

Art F.Y. Poon

- CONTACT INFORMATION** Antiviral Research Center Annex *Phone:* (619) 543-8897
 University of California, San Diego *Fax:* (619) 543-5094
 150 West Washington Street *E-mail:* afpoon@ucsd.edu
 San Diego, CA 92103
- CITIZENSHIP** Canadian.
- RESEARCH INTERESTS** Population genetics, phylogenetics, bioinformatics, experimental evolution, virology, infectious diseases, mathematical biology, social networks.
- EDUCATION** **University of California at San Diego**, La Jolla, California USA
 Ph.D., Biology (Ecology, Behavior, and Evolution), awarded May 2005.
- Dissertation: “Evolutionary consequences of the genetic environment on mutations in bacterial viruses.”
 - Advisor: Lin Chao
- University of British Columbia**, Vancouver, British Columbia, Canada
 M.S., Zoology (Mathematical Biology), July 2000.
- Dissertation: “The evolution of the genetic load caused by recurrent mutations in small populations: genetic context and demographic history.”
 - Advisor: Sarah P. Otto
- University of Toronto**, Toronto, Ontario, Canada
 Hon.B.Sc., Biology, June, 1998
- Advisor: David Houle.
- RESEARCH APPOINTMENTS** **University of California, San Diego**, La Jolla, California, United States
Postdoctoral Employee **August, 2005 - present**
- Development of phylogenetic and statistical methods for the analysis of sequence data from HIV-1 and other human viruses; social (epidemiological) networks. Co-developer of *HyPhy* (<http://www.hyphy.org>) phylogenetic analysis software.
 - Principal Investigator: Simon D.W. Frost
- BC Centre for Excellence in HIV/AIDS Research**, Vancouver, British Columbia, Canada
Associate Research Scientist, Bioinformatics **February, 2008 - present**
- Development of phylogenetic and machine learning techniques for analysis of HIV-1 clinical and sequence data. Analysis of patient genomic data. Quality control and analysis of high-throughput HIV-1 genome sequencing data.
 - Principal Investigator: P. Richard Harrigan

PUBLICATIONS

1. Streeck, H, B Li, AFY Poon, A Schneidewind, AD Gladden, KA Power, SB Bazner, C Brander, ES Rosenberg, S Frost, M Altfeld, and TM Allen. Immune driven HIV-1 recombination and loss of control following superinfection. **2008**. *Journal of Experimental Medicine*, in press.
2. Kosakovsky Pond, SL, AFY Poon, CS Zarate, DM Smith, SJ Little, SK Pillai, RJ Ellis, JK Wong, AJ Leigh Brown, DD Richman, and SDW Frost. **2008**. Estimating selection pressures on HIV-1 using phylogenetic likelihood models. *Statistics in Medicine*, in press.
3. Cachay, ER, SDW Frost, AFY Poon, D Looney, SM Rostami, ME Pacold, DD Richman, SJ Little, and DM Smith. **2008**. Herpes simplex virus type 2 (HSV-2) acquisition during recent HIV infection does not influence plasma HIV levels. *Journal of Acquired Immune Deficiency Syndromes* 47(5): 592-596.
4. Poon, AFY, FI Lewis, SL Kosakovsky Pond, and SDW Frost. **2007**. An evolutionary-network model reveals stratified interactions in the V3 loop of the HIV-1 envelope. *PLoS Computational Biology* 3(11): e231. doi:10.1371/journal.pcbi.0030231.
5. Poon AFY, SL Kosakovsky Pond, DD Richman, and SDW Frost. **2007**. Mapping protease inhibitor resistance to HIV-1 sequence polymorphisms within patients. *Journal of Virology* 81(24): 13598-13607.
6. Lapp, H, S Bala, JP Balhoff, A Bouck, N Goto, M Holder, R Holland, A Holloway, T Katayama, PO Lewis, A Mackey, BI Osborne, WH Piel, SL Kosakovsky Pond, AFY Poon, W-G Qui, JE Stajich, A Stolfus, T Thierer, AJ Vilella, RA Vos, CM Zmasek, D Zwickl, and TJ Vision. **2007**. The 2006 NESCent Phyloinformatics Hackathon: A field report. *Evolutionary Bioinformatics* 3: 357-366.
7. Poon, AFY, SL Kosakovsky Pond, P Bennett, DD Richman, AJ Leigh Brown, and SDW Frost. **2007**. Adaptation to human populations is revealed by within-host polymorphisms in HIV-1 and hepatitis C virus. *PLoS Pathogens* 3(3): e45. doi:10.1371/journal.ppat.0030045
8. Poon, AFY, FI Lewis, SL Kosakovsky Pond, and SDW Frost. **2007**. Evolutionary interactions between N-linked glycosylation sites in the HIV-1 envelope. *PLoS Computational Biology* 3(1): e11. doi:10.1371/journal.pcbi.0030011
9. Poon, AFY and L Chao. **2006**. Functional origins of fitness-effect sizes of compensatory mutations in the DNA bacteriophage ϕ X174. *Evolution* 60(10): 2032-2043.
10. Poon, A, BH Davis, and L Chao. **2005**. The Coupon Collector and the Suppressor Mutation: estimating the number of suppressor mutations by maximum likelihood. *Genetics* 170(3): 1323-1332.
11. Poon, A and L Chao. **2005**. The rate of compensatory mutation in the bacteriophage ϕ X174. *Genetics* 170(3): 989-999.
12. Poon, A and L Chao. **2004**. Drift increases the advantage of sex in bacteriophage ϕ 6. *Genetics* 166 (1): 19-24.
13. Poon, A and SP Otto. **2000**. Compensating for our load of mutations: freezing the meltdown of small populations. *Evolution* 54(5): 1469-1479.

- BOOK CHAPTERS Kosakovsky Pond, SL, AFY Poon, and SDW Frost. Estimating selection pressures on alignments of coding sequences. In *The Phylogenetic Handbook: A Practical Approach to DNA and Protein Phylogeny, 2nd ed.* M Salemi and A-M Vandamme, eds. Cambridge University Press. In press.
- AFY Poon, SDW Frost, and Kosakovsky Pond, SL. Detecting selection in DNA sequences with Data-monkey. In *Bioinformatics for DNA Sequence Analysis (Methods in Molecular Biology)*. Humana Press. In press.
- PENDING
PUBLICATIONS Poon, AFY, KC Brouwer, SA Strathdee, MA Firestone Cruz, RM Lozada, C Magis-Rodriguez, SL Kosakovsky Pond, D Heckathorn, SDW Frost. Languages of the underground: multitype branching processes into social networks. In review.
- Zarate, CS, AFY Poon, SJ Little, DD Richman, and SDW Frost. Effect of host genetics on HIV-1 viral and CD4+ dynamics and variation in pol in individuals with recent HIV infection. Submitted.
- Kosakovsky Pond, SL, AFY Poon, AJ Leigh Brown, and SDW Frost. Detecting time's arrow in the evolution of Influenza A virus. In review.
- Kosakovsky Pond, SL, K Scheffler, AFY Poon, MB Gravenor, CH Woelk, S Zarate, DC Nickle, SK Pillai, AJ Leigh Brown, DD Richman, and SDW Frost. Evolutionary fingerprinting of viral genes. Submitted.
- Poon, AFY, FI Lewis, SDW Frost, and SL Kosakovsky Pond. Spidermonkey: rapid detection of co-evolving sites using Bayesian graphical models. Submitted.
- PR Harrigan, C-W Sheen, V Gill, B Wynhoven, E Hudson, V Lima, P Lecocq, AFY Poon, and N Sluis-Cremer. Silent mutations are selected in HIV-1 reverse transcriptase and affect enzymatic efficiency. Submitted.
- INVITED
PRESENTATIONS Partners AIDS Research Center, Boston, MA. June 2008.
- Poon, AFY, SL Kosakovsky Pond, and SDW Frost. Phylogenetic comparative methods using Bayesian graphical models in HyPhy and Spidermonkey. 15th International Workshop on HIV Dynamics and Evolution. Santa Fe, New Mexico. April 2008.
- Vertex Pharmaceuticals, Cambridge, MA. February 2008.
- Poon, AFY, PR Harrigan, and SDW Frost. Co-variation networks in HIV-1 Nef sequences from phylogenetic and mixtures analysis. 15th Conference on Retroviruses and Opportunistic Infections. Boston, MA. February 2008.
- Poon, AFY, DD Richman, and SDW Frost. Tracing pathways of resistance to reverse transcriptase inhibitors from sequencing mixtures in HIV-1. —.
- HONORS AND
AWARDS Young Investigator Award, 13th Conference on Retroviruses and Opportunistic Infections (CROI), 2005.
- Student Presentation Award, Evolutionary Biology in the Pacific Northwest (EVO-WIBO), 2004.
- National Science and Engineering Research Council (NSERC) Postgraduate Scholarship, 1998.

TEACHING
EXPERIENCE

University of California, San Diego, La Jolla, California, United States

Applied Quantitative Analysis (CLRE 261), volunteer teaching assistant, 2006.

Population Genetics (BIEB 156), teaching assistant, 2004.

Ecology Laboratory (BIEB 121), teaching assistant, 2003.

Biodiversity (BIEB 140), teaching assistant, 2002.

University of British Columbia, Vancouver, British Columbia, Canada

First Year Biology Elective - Mathematical Biology (BIO140), instructor, 2000.

Biomathematics (BIO301), teaching assistant, 1999.

COMPUTING
LANGUAGES

C/C++, Python, R/S, *HyPhy* batch language, *Mathematica*, \LaTeX , SQL, Objective-C.

ACADEMIC
SERVICE

Peer review (manuscripts) — *American Naturalist* (2 manuscripts), *Bioinformatics* (1), *Evolution* (4), *Genetics* (4), *Heredity* (1), *Journal of Molecular Evolution* (2), *Molecular Biology and Evolution* (1), *Journal of Theoretical Biology* (2), *Nucleic Acids Research* (1), *PLoS One* (2).

Peer review (grants) — National Science Foundation, South African Medical Research Council.

Invited participant — 1st NESCent Phyloinformatics Hackathon: Lowering the Barrier. Open-source phylogenetics working group. Durham, North Carolina, 2006.

Graduate Admissions Committee, student representative (UCSD), 2003.

Teaching Assistant Coordinator (UCSD), 2003.

Member of the Society for the Study of Evolution (SSE), 2001-present; Canadian Society for Ecology and Evolution (CSEE), 2005-present; American Society for Microbiology (ASM), 2007-present.