

AURORA MIHAELA NEDELUCU

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AREAS OF ACADEMIC INTERESTS

My general interests center around understanding *how* and *why* biological systems evolve, especially in terms of changes in complexity levels. Most of my current research is rooted in the framework of transitions in individuality and complexity (at a conceptual level) and of cellular responses to stress, gene co-option and trade-offs (at a mechanistic level). I am using a combination of approaches (experimental and theoretical), spanning various levels of biological organization (genes, genomes, cells, individuals, groups) and fields (genetics/genomics, molecular/cell/developmental biology, experimental evolution).

Specific areas include:

- Molecular, gene and genome evolution as it applies to phenotypic innovations at the cellular level (e.g., gene regulation and expression; gene duplication and co-option; antagonistic pleiotropy; lateral gene transfer)
- Transitions in individuality (evolution of eukaryotic cell, multicellularity, and sociality)
- Evolution of development, cell differentiation, cancer, and aging
- Evolution of altruism, programmed cell death, and sex

Model-systems:

- Volvocine green algae
- Human cancer cell lines

EDUCATION

PhD (Biology) 1993 – 1997. Dalhousie University, Halifax, Canada. Thesis: Mitochondrial and chloroplast genome evolution in green algae (255 p). Advisor: Dr. Robert W. Lee

BSc Honors (Cum Laude) 1984 – 1988. Babes-Bolyai University, Cluj-Napoca, Romania. Thesis: The origin of euglenoid flagellates: Phylogenetic relationships with other groups of protists (125 p). Advisor: Dr. Nicolae Dragos

CURRENT PROFESSIONAL APPOINTMENTS

PROFESSOR OF BIOLOGY – University of New Brunswick, Department of Biology, Fredericton, Canada (2010 – present)

ADJUNCT FACULTY – University of Arizona, Department of Ecology and Evolutionary Biology, Tucson, USA (2002 – present)

EXTERNAL FACULTY – Center for Evolution and Cancer, University of California at San Francisco, USA (2011 – present)

PAST PROFESSIONAL APPOINTMENTS

DIRECTOR OF EDUCATION AND OUTREACH – Center for Evolution and Cancer, University of California at San Francisco, California, USA (2011 – 2015)

ASSOCIATE PROFESSOR OF BIOLOGY – University of New Brunswick, Department of Biology, Fredericton, NB, Canada (2004 – 2010)

ASSISTANT PROFESSOR OF BIOLOGY – University of New Brunswick, Department of Biology, Fredericton, NB, Canada (2002 – 2004)

RESEARCH ASSOCIATE – University of Arizona, EEB Department, Tucson, USA (2000 – 2002)

NSERC POSTDOCTORAL FELLOW – University of Arizona, EEB, Tucson, USA (1998 – 2000)

POSTDOCTORAL FELLOW – Université de Montréal, Départ. de Biochimie, Organelle Genome Megasequencing Lab, Montréal, Canada (1997 – 1998)

TEACHING ASSISTANT – Dalhousie University, Biology Dept., Halifax, Canada (1994 – 1997)

ASSISTANT PROFESSOR OF BIOCHEMISTRY – Babes-Bolyai University, Faculty of Biology and Geology, Cluj-Napoca, Romania (1992 – 1993)

RESEARCH SCIENTIST – Babes-Bolyai University, Cluj-Napoca, Romania (1990 – 1992)

BIOLOGY TEACHER – Vladimirescu Secondary School, Arad, Romania (1988 – 1990)

MAJOR FELLOWSHIPS

- Harrison McCain Foundation Visitorship Award (Visitor Scientist at Arizona State University, Tempe, USA). 2016
- NSERC Postdoctoral Fellowship (Postdoctoral Fellow at University of Arizona, Tucson, USA). 1998-2000
- Killam Doctoral Fellowship (Dalhousie University, Halifax, Canada). 1993-1996
- Dalhousie Graduate Scholarship (Dalhousie University, Halifax, Canada). 1996-1997

PUBLICATIONS:

(reprints at <http://www2.unb.ca/vip/amnedelcu/publications.htm>)

51. Koenig SG and AM Nedelcu. Environmental regulation of an altruism gene: mechanistic insights and adaptive consequences (in prep for **Proceedings of the Royal Society B**)

50. Hanschen ER and AM Nedelcu. Deep homology and parallel evolution of complex development involving independent deployment of a DNA-binding domain unique to green plants and animals (in prep for **Molecular Biology and Evolution**)

49. May AN, Crawford B, AM Nedelcu. 2018. In Vitro Model-Systems to Understand the Biology and Clinical Significance of Circulating Tumor Cell Clusters. **Frontiers in Oncology** 8:63.

48. Figueroa-Martinez F, Nedelcu AM, Reyes-Prieto A, and DR Smith. 2017. The plastid genomes of nonphotosynthetic algae are not so small after all. **Communicative & Integrative Biology** 10:1, e1283080.
47. Figueroa-Martinez F, Nedelcu AM, Smith DR, and A Reyes-Prieto. 2017. The plastid genome of *Polytoma uvella* is the largest known among non-photosynthetic algae and plants and reflects contrasting evolutionary paths to nonphotosynthetic lifestyles. **Plant Physiology** 173: 932-943.
46. Nedelcu AM. 2017. Understanding ancient legacies to expose and exploit cancer's evolutionary vulnerabilities. In Ujvari B, Roche B, Thomas F (Eds) "**Ecology and Evolution of Cancer**". Pp 203-209. Elsevier.
45. Olson BJSC and AM Nedelcu. 2016. Co-option during the evolution of multicellularity and developmental complexity in the volvocine green algae. **Current Opinion in Genetics & Development** 39:107-115.
44. Nedelcu AM and AF Caulin. 2016. The evolution of cancer suppressor mechanisms. In Maley CC and Greaves M (eds) "**Frontiers in Cancer Research: Evolutionary Foundations, Revolutionary Directions**". Pp. 217-246. Springer.
43. Nedelcu AM. *Volvox*. 2016. In **World Book Encyclopedia**. World Book Publishing.
42. Koenig SG and AM Nedelcu. 2016. The mechanistic basis for the evolution of soma during the transition to multicellularity in the volvocine algae. In Newman SA and Niklas K (eds) "**Multicellularity: Origins and Evolution**". Pp. 43-70. Vienna Series in Theoretical Biology. MIT Press.
41. Figueroa-Martinez F, Nedelcu AM, Smith DR, A Reyes-Prieto. 2015. When the lights go out: the evolutionary fate of free-living colorless green algae. **New Phytologist** 206:972-982.
40. Kessler JO, Nedelcu AM, CA Solari, and DE Shelton. 2015. Cells acting as lenses: A possible role for light in the evolution of morphological asymmetry in multicellular volvocine algae. In Ruiz-Trillo I and AM Nedelcu (eds) "**Evolutionary transitions to multicellular life: Principles and Mechanisms**". Pp. 225-243. Springer.
39. Herron MD and AM Nedelcu. 2015. Volvocine algae: from simple to complex multicellularity. In Ruiz-Trillo I and AM Nedelcu (eds) "**Evolutionary transitions to multicellular life: Principles and Mechanisms**". Pp. 129-152. Springer.
38. Keeling PJ et al. 2014. The Marine Microbial Eukaryote Transcriptome Sequencing Project (MMETSP): Illuminating the functional diversity of eukaryotic life in the oceans through transcriptome sequencing. **PLoS Biology**. 12(6): e1001889
37. Sprouffske K, Aktipis CA, Radich JP, Carroll M, Nedelcu AM, and CC Maley. 2013. An evolutionary explanation for the presence of non-cancer stem cells in neoplasms. **Evolutionary Applications** 6:92-101.

36. Lang BF and AM Nedelcu. 2012. Plastid genomes of algae. In Bock R and Knoop V (eds) "**Genomics of Chloroplasts and Mitochondria**". **Advances in Photosynthesis and Respiration Series**. Vol. 35. pp. 59-87. Springer.
35. Burger G and AM Nedelcu. 2012. Mitochondrial genomes of algae. In Bock R and Knoop V (eds) "**Genomics of Chloroplasts and Mitochondria**". **Advances in Photosynthesis and Respiration Series**. Vol. 35. pp. 127-157. Springer.
34. Nedelcu AM. 2012. Evolution of Multicellularity. In: **eLS (Encyclopedia of Life Sciences)** 2012, John Wiley & Sons, Ltd: Chichester [DOI: 10.1002/9780470015902.a0023665]
33. Nedelcu AM. 2012. On the evolution of self during the transition to multicellularity. In Lopez-Larrea C (ed) "**Self and Non-Self**". pp. 14-30. Landes Biosciences and Springer.
32. Nedelcu AM and RE Michod. 2011. Molecular mechanisms of life history trade-offs and the evolution of multicellular complexity in volvocalean green algae. In Flatt T and Heyland A (eds) "**Mechanisms of Life History Evolution: The Genetics and Physiology of Life History Traits and Trade-Offs**". pp. 271-283. Oxford University Press.
31. Nedelcu AM, WW Driscoll, PM Durand, M Herron, A Rashidi. 2011. On the paradigm of altruistic suicide in the unicellular world. **Evolution** 65:3-20.
**selected by Faculty of 1000 (<http://f1000.com/7926956>)*
30. Prochnik SE, J Umen, AM Nedelcu *et al.* 2010. Genomic analysis of organismal complexity in the multicellular green alga *Volvox carteri*. **Science** 329: 223-226.
**featured in Science, Science Daily*
29. Nedelcu AM. 2009. Environmentally-induced responses co-opted for reproductive altruism. **Biology Letters** 5: 805-808.
28. Nedelcu AM, A Blakney and K Logue. 2009. Functional replacement of a primary metabolic pathway via multiple independent eukaryote-to-eukaryote gene transfers and selective retention. **Journal of Evolutionary Biology** 22: 1882-1894.
27. Nedelcu AM. 2009. Comparative genomics of phylogenetically diverse unicellular eukaryotes provide new insights into the genetic basis for the evolution of the programmed cell death machinery. **Journal of Molecular Evolution** 68: 256-268.
26. Nedelcu AM, I Miles, K Karol, A Fagir. 2008. Adaptive eukaryote-to-eukaryote gene transfer: Stress-related genes of algal origin in the closest unicellular relatives of animals. **Journal of Evolutionary Biology** 21: 1852-1860.
25. Michod RE, H. Bernstein, AM Nedelcu. 2008. Adaptive value of sex in microbial pathogens. **Infection, Genetics and Evolution** 8: 267-285.
24. Nedelcu AM and C Tan. 2007. Early diversification and complex evolutionary history of the *p53* tumor suppressor gene family. **Development Genes and Evolution** 217: 801-806.
23. Merchant SS et al (118 authors). 2007. The *Chlamydomonas* genome reveals the evolution of key animal and plant functions. **Science** 318: 245-250.

22. Nedelcu AM. 2006. Evidence for p53-like-mediated stress responses in green algae. **FEBS Letters** 580: 3013-3017.
21. Nedelcu AM and RE Michod. 2006. The evolutionary origin of an altruistic gene. **Molecular Biology and Evolution** 23: 1460-1464.
**featured in The Economist, New Scientist*
20. Nedelcu AM, Borza T, and RW Lee. 2006. A land plant-specific multigene family in the unicellular *Mesostigma* argues for its close relationship to Streptophyta. **Molecular Biology and Evolution** 23: 1011-1015.
19. Michod RE, Y Viostat, CA Solari, M Hurrand and AM Nedelcu. 2006. Life history evolution and the origin of multicellularity. **Journal of Theoretical Biology** 239: 257-272.
18. Nedelcu AM. 2005. Sex as a response to oxidative stress: Stress genes co-opted for sex. **Proceedings of Royal Society London B: Biological Sciences** 272: 1935-1940.
**featured in New Scientist*
17. Nedelcu, AM, O Marcu, and RE Michod. 2004. Sex as a response to oxidative stress: A two-fold increase in cellular reactive oxygen species activates sex genes. **Proceedings of Royal Society London B: Biological Sciences** 271: 1591-1596.
**featured in Science Daily, New Scientist, Scientific American, etc.*
16. Nedelcu AM and RE Michod. 2004. Evolvability, modularity, and individuality during the transition to multicellularity in volvoclean green algae. In Schlosser G and Wagner G (eds) “**Modularity in development and evolution**”; pp 466-489. Univ. of Chicago Press.
15. Michod RE and AM Nedelcu. 2004. Cooperation and conflict during the unicellular-multicellular and prokaryotic-eukaryotic transitions. In Moya A and Font E (eds) “**Evolution: From Molecules to Ecosystems**”; pp. 195-208. Oxford Univ. Press.
14. Nedelcu AM and RE Michod. 2003. Sex as a response to oxidative stress: The effect of antioxidants on sexual induction in a facultatively sexual lineage. **Proceedings of Royal Society London B: Biological Sciences** 270: S136-S139.
13. Michod RE and AM Nedelcu. 2003. On the reorganization of fitness during evolutionary transitions in individuality. **Integrative and Comparative Biology** 43:64-73.
12. Michod RE, AM Nedelcu, and D Roze. 2003. Cooperation and conflict in the evolution of individuality. IV. Conflict mediation and evolvability in *Volvox*. **BioSystems** 69: 95-114.
11. Solari CA, Nedelcu AM, and RE Michod. 2003. Fitness and complexity in volvoclean green algae. In H. Lipson, EK Antonsson and JR Koza (eds) “**Computational Synthesis: From basic building blocks to high-level functionality**”, pp 218-225. AAAI Press
10. Nedelcu AM. 2001. Complex patterns of chloroplast small-subunit ribosomal RNA gene evolution in nonphotosynthetic green algae. **J of Molecular Evolution** 53: 670-679.
9. Nedelcu AM, RW Lee, C Lemieux, MW Gray, and G Burger. 2000. The complete mitochondrial DNA sequence of *Scenedesmus obliquus* reflects an intermediate stage in the evolution of the green algal mitochondrial genome. **Genome Research** 10: 819-831.

8. Nedelcu AM. 1998. Contrasting mitochondrial genome organizations and sequence affiliations among green algae: Potential factors, mechanisms, and evolutionary scenarios. **Journal of Phycology** 34: 16-28.
7. Nedelcu AM and RW Lee. 1998a. Short repetitive sequences in green algal mitochondrial genomes: Potential roles in mitochondrial genome evolution. **Mol Biol Evol** 15: 690-701.
6. Nedelcu AM and RW Lee. 1998b. A degenerate group II intron in the intronless mitochondrial genome of *Chlamydomonas reinhardtii*: Evolutionary implications. **Mol Biol Evol** 15: 918-923.
5. Nedelcu AM and RW Lee. 1998c. Modes and tempos of mitochondrial and chloroplast genome evolution in *Chlamydomonas*: A comparative analysis. In Rochaix J-D, Goldschmidt-Clermont M and Merchant S (eds) “**The Molecular Biology of Chloroplast and Mitochondria in Chlamydomonas**”, pp 63-91. Kluwer Publishers.
4. Denovan-Wright EM, AM Nedelcu, and RW Lee. 1998. Complete sequence of the mitochondrial DNA of *Chlamydomonas eugametos*. **Plant Mol Biology** 36: 285-295.
3. Nedelcu AM. 1997. Fragmented and scrambled mitochondrial ribosomal RNA coding regions among green algae: A model for their origin and evolution. **Mol Biol Evol** 5: 506-517.
2. Nedelcu AM, DF Spencer, EM Denovan-Wright, and RW Lee. 1996. Discontinuous mitochondrial and chloroplast large subunit ribosomal RNAs among green algae: Phylogenetic implications. **Journal of Phycology** 32: 103-111.
1. Dragos N, L-S Peterfi, AM Nedelcu, and V Craciun. 1990. Intracellular bacteria in euglenoid flagellates. **Revue Roumaine de Biologie** 35: 51-54.

BOOKS

Evolutionary transitions to multicellular life: Principles and mechanisms. Inaki Ruiz-Trillo and Aurora M. Nedelcu (Eds). 2015. Springer. ISBN 978-94-017-9641-5; <http://www.springer.com/us/book/9789401796415>

WEBSITES/DATABASES

- Volvocales Information Project (VIP); <http://www2.unb.ca/vip/>
- Volvocales wiki; <http://volvocales.pbworks.com/>
- Center for Evolution and Cancer (CEC) – Education and Outreach; <http://www2.unb.ca/vip/CEC/>

MEDIA COVERAGE, INTERVIEWS

(see www2.unb.ca/vip/amnedelcu/media.htm for full list)

- Science, New Scientist, Scientific American, The Economist, CBC, etc.

SELECTED CONTRIBUTIONS AT SCIENTIFIC MEETINGS:

(see <http://www2.unb.ca/vip/amnedelcu/meetings.htm> for full list)

1. Nedelcu AM. 2018. The role of selection in shaping cancer's evolutionary potential: therapeutic implications. **2nd Joint Congress on Evolutionary Biology, Montpellier, France.**
2. Nedelcu AM. 2018. TBD. **The cancer mosaic, traits, strategy and adaptation workshop, Montpellier, France.**
3. Jong ED, Chan ICW, and Nedelcu AM. 2017. Phenotypic state affects resistance and response to pH changes in a lung cancer cell line. **International Society for Evolution, Ecology and Cancer Conference, Tempe, AZ, USA.**
4. Chan ICW, Lee CWJ, Lee AX, Olson BJSC, Durnford DG, Nedelcu AM. 2017. The adaptive role of RLS1 in *Chlamydomonas*: a direct test using genomic and RNAi *RLS1* mutants. **4th International Volvox Conference, Saint Louis, MO, USA**
5. Lee CWJ, Chan ICW, Lee AX, Olson BJSC, Nedelcu AM, Durnford DG. 2017. Investigations into the mechanistic role of *Chlamydomonas* RLS1 in photosynthetic acclimation using an *RLS1* genomic mutant and RNAi knockdown. **4th International Volvox Conference, Saint Louis, MO, USA**
6. Nedelcu AM. 2015. Exploiting trade-offs to expose cancer's evolutionary vulnerabilities. **3rd International Biannual Conference on Evolution and Cancer.** Center for Evolution and Cancer, UCSF, San Francisco, USA. 2015 (*invited Plenary*)
7. Nedelcu AM and SG Koenig. 2015. Gene co-option, antagonistic pleiotropy, and the evolution of somatic cell differentiation in *Volvox carteri*. **3rd International Volvox Conference, Cambridge, UK**
8. Meng L, Smith DR, AM Nedelcu. 2015. The transcriptome of *Chlamydomonas euryale* provides insights into secondary adaptation to marine environments. **3rd International Volvox Conference, Cambridge, UK**
9. Lee AX and AM Nedelcu. 2014. *Volvox carteri* as a model-system for cancer research. **Northeast Algal Society Meeting, Newport, RI, USA**
10. Nedelcu AM. 2013. Gene co-option, antagonistic pleiotropy, and the evolution of somatic cell differentiation. **ICREA Conference on the Evolution of Multicellularity. Barcelona, Spain (invited)**
11. Nedelcu AM. 2013. Understanding ancient legacies to expose and exploit cancer vulnerabilities. **2nd International Biannual Conference on Evolution and Cancer. Center for Evolution and Cancer, San Francisco, USA (invited)**
12. Nedelcu AM, and ER Hanschen. 2013. The SAND domain and the evolution of complex multicellularity. **2nd International Volvox Conference, Fredericton, NB, Canada**
13. Lima MS, Meng L, Meng J, AM Nedelcu. 2013. Testing the oxidative damage theory of aging in *Volvox carteri*. **2nd International Volvox Conference, Fredericton, NB, Canada**
14. Meng L, Reyes-Prieto A, AM Nedelcu. 2013. Single-domain TAZ-containing proteins potentially involved in the evolution of multicellularity. **2nd International Volvox Conference, Fredericton, NB, Canada**
15. Lee AX and Nedelcu AM. 2013. *Volvox carteri* as a model-system for cancer research. **2nd International Volvox Conference, Fredericton, NB, Canada**
16. Meng J and AM Nedelcu. 2013. *Volvox carteri* as a model-system for aging research. **2nd International Volvox Conference, Fredericton, NB, Canada**

17. Nedelcu AM. 2013. To be or not to be multicellular. **NESCent (National Evolutionary Synthesis Center) Catalysis Meeting on the Evolutionary Origins of Multicellularity, Duke Univ, NC, USA (invited)**
18. Nedelcu AM. 2013. Co-option of stress responses during evolutionary transitions. **Cooperation and Major Evolutionary Transitions. The Kavli Institute for Theoretical Physics. U California Santa Barbara. USA (invited)**
19. Nedelcu AM. 2012. Stress and the evolution of reproductive altruism. **Bionergetics and the major evolutionary transitions. Royal Society Kavli Centre. UK (invited)**
20. Nedelcu AM. 2012. Evolutionary vulnerabilities in cancer: Insights from unicellular lineages. **Evolution, development and cancer. Beyond Center for Fundamental Concepts in Science. Phoenix. USA (invited)**
21. Nedelcu AM. 2011. Evo-Volvo: Using the volvocine algae to address evolutionary questions. **1st International Volvox Conference, Biosphere 2, Arizona, USA.**
22. Koenig S, and Nedelcu AM. 2011. New insights into the regulation of *regA* expression in *Volvox carteri*. **1st International Volvox Meeting, Biosphere 2, Arizona, USA.**
23. Nedelcu AM. 2011. Evolutionary vulnerabilities in cancer: Insights from unicellular lineages. **1st International Biannual Conference on Evolution and Cancer. Center for Evolution and Cancer, UCSF, San Francisco, USA (invited)**
24. Nedelcu AM. 2011. Stress responses and life history evolution in the unicellular world. **French National Agency for Research (ANR) and TARA OCEANS – Atelier de Reflexion Prospective: Environmental changes and the evolution of marine ecosystems, Stazione Zoologica A. Dohrn, Naples, Italy (invited)**
25. Nedelcu AM. 2010. Co-opting environmentally-induced responses for group advantage. **Biocomplexity XI Workshop. The Evolution of Cooperation: Paradoxes of Collectivity & Individuality. Bloomington, IN, USA (invited)**
26. Nedelcu AM. 2010. General acclimation responses co-opted for somatic differentiation in *Volvox carteri*. **14th International Conference on the Cell and Molecular Biology of Chlamydomonas, Norton, MA, USA.**
27. Koenig SG and AM Nedelcu. 2010. Investigations on the regulation of *regA* – the gene responsible for somatic cell differentiation in *Volvox carteri*. **14th International Conference on the Cell & Molecular Biology of Chlamydomonas. Norton, USA.**
28. Koetzer TL, Nedelcu AM, and PM Durand. 2010. Genomic evidence for elements of a programmed cell death pathway in *Plasmodium*: Exploiting programmed parasite death for malaria control? **52nd Annual Meeting of the American Society for Hematology. Orlando, USA**
29. Nedelcu AM. 2009. The genetic basis for the evolution of reproductive altruism. **12th Congress of the European Society for Evolutionary Biology. Torino, Italy.**
30. Nedelcu AM. 2009. The mechanistic basis for the evolution of reproductive altruism. **The Center for Social Dynamics and Complexity 1st International Conference: Groups as individuals, Tempe, AZ, USA.**
31. Koenig SG and AM Nedelcu. 2009. Investigating the regulatory elements of *regA* – the gene responsible for reproductive altruism in the green alga *Volvox carteri*. **Canadian Society for Ecology and Evolution Meeting. Halifax, NS, Canada**
32. Prochnik SE, Umen J, Hallmann A, Nedelcu AM, Miller S, Nishii, I, Fritz-Laylin L, Schmutz J, Grimwood J and D Rokhsar. 2009. Comparative genomic analysis of *Chlamydomonas* and *Volvox* sheds light on the evolution of developmental complexity.

- Joint Annual Meetings of the American Society of Plant Biologists and the Phycological Society of America.** Honolulu, Hawaii, USA
33. Nedelcu AM. 2008. *Chlamydomonas* as a model-system for programmed cell death research. **13th International Conference on the Cell and Molecular Biology of *Chlamydomonas*, Hyeres, France.**
 34. Prochnik SE, Umen J, Miller S, Hallmann A, Nishii I, Nedelcu AM, Fritz-Laylin A, Schmutz J, Grimwood J and D Rokhsar. 2008. Comparative genomics of *Volvox carteri* and *Chlamydomonas reinhardtii*: clues to the evolution of algal multicellularity. **13th International Conference on the Cell and Molecular Biology of *Chlamydomonas*.** Hyeres, France.
 35. Nedelcu AM. 2007. To die or not to die? Programmed cell death in *Volvox carteri*. **Volvox Symposium, St. Louis, MO, USA. (invited)**
 36. Nedelcu AM. 2007. Early evolution of the eukaryotic programmed cell death machinery revealed by comparative genomics. **Society for Molecular Biology and Evolution Meeting, Halifax, Nova Scotia, Canada.**
 37. Nedelcu AM. 2006. Sex and programmed cell death as p53-like-mediated stress responses in *Volvox* and *Chlamydomonas*. **12th International Conference on the Cell and Molecular Biology of *Chlamydomonas*, Portland, Oregon, USA**
 38. Nedelcu AM and RE Michod. 2006. The evolutionary origin of an altruistic gene. **Society for Molecular Biology and Evolution Meeting: Genomes, Evolution and Bioinformatics, Tempe, Arizona, USA.**
 39. Solari CA, AM Nedelcu, and RE Michod. 2003. Fitness and the evolution of complexity in volvocalean green algae. **2003 American Association of Artificial Intelligence Spring Symposium Series: From basic building blocks to high-level functionality, Stanford, California, USA.**
 40. Solari CA, AM Nedelcu, and RE Michod. 2003. Fitness, life history, and the evolution of complexity in volvocalean green algae. **Annual Joint Meeting of the Society for the Study of Evolution (SSE), Society of Systematic Biologist (SSB), and American Society of Naturalists (ASN), Chico, California, USA.**
 41. Solari CA, AM Nedelcu, J Kessler and RE Michod. 2003. Physical constraints and the evolution of germ-soma differentiation in volvocalean green algae.
 42. Nedelcu AM. 2002. Evolvability and individuality during the unicellular-multicellular transition in volvocalean green algae. **UK EPSERC Network on evolvability in biological & software systems; Symposium on Evolvability and Individuality, St. Albans, Hertfordshire, UK (invited)**
 43. Nedelcu AM and RE Michod. 2002. Stress, reactive oxygen species and DNA damage as signal for sex: evolutionary implications. **Vith International Congress of Systematic and Evolutionary Biology: Biodiversity in the information age. Patras, Greece (invited)**
 44. Nedelcu AM and RW Lee. 1998. Concerted modes and tempos of mitochondrial and chloroplast genome evolution in *Chlamydomonas*. **12th Meeting of the International Society for Evolutionary Protistology, Flagstaff, USA.**
 45. Lopez-Bautista, JM, Nedelcu AM and RL Chapman. 1998. Continuous mitochondrial large subunit rRNAs in *Cephaleuros parasiticus* Karsten (Trentepohliales, Chlorophyta): Phylogenetic implications. **52nd Meeting of the Phycological Society of America.** Flagstaff, Arizona, USA.

46. Nedelcu AM. 1996. Fragmented and scrambled mitochondrial rRNA coding regions among green algae: A model for their origin and evolution. **Canadian Institute for Advanced Research, Evolutionary Biology Program, Halifax, Canada.**
47. Nedelcu AM, DF Spencer, EM Denovan-Wright, and RW Lee. 1996. Evolution and phylogenetic distribution of discontinuous mitochondrial ribosomal rRNAs among green algae. **1st European Phycological Congress, Cologne, Germany.**
48. Lee RW, EM Denovan-Wright, DF Spencer, and AM Nedelcu. 1996. Mitochondrial genomes among green algae: so small, yet so diverse. **Annual Meeting of the Genetic Society of Canada.** Winnipeg, Canada

SELECTED SEMINARS

- University of Dundee**, Scotland, UK: Environmental stress, antagonistic pleiotropy, and the evolution of somatic cell differentiation. May 2016
- Carleton University**, Biology Department. Ottawa, ON, Canada: Stress responses, life-history trade-offs and evolutionary transitions in individuality. April 2012
- University of British Columbia**, Biodiversity Seminar, Vancouver, BC, Canada: “To die or not to die: On the paradigm of altruistic suicide in the unicellular world”. November 2011
- Sam Houston State University**, Department of Biology, Huntsville, TX, USA: “To die or not to die: Programmed cell death in volvoclean green algae”. December 2008
- University of California**, Department of Plant Biology, Davis, CA, USA: “To die or not to die: Programmed cell death in volvoclean green algae”. December 2008
- University of Arizona**, Department of Ecology and Evolutionary Biology, Tucson, USA: “Genes of algal origin in the closest unicellular relatives of Metazoa: A photosynthetic past for animals?”. November 2007
- University of Massachusetts Lowell**, Department of Biological Sciences, Lowell, MA, USA: “Altruism, Programmed Cell Death and Sex as Evolutionary Responses to Stress”. May 2007
- University of New Brunswick**, Department of Biology, Fredericton, NB: “Evolutionary responses to stress: sex, death, and altruism”. October 2006.
- University of Arizona**, Department of Ecology and Evolutionary Biology, Tucson, USA: “Genomic pre-adaptations for multicellularity and land plant evolution in unicellular green algae”. November 2005
- Dalhousie University**, Halifax, NS: “Programmed cell death and sex as alternative responses to stress: An evolutionary perspective”. September 2005
- University of New Brunswick - Saint John**, Department of Biology, Saint John, NB: “Programmed cell death and sex as alternative responses to stress”. March 2004
- University of Arizona**, Department of Ecology and Evolutionary Biology, Tucson, AZ: “Sex and suicide as alternative responses to oxidative stress”. December 2003

RESEARCH GRANTS

PI:

- NSERC Discovery Grant: Cellular stress responses in the evolution of multicellular complexity (2013-2018) - \$ 215,000 (+1 year extension at \$43,000)

- NSERC Discovery Grant: The genetic basis for the evolution of altruism during the transition to multicellularity (2008-2013) - \$ 88,650
- NSERC Discovery Grant: An alternative framework for understanding evolutionary transitions: the green algal group as a model-system (2003-2008) - \$ 90,000
- NSERC RTI Grant: Refrigerated microfuge to study the evolution of programmed cell death (2006) - \$ 10,436
- NSERC RTI Grant: Free-radical analyzer to study the evolution of cellular responses to oxidative stress (2005) - \$ 14,875
- NSERC RTI Grant: Incubator and PCR machine to study the connection between sex and programmed cell death as alternative responses to stress (2004) - \$ 20,155
- University Research Fund Grant, University of New Brunswick: Sex and programmed cell death as alternative responses to stress (2002-2003) - \$ 7,000

Co-PI/Collaborator:

- NSF Collaborative Research: De Novo Evolution of Multicellularity in a Unicellular Volvocine Alga (**Co-PI**; with Matthew Herron and Frank Rosenzweig, U. Montana; William Ratcliff, Georgia Inst. Tech., USA) (2015-2018; +1 year no-cost extension) – \$775,000 (\$109,285 to UNB)
- National Center for Genome Resources (USA) and the Gordon and Betty Moore Foundation Marine Microbiology Initiative: Transcriptome sequencing of marine eukaryotic algae (**Co-PI**; with David R. Smith, UBC, Canada) (2011)
- NSF: Life-history trade-offs and the evolution of multicellularity (**Co-PI**: 2008-2009; PI: Richard E. Michod, Univ. of Arizona, USA) - \$ 720,000
- NSERC RTI Grant: Real-Time PCR Thermal Cycler to Quantify Genes and Gene Expression (**Co-PI**; with 5 others from UNB) (2007) - \$ 53,310
- CONICET (Argentina): Efectos ecotoxicológicos de distintos contaminantes sobre la biología de las microalgas de agua dulce (The effect of different cotaminants on the biology of freshwater microalgae) (**Collaborator**; PI: Visitación Conforti, Universidad de Buenos Aires, Argentina. (2010-2013)
- NSF Small Grant for Exploratory Research: Motility, Mixing, and Multicellularity (2005-2006); **Collaborator** (PI: Raymond Goldstein – Physics Dept., Univ. of Arizona, USA)

OTHER GRANTS

Meeting Sponsorships

- American Genetics Association, Special Events Awards: Workshop on volvocalean genomics at The 4th International *Volvox* Conference, St. Louis, USA (**Co-PI**; with James Umen, Donald Danforth Plant Science Center) (2017); \$9,000 US
- American Genetics Association, Special Events Awards: Workshop on volvocalean genomics at The 3rd International *Volvox* Conference, Cambridge, UK (**Co-PI**; with Stephanie Hohn, Cambridge U) (2015); \$10,000 US
- The Company of Biologists: The 3rd International *Volvox* Conference, Cambridge (UK) (**Co-PI**; with Stephanie Hohn, Cambridge U) (2015); 2,000 GBP

- American Genetics Association, Special Events Awards: Workshop on volvoclean genomics at The 2nd International *Volvox* Conference, UNB, Fredericton (New Brunswick, Canada) (**PI**; with Bradley Oslon, Kansas State University and Matthew Herron, University of Montana) (2013); \$15,000 US
- The Company of Biologists: The 2nd International *Volvox* Conference, University of New Brunswick, Fredericton (NB, Canada) (**PI**) (2013); 3,000 GBP
- Phycological Society of America: Sponsorship for the 2nd International *Volvox* Conference, Fredericton (New Brunswick, Canada) (2013) (**PI**; with M Herron, UBC); \$1,000 US
- The Company of Biologists: ICREA Conference on the Evolution of Multicellularity (Barcelona, Spain) (**Co-PI**; with Iñaki Ruiz-Trillo and Ricard V. Solé, Institut de Biologia Evolutiva CSIC-UPF) (2013); £2,500
- American Genetics Association, Special Events Awards: Workshop on *Volvox* genetics and genomics at The 1st International *Volvox* Conference, Biosphere 2 (Arizona, USA) (**PI**; with SE Prochnik, JGI; SM Miller, UMBC; J Umen, Salk Inst.) (2011) \$15,000 US
- Phycological Society of America: Sponsorship for the 1st International *Volvox* Conference, Biosphere 2 (Arizona, USA) (**PI**; with M Herron, UBC) (2011); \$500 US
- The Company of Biologists: The 1st International *Volvox* Conference, Biosphere 2 (Arizona, USA) (**PI**; with S Miller – UMBC) (2011) 3,000 GBP

Educational activities

- UNB One-Time Priority Funding: Enhancing student learning in Biology through instructional computer games and apps (**PI**; with Michael Duffy, UNB) (2016); \$ 5,000
- UNB One-Time Priority Funding: Enhancing student experiential learning in Biology laboratories through instructional videos (**Co-PI**; with Michael Duffy and Gary Saunders, UNB) (2015); \$ 4,996

TEACHING EXPERIENCE

ASSIST/ASSOC/PROFESSOR (2002 – present) Univ. of New Brunswick, Fredericton, Canada

Current courses:

- BIOL 2251: Clinical Microbiology (2013 - present; full term; up to 135 students)
- BIOL 3242: Molecular Evolution (2005 – present; full term; 15-25 students)
- BIOL 4123: Evolutionary Medicine (2018 – present; full term; ca. 30 students)
- BIOL 3149: Independent Study (2018/2019; 1 student)

Past Courses

- BIOL 4123: Selected Topics in Evolution (2011 – 2017; full term; 20-30 students)
- BIOL 4123: Major Evolutionary Transitions (2004 – 2011; full term; 20-30 students)
- BIOL 2043: Cell Biology (2002 – 2012; full term; up to 180 students)
- BIOL 3149: Independent Study (2007; 2010; 2013; 2015; full term; 4 students)
- BIOL 4090: Honours Project (2006; 2011; 2016; 2017; 2018; full year; 6 students)
- BIOL 4149: Senior Research Project (2007; 2013; 2014; full year; 3 students)

TEACHING ASSISTANT (1994 – 1997) Dalhousie University, Halifax, Canada

- BIOL 1000: Introductory Biology

ASSISTANT PROFESSOR OF BIOCHEMISTRY (1992 – 1993) Babes-Bolyai University, Romania

BIOLOGY TEACHER (1988 – 1990) Vladimirescu Secondary School, Arad, Romania

ADVISING (see <http://www2.unb.ca/vip/GreenLab/people.htm>)

(i) UNDERGRADUATE STUDENTS

***Honours Research Project Theses**

- Lua Samimi – Complex consequences of glucose deprivation and metformin treatment on a cancer line expressing both adherent and circulating tumour cell phenotypes (Sept. 2017- April 2018)
- Julie Hanscomb – The combined effect of nutrient limitation and metformin treatment on an experimentally evolved cancer line that expresses a circulating tumour cell-like phenotype (Sept. 2017- April 2018)
- Dakota van Dyke – Experimental evolution in cancer: exploring the role of selection in shaping cancer’s evolutionary potential (Sept. 2016 – Apr. 2017)
- Sarah Hirtle – Investigations into a Microsporidian parasite infecting zebrafish (*Danio rerio*) at the U.N.B. Aquatic Research Facility: Detection, identification, and distribution of *Pseudoloma neurophilia*, and an update on its phylogenetic position (Sept. 2016 – Apr. 2017)
- Jassy Meng – Testing evolutionary theories of aging in *Volvox* (Sept. 2011 – April 2012)
- Christopher Tan – The early evolutionary history of the p53 tumor suppressor gene family (Sept. 2007 – April 2008)

***NSERC USRA**

- Christopher Lee – Role of the *Chlamydomonas RLS1* gene in photo-acclimation (May 2017 – September 2017)
- Irina Chan – Exposing cancer’s evolutionary vulnerabilities (May 2016 – September 2016)
- Linna Meng – The impact of lateral gene transfer in the evolution of animals (May 2013 – August 2013)
- Isabelle Miles – Programmed cell death in *Pleodorina* (May 2008 – September 2008)
- Ahmed Fagir – Programmed cell death in *Eudorina* (May 2008 – September 2008)
- Kanishk Karol – Programmed cell death in *Gonium* (May 2008 – September 2008)
- Sankalp Bhasvar – Programmed cell death in *Volvox* (May 2005 – September 2005)
- Sankalp Bhasvar – The evolution of programmed cell death during the unicellular-multicellular transition in the volvoclean algal group (May 2004 – September 2004)
- Fei Liu – Reactive oxygen species and sex: Manipulating the cellular antioxidant system in the green alga, *Volvox carteri* (May 2004 – September 2004)
- Mononita Roy – Reactive oxygen species and sex in the multicellular green alga, *Volvox*: Investigating the role of mitochondria (May 2004 – September 2004)

- Andrea Simmonds – Reactive oxygen species and sex in the unicellular green alga, *Chlamydomonas reinhardtii* (May 2004 – September 2004)

*Work-Study

- Bridgette Ruck-Jessome – (Jan 2018-April 2018)
- Alisha Tung-Shun – (Jan 2017-April 2017)
- Stephanie Scott – (Jan 2017-April 2017)
- Irina Chan – (October 2014 – April 2015; October 2015 – April 2016)
- Jennifer Earle – (October 2013 – April 2014)
- Aleatha Lee – (October 2011 – April 2012; October 2012 – April 2013)
- Grishma Vadlamani – (October 2008 – April 2009)
- Emma Logan – (October 2007 – April 2008)
- Christopher Tan – (October 2006 – December 2006)
- Marcia English – (October 2003 – April 2004; October 2004 – April 2005)

*Student Employment Experience Development Program (Equal Employment Opportunity)

- Christopher Tan (April 2007 – August 2007)
- Marcia English (April 2004 – August 2004; April 2005 – August 2005)

*Co-OP

- Linna Meng – The impact of lateral gene transfer in the evolution of animals (May 2013 – August 2013)
- Marcia English – PCD in volvocalean green algae (January 2006 – September 2006);

*International Exchange

- Matheus Sanitá Lima (Brazil) – Senescence in *Volvox carteri* (May 2013 – August 2013)

*Research Assistants

- Alisha Tung-Shun – (May 2017-September 2017)
- Irina Chan – (April 2015 – September 2015; July 2017 – September 2017; May 2018 – June 2018)
- Stephanie Scott – (April 2017-May 2017)
- Jennifer Earle – (October 2014 – February 2015)
- Amal Alahmadi – (October 2012 – April 2013; October 2012 – May 2014)
- Aleatha Lee – (June 2012 – August 2012; May – August 2013)
- Fei Liu – (April 2006 – August 2006)

*Volunteers

- Eric Jong – (Sept 2016 – April 2018)
- Linna Meng – (September 2014 – April 2015)
- Theodore Cios – (January 2004 – April 2004)

(ii) GRADUATE STUDENTS:

- Rani Saggere, PhD – Evolution of multicellularity (May 2018 - present)
- Travis Melanson, MSc – *Pseudoloma neurophilia*: a microsporidian infecting zebrafish (September 2016 – May 2017);

- Alex May, MSc 6-month internship (Free University of Amsterdam; Ecology and Evolution) – Applying evolutionary theory to cancer (February – September 2015)
- Aleatha Lee, MSc (2013 – 2016); Exposing evolutionary vulnerabilities to suppress cancer: Proof of concept using *Volvox*
- Stephan Koenig, PhD – The genetic and evolutionary basis for somatic cell differentiation in the multicellular alga *Volvox carteri*: investigations into the regulation of regA expression (2007 – 2014);
- Sarah Garnett, MSc – Sex and programmed cell death as responses to stress (2005 – 2006)

(iii) RESEARCH ASSOCIATES:

- Alex May, MSc – Applying evolutionary theory to cancer (September 2015 - December 2015)

(iv) RESEARCH TECHNICIANS:

- Irina Chan (May 2018 – June 2018); part-time
- Maria Davis (September 2017 – April 2018); part-time

(v) OTHER ADVISORY ACTIVITIES

- Supervisory Committee member: 11 MSc, 9 PhD
- Examiner: Honours Theses – 17; MSc Theses – 6; PhD Theses – 11; PhD Qualifying Exams – 9

SELECTED PROFESSIONAL ACTIVITIES, SERVICE, and MEMBERSHIPS

Meeting Organizer

- Founder and Organizer of the **1st International *Volvox* Meeting**. Biosphere 2, Arizona, USA. Dec.1-4, 2011 - <http://www2.unb.ca/vip/IVC/>
- Organizer of the **2nd International *Volvox* Meeting**. Fredericton, New Brunswick, Canada. July 31 – August 3, 2013 <http://www2.unb.ca/vip/IVC2013/index.htm>
- Co-organizer of the **2nd International Biannual Evolution and Cancer Conference**, San Francisco, USA. June 12-16, 2013 <http://cancer.ucsf.edu/evolution/conference-2013>
- Co-Organizer of the **ICREA Conference on the Evolution of Multicellularity**. Barcelona, Spain. October 2013

Meeting Organizing Committee member

- Organizing Committee Member for the **5th International *Volvox* Meeting**. Tokyo, Japan. July 26-29, 2019
- Organizing Committee Member for the **International Society for Evolution, Ecology and Cancer Conference**, Tempe, Arizona, USA. December 7-10, 2017
- Organizing Committee Member for the **4th International *Volvox* Meeting**. St. Louis, USA. August 16-19, 2017
- Organizing Committee Member for the **3rd International *Volvox* Meeting**. Cambridge, UK. August 19-22, 2015.

Meeting Chair Session

- Chair of the Cell Differentiation and Development Session at the **4th International *Volvox* Meeting**. St. Louis, USA. August 16-19, 2017
- Chair of the Evolution Session at the **3rd International *Volvox* Meeting**. Cambridge, UK. August 19-22, 2015.
- Chair of the Evolution Session at the **2nd International *Volvox* Meeting**. Fredericton, New Brunswick, Canada. July 31 – August 3, 2013.
- Co-Chair for Session on Evolution, Development and Life Cycle at the **14th International Conference on the Cell and Molecular Biology of *Chlamydomonas***. Norton, MA, 2010

International Committees, Boards:

- International Society for Evolution, Ecology and Cancer – Board of Directors (2017 – present)
- International Society for Evolution, Ecology and Cancer – Secretary (2015- present)
- The Durand Foundation Scholarship for evolutionary biology and phycology (South Africa) – Selection Committee

National Committees:

- NSERC Selection Committee (2014 - 2017) - Genes, Cells and Molecules
- Killam Selection Committee (2009 - 2012) – Killam Prizes and Killam Research Fellowships; <http://www.canadacouncil.ca/prizes/killam/>

University Level

- Faculty Assessment Committee (Level II) (2016 – present)

Departmental Committees:

- Departmental Retreat Committee (2018)
- Genetics and Evolution Teaching Group (Chair: 2013 – present)
- Biology Curriculum Committee (2014 – present)
- Level I Assessment Committee (2013 – present)
- Graduate Studies Committee (2003 – present)
- Space Committee (2003 – present; Chair: 2010 – present)
- NSERC USRA and PGS Committees (2004; 2005; 2010; 2011; 2014)
- ARA Taylor Graduate Fellowship Committee (2004, 2012, 2014)

Refereeing activities:

- Research Grants – eg: NSERC (Canada), ADF (Canada), CFI (Canada), NSF (USA), USDA (USA), BBSRC (UK)
- Manuscripts – eg: Science, Evolution, Molecular Biology and Evolution, Evolutionary Applications, Molecular Biology Reports, Molecular Phylogenetics and Evolution, Molecular Genetics and Genomics, Eukaryotic Cell, Proc. of Royal Society, BMC Evolutionary Biology, BMC Genomics, BMC Biotechnology, BMC Developmental Biology, BMC Biology, Trends in Genetics, Int. J. for Systematic and Evolutionary Microbiology, FEMS Microbiology Letters, J. of Phycology, Phycological Res., Current Genetics, J. Biol. Chem., Microbiology, Sexual Plant Reproduction, PLoS ONE, Philosophy & Theoretical Biology, Behavioral Ecology and Sociobiology, J. of Heredity
- Books – for University of Chicago Press

Professional Memberships:

- International Society for Evolution, Ecology and Cancer (ISEEC)
 - American Genetics Association (AGA)
 - Society for Molecular Biology and Evolution (SMBE)
 - Society for the Study of Evolution (SSE)
 - European Society for Evolutionary Biology (ESEB)
 - Centre for Environmental & Molecular Algal Research (CEMAR)
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