

# **Euro Food Chem Conferences and the Development of Food Chemistry**

**Peter Czedik - Eysenberg Lecture**  
**EURO FOOD CHEM CONFERENCE COPENHAGEN 2009**

**O.Univ. Prof. Dr. Werner Pfannhauser**  
**Graz University of Technology, Austria**

# Peter Czedik – Eysenberg



- Founder of FECS Working Party of Food Chemistry 1976
- President 1976 – 1995
- Initiator of
  - Euro Food Chem Conferences
  - Allergy Conferences
  - Toxicology Conferences
  - Chemical Reactions in Food
  - Recent Advances in Food Analysis
  - Pigments in Food
  - In Vino Analytica Scientia
  - amongst others

# THE HISTORY

of 33 years

**„Only those who know from  
where we come know where  
we are going“**

# DIVISION OF FOOD CHEMISTRY

## Chairpersons

TUG

- Peter Czedik Eysenberg 1976 – 1995
- Reto Battaglia 1995 – 2000
- Roger Fenwick 2000 – 2005
- Trygve Eklund 2005 – 2009
- Livia Simon Sarkadi  
incoming  
chairwoman

# **DIVISION OF FOOD CHEMISTRY**

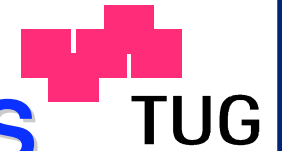


**TUG**

## **List of Secretaries General**

- **1976 – 1995**                      **Werner Pfannhauser (A)**
- **1995 – 2001**                      **Roger Fenwick (UK)**
- **2001 – 2005**                      **Jose Empis (E)**
- **2005 – 2009**                      **Livia Simon Sarkadi (H)**
  
- **Incoming secretary Kitti Nemeth (SK)**

# EURO FOOD CHEM CONFERENCES



- **I**                    **1981**                    **Vienna (A)**
- **II**                    **1983**                    **Roma (I)**
- **III**                    **1985**                    **Antwerp (B)**
- **IV**                    **1987**                    **Loen (N)**
- **V**                    **1989**                    **Paris/Versailles (F)**
- **VI**                    **1991**                    **Hamburg (D)**
- **VII**                    **1993**                    **Valencia (E)**
- **VIII**                    **1995**                    **Vienna (A)**

# EURO FOOD CHEM CONFERENCES

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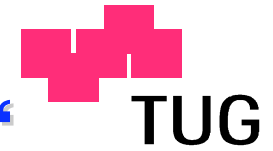
- IX 1997 Interlaken (CH)
- X 1999 Budapest (H)
- XI 2001 Norwich (UK)
- XII 2003 Brügge (B)
- XIII 2005 Hamburg (D)
- XIV 2007 Paris (F)
- XV 2009 Copenhagen (DK)

# The „Working Party on Food Chemistry – Standards“

- The Book of Abstracts is available at the beginning of each conference
- A list of participants is edited

*These standards have been urged and introduced by Czedik-Eysenberg as a must.  
And still the idea works !*

# **A Story from the Early Days... or „The Case of the Magic Scissor“**

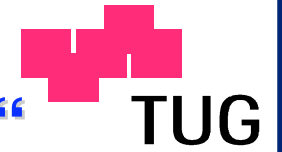


**As the formerly called „Working Party of Food Chemistry“ started to prepare their „First European Conference on Food Chemistry“ 1981 in Vienna the Scientific Committee sat together to select oral communications and posters from the proposals handed over.**

**We all were not very skilled in preparing big conferences.**

**So a list of all proposals with names and titles was typed (remember : there was no computer available) and a nearly endless list – better to say a list like forming a big cylinder - was pasted.**

....continuing „The Case of the Magic Scissor“



At this stage Prof. Baltes looked at and asked for a big scissor.

He cut the roll in little pieces and afterwards he arranged the presentations on a big table in the order of sessions planned.

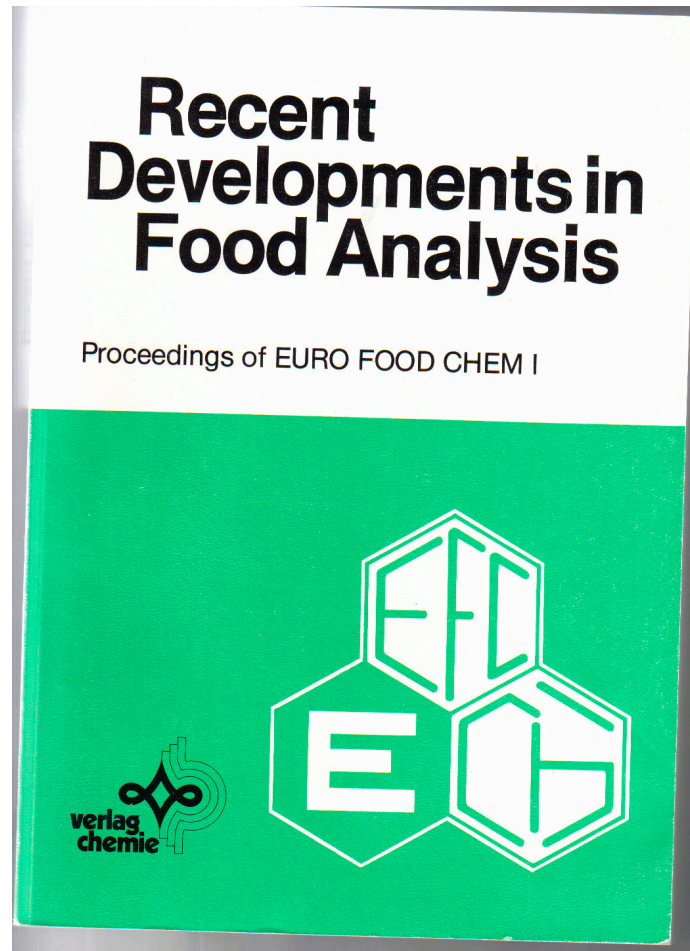
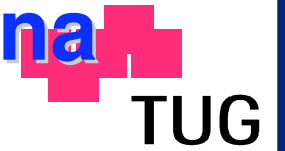
During this we discussed about the scientific value and to put what contribution in what section.

In principle not much has changes, I guess, in preparing the program of EFC conferences except the scissor which was substituted by a computer.

*O.Univ. Prof. Dr. Werner Pfannhauser*

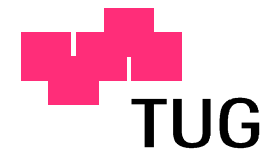
# Book from EURO FOOD CHEM I Vienna

## Titel



*O.Univ. Prof. Dr. Werner Pfannhauser*

## Book from EURO FOOD CHEM I Vienna (back side)



### **Recent Developments in Food Analysis**

This book presents the lectures and posters that were presented at the First European Congress on Food Chemistry (EURO FOOD CHEM I). It thus provides state-of-the-art reports on 67 topics that are of current importance in food analysis. The methods dealt with include chromatography, mass spectrometry, electrophoresis, immunological and enzymatic assays as well as procedures for the analysis of inorganic contaminants. Applications of these methods in the analysis of a vast variety of foodstuffs are described.

*O.Univ. Prof. Dr. Werner Pfannhauser*

# Titles of EURO FOOD CHEM Conferences

  
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- EFC I (1981) „Recent developments in Food Analysis“
- EFC II (1983) „Progress in the elucidation of chemical reactions during processing and storage of food“
- EFC III (1985) „Strategies in food quality assurance : analytical, industrial and legal aspects.“
- EFC IV (1987) „Rapid analysis in food processing and food control.“
- EFC V (1989) „Agriculture, food chemistry and the consumer.“

**EFC III (1985) „Strategies in food quality assurance  
: analytical, industrial and legal aspects.“**  **TUG**

## Hazard Analysis and Critical Control Points (HACCP)

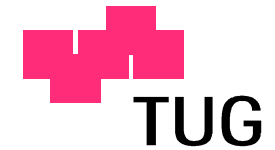
A preventive strategy for food safety

1959 developed by Pillsbury Co für NASA

1993 FAO recommended HACCP

2004 EU Regulation 853/2004

# EFC Topics



- In EFC IV (1987) „**Rapid analysis in food processing and food control**“ was the title.
- Rapid in-line control as well as food control by rapid methods made again a step forward in food chemistry, saving resources and money.

**EFC V (1989)** had chosen the main title  
**„Agriculture, food chemistry and the  
consumer.“**

***From the farm to the fork*** was the  
catchphrase of these days.

***Traceability and quality assurance*** on all  
stages of production took centre stage.

# Titles of EURO FOOD CHEM Conferences

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- EFC VI (1991) „Strategies for Food Quality Control and Analytical Methods in Europe.“
- EFC VII (1993) „Progress in Food Fermentation“
- EFC VIII (1995) „Current Status and Future Trends in Analytical Food Chemistry.“
- EFC IX (1997) „Authenticity and Adulteration of Food - The Analytical Approach.“
- EFC X (1999) „Functional Foods -A New Challenge for the Food Chemist.“

In Valencia **EFC VII (1993)** dealt  
with

**„Progress in Food Fermentation“**

putting the focus on developments  
in fermentation technology.

At that time probiotics was a minor  
subject but DFC dealt with it.

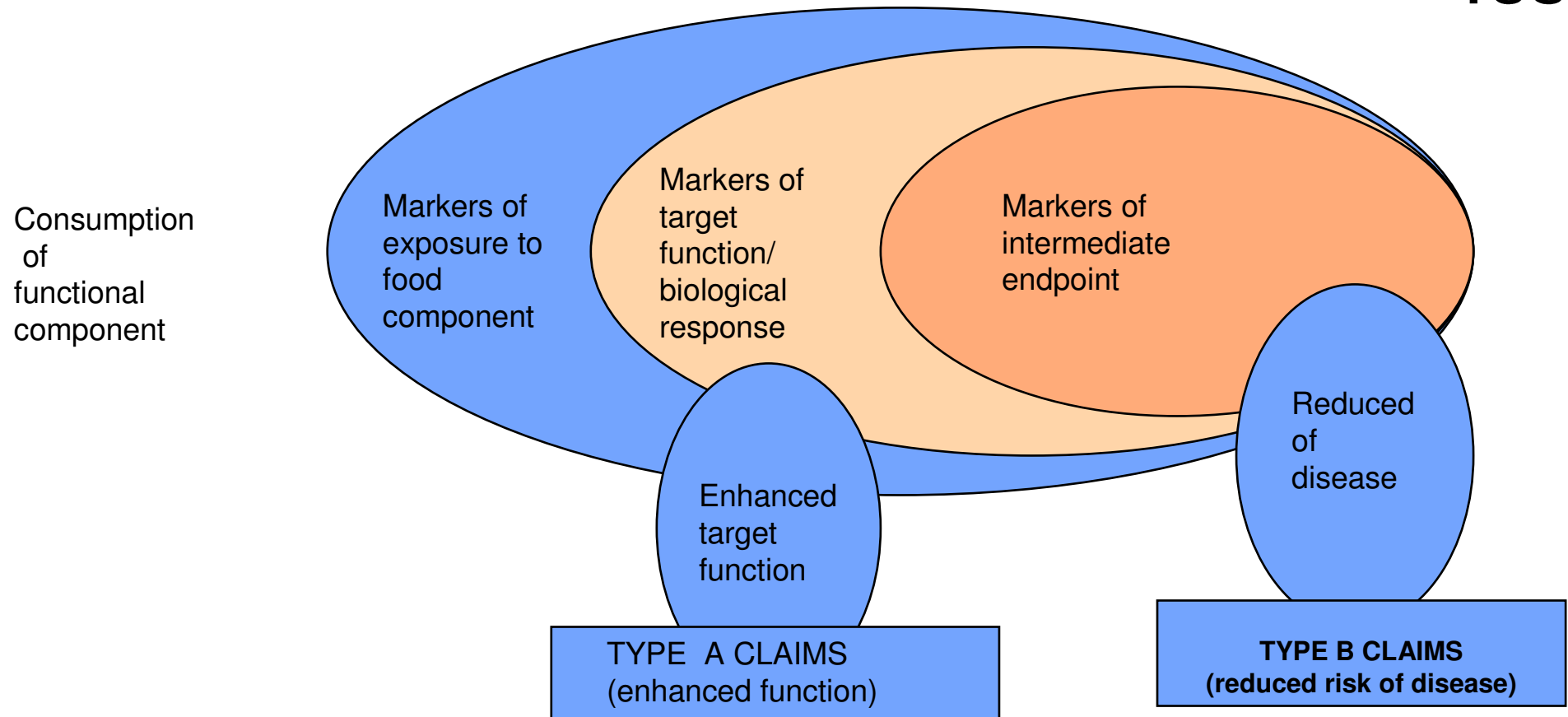
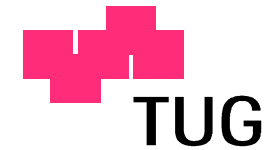
# EFC X (1999) „Functional Foods - A New Challenge for the Food Chemist.“

- The European Commission Concerted Action on Functional Food Science in Europe (FUFOSE)
- To assess critically the science base required to provide evidence that specific nutrients and food components positively affect target functions in the body;
- To examine the available science from a function-driven perspective rather than a product-driven one ;
- To reach consensus on targeted modifications of food and food constituents, and options for their application.

# EFC X (1999) „Functional Foods - A New Challenge for the Food Chemist.“

- Functional Food Science in Europe. (1998). British Journal of Nutrition, 80(1):S1-S193.
- Scientific Concepts of Functional Foods in Europe: Consensus Document. (1999). British Journal of Nutrition, 81(1):S1-S27.
- European Commission Community Research (2000) Project Report: Functional food science in Europe, Volume 1; Functional food science in Europe, Volume 2; Scientific concepts of functional foods in Europe, Volume 3. EUR-18591, Office for Official Publications of the European Communities, L-2985, Luxembourg.

# Scientific Concepts of Functional Foods in Europe



From scientific evidence based on markers for functional foods of types of claims relevant to them *Scientific Concepts of Functional Foods in Europe: Consensus Document. (1999). British Journal*

*of Nutrition, 81(1):S1-S27.*

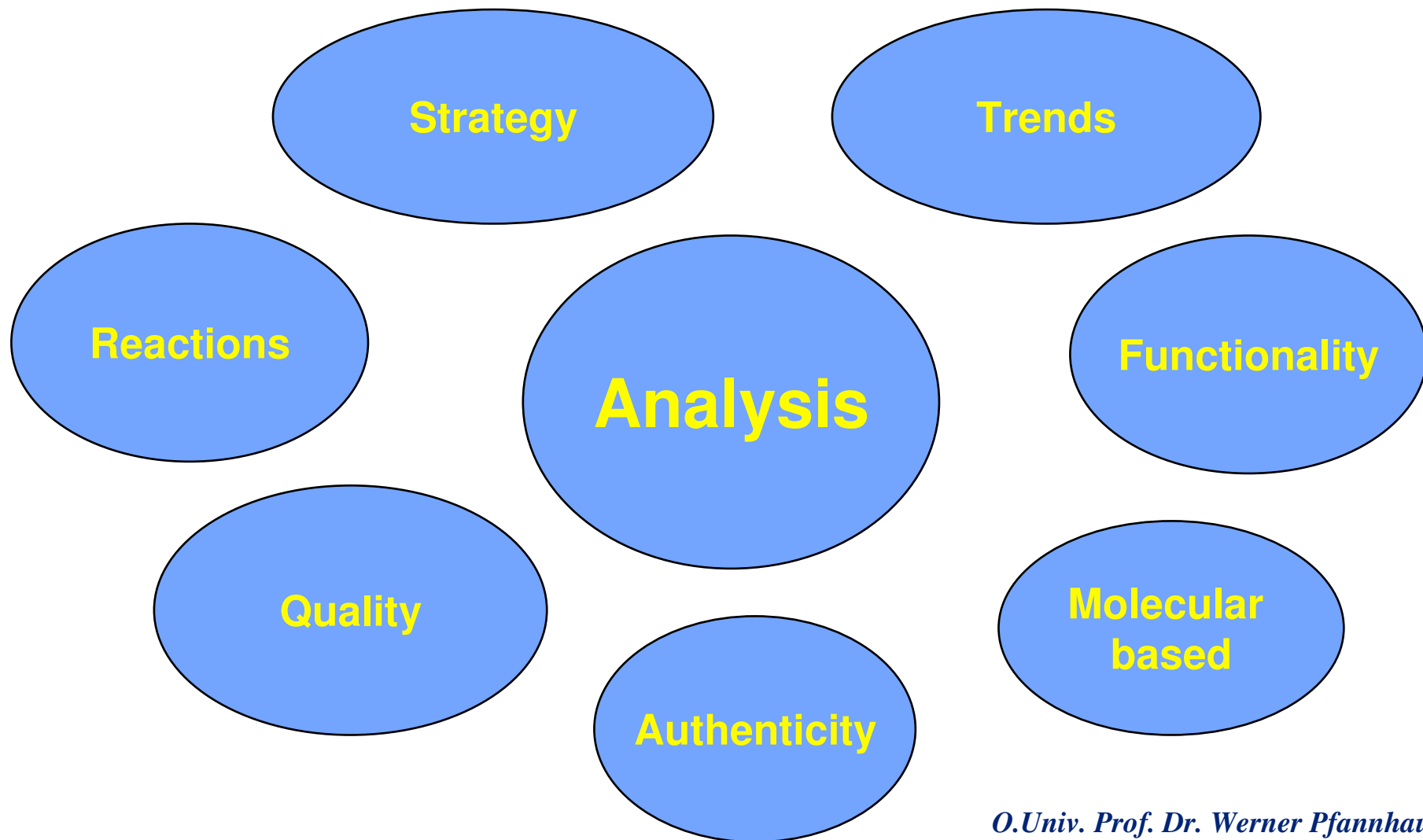
*O.Univ. Prof. Dr. Werner Pfannhauser*

# Titles of EURO FOOD CHEM Conferences

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- EFC XI (2001) "Biologically-active Phytochemicals in Food: Analysis, Metabolism, Bioavailability and Function."
- EFC XII (2003) „Strategies for Safe Food : Analytical Industrial and Label Aspects : Challenges in Organisation and Communication.“
- EFC XIII (2005) "Macromolecules and their Degradation Products in Food – Physiological, Analytical and Technological Aspects"
- EFC XIV (2007) „Food Quality - An Issue of Molecule based Science.“

# Central Issues in EURO FOOD CHEM Conferences



# Trends in Analytical Food Chemistry

Faster, smaller, cheaper.

Combination of chemistry and bio-analytcs, which at present are pacemaker

Dynamic developments are seen in chromatography, mass spectrometry, coupling techniques and sensor techniques.

# Analytical Chemistry in Food Chemistry



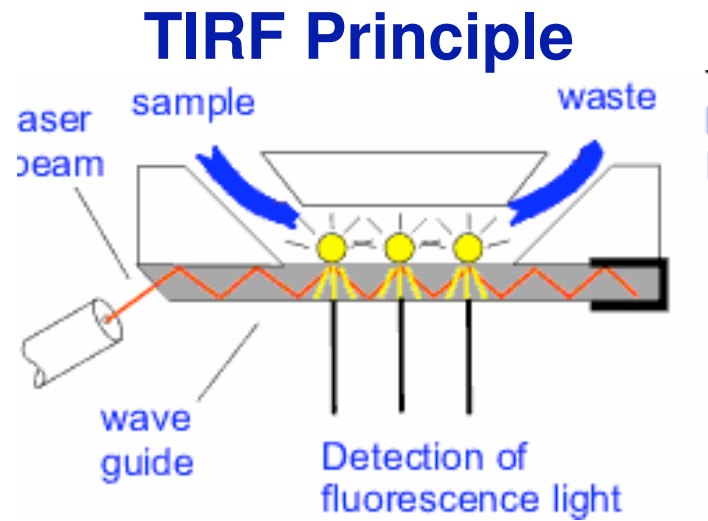
## Hot Issues

- Dioxine in hen eggs
- Acrylamide in food
- Coumarin in Cinnamon containing products
- Chloramphenicol
- Sudan red
- Phthalates

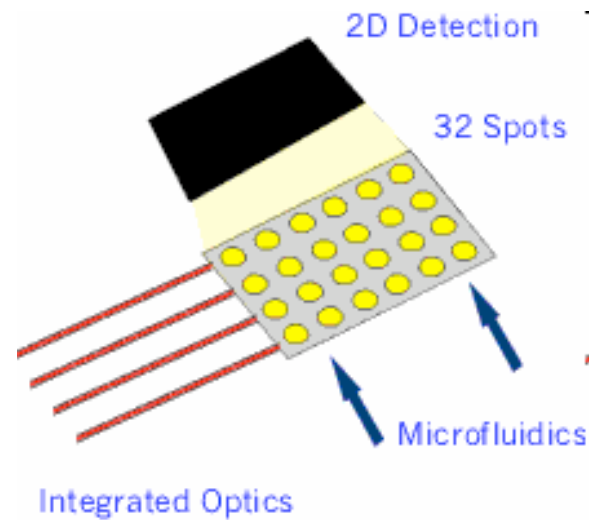
# Analysis of Water

- **Development of methods:**
- Automatic water analysis using **biosensoren**
- parallele detection of up to 32 contaminants within a few minutes





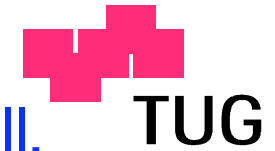
## Automated Water Analyser Computer Supported System



- February 28, 2008
- **Technology uses live cells to detect food-borne pathogens, toxins**
- WEST LAFAYETTE, Ind. - **Pratik Banerjee, left, and Arun Bhunia**
- Researchers have developed a new technology that can simultaneously screen thousands of samples of food or water for several dangerous food-borne pathogens in one to two hours.
- The technique, which has potential biosecurity and food safety applications, also can estimate the amount of microbes present and whether they pose an active health risk. This could help neutralize potential threats and improve food processing techniques, said Arun Bhunia, a professor of food science at Purdue University.
- "For food safety and biosecurity purposes, you need a quick test - a first line of defense - to be able to tell if there is something pathogenic in the food or water," Bhunia said.
- The technology utilizes live mammalian cells that release a measurable amount of a signaling chemical when harmed. Optical equipment and computer software can then analyze this quantity to estimate the amount of harmful microbes present,



# Authenticity of Wild salmon



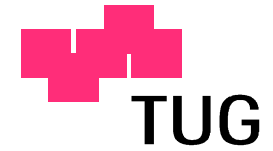
Wild salmon become pink by eating sea creatures like krill, which contain a carotenoid called astaxanthin. Farmed salmon are naturally grayish but turn pink when they are fed various sources of astaxanthin, including one that is chemically synthesized and others that originate from yeast or microalgae.

During a two-week testing it was determined that the controlled sample had more than 60 percent of the form of astaxanthin that occurs naturally, within the range of 50 to 80 percent typical for wild salmon. All the other samples except one had 30 percent or less of the form dominant in wild salmon.

The sample from another producer had 37.9 percent. The farmed samples tested high in either the synthetic or the yeast forms of astaxanthin.

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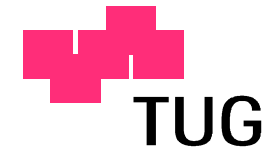
# TREND IN FOOD CHEMISTRY



TUG

- The **EURO FOOD CHEM Conferences** are representing and mirroring the state of the art in Food Chemistry.
- Therefore one can follow the developments in Food Chemistry by looking at the topics and contributions.
- As an outlook to the future I like to give only a few examples of contemporary problems handled by food chemists.

# NUTRIGENOMICS



Tailoring the human diet to match the individual's genome

Nutrigenomics is the study of the response of humans to food and food components using genomics, proteomics and metabolomics approaches.

The **goal of nutrigenomics** is to develop foods that can be matched to individual human genotypes to benefit the health of those individuals and enhance normal physiological processes.

**Nutrigenomics will lead to the development of new foods for individualised health and nutritional benefit.**

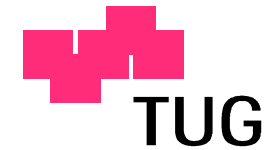
**Genome**  
**Transcriptom**  
**Proteom**  
**Metabolom**  
**Phenotyp**

The **transcriptome** is the set of all messenger RNA (mRNA), or "transcripts", produced in one or a population of cells. Unlike the genome, which is roughly fixed for a given cell line, *the transcriptome can vary with external environmental conditions.*

The **proteome** is the entire complement of proteins in a given biological organism or system at a given time, i.e. *the protein products of the genome.*

**Metabolome** refers to the complete set of *small-molecule metabolites* (such as metabolic intermediates, hormones and other signalling molecules, and secondary metabolites)

- **A CHANGE OF PARDIGM can be seen**



The new tools now available in the **postgenomic era** opens **a new future for nutritionists and food chemists** being now able for the first time to screen the genetic background, to monitor the transcriptome, proteome and metabolome and **to ultimately develop dietary strategies which are targeted to supply the optimum nutrition for single individuals.**

These tools are the focus of the new emerging field of nutrigenomics.

# Trends in the field of contaminants

## Example Pesticides

The hype of contaminants in food started in the early 60s of the last century (Rachel Carson „The silent spring“, 1962).

But nowadays there is again much discussion about pesticides.

This times multi residues of pesticides below legal limits are under consideration.

**RISK ASSESSMENT IS NEEDED URGENTLY**

# Food with pesticide multi residues



TU  
G

*(Source: BVL; nationale Berichterstattung 2003)*

Tafeltraube 65 %

Erdbeere 56 %

Johannisbeere 52 %

Mandarine 69 %

Orange 53 %

Zitrone 43 %

Paprika 41 %

Salat 40 %

Apfel 38 %

Birne 37 %

Tomate 24 %

*(Es sind nur Lebensmittel berücksichtigt, bei denen >100 Proben untersucht wurden)*

Data from Rudolf Pfeil BfR

# Risk Assessment



# Investigation on Multiretidues (1)

JG

The mixture of 4 OP insecticides at low toxicologically relevant doses showed moderate

synergistic interactions on

but not on

Brain ChE activity

Tail pinch

Motor activity

Miosis

Abnormal gait

Lacrimation

**Thus these OP do not act merely additive  
but to some degree synergistic.**

The most abundant insecticide, **Malathion**,  
appears to be not involved in this interaction (except for gait-score).

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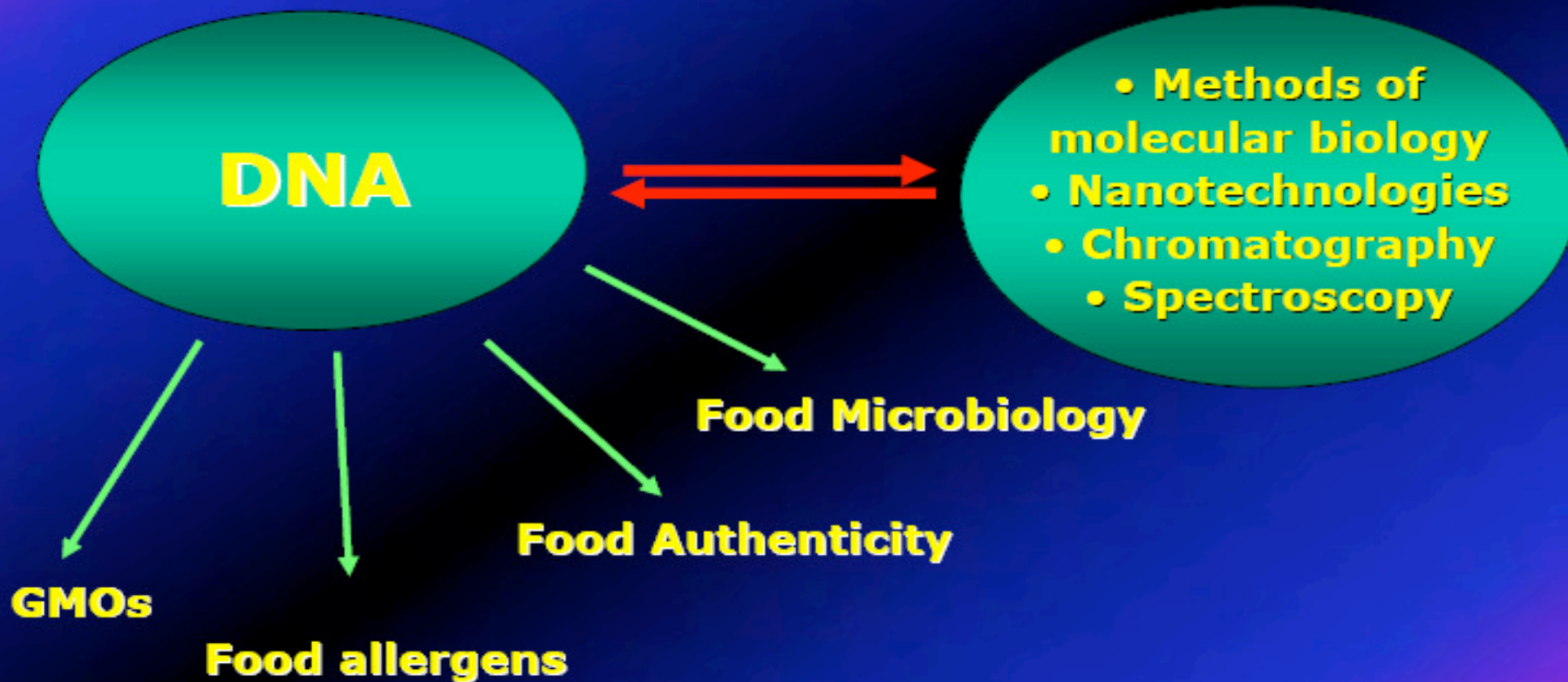
# Investigation on Multiresidues (2)

3

- **Synergistic effects** not only in the high-dose but also in the **low-dose range**.
- **Lowest acute doses with measurable effects were in the threshold range and far above ADI.**
- **At even lower doses effects would no longer be measurable.**
- **Mechanisms for departure from additivity:  
No confirmed knowledge  
only theories, supported by a few studies.**

According to W. Parzefall, 2007

# New methods based on genomics



## Conclusions

- **The trend in food analysis is to devise micro(nano) systems, which can provide affordable, portable, fast and user friendly equipments**
- **Nanotechnologies allow to push down the detection limits almost to “nothing”**
- **How low should the legal limits be set in food analysis ?**

From a presentation at EFSA, Parma, by Rosangela Marchelli

## How low should the legal limits be set in food analysis ? (Rosangela Marchelli)

*This questions leads us back to the early days. Analytical food chemistry was and will be indispensable.*

*It will be a central focus of food chemistry.*

*Their link with and the use of biochemical methods is also indispensable in future.*



What Peter Czedik – Eysenberg and the members of the early days have founded and put forward has become now an important group within the Food Sciences in Europe stimulating the progress of our science.

Division of Food Chemistry – ad multos annos !

*O.Univ. Prof. Dr. Werner Pfannhauser*