

eel. The parasites attach themselves at the wall of the intestine where they cause inflammatory reactions. This inflammation together with the high worm burdens is harmful to the eel leading to retarded growth of this commercially important fish. The growing interest in fish parasitology resulting from the expanding commercial aquaculture for edible fishes and from substantial financial losses by pathogenic effects of parasitic worms prompted us to study the lipids of *P. ambiguus* in comparison with infected tissue of eel intestine. Differences between lipid metabolism of parasite and host might be utilized as a useful approach for the control of acanthocephalans in fish and of endoparasites in general.

Analysis of various neutral and ionic lipid classes, e. g. triacylglycerols, sterols, and phosphatidyl-cholines, of *P. ambiguus* and of infected intestinal tissue of eel show considerable differences in the fatty acid composition of both neutral and ionic lipid fractions from the endoparasite compared to the host tissue. The enrichment of individual fatty acids, in particular eicosapentaenoic acid (20:5 *n*-3) as well as long-chain and very long-chain saturated fatty acids, in various lipid fractions of the parasites indicates that in *P. ambiguus* species-specific mechanisms exist for the regulation of fatty acid composition by biosynthetic reactions or absorptive and excretory processes. The sterols of *P. ambiguus* contain high proportions (> 20%) of minor sterols which were identified by gaschromatography-mass spectrometry as campesterol and various dehydrosterols, e. g. 7-dehydrocholesterol and cholesta-5,22(*E*)-dienol. Moreover, an active enzyme system for fatty acid chain elongation exists in *P. ambiguus* which elongates [ $1-^{14}\text{C}$ ]palmitic acid consecutively to stearic and arachidic acids. Highest proportions of radioactive elongation products were detected in phosphatidylethanolamines. In contrast, incubation of *P. ambiguus* with [ $1-^{14}\text{C}$ ]oleic acid under similar conditions led to only small proportions of labelled eicosenoic acid.

T. C. Christensen, A.-M. Haahr and Gunhild Højlmer, Lyngby/DK: *Volatile aroma components from autoxidized butter and a spread made of butter and vegetable oil*

The sensory quality of products containing fat is highly dependent on the presence of volatile lipid oxidation products. The process of lipid oxidation typically leads to the formation of a wide range of secondary oxidation products, some of which are potent odorants contributing to a pleasant taste and smell. These volatiles may however sooner or later lead to deterioration.

The oxidation processes are still to-day often followed by simple empirical methods, which are inadequate to characterize the great variety of products formed. The determination of the flavor impact of individual components is very difficult due to the large number of products formed and their different flavor threshold values. Therefore new methods of detection are needed.

In an attempt to correlate different methods for oxidative characterization we examined techniques as GC/MS, GC combined with "sniffing" and conventional analysis as the peroxide and anisidine values.

Butter and the spread were stored under various

conditions at three different temperatures for four weeks to determine flavor stability. These fats were chosen because of the difference in their fatty acid composition and their commercial importance. The volatiles were collected for 30 minutes on an adsorbent trap (Tenax/GR) in a dynamic system operating at 60°C with N<sub>2</sub> as purging gas.

After thermal desorption the volatiles were separated by GC and identified by mass spectrometry and GC with FID by comparison of retention times for available standards. A further characterization was performed by "sniffing" analysis on a GC equipped with an olfactory outlet.

From both the butter and the spread more than 100 compounds could be identified by GC/MS. An increasing total amount of volatiles was formed during storage. The "sniffing" analysis indicated that the following components were important to the sensory quality: Diacetyl, heptanal, 2-heptanone, D-limonene, 1-octene-3-one and 2-nonenane.

A correlation could be seen between the fatty acid composition of the fats and the volatiles expected from simple cleavage of the hydroperoxides formed by oxidation of the unsaturated fatty acids present. The development of different volatiles during the storage was shown to correlate with results obtained by the Totox and the anisidine values.

The methods presented has thus proven to be powerful tools in the characterization of oxidative changes in stored milkfat.

S. Warwel, Barbara Kaiser and W. Kaiser, Münster: *Continuous metathesis of unsaturated fatty acid methylesters with ethylene in a miniplant*

A continuously working miniplant for the metathesis of unsaturated fatty acid methylesters with ethylene was developed. The reaction takes place under pressure of 25 bar ethylene at room temperature in a loop reactor using the tin alkyl activated catalyst Re<sub>2</sub>O<sub>7</sub>/B<sub>2</sub>O<sub>3</sub>-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub> in suspension.

Starting with fatty acid methylesters from high-oleic sunflower oil, normal and high-erucic rapeseed oil as well as from linseed oil conversion rates of 60–70% of the unsaturated esters are achieved at an average retention time of 45 minutes yielding ω-unsaturated esters and α-olefins.

N. Tsevegşüren, K. Aitzetmüller, Gisela Werner and T. Otgonbajar, Münster: *Analytical investigation on some seed lipids from Mongolia*

A large number seed fats of flowering plants contain palmitic, oleic, linoleic and α-linolenic acids in varying proportions as the major components. But many wild species of high plants are capable of synthesizing unusual and technical interesting fatty acids. Recently, there has been much interest in natural source of γ-linolenic and stearidonic acids due to claims of their involvement in

preventing or alleviating a wide variety of human diseases. The occurrence of unusual fatty acids in seed lipids is often correlated to Taxonomy.

In the scope of systematic studies the seed oil fatty acids from seeds of some selected plants from the Mongolia are investigated for presence of unusual fatty acids and supplement the literature data with respect to species not previously studied.

Capillary gas chromatographic analysis of fatty acid methyl ester indicates different unusual fatty acids ( $\gamma$ -linolenic, stearidonic, gondoic and columbinic acid) in the seed lipids from Ranunculaceae, Boraginaceae and other families, what may be correlated to certain genera or species.

Analysis, identification, structure elucidation and chemotaxonomical significance of unusual fatty acids from seed lipids are discussed by way of several wild plant species from the Mongolia investigated by us last time.

Eva Selstam, P. Williams and G. Lindblom, Umeå/S: *Cubic phase structures formed by chloroplast lipids*

Chloroplast lipids consist mainly of monogalactosyl diacylglycerol (MGDG, 50%), digalactosyl diacylglycerol (DGDG, 30%), sulfoquinovosyl diacylglycerol and phosphatidyl glycerol. MGDG forms a H<sub>II</sub> phase structure in contrast to the other lipids that will form a lamellar phase with water. In mixtures of MGDG and DGDG as well as in mixtures of the four major chloroplast lipids cubic phase structures are formed. In both cases these structures have a bicontinuous Ia3d symmetry.

*In vivo* the chloroplast lipids participate in the formation of a cubic phase structure, the prolamellar body, formed in plastids of etiolated leaves. Prolamellar bodies isolated from maize leaves have a bicontinuous Pn3/Pn3m symmetry. The face structures of the chloroplast lipids and the prolamellar bodies were analysed with a combination of methods: NMR, X-ray diffraction, electron microscopy and optical diffraction

Dubravka Štrucelj, Desanka Rade and Ž. Mokrovčak, Zagreb/Croatia: *Antioxidative activity of soybean phospholipids in lard as a model system*

The effect of commercial soybean lecithin (containing 65.7% AI) and its fractions (deoiled lecithin, lecithin with 15% glycolipids, lecithin with 20% lysophosphatidylcholine, phosphatidylcholine-enriched lecithins) on the oxidative stability of lard was measured at different temperatures (60°C, 98°C, 140°C) and during exposure to UV light. The optimal concentration of added lecithins in the range 0.02–2% was investigated at 98°C, as well.

The order of effectiveness in inhibiting lard oxidation was as follows: commercial soybean lecithin > deoiled lecithin > phosphatidylcholine-enriched lecithin > phosphatidylcholine. The best antioxidative properties of commercial lecithin are especially marked at higher concentrations.

Desanka Rade, Dubravka Štrucelj and Ž. Mokrovčak, Zagreb/Croatia: *Effect of soybean pretreatment on the phospholipid content in crude and degummed oil*

The influence of heating temperature (30, 60, 80, 100°C), initial moisture (12.2 and 13.5%) and grinding (0.5–0.8 mm) or flaking (0.25 mm) of soybean on the phospholipid extraction with chloroform/methanol mixture (volume ratio 2:1) and/or hexane, as well as the effect of soybean pretreatment on water degumming of crude oil were investigated. The content of phospholipids in oil decreased with increased heating temperature and with lower initial soybean moisture. The wet-heat treatment of soybean (grinding and flaking) prior to the extraction increased the phospholipid content in oil. Extraction with chloroform/methanol mixture yielded 2–3 times more phospholipids than with hexane. Soybean pretreatment elevated or lowered the phospholipid level in extracted oil similar to hexane extraction. Under the same processing conditions, the oil obtained from soybean flakes had a higher phosphorus content than the oil from ground soybean. The results of laboratory water degumming show that the phosphorus content of degummed oil from unpretreated soybean is higher than that obtained from pretreated seed. A higher content of hydratable phospholipids was retained in degummed oil obtained from unpretreated soybean.

W. Reuter, L. Engelmann, B. Vorberg, H.-J. Peters and U. Pilz, Leipzig: *The behaviour of selected parameters of the antioxidative potential in acute myocardial infarction*

Cardiovascular diseases, particularly the acute myocardial infarction, are still the most common death cause among the population of the highly developed industrial countries.

Clinical research experiments are increasingly aimed at preventing myocardial infarction and reducing its consequences, respectively.

The objective is to increase the supply of oxygen and to lower the need for oxygen of the heart. From the clinical point of view the determination of the concentration of the antioxidative potential is getting more and more important in evaluating and treating the damage of reperfusion.

The following parameters in serum were measured in 20 patients with established myocardial infarctions and following lysis therapy:

- magnesium, copper, zinc, selenium (atomic absorption),
- vitamins C and E (HPLC),
- TBARS (Malonyldialdehyd), Glutathione peroxidase (GP<sub>x</sub>) (VIS-spectrometry).

Various blood samples were taken immediately at admission to hospital and after 2, 4, 8, and 24 hours and furthermore daily from the second to the tenth day.

Statistic were made by mean of a paired samples t-test two-tailed probability ( $\alpha = 5\%$ ).

While controlling the procedure we found significant changes in the following parameters

- Vitamin E – highly significant decrease from the 4th hour to the tenth day,