

EUROPEAN **CHITIN** SOCIETY

NEWSLETTER

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EDITORIAL

Ave atque Vale

'*Ave atque vale*' was a Roman expression meaning "Hail and Farewell". However in this case it really should be '*Vale atque Ave*', "Farewell and Hail". At a meeting of the Board of the European Chitin Society, held during the recent EUCHIS '09 conference in Italy, Kjell Vårum, our current President, stepped down after completion of two terms as President. During his time in office he introduced a number of important changes and the Society has continued to thrive, and it is good that he, together with his wide-ranging experience, will be remaining on the Board. Following his stepping down the Board unanimously elected Sevda Şenel to serve as the new President.

Our new President represents a change with the past in several ways. She is the first ECS President not to come from that group of scientists – the 'Founding Fathers' if you like – who met in Lyon in the early 1990s and set up the European Chitin Society. So to quote from the inaugural address of another President, the late President J F Kennedy, "The torch has passed to a new generation". Also, all the previous holders of the office have been scientists who primarily studied the intrinsic properties of chitin and chitosan in order to understand these polymers, this understanding being necessary before possible applications could be identified. The main emphasis in chitin/chitosan research has now shifted to studying the properties of chitin and chitosan under conditions that would be encountered during use in various potential applications; an approach that is necessary if chitin and chitosan are to assume their rightful roles as commercially important biopolymers. Our new President is part of this new emphasis. The final change represented by Sevda Şenel is that she is the first woman to hold the office, but there can be no doubt whatever that her election as President is on merit and is not due to a collective rush of 'political correctness' by the Board.

I am sure all EUCHIS members will join me in first thanking Kjell Vårum for the work he has carried out for the Society during his term of office, and secondly in wishing Sevda Şenel well during her term. There are messages from both in the *Newsletter* immediately after the Editorial.

Since the last issue of the *Newsletter* many of the Society's members will have met with old contacts and forged new ones at EUCHIS '09. San Servolo was a beautiful setting for the conference, for while Venice itself was hot and packed with tourists, on the island it was cool and quiet, with the occasional breeze – very relaxing indeed. The conference ran smoothly, presumably in the same way as a swan moves smoothly on water – calm on the surface and furious activity underneath - and thanks are due to the organisers: Franco Rusticelli, Carla Caramella, Flavio Carsughi, Sevda Şenel, Kjell Vårum and their band of helpers.

This year's Braconnot Prize was awarded to Dr Marc Lavertu of the Ecole Polytechnique of Montreal, Canada. This is the first time that the Prize has been awarded to a researcher from outside continental Europe, and demonstrates the ever-growing global nature of EUCHIS. A short CV for Dr Lavertu is included in the *Newsletter*.

Prizes were again awarded for the best posters presented at the conference and abstracts, together with CVs of the presenting authors, are included in the *Newsletter*. This year the winning posters were:

1st prize: “Human chitotriosidase – degradation of chitosan and chitin and its role within the innate immune response.” Christian Gorzelanny (presenting author), Birgit Poeppelmann, Sophie Haebel, Bruno M Moerschbacher and Stefan W Schneider.

3rd prize: “Chitinolytic activities of two Clostridia isolated from human faeces.” Jiri Simunek (presenting author), Ingrid Koppova and Galina Tishchenko

Finally a reminder that the next major conference is the joint 11th ICC/8th APCCS meeting that will be held in Taipei, Taiwan from 6th-9th September, 2009. If you have not already booked full details can be found in the ‘Events’ section of our website www.euchis.org.

George Roberts

Secretary

MESSAGE FROM THE PRESIDENT



Dear members of the *EUCHIS family*,

It is an honour and privilege to take up the Presidency of the European Chitin Society. My first duty is to thank our past President, Prof. Dr. Kjell Vårum, for his enormous contribution to the Society, over many years. Kjell has led us through a period of new initiatives and directions, and continued the successful development of our mission. I congratulate him on behalf of the *EUCHIS family*.

As President of the EUCHIS, I will commit myself to bring continuity to these valuable expansions and consolidation of new initiatives and direction besides strengthening our objectives which are to encourage basic and applied scientific studies on chitin, including chitosan and derivatives of chitin and chitosan, and related enzymes; to aid the dissemination of such studies through the organisation of symposia, workshops, congress or any other form of assembly; to encourage and facilitate exchanges between European scientists working in the field of chitin; to formulate recommendations and guidelines in the fields of standardisation and nomenclature, and to develop links with other societies having similar or related interests.

I am very fortunate to have the very privileged board members, with extensive experience and insight, working with me for the next two years. Henryk Pospieszny and Bruno Moerschbacher will be supporting me as the two vice-presidents. We are thankful to George Roberts who remained serving as the secretary and will continue giving support to the EUCHIS as always in every aspect with his valuable experience in this field. The newly re-elected member, Malgorzata Jaworska will be serving as the vice-secretary. The Treasurer, Martin Graeve, will again be in charge of financial administration, with Laurent David as the vice-treasurer. His precise monitoring of finance helped the society to grow in a sound manner.

I remain eager to hear from you and to take up any points you may care to raise about activities, website etc. that will enable our Society to function better on your behalf. Please contact me through my e-mail address which is ssenel@hacettepe.edu.tr .

With best wishes

Sevda Şenel

MESSAGE FROM THE FORMER PRESIDENT

During the recent EUCHIS meeting in Venice I was again able to meet many of our members, from students to retired professors. The EUCHIS meetings is the most important event of EUCHIS, and the recent success in Venice with about 170 participants in the current world-wide financial situation shows that EUCHIS meetings continue to attract participants.

As you know, the new EUCHIS president is Professor Sevda Senel, and I am confident that she will contribute to the best of EUCHIS. After 5 years as president, I would like to share with you some thoughts regarding our Society, how it has developed during the last 5 years and future challenges.

One way of looking at the development of chitin/chitosan research is to compare the published articles with respect to subject area. Using the ISI Web of Science database searching for: CHITIN* or CHITOSAN*

for the year 2004 and the year 2009 (up to July), the Table (see next page) was created containing the top 25 subjects, i.e. the subjects that obtained the highest numbers of published articles related to chitin and chitosan.

Are there any trends to see from looking at the Table on the next page? Firstly, I would say that the subject areas that chitin/chitosan researchers are focusing on are not that different in 2004 and 2009, at least not from what I expected. Polymer Science continues to be the most important subject area, with 17% of the articles. However, in some subject areas changes can be observed. A clear increase in popularity can be observed for Materials Science (Biomaterials), Chemistry (Organic and Physical), Engineering (Biomedical) and Electrochemistry. A large decrease can be seen for Biochemistry & Molecular Biology, Plant Sciences and Biotechnology & Applied Microbiology. The relevance of this subject is to the organization of future EUCHIS conferences. In my opinion it is important that EUCHIS continues to keep a focus on chitin and chitosan as polymers, including their properties and characterization. I believe we are still not at a stage where we can consider chitosan to be a polymer that can just be taken “from the shelf” for a given application. This is perhaps especially the case for biomedical applications. Furthermore, I believe that regulatory matters are still a very important issue before chitosans can be a success outside the health care market.

I would finally especially thank two persons for their contributions during my time as president. George Roberts has taken care of the Chitin Newsletter, and this has now been published biannually since 2004. His experience and objectiveness is highly appreciated, which he generously offered whenever I asked him. Martin Graeve has been the EUCHIS treasurer for more than 10 years, and has taken care of the EUCHIS finances in an excellent way. I really appreciate that both George and Martin will continue in their positions, which also makes the job for the new president somewhat easier. I am sure that our new president, Sevda Senel, will continue to develop EUCHIS to the benefit of the members.

Kjell M. Vårum

Table. Top 25 subject areas of the published articles in 2004 (left column) and in the first half of 2009 (right column) as obtained from a search using **ISI Web of Science**.

Field: Subject Area	Record Count	% of 1755	Field: Subject Area	Record Count	% of 1530
POLYMER SCIENCE	298	16.9801 %	POLYMER SCIENCE	260	16.9935 %
BIOCHEMISTRY & MOLECULAR BIOLOGY	202	11.5100 %	BIOCHEMISTRY & MOLECULAR BIOLOGY	240	15.6863 %
BIOTECHNOLOGY & APPLIED MICROBIOLOGY	170	9.6866 %	BIOTECHNOLOGY & APPLIED MICROBIOLOGY	198	12.9412 %
MATERIALS SCIENCE, BIOMATERIALS	155	8.8319 %	PHARMACOLOGY & PHARMACY	151	9.8693 %
PHARMACOLOGY & PHARMACY	154	8.7749 %	CHEMISTRY, MULTIDISCIPLINARY	128	8.3660 %
CHEMISTRY, ORGANIC	135	7.6923 %	MICROBIOLOGY	116	7.5817 %
CHEMISTRY, PHYSICAL	133	7.5783 %	CHEMISTRY, APPLIED	115	7.5163 %
CHEMISTRY, APPLIED	132	7.5214 %	PLANT SCIENCES	107	6.9935 %
ENGINEERING, BIOMEDICAL	128	7.2934 %	FOOD SCIENCE & TECHNOLOGY	92	6.0131 %
MATERIALS SCIENCE, MULTIDISCIPLINARY	122	6.9516 %	MATERIALS SCIENCE, BIOMATERIALS	89	5.8170 %
CHEMISTRY, MULTIDISCIPLINARY	115	6.5527 %	ENGINEERING, CHEMICAL	88	5.7516 %
CHEMISTRY, ANALYTICAL	92	5.2422 %	CHEMISTRY, ORGANIC	80	5.2288 %
ENGINEERING, CHEMICAL	86	4.9003 %	CHEMISTRY, PHYSICAL	73	4.7712 %
FOOD SCIENCE & TECHNOLOGY	85	4.8433 %	ENGINEERING, BIOMEDICAL	69	4.5098 %
MICROBIOLOGY	70	3.9886 %	CHEMISTRY, ANALYTICAL	57	3.7255 %
ENVIRONMENTAL SCIENCES	64	3.6467 %	BIOCHEMICAL RESEARCH METHODS	44	2.8758 %
NANOSCIENCE & NANOTECHNOLOGY	60	3.4188 %	CELL BIOLOGY	42	2.7451 %
ELECTROCHEMISTRY	59	3.3618 %	BIOPHYSICS	36	2.3529 %
PLANT SCIENCES	55	3.1339 %	ENVIRONMENTAL SCIENCES	35	2.2876 %
BIOPHYSICS	51	2.9060 %	IMMUNOLOGY	32	2.0915 %
PHYSICS, APPLIED	43	2.4501 %	ENTOMOLOGY	30	1.9608 %
ENGINEERING, ENVIRONMENTAL	39	2.2222 %	CHEMISTRY, MEDICINAL	26	1.6993 %
IMMUNOLOGY	36	2.0513 %	MYCOLOGY	25	1.6340 %
BIOCHEMICAL RESEARCH METHODS	35	1.9943 %	MATERIALS SCIENCE, MULTIDISCIPLINARY	24	1.5686 %
CHEMISTRY, MEDICINAL	34	1.9373 %	GENETICS & HEREDITY	19	1.2418 %
Field: Subject Area	Record Count	% of 1755	Field: Subject Area	Record Count	% of 1530

Minutes of the EUCHIS Board Meeting held at 18.45 on Sunday 24th May during EUCHIS '09, San Servolo, Venice, Italy.

Members present: KM Vårum (President), M Graeve (Treasurer), G Roberts (Secretary), H Pospieszny (Vice-President), S Şenel (Vice-President), E Guibal, V Eijsink, L David, B Moerschbacher.

1. Meeting began with the sorting out of the status of all current members of the Board, with the following results: B Moerschbacher, G Roberts and S Şenel would be proposed for re-election, while J O Duarte, L Gorovoj, M Healy and B Kochańska, having completed their time on the Board, would have to step down.
2. As the Treasurer, M Graeve, would be giving a full financial report to the General Assembly the following day, only an outline report was given to the Board. In summary, the Board is in a very good position financially although we are getting close to the maximum that we can legally have and retain charitable status. KMV argued that the Society needed to have a sizeable reserve for initial funding of conferences.
3. Prizes and awards - KMV announced that:
 - the winner of the Braconnot Prize for 2008/09 was Dr Marc Lavertu of École Polytechnique of Montreal;
 - 5 travel grants had been awarded to research students attending EUCHIS '09;
 - a sub-committee of the Board was currently working on the poster awards.
4. The agenda for the General Assembly was finalised:
 - Status report (KMV)
 - Financial report (MG)
 - Election of new Board members (four needed)
 - Membership fees for members from former Soviet bloc states

Minutes of the General Assembly of the European Chitin Society

1. The General Assembly was held 15.30, Monday 25th May, 2009, San Servolo, Venice, and was attended by 31 active members.
2. The President, KM Vårum, gave a status report on how well the Society is fulfilling its remit:
 - The biennial meetings are functioning well and enjoy considerable support
 - The provision of travel grants to help research students participate in the meetings is continuing
 - The Braconnot Prize continues to have several excellent candidates every time, with increasing difficulty in selecting a winner due to the increasing standard of submissions
 - The poster awards continue to receive considerable interest
 - The *Newsletter* has continued to be published on a twice-yearly basis but once again it was necessary to remind the members that their contributions would be very helpful, if not essential, in maintaining this schedule.
3. The Treasurer, M Graeve, presented the financial accounts and once again the bank balance has increased (full details can be seen elsewhere).
4. The restructuring of membership categories was then discussed and it was proposed (MG) that the current 'Active (East)' members retain their status but that new members from the countries affected would join as standard Active members. The motion was put to the vote and the result was:
29 in favour: 1 opposed: 1 abstention. The motion was declared passed.
5. Election of Board members
Three current Board members – B Moerschbacher, G Roberts, S Şenel – were up for re-election. All three were re-elected without opposition.
Four Board members - J Duarte, L Gorovoj, M Healy, B Kochańska - were stepping down following completion of their periods of office, and the following were elected to replace them: K Heppe, M Jaworska, V Seidl, V Varlamov.

Minutes of the EUCHIS Board Meeting held at 16.00 on Monday 25th May during EUCHIS '09, San Servolo, Venice, Italy.

Members present: KM Vårum (President), L David, V Eijsink, M Graeve (Treasurer), E Guibal, K Heppe, M Jaworska, B Moerschbacher, H Pospieszny (Vice-President), G Roberts (Secretary), S Şenel (Vice-President), V Seidl and V Varlamov

The first item of business was to determine the venue for EUCHIS '11. A presentation was given by Professor V Varlamov in support of the proposal that the meeting should be organised by the Russian Chitin Society and held in St Petersburg. This was agreed subject to the provision of some additional information on the actual accommodation at the suggested location.

The second item of business was the election of officers of the Board. The current President, KM Vårum, having completed his two terms of office, stated that he was stepping down and proposed the election of S Şenel as his successor as President of EUCHIS. This was passed unanimously by the Board. Both the Treasurer (MG) and Secretary (GR) were re-elected. B Moerschbacher was elected Vice-President to replace S Şenel, M Jaworska was elected Vice-Secretary, and L David was elected Vice-treasurer.

The new Board now consists of:

S Şenel (President), L David (Vice-Treasurer), V Eijsink, S Fenicie, M Graeve (Treasurer), E Guibal, K Heppe, A Heras, M Jaworska (Vice-Secretary), B Moerschbacher (Vice-President), H Pospieszny (Vice-President), G Roberts (Secretary), V Seidl, V Varlamov and KM Vårum, together with O Smidsrød (Honorary President).

BRACONNOT PRIZE WINNER 2009

Profile : Marc Lavertu

Date of birth : July 7th, 1976 in Montreal (Canada)

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Education :

- 1998-2007 Master and PhD in Biomedical Engineering, Ecole Polytechnique of Montreal
Thesis title : Characterization of the Thermosensitive System Chitosan-Glycerol Phosphate and Applications for Gene Delivery
Supervisor : Pr. M.D. Buschmann
- 1994-1998 Bachelor degree in Physical Engineering, Ecole Polytechnique of Montreal

Publications:

- Jean M, Smaoui F, **Lavertu M**, Methot S, L. Bouhdoud, Buschmann MD, Merzouki A. Chitosan-Plasmid Nanoparticle Formulations for Systemic In Vivo Delivery of Recombinant FGF-2 and PDGF-BB or Generation of Antibodies. *Gene Therapy*, published online May 14th 2009.
- Ma PL, **Lavertu, M**, Winnik FM, Buschmann MD. New Insights into Chitosan-DNA Interactions Using Isothermal Titration Microcalorimetry. *Biomacromolecules* 2009, 10, 1490–1499.
- Ma O, **Lavertu M**, Sun J, Nguyen S, Buschmann MD, Winnik F, Hoemann CD. Precise Derivatization of Structurally Distinct Chitosans with Rhodamine B Isothiocyanate *Carbohydrate Polymers* 2008, 72, 616–624
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- **Lavertu M**, Xia Z, Serreqi A, Berrada M, Rodrigues A, Buschmann MD, Gupta A. A Validated ¹H NMR Method for the Determination of the Degree of Deacetylation of Chitosan, *Journal of Pharmaceutical and Biomedical Analysis*. 2003, 32(6) 1149-1158.

¹ The first's two authors contributed equally to this publication.

Patents:

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- Ouellet, M; Garon, M; Buschmann, MD; **Lavertu, M**. Universal mechanical material testing appts. using an actuator and load cell mounted on a frame to apply and measure the force applied to small samples with signal conditioning to remove noise from the load signals. CA2306275-A; CA2306275-A1; US6332364-B1, CA2306275-A CA2306275-A1 23 Oct 2000 G01N-003/08 200112 Pages: 45 English US6332364-B1 25 Dec 2001 G01N-003/00 200206.

Main communications:

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- [2] **Lavertu M**, Buschmann MD. Biomatériaux hybrides pour la réparation du cartilage. Présenté à la Rencontre Technologique – Génie Tissulaire et Biomatériaux (CQVB), Sherbrooke (Québec), 14 octobre 2004.
- [3] **Lavertu, M**; Filion, D; Schmid, A; Zayani, M, Buschmann, MD. Studies on the Mechanism of Thermal Gelation of Chitosan-Glycerol Phosphate Solutions. 10th International Conference on Chitin & Chitosan, Montpellier, France, September 2006. Poster

1st POSTER AWARD 2009**Human chitotriosidase – degradation of chitin and chitosan and its role within the innate immune response**

Christian Gorzelanny^{1, 2}, Birgit Poeppelmann³, Sophie Haebel⁴, Bruno M. Moerschbacher² and Stefan W. Schneider¹

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Chitotriosidase (ChT) was the first chitinase that has been identified in humans. After its discovery in 1994, ChT has been established as a marker enzyme for lysosomal storage diseases such as Gauche's and Fabry's disease. In Gauche's disease patients' expression of ChT was found to be elevated up to 1000 fold while it decreases to normal levels in response to a successful therapy. The up-regulation of ChT is related to an activation of macrophages induced by a dysfunction of the endosomal processing of glycolipids. The physiological function of the chitinases is still a matter of discussion although a direct defence function as part of the innate immune system against parasites and fungi has been proposed. More recently another human chitinase the acetic mammalian chitinase received remarkable attention due to its likely contribution to the development of asthma and an allergic-like response against chitin in mice.

To our knowledge nothing has been reported on ChT as a potential chitosan degrading enzyme in humans and on its potential contribution to chitosan-related biological activities. Therefore, we focused our work on the characterisation of native human blood-derived ChT as a chitosan degrading enzyme and the impact of ChT produced chitin and chitosan oligomers on the activation of human blood-derived monocytes/macrophages. We found that degradability of chitosan by ChT depends on the degree of acetylation (DA) in a linear manner and decreases with decreasing DA. Further analysis applying MALDI-TOF mass spectroscopy revealed high cleavage specificity between two N-acetylglucosamine residues and a processive endo-cleaving activity of ChT.

The measured inflammatory response of macrophages after treatment with ChT degraded chitosan was found only for highly acetylated chitosans (DA>30%) with a low molecular weight. The inflammatory response was characterised by a dose-dependent feed-back regulation of ChT and an up-regulated expression of typical cytokines such as TNF α or IL-6 involving the transcription factor NF- κ B.

In conclusion, our data suggest that chitotriosidase is able to generate small chitin and chitosan oligomers from polymeric chitosans. We could also show that oligomers generated by ChT degradation could induce in contrast to polymers a pro-inflammatory response in human macrophages.

Christian Gorzelanny, received his master degree in biology from the Department of Plant Biochemistry and Biotechnology, University of Muenster in 2004. In 2008 he received his Ph.D. from the department of Dermatology, University of Muenster. During his Ph.D. thesis he focused on the biological properties of various chitosans towards human cells. Since 2009 he works as a post-doc at the Department of Experimental Dermatology, Medical Faculty Mannheim, University of Heidelberg. His main research interest is the regulation of mammalian chitinases under inflammatory conditions and their impact for the innate immune response in humans.



3rd POSTER AWARD 2009**Chitinolytic activities of two Clostridia isolated from human faeces.**

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In many chitinolytic systems, chitin is hydrolyzed by chitin depolymerases which have wide-ranging application particularly in biotechnology. Microorganisms, the primary degraders of chitin in the environment, are a rich source of valuable chitin-modifying enzymes. In this work we isolated from human faeces two strictly anaerobic mesophilic chitinolytic bacteria lately identified as *Clostridium paraputrificum* J4 and *Clostridium beijerinckii* JM2.

Both strains grown on colloidal chitin produced complete array of chitinolytic enzymes. Significant activities of endochitinase, exochitinase and chitosanase were excreted extracellularly (JM2 301.2, 281.6 and 268.3 nkat/μg protein, resp., J4 256.4, 346.5 and 154.4 nkat/μg proteins, resp.). The high cellular activity of N-acetyl-β-glucosaminidase and chitosanase were detected (JM2 732.4 and 154.4 nkat/μg protein, resp.) and N-acetyl-β-glucosaminidase activity represents the main activity associated with the cellular fraction. The chitinase variability was confirmed on zymograms of renaturated SDS-PAGE. The enzymes were visualized as fluorescent bands by using 4-Methylumbelliferyl derivatives of N-acetyl-β-D-glucosaminide, β-D-N,N'-diacetylchitobioside, or β-D-N,N',N''-triacetylchitotriose for N-acetyl-β-glucosaminidase, chitobiosidase, or endochitinase, resp. The extracellular complex consisted of at least 6 isoenzymes with molar mass 32-76 kDa, in the cellular fraction 5 more prominent bands with higher molar mass (45-90 kDa) was detected. One protein with molar mass 90 kDa was isolated and characterized using MALDI-TOF/TOF tandem mass spectrometry (MS/MS) as chitinase B.

The production of chitinolytic activity in the human colon can be of importance with respect to a constant increase in application of nontraditional nutrients such as chitin/chitosan-containing nutrition diets and controlled drug release medicines.

Jiri Simunek, DVM, PhD graduated in 1982 at The University of Veterinary Medicine in Brno (Czech Republic). He received his PhD (physiology and biochemistry) in 1989 at the Institute of Animal Physiology and Genetics in Prague (PhD thesis Manipulation of ruminal fermentation of saccharides). In this institute he still operates at the position of scientific worker. He has coordinated several projects solving chitin and chitosan degradation in human colon. His research interests include microbiology and biochemistry of anaerobic microorganisms of the gastrointestinal tract in health and disease, especially chitinolytic anaerobic bacteria and their chitinolytic enzyme complex. In recent years he specializes in studying of the fate of chitosan in the digestive tract and chitosan and chitoooligosaccharides interaction with the colonic microbial population.

