CYCLODEXTRIN NEWS

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Boldog Karácsonyi Ünnepeket és
Sikerekben Gazdag Új Esztendőt!

Merry Christmas and
a Happy New Year!

Frohe Weihnachten und
ein Glückliches Neues Jahr!

Joyeux Noël et Bonne Année!

CycloLab Ltd.

Ten Years After

Remembering József Szejtli, Ten Years After His Death

At CycloLab we had a memorial meeting on the day of the tenth anniversary of Prof. Szejtli's death on 26 November 2004. We still miss his vibrating personality, clever advices and pragmatic instructions.

Prof. Szejtli was exceptional being a worldwide recognized scientist and a good manager at the same time. The main milestones of his carrier were summarized in the December issue of Cyclodextrin News in 2013 [1]. His abundant activity in the cyclodextrin chemistry and application was overviewed in a recent review on the history of cyclodextrins written by Crini [2]. According to this review his most remarkable achievements were as follows:

- He founded CycloLab, the first cyclodextrin R&D company, totally devoted to cyclodextrins.
- He organized the first International Cyclodextrin Symposium in 1981.

- He started to publish the Cyclodextrin News in 1987 and to build a database of the cyclodextrin related literature.
- He wrote several books, monographs and reviews on cyclodextrins, which are still considered as reference works.
- He supported the idea that the driving force of spontaneous inclusion complex formation is the energy gain by replacement of high enthalpy water molecules by hydrophobic molecules in the cavity.
- He published plentiful experimental data on almost every field of cyclodextrin chemistry and applications: production, synthesis of derivatives, polymers, pharmaceutical, food, cosmetic, textile, agricultural, environmental use, toxicology, catalysis, etc.
- According to Crini, Prof. Szejtli is considered to be "Godfather of Cyclodextrins".

Seven years after Szejtli's death, Sacha Loeve, a post-doctoral fellow in philosophy from Sorbonne University and Mickaël Normand, a Ph.D student in chemistry from University of Rennes, contributed in a book chapter dealing with the role of trust, ambitiousness, dedication and preseverance in scientific-technological achievements [3]. The title of this chapter is:

"How to Trust a Molecule? The Case of Cyclodextrins Entering the Nanorealm"

The paper starts with the introduction as follows:

"*In this paper, we tell the story of a little observed yet widely applied tiny little thing, a molecule named cyclodextrin (CD). During the second half of the 20th century, the image of CDs has shifted from toxic yet interesting molecules to trustworthy molecules that could be used in a great number of invasive applications. In following the various objectifications of this molecule in multiple scientific communities, contexts of application and research trends, our story narrates the adventures of trust in cyclodextrin."*

The paper clearly acknowledges Szejtli's seminal role in making reality from the scientific curiosity and initializing industrial production during his nearly 35-year long crusade.

After his death we tried to go further on the way he paved for us. Headed by Dr. Lajos Szente, former student and deputy of Prof. Szejtli, we started to realize his great dream changing the R&D company to a small factory producing various cyclodextrin derivatives. The income from selling cyclodextrin derivatives increased from approx. 20% to about 80% of the total income from 2004 to 2014.

In the same time we have preserved the academic character of the company with an average of 8 publications, 6 conference presentations annually. CycloLab participated in 4 EU FP7 and 8 national R&D projects in the period of 2004-2014. The results of innovation have been included in 15 patent applications.

CycloLab is among the registered places for education of Ph.D and undergraduated students. During these 10 years 17 graduation and 6 PhD dissertations were compiled and defended with the contribution of our researchers. We had 16 Hungarian and 4 foreign students for shorter or longer internship to get experience in the industrial approach of cyclodextrin chemistry.

CycloLab established Szejtli prize to preserve his legacy, keep his memory alive and recognizing his ground-breaking achievements in the area of cyclodextrin research, development and commercialization of related technologies. This prize was aimed to award young researchers demonstrating outstanding results in the cyclodextrin science and technology. The first award was presented to Prof. Keiichi Motoyama, Kumamoto University, in Saarbrücken, at the 17th International Cyclodextrin Symposium in 2014.

The József Szejtli medal

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Esterification, Semi-dry process

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Amylodextrin, Cyclomaltodextrinase, Caldivirga maquilingensis, Debranching and degrading reactions

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Selectivity, Anomeric configuration, Thermoanaerobacter sp., B. macerans

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Regioisomers, Mesitylenesulfonylation, Mesitylenesulfonyl chloride, Mono-6-O-mesitylenesulfonyl-α-CD

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Degree of substitution, Thermal decomposition

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Rubbery and glassy phases, Amorphous models

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Intramolecular charge transfer, Host-guest complex, Silver nanoparticles, Fluorophores

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Per-6-deoxy-6-(1-methylimidazol-3-ium-3-yl)-β-cyclodextrin, Mono-6-deoxy-6-(1-methylimidazol-3-ium-3-yl)-β-cyclodextrin, Dioctyl sodium sulfosuccinate

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Photoisomerization, Wound dressing, β-Cyclodextrin-grafted alginate, Diazobenzene-modified poly(ethylene glycol)

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Doxorubicin, Fluorescence, Molecular dynamics, HeLa cells, Monitoring cell entrance

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FT-IR, NMR, Aqueous solubility

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Inflammation, Protein kinase C, HPβCD, γ-CD

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Plasma membrane, Apoptosis, Mice model, Chemotherapy-resistant non-Hodgkin lymphoma

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3D distribution diagram for the different species

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Host–guest interaction, Anticancer effects, Conjugating HP-β-CD with HA, Adamantyl-PEG

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Alkynylpiperidone, Pharmacological properties, β-Cyclodextrin complexes, Myelostimulators, Acute toxity

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Gut intestinal epithelium injury, Permeability, Single-pass intestinal perfusion, Triethanolamine, Increased apparent permeability

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2-Hydroxypropyl-γ-cyclodextrin, Antitumor efficacy

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Hyperalgesia, Lipid rafts, Methyl-β-cyclodextrin, Versican, Integrin β1, Nociceptor

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Cholesterol, Actin, Cardiomyocytes, Treatment with methyl-beta-cyclodextrin

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Polyrotaxane, RGDS, Cell adhesion, Cell differentiation, α-Cyclodextrin

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Platelets, P2Y12, Signal transduction, Methyl-β-cyclodextrin

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Neuromuscular junction, Methyl-beta-cyclodextrin, Kiss-and-run mechanism

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Fertility, Sperm viability, Acrosome integrity

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β-Cyclodextrin, Dextran, Chitosan, Gene vectors, Degradability, Cytotoxicity, Gene transfection ability

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5. CDs in Food, Cosmetics and Agrochemicals

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Betacyanins, β-cyclodextrin, Maltodextrin, Central composite design, Droplet size, Drying rate, Drying time

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Thermal stability, Non-thermal spray–freeze-drying, Rehydration ability

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Sensory test, Decrease of bitterness, Functional food

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Formation constant, Photostability, α-CD, β-CD, γ-CD, HP-β-CD, RAMEB, CRYSMEB, Static headspace gas chromatography, DPPH radical scavenging activity

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Enantioselectivity, Substrate selectivity

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Chromatography, Methyl-ß-cyclodextrin, Drosophila S2 cells, L cells, ß-Catenin, Thrombin, Wnt proteins

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Extreme ultraviolet, Noria derivative, Calixarene derivative, Lithographic processing, Cyclohexyl 2-propyl ether

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Magnetic nano-particles, Spectrofluorometry, Surface modification of graphene oxide by β-CD

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Imidacloprid, Oxygen reduction, Electrocatalytic performance, Reduced graphene oxide, Gold nanoparticles

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Rhizobiaceae, Complexation, Removal of polycyclic aromatic hydrocarbons by soil washing, Benzo[a]pyrene, Pyrene, Phenanthrene, Perylene, Fluoranthene

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Biphasic catalysis, Organometallic catalysis, Decrease in viscosity

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Adsorption, Doped TiO_2, Total organic carbon

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Hydrosoluble phosphines, Rhodium

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Adsorption, Composite, Fluoride adsorption, Fluoride removal from aqueous media

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Wastewater, Langmuir adsorption model

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Silver nitrate, Thermodynamic parameters

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Quantum dots, α-CD, β-CD, Fluorescent color, Micro-detector to chemicals

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Self-assembled monolayer, Pesticide, Anodic stripping voltametry, Electrochemical sensor

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β-Cyclodextrin, Multiwalled carbon nanotubes, Modified electrode, Electrochemical detection, Anti-tumoral agent, Cyclic voltammetry

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Air sampling, Air fresheners, Occupational exposure, Phenol, Guaiacol, Cresol isomers, Eugenol, 4-Ethylphenol, 4-Ethylguaiacol, Phthalates

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Chemosensors, Job's plot analysis, Real sample analysis, Chromo-fluorogenic probe

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Tomato analysis, SPME

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Chiral separation, Migration order, Nucynta, Tapentadol, Negatively charged sulfated-a-CD

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