



VICE CHANCELLOR FOR RESEARCH OFFICE
Exceptional Principal Investigator Status Justification Form

Applicant Name: Andrew Rominger Dept./Unit: BNHM

Unit head and dean attest to the following:

- The investigator has primary responsibility for design, execution, and management of the project and will be involved in the project in a significant manner.
- The sponsoring department/unit has committed to continue the investigator's appointment for the duration of the grant and will provide resources.
- The proposed project is sufficiently important to the achievement of educational, research, or public service goals of the submitting unit and of the University of California, to justify an additional focus of independent project development and the explicit or implicit allocation of University resources, given competing requirements especially those necessary for the administering unit.
- The support of graduate students and/or postdocs in the conduct of their research, and/or the participation of undergraduate students in the research project, should be a component of the project or program for which the eligibility exception is being requested. **If not, include justification below.**
- Individuals recommended for Principal Investigator status on a research project must possess qualifications which satisfy the general standards of research competence appropriate to the professorial rank and step comparable to the non-Senate academic appointment held by the candidate. Recommendations for service as Project Director on a training or public service project will be evaluated in terms of individual competence in the program area.

Provide in space below **or** in an attached document a detailed justification for exception, addressing the candidate's qualifications in accordance with items 4(a) through 4(d) of the Principal Investigator Status

Policy: <http://vcresearch.berkeley.edu/principal-investigator-status>.

Dr. Andrew Rominger is currently postdoctoral fellow in the Berkeley Initiative in Global Change Biology (BiGCB) project at UC Berkeley. We request that he be granted Exceptional Principal Investigator status for a proposal entitled "MSB-ENSA: Combining Gradients of Space and Time to Understand Biodiversity Dynamics in the Hawaiian Islands" to be submitted to the National Science Foundation in October 2016. The project, if funded, will remain under the mentorship of Rosemary Gillespie. Andrew, who is a US citizen, is currently paid from the College of Natural Resources at UC Berkeley for data science efforts associated with BiGCB until July 2017. Funds from this grant, if approved by NSF in March 2017 will take effect in July 2017. This Macrosystems proposal builds on Andrew's strengths in ecological theory, while also continuing to strengthen existing connections between this Data Science effort and the BiGCB. The project aims to integrate ecological and evolutionary biodiversity data in the Hawaiian Islands to develop insights into mechanisms underlying biodiversity on a regional and global scale. Turning to Andrew himself, he is a truly exceptional scholar and innovator, working at the cutting edge of software development and eco-informatics. His work straddles very different fields of biology, and during his PhD he was co-advised by me (evolutionary ecology and population genetics) and Professor John Harte (theoretical macroecology) in Energy and Resources. Thus, he has been able to merge highly theoretical and abstract concepts, with real field and lab data and natural history. His exceptional computational skills allow him to leverage "big data", a particularly important skill as we try to navigate through the deluge of environmental data that are becoming available from disparate sources, including data from museum specimens, genomics, environmental sensor networks, and many more. In the course of the project, Andrew will be involved in training a graduate student and multiple undergraduates in the area of theoretical macroecology and evolution. He is certainly ready to lead, and would benefit from doing so.

Kipling Will

Chair/Director

Kipling W.
Will

PRINT NAME

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Date: 2016.09.27 04:22:14 -07'00'

27 Sept 2016

Chair/Director

SIGNATURE

Date

Charles Marshall

Dean

PRINT NAME

Dean

SIGNATURE

Date



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Kipling Will

Chair/Director PRINT NAME

Charles Marshall

Dean PRINT NAME

Chair/Director SIGNATURE Date

Charles R. Marshall
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Dean SIGNATURE

9/26/2016

Date

Andrew J. Rominger

CONTACT INFORMATION	Department of Environmental Science, Policy & Management University of California, Berkeley 130 Mulford Hall Berkeley, CA 94720 USA	<i>Phone:</i> +1-650-862-6063 <i>E-mail:</i> rominger@berkeley.edu <i>Web:</i> nature.berkeley.edu/~rominger
EDUCATION	University of California, Berkeley Ph.D. Environmental Science, Policy & Management <i>Committee:</i> Rosemary Gillespie, John Harte & Charles Marshall <i>Dissertation:</i> The statistical mechanics of biodiversity	2016
	Stanford University B.S. in Biological Sciences <i>Advisors:</i> Elizabeth Hadly & Rodolfo Dirzo <i>Honors thesis:</i> Both neutral and deterministic processes drive community structure	2009
APPOINTMENTS	Postdoctoral Fellow , National Institute of Mathematical and Biological Synthesis, University of Tennessee	starting 2017
	Postdoctoral Fellow , Berkeley Initiative in Global Change Biology, UC Berkeley	2016
	Fulbright Scholar , Pontificia Universidad Católica de Chile	2010
PEER- REVIEWED PUBLICATIONS	Rominger AJ , Merow C. (2016) meteR : An R package for testing the Maximum Entropy Theory of Ecology. In press at <i>Methods in Ecology and Evolution</i> .	in press
	Sardinas HS, Tom K, Rominger AJ , Kremen C. (2016). Patterns of native bee crop pollination within agricultural fields are limited by nest site location. In press at <i>Ecological Applications</i> .	
	Rominger AJ , <i>et al.</i> (2016). Community assembly on isolated islands: Macroecology meets evolution. <i>Global Ecology and Biogeography</i> 25: 769–780.	2016
	Rominger AJ Rominger, A.J. (2016) Ecological Theories in Biogeography. In: Kliman, R.M. (ed.), <i>Encyclopedia of Evolutionary Biology</i> 1: 145–148. Oxford: Academic Press.	
	Harte J, Rominger AJ , Zhang W. (2015). Integrating macroecological metrics and community taxonomic structure. <i>Ecology Letters</i> 18: 1068–1077.	2015
	Harte J, Kitze J, Newman E & Rominger AJ . (2013). Taxon categories and the universal species-area relationship: A comment on Sizling et al. <i>The American Naturalist</i> 181: 282–287.	2013
	Maurer BA, Kembel SW, Rominger AJ & McGill BJ. (2012). Estimating metacommunity extent using data on species abundances, environmental variation, and phylogenetic relationships across geographic space. <i>Ecological Informatics</i> 13: 114–122.	2012
	Karp DS, Rominger AJ , Zook J, Ranganathan J, Ehrlich PR & Daily GC. (2012). Intensive agriculture erodes β -diversity at large scales. <i>Ecology Letters</i> 15: 963–970.	

	Rominger AJ , Miller TEX & Collins SL. (2009). Relative contributions of neutral and niche-based processes to the structure of a desert grassland grasshopper community. <i>Oecologia</i> 161: 791–800.	2009
	Rominger AJ , Fuentes MA, Marquet PA. (submitted). Punctuated non-equilibrium in the volatility of macroevolution drives complex trajectories of Phanerozoic diversity. Submitted to <i>Nature Ecology and Evolution</i> .	submitted
AUTHORED SOFTWARE	Rominger AJ , pika : An R package for testing and visualization macroecology. https://github.com/ajrominger/pika	2016
	Rominger AJ , Merow C. (2015). meter : Testing the Maximum Entropy Theory of Ecology. R package version 1.0. http://CRAN.R-project.org/package=meter	2015
GRANTS	NSF Biocollections Postdoc , University of Florida (declined). \$137,000	2016
	Philomathia Graduate Student Fellowship , UC Berkeley. \$20,000	2015
	Berkeley Initiative in Global Change Biology Workshop Grant , UC Berkeley. \$10,000	2014
	National Science Foundation Grant DEB 1241253 : Dimensions of Biodiversity—Community level approach to understanding speciation in Hawaiian lineages. I contributed to the design and writing of grant sections dealing with sampling strategy, statistical analysis and ecological theory testing and development.	2012–2017
	Graduate Research Fellowship , National Science Foundation. \$121,000	2011–2015
	Walker Fund for Entomology , Essig Museum of Entomology. \$4,200	
AWARDS & HONORS	Outstanding GSI Award , University of California, Berkeley	2015
	Usinger Award in Entomology , University of California, Berkeley	
	Kennedy Prize for Outstanding Honors Thesis , Stanford University. Given to one thesis in the Natural Sciences	2009
	Firestone Medal for Excellence in Undergraduate Research , Stanford University. Given to ten finishing students in the Department of Biology	
	Award for Excellence in Teaching , Stanford University	
ORGANIZED WORKSHOPS	Big ecological questions, diverse data, new methods . I organized and secured funding from the Berkeley Initiative in Global Change Biology for a workshop bringing together leaders in ecological theory, statistics and data digitization efforts to help map future directions for ecoinformatics.	2014
	Global change biogeography . Created and lead a Berkeley Initiative in Global Change Biology working group.	2012–2013

INVITED TALKS	Rominger AJ. (2016). Isolated islands untangle universal patterns at the nexus of macroevolution and macroecology. <i>Island Biology 2016</i> . Terceira Island, Azores, Portugal.	2016
	Rominger AJ. (2015). Community assembly on isolated islands: Macroecology meets evolution. <i>Evolution 2015</i> . Sao Palo, Brazil.	2015
	Rominger AJ. (2014). Theory based perspectives on global change biology. Berkeley Initiative in Global Change Biology site visit by the Moore Foundation.	2014
	Rominger AJ. (2013). Evolutionary constraints and information entropy in ecology. 98 th <i>Ecological Society of America Annual Meeting</i> . Minneapolis, MN, USA.	2013
	Rominger AJ. (2012). Specimen-based biogeography: Imperfect detection and biased sampling. 6 th <i>Biannual Meeting of the International Biogeography Society</i> . Miami, FL, USA.	2012
	Rominger AJ, Gruner D, Harte J & Gillespie RG. (2011). Making and breaking a new ecological theory. <i>Evolution of the Pacific</i> . Honolulu, HI, USA.	2011
SELECTED CONFERENCE PRESENTA- TIONS	Rominger AJ. How to be happy when your data are SAD. 101 st <i>Ecological Society of America Annual Meeting</i> . Ft. Lauderdale, FL, USA.	2016
	Rominger AJ, Gillespie R. (2015). Macroevolutionary signals of insular adaptive radiations: Synthesizing across island systems with a novel statistical method. 7 th <i>Biannual Meeting of the International Biogeography Society</i> . Bayreuth, Germany.	2015
	Rominger AJ, M'Gonigle L, Maher SP, Iknayan KJ, Chang L, Rapacciuolo G, Holroyd P. (2014). Estimating community change from sporadic data: A novel statistical technique sheds light on continental-scale ecology of the Pleistocene-Holocene transition. 99 th <i>Ecological Society of America Annual Meeting</i> . Sacramento, CA, USA.	2014
	Rominger AJ, Gruner D, Harte J & Gillespie RG. (2012). Making and breaking a new ecological theory. 97 th <i>Ecological Society of America Annual Meeting</i> . Portland, OR, USA.	2012
	Rominger AJ, Fuentes MA & Marquet PA. (2011). Volatility of clade-specific random walks evolves across lineages and drives complex diversification patterns through geologic time. 96 th <i>Ecological Society of America Annual Meeting</i> . Austin, TX, USA.	2011
	Rominger AJ & Hadly EA. (2009). Geographic diffusion of New World bird species: Energetics, inter-continental dispersal, vicariance and diversification. 4 th <i>Biannual Meeting of the International Biogeography Society</i> . Merida, Yucatan, Mexico.	2009
	Rominger AJ, Miller TEX & Collins SL. (2007). Dispersal, determinism and the structure of a local grasshopper community. 92 nd <i>Ecological Society of America Annual Meeting</i> . San Jose, CA, USA.	2007
TEACHING EXPERIENCE	Graduate Student Instructor, UC Berkeley ESPM 174: Design and Analysis of Ecological Studies <i>Instructor:</i> Perry de Valpine Graduate Student Instructor, UC Berkeley INTEGRATIVE BIOLOGY 166: Evolutionary Biogeography <i>Instructor:</i> Anthony Barnosky	2014

	R Tutorials , Stanford University and UC Berkeley R and phylogenetics. Evo Lab group, UC Berkeley <i>December 2013</i> General R. Evo Lab group, UC Berkeley <i>December 2012</i> Advanced R plotting. Hadly Lab group, Stanford University <i>March 2010</i> General R. Hadly Lab group, Stanford University <i>December 2011</i> Teaching Assistant , Stanford University BIOLOGY 121: Biogeography <i>Instructor: Elizabeth Hadly</i>	2010–2013 2009
MENTORING EXPERIENCE	Karen Gallardo: Soundscape evolution across the Hawaiian chronosequence. Edward Huang: Scientific computing and biocollections database management with R. Brittany Mathat: Phylogeny and biogeography of native Hawaiian <i>Nabis</i> . Kelley Henning: Microbiome of native Hawaiian arthropods Crispin Herrick: Populations genetics of native Hawaiian spiders Terisa Yiin: Phylogeography, population genomics and speciation mechanisms of the spider genus <i>Ariamnes</i> Victoria Knorr: Integrating the Red Queen hypothesis with biogeography using fossil mammals Addien Wray: Analysis of island β -diversity patterns and land-use change.	current 2016 2015 2014 2013
OUTREACH	Board Member Talking Talons Youth Leadership Community Fund, an organization that funds environmental education projects. Community presentation speaker Present at youth and environmental group meetings including Central New Mexico Audubon Society and Pacific Internship Programs for Exploring Science about science, conservation and environmental education. Splash instructor Thought an interactive course about global change biology to K-12 students as part of Stanford University’s Educational Studies Splash Program. Natural history docent Lead classroom and community tours of Jasper Ridge Biological Preserve (Stanford University) focusing on local conservation issues, ecology, evolution and geology.	2013–present 2009–present 2009 2006–present
PROFESSIONAL SERVICE	Referee for: <i>Ecology Letters</i> <i>Proceedings of the Royal Society B</i> <i>The American Naturalist</i> <i>Ecology</i> <i>Journal of Theoretical Biology</i> <i>Oecologia</i> <i>PLoS ONE</i>	

COLLABORATIVE PROPOSAL: MSB-ENSA: COMBINING GRADIENTS OF SPACE AND TIME TO UNDERSTAND BIODIVERSITY DYNAMICS IN THE HAWAIIAN ISLANDS

Biological diversity is fundamentally important to the functioning of all natural and human-engineered ecosystems. Yet we still have only a very rudimentary understanding of biodiversity as a dynamic process – *how has it been shaped in the past, and what are the expectations as we move into the future? How will associated ecosystems adapt to global change?* A grand challenge in understanding the origins of biodiversity is to disentangle the influence of evolutionary and historical processes operating at larger spatiotemporal scales from ecological processes operating at smaller scales. One underexploited system that provides an opportunity to integrate ecological and evolutionary processes is that of remote island archipelagoes, in particular when the component islands are arranged chronologically, as is found in “hotspot” islands with multiple discrete volcanoes each providing elevational gradients with contrasting physiological barriers (temperature and rainfall) across the gradient, and that have incurred radically different anthropogenic impacts. Our proposed research aims to use the Hawaiian Island chronosequence as a natural laboratory for understanding community interactions that underlie biodiversity dynamics and environmental change by incorporating new technologies and theoretical approaches, coupled with standardized sampling protocols, thus providing temporal replicates of the same ecological and evolutionary processes across gradients of elevation. The primary goals of the project are two-fold: (1) Characterizing the biotic community using metabarcoding and related approaches to look at soils &/or atmospheric attributes; microbial diversity; and arthropod and plant diversity. (2) Look at how entire communities are changing (especially in the context of invasions and disease) across the elevation gradients and over the chronosequence using approaches including ecological interaction networks; assessing the predictability of patterns of community assembly and diversification/ extinction; effect of trophic level on diversification; and the effect of interactions on diversification. We will make use of a National Ecological Observatory Network (NEON) site on the Big Island of Hawaii, and integrate the data generated with data currently being generated as part of a NSF Dimensions in Biodiversity project. The data will be integrated into a statistical and Bayesian framework in order to determine signatures of change from ecological processes to evolutionary processes over gradients of elevation, precipitation, and time.

BUDGET JUSTIFICATION

B1. **Postdoctoral Researcher Salary.** Theoretical development will be coordinated by postdoc Andrew Rominger on the UC Berkeley campus. We are requesting 20 months of funding for a postdoc to perform the theoretical work. \$80,690

B1. **Postdoctoral Researcher Salary.** Lab work (genomic) will be coordinated by postdoc Henrik Krehenwinkel on the UC Berkeley campus. We are requesting 20 months of funding for a postdoc to perform the molecular work. \$80,690

B1. **Postdoctoral Researcher Salary.** Microbial work will be coordinated by Eion Brodie at the Lawrence Berkeley lab. We are requesting 20 months of funding for postdoc Javier Ceja Navarro to perform the microbial work. \$80,690

B3. **Graduate Students** (Graduate Student Researchers, step IV, 1 full time in year 1. Jun Ying Lim will work for a year on the project, developing work on plants. He is based at Berkeley. \$21,917

C. **Fringe.** Benefits calculated at a projected weighted amount, as follows, due to division of fiscal years and the start/end date of the project:

	FY17	FY18	FY19
Postdoc	21%	21%	21%
Grad/Undergrad	0.0%	0.0%	0.0%

D. Equipment

None requested

E1. Travel, Domestic

Fieldwork in Hawaii. To sample and collect populations and species of arthropods and other organisms. Airfare Hawaii \$750/trip, interisland flights \$90 (5 each), accommodation 15 days, \$20/ day. Vehicle \$100/ day. \$1,500 for each of 4 participants for first 2 years, one participant in 3rd year

Travel for co-PI Jonathan Chase from Germany. \$4000/ year for 4 years.

G1. **Materials and Supplies.** We are requesting funds for molecular and microbial work at the rate of \$100,000 for the first 2 years, \$20,000 for the third.

G6. **Other direct costs:**

Graduate Student Fees. (Year 1), \$15,733.

I. **Indirect Costs.** Under the new Indirect Cost Rate Agreement dated 6/29/12, rates are set by fiscal year. We applied the FY16 rate (57%) for Years 1-3. Indirect costs are calculated using the Modified Total Direct Cost (MTDC). MTDC excludes equipment over \$5000 and fee remission.

TOTAL: \$798,866

(additional funds will be requested for collaboratives at the University of Hawaii Hilo, and the University of Maryland, for a total budget of \$1,499,572)