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## BIOGRAPHICAL SKETCH

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NAME Elodie Ghedin, Ph.D.	POSITION TITLE
eRA COMMONS USER NAME	Assistant Professor of Medicine

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(S)	FIELD OF STUDY
McGill University, Montreal, Canada	B.S.	1989	Biology
University of Quebec in Montreal	M. S.	1993	Environmental Sciences
McGill University, Institute of Parasitology	Ph.D.	1998	Molecular Parasitology
Laboratory of Parasitic Diseases, NIAID/NIH	Post-doc	1998-2000	Molecular Parasitology
Eukaryotic Genomics, TIGR	Post-doc	2000-2001	Genomics

### A. Positions and Awards

#### Positions and Employment

- 1993-1998 Graduate Student, McGill University, Institute of Parasitology (Laboratory of Dr. Greg Matlashewski)
- 1998-2000 Postdoctoral Fellow, Laboratory of Parasitic Diseases, NIAID/NIH, Bethesda, MD (Laboratory of Dennis Dwyer)
- 2000-2001 Postdoctoral Fellow, Department of Eukaryotic Genomics, The Institute for Genomic Research, Rockville, MD (Laboratory of Najib El-Sayed)
- 2001-2004 Collaborative Investigator, Parasite and Viral Genomics, The Institute for Genomic Research, Rockville, MD
- 04/2004-04/2006 Assistant Investigator, Parasite and Viral Genomics, The Institute for Genomic Research, Rockville, MD
- 05/2006 - *present* Assistant Professor of Medicine, School of Medicine, Division of Infectious Diseases, University of Pittsburgh, Pittsburgh, PA
- 12/2007 - *present* Adjunct position, Department of Computational Biology, University of Pittsburgh

#### Awards and Honors

- 1994-1995, 1996-1997 J.W. McConnell McGill Major post-graduate fellowship
- 1995-1996 FCAR post-graduate fellowship (governmental fellowship)
- June 8, 2007 Senior Vice Chancellor's Research Seminar Series, U. Pittsburgh

### B. Peer-reviewed publications (in chronological order)

1. Zhang, W.W., Charest, H., Ghedin, E. and Matlashewski, G. (1996) Identification and overexpression of the A2 amastigote-specific protein in *Leishmania donovani*. ***Mol Biochem Parasitol.*** 78: 79-90.
2. Ghedin, E., Charest, H., Zhang, W.W., Sundar, S., Kenney, R.T. and Matlashewski, G. (1997). Antibody response against a *Leishmania donovani* amastigote-stage-specific protein in patients with visceral leishmaniasis. ***Clinical and Diagnostic Laboratory Immunology*** 4: 530-535.
3. Ghedin, E., Charest, H. and Matlashewski, G. (1998) A2rel: a constitutively expressed *Leishmania* gene linked to an amastigote-stage-specific gene. ***Mol Biochem Parasitol.*** 93: 23-29.
4. Ghedin, E., Charest, H., Zhang, W.W., Debrabant, A., Dwyer, D., and Matlashewski, G. (1998) Inducible expression of suicide genes in *Leishmania donovani* amastigotes. ***J Biol Chem.*** 273: 22997-23003.

5. Debrabant, A., Ghedin, E., and Dwyer, D. (2000) Dissection of the functional domains of the *Leishmania* surface membrane 3'-Nucleotidase/Nuclease, a unique member of the class I nuclease family. **J Biol Chem.** 275: 16366-16372.
6. Ghedin, E., Debrabant, A., Engel, J.C., and Dwyer, D.M. (2001) Secretory and endocytic pathways converge in a dynamic endosomal system in a primitive protozoan. **Traffic** 2: 175-188.
7. Shakarian, A.M., Joshi, M.B., Ghedin, E., Dwyer, D.M. (2002) Molecular dissection of the functional domains of a unique, tartrate-resistant, surface membrane acid phosphatase in the primitive human pathogen, *Leishmania donovani*. **J Biol Chem** 277: 17994-18001.
8. Bringaud, F., Garcia-Perez, J. L., Heras, S. R., Ghedin, E., El-Sayed, N.M., Andersson, B., Baltz, T., and Lopez, M. C. (2002) Identification of non-autonomous non-LTR retrotransposons in the genome of *Trypanosoma cruzi*. **Mol Biochem Parasitol** 124: 73-78.
9. El-Sayed, N.M.A., Ghedin, E., Song, J., MacLeod, A., Bringaud, F., Larkin, C., Wanless, D., Peterson, J., Hou, L., Taylor, S. Tweedie, A., Biteau, N., Khalak, H.G., Lin, X., Mason, T., Hannick, L., Caler, E., Blandin, G., Bartholomeu, D., Simpson, A.J., Kaul, S., Zhao, H., Pai, G., Van Aken, S., Utterback, T., Haas, B., Koo, H.L., Umayam, L., Suh, B., Gerrard, C., Leech, V., Qi, Q., Schwartz, D., Feldblyum, T., Salzberg, S., Tait, A., Turner, M.R., Ullu, E., White, O., Melville, S., Adams, M.D., Fraser, C.M., Donelson, J.E. (2003). The sequence and analysis of *Trypanosoma brucei* chromosome II **Nucl. Acids. Res.** 31:4856-4863
10. Ghedin, E., Bringaud, F., Peterson, J., Myler, P., Berriman, M., Ivens, A., Andersson, B., Bontempi, E., Eisen, J., Angiuoli, S., Wanless, D., Von Arx, A., Murphy, L., Lennard, N., Salzberg, S., Adams, M., White, O., Hall, N., Stuart, K., Fraser, C.M., El-Sayed, N.M.A. (2004) Gene synteny and evolution of genome architecture in trypanosomatids. **Mol Biochem Parasitol** 134: 183-191.
11. Ghedin, E., Wang, S., Foster, J., Slatko, B. (2004) First sequenced genome of a parasitic nematode. **Trends Parasitol.** 20: 151-153.
12. Bringaud, F., Biteau, N., Zuiderwijk, E., Berriman, M., El-Sayed, N.M., Ghedin, E., Melville, S.E., Hall, N., Baltz, T. (2004) The *ingi* and RIME non-LTR retrotransposons are not randomly distributed in the genome of *Trypanosoma brucei*. **Mol. Biol. Evol.** 21: 520-528.
13. Ghedin, E., Pumfery, A., De La Fuente C., Yao K., Miller, N., Lacoste, V., Quackenbush, J., Jacobson, S., Kashanchi, F. (2004) Use of a multi-virus array for the study of human viral and retroviral pathogens: gene expression studies and ChIP-chip analysis. **BMC Retrovirology** 1:10.
14. Guiliano, D.B., Hong, X., McKerrow, J.H., Blaxter, M.L., Oksov, Y., Liu, J., Ghedin, E., Lustigman, S. (2004) A gene family of cathepsin L-like proteases of filarial nematodes are associated with larval molting and cuticle and eggshell remodeling. **Mol Biochem Parasitol** 136:227-242
15. Kehn, K., Berro, R., de la Fuente, C., Strouss, K., Ghedin, E., Dadgar, S., Bottazzi, M.E., Pumfery, A., and Kashanchi, F. (2004) Mechanisms of HTLV-I transformation. **Front. Biosci.** 9:2347-2372.
16. Seelamgari, A., Maddukuri, A., Berro, R., de la Fuente, C., Kehn, K., Deng, L., Dadgar, S., Bottazzi, M.E., Ghedin, E., Pumfery, A., and Kashanchi, F. (2004) Role of viral regulatory and accessory proteins in HIV-1 replication. **Front. Biosci.** 9:2388-2413.
17. Porter-Kelley, J.M., Gerald, N., Engel, J., Ghedin, E., Dwyer, D.M. (2004) ADP ribosylation factor 1 is transiently Golgi associated in *Leishmania donovani*. **Traffic** 5:868-883.
18. Ghedin, E. and Fraser, C.M. (2005) A virus with big ambitions. **Trends in Microbiology** 13:56-57
19. Foster, J, Ganatra, M, Kamal, I, Ware, J, Makarova, K, Ivanova, N, Bhattacharyya, A, Kapatral, V, Kumar, S, Posfai, J, Vincze, T, Ingram, J, Moran, L, Lapidus, A, Omelchenko, M, Kyripides, N, Ghedin, E, Wang, S, Goltsman, E, Joukov, V, Ostrovskaya, O, Tsukerman, K, Mazur, M, Comb, D, Koonin, E, Slatko, B. (2005) The *Wolbachia* Genome of *Brugia malayi*: Endosymbiont Evolution within a Human Pathogenic Nematode. **PLoS Biol.** Mar 29;3(4):e121
20. Huete-Perez, J., Flores-Obando, R.E., Ghedin, E., Caffrey, M. (2005) Genomic and Proteomic Approaches for Chagas' disease: critical analysis of diagnostic methods. **Expert Review of Molecular Diagnostics** Jul;5(4):521-530.
21. El-Sayed, N.M.A., Myler, P.J., Bartholomeu, D., Nilsson, D., Aggarwal, G., Tran, A.N., Ghedin, E.,...[+46 authors]...Andersson, B. (2005) The genome sequence of *Trypanosoma cruzi*, etiological agent of Chagas' disease. **Science** Jul 15;309(5733):409-415.
22. El-Sayed, N.M.A., Myler, P.J., Blandin, G., Berriman, M., Crabtree, J., Aggarwal, G., Caler, E., Renauld, H., Worthey, E.A., Hertz-Fowler, C., Ghedin, E., Peacock, C., Haas, B., Angiuoli, S., Anupama, A., Bartholomeu, D., Cadag, E., Carlton, J.M., Creasy, T., Djikeng, A., Hauser, C., Ivens, A.C., Kummerfeld, S.,

- Leal, J., Nilsson, D., Peterson, J., Shallom, J., Silva, J.C., Sundaram, J., Tran, A.-N., Westenberger, S., White, O., Wortman, J., Melville, S.E., Donelson, J.E., Andersson, B., Stuart K.D., and Hall, N. (2005) Comparative genomics of the trypanosomatids. **Science** Jul 15;309(5733):404-409.
23. Berriman, M., Ghedin, E., .[+77 authors]...El-Sayed, N.M.A. (2005) The genome sequence of the African trypanosome, *Trypanosoma brucei*. **Science** Jul 15;309(5733):416-422.
  24. Ghedin, E. and Claverie, J.-M. (2005) Mimivirus Relatives in the Sargasso Sea. **Virology J** Aug 16;2(1):62.
  25. Holmes, E.C., Ghedin, E., Miller, N., Taylor, J., Bao, Y., George, K.S., Grenfell, B.T., Salzberg, S.L., Fraser, C.M., Lipman, D.J., Taubenberger, J.K. (2005) Whole-Genome Analysis of Human Influenza A Virus Reveals Multiple Persistent Lineages and Reassortment among Recent H3N2 Viruses. **PLoS Biol.** Jul 26;3(9):e300.
  26. Ghedin, E., Sengamalay, N.A., Shumway, M., Zaborsky, J., Feldblyum, T., Subbu, V., Spiro, D.J., Sitz, J., Koo, H., Bolotov, P., Dernovoy, D., Tatusova, T., Bao, Y., St. George, K., Taylor, J., Lipman, D.J., Fraser, C.M., Taubenberger, J.K., Salzberg, S.L. (2005) Large-scale sequencing of human influenza reveals the dynamic nature of viral genome evolution. **Nature** Oct 20;437(7062):1162-6. Epub 2005 Oct 5.
  27. Bringaud, F., Ghedin, E., Blandin, G., Bartholomeu, D., Levin, M.J., Baltz, T. and El-Sayed, N.M.A. (2006) Evolution of non-LTR retrotransposons in the trypanosomatid genomes: *Leishmania major* has lost the active elements. **Mol Biochem Parasitol** Epub 2005 Oct 10.
  28. Bringaud, F., Bartholomeu, D., Blandin, G., Delcher, A., Baltz, T., El-Sayed, N.M.A. and Ghedin, E. (2006). The *Trypanosoma cruzi* L1Tc and NARTc Non-LTR Retrotransposons Show Relative Site-Specificity for Insertion. **Mol Biol Evol** Feb;23(2):411-420. Epub 2005 Nov 2.
  29. Yao, K., Mandel, M., Akyani, N., Maynard, K., Sengamalay, N., Fotheringham, J., Ghedin, E., Kashanchi, F., Jacobson, S. (2006) Differential HHV-6A gene expression in T cells and primary human astrocytes based on multi-virus array analysis. **Glia**.53:789-798.
  30. Nelson, M. I., Simonsen, L., Viboud, C., Miller, M.A., Taylor, J., St. George, K., Griesemer, S.B., Ghedin, E., Sengamalay, N.A., Spiro, D.J., Volkov, I., Grenfell, B.T., Lipman, D.J., Taubenberger, J.K., Holmes, E.C. (2006) Stochastic Processes are Key Determinants of Short-Term Evolution in Influenza A Virus. **PLoS Pathogen** 2(12):e125
  31. Yao, K., Akyani, N., Donati, D., Sengamalay, N., Fotheringham, J., Ghedin, E., Bishop, M., Barrett, J., Kashanchi, F., Jacobson, S. (2006) Detection of HHV-6B in post-mortem central nervous system tissue of a post-bone marrow transplant recipient: a multi-virus array analysis. **J Clin Virol.** Suppl 1:S57-62.
  32. Zhang, X., Hasoksuz, M., Spiro, D., Halpin, R., Wang, S., Stollar, S., Janies, D., Hadya, N., Tang, Y., Ghedin, E., Saif, L. (2007) Complete genomic sequences, a key residue in the spike protein and deletions in nonstructural protein 3b of US strains of the virulent and attenuated coronaviruses, transmissible gastroenteritis virus and porcine respiratory coronavirus. **Virology**.; 358(2):424-35. Epub 2006 Oct 4.
  33. Hasoksuz, M., Alekseev, K., Vlasova, A., Zhang, X., Spiro, D., Halpin, R., Wang, S., Ghedin, E., Saif, L.J. (2007) Biologic, antigenic and full length genomic characterization of a bovine-like coronavirus isolated from a giraffe. **J Virol.** May;81(10):4981-4990.
  34. Zhang, X., Hasoksuz, M., Spiro, D., Halpin, R., Wang, S., Vlasova, A., Janies, D., Jones, L.R., Ghedin, E., Saif, L.J. (2007) Quasispecies of bovine enteric and respiratory coronaviruses based on complete genome sequences and genetic changes after tissue culture adaptation. **Virology.** 363:1-10.
  35. Salzberg, S.L., Kingsford, C., Cattoli, G., Spiro, D.J., Janies, D.J., Mehrez Aly, M., Brown, I.H., Couacy-Hymann, E., De Mia, G.M., Dung, D.H., Guercio, A., Joannis, T., Ali, A.S.M., Osmani, A., Padalino, I., Saad, M.D., Savić, V., Sengamalay, N.A., Yingst, S., Zaborsky, J., Zorman-Rojs, O., Ghedin, E., Capua, I. (2007) Genome Analysis Linking Recent European and African Influenza H5N1 Viruses. **Emerging Infectious Diseases** 13: 713-718.
  36. Liu, C.; de Oliveira, A.; Higazi, T.B. Ghedin, E., DePasse, J., Unnasch, T.R. (2007) Sequences necessary for trans-splicing in transiently transfected *Brugia malayi*. **Molecular and Biochemical Parasitology** 156(1):62-73. Epub 2007 Jul 22..
  37. Dunning Hotopp, J.C., Clark, M.E., Oliveira, D.C.S.G. Foster, J.M., Fischer, P., Muñoz Torres, M.C., Giebel, J.D., Wang, S., Ingram, J., Nene, R.H., Shepard, J., Ishmael, N., Kumar, N., Tomkins, J., Richards, S., Spiro, D.J., Ghedin, E., Slatko, B.E., Tettelin, H., Werren, J.H. (2007) Widespread Lateral Gene Transfer from Intracellular Bacteria to Multicellular Eukaryotes, **Science**, 317:1753-1756. Epub 2007 Aug 30.

38. Bringaud, F., Müller, M., Coutinho Cerqueira, G., El-Sayed, N.M.A., Papadopoulou, B., and Ghedin, E. (2007) A Large Family of Extinct Short Retroposons is Involved in the Regulation of Gene Expression in *Leishmania*. **PLoS Pathogens**, Sep 7;3(9):e136.
39. Ghedin, E., Wang, S., Spiro, D.J., ...[+63 co-authors]...Blaxter, M, Scott, A. (2007) Draft Genome Sequence of the Filarial Nematode Parasite *Brugia malayi* **Science** 317:1756-1760.
40. Kumar, S., Chaudhary, K., Foster, J.M., Novelli, J., Zhang, Y., Wang, S., Spiro, D.J., Ghedin, E., Carlow, C.K.S. (2007) Mining predicted essential genes of *Brugia malayi* for nematode drug targets **PLoS One** Nov 14;2(11):e1189.
41. Nelson, M.I., Viboud, C., Simonsen, L., Bennett, R.T., Griesemer, S.B., St. George, K., Taylor, J., Spiro, D.J., Sengamalay, N.A., Ghedin, E., Taubenberger, J.K., Holmes, E.C. (2008) Multiple Reassortment Events in the Evolutionary History of H1N1 Influenza A Virus Since 1918. **PLoS Pathogens** (Accepted).
42. Djikeng, A., Halpin, R.A., Kuzmickas, R., Depasse, J., Feldblyum, J., Sengamalay, N., Afonso, C.L., Zhang, X., Anderson, N.G., Ghedin, E., Spiro, D.J. (2008) Viral genome sequencing by random priming methods. **BMC Genomics** 9:5.
43. Ghedin, E., Daehnel, K., Foster, H., Slatko, B., Lustigman, S. (2008) The symbiotic relationship between filarial parasitic nematodes and their *Wolbachia* endosymbionts – a resource for a new generation of control measures. **Symbiosis** (in press).

## C. Other Support

### ACTIVE

N01-AI-3-0071 (Strausberg) 05/01/06 - 02/28/09  
 J. Craig Venter Institute/ NIH/NIAID  
**Influenza Genome Project** (Subcontract)

Z910501 (Selengut) 08/20/07 - 02/20/09  
 J. Craig Venter Institute/ Department of Homeland Security  
**Viral genomic characterization of environmental backgrounds for DNA signature design in bio-surveillance.** (Subaward)

R01 AI072465 (Unnasch) 04/01/08 - 03/31/12  
 NIH/NIAID  
**Mapping protein interactions between filaria and its *Wolbachia* endosymbiont**  
 Co-investigator

U01 (Ross) 03/01/08 - 02/28/11  
 NIH/NIAID  
**Virus-Like Particle Vaccines for Pandemic Influenza**  
 Co-investigator

(Ghedin) 05/01/08 – 04/30/09  
 Burroughs Wellcome Fund  
**Closing and Re-assembly of the *Brugia malayi* Genome**