

ARRTI



Alberta RNA Research and Training Institute

ANNUAL REPORT 2016 – 2017

University of
Lethbridge



MAY 1, 2016 TO
APRIL 30, 2017

WWW.ULETH.CA/RESEARCH/ARRTI

TWITTER: @ARRTI_RNA

Mandate

ARRTI is dedicated to foster and facilitate RNA research and training excellence at the University of Lethbridge and to contribute to the multidisciplinary research and teaching community at the University of Lethbridge and its surrounding communities.

Members

Director – Hans-Joachim Wieden (Department of Chemistry and Biochemistry)

Associate Director – Tony Russell (Department of Biological Sciences)

Research Members –

- Ute Kothe (Department of Chemistry and Biochemistry)
- Marc Roussel (Department of Chemistry and Biochemistry)
- Nehal Thakor (Department of Chemistry and Biochemistry)
- Stacey Wetmore (Department of Chemistry and Biochemistry)
- Trushar Patel (Department of Chemistry and Biochemistry)
- Athanasios Zovoilis (Department of Chemistry and Biochemistry)



(L-R) Dr. Zovoilis, Dr. Russell, Dr. Roussel, Dr. Kothe, Dr. Thakor, Dr. Wetmore, Dr. Patel and Dr. Wieden

Recruitment

1. Canada Research Chair (Tier II) in RNA Bioinformatics
 - Dr. Anathasios Zovoilis (Started December 2016)
2. Scientific Assistant / ARRTI Administrator
 - Emily Wilton (Started May 1, 2016)
3. Research Technician (Kothe lab)
 - Emily Soon (Started June 2016)

Trainees

Total trainees between May 1, 2016 and April 30, 2017: 85

Postdoctoral Fellows – 8

- 2 postdoctoral fellows recruited externally during this reporting period
- 1 postdoctoral fellow transitioned to a Research Associate position during this reporting period

Research Associates – 7

- 1 Research Technician was recruited during this reporting period

PhD Students – 15

- 1 student successfully defended their dissertation during this reporting period
- 1 student successfully transferred from MSc to PhD program during this reporting period
- 4 students began a PhD program during this reporting period (2 recruited externally, 2 recruited internally)

MSc Students – 18

- 3 students successfully defended their thesis during this reporting period
- 8 students began an MSc program during this reporting period (3 recruited externally, 5 recruited internally)

Undergraduate Students – 34

Exchange Students – 1

High School Students – 2

Note: Trainees who completed a BSc or MSc and moved on to an MSc or PhD, respectively, are only listed under their current category, to avoid counting any trainee twice.



ARRTI Group (May 2016) in front of University of Lethbridge Destination Project construction
Photo Credit: Douglas Mackintosh

ARRTI Trainee Engagement Award

This year, ARRTI established a Trainee Engagement Award to encourage our trainees to participate in guest speaker presentations by asking thoughtful and engaging questions.

In this first awarding period, we are pleased to recognize three ARRTI trainees for their outstanding engagement:

Luc Roberts (PhD student in Wieden lab) asked the most questions.

Dylan Girodat (PhD student in Wieden lab) participated in the most events.

Elijah Dueck (undergraduate student in Kothe lab) had the highest participation of all undergrads.

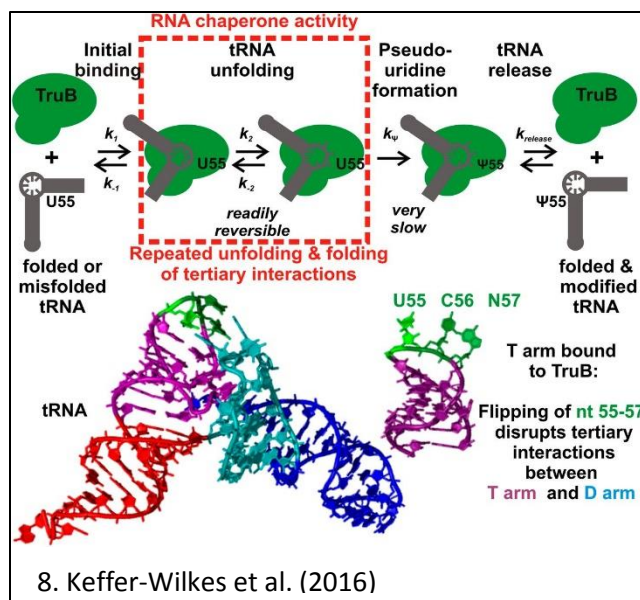
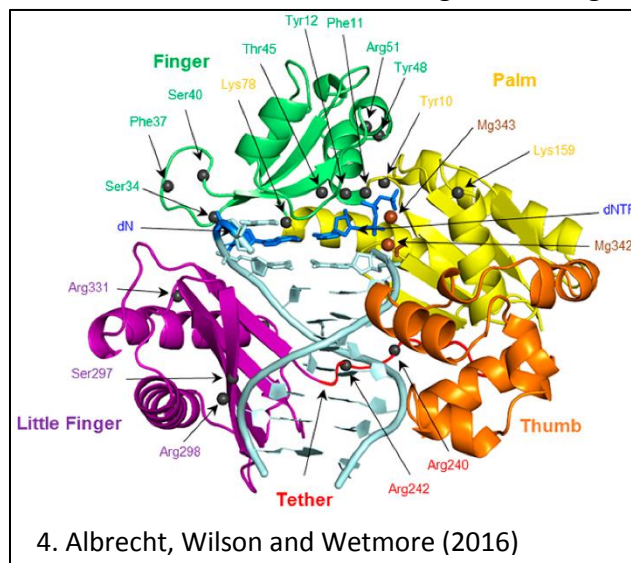
ARRTI Lab Representatives (2017-18)

- Wieden – Taylor Sheahan
- Russell – David McWatters
- Kothe – Abeer Ogailan
- Roussel – Hossein Hosseini
- Thakor – Joseph Ross
- Wetmore – Stefan Lenz
- Patel – Tyler Mrozowich
- Zovoilis – Chris Isaac

Research Dissemination

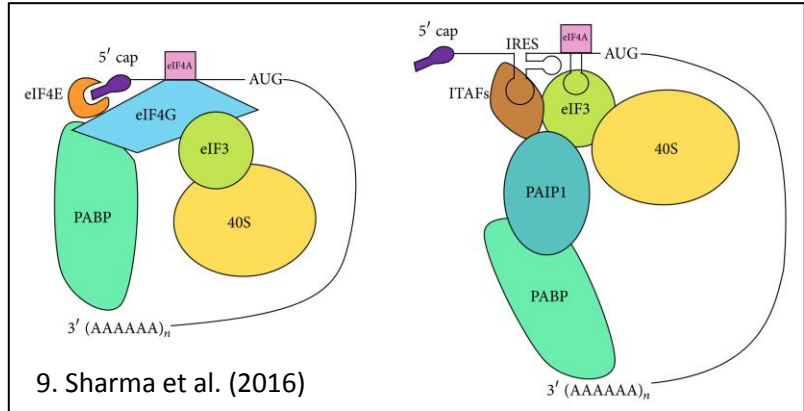
Journal articles published – 21

1. **Thakor, N.**, Smith, M.D., **Roberts, L.**, **Patel, H.**, **Wieden, H.-J.**, Cate, J.C.D., and Holcik, M. (2016) Cellular mRNA recruits the ribosome via eIF3-PABP bridge to initiate internal translation. *RNA Biol.* **14**(5): 553–567. DOI: 10.1080/15476286.2015.1137419 (IF: 4.97)
2. **De Laurentiis, E.I.**, **Girodat, D.**, **Mercier, E.**, **Wieden, H.-J.*** (2016) Using Rapid Kinetics and Molecular Dynamics Simulations to Study Biomolecular Information Processing and Design. *Biomath Communications* **3**. DOI: 10.11145/bmc.2016.04.167 (IF: NA)
3. Sarhan, A.R., **Patel, T.R.**, Tomlinson, M.G., Hellberg, C., Heath, J.K., Cunningham, D.L. and Hotchin, N.A.* (2016) LAR protein tyrosine phosphatase regulates focal adhesions via CDK1. *J. Cell Sci.* **29**: 175-185. DOI: 10.1242/jcs.191379 (IF: 4.7)
4. **Albrecht, L.**, **Wilson, K.A.** and **Wetmore, S.D.*** (2016) Computational evaluation of nucleotide insertion opposite expanded and widened DNA by the translesion synthesis polymerase Dpo4. *Molecules* **21**(7): 822. DOI: 10.3390/molecules21070822 (IF: 2.861) (*Invited Article for Special Issue entitled Computational Design: A New Approach to Drug and Molecular Discovery*)
5. Gillis, R.B., Adams, G.G., Besong, T.M., Machová, E., Ebringerová, A., Rowe, A.J., Harding, S.E. and **Patel, T.R.*** (2016) Application of novel analytical ultracentrifuge analysis to solutions of fungal mannans. *Eur. Biophys. J.* **46**(3): 235-245. DOI: 10.1007/s00249-016-1159-5 (IF: 1.472)

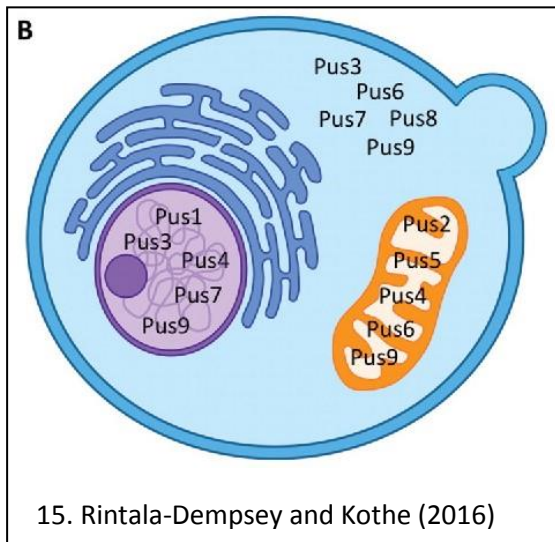


6. **De Laurentiis, E.I.**, **Mercier, E.**, and **Wieden, H.-J.*** (2016) The C-terminal Helix of *Pseudomonas aeruginosa* Elongation Factor Ts Tunes EF-Tu Dynamics to Modulate Nucleotide Exchange. *J. Biol. Chem.* **291**: 23136-48. DOI: 10.1074/jbc.M116.740381 (IF: 4.258)
7. Stetefeld, J., McKenna, S.A. and **Patel, T.R.*** (2016) Dynamic light scattering: A practical guide and applications in biomedical sciences. *Biophys Rev*, **8**: 409–427. DOI: 10.1007/s12551-016-0218-6
8. **Keffer-Wilkes, L.C.**, **Veerareddygari, G.R.**, and **Kothe, U.*** (2016) RNA modification enzyme TruB is a tRNA chaperone. *PNAS* **113**: 14306-14311. DOI: 10.1073/pnas.1607512113 (IF: 9.661) (*highlighted by a commentary in the same issue*)

9. Sharma, D., Bressler, K., Patel, H., Balasingam, N., and Thakor, N.* (2016) Role of eukaryotic initiation factors (eIFs) during cellular stress and cancer progression. *J. Nucleic Acids*. DOI: (IF: 2.98) (*Invited Review Article*)
10. Manderville, R.A.* and Wetmore, S.D.* (2016) Understanding the Mutagenicity of O-linked and C-linked Guanine DNA Adducts: A Combined Experimental and Computational Approach. *Chem. Res. Toxicol.* **30**(1): 177-188. DOI: 10.1021/acs.chemrestox.6b00323. (IF: 3.278) (*Invited Perspective*)

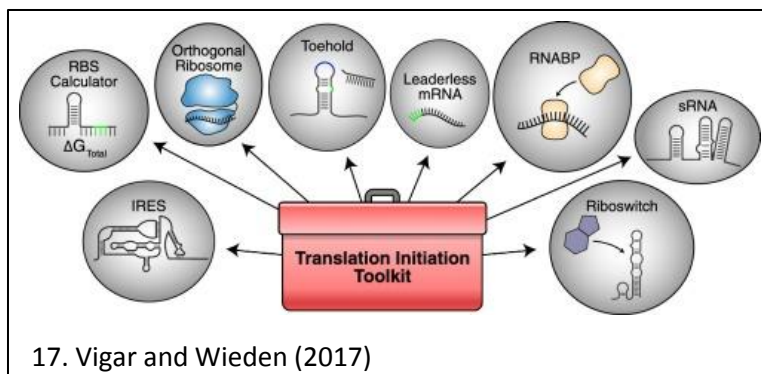


11. Lenz, S.A.P., Kohout, J.D., and Wetmore, S.D.* (2016) Hydrolytic Glycosidic Bond Cleavage in RNA Nucleosides: Effects of the 2'-Hydroxy Group and Acid-Base Catalysis. *J. Phys. Chem. B* **120**(50): 12795-12806. DOI: 10.1021/acs.jpcc.6b09620 (IF: 3.177)
12. Reuten R.,* Patel, T.R.,* McDougall, M., Rama, N., Nikodemus, D., Gibert, B., Delcros, J., Prein, C., Meier, M., Metzger, S., Zhou, Z., Kaltenberg, J., McKee, K.K., Bald, T., Tüting, T., Zigrino, P., Djonov, V., Bloch, W., Clausen-Schaumann, H., Poschl, E., Yurchenco, P.D., Ehrba, M., Mehlen, P., Stetefeld, J. and Koch, M. (2016) Structural decoding of netrin-4 reveals a regulatory function towards mature basement membranes. *Nat. Commun.* **7**: 13515, 1-17. DOI: 10.1038/ncomms13515 (IF: 12.124)
13. Zovoilis, A., Cifuentes-Rojas, C., Chu, H.-P., Hernandez, A.J., and Lee, J.T.* (2016) Destabilization of B2 RNA by EZH2 Activates the Stress Response. *Cell* **167**(7): 1788-1802. DOI: 10.1016/j.cell.2016.11.041 (IF: 28.710)



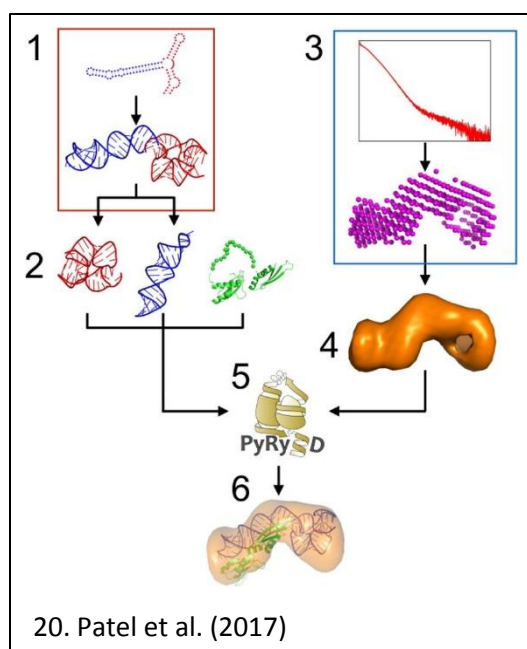
14. Krahn, N., Spearman, M., Meier, M., Spearman, M., Dorion-Thibaudeau, J., McDougall, M., Patel, T.R., De Crescenzo, G., Durocher, Y., Stetefeld, J. and Butler, M. (2017) Inhibition of glycosylation on a camelid antibody uniquely affects its FcγRI binding activity. *Eur. J. Pharm. Sci.* **96**: 428-439. DOI: 10.1016/j.ejps.2016.09.040 (IF: 3.773)
15. Rintala-Dempsey, A.C., and Kothe, U.* (2017) Eukaryotic stand-alone pseudouridine synthases – RNA modifying enzymes and emerging regulators of gene expression? *RNA Biology*, **Jan 3**: 1-12. DOI: 10.1080/15476286.2016.1276150. (IF: 3.900)
16. Chao, Y., Li, L., Girodat, D., Förstner, K.U., Said, N., Corcoran, C., Śmiga, M., Papenfort, K., Reinhardt, R., Wieden, H.-J., Luisi, B., and Vogel, J.* (2017) A global in vivo cleavage map reveals a central role for RNase E in small RNA biogenesis. *Mol. Cell* **65**(1): 39-51. DOI: 10.1016/j.molcel.2016.11.002 (IF: 13.958)

17. Vigar, J., and **Wieden, H.-J.*** (2017) Engineering bacterial translation initiation - Do we have all the tools we need? *Biochim. Biophys. Acta. In Press*. DOI: 10.1016/j.bbagen.2017.03.008 (IF: 5.083)



17. Vigar and Wieden (2017)

18. Wilson, K.A. and **Wetmore, S.D.*** (2017) Molecular Insights into the Translesion Synthesis of Benzyl-Guanine from Molecular Dynamics Simulations: Structural Evidence for Mutagenic and Non-Mutagenic Replication. *Biochemistry* **56**(13): 1841-1853. DOI: 10.1021/acs.biochem.6b01247 (IF: 2.938)



20. Patel et al. (2017)

19. Heller, J.L.E., Kamalampeta, R., and **Wieden, H.-J.*** (2017) Taking a step back from back-translocation: An integrative view of LepA/EF4's cellular function. *Mol. Cell. Biol.* **37**(12): 100653-16. DOI: 10.1128/MCB.00653-16. (IF: 4.427)

20. **Patel, T.R.***, Chojnowski, G.A., Koul, A., McKenna, S.A., and Bujnicki, J.M. (2017) Structural studies of RNA-protein Complexes: A hybrid approach involving hydrodynamics, scattering and computational methods. *Methods* **118-119**: 146–162. DOI: 10.1016/j.ymeth.2016.12.002 (IF: 3.802)

21. Wilson, K.A., and **Wetmore, S.D.*** (2017) Combining Crystallographic and Quantum Chemical Data to Understand DNA-protein π -Interactions in Nature. *Struct. Chem.* DOI: 10.1007/s11224-017-0954-7 (IF: 1.582) (Invited Article)

Journal articles under review – 3

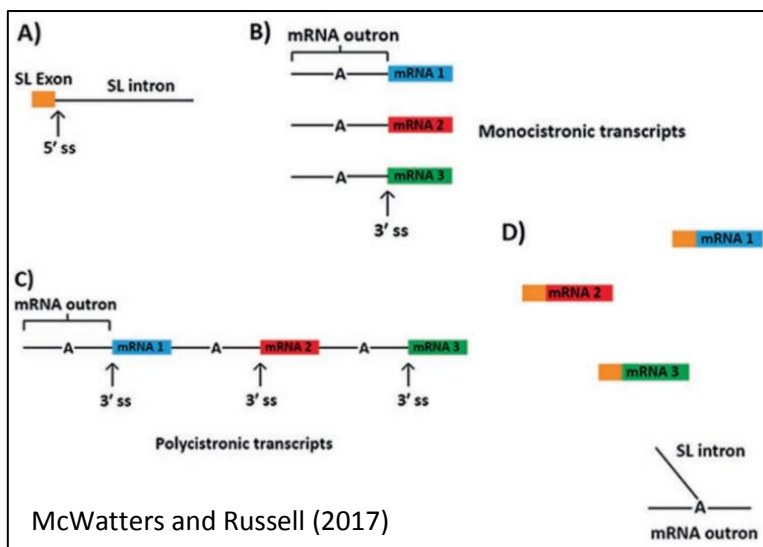
1. Krahn, N., Meier, M., Booy E., Vu, T., McEleney, K., O'Neil, J., Klonisch, T., McKenna, S. A., **Patel, T.R.*** and Stetefeld, J. High-mobility group AT-hook 2a protein acts as a "clamp" to stabilize DNA replication fork. Submitted to *J Biol Chem* (April 2017)
2. Hyde, E. I., Callow, P., Rajesekar K. ., Timmins, P., **Patel, T.R.**, Siligardi, G., Hussain, R., White, S.A., Thomas, C. M., and Scott, D.J. Intrinsic disorder in the partitioning protein Korb persists after cooperative complex formation with operator DNA and KorA. Submitted to *Biochemical J* (April 2017)
3. Caton, E.A., Kelly, E., Kamalampeta, R., and **Kothe, U.** (2017) Efficient RNA pseudouridylation by eukaryotic H/ACA small Ribonucleoproteins requires high affinity binding and correct positioning of guide RNA. Submitted to *Nucleic Acids Research* (ID: NAR-01711-2017)

Journal articles under review before April 30, and now published – 3

1. Gzyl, K.E. and **Wieden, H.-J.*** (2017) Tetracycline Does Not Directly Inhibit the Function of Bacterial Elongation Factor Tu. *PLoS ONE* **12**(5): e0178523. DOI: 10.1371/journal.pone.0178523. (IF: 3.057)
2. Dubé, S., Orr, D., Dempsey, B., and **Wieden, H.-J.*** (2017) A Synthetic Biology Approach to Integrative High School STEM Training. *Nature Biotechnol.* **35**: 591-595. DOI: 10.1038/nbt.3896. (IF: 43.113)
3. Ingalls, B.,* Mincheva, M., and **Roussel, M.R.** (2017) Parametric sensitivity analysis of oscillatory delay systems with an application to gene regulation. *Bull. Math. Biol.* DOI: 10.1007/s11538-017-0298-x (IF: 1.263)

Book Chapter – 2

1. Wilson, K.A., Kung, R.W., and Wetmore, S.D. (2016) Toxicology of DNA Adducts Formed Upon Human Exposure to Carcinogens. In: Fishbein, J.C., Heilman, J. (eds) *Advances in Molecular Toxicology*, vol 10. Academic Press.
2. McWatters D.C. and Russell A.G. (2017) *Euglena* Transcript Processing. In: Schwartzbach S., Shigeoka S. (eds) *Euglena: Biochemistry, Cell and Molecular Biology*. *Advances in Experimental Medicine and Biology*, vol 979. Springer, Cham.



Mathematical reviews – 6

1. MR3457690: Periodic oscillations for nonmonotonic smooth negative feedback circuits. By C. Poignard, M. Chaves and J.-L. Gouzé (Review by **Roussel, M.R.**)
2. MR3463706: Product-form Poisson-like distributions and complex balanced reaction systems. By D. Cappelletti and C. Wiuf (Review by **Roussel, M.R.**)
3. MR3490491: Some results on injectivity and multistationarity in chemical reaction networks. By M. Banaji and C. Pantea (Review by **Roussel, M.R.**)
4. MR3494567: State space truncation with quantified errors for accurate solutions to discrete chemical master equation. By Y. Cao, A. Terebus and J. Liang (Review by **Roussel, M.R.**)
5. MR3529114: Smoluchowski reaction kinetics for reactions of any order. By M. B. Flegg (Review by **Roussel, M.R.**)
6. MR3544090: First-order chemical reaction networks I: theoretical considerations. By R. Tóbiás, L. L. Stacho and G. Tasi (Review by **Roussel, M.R.**)

Theses – 4

1. Laura Keffer-Wilkes, PhD. (2016) Functional and mechanistic characterization of two tRNA modifying enzymes. Supervisor: Dr. Kothe
2. Dustin Smith, MSc. (2016) Rapid kinetic studies of PhyA from *Selenomonas ruminantium*, and a simplified means of production of a phosphate biosensor. Supervisors: Drs Selinger and Wieden
3. Hossein Hosseini, MSc. (2016) Analytic solutions for stochastic models of transcription. Supervisor: Dr. Rousel
4. Silky Sharma, MSc. (2017) Delayed stochastic modelling of prokaryotic transcription with abortive initiation. Supervisor: Dr. Rousel

Other research dissemination – >130

- >30 presentations by PIs (>8 of these presentations invited or keynote lectures)
- >100 presentations by trainees (poster and oral presentations)

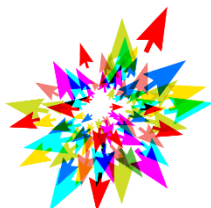
Funding

ARRTI Principal Investigators received approximately \$1.4 million in operating grants in 2016-17. This includes:

- \$256,000 from NSERC Discovery Grants
- \$999,000 from Research Chairs
 - Dr. Stacey Wetmore – Canada Research Chair in Computation Chemistry
 - Dr. Athanasios Zovoilis – Canada Research Chair in RNA Bioinformatics and Genomics
 - Dr. HJ Wieden – Alberta Innovates Strategic Chair in RNA Bioengineering
 - Dr. Ute Kothe – Alberta Innovates Strategic Chair in Transcriptomics of RNA Modification
 - Dr. Nehal Thakor – Campus Alberta Innovation Program (CAIP) Chair of Synthetic Biology and RNA-based Systems



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Also, almost \$80,000 in funding was received from the following sources:

- >\$17,000 resource allocation from Compute Canada
- \$22,000 for events from CIHR and the RNA Society
- \$40,000 from geekStarter for the high school and collegiate iGEM teams

In addition, >\$215,000 in funding was received by ARRTI students from NSERC and Alberta Innovates.

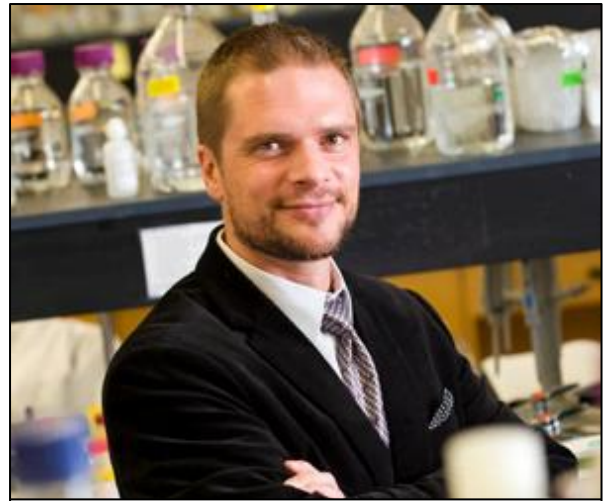
This makes a total of >\$1.6 million in funding in the 2016-17 reporting year.



EventsGairdner Symposium – RNA Meets DNA: From molecules to medicine (Standalone Activity)

Keynote Speaker: Dr. Rodolphe Barrangou

- Dr. Barrangou is a recipient of the 2016 Canada Gairdner International Award for his work in establishing and characterizing the CRISPR-Cas bacterial immune defense system.
- Dr. Barrangou is an Associate Professor in the Department of Food, Bioprocessing and Nutrition Sciences at North Carolina State University, an NC State University Scholar, and the Todd R. Klaenhammer Distinguished Scholar in Probiotics Research; an associate member of the Microbiology graduate program, the Biotechnology graduate program, the Functional Genomics graduate program and the Center for Integrative Medicine; and an adjunct member of the Food Science Department at the Pennsylvania State University.
- Dr. Barrangou's talk was titled "CRISPR-Cas Systems: From adaptive immunity to genome editing machines". Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), together with associated sequences (cas) constitute the CRISPR-Cas system, which provides adaptive immunity against invasive elements in many bacteria and most archaea. Recently, the CRISPR machinery has been repurposed to drive the Cas9-enabled genome editing craze. The democratization of CRISPR-based technologies in the past three years hinges on the portability and functionalities of these molecular machines, and has revolutionized biology.
- This event also included a New Investigator Symposium, sponsored by the Alberta Epigenetics Network, with presentations from new PI's and postdoctoral fellows, and a student poster session.



Dr. Barrangou at the University of Lethbridge



RiboWest 2016 attendees

12th Annual RiboWest Conference (Standalone Activity)

Co-organized by all ARRTI researchers

Over 80 attendees from across Canada

Keynote Speaker: Dr. Adam Arkin (University of California Berkeley)

- Lecture Title: Discovery and design of mRNA determinants of expression control

Keynote Speaker: Dr. Paul Lasko (McGill University)

- Lecture Title: Translational control in the *Drosophila* germ line

Invited Speaker: Dr. Eric Massé (Université de Sherbrooke)

- Lecture Title: The RNA chaperone Hfq directly binds target mRNAs to promote sRNA-mediated cleavage

Breakthrough Lecture: Dr. Bogumil Karas (Founder and CSO at Designer Microbes Inc.)

- Lecture Title: The emerging era of creating designer microbes - Recent advancements in cloning and manipulating natural and synthetic chromosomes in yeast

ARRTI Speaker Series (Ongoing Activity)

In order to broaden the knowledge base of ARRTI members, a monthly speaker series has been established. The speaker series is intended to bring leading researchers to the University of Lethbridge for lectures on a broad range of topics relating to RNA research.

For the 2016-17 year, this series of events was funded by the RNA Salon initiative by the RNA Society. This year's speaker series:

1. Dr. Darren Derksen (May 6, 2016)
 - Department of Chemistry, University of Calgary
 - "Natural Products as Inspiration for Novel Therapeutics - Opportunities and Challenges"
2. Dr. Brian Ingalls (May 16, 2016)
 - Department of Applied Mathematics, University of Waterloo
 - "Displacement of Bacterial Plasmids by Engineered Unilateral Incompatibility"
3. Dr. Joerg Stetefeld (June 13, 2016)
 - Department of Chemistry, University of Manitoba
 - "A Hybrid Method Approach to Unravel Higher-Order Signaling Complexes"
4. Dr. Eugene Mueller (June 28, 2016)
 - Department of Chemistry, University of Louisville
 - "Transforming U: The Modification of Uridine in RNA to Pseudouridine and 4-Thiouridine"
5. Dr. Joseph Ross (November 21, 2016)
 - Department of Chemistry and Biochemistry, University of Lethbridge (Postdoctoral Fellow)
 - "Host-imposed regulation of bacterial transposition: the extended director's cut"
6. Dr. Trushar Patel (November 28, 2016)
 - Department of Chemistry and Biochemistry, University of Lethbridge
 - "Moving to the other side: from Postdoc to PI, from project to program"
7. Dr. Athanasios Zovoilis (January 30, 2017)
 - Department of Chemistry and Biochemistry, University of Lethbridge
 - "Decoding the non-coding: The case of B2 SINE repeats"
8. Dr. Michael Stingl (February 15, 2017)
 - Department of Philosophy, University of Lethbridge
 - "Ethical Arguments: Are they aimed at truth?"
9. Dr. Kristian Baker (March 28, 2017)
 - Center for RNA Molecular Biology, Case Western Reserve University
 - "RNA Quality Control – Looking for Nonsense"

10. Dr. Sean McKenna (April 21, 2017)

- Department of Chemistry, University of Manitoba
- “Investigations into a long non-coding RNA critical for cancer cell survival and proliferation”

Average attendance: 39 attendees total, 5-8 PIs

ARRTI Seminar Series (Ongoing Activity)

To foster a greater awareness of the research being conducted within the institute, members of ARRTI have participated in a monthly seminar series, where a member of each research group presented their research to members of the institute.

Average attendance: 29 attendees total, 4-6 PIs

RiboClub Webconferences (Ongoing Activity)

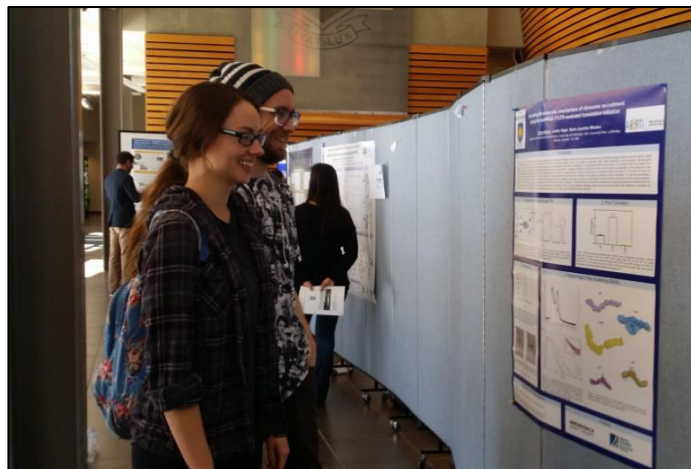
Members of ARRTI participate in monthly RiboClub videoconferences. RiboClub is a pan-Canadian research association founded in Sherbrooke, Quebec, whose members study the evolution, structure and function of RNA. Each monthly videoconference has four presentations from researchers representing RNA laboratories across Canada.



Presentations by ARRTI members:

- Erin Kelly (Kothe): *RNA modification by H/ACA small Ribonucleoproteins*
- Dr. Senthil Kumar Duraikannu Kailasam (Wieden): *Molecular dynamics simulation guided rational design of a L-Ribonucleic acid aptamer*

Average attendance: 24 total attendees, 3-6 PIs



ARRTI Trainees (J. Heller and D. McWatters) at the Chinook Symposium

10th Annual Chinook Symposium for Chemistry and Biochemistry (Annual Activity)

Annual student conference hosted by the Department of Chemistry and Biochemistry at the University of Lethbridge to showcase student research.

ARRTI members Trushar Patel, Ute Kothe and Nehal Thakor were among the judges.

Journal Club (Ongoing Activity)

Members of ARRTI participate in weekly journal club meetings, where members choose a work of contemporary scientific research to present to colleagues within the institute

Average attendance: 30 total attendees, 3-4 PIs

Webinars (Ongoing Activity)

Members of ARRTI have the option of attending webinars together in a classroom, and these webinars are therefore also made available to other interested parties at the University of Lethbridge. While attendance may not be large, those who do attend find the opportunity beneficial.

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Noncoding RNAs: Current and Future Trends (Virtual Keystone Symposia) <ul style="list-style-type: none"> - October 18, 17 - 11 attendees 2. New innovations in drug delivery technology <ul style="list-style-type: none"> - March 29, 2017 - 3 attendees | <ol style="list-style-type: none"> 3. Single-cell phenotypic analysis: Breaking the law of averages <ul style="list-style-type: none"> - March 29, 2017 - 4 attendees 4. Predicting and observing RNA folding: a progress report <ul style="list-style-type: none"> - March 30, 2017 - 6 attendees |
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Let's Do Science Day (2017)

Let's Talk Science (Ongoing Activity)

Ute Kothe serves as faculty supervisor for graduate student coordinators of Let's Talk Science, a national science outreach program. ARRTI trainees Rhys Hakstol and Darren Gemmill are LTS coordinators.

Special events:

1. Spooky Science Night – Target audience: Elementary students (October 23-24, 2015)
2. Let's DO Science Day – Target audience: High school students (April 27, 2016)
3. Exploration Expo – Target audience: all ages, preschool to senior (May 28, 2016)

ARRTI Retreat (Ongoing Activity)

An intensive one day retreat attended by principle investigators of ARRTI in order to have discussions shaping the future and direction of the institute.

International Genetically Engineered Machine (iGEM) Competition (Ongoing Activity)

ARRTI trainees make part of the collegiate iGEM team, as well as acting as mentors and trainers for the Lethbridge high school team. In the 2016 Giant Jamboree, the high school team won a bronze medal and the collegiate team won a gold medal.

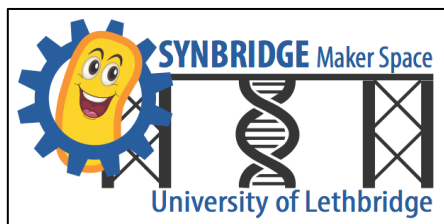
The collegiate team (NanoResponder) was working with Lethbridge Fire and Emergency Services to assess the cleanliness of ambulances. The high school team (Coagu.coli) devised a blood clotting product based on snake venom.



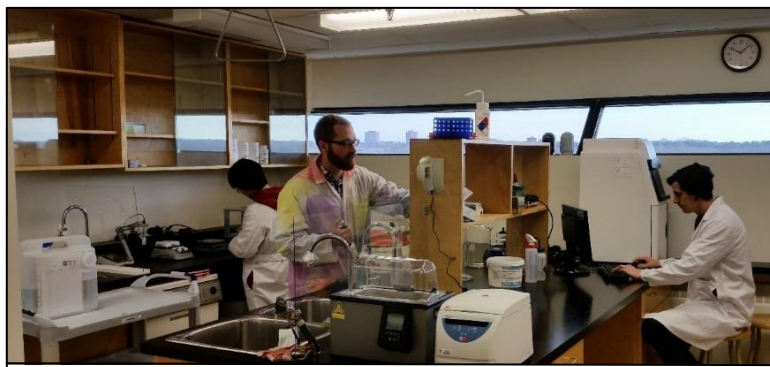
Facilities

SynBridge Maker-Space

In line with our goal of establishing a world-class environment for biological engineering and synthetic biology, we were able to leverage (\$1.1M – Western Diversification Program & \$110,000 – UofL) funding for a supervised synthetic biology maker-space (SynBridge). Trainees will learn entrepreneurial skills that will aid in the commercialization of research outcomes. In addition to its function as a maker-space, providing a work space for local businesses and entrepreneurs, it also serves as a core facility for the University of Lethbridge research community.



This facility is ready for faculty, students, graduates and post-doctorates to explore their ideas with access to infrastructure otherwise not available to them. In the 2016-17 reporting year, we had 39 total



ARRTI Trainees in SynBridge shortly after it opened

users from 9 different research groups, with 3,450 hours of total usage of all equipment (143 days). One of the most popular instruments is the BD FACSAria™ Fusion (fluorescence activated cell sorter) with 12 users and 288 hours of usage, as no other similar equipment is available at the UofL. As of May 1, 2017, we are charging user fees in order to maintain our equipment and expand our capacity. Equipment can be rented individually at an hourly or daily rate, or as part of an equipment package for a monthly rate (i.e. cell culture equipment package).

Details about SynBridge equipment and rates can be found on our website:

<http://www.uleth.ca/research/centres-institutes/alberta-rna-research-and-training-institute/synbridge-synthetic-biology-maker-space>

Mass Spectrometry Facility

To provide access to metabolomics and proteomics analysis required for our research projects, we have successfully applied (via a joint CFI Innovation Fund application) for funds to establish a Mass Spectrometry Facility at the UofL (\$1M). This platform (Orbitrap Fusion™ Tribrid™ Mass Spectrometer) is operational and able to provide service not only to our research groups but also to the SynBridge maker-space and serves as a core facility at the University of Lethbridge.

For more information about the facility and its fees, please visit our website:

<http://www.uleth.ca/research/centres-institutes/alberta-rna-research-and-training-institute/artti-mass-spectrometry-facility>

Notable Accomplishments

12th Annual RiboWest Conference Awards (Lethbridge, Alberta)

- Justin Vigar (Wieden) – oral presentation award
- Anne-Sophie Tillault (Kothe) – poster prize
- Taylor Sheahan (Wieden) – poster prize
- Jalyce Heller (Wieden) – poster prize
- Elijah Dueck (Kothe) – 2nd place undergraduate poster (student judges)
- Dylan Girodat (Wieden) – 1st place graduate poster (student judges)
- Jessica Baedke (Kothe) – 3rd place poster (PI judges)
- Dominic Czekay (Kothe) – 2nd place poster (PI judges)
- Sarah Schultz (Kothe) – 1st place undergraduate poster (student judges) and 1st place poster (PI judges)

10th Annual Chinook Symposium for Chemistry and Biochemistry (Lethbridge, Alberta)

- Stefan Lenz (Wetmore) – 1st place PhD; Chemistry
- Dylan Girodat (Wieden) – 1st place PhD (tied); Biochemistry
- Dina Irofti (Roussel) – 1st place PhD (tied); Biochemistry
- Divya Sharma (Thakor) – 1st place MSc; Biochemistry
- Justin Vigar (Wieden) – 2nd place MSc; Biochemistry
- Kamiko Bressler (Thakor) – 1st place undergraduate; Biochemistry
- Erin Kelly (Kothe) – 2nd place undergraduate; Biochemistry
- Daniel Rocca (Wieden) – rookie of the year

99th Canadian Chemistry Conference and Exhibition (Halifax, Nova Scotia)

- Ryan Kung (MSc, Wetmore) – 2nd place poster; Physical, Theoretical, Computational

- Stefan Lenz (PhD, Wetmore) – Computational Biophysical Chemistry (ACENET Award) for best presentation by a Graduate Student
- Katie Wilson (PhD, Wetmore) – ACENET travel award

Annual Meeting of the Institute of Biological Engineering (Salt Lake City, Utah)

- Outstanding Presentation in Synthetic Biology (Taylor Sheahan, PhD student, Wieden)

Spring Convocation 2016 (University of Lethbridge)

- Faculty of Arts & Science Gold Medal (Science) – Jessica Baedke (Kothe)

NSERC Postgraduate Scholarships – Doctoral

- Harland Brandon (Wieden)

NSERC University Undergraduate Student Research Awards

- Alycia Amatto (Kothe)
- Devany Holland (Wetmore)
- Hanzala Hussain (Wetmore)
- Erin Kelly (Kothe)
- Harshil Patel (Thakor)
- Sarah Schultz (Kothe)

Alexander Graham Bell Canada Graduate Scholarships

- Ryan Kung (MSc, Wetmore)
- Stefan Lenz (PhD, Wetmore)

Vanier Canada Graduate Scholarship Tri-Council – Doctoral

- Katie Wilson (Wetmore)

Alberta Innovates – Technology Futures (AITF) Graduate Student Scholarship

- Dylan Girodat (PhD student, Wieden)
- Ryan Kung (MSc student, Wetmore)

Alberta Innovates – Health Solutions (AIHS) Summer Studentship

- Daniel Rocca (Undergraduate student, Wieden)

