

Publications - Sylvain Tollis - April 1st, 2022

Peer-reviewed scientific articles

In preparation:

- **Tollis, S.[†]**, Palou, R., Munawar, M., Thattikota, Y., and Tyers, M. (expected submission spring 2022) Glucose availability modulates cell size through Msn2/4-dependent control of Swi6 expression in budding yeast. *In preparation for Science*. ([†]): *corresponding author*.
- Lyst, M., Zhang, L., Alexander-Howden, B., **Tollis, S.**, St-Cyr, D., van der Sloot, A.M., Tyers, M., and Bird, A. (expected submission summer 2022) Screening for inhibitors of an autism-relevant protein-protein interaction". *In preparation for PLoS one*.
- Rizzotto, R., **Tollis, S.**, Pham, N.T., Zheng, Y., Abada, A., Wildenhain, J., Arulanandama, J., Auer, M., Tyers, M., and Schirmer, E.C. (expected submission summer 2022) NET50/DHRS7 and estradiol propionate correct nuclear size defects in PC3 prostate cancer cells. *In preparation for BBRC journal*.
- Cook, M., **Tollis, S.**, Cheng, J., Caudy, A., Rosebrock, A., Tyers, M. (expected submission summer 2022) A giant genetic network mediates condition-dependent control of cell size. *In preparation for Cell*.
- Cheng, J., **Tollis, S.**, Fayet-lebaron, E., Blake, D., Tang, X., and Tyers, M. (expected submission fall 2022) Nnk1-induced Gdh2 focus formation presents a novel protein conformation-based epigenetic regulation. *In preparation for Cell Metabolism*
- Ghazal, G., **Tollis, S.**, Gagnon, J., Coulombe-Huntingdon, J and Tyers, M. (expected submission fall 2022) A novel non-coding RNA affecting the G1/S transition through the expression of chromatin remodeling genes. *In preparation for RNA Journal*

Submitted/in revision:

1. **Tollis, S.** (2022) The transcription repressor gene WHI5 is transcribed in G1 budding yeast cells. *Submitted to BMC Research Notes*.

Published/in press (for conference proceedings, only works not included in other published manuscripts are listed):

1. Aaltonen, N., Kyykallio, H., **Tollis, S.**, Capra, J., Hartikainen, J., Matilainen, J., Oikari, S., Heldin, P. and Rilla, K. (2022) MCF10CA breast cancer cells utilize hyaluronan-coated EV-rich trails for coordinated migration. *In press, Frontiers of Oncology*.
2. Litsios, A., Goswami, P., Terpstra, H.M., Coffin, C., Vuilleminot, L-A., Rovetta, M., Ghazal, G., Guerra, P., Buczak, K., Schmidt, A., **Tollis, S.[†]**, Tyers, M.[†], Royer, C.A.[†], Miliadis-Argeitis, A.[†], and Heinemann, M.[†] (2022) The timing of Start is determined primarily by increased synthesis of the Cln3 activator rather than dilution of the Whi5 inhibitor. *In press, Molecular Biology of the Cell*. ([†]):*co-corresponding authors*
3. Ould Setti, M.* and **Tollis, S.*** (2022) In-Depth Correlation Analysis of SARS-CoV-2 Effective Reproduction Number with Mobility Patterns Identifies Three Groups of Countries. *J. Prev. Med. Public Health* **55**(2): 134-143. (*): *equivalent contributions*.
4. **Tollis, S.^{†,*}**, Singh, J.* , Thattikota, Y., Palou, R., Ghazal, G., Coulombe-Huntington, J., Tang, X., Moore, S., Blake, D., Bonnell, E., Royer, C.A., Thibault, P., and Tyers, M.[†] (2022) The microprotein Nrs1 rewires the G1/S transcriptional machinery during nitrogen limitation in budding yeast. *PLoS Biol* **20**(3): e3001548. (*): *equivalent contributions*. ([†]):*co-corresponding authors*; <https://doi.org/10.1371/journal.pbio.3001548>
5. **Tollis, S.^{†,*}**, Rizzotto, A.*, Pham, N., Koivukoski, S., Sivakumar, A., Wildenhain, J., Zuleger, N., Keys, J.T., Batrakou, D., Culley, J., Zheng, S., Lammerding, J., Carragher, N., Brunton, V. G., Latonen, L., Auer, M., Tyers, M., and Schirmer, E.C.[†] (2022) Chemical interrogation of nuclear size identifies compounds with cancer cell line-specific effects on migration and invasion. *ACS Chem. Biol.* **17**(3), 680–700. (*): *equivalent contributions*. ([†]): *co-corresponding authors*.
6. **Tollis, S.**, Goswami, P., Palou, R., Coffin, C., Thattikota, Y., Tyers, M. and Royer, C.A. (2022) Growth- and nutrient-dependent G1/S transcription factor upregulation is controlled at the transcriptional level and is

critical for proliferation in poor nutrient conditions. *Biophysical Journal* **121** (3): Pages 404a-405a (peer-reviewed conference proceedings) <https://doi.org/10.1016/j.bpj.2021.11.745>

7. Black, L.*, **Tollis, S.*†**, Fu, G., Fiche, J.-B., Dorsey, S., Cheng, J., Ghazal, G., Notley, S., Crevier, B., Bigness, J., Nollmann, M., Tyers, M. †, and Royer, C.A. † (2020) G1/S transcription factors assemble in increasing numbers of discrete clusters through G1 phase. *J. Cell Biol.* **219** (9): e202003041. (*):equivalent contributions.(†):co-corresponding authors.
8. Jacques, S.*, van der Sloot, A.M.*, Huard, C.*, Coulombe-Huntington, J., Tsao, S., **Tollis, S.**, Bertomeu, T., Culp, E.J., Pallant, D., Cook, M., Bonneil, E., Thibault, P., Wright, G.D., and Tyers, M. (2020) Imipridones cause cellular toxicity in human cells and bacteria by ectopic activation of the ClpP protease. *Genetics* **214** (4): 1103-1120. (*): equivalent contributions.
9. Dorsey, S., Goswami, P., Cheng, J., Thattikota, Y., **Tollis, S.**, Royer, C.A., Tyers, M. (2019) Quantification of G1-Cyclin Dynamics in Yeast by Scanning Number and Brightness. *Biophysical J* **116** (3): page 532 (peer-reviewed conference proceedings).
10. Dorsey, S.*, **Tollis, S.***, Cheng, J., Black, L., Notley, S., Tyers, M., Royer, C.A. (2018) G1/S Transcription Factor Abundance Reveals Growth-Dependent Determinants of Cell Cycle Commitment in Yeast. *Cell Systems* **6**: 1-16. (*): equivalent contributions.
11. **Tollis, S.**, Dorsey, S., Tyers, M. and Royer, C.A. (2018) Absolute Quantification Reveals Growth and Nutrient-Dependent Control of G1/S Transcription Factor Abundance as a Determinant of Start. *Biophysical J.* **114** (3): p151a (peer-reviewed conference proceedings).
12. Black, L., Fiche, J.-B., **Tollis, S.**, Cheng, J., Notley, S., Crevier, B., Tyers, M., Nollmann, M. and Royer, C.A. (2018) Super Resolution Imaging of Start Transcription Factors in Yeast. *Biophysical J.* **114** (3): p547a (peer-reviewed conference proceedings).
13. Thattikota, Y., **Tollis, S.**, Palou, R., Vinet, J., Tyers, M., and D'Amours, D. (2018) Cdc48/VCP promotes chromosome morphogenesis by releasing condensin from self-entrapment in chromatin. *Mol. Cell* **69**: 1-13.
14. Laporte, D., Courtout, F., **Tollis, S.**, Sagot, I. (2016) Quiescent *Saccharomyces cerevisiae* forms telomere hyperclusters at the nuclear membrane vicinity through a multifaceted mechanism involving Esc1, the Sir complex, and chromatin condensation. *Mol. Biol. Cell* **27** (12): 1875-1884
15. **Tollis, S.** (2015) A Jump Distance-based Bayesian analysis method to unveil fine single molecule transport features. <http://arxiv.org/abs/1506.01112>
16. Jose, M., **Tollis, S.**, Nair, D., Mitteau, R., Velours, C., Massoni-Laporte, A., Sibarita, J.B., and McCusker, D. (2015) A quantitative imaging-based screen reveals the exocyst as a network hub connecting endo- and exocytosis. *Mol. Biol. Cell* **26** (13): 2519-2534
17. Jose, M.*, **Tollis, S.***, Nair, D., Sibarita, J.B., and McCusker, D. (2013) Robust polarity establishment occurs via an endocytosis-based cortical corralling mechanism. *J. Cell Biol.* **200**(4), 407-418. (*): equivalent contributions. Article in Focus in JCB, <http://jcb.rupress.org/content/200/4/363/tab-pdf>
18. Mitteau, R., Massoni-Laporte, A., Deepak, M. J., **Tollis, S.**, and McCusker, D. (2012). Mechanisms underlying the regulation of a Rho-family GTPase. *Mol. Biol. Cell* **23** (conference proceedings).
19. **Tollis, S.**, Gopaldass, N., Soldati, T., Endres, R.G. (2012) How one cell eats another: principles of phagocytosis. Chapter of the book “Systems microbiology: current topics and applications” by B. Robertson and B. Wren, Caister Academic Press 2012 (ISBN-13: 978-1-908230-02-7) <https://www.caister.com/hsp/pdf/flyer/systemsmicrobiology.pdf>
20. Dart, A.E., **Tollis, S.**, Bright, M.D., Frankel, G.M., and Endres, R.G. (2012) The motor protein Myosin 1G functions in FcγR-mediated phagocytosis. *J. Cell Sci.* **125**, 6020-6029
21. Aquino, G., Clausznitzer, D., **Tollis, S.**, Endres, R.G. (2011) Optimal receptor-cluster size determined by intrinsic and extrinsic noise. *Phys. Rev. E.* **83**: 021914
22. **Tollis, S.**, Dart, A.E., Tzircotis, G., Endres, R.G. (2010) The zipper mechanism in phagocytosis: energetic requirements and variability in phagocytic cup shape. *BMC Sys. Biol.* **4**: 149

23. Crouzy B., **Tollis, S.**, Ivanov, D.A. (2007) Josephson current in a superconductor-ferromagnet-superconductor junction with in-plane ferromagnetic domains. *Phys. Rev. B* **76**: 134502
24. Buzdin, A., **Tollis, S.**, Cayssol, J. (2007) Anomalous (H, T) phase diagram in bilayered superconducting systems. *Physica C*, **460**: 1028-1030
25. Crouzy, B., **Tollis, S.**, Ivanov, D.A. (2007) Josephson current in a superconductor-ferromagnet junction with two noncollinear magnetic domains. *Phys. Rev. B* **75**: 054503
26. **Tollis, S.**, Cayssol, J., Buzdin, A. (2006) Competition between π -coupling and Fulde-Ferrell-Larkin-Ovchinnikov modulation in a periodic array of ferromagnetic-superconducting bilayers of atomic thickness. *Phys. Rev. B* **73**: 174519
27. Buzdin, A., **Tollis, S.**, Cayssol, J. (2005) Field-Induced superconductivity with an enhanced and tunable paramagnetic limit. *Phys. Rev. Lett.* **95**: 167003
28. **Tollis, S.**, Daumens, M., Buzdin, A. (2005) Inversion of the proximity effect in atomic-scale ferromagnet/superconductor/ferromagnet trilayers. *Phys. Rev. B* **71**: 024510
29. **Tollis, S.** (2004) First-order phase transitions in ferromagnetic/superconducting/ ferromagnetic trilayers. *Phys. Rev. B* **69**: 104532

Publications intended for the general public (science popularization articles, in French)

1. **Tollis, S.** (2014) Tous les chemins mènent au Pôle. *Tell me your science popularization blog*, <https://tellyourscience.org/2014/01/06/tous-les-chemins-menent-au-pole/>
2. **Tollis, S.** (2014) Je suis un excellent conducteur. *Tell me your science popularization blog*, <https://tellyourscience.org/2014/01/21/je-suis-un-excellent-conducteur/>
3. **Tollis, S.** (2014) Breaking news ! Un nouvel océan est en train de naître!. *Tell me your science popularization blog*, <https://tellyourscience.org/2014/01/27/breaking-news-un-nouvel-ocean-est-en-train-de-naître/>
4. **Tollis, S.** (2014) La merveilleuse ingéniosité des bactéries. *Tell me your science popularization blog*, <https://tellyourscience.org/2014/03/03/la-merveilleuse-ingeniosite-des-bacteries/>
5. **Tollis, S.** (2013) 2nd Kerner Prize for scientific popularization. ARC foundation congress, Paris, France.
6. **Tollis, S.** (2007) Le théorème de Wick. *Article about the demonstration of Wick's statistical physics theorem on the online encyclopedia Wikipedia*. https://fr.wikipedia.org/wiki/Th%C3%A9or%C3%A8me_de_Wick

Public artistic and design activities

1. **Tollis, S.** (2014) Interview for the radio show « Que cherchent'ils? » on RCF radio (Bordeaux, France) in collaboration with Cap Sciences. <https://www.youtube.com/watch?v=uwMFLZYlnT4>
2. **Tollis, S.** (2014) Production of a short movie « Tous les Chemins mènent au Pôle » (all routes lead to the Pole), selected for the final of the contest « Filmer sa recherche », in the framework of the CNRS Researchers films' Festival, Nancy, France.

Theses

1. **Tollis, S.** (2005) Contributions to the theory of superconductor-ferromagnetic nanostructures. Ph.D. dissertation, University of Bordeaux 1. Supervisor: A. I. Buzdin.
2. **Tollis, S.** (2002) Modeling the violation of the CPT symmetry in neutrinos. Masters dissertation, University of Clermont-Ferrand Blaise Pascal. Supervisor: J. Orloff.

Project Leadership and International Research Collaborations

Leading role in interdisciplinary research projects

2018-2019 “Quantification of G1-Cyclin Dynamics in Yeast by Scanning Number and Brightness”. Catherine Ann Royer (Rensselaer Polytechnique Institute, USA) – *unpublished, on-going work*

2018-2019 “Characterization of the YLR053c gene and its impact on cell cycle control under nutrient deprivation”.

With Mike Tyers and Yogitha Thattikota (IRIC, University of Montreal, Canada) – **1 article**

2016-2019 “Screening of chemical compounds and nuclear envelope transmembrane proteins co-affecting the karyoplasmic ratio and cancer progression in human cancer cell lines”. Eric Schirmer (Uni. Edinburgh) – **1 article**

2016-2018 “Transcription Factor Abundance Reveals Growth-Dependent Determinants of Cell Cycle Commitment in Yeast.” and “Super-resolution mapping of single G1/S transcription factors in budding yeast reveals cell size-dependent spatial clustering”. Catherine Ann Royer (Rensselaer Polytechnique Institute, USA) – **2 articles**

New collaborations initiated within my institute

2019 “The role of acetylation and interaction with karyopherins in nuclear import of histones”. Alain Verreault (IRIC, University of Montreal, Canada) – *unpublished, on-going work*

2017-2018 “Cdc48/VCP promotes chromosome morphogenesis by releasing condensin from self-entrapment in chromatin”. Damien D’Amours (now University of Ottawa, Canada) – **1 article**

Other international collaborations

2016-2019 “Screening of chemical compounds affecting the MeCP2/Tb11 interaction responsible for Rett syndrome in human cells”. Adrian Bird (University of Edinburgh, UK) – *unpublished, on-going work*

2015-2017 “Analysis of mechanisms controlling intra-cellular scaling in yeast using multi-channel fluorescence microscopy-based screening of thermosensitive mutants of essential genes affecting the relative scaling of different organelles”. Orna Cohen-Fix (NIH/Johns Hopkins University, USA) and Brenda Andrews (University of Toronto, Canada) – *unpublished, on-going work*

Key publications with details of contributions - (*): co-first authors; (†): co-corresponding authors

Tollis, S. ^{†,*}, Singh, J.^{*}, Thattikota, Y., Palou, R., Ghazal, G., Coulombe-Huntington, J., Tang, X., Moore, S., Blake, D., Bonneil, E., Royer, C.A., Thibault, P., and Tyers, M.[†] (2022) The microprotein Nrs1 rewires the G1/S transcriptional machinery during nitrogen limitation in budding yeast. *PLoS Biol* 20(3): e3001548. (*): equivalent contributions. (†): co-corresponding authors; <https://doi.org/10.1371/journal.pbio.3001548>

My personal contributions: I leaded the project (with M. Tyers), coordinated the day-to-day work of research contributors, contributed to the conceptualization of the study (scientific question framing, choice of methodologies and analytical tools), performed all microscopy experiments and most cell biological experiments, provided resources (construction and validation of yeast strains), performed the statistical analysis of the data, performed the bioinformatical analyses of the NSR1 gene evolution and of the proteomics experiments, wrote the manuscript (text and figures), and contributed to funding acquisition.

Tollis, S. ^{†,*}, Rizzotto, A.^{*}, Pham, N., Koivukoski, S., Sivakumar, A., Wildenhain, J., Zuleger, N., Keys, J.T., Batrakou, D., Culley, J., Zheng, S., Lammerding, J., Carragher, N., Brunton, V. G., Latonen, L., Auer, M., Tyers, M., and Schirmer, E.C.[†] (2022) Chemical interrogation of nuclear size identifies compounds with cancer cell line-specific effects on migration and invasion. *ACS Chem. Biol.* **17**(3), 680–700. (*): equivalent contributions. (†): co-corresponding authors.

My personal contributions: I leaded the project (with E. Schirmer), contributed to the conceptualization (scientific question framing, choice of methodologies and analytical tools), performed the investigation (high-throughput imaging screen, bioinformatical and statistical analysis of the data, compound clustering and inference, and some validation experiment); I developed new methodologies and custom analysis software in Matlab; I wrote the manuscript (text and figures, with E. Schirmer).

Black, L.^{*}, **Tollis, S.** ^{*,†}, Fu, G., Fiche, J-B., Dorsey, S., Cheng, J., Ghazal, G., Notley, S., Crevier, B., Bigness, J., Nollmann, M., Tyers, M.[†], and Royer, C.A.[†] (2020) Super-resolution mapping of single G1/S transcription factors in budding yeast reveals cell size-dependent spatial clustering. *J. Cell Biol.* **219** (9): e202003041.

My personal contributions: I leaded the project (with C.A. Royer), coordinated the day-to-day work of research contributors, conceptualized the study (scientific question framing, choice of methodologies and analytical tools), developed methodologies (conception and writing of custom quantitative analysis scripts for super-resolution data, development of the mathematical model and stochastic Monte Carlo simulations), provided resources (construction and validation of yeast strains), performed the investigation (some validation experiments, super-resolution data analysis and interpretation of the results, resolution of the model and analysis of model parameter space, scaling arguments); I wrote the manuscript (text and figures, with C.A. Royer) and contributed to funding acquisition.

Dorsey, S.^{*}, **Tollis, S.** ^{*}, Cheng, J., Black, L., Notley, S., Tyers, M., Royer, C.A. (2018) G1/S Transcription Factor Abundance Reveals Growth-Dependent Determinants of Cell Cycle Commitment in Yeast. *Cell Systems* **6**: 1-16.

My personal contributions: I leaded the project (with C.A. Royer), coordinated the day-to-day work of research contributors, conceptualized the study (scientific question framing, choice of methodologies and analytical tools); I developed experimental and analytical methodologies (improvement of experimental techniques, conception and writing of custom quantitative imaging analysis scripts, development of the mathematical model); I provided resources (construction and validation of yeast strains); I performed some N&B experiments and all non-N&B experiments; I performed N&B data analysis, solved the model and analyzed the parameter regimes, made testable predictions; I contributed to the design of validation experiments and performed some of them; I wrote the manuscript (text and figures, with C.A. Royer) and contributed to funding acquisition.

Jose, M.^{*}, **Tollis, S.** ^{*}, Nair, D., Sibarita, J.B., and McCusker, D. (2013) Robust polarity establishment occurs via an endocytosis-based cortical corraling mechanism. *J. Cell Biol.* **200**(4), 407-418. Article in Focus in JCB, <http://jcb.rupress.org/content/200/4/363/tab-pdf>

My personal contributions: I led the project (with M. Jose and D. McCusker), coordinated the day-to-day work of research contributors, and conceptualized the study (scientific questions framing, choice of methodologies and analytical tools); I conceived and implemented custom analysis scripts for all fluorescence microscopy data; I conceived the mathematical model and developed the Monte Carlo stochastic simulation framework; I performed simulations, analyzed statistically the results and made testable predictions; I contributed to the conception of validation experiments and analyzed statistically experiments results; I wrote the manuscript (text and figures) with M. Jose and D. McCusker, and contributed to funding acquisition.

Tollis, S., Dart, A.E., Tzircotis, G., Endres, R.G, (2010) The zipper mechanism in phagocytosis: energetic requirements and variability in phagocytic cup shape. *BMC Sys. Biol.* **4:** 149

My personal contributions: I led the project (with R. Endres), conceived the biophysical model, chose the resolution framework, developed Monte Carlo computer simulations and image analysis algorithms; I performed the simulations, image analysis, and statistical analysis of the data; I interpreted the simulation results, contributed to the design of validation experiments, performed the bioinformatical analysis of the experiments, designed figures and wrote the manuscript;