Curriculum Vitae: May-Britt Moser

Affiliation:
Kavli Institute for Systems Neuroscience and *Centre for Neural Computation*, Norwegian University of Science and Technology (NTNU), Trondheim, Norway

Contact:
Telephone: +47 73 59 82 77 /+47 917 11 907; e-mail: maybm@ntnu.no;
web: http://www.ntnu.edu/kavli/

Place and Date of Birth, Nationality: Fosnavåg, Norway, 4. Jan. 1963, Norwegian

Present positions:
Founding Director of Centre for Algorithms in the Cortex (2023 – 2033)
Founding Director of Centre for Neural Computation (2013 – 2022)
Founding Co-Director of Kavli Institute for Systems Neuroscience (2007 –)
Professor of Neuroscience (2000 –)

Past positions:
Founding Co-Director of Centre for the Biology of Memory (2002 – 2012)
Head of Section for Biol. and Cognitive Psychology, NTNU (2001-2002)
Associate Professor of Biological Psychology (1996-2000)
Research Fellow , Dept. of Psychology, Univ. Oslo; Univ Edinburgh (1995-96)
Ph D student, Univ. Oslo and periodically Univ. Edinburgh (1991-95)

Education (all Univ. of Oslo):
Mathematics, chemistry, physics, statistics, neurobiology (1982-83, 1990)
Psychology (1984-90)
Neurobiology (1990)

Research

My vision is to understand the neural basis of psychological phenomena. I have focused my research on spatial navigation and memory because these are fundamental cognitive functions that we share with all animals. Most of my research has been in collaboration with Edvard I. Moser after we built a lab together in 1996 and with whom I shared the Nobel Prize in Medicine or Physiology in 2014. Through combining advanced recording techniques for single units with anatomical knowledge and advanced analyses, our efforts have resulted in several important discoveries. The most spectacular finding was the discovery of grid cells in the entorhinal cortex. The discovery of grid cells was succeeded by the identification of other functional cell types in the same brain structure, including head direction cells, conjunctive cells, border cells and speed cells; and collectively the findings point to the entorhinal cortex as a hub for the brain network that makes us able to find our way. The grid cells are thought to provide the brain with information about the metrics of the spatial environment. Our papers have attracted special interest because spatial representation is one of the first functions to be characterized at a mechanistic level in neuronal networks. With new methods we are now able to record thousands of cells simultaneously, and by focusing on populations of cells instead of single cells, we can understand how they interact to generate cognitive functions and what rules the firing patterns follow: We are at a stage where we can test theories like attractor networks. The entorhinal cortex is providing the hippocampus with information about what happened where and when – which is episodic memory and with the new tools we can test algorithms for these functions.

Honours

1999: Prize for young scientists awarded by the Royal Norwegian Academy for Sciences and Letters
2003–: Elected member of The Royal Norwegian Society of Sciences and Letters
2005–: Elected member of The Norwegian Academy of Science

2005: 28th annual W. Alden Spencer Award (College of Physicians and Surgeons of Columbia University)
2006: 10th Prix "Liliane Bettencourt pour les Sciences du Vivant" (Fondation Bettencourt, Paris)
2006: 14th Betty and David Koetser Award for Brain Research (University of Zürich)
2008 : 30th Eric K. Fernström's Great Nordic Prize (Fernström Foundation, University of Lund)
2010–: Elected member of The Norwegian Academy of Technological Sciences (NTVA)
2011: 26th Louis-Jeantet Prize for Medicine (Louis-Jeantet Foundation)
2011: Anders Jahre's Great Nordic Prize for Medical Research (Univ. Oslo)
2011–: Elected member of Academia Europaea
2012–: Elected member of the European Molecular Biology Organization (EMBO)
2013: 13th Perl/UNC Neuroscience Prize (Univ. of North Carolina)
2013: 102nd annual Fridtjof Nansen Award of Outstanding Research in Science and Medicine, Norwegian Academy of Science
2013: 'Best female leader' award from Trondheim Business Society (Madame Beyer Award)
2013: 47th Louisa Gross Horwitz Prize for Biology or Biochemistry (Columbia University)
2014: 59th Karl Spencer Lashley Award (American Philosophical Society)
2014: 30th Koerber European Science Prize (Koerber Foundation)
2014: Elected Foreign Associate of the National Academy of Sciences (USA)
2014: Nobel Prize in Medicine or Physiology (shared with E.I. Moser and J. O'Keefe)
2014: Name of the Year (Dagbladet, major Norwegian newspaper)
2015: Trønder of the Year (Adresseavisen and Norwegian Broadcasting Company)
2015: Peer Gynt Prize (Peer Gynt of the Year) (after voting in the Norwegian Parliament)
2015: Elected International Member of the American Philosophical Society (USA)
2015: International member of the National Academy of Medicine (USA)
2016: International member of the German National Academy of Sciences Leopoldina
2016: Erna Hamburger Prize, EPFL (Swiss Federal Institute of Technology)
2016: Royal Swedish Academy of Sciences
2017: Honarary Doctorate: University of Bergen, Norway (5 May 2017)
2017: Lars Onsager Prize lecture, Norwegian University of Science and Technology; lecture 25 Jan 2018
2018: Grand Cross of the Royal Norwegian Order of St. Olav (H.M. Harald of Norway), 28 Feb 2018
2018: Elected as a Fellow of the Association for Psychological science for sustained and outstanding distinguished contributions to psychological science (Dec, 7th)
2019: Kristine Bonnevie Lecture, University of Oslo, Norway (Sept. 2)
2020: Gunerius gold medal 28th of February awarded by the Royal Norwegian Academy for Sciences and Letters
2021: Honorary Fellow of the Royal Institute of Navigation, London
2022: The 2022 Mike Hogg Award, University of Texas, MD Anderson Cancer Center (June 2nd)
2022: Vilhelm Magnus Medal, Norwegian Neurosurgical Association, (Oct, 21st)
2023: Monrad-Krohn Prize for Neurology, University of Oslo, 15 March 2023.
2023: Foreign Member of the Royal Society, London.

International evaluations

2001-02: Centre of Excellence appointment by Norw. Res. Council. The Centre is structured around the research group of May-Britt Moser (Deputy Director) and Edvard Moser (Director). Thirteen centers from all fields of science were selected from 129 proposals through an extensive international review process.
2003: Evaluation by Norwegian Research Council Panel for Psychology /Psychiatry. Rated 'Excellent'.
2006: Centre for the Biology of Memory gets top rating ("exceptionally good") at midterm evaluation by an international group of experts.
2007: Appointed Co-Director of Kavli Institute for Systems Neuroscience (4th Kavli institute in the field of Neuroscience in the world).
2011: National Research Council evaluation of biological disciplines: Rated 'Undoubtedly excellent'.
2012: In its final report, the Scientific Advisory Board of the Centre for the Biology of Memory ranked the Moser group as among the top 0.1% of neuroscience groups worldwide.

2012: Centre of Excellence appointment by Norw. Res. Council. I am Director; Edvard Moser is Co-Director. Thirteen centers from all fields of science were selected.
2015: Egil and Pauline Braathen and Fred Kavli Centre for Cortical Microcircuits, 6 M dollar from Braathen, 6 M dollar from Kavli.
2023-33: Centre of Excellence appointment by Norw. Res. Council. I am Director; Edvard Moser is Co-Director. 11 centers from all fields of science were selected.

Other

2020 (and before): Highly Cited Researcher – on Clarivate list of 0.1% most cited researchers in Web of Science 2010-2019.

Selected invited lectures

2005: 28th annual W. Alden Spencer Award, given by the College of Physicians and Surgeons of Columbia University, New York
2006: Distinguished Visitor Lectureship, Kavli Institute for Brain and Mind, San Diego: Feb 14-27.
2006: 5th Picower-RIKEN Neuroscience Symposium "New Frontiers in Brain Science from molecules to mind", Picower Centre, MIT, March 26-28.
2006: Gatsby workshop on 'Principles of Neural Representation', London, May 10-12th.
2006: Shanghai Symposium in Neuroscience, Shanghai Inst. of Brain Functional Genomics, Oct 30th.
2007: Plenary lecture at Gordon Research Conference on Neural Circuits and Plasticity, Newport RI, July 1-6.
2007: Seminar at McGill University, Montreal, Nov. 10.
2008: Seminar at Janelia Farm Research Campus, VA, March 12.
2008: Seminar at State Univ New York, Brooklyn, March 13.
2008: Monthly Lecture at Rockefeller University (for broad neuroscience community), April 18.
2008: Neuroscience seminar at the research Institutes in Basel, Oct 9th
2008: Lord Adrian Seminar, Cambridge, Oct. 13
2009: Plenary speaker at Hungarian Neuroscience meeting, Budapest, 22-24 Jan 2009.
2009: Univ Toronto lecture, 7 May
2009: Lectures at UC Berkely and UC San Fransisco, 13-14 May
2009: Keynote Lecture, European Psychology Conference, Oslo 7-10 July.
2009: Keynote Lecture at McKnight Conference in Neuroscience, Aspen, Colorado, 4-8 June
2009: Ernst Strüngmann Forum (former Dahlem Conference), Frankfurt, 16-21 Aug.
2009: Plenary Special Lecture at Society for Neuroscience, Chicago, Oct 17-21.
2010: 3rd Cold Spring Harbor Meeting "Neuronal circuits: from structure to function", NY, March 11-13
2010: 11th Sloan-Swartz Centers for Theoretical Neurobiology summer meeting at Yale Univ., June 29-30
2010: Gatsby meeting on grid cells, London, July 1-3
2010: Plenary Lecture at FENS biannual meeting in Amsterdam, July 3-7.
2010: Nansen Neuroscience Lectures 101010
2010: Neural Circuits: From Development to Function to be held Oct. 7, UCLA Campus, LA
2011: Neural Plasticity conference, Morea, Tahiti, 14-18 Feb
2011: Lecture at New York University, 14 March
2011: Speaker at Nobel symposium on 'Machines, Molecules and Mind', Sånga-Säby, Stockholm, May 25-28.
2011: Plenary lecture at EBBS biannual meeting, Sevilla, Sep 9-11.
2011: Plenary lecture at EMBO meeting, Vienna, Sep 11-14.
2011: Lecture at Nobel Forum: symposium on Brain Circuits, 27-28 Oct.
2011: Kavli Lecture, Yale, 17 Nov
2011: Lecture at Ludwig-Maximilians-Universität München, 5 Dec
2012: 10th anniversary of the Erasmus MC Neuroscience Department on 16/01/2012
2012: Bauer Lectures, Brandeis University, Boston, 2-4 April
2012: Keynote Lecture, MBG Annual Meeting 2012 in Aarhus,DK on 8 June
2012: Gordon conference on Neurobiology of Cognition, Il Ciocco, Lucca/Barga, Italy, July 8-13
2012: Kavli Popular Lecture (Kavli Prize Week, Norwegian Academy of Science)

2012: Plenary talk at the Annual Festival of the Research Council of Norway
2012: Keynote Lecture at University of Helsinki Research School conference, November 23rd
2013: Lecture at Neural Plasticity meeting, Curacao, February 15th
2013: First annual Jupiter Brain Sunposium, February 18-20th
2013: 8th Annual Eric M. Shooter Lecture, Stanford Univ Sch Med, 10 April
2013: Keynote Lecture, UT Austin Learning and Memory Conference, 12-14 April
2013: Perl/UNC Neuroscience Prize Lecture 17 April
2013: Royal Society scientific meeting, "Space in the Brain: Cells, Circuits, Codes and Cognition" May 1-3, London.
2013: ESF Neuroscience meeting Lago Maggiore, 20-23 Sept.
2013: Hungarian Academy of Science: Neuroscience Seminar Series, 5-6 Dec.
2014: Louisa Gross Horwitz Prize Lecture, 16 Jan
2014: Friday Lecture Series seminar at Rockefeller University, 17 Jan.
2014: Phillip A. Sharp Lecture in Neural Circuits, McGovern Institute, 5 Feb
2014: Lecture at UC Berkeley (student invited speaker), 7 Feb
2014: Lecture at Institute Pasteur, Paris, 26 March
2014: Lecture at NYU Med Ctr annual retreat, 10-12 April
2014: Lecture at Center for Theoretical Neuroscience, Columbia University, April.
2014: Neural Networks in the Arctic, Spitsbergen 5-10 June
2014: Lecture at 50th anniversary conference of FEBS and EMBO, 1 Sept.
2014: Koerber lecture 2014, University of Hamburg, 4 Sept.
2014: Keynote lecture at Cold Spring Harbor Meeting on Axon Guidance, Synapse Formation and Regeneration 17-19 Sept.
2014: **Nobel Lecture in Medicine or Physiology, Karolinska Institutet, Stockholm, 7 Dec**
2015: Popular lecture, Parliament of Sweden, Stockholm, 11 March
2015: University of Arizona neuroscience day, keynote lecture, Tucson, 27 March
2015: Lecture, Norwegian Academy of Science, Oslo 16 April
2015: Lecture, Harvard University, Boston, 27 April
2015: Plenary lecture, 1st Nordic Neuroscience Meeting, Trondheim, 11 June
2015 Presidential Lecture, Society for Neuroscience, Chicago, 20 Oct
2016: Public Lecture, Royal Danish Academy of Sciences and Letters, 19 Apr.
2016: Lecture, Cajal Club, Copenhagen, 1 July
2016: Presidential Lecture, FENS biannual meeting, Copenhagen, 2-6 July
2017: Lecture, Kavli Salon: Systems Neuroscience, Havana, Cuba, 19-21 Jan.
2017: Keynote Lecture, British Neuroscience Meeting, Birmingham, 13 April
2017: Lecture University Geneva, 25 April
2017: Keynote Lecture, Zeitgeist, Google, London, 9 May
2017: Art/science-talk at the Stephen Hawking Medal ceremony at Starmus in Trondheim, Norway, 19th June
2017: Public lecture at the 10 years with ERC celebration at the Norwegian Research Council
2017: Talk at the 650th anniversary of University of Pecs
2017: Talk at the Central European University, Hungary
2018: EMBO at Basel Life
2018: Beijing, Forum on Industrialization of Scientific and Technological Achievements
2018: Bologna, Festival della Scienza Medica
2018: Accademia delle Scienze of Turin
2018: Ålesund, Fjord Cadenza
2018: Fosnavåg, "Into Whiteness
2018: Keynote at PhD Day 2018, Copenhagen's University
2018: NTNU, Lars Onsager lecture
2018: World Laureates Forum, Dishui Lake, Shanghai
2018: Royal Academy, Stockholm, Sweden
2018: Yale, USA, Gordon M. Shepherd Lecture in Integrative Science
2018: Madrid, Spain with Nobel Media
2018: Santiago de Compostella with Nobel Media

2019: Keynote: in International inauguration meeting Hearing Institute-Paris 2019, Collège de France
2019: Starmus, Zurich
2019: World Laureate Association, Shanghai
2020: Keynote in CONNECT: The Symposium of Wu Tsai Neuro and ChEM-H, Stanford
2021: CNC 2021 virtual, Special Session – in honor of Brenda Milner
2021: PMRC Virtual Albert Einstein Memorial Lecture
2021: Karolinska Institutet, Psychology speaker Series at Nobel Forum (Virtual)
2021: Annual meeting of Federations of Korean Basic Medical Scientists (FMBMS) (Virtual)
2021: Tokyo University (Virtual)
2022: Julius Axelrod Distinguished Visiting Neuroscientist Lecturer, University of Ontario, virtual
2022: Mike Hogg Award Lecture, University of Texas MD Anderson Cancer Center
2023: ASSC26 Keynote, New York University
2023: Benzon symposium no. 67, Keynote, Copenhagen, Denmark
2023: Keynote- opening lecture, WLA forum, Shanghai, China

Conference organizer:
2008: Fridtjof Nansen conference on Neural Networks and Memory, June 4-8.
2008: Kavli Prize symposium, Univ. of Oslo and NTNU, Sept 8-11, co-organizer.
2010: Kavli Prize symposium, Univ. of Oslo and NTNU, Sept 6-9, co-organizer.
2013: Kavli Community Symposium, organizer, 22-23 Aug.
2014: 'How to read a map' conference, Janelia Farm Res. Campus, 6-9 April
2014: Neural Networks in the Arctic, conference organizer, Spitsbergen 5-10 June.
2014: FENS Forum Milan, Italy, 59 July (member of programme committee).
2017: Co-organizer of Kavli Salon: Systems Neuroscience, Havana, Cuba
2019: Co-organizer of Kavli Salon: Systems Neuroscience; Costa Rica
2021: Co-organizer of Louis Jeantet symposium, Geneva

International professional activities

2007-2010: Panel Member for European Research Council Starting Grants (panel L S4 Neurosci.)
2012 – : Member of Scientific Advisory Board (SAB) for the Department of Neuroscience at the Karolinska Institute
2012-2013: Member of programme committee for FENS Forum 2014 in Milan
2015 - : Member of the Louis Jeantet Prize committee
2020 - : Member of the Novo Nordisk Prize committee
2023: Foreign member of the Royal Society London

Editorial Boards*:* Hippocampus (2007 –)

Referee tasks
Nature, Science, Nature Neuroscience, Neuron, Journal of Neuroscience, European Journal of Neuroscience, Behavioral Neuroscience, Hippocampus, and other journals. Grant proposals: The Welcome Trust, National Science Foundation, The Norwegian Res. Council.

Current research supervision (shared with Edvard Moser)

Postdoc: R I Jacobsen (2014 –), R Gardner (2015 –), D Deca (2016 –), H Oberhaus (2016 –), Soledad Gonzalo Cogno (2017 –), Weijian Zong (2018 –), BK Kanter (2020 –), CM Lykken (2020 –), RD do Vale (2021 –), M. Pofahl (2022 –), D Tingley (2022 –), D Hayden (2022 –), M Guaramagna (2022 –).

PhD.: N Dagslott (2011 –), E. Skytøen (2013 -), A Nagelhus (2015 –), T Waaga (2015 –), T Slettmoen (2016 –), A Z Vollan (2016 –), V Normand (2017 –),J Carpenter (2019 –); H Enequist (2020 –), NL de Jong (2021 –), A Laurup (2022 –).

Completed postdocs: F. Sargolini (2004-06; now Associate Professor at Univ. Marseille), P Ganter (2002-06), S Leutgeb (2002–07; now Assistant Professor at UCSD), V Brun (2005-07; now Assoc. Professor at Univ. Tromsø), A Sale (2006-07), J Leutgeb (2003-08; now Assistant Professor at UCSD), M Fyhn (2005-08 ; now Assoc. Professor at Univ. Oslo), T Hafting (2005-08 ; now Assoc. Professor Univ. Oslo), J Angie (2007-08; now Lecturer at Univ. St. Andrews), R Langston (2007-10 ; now Lecturer at Univ. Dundee), K Jezek (2005-10 ; now Assoc. Professor at Czech Academy of Sciences), L Colgin (2005-10 ; now Assistant Professor at UT Austin)**, D Derdikman (2005-10; now Assistant Professor at Technion in Haifa), A Tashiro (2006-12; now Assistant Professor at Nanyang Technol. Univ., Singapore)*, E Kropff (2008-11; now Assistant Professor at Neuronal Plasticity Laboratory, Leloir Institute, Buenos Aires, Argentina), L Giocomo (2009-11; now Assistant Professor at Stanford Univ.)***, J Whitlock (2007-13) ****, T van Cauter (2008-13), S-J Zhang (2008-11) ; H Yamahachi (2011-13) ; H Ito (2009-15; group leader at Max Planck Institute for Brain Research in Frankfurt a.M. from 1.1.2016), K Igarachi (2008-15; Assistant Professor at UC Irvine from 1.1.2016), J Ye (2008-15; group leader, NTNU), F Donato (2013-19; Assistant Professor at Univ. Basel from 2019) #, M Hagglund (2013-19), M Carvalho (2014-19), N Tanke (2014-19), D Ledergerber (2011-19), D Rowland (2011-19; Associate Editor at Nature Neuroscience from 2019 and at Nature from 2020), J Sugar (2017-21; Associate Professor, Univ. Oslo), Ø Høydal (2020-21; Associate Professor, Høgskulen i Volda).

Completed PhDs: S Molden (2005), H-A Steffenach (2005), F Tuvnes (2005), M Fyhn (2005)*****, V Brun (2005), H-A Steffenach (2005), M K Otnæss (2006), T Solstad (2009) and Kirsten Gj Kjelstrup (2010), T Bonnevie (2014), C Boccara (2014), T Stensola (2014), C Alme (2015), L Lu (2015), A Tsao (2015), C Miao (2015), H Stensola (2016), I U Kruge (2017), T Wernle (2018), T L Bjerknes (2018), Ø Høydal (2020). J S Blackstad (2023), S Andersson (2023),

*Ayumu Tashiro received ERC Starting Grant in 2008 (at the Kavli Institute), also recipient of Gruber International Prize 2008 (awarded at Society for Neuroscience annual meeting); **Laura Colgin received the Gruber International Prize 2010; ***Lisa Giocomo received the Gruber International Prize 2012, she was offered an ERC Starting Grant in 2012, and she received the Young Investigator Award of the Society for Neuroscience in 2018: ****Jonathan Whitlock received an ERC Starting Grant in 2013 (Kavli Institute, 1.1.2014 –); *****Marianne Fyhn received the Donald B Lindsley Award for best PhD in behavioural neuroscience in 2005 and was a runner-up for the Science Eppendorff Prize in 2007. # Flavio Donato received the Science Eppendorff Prize in 2017 and an ERC Starting Grant in 2019 (Univ. Basel).

Selected administrative experience

Chairman of Board for Physiology and Pharmacology of Medicine and Health Division of the Norwegian Research Council (2004–2008); Member of Board for Physiology and Pharmacology of Medicine and Health Division of the Norwegian Research Council (2000–2004); Member of Medical-Technology management team of NTNU 2001-; Member of National Board for neuroscience funding in Norway (NevroNor) 2002-2004.

Funding (selected)

2002 – 2012: *Centre of Excellence Appointment by Norw. Res. Council:* Total budget 256 million NOK (35.5 mill Euro) over 10 years (100 MNOK from Research Council). See above.

2008 – : *Endowment from Kavli Foundation to establish Kavli Institute for Systems Neuroscience*; total of 7 million NOK per year, including supplementary funding from NTNU. Unlimited in time.

2011 – 2015: ***European Research Council Advanced Investigator Grant***; individual grant, total of 20 million NOK over 5 years (2.5 M Euro).

2013 – 2022: ***Centre of Excellence*** *Appointment by Norw. Res. Council:* Total budget 175 million NOK (24 mill Euro) over 10 years. See above.

2015 -: **Egil and Pauline Braathen and Fred Kavli Center for Cortical Microcircuits**, 6 M dollar from Braathen, 6 M dollar from Kavli, 25% ´gaveforsterkning´via Research Council.

2023 – 2033: ***Centre of Excellence*** *Appointment by Norw. Res. Council:* From NRC 149 million NOK (14 mill Euro) over 10 years. See above.

Selected publications

Moser, E.I., Moser, M.B. & Andersen, P. (1993). Spatial learning impairment parallels the magnitude of dorsal hippocampal lesions, but is hardly present following ventral lesions. ***Journal of Neuroscience*** 13, 3916-3925.

Moser, E.I., Moser, M.B. & Andersen, P. (1994). Potentiation of dentate synapses initiated by exploratory learning in rats: Dissociation from brain temperature, motor activity and arousal. ***Learning & Memory,*** 1, 55-73.

Moser, M.B., Trommald, M. & Andersen, P. (1994). An increase in dendritic spine density on hippocampal CA1 pyramidal cells following spatial learning in adult rats suggests the formation of new synapses. ***Proceedings of the National Academy of the Sciences of the U.S.A.***, 91, 12673-12675.

Moser, M.B., Moser, E.I., Forrest, E., Andersen, P. & Morris, R.G.M. (1995). Spatial learning with a minislab in the dorsal hippocampus. ***Proceedings of the National Academy of the Sciences USA***, 92, 9697-9701.

Moser, M.B., Trommald, M., Egeland, T. & Andersen, P. (1997). Spatial Training in a Complex Environment and Isolation Alter the Spine Distribution Differently in Rat CA1 Pyramidal Cells. ***Journal of Comparative Neurology***, 379, 1-9.

Moser, M.B. & Moser, E.I. (1998). Distributed encoding and retrieval of spatial memory in the hippocampus. ***Journal of Neuroscience***, 18, 7535-7542.

Moser, E.I., Krobert, K.A., Moser, M.B. & Morris, R.G.M. (1998). Impaired spatial learning after saturation of long-term potentiation. ***Science***, 281, 2038-2042.

Moser, M.B. & Moser, E.I. (1998). Functional differentiation in the hippocampus. ***Hippocampus,*** **8**, 608-619.

Moser, E.I. & Moser, M.B. (1999). Is learning blocked by saturation of synaptic weights in the hippocampus? ***Neuroscience and Biobehavioral Reviews***, 23, 661-672.

Moser, M.B. (1999). Making more synapses: a way to store information? ***Cellular and Molecular Life Sciences,*** 55, 593-600.

Otnæss, M.K., Brun, V.H., Moser, M.B. & Moser, E.I. (1999). Pretraining prevents spatial learning impairment after saturation of hippocampal long-term potentiation. ***Journal of Neuroscience,*** **19**, RC49 (1-5).

Moser, M.B. & Moser, E.I. (2000). Pretraining and the function of hippocampal long-term potentiation. ***Neuron*** 26, 559-561.

Brun, V.H., Ytterbø, K., Morris, R.G.M., Moser, M.B. & Moser, E.I. (2001). Retrograde amnesia for spatial memory induced by NMDA receptor-mediated long-term potentiation. ***Journal of Neuroscience,*** 21, 356-362**.**

Hollup, S.A., Molden, S., Donnett, J.G., Moser, M.B. & Moser, E.I. (2001). Accumulation of hippocampal place fields at the goal location in an annular watermaze task. ***Journal of Neuroscience,*** 21, 1635-1644.

Hollup, S.A., Molden, S., Donnett, J.G., Moser, M.B. & Moser, E.I. (2001). Place fields of rat hippocampal pyramidal cells and spatial learning in the watermaze. ***European Journal of Neuroscience,*** 13, 1197-1208.

Hollup, S.A., Kjelstrup, K.G., Hoff, J., Moser, M.B. & Moser, E.I. (2001). Impaired recognition of the goal location during spatial navigation in rats with hippocampal lesions. ***Journal of Neuroscience,*** 21**,** 4505-4513.

Steffenach, H.-A., Sloviter, R.S., Moser, E.I. & Moser, M.-B. (2002). Impaired retention of spatial memory after transection of longitudinally-oriented axons of hippocampal CA3 pyramidal cells. ***Proceedings of the National Academy of the Sciences USA,*** 99, 3194-3198.

Fyhn, M., Molden, S., Hollup, S.A., Moser, M.-B. & Moser, E.I. (2002). Hippocampal neurons responding to unpredicted dislocation of a target object. ***Neuron,*** 35, 555-566.

Brun, V.H., Otnæss, M.K., Molden, S., Steffenach, H.-A., Witter, M.P., Moser, M.-B., Moser, E.I. (2002). Place cells and place representation maintained by direct entorhinal-hippocampal circuitry. . ***Science,*** 296, 2089-2284..

Kjelstrup, K.G., Tuvnes, F.A., Steffenach, H.-A., Murison, R., Moser, E.I., Moser, M.-B. (2002). Reduced fear expression after lesions of the ventral hippocampus. ***Proceedings of the National Academy of the Sciences USA***, 99, 10825-10830.

Tuvnes, F.A., Steffenach, H.-A., Murison, R., Moser, M.-B. & Moser, E.I. (2003). Selective hippocampal lesions do not increase adrenocortical activity. ***Journal of Neuroscience,*** 23, 4345-4354.

Fyhn, M., Molden, S., Witter, M.P., Moser, E.I. and Moser, M.-B. (2004). Spatial representation in the entorhinal cortex (Research Article). ***Science,*** 305, 1258-1264.

Leutgeb, S., Leutgeb, J.K., Treves, A., Moser, M.-B. and Moser, E.I. (2004). Distinct ensemble codes in hippocampal areas CA3 and CA1. ***Science*** 305, 1295-1298.

Moser, E.I., Moser, M-B., Lipa, P., Newton, M., Houston, F.P., Barnes, C.A. and McNaughton, B.L. (2005). A test of the reverberatory activity hypothesis for hippocampal place cells. ***Neuroscience,*** 130, 519-526.

Steffenach, H.-A., Witter, M.P., Moser, M.-B., and Moser, E.I. (2005). Spatial memory in the rat requires the dorsolateral band of the entorhinal cortex. ***Neuron,*** 45, 301-313.

Hafting, T., Fyhn, M., Molden, S., Moser, M.-B., and Moser, E.I. (2005). Microstructure of a spatial map in the entorhinal cortex (Article). ***Nature,*** **4**36, 801-806.

Leutgeb, S., Leutgeb, J.K., Barnes, C.A., Moser, E.I., McNaughton, B.L., and Moser, M.-B (2005). Independent codes for spatial and episodic memory in the hippocampus. ***Science,*** 309, 619-623.

Leutgeb, S., Leutgeb, J.K., Moser, M.-B., and Moser, E.I. (2005). Place cells, spatial maps and the population code for memory. ***Current Opinion in Neurobiology,*** 15, 738-746.

Leutgeb, J.K., Leutgeb, S., Treves, A., Meyer, R., Barnes, C.A., McNaughton, B.L., Moser, M.-B., and Moser, E.I. (2005). Progressive transformation of hippocampal neuronal representations in 'morphed' environments. ***Neuron,*** 20, 345-358.

Sargolini, F., Fyhn, M., Hafting, T., McNaughton, B.L., Witter, M.P., Moser, M.-B., and Moser, E.I. (2006). Conjunctive representation of position, direction and velocity in entorhinal cortex. ***Science,*** 312, 754-758.

McNaughton, B.L., Battaglia, F.P., Jensen, O., Moser, E.I., and Moser, M.-B. (2006). Path-integration and the neural basis of the 'cognitive map'. ***Nature Reviews Neuroscience***, 7, 663-678.

Leutgeb, S., Leutgeb, J.K., Moser, E.I., and Moser, M.-B (2006). Fast rate coding in hippocampal CA3 cell assemblies. ***Hippocampus***, 16, 765-774.

Leutgeb, J.K., Leutgeb, S., Moser, M.-B., and Moser, E.I. (2007). Pattern separation in dentate gyrus and CA3 of the hippocampus. ***Science***, 315, 961-966.

Fyhn, M., Hafting, T., Treves, A., Moser, M.-B., and Moser, E.I. (2007). Hippocampal remapping and grid realignment in entorhinal cortex. ***Nature***, 446, 190-194.

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