NEWSLETTER

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http://euchis.org

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No. 42
Editorial

First of all, we wish all members a happy, healthy, and prosperous New Year 2018.

Sadly, we have to announce that our Honorary President, Olav Å. Smidsrød, passed away on January 29, 2017, at the age of 80. We became aware of his death when the obituary, written by Bjørn E. Christensen, turned up in the search for members publications. The obituary is reprinted in this issue with the consent of Bjørn and purchase of copyright from the publisher (page 3).

Olav was an eminent scientist, well known for his fundamental contributions to biopolymers, in particular alginates and chitosan. In 2008, he was awarded the “Gunnerus Medal” and was a fellow of the “Norwegian Academy of Science and Letters” and the “Norwegian Academy of Technological Sciences”. He was Vice-President of EUCHIS 1999-2004, and he was elected Honorary President in 2004, during the 6th EUCHIS conference in Poznan (see Newsletter No. 18, Dec. 2004). Personally (MGP), I met Olav during many Chitin/Chitosan Conferences, and always admired his gentle character, scientific competence, and his sharp mind, being critical but never hurting in the discussions.

An update of members' publications is presented in this Newsletter (pages 6 – 17).

The 14th International Conference on Chitin and Chitosan (ICCC) will take place this year at the end of August at Kansai University, Senriyama Campus, Osaka, Japan under the Chairmanship of Professor Hiroshi Tamura. It will be a big event, held together with the 12th APCCS and the 32nd Meeting of the Japanese Society for Chitin and Chitosan (page 17). Don’t miss it!

Preparations for the 14th EUCHIS Conference have started. It will take place in June 2019 in Cork, Ireland. Details will follow soon.

Bruno M. Moerschbacher, President
Martin G. Peter, Secretary
Obituary

Olav Åsmund Smidsrød (1936–2017)

Olav Smidsrød contributed to the carbohydrate polymer field through his extensive research on marine polysaccharides, especially alginates and chitosan, but worked also on other biopolymers such as xanthan, carrageenans, mixed linkage glucans, glycoproteins (mucins) and proteins (marine collagen). Trained as a physical chemist he brought important concepts from polymer science into the carbohydrate field, and became internationally recognized as an authority on water-soluble polysaccharides. A significant part of his career was devoted to running a multidisciplinary laboratory (NOBIPOL (Christensen, Indergaard, & Smidsrød, 1990)) being able to cover all aspects of biopolymer engineering: Biosynthesis – Primary Structure – Conformation – Physical Properties – Biological Properties and Industrial Applications, bringing together scientists from many different areas (molecular biology, biophysics, carbohydrate chemistry, medicine etc.). For the industrial applications he engaged vigorously in Academia-Industry collaborations. He was one of the original Editorial Board members of Carbohydrate Polymers and supported the journal extensively both as an authors and a reviewer for many years. Regrettably, health issues prevented him from being the active professor emeritus he and his collaborators had anticipated following his retirement in 2006.

Olav was educated at the Norwegian Institute of Technology (NTH) (presently incorporated in NTNU – The Norwegian University of Science and Technology) obtaining the degree ‘sivilingeniør’ in chemical engineering in 1961. His diploma work brought him for the first time into contact with seaweeds separating particles from dissolved alginate, an area that he would follow throughout his career, and on which in 1974 he defended his doctoral thesis ‘Some Physical Properties of Alginates in Solution and in the Gel State’.

Olav joined the Norwegian Institute of Seaweed Research (located at the NTH campus) as a research scientist in 1961. He quickly introduced practical methods, including the determination of the intrinsic viscosity (Haug & Smidsrød, 1962) and the molecular weight and size of alginates (Smidsrød & Haug, 1968). At the same time he engaged in the problem of analysing and understanding the distribution of the two monomers in alginates (M: ß-ß-d-mannuronic acid and G: α-ß–guluronic acid), which were thought to be binary copolymers analogous to synthetic copolymers until it was discovered some years later that the G residues were formed by enzymatic epimerization at C6 at the polymer level, i.e. post polymerization. The processive nature of these enzymes was discovered much later, and statistical methods, notably 2nd order Markov statistics, were therefore used (Larsen, Painter, Haug, & Smidsrød, 1969) to explain experimental (NMR) data on monad, diad, and triad frequencies, which are still used to characterize alginates (Grasdalen, Larsen, & Smidsrød, 1979; Draget, Moe, Skjak-Bræk, & Smidsrød, 2006). The understanding of the block structures in alginates emerged through seminal work on partial acid hydrolysis (Haug, Larsen, & Smidsrød, 1966) and solubility in acid of different sequences, leading to isolation of blocks (oligomers) with widely different compositions (homopolymeric M-blocks and G-blocks, and the polyalternating MG-blocks) (Fig. 1).

Besides studying the gel formation of alginates with calcium salts, the basis for the most important application of alginates, he was particularly interested in the polyelectrolyte properties of charged polysaccharides in aqueous solution. He introduced a semi-empirical parameter often called the ‘Smidsrød B-parameter’, which was based on the determination of the ionic strength depen-

Fig. 1. Detailed studies of the partial acid hydrolysis and fractionation of the alginate oligomers revealed the block-like structure in algal alginates.

http://dx.doi.org/10.1016/j.carbpol.2017.03.056
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...of the intrinsic viscosity (experimentally very simple), and which correlated well to the chain stiffness (persistance length) of a range of charged polymers (Smidsrød & Haug, 1971).

Throughout the 1980s he engaged much in studies of polysaccharides with secondary and higher order structure, and how conformational order influenced chemical and physical properties. It had been increasingly recognized that many polysaccharides showed an order-disorder transition upon changes in temperature and ionic strength, often associated with gelation/melting. The transition was typically monitored by chiroptical methods (ORD, CD), differential scanning calorimetry (DSC), NMR, or by rheology/viscometry. It was particularly debated whether the ordered forms of carrageenans and xanthan were single- or double stranded. The major problem was to separate conformational transitions from the recurrent and concomitant aggregation phenomena, which in particular biased light scattering measurements. For carrageenans his physical investigations (viscometry, polarimetry, osmometry) (Smidsrød, Andresen, Grasdalen, Larsen, & Painter, 1980) were incompatible with the double helix model earlier proposed by Rees et al. (Mckinnon, Rees, & William, 1969)

The combination of SEC-LALLS (Hjørde, Smidsrød, & Christensen, 1999) and degradation studies (Hjørde, Smidsrød, & Christensen, 1996; Hjørde, Kristiansen, Stokke, Smidsrød, & Christensen, 1994) seemed on the other hand to be compatible with a double-stranded model, although this conclusion has later been questioned (Collen et al., 2009).

Xanthan, on the other hand, seems to exist in a double-stranded state below the transition temperature. Smidsrød and co-workers drew their conclusions on the basis of numerous experimental approaches including electron microscopy (Stokke, Elgsæter, & Smidsrød, 1986; Stokke, Elgsæter, Skjåk-Bræk, & Smidsrød, 1987), and partial degradation combined with SEC-LALLS (Christensen, Smidsrød, Elgsæter, & Stokke, 1993; Christensen, Myhr, & Smidsrød, 1996). Recent and independent support for a detailed double-helix model was provided by AFM (Moffat, Morris, Al-Assaf, & Gunning, 2016). His work on xanthan was initiated through collaboration with the oil industry, which needed, and still need, water-soluble and environmentally acceptable polymers for enhanced oil recovery.

Towards 1990 Professor Smidsrød also turned his attention to chitosans, what he in many respects considered polycationic ‘analogues’ to alginites. These efforts were, as for alginites, stimulated by Norwegian research and industrial programmes related to marine resources. Research issues mirrored initially the sequence issues (Ottoy, Vårum, & Smidsrød, 1996) originally developed for alginites, but diversified to include, among other, solubility (Vårum, Ottoy, & Smidsrød, 1994), branching (Tømmeraas, 2002), polyanion-polyocation interactions (Thu et al., 1996), enzymatic degradation (Nordtveit, Vårum, & Smidsrød, 1994), and gene therapy.

Throughout the 1990s he also engaged in developing alginate-based gel technologies, notably microencapsulation (Smidsrød & Skjåk-Bræk, 1990), for practical, especially biomedical applications. The most prominent project he initiated was the development of calcium alginate beads for immobilizing insulin-producing cells for the treatment of diabetes mellitus (Soon-Shiong, 1993). This project involved quite diverse research tasks such as determining and controlling elasticity, swelling, homogeneity, porosity, transport of insulin and nutrients for the cells, and immunological properties. Prototypes were brought to the clinic for human trials already in 1991. Yet, the complexity of the project has led to numerous follow-up programs, even up to the present day, in many countries.

Olav Smidsrød would through his long career initiate studies on many other biopolymers in addition to those mentioned above. Examples include mucin (Mikkelsen, Stokke, Christensen, & Elgsæter, 1985), gellan (Grasdalen & Smidsrød, 1987), oat mixed linkage β-1,3-glucans (Vårum, Smidsrød, & Brant, 1992), xylan (acetan) (Berth, Dautzenberg, Christensen, Rother, & Smidsrød, 1996), and gelatin (Haug, Draget, & Smidsrød, 2004) from cold water fish.

As a professor at NTNU he developed an entirely new course in biopolymer chemistry which still is being taught. He wrote a textbook on the topic in 1979 (‘Biopolymerkjem’), The English version (‘Biopolymer Chemistry’) appeared in 2008 (Smidsrød & Moe, 2008).

Olav Smidsrød was a dedicated biopolymer scientist who also had a tremendous ability to inspire others. He generously shared his knowledge and supported enthusiastically his collaborators. He was missed both as a scientist and as a fellow human.

Editor’s note

Like numerous other scientists working on the physical properties of polysaccharides I was strongly influenced by Olav’s work. My thesis, ‘Rheological Properties of Polysaccharide Gels’ (1973) contained extensive work on alginate gels and the discussion used a lot of the information developed by Olav and colleagues on the stiffness of alginate chains and alginate ion interactions. In my work the Smidsrød B parameter was measured and used to compare the stiffness of peptate chains with different conformations.

John Mitchell

References


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Member's Bibliography
April – December 2017

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Reviews


Conference Abstracts


Research Papers


82. Lastel, M.-L., Fournier, A., Jurjanz, S., Feidt, C., Rychen, G., Thome, J.-P., Joaquim-Justo, C., Archimede, H., Mahieu, M., Comparison of chlordecone and NDL-PCB decontamination dynamics in growing male kids after cessation of oral exposure: Is there a potential to decrease the body levels of these pollutants by dietary supplementation of activated carbon or paraffin oil? Chemosphere, (2018) 193, 100-107; http://dx.doi.org/10.1016/j.chemosphere.2017.10.120.


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Patents


Events

- XXIX International Carbohydrate Symposium (ICS 2018), Lisbon, Portugal, July 14-19, 2018; Chair: Amélia Pilar Rauter. URL: http://ics2018.eventos.chemistry.pt/.


- 14th International Conference of The European Chitin Society (EUCHIS'19), Cork, Ireland, 2019; Chair: Maria Bardosova. In preparation; details will follow with the next Newsletter.

- XX European Carbohydrate Symposium (Eurocarb 20), Leiden, The Netherlands, 2019. No further information available at this time.
2nd Circular

14th International Chitin and Chitosan Conference (14th ICCC) & 12th Asia-Pacific Chitin and Chitosan Symposium (12th APCCS)
(Joint with 32nd Japanese Society for Chitin and Chitosan Conference)

Kansai University (Senriyama Campus)
Suita, OSAKA, JAPAN
August 27-30, 2018

● Important Deadlines

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<tr>
<th>Event</th>
<th>Deadline</th>
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<tr>
<td>Title and abstract submission deadline</td>
<td>April 30, 2018</td>
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<tr>
<td>Notification of acceptance</td>
<td>May 31, 2018</td>
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<tr>
<td>End of Early bird registration</td>
<td>July 31, 2018</td>
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<tr>
<td>Conference</td>
<td>August 27-30, 2018</td>
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● Registration Fees

<table>
<thead>
<tr>
<th>Category</th>
<th>Early bird registration (before July 31, 2018)</th>
<th>On site registration (after July 31, 2018)</th>
<th>Excursion &amp; dinner</th>
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<tr>
<td>Member of JSCC 1)</td>
<td>40,000 JPY</td>
<td>45,000 JPY</td>
<td>(included)</td>
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<tr>
<td>Non-member of JSCC 1)</td>
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<td>50,000 JPY</td>
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<td>Student 2)</td>
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<tr>
<td>Accompanying person 3)</td>
<td>25,000 JPY</td>
<td>25,000 JPY</td>
<td>(included)</td>
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1) The registration allows you to participate in sessions with proceedings, welcome party, excursion & dinner, lunches, and coffee breaks.
2) Students are allowed to join in sessions with proceedings, welcome party, lunches, and coffee breaks. In case to attend excursion & dinner, extra 5,000 JPY is necessary.
3) Accompany persons are allowed to join welcome party, excursion & dinner, lunches, and coffee breaks.
4) After 31 July 2018, payment is only on site.

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