and Simpkins, from La Jolla and

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for this, including: the beginning of cultivation of new Russian sorts resistant to some diseases from which the previous sorts very often suffered; the remarkable improvement of the production process of sunflower, with regard to agrotechny and mechanization; very high and constant yield, and the payment for the sunflower seed on the bases of the oil content.

For the production of sunflower the most important territory in Yugoslavia (which gives about 70% of the total production) is Vojvodina. This country has very convenient agroecological conditions for the cultivation of sunflower. Besides, the intensive investigation carried out in this country, especially by the Institute for Agricultural Investigations at Novi Sad, greatly contributed to the improvement of the production of sunflower. The results obtained by the research work of the Institute completely vindicated the investments. Considering the results obtained in the course of the last eight years, the areas sown with sunflower increased 320%, so that in Vojvodina, in 1969, there were 169.213 ha sown with sunflower. The yield of sunflower in Vojvodina, within the last few years, is among the highest in the world. In 1968 the average yield in this country was 21,1 mc/ha, and in 1969 it was 18,8 mc/ha. In 1968 the highest yield was marked 28,8 mc/ha, while in the same year the lowest was 17,1 mc/ha. A satisfying average yield of sunflower in Yugoslavia in 1968 was 19,5 mc/ha. According to the statistical data of FAO, Yugoslavia, next to Bulgaria, Austria and Italy, ranks among the countries with the highest production of sunflower.

An expert's opinion is that optimal results still have not been reached; therefore, the investigators continue in order to work out in detail technique of sunflower cultivation for each area, independent of agroecological conditions. In order to get maximal yield, the corresponding sort of sunflower has been strictly determined by means of investigations. From the new Russian sorts of sunflower, the most cultivated cultures in Yugoslavia are Vnimk 8931 and Peredovik, because they proved the most convenient.

The sort Peredovik was discovered in 1960 by the Russian academic Pustavojt, and the sort Vnimk 8931 was admitted in 1953, also created by the same scientist.

The sunflower oil content varies from year to year, and depends upon many factors. A primary factor is rain and temperature during the months of July and August. During the last eight years the highest oil content was in 1968. Some sorts showed the maximal oil content in this year. The sunflower with oil content of 52% calculated on dry matter was not very rare in that year. The best results were obtained with the sort Peredovik. The oil content in seed in 1969 was somewhat lower than in 1968. The year 1969 is the most important for the production of sunflower in Yugoslavia; about 400.000 tons of sunflower were produced. It is reasonable to expect that the following years will give higher production of oil, because new investigations should contribute to both an increase in seed yield and an increase in oil content in the seed.

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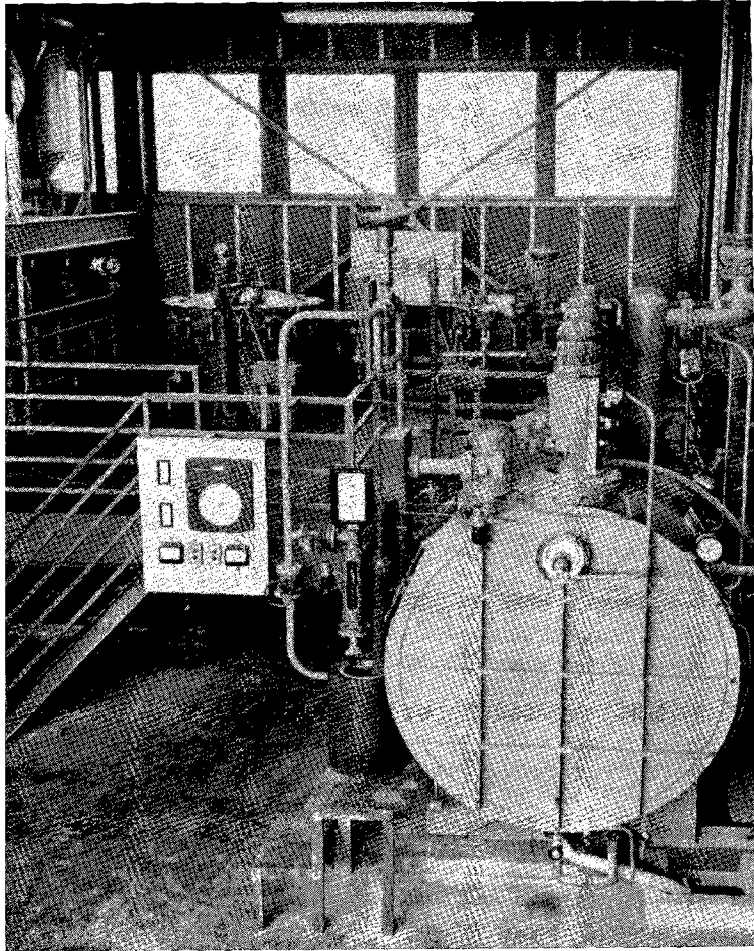
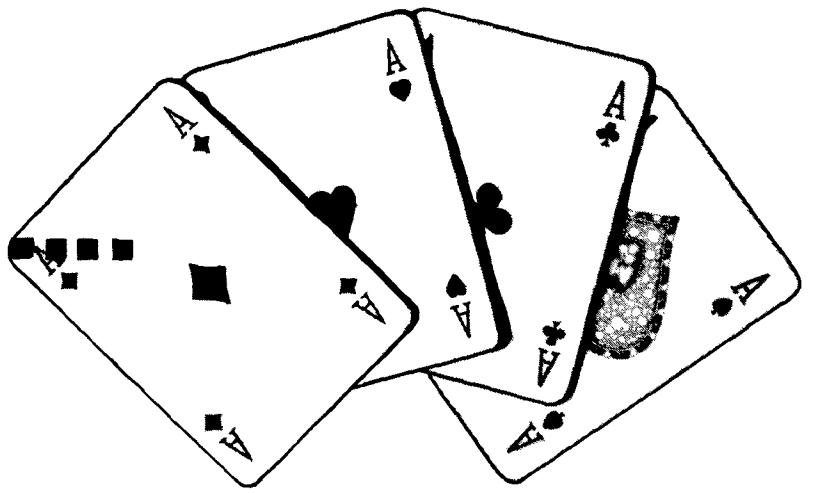
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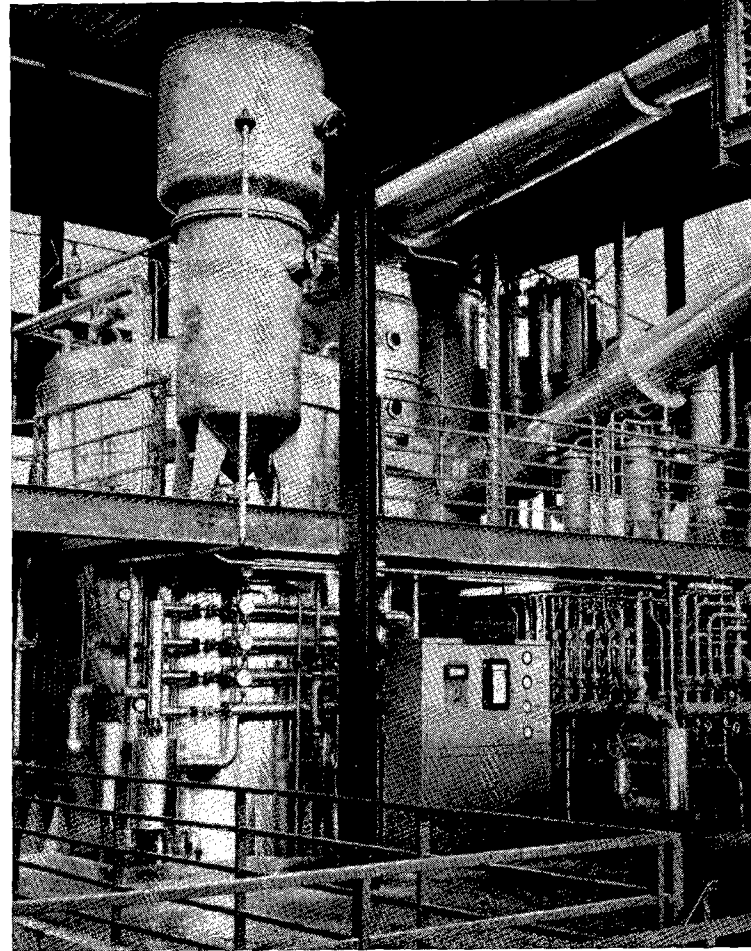
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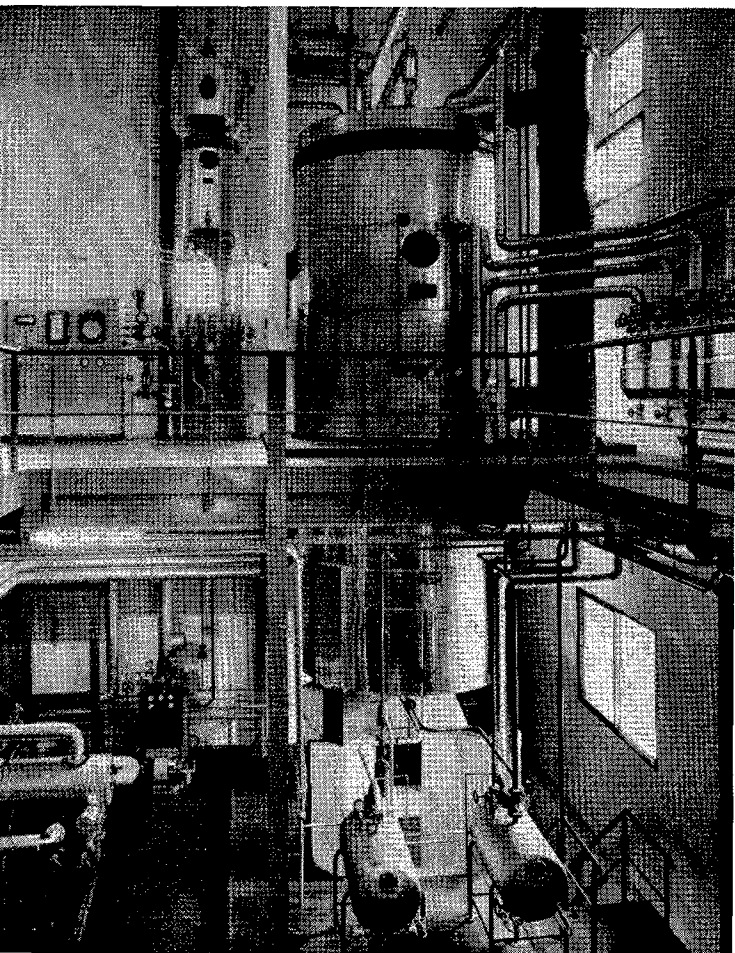
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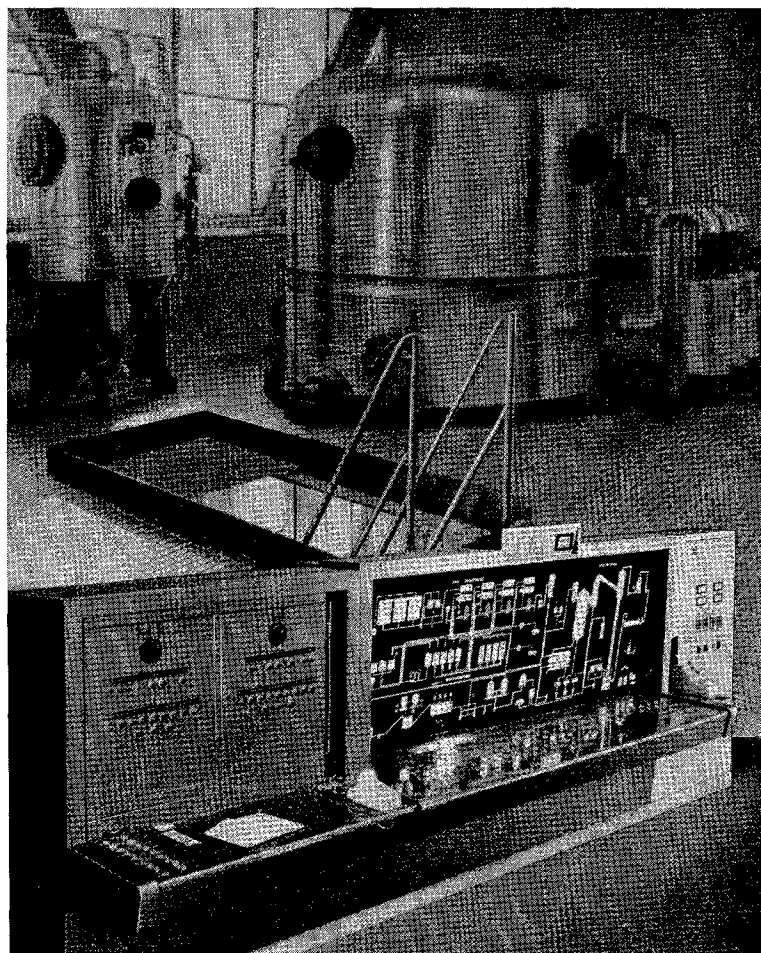
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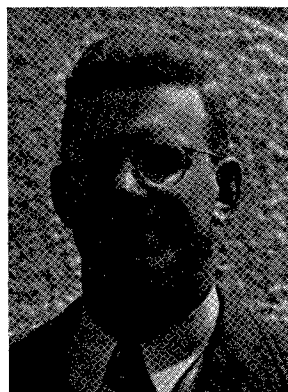


DOVERT-T timerized, semi-continuous deodorizing plant for edible oils and fats. Enables the changeover of the oil being treated without stopping the plant. Capacity: from 2.000 to 6.000 kg/hr.

which are now operating at the most important oil refineries of Europe

Chevreul Medal Awarded to AOCS Member for Eighth Time

Since 1963, the Association Francaise des Techniciens des Corps Gras has awarded the Chevreul Medal to outstanding recipients in order to honor foreign or French leaders in the field of lipid research. Eugène Chevreul was a nineteenth century French chemist noted for his work on fats and soaps and the medal has been established in his memory.



W. O. Lundberg

This year the medal has been awarded to W. O. Lundberg ('44) of the United States and to Roger Francois of France. This is the eighth time that an AOCS member has been awarded the coveted medal. Dr. Edgar Piret, Scientific Attache, American Embassy in Paris, represented Dr. Lundberg at the presentation.

Dr. Lundberg, besides being Editor of the AOCS's LIPIDS journal, is Executive Director and Professor of Biochemistry at The Hormel Institute, University of Minnesota. Mr. Francois is Honorary Director of the Institute des Corps Gras.

Previous winners who have been AOCS members are: Giovanni Jacini ('51) of Italy, Marcel Loncin ('54) of Belgium, A. R. Baldwin ('44) of the United States, Henryk Niewiadowski ('68) of Poland, Charles Paquot ('52) of France, Jan Boldingh ('68) of the Netherlands and A. C. Frazer ('64) of Great Britain. Other winners have been G. Champetier of France, T. P. Hilditch of Great Britain, J. Martinez Moreno of Spain, Miss Marie Therèse François and Pierre Desnuell of France, and C. Trottmann of France.

New Research Station Opened by Harrisons & Crosfield

A new Research and Development Laboratory was opened on July 10, 1970, at Camberley in Surrey, England, by J. F. E. Gilchrist, Chairman of Harrisons & Crosfield. The ceremony was attended by more than seventy distinguished guests from the United Kingdom and overseas including the High Commissioner of Malaysia.

The Laboratory is believed to be the only one outside the producing countries owned by a commercial organization specifically built and equipped to carry out a comprehensive program of palm oil and natural rubber research. Its main objective will be to improve the quality of the plantation products offered by Harrisons & Crosfield to world markets and to extend their use into new applications. Considerable emphasis will be given in its work to palm oil, of which the Group handles more than ten per cent of world production, and where for some years they have been making intensive efforts to meet buyers' quality requirements.

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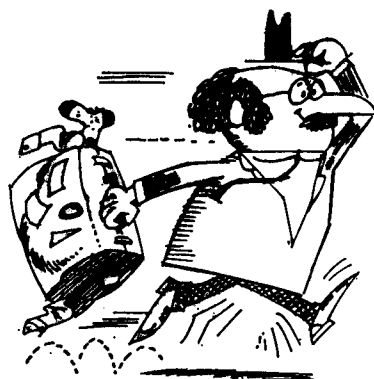
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Meetings

AOCS National Meetings

- Sept. 27-Oct. 1, 1970—Chicago, Conrad Hilton Hotel.
- May 2-6, 1971—Houston, Shamrock Hotel.
- Oct. 2-6, 1971—Atlantic City, Chalfonte-Haddon Hall Hotel.
- April 23-26, 1972—Los Angeles, Calif., Statler Hilton Hotel.
- Sept. 24-28, 1972—Ottawa, Canada, Chateau Laurier Skyline Hotel.

Other Organizations

- Oct. 11-14, 1970—Ninth Annual Meeting, ASTM Committee E-19 on Chromatography, Brown Palace Hotel, Denver, Colo.
- * Oct. 14-16, 1970—Second Technical Conference on Photopolymers, Nevele Country Club, Ellenville, N.Y.
- Oct. 14-17, 1970—International Symposium on Computer Applications in Engineering Sciences, Istanbul Technical University, Istanbul, Turkey.
- Oct. 12-15, 1970—84th Annual Meeting of the Association of Official Analytical Chemists, Marriott Motor Hotel, Twin Bridges, Washington, D.C.
- * Oct. 18-21, 1970—20th Canadian Chemical Engineering Conference, Sarnia, Ontario, Canada.
- Oct. 26-29, 1970—ISA 25th Annual Conference and Exhibit on Instrumentation, Systems and Automatic Control, Civic Center, Philadelphia, Pa.
- Oct. 26-28, 1970—17th Spectroscopy Symposium and Exhibition of Instrumentation, Skyline Hotel, Ottawa, Ontario, Canada.
- Oct. 26-30, 1970—Fourth Materials Research Symposium, National Bureau of Standards, U.S. Department of Commerce, Gaithersburg, Md.
- Oct. 28-31, 1970—48th Annual Meeting of the Federation of Societies for Paint Technology, Statler-Hilton and Sheraton-Boston, Boston, Mass.
- Oct. 29-30, 1970—Annual Meeting of the Texas Seedmen's Association, Fairmont Hotel, Dallas, Tex.
- Nov. 1-5, 1970—Dairy & Food Industries Exposition, Astorhall, Houston, Tex.
- Nov. 2-4, 1970—Technicon International Congress on Automated Analysis, New York Hilton Hotel, New York, N.Y.
- Nov. 8-13, 1970—Second Annual Educational Conference of the College of Pharmaceutical Sciences, Columbia University and the Society of Cosmetic Chemists, Dellwood Conference Center, New York, N.Y.
- * Nov. 9-13, 1970—U.S. Flow Automation Equipment Exhibition, U.S. Department of Commerce, U.S. Trade Center, London, England.
- * Nov. 9-13, 1970—U.S. Biochemical Test, Control Equipment Exhibition, U.S. Department of Commerce, U.S. Trade Center, Sydney, Australia.
- Nov. 16-21, 1970—Industrial and Scientific Temperature, Measurement and Control Equipment Exhibition, U.S. Trade Center for Scandinavia, Stockholm, Sweden.

*Additions to previous calendar.

• Names in the News

H. P. GORMLEY ('60) has been promoted to marketing manager of food additives for the Chemical Division of Hoffmann-La Roche Inc., Nutley, New Jersey. In his new capacity Mr. Gormley will be responsible for the marketing of carotenoids, antioxidants and new products to the food industry. Mr. Gormley received a B.S. degree in chemistry from Georgia State College. Previous to joining Roche in July 1962, he was plant chemist, and later assistant plant manager, for Atlanta Margarine Plant Standard Brands Inc., Atlanta, Georgia. Before his promotion at Roche, Mr. Gormley was a sales representative in the Fine Chemicals Division. As a representative he was responsible for sales in the Southeastern States. In recognition of his outstanding, creative salesmanship, Mr. Gormley received the Barrell Award in 1964 and was named Eastern Regional Top Ten Award Winner in 1969.

MORTON BEROZA, research chemist in the USDA, was named the winner of the 14th AOAC Harvey W. Wiley Award for his outstanding contributions to analytical chemistry important to agriculture and public health. The award will be presented to Dr. Beroza during the Association of Official Analytical Chemists Annual Meeting. The \$750 award is presented annually to recognize notable achievements in development and study of analytical methodology needed for research and regulatory purposes on foods, pesticides, feeds, drugs, fertilizers and related areas. The award was established in 1956 in honor of Harvey W. Wiley, the "father" of the 1906 Pure Food and Drug Act and a founder of the AOAC. The Award Committee noted that Dr. Beroza "has been an excellent and prolific research scientist in insecticide chemistry, and has developed gas chromatographic methods for analyzing residues of pesticides and their metabolites at nanogram levels." It also was noted that "his most interesting and far-reaching contributions are the methods developed for structure determinations." He has pioneered development of techniques, catalysts and apparatus for carbon-skeleton chromatography. In addition, he has developed reaction gas chromatography, techniques for micro-ozonolysis and concepts of partition coefficients of pesticides in binary solvent systems. These techniques for structure determination are a "major contribution to the broad field of analytical chemistry." After graduation from George Washington University in 1943 with a B.S. degree in chemistry, Dr. Beroza earned his M.S. degree in 1946 and his Ph.D. degree in 1950 at Georgetown University. He started his career with the Food and Drug Administration in 1939, served in the U.S. Navy 1943-1946, and worked at the U.S. Naval Ordnance Laboratory 1946-1948. Since 1948, he has been employed by the USDA in Beltsville, Maryland, and is Investigations Leader in charge of Synthetics and Analytical Investigations for the Pesticide Chemicals Research Branch. Dr. Beroza has received the USDA Certificate of Merit awards in 1959, 1965, 1966 and 1967.

At the 47th Annual Meeting of The American Institute of Chemists, LINUS PAULING was a recipient of the award, "Chemical Pioneers Who Have Shaped Industry," for "contribution to the theory of chemical bonding, metallurgy, biochemistry, crystal structure and for being a great humanitarian." He won the Nobel Prize in 1954 for chemistry and in 1962 he was awarded the peace prize. He has been on the staff of Stanford since 1969; having left the University of California, San Diego. F. D. SNELL also received the award for "his many contributions to surface chemistry and specifically for his role in the invention of packaged shave-foam." After receiving his Ph.D. in chemistry from Columbia University, Dr. Snell was an instructor at Pratt Institute until 1930 when he formed Foster D. Snell, Inc., a research and consulting firm. He directed the team which created shave-foam. He received the Gold Medal of the British Society of Chemical Industry in 1949. Dr. Snell is a Past President of the American Institute of Chemists and a Fellow of the Royal Society of Arts in London.

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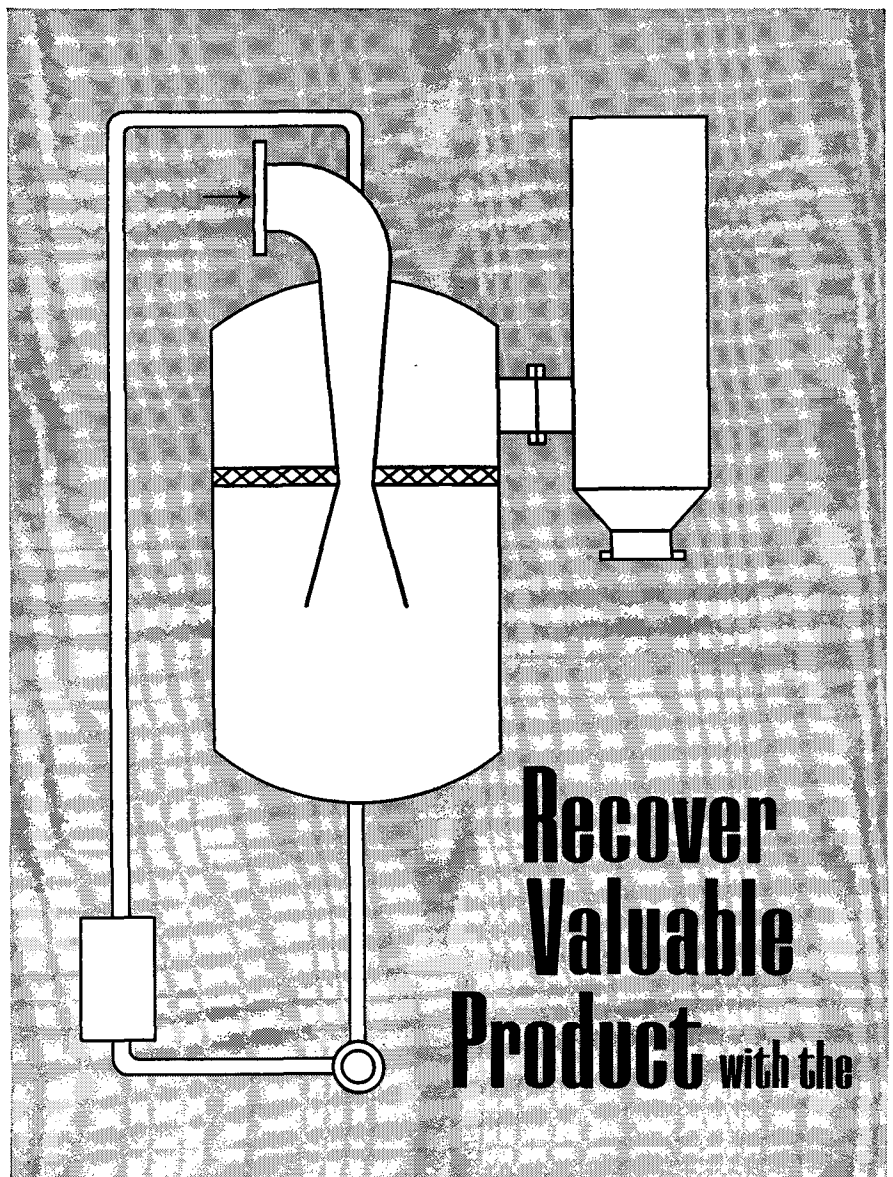
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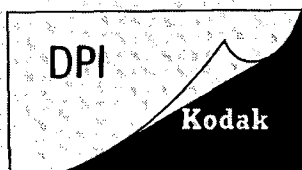
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with Sheetz, Prestegard and Chan from Caltech made some fascinating revelations. In whole red cell membranes, essentially all the lipid methylene and methyl protons were immobilized. Upon phospholipase C treatment a substantial portion of such protons were manifested in spectra that resembled those of phosphatidyl choline, whereas the membrane protein conformations remained essentially the same. The most powerful and far reaching concept developed by Singer was that a substantial portion of the lipid in the membrane is in a physical state that is not strongly coupled to the conformation of the membrane proteins. This and previous evidence concerning the accessibility of the phosphoester bonds of lecithin of red cell membrane to phospholipase C, supports further the model of Lenard and Singer; thereby, the membrane is a mosaic of lipid bilayers penetrated by protein.

Dr. Scanu presented circular dichroism spectra of the conformation of human serum low- and high-density lipoproteins (LDL and HDL) as a function of temperature. Both lipoproteins showed reversible thermal transitions whereas the apoproteins in the absence of lipid revealed marked thermal instability. Although the lipid in lipoprotein seems to stabilize the conformations of the protein, the latter are not too dependent on the former. Reconstitution was achieved by relipidation of apo-HDL with HDL lipids, which restored the spectral properties of the original lipoprotein under given thermal conditions.

New horizons loomed before Chapman's report of marked effect of small valinomycin concentrations on some physical properties of lipid systems and membranes.

Biological Membranes

The third session on biological membranes was chaired by A.A. Benson, who discussed the role of several lipids in the structure of chloroplast membranes. According to Benson, the hydrophobic chains of lipids are inserted within the hydrophobic interior of structural proteins. Experiments on the recombination of chloroplast lipids and lamellar protein showed that the association depends on the nature of the hydrophobic moiety of the lipid and not on the nature of their hydrophilic groups. The data point out the importance of specific hydrophobic association of lipids with the lamellar membrane protein.

Conventional preparatory procedures introduce artifacts in the electron microscopy images of membranes, explained Sjostrand. Systematic studies are required which use mild methods and avoid the extensive denaturation occurring after the conventional fixation and dehydration. The new techniques provide images that are consistent with Sjostrand's early model of cellular membranes: a mosaic of globular proteins intercalated with globular or lamellar lipid. The model emphasizes the distribution of function over the various protein, lipids and lipoprotein subunits.

Following Dr. Sjostrand's lecture on "Structure and Function of Biological Membranes," the remainder of the third session was devoted to the Mycoplasma membrane with reports by Terry, Steim and Engelman. The convergence of very fine techniques and talents have made this one of the most studied and appreciated membrane systems. Selective removal of mycoplasma membrane lipids and proteins was described by Thomas Terry. Lipid depleted membranes had higher isopicnic density than native membranes and preserved trilamellar fine structure and vesicular features. Membranes depleted of 80% protein by prolonged incubation with proteolytic enzymes lost the trilamellar structure but retained vesicular morphology. Conspicuously, after lipid and protein depletion, galactosamine and glucosamine remained associated with vesicular material, suggesting a possible structural role of hexosamines in these membranes. Dr. Steim explains that the phase transitions observed by differential scanning calorimetry of Mycoplasma membranes arise from melting of fatty acid chains within the membrane lipid bilayer. The X-ray diffraction studies of Engelman confirmed Steim's data and interpretations and pinpointed the membrane lipid quite neatly.

Biological Perspectives

The fourth symposium session was devoted to biological perspectives, encompassing techniques and approaches that reach for new vistas in biological membranes. The chair was given to Dr. Stoekenius whose remarks exemplified the wisdom of a good conference. He put it this way: The question is not whether a model is right or wrong but that it be useful to explain experimental data and to advance our thinking. Daniellis' and non-Daniellis' were so reconciled in the one same cathedral of the objective inquiry.

By freeze fracturing and deep etching, Daniel Branton presented new evidence for fracture of membranes along nonpolar planes just as in lipid systems. Membrane surfaces were usually smooth, whereas inner hydrophobic phases were rough and showed protein containing particles. Number and distribution of the latter were unique characteristics of a given membrane type. Quite intriguing is the suggestion a year later from Chapman's laboratory to the effect that freeze-fractures of some membrane systems take place along hydrophilic planes.

Electron spin resonance studies with a steroid incorporated in membranes or phospholipid dispersions were carried out at Stanford University, and Hubbell reported. The very rapid motion of the large and rigid steroid spin label lends support to models of membrane transport in which carrier molecules move within the membrane structure.

The observations of lipid mobility in membranes by spin-labeling prompted comments from Dr. Cadenhead. If studies of monomolecular lipid films are to relate to a membrane like environment then such films must be liquid, rather than solid or gaseous. Lipids at given temperatures and film pressures assume either one of the liquid states: expanded, intermediate or condensed depending on the chemical structure of the lipid. Flexible saturated molecules, such as dimyristoyl cephalin, exist in the sensitive intermediate state. Rigid lipid molecules exist in either the solid condensed state, irrelevant or adverse to membrane function or the liquid condensed state; cholesterol esters are found in the liquid condensed state. These observations relate to the role of cholesterol in mixed films: Expanded films are condensed by cholesterol, however, the final state is liquid condensed and not solid. The physical state of the film is also influenced by the chemical nature of the subphase.

Bearing on problems of the functioning of membrane proteins was a report by Bolis on work of Bolis, Willbrandt, Luly and Elia from the Universities of Rome, Bern and Geneva. Both K_m and V_{max} for the transport of glucose across human red cell membrane increased linearly with pH when blood was treated with heparin, whereas k_m showed a maximum and V_{max} had a minimum at pH 7.4 when the blood was treated with citrate. The possibility of different interactions of heparin and citrate with protein and lipid-protein subunits of membranes is noteworthy.

Studies of lipid-protein interactions in membranes may be advantaged by the understanding of where and how membrane proteins are formed and function. Woodward discussed genetic control in the biogenesis and function of mitochondria. Nuclear genes and cytoplasmic microsomes produce many if not all mitochondrial enzymes. A suggested role of mitochondrial DNA is that of specifying insoluble membrane protein. Homogeneity and heterogeneity of structural mitochondrial protein could be a problem of genetic control.

Membrane Proteins

The symposium was concluded with a half day discussion session on membrane proteins, chaired by Woodward. What makes a membrane protein and what confers it the associability with lipids? How do they engage in processes of membrane biogenesis? Monolayer studies at the air-water interface indicate that proteins originating from biological structures have a marked tendency to form films, some thin and some thick. A possible membrane model is one in which protein and lipid anchor at water interfaces independently, whereby the protein provides the

• *Commentary . . .*

matrix of a mosaic in which lipid plugs fill the holes or frames produced by the protein. This and other non-Danielli models do not violate Danielli's postulate that phospholipid membranes are necessarily bimolecular and satisfy the interpretation of Sjostrand and Lenard and Singer namely that the lipid bilayer is not continuous. Moreover, the membrane model originating from monolayer studies (Colacicco) is in line with the conclusions of Singer and Seanu and of other EPR and NMR studies, according to which protein conformation and mobility can be little changed in the absence of lipid.

At the end of the third day, Dr. Sjostrand closed the symposium with a review of the highlights and conveyed the feeling that the strength of this meeting was in the quality and quantity of free discussion. No one particular view dominated the parley and a youthful spirit pervaded the proceedings.

Among several marked features, the symposium had abundant and effective discussion, a vivid dialogue between surface chemist and morphologist, and an exuberant emphasis on membrane proteins. The symposium was organized around topics rather than individual contributions and it was a discussion of highlights and controversies rather than the presentation of data. Discussion time was twice as much as presentation time. The dialogue between surface chemist and membranologist was most effective. This relation has been clouded with timidity in the face of an embarrassing paradox: Biology and membranology are a science of surfaces and colloids, and little if any attention is paid to these disciplines in teaching and research. The mingling and exchange of language between these two breeds of investigators will help the cause of both surface chemistry and biology.

Origin, metabolism and behavior of membrane proteins are of the utmost importance. Only recently have membrane proteins become available. Because of that, surface chemists have reported on the properties of lipids, and the properties of membranes have been made to depend primarily on the properties of lipid monolayers and bilayers. From the look of things the structure of the membrane may be determined by the protein, which implants interfacial conformations that are suitable to disperse and carry the lipid.

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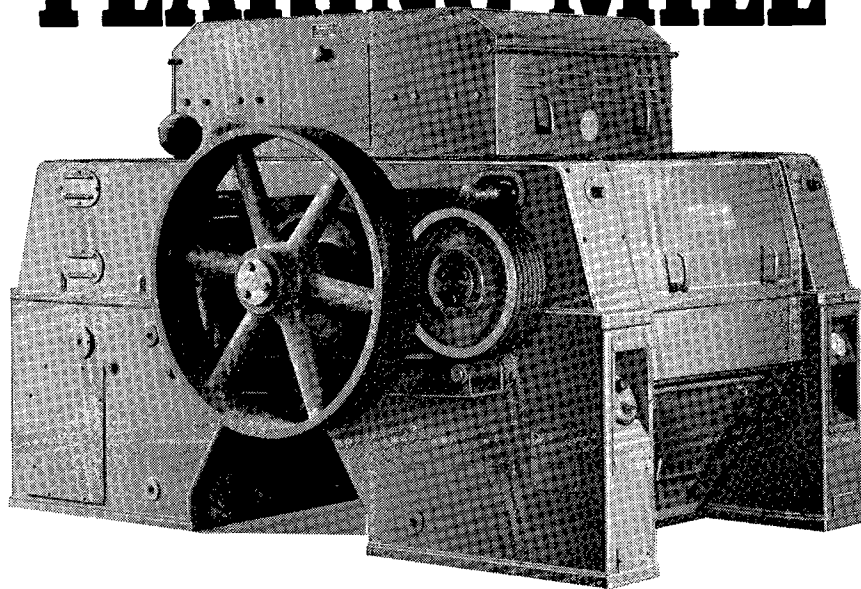
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(Continued from page 426A)

weight basis; with ethyl ether, it was 3.64%. About 90% of the residual fat was extracted in the first three hours. One cause of variability in the results was found to be the fineness of the grind and uniformity of particle size. Finer and more uniform particles permitted better extraction. (Rev. Franc. Corps Gras)

NOVEL HORIZONTAL EXTRACTOR WITH TWO CONVEYOR BELTS. R. Polatynski *et al.* *Tluszczze Jadalne* 14(3), 155-8 (1970). This extractor is not as tall as vertical ones (12 m against 20 m). It permits a higher concentration in the miscella (30% compared with 15-17%), and operates with countercurrent flow. (Rev. Franc. Corps Gras)

GLC ANALYSIS OF THE ISOTHIOCYANATES PRESENT IN OILSEEDS FROM CRUCIFEROUS PLANTS. K. Modzelewska and F. Mordret. *Tluszczze Jadalne* 14(3), 127-39 (1970). This method is rapid and accurate but requires use of a highly sensitive instrument equipped with a flame ionization detector. Butyl isothiocyanate is also required as a standard. (Rev. Franc. Corps Gras)

DETERMINATION OF TRACES OF SULFUR IN RAPESEED OIL. K. Babuchowski *et al.* *Tluszczze Jadalne* 14(3), 140-7 (1970). This method is similar to that of Granatelli and Reed used for the determination of sulfur in oil. The quantitative limits are 0.9-100 μ g. The method consists of a reductive desulfuration of the oil with a Raney nickel catalyst, conversion of the sulfur to H₂S by HCl, and titration of the H₂S with a solution of mercury acetate in the presence of dithizone. (Rev. Franc. Corps Gras)

SUCCESSIVE EXTRACTION AND PHOTOMETRIC DETERMINATION OF TRACES OF COPPER, IRON, NICKEL, MANGANESE, ZINC AND MOLYBDENUM IN SINGLE SAMPLES OF VEGETABLE MATERIAL. M. Karvanek. *Sb. Vys. Sk. Chem.-Technol. Praxe, Potraviny*. E23, 13-19 (1969). In the first step, 5-30 g of vegetable material is carbonized on a burner. Then it is ashed at 450C. The ash is taken up with 5-20 ml of HCl diluted 1:3, heated for 30 min in a boiling water bath, filtered, and the residue rinsed with water. The solid material is reashed, taken up a second time in 5-10 ml of HCl, and filtered. The two filtrates are combined and made to a volume of 25-100 ml with water. Determination of the different trace metals is carried out on three aliquots of the HCl extract: 1) Cu, Fe, Ni, Zn, Mn; 2) Zn in the presence of a large quantity of Mn; and 3) Mo. (Rev. Franc. Corps Gras)

RAPESEED. XI. STABILITY OF CRUDE RAPESEED OIL TO AUTOXIDATION. J. Pokorny. *Sb. Vys. Sk. Chem.-Technol. Praxe, Potraviny*. E23, 69-73 (1969). The Schaal oven at 60C was used to study the stability of six samples of crude rapeseed oil. Progress of the oxidation was followed by changes in peroxide value and sample weight. Results obtained from the peroxide values were a little higher than those from sample weights. The induction periods were longer than for refined oils. (Rev. Franc. Corps Gras)

THE STABILITY OF FATS AND SUBSTANCES AFFECTING STABILITY. XIII. STABILIZATION OF PARTIAL GLYCEROL ESTERS AND FATTY ACIDS OF SUNFLOWER OIL. J. Pokorny *et al.* *Sb. Vys. Sk. Chem.-Technol. Praxe, Potraviny*. E23, 63-7 (1969). The emulsifier obtained by glycerolysis of sunflower oil can be stabilized by addition of quercetin whereas the oil itself cannot. Quercetin and rutin are quite inactive in these two substrates. In the sunflower oil emulsifier, the length of the induction period is almost directly proportional to the concentration of quercetin. The product of the length of the induction period and the rate of oxidation is nearly constant. (Rev. Franc. Corps Gras)

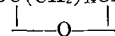
CHANGES IN THE STRUCTURE AND CONSISTENCY OF MARGARINE DURING STORAGE. N. I. Kozin *et al.* *Izv. Vysshikh Uchebn. Zavedenii, Pishchevaya Tekhnol.* 1970, 141-5. Polymorphic crystal changes which can occur in margarines during storage may adversely affect the use properties of the product. These changes are caused not only by the fatty raw material but also by the hydrogenation conditions. (Rev. Franc. Corps Gras)

• Fatty Acid Derivatives

PREPARATION AND PROPERTIES OF POLYMERS OF OLEIC ACID. T. Janowska (Inst. of General Chem., Warsaw). *Tluszczze, Srodki Piorace, Kosmet.* 14(1), 13-16 (1970). Preparation of fatty acid dimers for industrial uses was studied using local raw materials, in particular, methyl esters of oleic acid of 75% purity. Thermal polymers were obtained by heating at 400C with the addition of 5% water as a catalyst. Oxidative polymers were obtained by heating the esters at 250-300C in a current of air. Dehydropolymers were made by heating 0.97 mole of esters and 0.123 mole of *tert*-butyl peroxide at 135C in an atmosphere of nitrogen. The catalyst and the monomer were separated by vacuum distillation, and the polymers were purified by molecular distillation. The dehydropolymers exhibited the best properties for the intended uses. (Rev. Franc. Corps Gras)

THE SYNTHESIS OF A SPIN-LABELLED GLYCERO-PHOSPHOLIPID. R. Aneja and A. P. Davies (Unilever Res. Lab., Colworth/Welwyn, The Frythe, Welwyn, Herts., England). *Chem. Phys. Lipids* 4, 60-71 (1970). 0-(1,2-Distearoyl-sn-glycero-3-phosphoryl)-3'-hydroxymethyl-2',2',5',5'-tetramethylpyrrolidine-1'-oxyl has been synthesized as a spin-labelled substrate for the study of lipid-protein interactions with particular reference to lipolytic enzymes. For this, the new spin label, 3-hydroxymethyl-2,2,5,5-tetramethylpyrrolidine-1-oxyl was prepared and phosphorylated with 1,2-distearoyl-sn-glycero-3-phosphoric acid, using tri-isopropylbenzenesulphonyl chloride as the condensing agent.

SYNTHESIS OF MACROCYCLIC LACTONES. SYNTHESIS OF 1,14-TETRADECANOLIDE. Hiromu Kameoka, Akio Morita, Hironori Nakamura and Nenokiehi Hirao (Kinki Univ., Higashi-Osaka, Osaka, Japan). *Yukagaku* 19(2), 70-5 (1970). Erucic acid was converted to 1,14-tetradecanolide (I), $OC(CH_2)_{12}CH_2$, via




13-docosenol, erucyl bromide, 14-tricosenol, and ω -bromomyristic acid. It had musk-like odor. Infrared spectra are given.

RADICAL ADDITION TO OLEFINIC COMPOUNDS. Yasuo Suhara (Governm. Chem. Ind. Res. Inst. Tokyo, Shibuya-ku, Tokyo, Japan). *Yukagaku* 19(3), 121-34 (1970). The topics reviewed include the reaction mechanism, and addition of fatty acids, esters, their derivatives containing halogen or cyan, aldehydes, ketones, lactones, alcohols, amines, amides, and nitriles to various olefinic compounds.

• Biochemistry and Nutrition

SURFACE TENSION OF AN ARTIFICIAL BILEAFLET MEMBRANE IN COMPARISON TO PARENT LIPID SOLUTION-WATER INTERFACIAL TENSION. A. Moran and A. Ilani (Dept. of Physiol., Hebrew Univ., Haddassah Med. School, Jerusalem, Israel). *Chem. Phys. Lipids* 4, 169-80 (1970). Bileaflet membranes were produced between 0.1N NaCl solutions from a solution of 4% cholesterol and 5.5% egg-lecithin in methyl oleate. The surface tension of these membranes was calculated from the measured change in capacitance in response to a change in pressure difference across the membrane. The change in capacitance was assumed to reflect change in bulging of membrane. A surface tension of $0.49 \pm \text{s.d. } 0.15 \text{ dyn/cm}$ ($n = 15$) was found. The surface tension increased with membrane aging. The water-parent lipid solution interfacial tension was 0.72 dyn/cm. It is concluded that the difference between the free energy of formation of two interfacial surfaces and that of a bileaflet membrane is more than 1 erg/cm². Only a negligible fraction of this difference could be accounted for by the interaction between water molecules across the ultrathin membrane.

THE EQUILIBRIUM AND STRUCTURE OF LECITHIN-CHOLATE MIXED MICELLES. W. Shankland (Service de Biophysique, Institut Pasteur, 28, rue du Dr. Roux, Paris XV, France). *Chem. Phys. Lipids* 4, 109-30 (1970). The nature of the equilibrium between mixed micelles and intermicellar solution has been determined for the system lecithin-sodium cholate. The composition of the intermicellar solution has been estimated from light scattering data and the results confirmed by other methods. The composition and size of the mixed micelles have been evaluated. Provided that the mixed micelles are in equilibrium with a solution containing at least the critical micelle concentration (CMC) of cholate, their size was shown to diminish progressively as the ratio lecithin/cholate present in the mixed micelles decreased. At the same time the concentration of the free cholate dissolved in the intermicellar solution, in equilibrium with the mixed micelles, was shown

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