APPLICANT BIOGRAPHICAL SKETCH—Instructions
(see below for Actual Predoctoral Sample)

Use only for individual predoctoral and postdoctoral fellowships, dissertation research grants (R36),and Research Supplements to Promote Diversity in Health-Related Research (Admin Suppl). DO NOT EXCEED FIVE PAGES.

NAME OF APPLICANT: Marshall Huang

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

POSITION TITLE: PSTP Trainee

EDUCATION/TRAINING *(Most applicants will begin with baccalaureate or other initial professional education, such as nursing. Include postdoctoral training and residency training if applicable. High school students should list their current institution and associated information. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	START DATE MM/YYYY	END DATE *(or expected end date)* MM/YYYY	FIELD OF STUDY
Cornell University, College of Agriculture and Life Sciences (Ithaca, NY)	B.S.	08/09	05/13	Biological Sciences, Nutritional Sciences
University of Pittsburgh School of Medicine (Pittsburgh, PA)	M.D.	08/13	05/18	Medicine

NOTE: The Biographical Sketch may not exceed five pages. Follow the formats and instructions below.

A. Personal Statement

My long-term research goal is to elucidate the cellular and molecular mechanisms behind neurodegenerative processes. My undergraduate and medical school training have provided me with a strong background in cellular biology and neuroscience. While at Cornell University, my passion to study neurodegenerative diseases led me to Dr. Fenghua Hu's lab. There, I worked to determine the how a haplo-insufficiency of progranulin leads to frontotemporal lobar degeneration. Through this experience, I not only learned many essential molecular biology techniques, but also the theory behind them.

While at the University of Pittsburgh School of Medicine, I joined Dr. Robert Friedlander's lab in order to continue my work on neurodegeneration. As a renowned neurosurgeon who is heavily involved in both basic science research and clinical work, I found him to be the ideal mentor for my career aspirations. In addition, his group focuses on the pathophysiology of Huntington's disease, a goal I find both interesting and clinically significant. I have completed two years of medical school and am currently on a research year as a part of the Physician-Scientist Training Program. I was awarded the Walter L. Copeland Medical Student Scholar Fellowship in order to fund my research.

In recent years, finding effective treatments for neurodegenerative diseases has become increasingly urgent. Considering that the average age of our population is steadily increasing and that age is the greatest risk factor for neurodegeneration, we will likely see a dramatic rise in the incidence of these diseases in the near future. While I am concerned about all forms of neurodegeneration, Huntington's disease (HD) is of particular interest to me. Unlike Alzheimer's or Parkinson's disease, HD is virtually always attributable to a single genetic defect, which has led to the development of many accurate cell and animal models. This offers a unique opportunity to study disease pathogenesis and evaluate potential therapeutic interventions in a system that is highly translatable to humans.

Through my project, I aim to characterize the activity of the huntingtin protein on the mitochondria. Considering that many studies have linked mitochondrial dysfunction to neurodegeneration, I expect that this knowledge will elucidate the role of the critical protein that causes HD and one aspect behind mutant-huntingtin mediated neurodegeneration. Although my research is focused on HD, I hope that our findings reveal commonalities in the pathophysiology of several neurodegenerative diseases. My ultimate goal is to discover a connection between multiple causes of neurodegeneration and design a protective agent that is able to protect the brain from age-related degeneration. As a physician-scientist, I hope to not only improve the lives of my patients but also contribute globally by conducting patient-oriented clinical and basic science research.

B. Positions and Honors

ACTIVITY/ OCCUPATION	START DATE (mm/yy)	END DATE (mm/yy)	FIELD	INSTITUTION/ COMPANY	SUPERVISOR/ EMPLOYER
M.D. Student	08/13	Present	Medicine	University of Pittsburgh	Dr. Robert Friedlander
Undergraduate Research Student	01/12	05/13	Cell and Molecular Biology	Cornell University	Dr. Fenghua Hu
Undergraduate Research Student	06/11	09/11	Chemistry and Chemical Biology	Cornell University	Dr. Francis DiSalvo
Undergraduate Research Student	01/11	05/11	Plant Pathology and Plant-Microbe Biology	Cornell University	Dr. Michelle Cilia

Academic and Professional Honors

List any academic and professional honors that would reflect upon your potential for a research career and qualifications. Include all scholarships, traineeships, fellowships, and development awards. Indicate sources of awards, dates, and grant or award numbers. List current memberships in professional societies, if applicable.

Professional Memberships and Leadership Positions

2014 – 2015 Neurosurgery Interest Group, Founder and President

2014 – 2015 American Association of Neurological Surgeons Student Chapter, Founder

2014 – 2015 Student Interest Group in Neurology, President

Academic Honors / Awards

2015 – 2016 Walter L. Copeland Medical Student Scholar Fellowship

2015 – 2016 Physician Scientist Training Program

2014 Dean's Summer Research Project

2013 Magna Cum Laude, Cornell University

2010 – 2013 Dean's List

C. Contributions to Science (for predoctoral students and more advanced candidates only; high school students, undergraduates, and postbaccalaureates should skip this section)

The frontotemporal lobar degeneration risk factor, TMEM106B, regulates lysosomal morphology and function

A haploinsuffciency of progranulin (PGRN) is a common cause of frontotemporal lobar degeneration with ubiquitin positive inclusions of TDP-43 (FTLD-U), the second most common cause of early onset dementia. Genome-wide association studies have also found that single nucleotide polymorphisms in the TMEM106B

gene are a risk factor for FTLD-U, particularly in conjunction with PGRN mutations. This project investigated the functions of TMEM106B and its relationship to PGRN.

My role involved culturing T98G, N2A, and HEK293T cell lines for use in a variety of experiments. In order to determine if there was a direct interaction between TMEM106B and PGRN, I pulled down TMEM106B, along with anything complexed to it, from purified cell lysate with co-immunoprecipitations (Co-IP) and measured the protein concentrations by western blot. I also used the western blot to measure changes in PGRN levels after varying levels of TMEM106B expression.

We found that overexpression of TMEM106B resulted in the accumulation of enlarged lysosomes, impaired the degradation of endocytic cargoes, and elevated levels of PGRN. In addition, we found that TMEM106B is localized in the late endosome/lysosome compartments and its levels are regulated by lysosomal activities. We concluded that our molecular and cellular characterization of TMEM106B supports a role of TMEM106B in regulating lysosomal morphology and function. Considering that PGRN also functions in lysosomes, we believe that lysosomal dysfunction has critical role in the progression of FTLD-U.

Brady OA, Zheng Y, Murphy K, **Huang MJ**, Hu F. The frontotemporal lobar degeneration risk factor, TMEM106B, regulates lysosomal morphology and function. *Human Molecular Genetics*. 2013; 22(4):685–695. (peer-reviewed)

Structurally ordered intermetallic platinum–cobalt core–shell nanoparticles with enhanced activity and stability as oxygen reduction electrocatalysts

This project aimed to optimize the performance and durability of nanocatalysts for the oxygen reduction reaction (ORR) in fuel-cell applications. Instead of traditional carbon-supported platinum (Pt/C) nanoparticles, we were interested in creating structurally ordered intermetallic nanoparticles. In an attempt to create a stable catalyst with the highest ORR, we experimented with many combinations of elements.

My role in this project was to determine the best method to synthesize nanoparticles with a combination of platinum (Pt) with iron (Fe), nickel (Ni), and cobalt (Co). The ratios that I most commonly worked with were PtFe, PtNi, PtCo, $PtFe_{.2}Ni_{.8}$, $PtFe_{.5}Ni_{.5}$, and $PtFe_{.8}Ni_{.2}$. After synthesizing and annealing the nanocatalysts, I used x-ray diffraction to determine the structure. The samples were then tested durability and ORR activity. Our lab eventually found that ordered nanoparticles with Pt_3Co intermetallic cores and a 2–3 atomic-layer-thick platinum shell were more durable and active than Pt/C nanoparticles after 5,000 cycles. We concluded that these ordered intermetallic core-shell nanocatalysts could be used for the ORR in future fuel-cell applications.

D. Scholastic Performance

Predoctoral applicants: Using the chart provided, list by institution and year all undergraduate and graduate courses with grades. In addition, in the space following the chart, explain any marking system if other than 1-100, A, B, C, D, F, or 0-4.0 if applicable. Show levels required for a passing grade.

Postdoctoral applicants: Using the chart provided, list by institution and year all undergraduate courses and graduate scientific and/or professional courses germane to the training sought under this award with grades. In the space following the chart, explain any marking system if other than 1-100, A, B, C, D, F, or 0-4.0 if applicable. Show levels required for a passing grade.

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE

OMB No. 0925-0001 (Rev. 08/12 Approved Through 8/31/2015)

APPLICANT BIOGRAPHICAL SKETCH SAMPLE—PREDOCTORAL FELLOWS

(Note this Sample is for a Predoctoral Fellowship Applicant only and does not include information specific to R36 or Diversity Supplements. For a Postdoctoral Fellowship Sample, see: http://grants.nih.gov/grants/funding/424/postdocfellowshipbiosample.docx)

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NAME OF APPLICANT: Leilani Robertson-Chang

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

POSITION TITLE: Graduate Student Research Assistant

EDUCATION/TRAINING *(Most applicants will begin with baccalaureate or other initial professional education, such as nursing. Include postdoctoral training and residency training if applicable. High school students should list their current institution and associated information. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	START DATE MM/YYYY	END DATE *(or expected end date)* MM/YYYY	FIELD OF STUDY
Swarthmore College	B.A	08/2008	05/2012	Biology
UC San Diego	Ph.D.	08/2012	05/2018	Molecular Biology

A. Personal Statement

My long term research interests involve the development of a comprehensive understanding of key developmental pathways and how alterations in gene expression contribute to human disease. My academic training and research experience to date have provided me with an excellent background in molecular biology and microbiology. While in high school I was awarded an NIH Diversity Supplement award to work as a research technician for two summers in Dr. Indira Creative's lab at the University of Hawaii. As an undergraduate at Swarthmore College, I conducted research with Dr. Xavier Factor on the mechanisms of action of a new class of antibiotics. This resulted in a co-authorship publication, as well as an invitation to present a poster at the annual Antibiotica meeting in Denver, Colorado. For my graduate training at UC San Diego, I have moved into the fields of genetics and biochemistry by studying the regulation of transcription in yeast, under Dr. Tanti Auguri. Dr. Auguri is an internationally recognized leader in the field of yeast genetics and has an extensive record for training predoctoral and postdoctoral fellows. Along with giving me new conceptual and technical training, the proposed training plan outlines a set of career development activities and workshops – e.g. public speaking, literature analysis, biomedical ethics, and career options. For my initial project I am currently developing a novel protocol for the purification for components of large transcription complexes which I hope to submit as a first author publication in the next few months. As a native Hawaiian, I am the first in my family to graduate from college so I am excited to keep pushing forward with my education. Overall, I feel that my choice of sponsor, research project, and the training I will get from this fellowship will give me a solid foundation for my long-term goal to become an academic researcher.

B. Positions and Honors

ACTIVITY/ OCCUPATION	START DATE (mm/yy)	END DATE (mm/yy)	FIELD	INSTITUTION/ COMPANY	SUPERVISOR/ EMPLOYER
Lab Technician (Summers)	06/07	08/08	Biology	University of Hawaii	I.M Creative
Predoc	08/12	Present	Molecular Biology	UC San Diego	Xavier Factor

Academic and Professional Honors

Daughters of Hawaii Scholarship, 2008

National Merit Scholarship, 2008-2012

Paula F. Laufenberg award for best senior project in the Biology Department, Swarthmore College, 2012

B.S. awarded with high honors, Swarthmore College, 2012

NIH Diversity Supplement 2007-2008 (Summers)

Memberships in Professional Societies

Sigma Xi

Association for Women in Science

C. Contributions to Science

My contributions to science are organized to reflect the different research projects I have worked on to date, in high school, college, and now in graduate school.

I. High School Research: I spent two summers doing research in the laboratory of Dr. Indira M. Creative at University of Hawaii, funded by a NIH Diversity Supplement award. Dr. Creative has developed several new anti-fungal drugs that might protect against skin infections. Over the course of two summers I set up in vitro cultures of skin cell lines and conducted a wide range of toxicity assays. We were excited to find that one of the new agents showed almost no toxicity, even at fairly high doses. Dr. Creative is now testing the drug in animals exposed to different types of fungal infections, including *Candida albicans*.

Abstracts

Footman, B., Eisser, J.K., Robertson-Chang, L. and Creative, I.M. 1998. Testing XXH for toxicity in vitro. Abstract for poster presentation, University of Hawaii Research Symposium, Manoa, HI.

II. Undergraduate Research: I was part of a project in the laboratory of Dr. Xavier Factor at Swarthmore College. Dr. Factor's laboratory studies the mechanisms of action of antibiotics. During my time in his lab I was looking at how a new antibiotic, Gen Y, is able to unravel bacterial DNA. The work was particularly exciting because it looks like the mechanism used by Factor Y might be completely novel, making it a potential candidate for treating patients infected with antibiotic resistant organisms. Dr. Factor was recently awarded a patent for this new drug.

Research papers

Nieman, P.Y., Robertson-Chang, L., Pearson, K. and Factor, X. 2003. Gen Y: a novel antibiotic with DNA unwinding abilities. Cell. Mol. Biol. 30: 25-30.

Abstracts

Robertson-Chang, L. and Factor, X. Testing the ability of antibiotic Gen Y to kill Gram-negative bacteria. Abstract for poster presentation. 2002. Antibiotica annual meeting, Denver, Colorado, September 2002.

III. Graduate Research: My ongoing predoc research is focused on transcriptional gene regulation in *Saccharomyces cerevisiae.* I believe the results from my research will likely be highly relevant to human health as they will provide new details into the workings of complex biological systems, which will allow for further extrapolations into the development of certain diseases and their progression. I am currently developing a novel protocol for the purification for components of large transcription complexes which I hope to submit as a first author publication in the next few months.

Research papers

Robertson-Chang L and Auguri, T. 2005. A tandem affinity purification tag approach allows for isolation of interacting proteins in *Saccharomyces cerevisiae*. In preparation.

Abstracts

Robertson-Chang L and Auguri, T. A tandem affinity purification tag approach allows for isolation of interacting proteins in *Saccharomyces cerevisiae*. Abstract for poster presentation, 2004 Yeast Genetics and Molecular Biology Meeting, Seattle, Washington, September 2004.

D. Scholastic Performance

YEAR	SCIENCE COURSE TITLE	GRADE
	SWARTHMORE COLLEGE	
2008	Cellular and Molecular Biology	A
2008	Foundations of Chemical Principles	A
2009	Organismal and Population Biology	B
2009	Omics	B
2009	General Physics I	B
2009	Introductory Chemistry	A
2009	Organic Chemistry I	B
2010	General Physics II	B
2010	Organic Chemistry II	B
2010	Microbial Pathogenesis and the Immune Response	A
2010	Introduction to Cognitive Science	A
2010	Biological Chemistry	B
2011	Human Genetics	A
2011	Senior Project	A
2011	Bioinformatics	B
2012	Cell Biology	A
2012	Physics in Modern Medicine	A
2012	Genomics and Systems Biology	A
2012	Senior Project	A
	UC SAN DIEGO	

YEAR	OTHER COURSE TITLE	GRADE
	SWARTHMORE COLLEGE	
2008	First Year Seminar: Nation and Migration	A
2009	Statistics, Probability, and Reliability	A
2009	Calculus I	B
2010	American Literature	B
2011	Anthropology of Childhood and the Familv	A
2011	Disease, Culture and Society in the Modern World	A

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
2012	Seminar in Genetics	P			
2013	Statistics for the Life Sciences	P			
2013	Ethics in Biological Research	CRE			
2014	Seminar in Physiology & Behavior	P			

Except for the scientific ethics course, UC San Diego graduate courses are graded P (pass) or F (fail). Passing is C plus or better. The scientific ethics course is graded CRE (credit) or NC (no credit). Students must attend at least seven of the eight presentation/discussion sessions for credit.