

Quarterly Newsletter of the Belgian Society for Microbiology

Issue no. 1, May 2011

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As member of the Federation of European Microbiological Societies (FEMS), members of BSM can also profit of the granting opportunities of FEMS.

To be successful and to be granted a long life, we also appeal on your collaboration and to communicate about interesting findings in your field (items for inclusion can be emailed to BSM.newsletter@gmail.com).

Finally, I hope that you welcome this new initiative, and that it might be a stimulus to join BSM or to renew your BSM membership.

Jozef Anné, President BSM

Welcome

It is a great pleasure and privilege to present you the first issue of the BSM e-newsletter, a new initiative of the BSM Board. You receive this newsletter, because you have shown in the past your interest in one of the BSM activities. BSM was initiated in 1996 in close collaboration with the National Committee for Microbiology (<http://www.rasab.be>) as a succession of the FWO/FNRS contact group "General Microbiology". The aim was to create a forum for Belgian microbiologists of all sub-disciplines and to provide as such a unique opportunity for debate, discussion and for the exchange of important ideas and information in all fields of microbiology. To meet this goal the Society organizes yearly a full day symposium, and has and will also organize half day meetings on up-to-date topics.

With the launch of the BSM e-newsletter we will extend our services with this new communication means, in order to get more regularly contact with the BSM members, and to inform about activities, exchange ideas, and to open discussions concerning all aspects of microbiology. Important decisions of the Board will be announced and also interesting news from BSM members can be communicated.

Membership

Historically membership of BSM has been linked to the attendance of the yearly BSM symposium : the registration fee for the symposium was at the same time the membership or vice versa. While this has been a convenient system it poses several problems, the most important one that membership fees are only collected at the time of the symposium, which is typically in November or December. In addition, microbiologists who for one reason or another do not attend the yearly symposium are no longer a member of the BSM. For these reasons, the BSM board decided in its meeting on 13/01/2011 to uncouple both and to collect membership fees before July 1st. Members who pay their fee before this date pay € 20 (as before) and will get free access to the annual symposium. Later payments for symposium pre-registration or for membership will be at € 25. On-site registration fee will be € 30. To renew your membership please visit the BSM website (www.belsocmicrobio.be).

BSM Symposium 16 November 2011

The next annual BSM symposium will take place on Wednesday 16 November in the Academies' Palace, Hertogsstraat 1, Rue Ducale – 1000 Brussels. The topic of the symposium is "Life, death and survival of microorganisms".

We are currently putting together the program and it will follow the traditional schedule. In the plenary session (morning session), internationally renowned speakers will present their state-of-the-art work. Following the lunch and poster session, the afternoon sessions (one session bacteriology, one session virology) will provide young researchers from Belgian universities with the opportunity to share their results with others.

Confirmed speakers include Kim Lewis (Northeastern University, Boston, USA), Frank Mateo (University of Graz, Austria), Stacey Efstathiou (University of Cambridge, UK), Stanley Brul (University of Amsterdam, The Netherlands) and Stefano Aquaro (University of Calabria, Italy).

Registration forms and information about abstract submission will be available from the BSM website.

News from FEMS



FEMS is the Federation of European Microbiological Societies, and its main mission is to advance and unify microbiology knowledge. FEMS brings together 46 member societies from 36 European countries, covering over 30000 microbiologists. Belgium is represented in FEMS by BSM, and our FEMS delegate is Jozef Anné.

Members of FEMS Member Societies can apply for research fellowships, an advanced fellowship (new as of 2006) and/or support when organizing a meeting. These benefits are restricted to members of FEMS societies only. For more information, go to the FEMS website (<http://www.fems-microbiology.org/>).

Every other year FEMS organises the Congress of European Microbiologists – the 4th edition will take place in Geneva in June 2011



JOIN US AT FEMS 2011
4th Congress of European Microbiologists
Geneva, Switzerland
June 26-30, 2011

SAVE THE DATE! Advancing Knowledge on Microbes
www.kenes.com/fems-microbiology

The poster features a central image of a scientist in a white lab coat looking through a microscope. Below this, there is a scenic view of Geneva, Switzerland, with a large fountain in the foreground and mountains in the background. The FEMS logo is visible in the top left corner of the poster.

Ines Verbaendert (LM-UGent)

FEMS Research Fellowship at UMB, Ås, Norway

In winter, much of Norway is usually transformed into a snow-clad paradise. And so is Ås...

Ås is the village I visited in January for my research on the denitrification phenotype in *Bacillus* strains, with the support of a FEMS Research Fellowship. It is a small village in the south of Norway, about 30 minutes from Oslo by train. It is home to the Norwegian University of Life Sciences, but very cold and snowy in winter...So after buying some necessary extra thermal clothing and packing my warmest outfits, I set off for a one-month visit to the UMB Nitrogen Group at the Norwegian University of Life Sciences.

The PhD student that I was to collaborate with, Daniel Mania, and the rest of the lab members of the UMB Nitrogen Group gave me a warm welcome and so the research visit started in the second week of 2011.

The UMB Nitrogen Group accommodates pioneers in research on denitrification phenotype. They developed an automated incubation system [1] for comparative analysis of denitrification kinetics and have already studied several model denitrifiers [2, 3] and environmental samples [4]. The Laboratory of Microbiology (Ghent University, LM-UGent), where I am based, recently hypothesized that Gram-positive denitrifiers, which are generally overlooked in denitrification research [5], can play an important role in soil denitrification [6]. Since, denitrification can give rise to the greenhouse gas nitrous oxide (N_2O) depending on the environmental parameters in which the denitrifying organism resides, insight in response patterns of Gram-positive denitrifiers to these environmental parameters (a.o. pH and nitrogen source), could possibly contribute to future N_2O mitigation approaches in agricultural soils.

So, what was the research set-up? We wanted to evaluate the influence of pH and nitrogen source on kinetics and $N_2O:N_2$ ratio in denitrifying *Bacillus* strains of the same species and of distinct species. This was investigated by monitoring the kinetics of O_2 , NO, N_2O and N_2 using the automated incubation system of the UMB Nitrogen Group [1]. The genus *Bacillus* was chosen as a model because of its abundance in soil [3, 6] and because it harbors denitrifying representatives [7-9].

In addition, the Laboratory of Microbiology has a track record in the study of the genus *Bacillus* and has a large strain set at its disposal in the BCCM/LMG bacteria culture collection.

After one month of research, results show that Gram-positive denitrifying bacteria, in particular *Bacillus*, seem to cope differently with lower pH and with the availability of different nitrogen sources in comparison to Gram-negative bacteria, in particular with respect to N_2O emission.



Although we did expect this to some extent, it was nice to see it confirmed finally. Hence, this one-month research fellowship at UMB was very fruitful for my own research in denitrification in Gram-positive bacteria and has laid the groundwork for a joint scientific publication with Prof. Dr. L. Bakken and Prof. Dr. Å. Frostegård on kinetic responses of denitrifying *Bacillus* strains to environmental parameters.

1. Molstad et al. Robotized incubation system for monitoring gases (O_2 , NO, N_2O , N_2) in denitrifying cultures. *J Microbiol Methods* 2007, 71(3):202-211.
2. Bergaust et al. Transcription and activities of NOx reductases in *Agrobacterium tumefaciens*: the influence of nitrate, nitrite and oxygen availability. *Environ Microbiol* 2008, 10(11):3070-3081.
3. Felske et al. Phylogeny of the main bacterial 16S rRNA sequences in Drentse A grassland soils (The Netherlands). *Appl Environ Microbiol* 1998, 64(3):871-879.
4. Liu et al. Denitrification gene pools, transcription and kinetics of NO, N_2O and N_2 production as affected by soil pH. *FEMS Microbiology Ecology* 2010, 72(3):407-417.
5. Verbaendert et al. Denitrification in Gram-positive bacteria: an underexplored trait. *Biochem Soc Trans* 2011, 39(1):254-258.
6. Verbaendert et al. Denitrification is a common feature in members of the genus *Bacillus*. *Syst Appl Microbiol* 2011, in press.
7. Suharti et al. A novel copper A containing menaquinol NO reductase from *Bacillus azotoformans*. *Biochemistry (Mosc)* 2001, 40(8):2632-2639.
8. Pichinoty et al. La dénitrification chez *Bacillus licheniformis*. *Can J Microbiol* 1978, 24(1):45-49.
9. Urata & Satoh. Enzyme localization and orientation of the active site of dissimilatory nitrite reductase from *Bacillus firmus*. *Arch Microbiol* 1991, 156(1):24-27.

In this section of the newsletter we will highlight the work of a recently graduated PhD student who obtained his or her degree at a Belgian university. We start of with Gilles Brackman, who recently obtained his PhD degree at Ghent University. If you are interested to have your work highlighted in the next issue of this newsletter, send a one-page summary of your work to BSM.newsletter@gmail.com

Gilles Brackman graduated as Master in Pharmaceutical Sciences at Ghent University in 2006. He decided to join the Laboratory of Pharmaceutical Microbiology (promotors : Hans Nelis & Tom Coenye) and obtained a grant from the IWT to study the potential of quorum sensing inhibition to interfere with bacterial biofilm formation. He obtained his degree on 23 March 2011.

Although antibiotic resistance in bacteria is a growing problem, relatively few novel antibacterials have been developed in recent years. In addition, killing of bacteria or the inhibition of their growth, leads to a selective pressure, making antimicrobial resistance an inevitable consequence of antimicrobial use. For this reason, innovative antimicrobials with novel targets and modes of action are needed. One alternative approach is targeting the bacterial communication system (quorum sensing, QS). Based on the nature of the signalling molecules used by bacteria, three main QS systems can be distinguished: the AHL QS system in Gram-negative bacteria, the peptide QS system in Gram-positive bacteria and the AI-2 QS system in both Gram-negative and -positive bacteria. Many bacteria use QS for the coordination of virulence expression and biofilm formation and/or maturation. Hence, the bacterial QS system is an attractive target for novel anti-infective agents. To date, several QS inhibitors have been described but these have often only been poorly characterized.

It was our goal to implement and optimize different biosensors for the detection of QS inhibition and to use these biosensors to evaluate a set of AHL-QS inhibitors for their inhibitory effect on different QS systems. A second aim was to investigate the antibiofilm effect of these compounds.

AHL-QS inhibitory effects were observed in different biosensors and several compounds affected later stages of biofilm development/maturation and/or promoted detachment. In a second study we observed that QS inhibitors increased the susceptibility of bacterial biofilms towards selected conventional antibiotics, indicating that a combined treatment could be useful. In addition, this could broaden the therapeutic choice since antibiotics which have become ineffective could possibly regain efficacy when used in combination with QS inhibitors.

There is also considerable evidence for the involvement of interspecies communication in the control of bacterial virulence and biofilm formation/maturation, indicating the potential of this QS system to function as a target for antipathogenic agents. An adenosine derivative with a p-methoxyphenylpropionamide moiety at C-3' (LMC-21) and an analog lacking the adenine base inhibited AI-2 QS by interfering with LuxPQ. In a parallel study we discovered that cinnamaldehyde and several more potent cinnamaldehyde analogs inhibited AI-2 QS by decreasing the DNA binding ability of LuxR. An α,β unsaturated side chain capable of reacting through Michael-addition, a hydrophobic moiety as well as a (partially) negative charge were necessary for this activity. In addition, all QS inhibitors reduced *in vitro* virulence factor production and *in vivo* virulence of several *Vibrio* spp.

In conclusion, we have elucidated the mechanism of action of established QS inhibitors and have discovered novel QS inhibitors. We have shown that these compounds affect virulence factor production and biofilm formation in several pathogenic bacteria and have provided evidence that QS inhibitors could contribute to the control of bacterial infections, either alone or in combination with antibiotics.

For more details you can consult the following publications or contact Dr. Brackman (gilles.brackman@ugent.be) :

Brackman et al. (2008). Cinnamaldehyde and cinnamaldehyde analogues reduce virulence in *Vibrio* spp. by decreasing the DNA-binding activity of the quorum sensing response regulator LuxR. *BMC Microbiol* 8:149.

Brackman et al. (2009). The use of quorum sensing inhibitors to interfere with biofilm formation and development in *Burkholderia multivorans* and *Burkholderia cenocepacia*. *Res Microbiol* 160:144-151.

Brackman et al. (2009). AI-2 quorum sensing inhibitors affect the starvation response and reduce virulence in several *Vibrio* species, most likely by interfering with LuxPQ. *Microbiology* 155:4114-4122.

Brackman et al. (2011). Structure-activity relationship of cinnamaldehyde analogs as inhibitors of AI-2 based quorum sensing and their effect on virulence of *Vibrio* spp. *PLOS One* 6:e16084.

Microbiology in the News

On 18, 19 and 20 April of this year the Dutch Society for Microbiology (Nederlandse Vereniging voor Microbiologie) celebrated its 100th anniversary.

During the Opening Session on Monday 18 April, the first copy of the “Microcanon” was presented to Prince Willem-Alexander (see picture below). The Microcanon introduces topics from the entire breadth of microbiology. It contains 62 chapters organised in seven parts. Each topic in the Microcanon is described in an accessible and relative simple manner in order to increase the understanding and awareness for microbiology among the general public. The book further aspires to challenge its readers to get more in-depth information. For more information see www.nvmm-online.nl and www.microcanon.nl.

The plenary session on this opening day (attended by appr. 600 microbiologists) included presentations by Joan Bennet, Craig Venter, Harald zur Hausen (recipient of the 2008 Nobel Prize in Physiology or Medicine), Lynn Margulis, Barry Marshall (recipient of the 2005 Nobel Prize in Physiology or Medicine) and Paul Nurse (recipient of the 2001 Nobel Prize in Physiology or Medicine)

More information about the meeting (including abstracts of all presentations) can be found at http://www.nvmm-online.nl/downloads/NVvM-NVMM_Congress2011_AbstractBook_NTMM_20110408.pdf



On 30 June and 1 July 2011 the First Symposium on Microbial resource management (MRM) will take place in Gent. For more information, visit <http://www.labmet.ugent.be/mrm/>. This meeting is set up as a scientific honorary farewell to prof. Willy Verstraete (pioneer of MRM and head of the Laboratory of Microbial Ecology and Technology at Ghent University) , who will retire at the end of this year.

The topic of MRM recently received a lot of attention. Prof. Willy Verstraete (was interviewed by prof. Dirk Inzé in the framework of the “Grijze cellen” , a cooperation between the fund for Scientific Research-Vlaanderen, the science magazine EOS and production company deBuren. Videos of this interview can be found at www.youtube.com/watch?v=qxQ7SmZGaq4.



More recently, a documentary about prof. Verstraete and his ground-breaking work on MRM was shown on Canvas. More information about this program can be found on www.tv-corner.be/2011/03/21/alles-voor-de-wetenschap-willy-verstraete/. Parts of the documentary can also be viewed online (see video.canvas.be/tag/alles-voor-de-wetenschap).

CAREER OPPORTUNITIES IN MICROBIOLOGY

POSTDOCTORAL RESEARCH POSITION - Environmental molecular microbiology
 Université Libre de Bruxelles/Ecologie des Systèmes Aquatiques/Prof. Pierre Servais



We are looking for a postdoctoral fellow to join us on the FRFC project “Microbial diversity and processes in Lake KIVU (RDC, Rwanda)” (2011-2013). The overall goal of this project is to study bacterial and archaeal communities inhabiting the deep, stratified lake KIVU, and to quantify microbial processes involved in C, N and S cycles. A special emphasis will be put on the redoxcline, where many of the microbial processes take place.

More specifically, the tasks of our lab will be

- to characterize bacterial community structure by DGGE, pyrosequencing, FISH, qPCR and its variations over space (e.g. vertically) and time
- to assess heterotrophic bacterial production by incorporation of radioactive substrates and its spatial and temporal variations
- to determine the key microbial players in the C cycle of lake KIVU using DNA-SIP (stable isotope probing)

This project involves a collaboration with two other laboratories: the Laboratory of Freshwater Ecology, Facultés Notre-Dame de la Paix de Namur and the Chemical Oceanography Unit, Université de Liège. This postdoctoral research requires 2 field trips a year to lake KIVU with our partners.

Candidate profile

Microbiologist, (bio)chemist or bio-engineer with a PhD in environmental molecular biology. Must be academically competitive (minimum 2 publications in peer-reviewed journals), self-motivated, rigorous, with good English oral and writing skills, initiative, responsibility and team spirit.

Language : English, French.

Other requirements

The person who is interested to join us will have to apply to a 3-year grant "FNRS-POSTDOC-IN" (<http://www2.frs-fnrs.be/fr/soutenir-linternational/carriere-chercheur/fellowships-inout.html>) (deadline: end of May 2011, to start in January 2012). The person must be NON BELGIAN.

Contact

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CAREER OPPORTUNITIES IN MICROBIOLOGY

POSTDOCTORAL RESEARCH POSITION - Environmental metagenomics

Université catholique de Louvain/Unité de génie biologique/Prof. Spiros Agathos



A 1-year research position is available at the Unit of Bioengineering (<http://www.uclouvain.be/gebi>) of the Earth & Life Institute, University of Louvain, Louvain-la-Neuve, Belgium for a highly motivated postdoctoral scientist.

The research project seeks to develop novel tools for *environmental metagenomics*. Such techniques should enable the efficient cloning and sequencing of microbial *metagenomes* from selected soil and aquatic habitats, so that their subsequent screening may lead to the discovery and exploitation of industrially attractive enzyme activities. Specific aims include the development of new cloning/expression systems in hosts beyond *Escherichia coli*, such as novel strains of as-yet uncultured *Acidobacteria* as well as shuttle vectors between these. Our hypothesis is that gene expression will be higher in libraries based on hosts from natural habitats than on *E. coli*. The research will be carried out within a major consortium of university and industry partners (METAEXPLORE) that is supported by the 7th Framework Programme of the European Union.

Candidate profile

Microbiologist, (bio)chemist or bio-engineer with a strong background in molecular biology; good laboratory skills in molecular microbiology are highly desirable, while prior experience with construction and screening of metagenomic libraries will be considered an asset. Must be academically competitive, self-motivated, rigorous, with good English oral and writing skills, initiative, responsibility and team spirit.

Language

English. Some knowledge of French would be beneficial for the candidate to fully enjoy the social life and culture of the region.

Other requirements

Complete CV, letter of motivation and two letters of recommendation. Deadline for submission of application (preferably by e-mail): 30 August 2011

Contact

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Call for contributions

With this quarterly newsletter the BSM board wants to improve its communication with BSM members. While it is unrealistic to expect that we will achieve the level of “Microbiology Today” (SGM Newsletter) or “Microbe” (ASM Newsletter), we hope to bring you useful microbiology-related information on a regular basis.

Of course this is only possible with your contributions and we would like to invite you to submit these contributions to BSM.newsletter@gmail.com (preferably as a Word document).

What can you submit ? Basically anything that is microbiology-related : vacancies in your lab, announcements of seminars, a summary of important/interesting research findings etc. If you want to discuss whether something would be suitable for inclusion in the newsletter prior to preparing the text, feel free to contact us as well.

VISIT US AT :

<http://www.belsocmicrobio.be/>

Composition of the BSM Board

President & FEMS representative : Jozef Anné (KULeuven)

Treasurer : vacant

Secretary & representative in the International Union of Microbiological Societies (IUMS) : Paul De Vos (UGent)

Members : A. Alaoui (ULB), Spiros Agathos (UCL), Alfons Billiau (KUL), Tom Coenye (UGent, liaison with Dutch Society for Microbiology), Pierre Cornelis (VUB, liaison with ASM), Herman Favoreel (UGent), David Gillan (UMons), Isabelle George (ULB), Natalie Leys (SCK-CEN), Max Mergeay (SCK-CEN), Jozef Vanderleyden (KULeuven)