Organization For Computational Neurosciences

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Scenes from CNS*2018

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Contact us if you have comments or information to include in the newsletter.
newsletter@cnsorg.org

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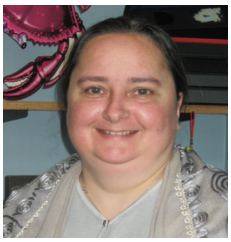
OCNS, Inc is a US non-profit, 501(c)(3) serving organization supporting the Computational Neuroscience community internationally. We seek sponsorship from corporate and philanthropic organizations for support of student travel and registration to the annual meeting, student awards, and hosting of topical workshops. For more information about how you can contribute, please email sponsorship@cnsorg.org.

OCNS Newsletter

Editor: Sharon Crook
Contributors: Salvador Dura-Bernal, Thomas Nowotny, Astrid Prinz, Alex Roxin, Volker Steuber, Taro Toyoizumi, Sharmila Venugopal

OCNS Past-President Astrid Prinz



Dear members and friends of the OCNS,

In my role as (now past) OCNS President I will use the opportunity of this newsletter to highlight OCNS activities over the past year, remind you of the benefits of OCNS membership, thank the members of the OCNS Board of Directors and Program Committees for their hard and important work, and "pass the baton" to our new OCNS President, Volker Steuber.

Our annual meeting in Seattle in July '18 was a first for OCNS in that it was co-hosted by the University of Washington and the Allen Institute for Brain Science (https://www.cnsorg.org/past-annual-meetings). In addition to stimulating and thought-provoking keynote addresses and oral and poster presentations on all facets of computational neuroscience, those of us attending the meeting were treated to a delicious banquet dinner at the Seattle Yacht Club, a fun CNS party at (and on the rooftop of!) the eclectic Fremont Foundry, and the pleasant environment of the Pacific Northwest. On behalf of OCNS and all meeting participants, I would like to thank the OCNS Program Committee (https://www.cnsorg.org/program-committee) under the leadership of Thomas Nowotny for putting together the scientific program of the meeting, and the local organizers Adrienne Fairhall (UW), Eric Shea-Brown (UW) and Christof Koch (AI) with their professional organizing staff for a smooth and successful meeting.

In addition to the annual meeting, 2018 saw the fruitful continuation of other (and often less visible) OCNS activities to foster computational neuroscience, including travel fellowships and support for summer school participation by junior and underprivileged scientists and many other benefits of OCNS membership (https://www.cnsorg.org/member-benefits).

In contrast to many other scientific organizations that have staff paid from membership fees, OCNS relies entirely on the time and effort invested by computational neuroscientists at the faculty and postdoctoral levels, most notably through their service on the Board of Directors (https://www.cnsorg.org/board-of-directors), the Program Committee (https://www.cnsorg.org/program-committee), and as abstract reviewers. Many thanks to those of you serving in one or several of these capacities! To those new to the CNS community, please consider becoming actively involved! To find out how, don't hesitate to contact us at any of the addresses listed here https://www.cnsorg.org/about-ocns.

My time as OCNS President officially ended with the end of 2018, and I would like to express my sincere gratitude to all those active in OCNS, with a special shout-out to Vice President Sharon Crook, (now former) Treasurer Volker Steuber, Program Committee Chair Thomas Nowotny, and web guru Pierre Yger. You have all gone above and beyond! Without your many contributions, the continued success of OCNS would not have been possible!

Going forward, I am thrilled that Volker Steuber has accepted his election as OCNS President by the Board of Directors. I trust Volker's leadership and dedication, and I know that we will all be in excellent hands with him as our President. As one of his first acts in his new office, I will let Volker update you on other comings and goings in the OCNS leadership, on the 2019 meeting in Barcelona, and on future plans for OCNS.
See you all in Barcelona!

Astrid Prinz

Astrid Prinz
(Past OCNS President)

OCNS President Volker Steuber

Dear friends and members of OCNS,

First of all, I would like to thank everyone on the board of Directors, and in particular our outgoing president, Astrid Prinz, for their excellent work. Astrid, you have done a great job as president, and following you will be a challenge for me. Having said that, I am very happy to have been elected as president, and I very much look forward to serving the Organization for Computational Neurosciences in this role. I have already started working very productively together with other members of the Board and Executive Committee, in particular our Vice President Sharon Crook and our new Treasurer Leonid Rubchinsky, and I am extremely happy to have such a good team that supports me.

2018 has seen a very exciting CNS meeting at the Allen Institute and the University of Washington in Seattle, and this year we have another exciting meeting lined up, which will be held at the Universitat de Barcelona (UB) in Spain. Thanks to our Program Chair Thomas Nowotny and the Program Committee, we have an outstanding array of Keynote Speakers, and, thanks to our Workshop Chair Martin Zapotocky, we already have a large number of excellent workshop proposals. The meeting in Barcelona promises to be one of the biggest and best ones yet, and I very much look forward to seeing you there.

Over the coming years, we would like to encourage an increased contribution of OCNS members to shaping our organization, we are hoping to become more inclusive by organising more meetings in the Southern Hemisphere, we want to establish our unique character as an organization that supports multi-level modelling, and we will explore new avenues to encourage more collaborations between experimentalists and theoreticians. I very much look forward to being involved in this exciting venture.

Best wishes,

V Steuber

Newly elected Members OCNS Board of Directors

Anthony Burkitt
University of Melbourne, Australia

Anca Doloc-Mihu
Georgia Gwinnett College, USA

Boris Gutkin
Ecole Normale Superiure, France

Renaud Jolivet
University of Geneva, Switzerland

Cecilia Romaro
University of São Paulo, Brazil

New Officers of the OCNS

Treasurer
Leonid Rubchinsky
Indiana University, USA

Web Assistant
Ankur Sinha
University of Hertfordshire, UK

For a complete list of the current Officers and Board of Directors and information about how they serve you and all of the OCNS community, go to http://www.cnsorg.org/board-of-directors.

CNS* 2018 Student Poster Awards

Each year at the Annual Meeting of OCNS, the Poster Award Competition is open to all Student Members presenting posters about their work. Voting was open to all meeting attendees at the Faculty level or equivalent. All winners received books generously donated by Springer.

1st Place Winners:

Bettina Hein, FIAS, Frankfurt, Germany. *Early spontaneous activity predicts structural changes in layout of orientation domains during early development* with Sigrid Trägenap, David Whitney, Gordon Smith, David Fitzpatrick, and Matthias Kaschube

Elisabetta Iavarone, École Polytechnique Fédérale de Lausanne, Switzerland. *Data-driven models of interneurons in the somatosensory thalamus and comparison with gene expression data* with Jane Yi, Ying Shi, Christian O'Reilly, Werner Alfons Hilda van Geit, Christian A Rössert, Henry Markram, and Sean Hill

Other Winners:

Cecilia Romaro, University of São Paulo, Brazil. *Implementation of the Potjans-Diesmann cortical microcircuit model in NetPyNE/NEURON with rescaling option* with Fernando Najman, Salvador Dura-Bernal, and Antônio C. Roque

Ehsan Mirzakhalili, University of Michigan, United States. *Probabilistic analysis of high-dimensional stochastic firing rate models: Bridging neural net- work models and firing rate models* with Bogdan Epureanu

Max Nolte, École Polytechnique Fédérale de Lausanne, Switzerland. *Interplay of synaptic noise and chaos determines limits of cortical reliability* with Michael Reimann, James King, Henry Markram, and Eilif Muller

Taylor Newton, École Polytechnique Fédérale de Lausanne, Switzerland. *Shedding light on the cellular origins of voltage-sensitive dye imaging: an in silico study* with Juan Hernando, Jafet Villafranca D'az, Stefan Eilemann, Grigori Chevtchenko, Henry Markram, and Eilif Muller

Alex Vargas, Georgia State University, United States. *The role of Na+/K+ pump in intrinsic intermittent bursting dynamics in model neuron of the Pre- Bötzinger Complex* with Gennady Cymbalyuk

Amelie Aussel, Université de Lorraine, France. *A detailed model of the hippocampal formation for the generation of sharp-wave ripples and theta-nested gamma oscillations* with Radu Ranta, Laure Buhry, Louise Tyvaert, and Patrick Henaff

Adree Songco Aguas, University of Washington, United States. *Modeling rod-cone parallel processing in the retina* with Fred Rieke, and William Grimes

Justas Birgiolas, Arizona State University, United States. *Rapid selection of NeuroML models via NeuroML-DB.org* with Richard Gerkin, and Sharon Crook

Janaki Raghavan, University of Madras, Institute of Mathematical Sciences, India. *Learning to be modular: Interplay between dynamics of synaptic strengths and neuronal activity in the brain results in its modular connection topology* with Sitabhra Sinha

If you know any of these hard-working students, please congratulate them!

Sharmila Venugopal, on behalf of the OCNS Board of Directors

Login at *cnsorg.org* to pay your OCNS dues.
Please consider renewing with a multiple year membership.

Member Type	One year	Two years	Three years
Student	10 USD	15 USD	20 USD
Post-doc	20 USD	30 USD	40 USD
Faculty and other	50 USD	75 USD	100 USD

Travel Award Report

One of the benefits of being an OCNS member is the right to apply for a Travel Award for the annual meeting. The goal is to facilitate CNS meeting attendance for PhD students, postdocs, and occasionally young faculty, especially from developing countries. We encourage you to use this mechanism to attend the CNS meeting if your personal or lab circumstances make it financially difficult.

To provide a perspective on your chances, here are some data on the application process for CNS 2018. OCNS received 61 Travel Award applications to attend the main meeting with 42 from students and the remainder mostly from postdocs. 41 of these applicants were male and 20 were female. Selection for funding is based on abstract scores, which are determined by the peer review process for the meeting and range from 2 to 6 out of 6. The threshold for funding usually falls around 3-4 but varies from year to year. This year all applications with a score of 3.35 and above were funded. As a consequence, 48 applicants received funding (16 female and 32 male), where 35 were students. In addition, OCNS received 9 (5 female and 4 male) nominations for workshop Travel Awards from workshop organizers and all were funded. Four of these awards went to students.

CNS*2018 Travel Award amounts were determined by estimated travel costs. Applicants from areas close to Seattle (within 500 km from the venue) were awarded $200, awards from within the US that were farther from Seattle were $400, and applicants from outside the US were awarded $800.

OCNS also provided two student members with travel funding of $2000 each in support of their attendance at the 2018 Woods Hole Marine Biological Laboratory Methods in Computational Neuroscience Course.

Taro Toyoizumi, Travel Award Coordinator
On behalf of the Board of Directors

Local Organizers:
Albert Compte, Institut d'Investigacions Biomèdiques August Pi I Sunyer, Spain
Jaime de la Rocha, Institut d'Investigacions Biomèdiques August Pi I Sunyer, Spain
Gemma Huguet Ramon, Universitat Politècnica de Catalunya, Spain
Alex Roxin, Centre de Recerca Matemàtica, Spain
Klaus Wimmer, Centre de Recerca Matemàtica, Spain

Invited Keynote Speakers:
Ed Bullmore, University of Cambridge, UK
Kenji Doya, Okinawa Institute of Science and Technology, Japan
Ila Fiete, University of Texas at Austin, USA
Mavi Sanchez-Vives, University of Barcelona, Spain

2019 Program Committee Chair:
Thomas Nowotny, University of Sussex, UK

2019 Program Committee:
Maxim Bazhenov, University of California San Diego, USA
Jean-Marc Fellous, University of Arizona, USA
Julie Haas, Lehigh University, USA
Cliff Kerr, University of Sydney, Australia
Christoph Metzner, Technische Universität Berlin, Germany
Tatyana Sharpee, Salk Institute, USA
Ingo Bojak, University of Reading, UK
Tomoki Fukai, RIKEN, Japan
Dieter Jaeger, Emory University, USA
Sukbin Lim, NYU Shanghai, China
Steven A Prescott, University of Toronto, Canada
Sacha van Albada, Research Center Jülich, Germany

We have an exciting lineup of 20 workshops scheduled for July 16-17. As the full capacity of the venue has been nearly reached, a pre-submission inquiry to workshops@cns.org is requested in case of any new workshop proposals. Proposals for tutorials from the international community of computational neuroscientists are welcome from all levels of faculty, as well as advanced postdoctoral fellows. This is a great opportunity to introduce novel methodology through a tutorial. We look forward to your submissions.

CALL FOR **WORKSHOPS**
https://www.cnsorg.org/cns-2019-call-for-workshops
Martin Zapotocky, Workshop Organizer, CNS*2019

CALL FOR **TUTORIALS**
https://www.cnsorg.org/cns-2019-call-for-tutorials
Hermann Cuntz, Tutorial Organizer, CNS*2019

2019 CNS Calendar

Organization For Computational Neurosciences

Tue 08 Jan	Registration opens
Wed 09 Jan	Abstract submission opens
Wed 27 Feb	Last safe date for member applications before abstract submission closes
Mon 4 Mar	Abstract submission closes (11:00 pm PST USA)
Mon 4 Mar	Travel Award applications due
Wed 10 April	Notification of abstract acceptance
Wed 1 May	Notification of oral/poster selection
Mon 6 May	Early registration closes for non-members (11:00 pm PST USA)
Tue 7 May	Travel Award notification
Wed 8 May	Last safe date for member applications before early registration closes for members
Wed 15 May	Early registration closes for members (11:00 pm PST USA)
Sat 13 July	Tutorials (morning & afternoon)
Sat 13 July	Keynote Talk and Reception (evening)
Sun 14 July	Main meeting: oral and poster sessions
Mon 15 July	Main meeting: oral and poster sessions
Tue 16 July	Mixed day: Keynote, workshop session and poster session
Wed 17 July	Workshops

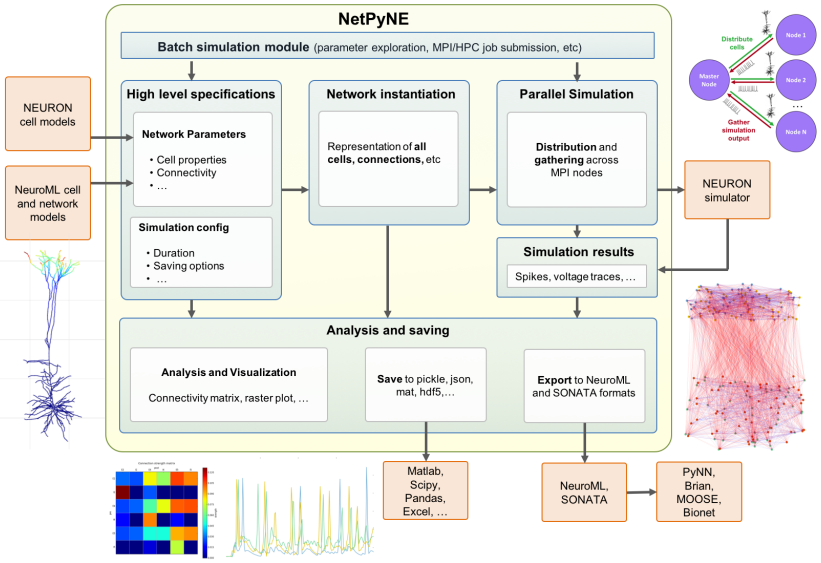
Featured Resource for Computational Neuroscience

NetPyNE: A tool to build, simulate and analyze multiscale **Net**works using **Py**thon and **NE**URON

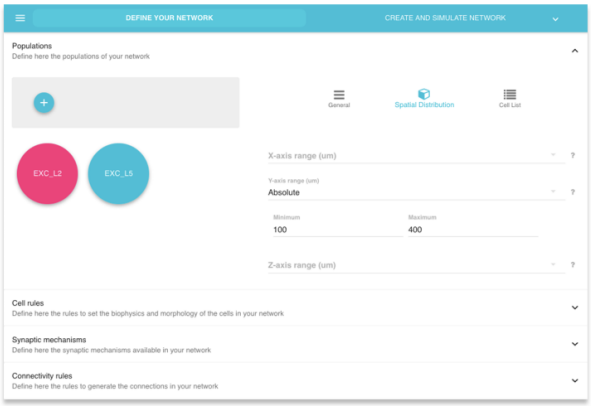
Tool components and workflow

- Provides a programmatic and graphical interface for the creation, parallel simulation, optimization, and analysis of data-driven, biophysically detailed multiscale network models in NEURON.

- Makes multiscale modeling accessible to a wider community -- including students and experimentalists; and facilitates and accelerates the workflow of experienced modelers.



High-level specifications



- Standardized, rule-based, human-readable high-level specifications (programmatic or via GUI).

- Declarative language separates model parameters from implementation, preventing coding errors and inefficiencies.

- Multiple scales from intra- and extra-cellular molecular reaction-diffusion (RxD) to network level.

- Import existing cell models from hoc, python or NeuroML.

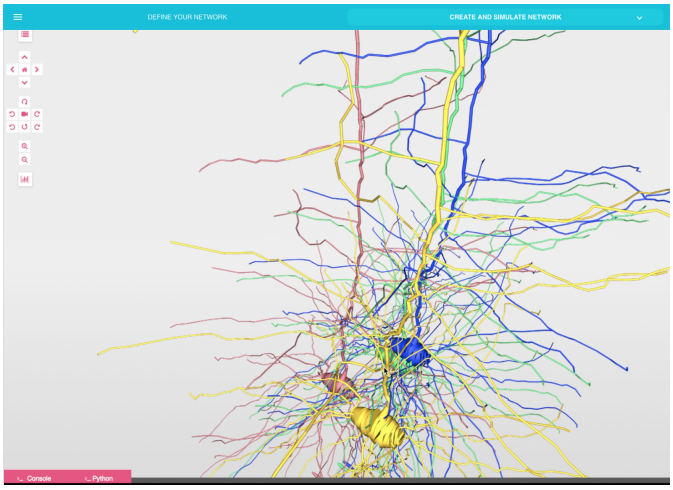
- Supports complex connectivity and stimulation patterns at cell and dendritic level.

Network instantiation and parallel simulation

- Generates network instance as Python hierarchical structure with all required NEURON objects.

- Efficient parallel simulation, including distributing cells and gathering data from computing nodes.

- Automated parameter exploration/optimization via grid search or evolutionary algorithms, including HPC job submission (MPI, Slurm, Torque, and Neuroscience Gateway).

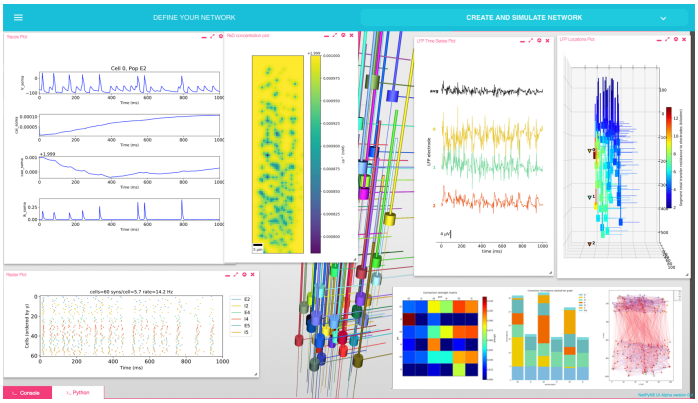


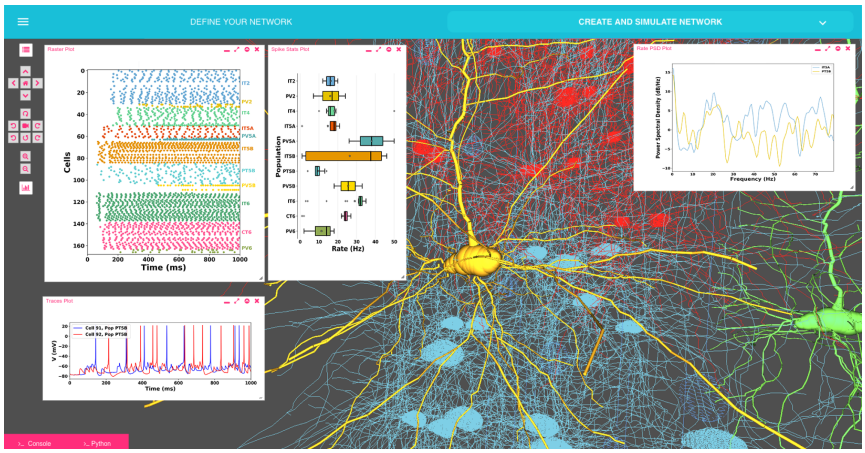
Analysis and saving

· Built-in data analysis and visualization: connectivity, voltage/current traces, molecular concentrations, raster plot, statistics, information theoretic analysis

· LFP recording electrodes at any arbitrary 3D locations (plot LFP signal, PSD, spectrogram)

· Save to common formats (JSON, Pickle, Matlab) and export / import to NeuroML and SONATA.





Usage examples

· Over 40 existing models of different brain regions and phenomena (including examples and tutorials).

· Several models converted from other languages (e.g. NEST or hoc) to NetPyNE reproduce original results.

· Makes models easier to understand, modify, extend and share.

· Used in www.OpenSourceBrain.org to run parallel simulation of NeuroML-based models.

· Used in Human Neocortical Solver (http://hnn.brown.edu) to flexibly build and modify cortical models.

Websites

· Installation, documentation and tutorials: www.netpyne.org
· GUI: https://github.com/MetaCell/NetPyNE-UI
· Mailing list: www.netpyne.org/mailing
· Q&A forums: www.netpyne.org/forum and www.netpyne.org/neuron-forum
· List of models: www.netpyne.org/models
· Github: https://github.com/Neurosim-lab/netpyne (open source; contributions welcome)
· Developers: www.neurosimlab.org and www.metacell.us

References

Dura-Bernal S, Suter B, Gleeson P, Cantarelli M, ..., McDougal R, Hines M, Shepherd GMG, Lytton WW. (2018) **NetPyNE: a tool for data-driven multiscale modeling of brain circuits.** *bioRxiv 461137; 1101/461137*

Lytton WW, Seidenstein AH, Dura-Bernal S, ..., McDougal RA, Hines ML. (2016) **Simulation neurotechnologies for advancing brain research: Parallelizing large networks in NEURON.** *Neural Computation 28:2063-2090*

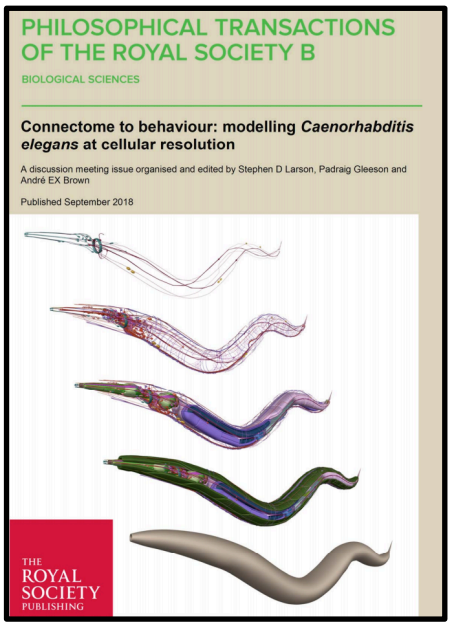
Cantarelli C, Marin B, Quintana A, ..., Gleeson P, Dura-Bernal S, Silver A, Idili G. **Geppetto: a reusable modular open platform for exploring neuroscience data and models.** *Phil. Trans. R. Soc. B*, 373(1758):20170380, 2018.

Funding: NIH U01EB017695, DOH01-C32250GG-3450000, NIH R01MH086638, NIH R01EB022903.

Do you have a favorite software tool or online resource? Users and developers are welcome to contribute short articles of broad interest to OCNS members. Contact us at newsletter@cnsorg.org.

General Announcements

Special issue of *Philosophical Transactions B*. Articles are FREE TO ACCESS: http://rstb.royalsocietypublishing.org/content/373/1758.
A print version is available at the same web page. For a discounted fee, enter special code TB 1758 when prompted.



About this issue: An outstanding mystery in science is how cells of a brain come together to compute. Studying how this works is challenging, especially in large brains like that of humans. The worm *Caenorhabditis elegans* is one of the most exhaustively characterized animals in biology. Experimental data has been produced by researchers on the worm's genetics and behavior, in addition to a complete wiring diagram of its nervous system, known as a connectome. A number of groups are attempting to consolidate this knowledge into models which can simulate its behavior, leading to the possibility of a deeper understanding of how a complete nervous system processes information and reacts to its environment. This special issue gathers contributions from experimentalists, computational neuroscientists and engineers with a shared interest in understanding the "mind of the worm" by approaching this challenge from many different angles.

Image: Multiple levels at which experimental data is acquired and modelling takes place for the nematode *Caenorhabditis elegans*. Generated using the OpenWorm Browser (http://browser.openworm.org). Credit: Padraig Gleeson, UCL, UK. Original data set from Christian Grove, Wormbase at Caltech, USA.

New fee structure due to the meeting reorganization for CNS*2019. Be sure to update your membership before registering.

	Student Member	Student	Postdoc Member	Postdoc	Faculty Member	Faculty
Main meeting only	$160 (late: $200)	$245 (late: $305)	$200 (late: $255)	$325 (late: $425)	$290 (late: $375)	$475 (late: $620)
Main meeting + tutorials + workshops	$280 (late: $350)	$425 (late: $525)	$345 (late: $445)	$565 (late: $735)	$500 (late: $650)	$825 (late: $1030)
Main meeting + tutorials	$200 (late: $250)	$305 (late: $375)	$250 (late: $320)	$405 (late: $525)	$360 (late: $465)	$590 (late: $770)
Main meeting + workshops	$240 (late: $300)	$365 (late: $455)	$295 (late: $380)	$485 (late: $630)	$425 (late: $555)	$705 (late: $925)
Tutorials only	$60 (late: $75)	$90 (late: $110)	$75 (late: $95)	$130 (late: $170)	$110 (late: $140)	$220 (late: $280)
Workshops only	$110 (late: $140)	$165 (late: $210)	$135 (late: $175)	$220 (late: $285)	$195 (late: $255)	$325 (late: $420)

On behalf of the OCNS, the Newsletter contributors wish you much success with your research and training, and we look forward to seeing you in Barcelona at CNS*2019.