

Principal Investigator: \_\_\_\_\_

### BIOGRAPHICAL SKETCH

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|  |                                  |  |                       |
|--|----------------------------------|--|-----------------------|
| NAME<br><b>Golden, Aaron Alain-Jon</b>   |                                  | POSITION TITLE<br><b>Associate Professor, Genetics</b> |                       |
| eRA COMMONS USER NAME (credential, e.g., agency login)<br><b>aaron.a.golden</b>  |                                  | <b>Associate Professor, Mathematical Sciences</b>      |                       |
| EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)</i> |                                  |  |                       |
| INSTITUTION AND LOCATION   | DEGREE<br><i>(if applicable)</i> | MM/YY  | FIELD OF STUDY        |
| University of Dublin, Trinity College, Ireland   | B.A. (Mod.)                      | 12/91  | Natural Sciences      |
| Queens University of Belfast, Northern Ireland   | M.Sc.                            | 12/93  | Computational Science |
| National University of Ireland Galway, Ireland   | Ph.D.                            | 12/99  | Astrophysics          |

## A. Personal Statement

My undergraduate and postgraduate training in the quantitative and computational sciences has formed the basis for my ongoing research activities in the life sciences. In particular I have sought to find those synergies in the methodologies and analytical strategies developed and adopted in the more mainstream data sciences and work with collaborators to implement them in a biomedical context. In all cases my principal motivation has been the use of hard scientific questions to drive computational innovation, starting from my initial faculty appointment in 1999 at the National University of Ireland Galway. There I coordinated two research groups, one in the physical sciences, the other in computational biology, and in particular pioneered the use of self organizing map neural networks for application to several central problems in bioinformatics – gene prediction, motif finding, and integrative genomics. These activities were acknowledged by significant R01 equivalent awards in both computational biology and in physics by both Science Foundation Ireland and the European Commission, and I have held fellowships from both the Human Frontiers Science Program and the European Molecular Biology Organisation to extend my training in the biomedical sciences. Since my appointment at the Department of Genetics, Albert Einstein College of Medicine, I have been developing my lab to (i) further explore novel clustering approaches to diverse next generation 'omic' datasets, (ii) the development of novel computational infrastructures to expedite knowledge discovery in clinically relevant 'omic' datasets and, (iii) applying accelerated processing and novel data management paradigms to 'omic' informatics problems. In so doing I have gained extensive insights into the needs of 'bench' scientists and clinicians through the highly collegial environment of the Albert Einstein College of Medicine. As of this January 2014, I have a joint appointment with the Department of Mathematical Sciences at Yeshiva University, where I teach graduate courses on Data Science with a distinct biomedical slant, furthering my interactions with computer scientists, applied mathematicians and physicists on the main University campus, with consequent benefits to my colleagues on the Einstein campus.

One particular area of institutional expertise that I count myself extremely fortunate to be associated with is that of my colleague Dr. Nir Barzilai and his pioneering work on aging research specifically in a human context, supported by the Glenn Foundation. In the past 12 month period I have actively participated in a specific program of study into the functional transcriptomics of the phytoalexin Resveratrol (3,5,4'-trihydroxy-*trans*-stilbene) on human *in vivo* skeleton-muscle tissue, and this work is 'on-going'. My laboratory's close links with the Genomics and Epigenomics core facilities on the Einstein campus ensures that we can apply full oversight over the sequencing, primary and secondary analyses, as well as have the ability to 'tap' the domain expertise of my colleagues in the comprehensive final analysis of these very precious muscle biopsy RNA-seq datasets. We are also fortunate in having access to the laboratory's dedicated supercomputing resource 'Leo', a 128 processor core SGI Altix UV1000 with 2 TB of shared RAM. I am very happy indeed to have this opportunity to make these resources and expertise available again to Dr. Barzilai's planned endeavor's with the Glenn Foundation and would be sincerely grateful to have such work acknowledged by a contribution to my salary of 5%.

## B. Positions and Honors

### Positions and Employment

|         |  |
|---------|--|
| 1999-06 | Junior Lecturer, Department of Information Technology, National University of Ireland, Galway        |
| 2002-04 | Visiting Professor, Department of Mathematics, University of Porto, Portugal                         |
| 2004    | Visiting Astronomer, Paris Observatory, France   |
| 2006-09 | College Lecturer, Department of Information Technology, National University of Ireland, Galway       |
| 2009-11 | College Lecturer, School of Maths, Statistics & Applied Math, National University of Ireland, Galway |
| 2011-   | Associate Professor, Department of Genetics, Albert Einstein College of Medicine, Bronx, NY          |
| 2014-   | Associate Professor, Department of Mathematical Sciences, Yeshiva University, New York, NY           |
| 2014-   | Member, Institute for Onco-Physics, Albert Einstein College of Medicine                              |

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### **Other Experience and Professional Memberships**

- 2001- Fellow, Royal Astronomical Society
- 2001-05 Irish Representative, European Commission COST Action 283, 'Computational and Information Infrastructure in the Astronomical Datagrid'
- 2001- Member, Technical Committee 13 'Pattern Recognition in Astronomy & Astrophysics', International Association for Pattern Recognition
- 2003- Member, International Astronomical Union  
Member of Division III Commission 51 Bio-Astronomy  
Member of Division XII Commission 5 Documentation & Astronomical Data  
Member of Division III Commission 53 Extrasolar Planets  
Member of Division III Planetary Systems Sciences
- 2010 U.K. Medical Research Council's Molecular and Cellular Medicine Grant Review Board
- 2010 Expert Evaluator, European Commission Framework Programme 7, *FP7-KBBE-2010-3.5.04: Microbial diversity and metagenomic mining for biotechnological innovation*
- 2011- Associate Editor, PLoS One
- 2012- Review Panel Member, NASA **NNH12ZDA001N-MATISSE** ROSES 2012: '*Maturation of Instruments for Solar System Exploration*' Program
- 2012- Member, American Astronomical Society  
Member, AAS Working Group on Astroinformatics and Astrostatistics
- 2013- Bioinformatics Standards & Protocols Subcommittee, New York Genome Center
- 2013- Review Panel Member, NASA **NNH12ZDA001N-MATISSE** ROSES 2012: '*Space Technology Research Opportunities – Early Stage Innovations*' Program
- 2013- Review Panel, National Sciences & Engineering Research Council of Canada  
*Discovery Frontiers: Advancing Big Data Science in Genomics Research*
- 2013- Associate Editor, Genomics
- 2014- NSF Extreme Science & Engineering Discovery Environment (XSEDE) Campus Champion for Albert Einstein College of Medicine & Yeshiva University.

### **Honors**

- 1994 Postgraduate Fellowship, Israeli Academy of Sciences (declined)
- 1995 Postgraduate Fellowship, College of Science, National University of Ireland Galway
- 1998 Visiting Scholar under the bi-lateral NUI Galway/UC Berkeley 'Education Abroad Program'
- 2001 International Astronomical Union approve naming of minor planet 11451 'Aarongolden'

### **C. Selected Peer-reviewed Publications** (Selected from 87 peer-reviewed publications)

#### **Most relevant to the current application**

1. Mahony, S., McInerney, J., Smith, T. and Golden, A. (2004). Gene prediction using the Self-Organising Map: automatic generation of multiple gene models. *BMC Bioinformatics*, 5, 23. (PMID: 15070404)
2. Mahony, S., Hendrix, D., Golden, A., Smith, T.J., & Rokhsar, D.S. (2005). Transcription factor binding site identification using the self-organizing map. *Bioinformatics*, v. 21(9), p. 1807. (PMID: 15647296)
3. Mahony, S., Golden, A., Smith, T.J., Benos, P.V. (2005). Improved detection of DNA motifs using a self-organized clustering of familial binding profiles. *Bioinformatics*, v. 21, Suppl 1:i283. (PMID: 15961468)
4. McCoy, N., S Mahony, Golden, A. (2007) Gene Prediction in Metagenomic Libraries Using the Self-Organising Map and High Performance Computing Techniques. *Distributed and Grid Computing in Computational Biology*, Vol. 4360 (Springer), Lecture Notes in Computer Science.
5. Kim, M.K.-H., McGarry, T.J., Ó Broin, P., Flatow, J.M., Golden, A. A.-J., Licht, J.D. (2009). An Integrated Genome Screen Identifies The Wnt Signalling Pathway as a Major Target of WT1. *Proceedings of the National Academy of Sciences*, 106(27):11154-9. (PMID: 19549856)

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6. McLellan, A.S., Dubin, R.A., Jing, Q., 'O Broin, P., Moskowitz, D., Suzuki, M., Calder, R.B., Hargitai, J., Golden, A., Grealley, J.M. (2012) 'The Wasp System: an open source environment for managing and analyzing genomic data.' (doi: 10.1016/j.ygeno.2012.08.005) *Genomics*, 2012 (PMID: 22944616)
7. Golden, A., McLellan, A.S., Dubin, R.A., Jing, Q., 'O Broin, P., Moskowitz, D., Xhang, Z., Suzuki, M., Hargitai, J., Calder, R.B., Grealley, J.M., (2012) 'The Einstein Genome Gateway using WASP - A High Throughput Multi-Layered Life Sciences Portal for XSEDE', Proceedings of the 4th International Workshop on Science Gateways for Life Sciences, IOS Press, Amsterdam, 2012 (PMID: 22942009)
8. Rhee, D., Calder, R.B., Shieh, K., 'O Broin, P., Hargitai, J., Golden, A., "Spring through the gateway": deploying genomic workflows with XSEDE', XSEDE '13 Proceedings of the Conference on Extreme Science and Engineering Discovery Environment: Gateway to Discovery, ACM New York, NY, USA, 2013.
9. Golden, A., Djorgovski, S.G., Grealley, J.M., 'Astrogenomics: big data, old problems, old solutions?' *Genome Biology*, 14:129, 2013. (PMID:23953643)
10. Sparano, J.A., Golden, A., A.J., Montagna, C., 'Translating the TCGA Breast Cancer Results into Clinical Practice: Searching for Therapeutic Clues' *Oncology Journal*, Dec 15 2013. (PMID: 24624547)
11. Lubetzky, M., Bao, Y., 'O Broin, P., Marfo, K., Ajaimy, M., Aljanabi, A., de Boccardo, G., Golden, A., Akalin, E., 'Genomics of BK Viremia in Kidney Transplant Recipients', *Transplantation*, 97, 4:451-6, 2014. (PMID: 24310299)
12. Hayde, N., 'O Broin, P., Bao, Y., de Boccardo, G., Lubetzky, M., Ajaimy, M., Pullman, J., Colovai, A., Golden, A., Akalin, E. 'Increased Rejection Associated Gene Transcripts in Biopsies of Donor-Specific Antibody Specific Positive Patients with Normal Biopsies', (advance online publication, 26 March 2014; doi:10.1038/ki.2014.75) *Kidney International*, 2014. (PMID: 24670411)

#### **Additional recent publications of importance to the field (in chronological order)**

1. Geeleher, P., Morris, D., Hinde, J.P., Golden, A. (2009). BioconductorBuntu - a Linux Distribution that Implements a Web-Based DNA Microarray Analysis Server. *Bioinformatics*, 25(11):1438-9. (PMID: 19307241)
2. McDonald, J., Golden, A., Jennings, S.G. (2009) 'OpenDDA: A Novel High-Performance Computational Framework for the Discrete Dipole Approximation', *International Journal of High Performance Computing Applications*, 23, 42-61.
3. Geeleher, P., Huang, R.S., Gamazon, E.R., Golden, A., Seoighe, C. (2012) 'The regulatory effect of miRNAs is a heritable genetic trait in humans' *BMC Genomics*, Aug 10;13:383. (PMID: 23272639)
4. Agoni, L., Golden, A., Guha, C., Lenz, J. 'Neandertal and Denisovan retroviruses', *Current Biology*, 22, 11:R437-8, 2012.
5. Geeleher, P., Hartnett, L., Egan, L.J., Golden, A., Raja Ali, R.A., Seoighe, C. (2013). 'Gene-Set Analysis is Severely Biased When Applied to Genome-wide Methylation Data' *Bioinformatics*, (published June 3, 2013 doi: 10.1093/bioinformatics/btt311) (PMID: 23732277)

#### **D. Research Support**

##### **ACTIVE**

NIH 8581470 (Warren, PI) 09/26/13 – 07/31/17

International Consortium on Brain and Behavior in 22q11.2 Deletion Syndrome

Responsible for the design, development and management of the genomics data to be obtained from patients participating in this project – specifically this will involve 1000 genotype datasets (Affymetrix SNP arrays) and 600 deep-sequenced patient genomes.

Glenn Foundation for Medical Research (Barzilai/Cuervo PIs) 10/1/12 – 9/30/14

*The Paul F. Glenn Center for the Biology of Human Aging Research*

Principal Investigator:

Assessing the role of resveratrol and other compounds in mitochondrial function in human skeleton-muscle tissue and their potential role in longevity using RNA-seq.

NIH AI091175 (Guha, PI)

8/01/10 – 7/31/15

*Stem cell-based therapies for mitigation of acute radiation syndrome*

Pilot award to generate preliminary data to identify signatures in metabolite/lipidomic data obtained from plasma, urine and biopsy samples associated with whole-body irradiation.

Institutional Startup Package

5/08/11 – 5/08/16

Albert Einstein College of Medicine

Funds to purchase Altix UV1000 supercomputer and recruit a systems programmer and three lab personnel.