Swammerdam Institute for Life Sciences

Swammerdam Institute for Life Sciences
Faculty of Science
Annual report 2018

UNIVERSITY OF AMSTERDAM
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SILS Management and office
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Operational & Financial Manager: dr. Casper Huijser
Management assistant: Anoeska van de Moosdijk MSc
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Swammerdam Institute for Life Sciences (SILS)
Faculty of Science, University of Amsterdam
Annual Report 2018
Amsterdam, June 2019
Interviews, text editing and lay-out: Anoeska van de Moosdijk

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In the year 2018 we have restructured SILS to meet the demands of the future and provide a better fit to the researchers and towards outreach activities. SILS harbours four themes now: Microbiology, Cell and Systems Biology, Green Life Sciences and Neurosciences. Next to these themes we distinguished essential top-level support as “underpinning technologies”. As in previous years, everybody has performed exceptionally well with the management team to prepare SILS for the future.

**Valorisation activities**

2018 was the year that the SILS spin-off Confocal.nl acquired external finance and as a consequence dr. Erik Manders moved into the company. We wish them success and will follow the developments. In 2018 the spin off company “Macrobian Biotech BV” reached new goals, funding and prepared new patents. The activities are boiling down to several development lines, which the company hopes to bring to the market/external-finance in 2019-2020. To meet the company see their website or talk to the founders: dr. Lars van der Heide and Prof. Marten Smidt.

**Research funding**

SILS researchers were again very successful in attracting additional research funding, which totalled to about €5.500k for 2018. Amongst these were research grants of dr. Allman (ERC-starting), HBP grants to the group of Prof. Pennartz (~ €1000k), TTW grants to Prof. Bouwmeester and dr. Schuring (~ €1000k) and two grants to the newly appointed Prof. Kessels (~ €600k). I sincerely thank everybody for their continuous efforts and congratulate those with their success.

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**Facts & Figures**

**SILS revenues**

![SILS revenues](image)

**SILS costs**

![SILS costs](image)

**SILS result**

![SILS result](image)

*Figure 1: Charts of revenues (a), costs (b) and results (c) of the Swammerdam Institute for Life Sciences, in k€, for the years 2014-2018.***

**Results**

The integrated results for 2018 show a volume of €293.000 (see figure 1c) resulting in €957.000 of reserve remaining on 31 December 2018.

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Marten P. Smidt
SILS director
Personnel

In 2018, SILS employed around 240 employees year round (including FOM employees and PhD fellows with a scholarship). Figure 3 presents the male:female ratio on 31 December 2018. SILS is committed to a diverse employee population and aims at an equal ratio across all ranks. The balance at PhD and postdoc level remains fairly equal and our diversity policy was successful in attracting more women at the associate-professor level. We continue to strive to a complete balance at all levels.

At the end of 2018, an approximate two thirds majority of all SILS employees (including bursaries) were Dutch natives. Of the in total 232 SILS employees on 31 December, 33% originated from abroad, most notably from China and Italy (see figure 4). In terms of age, SILS staff span the full range from new PhD students to employees near retirement.
Research Theme

Cell and Systems Biology
Chair: Prof. Age Smilde  
Group leaders: dr. Huub Hoefsloot  
dr. Johan Westerhuis  
dr. Antoine van Kampen

Highlights
1. Start of the ChemoSense project at the Biosystems Data Analysis Group.
2. EU project COSMIC (www.cosmic-h2020.eu) started with 14 PhD candidates focussing on the role of the germinal center in rheumatoid arthritis and B-cell lymphoma combining experimental approaches and mathematical modelling.

In brief
1. Age Smilde was appointed Editor-in-Chief of the Journal of Chemometrics
2. PhD of Mari van Reenen: New Statistical approaches for the assessment of metabolomics data, North West University, Potchefstroom, South Africa, Promotor Johan Westerhuis
3. Appointments on the ChemoSense and CounterStrike projects.
4. Grassroots grant awarded to Gooitzen Zwanenburg and Renée van Amerongen

Info
Staff 7,5 FTE  
Publications 19

Figure: Multiscale modelling of B-cells in the dark zone (DZ) and light zone (LZ) of the germinal center. B cells (centrocytes and centroblasts) interact with follicular dendritic (FDC) cells and T follicular helper (Tfh) cells resulting signals that determine the state of the gene regulatory network (GRN) in each cell and, hence, its differentiation to plasma cells. Cells are modelled with an agent-based model. The GRN and chemokine gradients are modelled with differential equations. Made by Elena Merino Tejero

Read more about this research group on their web page sils.uva.nl/bda
Chair: Prof. Dorus Gadella
Group leaders: dr. Renée van Amerongen
dr. ir. Joachim Goedhart
dr. ir. Mark Hink
dr. Marten Postma

**Highlights**

1. Renée van Amerongen organized and chaired the 2018 Gordon Research Conference on Mammary Gland Biology. Together with co-chair Dr. Christina Scheel (Munich, Germany) she raised over $80,000 to run the meeting, which was held in Il Ciocco, Italy.

2. Mark Hink organized 4 extra-curricular microscopy courses, all rated with an 8.5 or higher.

3. A novel absorbing but non-fluorescent pink chromo-protein was developed from mScarlet (Laura van Weeren and Dorus Gadella).

4. Most-read blog on “the Node” by Joachim Goedhart on an alternative for p-values.

**In brief**

1. Dorus Gadella was awarded an ALW-internationalization grant (313 k€) for joining the Euro-BioImaging ESFRI roadmap.

2. Anoeska van de Moosdijk won the poster prize at the Wnt meeting in Heidelberg for the generation and characterization of a novel mouse model to visualize and trace Wnt-responsive cells in vivo.

3. Mark Hink was awarded a FEBS Advanced Practical Course grant.

4. 1083 samples of constructs originating from Molecular Cytology were distributed by Addgene in 2018, increasing the total number of distributed samples to 4378.


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Read more about this research group on their web page sils.uva.nl/mc
Highlights

1. Discovery of maternal specific snoRNAs for early zebrafish embryogenesis.
2. Developed a method to discover, detect and monitor viruses in plants via siRNA (ViSiR).
3. Developed a method for visualizing the genomic landscape of a species (Genome Lineup).
4. Developed a method to track-down invasive species via eDNA in waterways (MBR eDNA toolkit).

In brief

1. Set up a -SILS-funded- Illumina NextSeq500 system for next-generation DNA and RNA sequencing.
2. Finished implementation of Oxford Nanopore third-generation DNA and RNA sequencing platform.
3. Started EFRO OPZuid project with Meyer Potato BV about smart genomics in plant breeding.
4. Dr. Martijs Jonker achieved his SKO certificate.

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Read more about this research group on their web page sils.uva.nl/rbab
Chair: Prof. Hans Westerhoff
Group leaders: dr. Matteo Barberis, dr. Pernette Verschure

In brief
1. Pernette Verschure organized and chaired an international conference on 'Systems Epigenetics: Precision medicine cancer' in Amsterdam setting the stage for an innovative research niche of systems epigenetics.
2. Matteo Barberis was appointed as Reader/Professor of Systems Biology at the University of Surrey, UK.
3. Hans Westerhoff received the Systems Biology Foundation Award of the International Federation of Automation and Control, in Chicago, IL.
4. Pernette Verschure started a national research initiative on functionality of epigenetic heterogeneity for cell behavior in the context of the NWA Origins of life theme.
5. Matteo Barberis chaired four plenary symposia at Systems Biology conferences: BGRS\SB Novosibirsk, Russia; ECCB Athens, Greece; FISV Rome, Italy; and ICSB Lyon, France.
6. Pernette Verschure successfully coordinated the EU H2020 MSCA EpiPredict consortium with 11 PhD students of which 2 received their PhD degree and 5 are finishing their research at SILS, UvA.

Highlights
1. Verschure et al. showed the impact of epigenetic DNA methylation profiling in single cell traces across different tissues for age determination. The method combines massive parallel sequencing with machine learning and attracts the interest of forensic experts.
2. Existing molecular ‘understanding’ of the eukaryotic cell cycle consists of understandings of bits and pieces. Barberis et al. constructed a molecules-based model of the cell cycle that does oscillate autonomously. This should enable much better drug targeting.
3. We showed that a computational model reflecting the molecular network of innate inflammation produces a special type of bi-stability. The transition to the chronic inflammation state was irreversible unless fibroblast infiltration was enabled. Tipping the balance of this bi-stability could affect tumorigenesis.
4. Innovative single cell analysis tools have been developed to determine systems behavior of epigenetic transcription regulation and breast tumor cell state switching.

Figure: PGK1 single molecule transcripts (red dots) in CD44 expressing (green) breast cancer cells showing large cell-to-cell variability in transcription. Computer simulation of gene on-off switching to interpret transcription bursting dynamics. Image by Will Beckman, modelling by Michal Kowalczyk (Verschure group).

Figure: Anti FLC peptide drug should transiently reduce chronic inflammation, especially at low antigen load.

Read more about this research group on their web page sils.uva.nl/ssbnog

Info
Staff 6.5 FTE
Publications 5
Research Theme

Green Life Sciences
Chair: Prof. Martijn Rep  
Group leaders: dr. Harrold van den Burg  
 dr. Frank Takken  
 Prof. Saskia Hogenhout (special chair)  
 Prof. Marcel Prins (special chair)

“Our mission is to unravel the molecular basis of disease and disease resistance in plants. We have developed Fusarium wilt of tomato as a model system for the molecular analysis of plant-fungus interactions and have broadened our research to include interactions of plants with viruses and bacteria.”

**Highlights**

1. Together with two breeding companies, Harrold van den Burg received a Topsector grant from “Tuinbouw en Uitgangsmaterialen” to reveal the Achilles’ heel of Brassica for Black Rot disease.


**In brief**

1. EPS Talent program ‘Groene Topsector’ grant to Thomas Aalders: TOPLESS a novel S gene: Unravelling the manipulation of Topless by a conserved effector from Fusarium oxysporum.

2. Frank Takken has co-organised the Third International Conference “Plant Biotic Stresses & Resistance Mechanisms” in Vienna, Austria (July 2-3, 2018). A diverse and exciting program with top scientist from all over the world.

3. Martijn Rep was appointed as new chairholder of the group.

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Figure from “Genome-wide functional analyzes of plant CC-NB-LRR pathogen receptors reveal critical roles of their N-terminal domain in oligomerization and immunity.” PLoS Biol., 16(12): e200582, provided by Frank Takken.

Read more about this research group on their web page on sils.uva.nl/mpp
Highlights

1. Using knock-out (KO), knock-down (KD) and overexpression mutants of phospholipase C (PLC) in Arabidopsis thaliana, novel functions for PLC2, PLC3, PLC5 and PLC7 were discovered in plant signaling and development (D’Ambrosio et al., 2017; Zhang et al., 2018a, and 2018b; Van Wijk et al., 2018), with the latter functioning in seed mucilage, leaf serration and drought tolerance (see Figures).

In brief

1. EU-Future Emerging Technologies (EU-FET) grant.
2. Patent on Molecular Heaters to boost crop yield at cold temperatures.
3. IXA Physics2Market grant.

Read more about this research group on their web page on sils.uva.nl/pcb
Chair: Prof. Ronald Koes  
Group leaders:  dr. Paul Fransz  
              dr. Maike Staim  
              dr. Francesca Quattrocchio

**Highlights**

1. Publication of a paper in *Plant Physiology* proposing that locus-specific epigenetic divergence between the parental lines can directly or indirectly trigger heterosis in Arabidopsis hybrids independent of genetic changes. These results add to a growing body of evidence that points to epigenetic factors as one of the key determinants of hybrid performance.


3. Publication in *Plant Direct*: Identification and publication of three new MYB genes regulating anthocyanin synthesis in *Petunia hybrida*

4. Several group members gave oral presentations at the World Petunia Days in Amsterdam (March 2018).

5. In July the Marie Curie ITN project MEICOM has started, which is aimed to develop methods to understand the influence of the genomic environment on crossover formation/control in crops.

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**In brief**

1. Maike Stam was promoted to UHD/associate professor.
2. Francesca Quattrocchio and Ronald Koes got a post-doc position financed by ENZA zaden, Enkhuizen.
3. Paul Fransz obtained funding for a PhD position via a Horizon2020 ETN training grant network.

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In the three compartments of the Science Park greenhouse devoted to petunia are maintained hundreds of different genotypes belonging to *P. hybrida* and different wild petunia species. This collection, unique in the world, is genetically well characterized material for groups at the UvA and all over the world. It is moreover important for the interaction with companies (especially breeders of Solanaceae crops) and for the interaction with schools to which we provide material for practical classes. Image by Francesca Quattrocchio.

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Read more about this research group on their web page sils.uva.nl/pdeg
Chair: Prof. Michel Haring  
Group leaders: dr. Silke Allmann  
            dr. Petra Bleeker  
            dr. ir. Rob Schuurink

**Highlights**

1. Silke Allmann was awarded an ERC starting grant: “Scentsitive nature: Green leaf volatile perception in plants and insects.”

2. Robert Schuurink and Michel Haring have published their work on the regulation of plant trichome formation and volatile production in *Plant Cell* which was additionally featured on the cover of the magazine.

3. Robert Schuurink and Silke Allmann have published together with colleagues from Ghent University a prestigious Tansley review in *New Phytologist* about green leaf volatile production by plants.

4. Robert Schuurink chaired the session Perception of Volatiles in Plants at the Gordon Conference on Plant Volatiles, Ventura, CA, USA and Petra Bleeker was Keynote speaker at the Graduate School for Life and Health Sciences, Université Cote d’Azur, France with a talk about Natural variation in tomato specialized metabolites against insects.

**In brief**

1. Robert Schuurink organized the 16th World Petunia Days in Amsterdam
2. Silke Allmann was appointed as permanent staff member of the Plant Physiology group
3. Michel Haring was appointed as Program director of the Bachelor Biology UvA

**Figures:** *Green Factories.* Glandular trichomes on the surface of different wild and cultivated tomatoes. The gland cells can synthesis and secrete a variety of specialized metabolites that can act in plant defence against pest and insects (Photos by Ruy Kortbeek and Maurice Heilijgers).

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Chair: Prof. Harro Bouwmeester

**Highlights**

1. A method was developed to analyse the production of a rhizosphere signalling molecule and it was shown to affect the behaviour of plant pathogenic nematodes in extremely low concentrations.

2. In rice indications were found that the rhizosphere microbiome is affected by the amount of rhizosphere signalling molecules exuded.

3. The group published their first UvA papers (Yanting Wang in *J Exp Bot*; Harro Bouwmeester in *J Exp Bot* and Harro Bouwmeester was invited to write a Perspective in *Science*).

4. Harro Bouwmeester organized and chaired the Gordon Conference on Plant Volatiles held in Barga, Italy, 3-9 February 2018

**In brief**

1. The group acquired a number of important grants: NWO-TTW-HIP project, NWO-ECHO project, Marie Curie fellowship (Lemeng Dong), PhD grant (Daan Mangé)

2. Together with Syngenta coworkers, Harro Bouwmeester received the 20,000 CHF Sandmeyer award of the Swiss Chemical Society for the joint work on the use of strigolactones in agriculture.

3. UVA approved the continuation of the Research Priority Area Systems Biology in which the PHB group will make an important contribution to the plant host-microbiome interaction work

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Aeroponics set-up for the collection of plant root exudates (drawing by Bora Kim)

Graph: Principal Coordinates Analysis (PCoA) on the bacterial microbiome composition of two different soils, and the roots and rhizosphere of rice genotypes (Unpublished results Bora Kim)

Read more about this research group on their web page on sils.uva.nl/phb
Microbiology
Chair: Prof. Leendert Hamoen
Group leaders: dr. Tanneke den Blaauwen
dr. Filipe Branco dos Santos

“The Bacterial Cell Biology & Physiology groups (BCBP) study key bacterial processes to better understand how bacterial cells work, to find new ways to control and eradicate them, but also to develop them into biofactories for the production of commercial valuable enzymes and chemicals.”

Highlights

1. Dr. Wei Du has completed his PhD thesis under the title ‘Towards stable cyanobacterial cell factories’.

2. Dr. Laura Bohorquez has completed her PhD thesis ‘The dynamic role of the conserved WhiA and MinD proteins in chromosome segregation, fatty acid metabolism and cell division in Bacillus subtilis’.

3. We have studied different alternative approaches to use solar energy to alleviate the dependency of human societies on fossilized carbon deposits. This has lead to a nice high-impact publication in Energy & Environmental Science, in which we argue that the direct usage of engineered cyanobacterial cell factories is still the most promising approach under many different circumstances.

4. Nils Meiresonne has developed FRET assay for the periplasm in E. coli with an excellent signal to noise ratio. It can be used to study protein interactions in the envelope but also conformational changes upon inhibition of the function of these proteins as was shown in publications in Mbio, Mol. Microbiol, and Bioprotocols.

5. Xiaolong Liu showed that the flippase MurJ is part of the divisome and requires the activity of FtsW for translocation across the cytoplasmic membrane of the peptidoglycan precursor Lipid II as was published in Mol. Microbiol.

6. Dr. Michaela Wenzel has revealed the mode of action of a common Asian herbal antibiotic, rhodomyrtone, which was published in Plos Pathogens, and she published a study in MBio revealing how the first clinical used antibiotics, tyrocidine and gramicidin, differ in activity, despite their homologous structures.

Read more about this research group on their web page sils.uva.nl/bcbp
### Highlights

1. A ‘one-pot’ sample processing method for proteomic analysis of bacterial spores and cells is developed and published in *Proteomics Clinical Applications*. The method enables very efficient comprehensive protein identification and quantification and is applied for monitoring in depth the changeover of the proteome of *Bacillus subtilis* during sporulation and germination.

2. A method is developed for metabolic labelling of the proteomes of pathogens *Bacillus cereus* and *Peptoclostridium* and the method is applied for the quantitative comparison of spore and vegetative cell proteomes of *Peptoclostridium* (submitted for publication) and for the identification of spore inner membrane proteins of *Bacillus cereus*.

3. In the framework of the European Regional Development Fund, in collaboration with Naktuinbouw, methods are developed using IsotopeRatio mass spectrometry for designation of origin of agricultural and horticultural products. Following bell peppers and roses, this year the methods are developed for cherries and trees.

4. In collaboration with the group of Tanneke den Blaauwen, the study of mapping the contact sites of the *Escherichia coli* division-initiating proteins FtsZ and ZapA by BAM cross-linking and site-directed mutagenesis, is completed and published in *Int. J. Mol. Sci.*

### In brief

1. It is planned that the workgroup is continuing in 2019 as a Proteomics and Metabolomics Mass Spectrometry research center. In collaborations, this MS research center will perform proteomics and metabolomics analyses and research for the SILS research groups.

2. Dr. Gertjan Kramer is appointed from March 2019 as assistant professor for managing the MS research center.

3. The FNWI and SILS are investing in a high end mass spectrometer with UPLC instruments for the MS research center. Acquisition of the new instrumentation is in preparation.

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**Figure:** Transmission electron microscopy (TEM) cross section of a spore of *Bacillus subtilis* PY79. The different layers of spore are seen clearly in this cross-section. The image is made at the Electron Microscopy Centre Amsterdam, Academic Medical Center, Amsterdam
Chair: Prof. Stanley Brul  
Group leaders: Prof. Jeroen Hugenholtz  
Prof. Benno ter Kuile  
dr. Gertien Smits  
dr. Hans van der Spek

**Highlights**

1. Proteomics tools for time resolved analysis of bacterial spore formation and spore germination was established. Using this tool and an innovative labelling method based on growth medium with yeast lysates we achieved relative quantification of protein abundance in model *Bacilli* and pathogenic *Clostridium difficile* bacterial spore formers. The minimal survival set of proteins for life on earth was thus identified.

2. Spore germination protein identification with super resolution microscopy was achieved. We can now follow visualize clusters of germinant receptors in germinosomes at unprecedented resolution and follow their dynamics during spore germination prior to spore water uptake.

3. The analysis of the mode of action of human antimicrobial peptides derived from naturally occurring proteins was successfully completed in close collaboration with the Amsterdam UMC. The analysis was facilitated by the development of the SporeTracker X version of this purposely built image analysis program to trace and track the development of bacterial spores. Visualization of the mode of action of antimicrobial peptides was made possible by the generation of fluorescently tagged versions of these peptides and fluorescent probes to test membrane organisation. We showed that local large fluid domains are induced by the presence of the peptides likely leading to phase boundary defects and cell death.

**In brief**

1. In 2018 we successfully obtained a POP-3 grant to pursue together with Algae Innovation Netherlands (AIN) spin-off work on growth promotion by algae and their associated microbial communities.

2. We were successful in our contribution to get the Research Priority Area Systems Biology refunded and refocused on host-microbe interactions. A new tenure track Assistant Professor position is advertised.

3. We were successful in getting 5 year PhD students with an extended teaching task approved by the faculty and focused on microbiome studies of the gut and oral cavity in close collaboration with the Amsterdam UMC.

4. In 2018 our group saw two successful PhD defenses (Soraya Omardien, Laura Dolz-Edo).

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Schematic overview of “One-Pot” Sample Processing Method for Proteome-Wide Analysis of Microbial Cells and Spores (by Bhagyashree Swarge)

Read more about this research group on their web page sils.uva.nl/mbmfs
Neurosciences
Cellular and Computational Neuroscience

Chair: Prof. Helmut Kessels
Group leaders: dr. Natalie Cappaert
dr. Pascal Chameau
dr. Jan Gorter
dr. Erwin van Vliet
dr. Taco Werkman

Highlights

1. In 2018 we successfully started a Master Track “Physiology of Synapses and Networks”. In this Master Track we focus on the fundamental principles of cellular neurophysiology, synaptic communication and synaptic plasticity, and explain how these processes control network activity, memory formation and behaviour. In addition, we explore how dysfunction in cellular and network activity contributes to brain disorders. The focus of this Master Track is unique both inside and outside the Netherlands, and elegantly complements the other neuroscience Master Tracks at the UvA.

2. Publication in Hippocampus: “Parvalbumin interneuron mediated feedforward inhibition controls signal output in the deep layers of the perirhinal-entorhinal cortex”. By studying the anatomical and functional network properties of the hippocampus and parahippocampal region (brain regions that mediate memory formation), we found that parvalbumin interneurons in the parahippocampal region play an essential role in gating information to reach the hippocampus.

3. Publication in Epilepsia: “Activation of the innate immune system is evident throughout epileptogenesis and is associated with blood-brain barrier dysfunction and seizure progression”. In this paper we show that monocytes/macrophages and other cells of the innate immune response are activated and enter the epileptogenic brain and contribute to the development of epilepsy by disrupting the blood-brain barrier.

In brief

1. Appointment Dr. Helmut Kessels as full professor
2. Appointment Dr. Erwin van Vliet as assistant professor
3. Top-ZonWM grant “Synapses on high alert in Alzheimer’s disease” (in collaboration with Prof. C. Levelt (Nederlands Herseninstituut) & Prof. van der Flier (VUMC)
4. Hersenstichting Grant “Leaning to resist Alzheimer”

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Figure: Activated perivascular macrophages (red) which can cause blood-brain barrier leakage (green) in the epileptogenic brain (Broekaart et al. 2018).

Read more about this research group on their web page sils.uva.nl/ccn
Cognitive and Systems Neuroscience

Chair: Prof. Cyriel Pennartz
Group leaders: dr. Conrado Bosman
dr. Carien Lansink
dr. Jeannette Lorteije
dr. Jorge Mejias
dr. Umberto Olcese

Highlights

1. In February, Prof. Dr. Cyriel Pennartz published a paper on the relationship between conscious representations and goal-directed actions on Trends in Cognitive Science.

2. We also published a paper in the journal Sleep which demonstrated how, during sleep, different functional architectures coexist within and between cortical areas. Previously, most long-range communication between neurons was thought to be depressed during Non-REM sleep. We now showed that, based on the interaction between temporal scale, anatomical factors and functional properties of individual neurons, some long-range connection may even be enhanced in sleep compared to wakefulness.

3. The group investigated the synchronization on the rodent hippocampal network, finding a pathophysiological mechanism explaining cognitive impairments in Fragile X Syndrome and autism. The anomalous processing of social and environmental cues was associated with deficits in memory and cognition. The work was published in Neurobiology of Disease.

4. A paper was published in ELife, “Conditioning refines the spatial representation of rewarded stimuli in mouse primary visual cortex”.

In brief

1. Umberto Olcese was selected as a member of the Amsterdam Young Academy: a new, independent platform where talented young scientists from the UvA and VU Amsterdam can meet each other and develop perceptions around science and society.

2. The group received 3 IDA grants (Jeannette Lorteije, Carien Lansink and Umberto Olcese).

3. Umberto Olcese and Conrado Bosman joined Sub-project 1 (Mouse Brain Organization) of the Human Brain Project. They are investigating how the different neuronal subpopulations of sensory cortices encode sensory and non-sensory information in a context-dependent manner. Cyriel Pennartz acquired a grant for research under Sub-project 3 (Systems and Cognitive Neuroscience) and was re-elected continued as Leader of the Sub-project 3 (Systems and Cognitive Neuroscience), raising additional funding for project management, and Angelica da Silva Lantyer joined the department as the Project Manager.

Info

Staff 18,8 FTE
Doctorate conferrals 2
Publications 17

Schematic of inter-areal information flow during NREM. During NREM (as compared to wakefulness), STE is enhanced between TM neurons (black) located in HPC and neocortical areas; this increase in STE co-occurs with sharp-wave ripples. Conversely, LTE during NREM is enhanced between NTM neurons (red) located across neocortical areas, and follows the NREM-dependent increase in slow wave activity. Non-overlapping, functionally- and anatomically-defined neuronal subpopulations thus account for patterns of directed information flow at short and long time scales.

Read more about this research group on their web page sils.uva.nl/csns
Highlights

1. The research in the MNS team has progressed significantly. The separate teams have acquired funds from internal and external sources to implement their research strategies. With the hiring of new PhD candidates and the finalization of several PhD programmes we are fulfilling our goals as research cluster and excel in our research disciplines within molecular neurosciences.

2. Publication in ‘Cell’ about the identification and characterization of a group of human-specific neurodevelopmental NOTCH2NL genes and their possible contribution to human’s enlarged neocortex.

3. The master track Molecular neuroscience has been evaluated for four consecutive years with very high grades (average of 8). Moreover, the interest of students was extremely high in 2018, which led to a massive selection procedure.

4. In 2017 Lars van der Heide and Marten Smidt, together with UvA Ventures, founded Macrobian Biotech. In 2018 the funding of the company was strengthened (POC 2) and 2 employees (PhDs) were hired to facilitate the drug development programme. Moreover, new patents were filed which created more drug development opportunities. Finally, a new website was created to display the company to the world in a more appropriate fashion (www.macrobianbiotech.com).

In brief

1. €200,000 grant from Alzheimer Nederland for Frank Jacobs
2. The NOTCH2NL publication led to a lot of outreach activities for the Jacobs lab.
3. Iris wever sucessfully defended her thesis: “Defining Mesodiencephalic dopaminergic neurons; Identifying different levels of transcriptional control”.

Info

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<th>Staff</th>
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<td>Doctorate conferrals</td>
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Image by Gerrald Lodewijk

Read more about this research group on their web page sils.uva.nl/mns
Highlights

1. Early-life stress aggravated amyloid pathology and altered the neuroimmune response in an Alzheimer model. Treatment with a stress hormone blocker at middle age rescued amyloid and cognitive changes, highlighting a role for (early) stress in Alzheimer’s disease risk.

2. An enriched early diet prevented deficits in hippocampal cognition, neurogenesis and neuroinflammation after early stress, highlighting diet as a critical factor in early life.


4. The Amsterdam Moedermelk bank is recruiting young mothers to study changes in milk composition in relation to (early) stress.

5. Glucocorticoid increase the (age-related) ramifications of hippocampal microglia.

6. We published a united response of the field on the role of adult-generated neurons and their contributions to human plasticity and cognition in Cell Stem Cell.

7. We showed that a combination of anti microRNA oligonucleotides (AMOs) is able to revert the hippocampal neural stem cell loss associated with non-convulsive seizures.

In brief

1. Grants to; Anouk Schrantee (250k€ NWO-VENI award) on; ‘The brain’s response to medication: zooming in with phMRI’, to Lucassen/Korosi/Krugers/Kessels (200k€ Alzheimer NL) on; ‘Early diet and stress, microglia and Alzheimer changes’, to; Eva Naninck and Aniko Korosi (100k€ ISRHML Award) on ‘Microbiome and mothers milk’.

2. International ‘BrainSINposium’ organized by the Korosi team on early life stress, nutrition and inflammation attended by 150 people, 22 March 2018.

3. 5 PhD theses successfully defended by; Michelle Solleveld, Lianne Hoeijmakers, Kit Yi-Yam, Lana Beex-Osborne and Juan Zhao.

4. Harm Krugers chosen as FENS treasurer-elect & member FENS Advisory Board.

5. Aniko Korosi chosen as EBBS treasurer and EBBS organizing committee member.

6. Aniko was chosen as chair elect for DNM 2020

Figure: age associated changes in microglia morphology. The figure shows the decreased complexity of CD11b positive cells (microglia) in the hippocampus in mice from 3 (young adult) to 18 (old) months of age. Images made by Marijn Schouten.

Read more about this research group on their web page sils.uva.nl/sfpns