BIOGRAPHICAL SKETCH

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NAME: Clinton S. Potter

eRA COMMONS USER NAME (credential, e.g., agency login): cpotter

POSITION TITLE: Director, Simons Electron Microscopy Center

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Rochester Institute of Technology, Rochester, NY	BS	1981	Photographic Science

A. Personal Statement

For 30 years, my career has focused on developing and managing the application of computational technologies to imaging systems with applications including satellite reconnaissance systems, medical imaging and structural biology. For the past 20 years, in collaboration with Bridget Carragher, I have focused on the development of technology for advancing electron microscopy methods for structural biology through automation with a focus on single-particle cryoEM. Projects have covered all aspects of the pipeline from grid substrate development and improved vitrification devices to developing automation software for data collection and processing. I have extensive experience designing, building, managing and running microscopy facilities and negotiating the purchase, installation and successful operation of high-end TEM systems (I have purchased and installed 5 FEI Titan Krios microscopes to date).

B. Positions and Honors

Positions and Employment

1977 Intern, National Center for Photographic Interpretation, Washington, DC.
1982-1985 Image Scientist, ITEK Optical Systems, Lexington, MA.
1985-1987 Scientific Programmer, Division of Nuclear Medicine, The Children's Hospital,
1987-1998 Image Processing Specialist/Senior Research Programmer, Beckman Institute for Advanced Science and Technology and Biomedical Magnetic Resonance Laboratory, University of Illinois, Urbana, IL.
1987-1999 Image Processing Specialist/Senior Research Programmer/Group Leader, National Center for Supercomputing Applications (NCSA)
1998-2001 Co-director, Imaging Technology Group, Beckman Institute, University of Illinois.
2001-2012 Associate Professor, Dept. of Cell Biology, The Scripps Research Institute, La Jolla, CA
2002-present Co-Director, National Resource for Automated Molecular Microscopy, La Jolla, CA
2007-present Founder and CEO, NanoImaging Services, Inc.
2012-2014 Professor, Dept. of Cell Biology, The Scripps Research Institute. La Jolla, CA.
2015- present Director of Electron Microscopy, New York Structural Biology Center, New York, NY
2015- present Adjunct Professor, Dept. of Biochemistry and Molecular Biophysics, Columbia University

Other Experience and Professional Memberships

1993	Co-organizer, Workshop on Real-time Applications of High-Performance Computing
1995	Co-organizer, Workshop on Advanced Computing and Biological Imaging
1999	Co-organizer, Workshop on Advanced Computing for Distributed Instrumentation, University of Illinois.
2001	Co-chair, Symposium on Instrument Automation, Microscopy and Microanalysis, Long Beach, CA
2003	Co-organizer, Multidisciplinary Workshop on Automated Particle Selection, April 24-25, La Jolla, CA
	Co-editor, Journal of Structural Biology, Special Issue on Automated Particle Selection
2003,2005	Co-organizer, A Practical Course In Molecular Microscopy, La Jolla, CA
2007,2009	Co-organizer, Advanced Topics in EM Structure Determination, La Jolla, CA
2012	Co-organizer, Workshop on Advanced Topics in EM Structure Determination, November 11-16, 2012, La Jolla, CA
2013	NIH P41 Review Panel
2014	Co-Chair, NIH P41 PI Annual Meeting
	NIH P41 Review Panel
	Co-organizer, Workshop on Advanced Topics in EM Structure Determination, November 9-14, 2014, La Jolla, CA
2015	Co-Editor, Journal of Structural Biology, Special Issue on Instrumentation

C. Contributions to Science

1. Automation for cryoTEM. For 20 years, we have focused on developing automated methods for data collection and processing for cryoTEM. During this time, the field has evolved from tedious manual data collection onto film where ~100 films could be collected per day to fully automated data collection using direct detector cameras where over 1000 movies are acquired and corrected automatically in 24 hours. Resolution has improved from "blobology" to sub 3A structures that allow de novo chain traces. The Leginon and Appion software that we have developed has contributed to this revolution and has served as a model for commercial software packages.

1. Potter CS, Chu H, Frey B, Green C, Kisseberth N, Madden TJ, Miller KL, Nahrstedt K, Pulokas J, Reilein A, Tcheng D, Weber D, Carragher B. Leginon: a system for fully automated acquisition of 1000 electron micrographs a day. Ultramicroscopy. 1999;77(3-4):153-61.
2.. Suloway C, Pulokas J, Fellmann D, Cheng A, Guerra F, Quispe J, Stagg S, Potter CS, Carragher B. Automated molecular microscopy: the new Leginon system. J Struct Biol. 2005;151(1):41-60.
3. Lander GC, Tang L, Casjens SR, Gilcrease EB, Prevelige P, Poliakov A, Potter CS, Carragher B, Johnson JE. The structure of an infectious P22 virion shows the signal for headful DNA packaging. Science. 2006;312(5781):1791-5.
4. Campbell MG, Veesler D, Cheng A, Potter CS, Carragher B. 2.8 A resolution reconstruction of the Thermoplasma acidophilum 20S proteasome using cryo-electron microscopy. Elife. 2015;4. PMCID: PMC4391500.

2. Specimen Preparation and Handling for TEM. We have developed new TEM grid substrates that are commercially available (C-Flats from Protochips) and widely used in the field. We have developed new approaches for screening multiple samples including robotic loading of samples and multiplexing multiple samples on a single grid. We have developed new approaches to vitrifying samples for cryoEM using piezoelectric dispense methods (Spotiton) and novel self wicking grids.

1. Quispe J, Damiano J, Mick SE, Nackashi DP, Fellmann D, Ajero TG, Carragher B, Potter CS. An improved holey carbon film for cryo-electron microscopy. Microsc Microanal. 2007;13(5):365-71.
2. Yoshioka C, Carragher B, Potter CS. Cryomesh: a new substrate for cryo-electron microscopy. Microsc Microanal. 2010;16(1):43-53. PMCID: 2840046.
3. Jain T, Sheehan P, Crum J, Carragher B, Potter CS. Spotiton: a prototype for an integrated inkjet dispense and vitrification system for cryo-TEM. J Struct Biol. 2012;179(1):68-75. PMCID: 3378829.
4. Razinkov I, Dandey VP, Wei H, Zhang Z, Melnekoff D, Rice WJ, Wigge C, Potter CS, Carragher B. A new method for vitrifying samples for cryoEM. J Struct Biol. 2016;195(2):190-8. PMCID: 5464370

3. Biological Projects Enabled by Automation. Our technology development has been driven by working closely with a wide range of collaborators focused on the biology. We have been fortunate to have talented graduate students and post-docs that liaise between the groups.

1. Davis JH, Tan YZ, Carragher B, Potter CS, Lyumkis D, Williamson JR. Modular Assembly of the Bacterial Large Ribosomal Subunit. Cell. 2016;167(6):1610-22 e15. PMCID: 5145266
2. Lyumkis D, Julien JP, de Val N, Cupo A, Potter CS, Klasse PJ, Burton DR, Sanders RW, Moore JP, Carragher B, Wilson IA, Ward AB. Cryo-EM structure of a fully glycosylated soluble cleaved HIV-1 envelope trimer. Science. 2013;342(6165):1484-90. PMCID: 3954647
3. Mulder AM, Yoshioka C, Beck AH, Bunner AE, Milligan RA, Potter CS, Carragher B, Williamson JR. Visualizing ribosome biogenesis: parallel assembly pathways for the 30S subunit. Science. 2010;330(6004):673-7. PMCID: 2990404.
4. Lander GC, Tang L, Casjens SR, Gilcrease EB, Prevelige P, Poliakov A, Potter CS, Carragher B, Johnson JE. The structure of an infectious P22 virion shows the signal for headful DNA packaging. Science. 2006;312(5781):1791-5.

4. Remote Microscopy for K-12 Education. In the very early days of the World Wide Web, we conceived projects where classrooms could remotely control microscopes from their classrooms. The first project, called Chickscope (**http://chickscope.beckman.uiuc.edu**), allowed classrooms to control an MRI system to image a developing chicken embryo over the 21 day incubation period. Chickscope was a one-time experiment. The second project called Bugscope (**http://bugscope.beckman.uiuc.edu**) was designed to be sustainable. It allowed classrooms to remotely use a scanning electron microscope to examine their own specimens. It has been running continuously since 1999 and has served over 200 schools.

1. Bruce BC, Carragher BO, Damon BM, Dawson MJ, Eurell JA, Gregory CD, Lauterbur PC, Marjanovic MM, Mason-Fossum B, Morris HD, Potter CS, Thakkar U. ChickScope: An interactive MRI classroom curriculum innovation for K-12. Computers and Education. 1997;29(2–3):73-87.
2. Potter CS, Carragher B, Carroll L, Conway C, Grosser B, Hanlon J, Kisseberth N, S.Robinson, Thakkar U, Weber D. Bugscope: A Practical Approach to Providing Remote Microscopy for Science Education Outreach. Microscopy and Microanalysis. 2001;7(3):249-52.

Complete list of published work in MyBibliography:
http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/45247561/?sort=date&direction=descending

D. Research Support

Ongoing Research Support

2P41GM103310-17 Carragher and Potter (PIs) 9/30/2002 - 03/31/2022
National Resource for Automated Molecular Microscopy
The overall goal is to establish a Research Resource for high-throughput molecular microscopy using automation for data acquisition and processing. Potter is PI/PD and co-director of this project.
Role: PI/PD

Past Research Support

1 R01 GM103966-01 Potter (PI) 04/01/13 - 02/28/2017

High Throughput EM Sample Preparation for Structural Biology

The objective is to develop a novel approach to TEM specimen preparation, incorporating miniaturization and small volume (picoliter to nanoliter) dispensing that will enable high throughput screening.
Role: PI

1 R01 GM099678 Carragher and Potter (PIs) 09/01/12 - 08/31/16

Continued Development and Maintenance of Appion Software

The objective is to provide support for the continued development and maintenance of the Appion software.
Role: PI