resume\_25@gmail.com  
316-291-4608  
David Lucero Public Health Analyst  
Burlington VT - Email me on Indeed: indeed.com/r/David-Lucero/1d742930ed41b354  
WORK EXPERIENCE  
Graduate Researcher Vermont USA  
University of Vermont - Burlington VT - August 2008 to July 2013  
Primary research focused on monitoring indicators of disease risk across time and space in 2 indigenous communities in rural Latin America. Secondary responsibility included managing the Stevens laboratory (e.g. negotiating with vendors QA/QC experiments and equipment etc.). Trained and supervised 48 scientists (4 international 3 American 3 PhDs 30 international undergraduates and 8 American undergraduates) in biological assays and interpretation techniques.  
1. Sustainable Public Health Initiative in Guatemala  
Sustainable interventions to control Chagas disease insect vectors were applied between 2002 and 2009 in conjunction with partners in the Guatemalan Ministry of Health and local University. Person-hour surveys of disease risk (e.g. abundance of insect vectors cleanliness index wall/ floor construction etc.) were administered 5 times during this period.  
o Positive Control Impact: Household reinfestation of insect vectors maintained below 5% over 9 years despite previous studies reporting a rapid 4 month reinfestation with traditional intervention methods.  
o Positive Educational Impact: Residents were trained in developing a cement-like compound from local resources. Findings shared with scientific community via peer-reviewed publication.  
o Analytical tools: Esri ArcGIS 10.1 high-res imagery MATLAB-coded spatial models SAS JMP Pro 10 MS Access PCR  
2. Secondary Hosts and Sylvatic Reinfestation in Bolivia  
Between 2011 and 2012 person-hour surveys of disease risk (e.g. abundance of insect vectors primary hosts secondary hosts etc.) were administered in conjunction with Bolivian Ministry of Health and local University researchers. Sylvatic insect vectors were collected with traps and blood meals were subsequently analyzed to monitor migration.  
o Positive Control Impact: Sylvatic vectors are potential sources of reinfestation. Secondary hosts vary in their statistical correlation with household infestation. Roads may aid in passive migration of insect vectors.  
o Positive Educational Impact: Government officials and Bolivian University students were trained in the use of ESRI Arc GIS 10.1 GPS acquisition and advanced molecular biology techniques. Findings were shared with stakeholders (e.g. public health officials community members etc.) via presentations and reports.  
o Analytical tools: Esri ArcGIS 10.1 MATLAB-coded spatial models Graph Pad Prizm Sequencher Sequencing Cloning qPCR  
Teaching Assistant Vermont USA  
University of Vermont - Burlington VT - August 2009 to January 2013  
Prepared and presented PhD and undergraduate level coursework for 20 to 250 students per semester across 5 courses.  
Evaluated progress weekly with assignments and grades.  
Performed troubleshoot on various statistical and molecular ecology software across OS platforms.  
1. Graduate Teaching Assistant Genetics (Spring 2012)  
   
2. Guest Lecturer and Graduate Teaching Assistant Population Genetics (Fall 2009 2011 2012) 3. Graduate Teaching Assistant Biology 2 (Spring 2010 2011)  
4. Guest Lecturer and Graduate Teaching Assistant Biology 1 (Fall 2010)  
5. Undergraduate Teaching Assistant Sustainable Community Development (Spring 2008)  
Research Fellow  
EcoHealth - \_\_\_ - June 2011 to September 2011  
Research focused on H5N1 evolution (avian flu) post-vaccination of the avian host nationally.  
o Positive Control Impact: H5N1 strains are rapidly evolving; therefore public health officials should consider these findings before administering another blanket vaccination.  
o Positive Educational Impact: Scientific writing workshops in English for non-native speakers led to numerous reports and publication drafts.  
o Analytical tools: RT-PCR Gel Electrophoresis MS Excel MS Word Google Translate  
Undergraduate Researcher  
University of Vermont - Burlington VT - December 2004 to July 2008  
Primary research focused on monitoring Chagas disease insect vector movement within and between indigenous communities in rural Bolivia with kinship and bloodmeal analysis.  
o Positive Control Impact: One rural town in Bolivia displayed high vector movement and was surveyed in my Graduate Researcher position.  
o Positive Educational Impact: Research led to 3 scientific publications. Findings were shared with the University at least 2 times a year via presentations and posters.  
o Analytical tools: MS Powerpoint Structure Genepop Multiplex PCR Microsatellites  
EDUCATION  
Ph.D. in Biology (Public Health concentration)  
University of Vermont (College of Arts and Sciences) - Burlington VT 2008 to 2013  
B.S. in Natural Resources Self-designed (Infectious diseases concentration)  
University of Vermont (Rubenstein School of Natural Resources) - Burlington VT 2004 to 2008  
SKILLS  
Fluent in Spanish Research Scientific Writing Molecular Biology (e.g. qPCR Cloning Sequencing Gel Electrophoresis) Spatial Statistics GIS Windows Apple OSX Apple iOS Android  
PUBLICATIONS  
Ecohealth interventions limit triatomine reinfestation in La Brea Guatemala. American Journal of Tropical Medicine and Hygiene  
http://www.ajtmh.org/content/88/4/630.short  
February 4 2013  
Published Abstract  
In this study we evaluate the effect of participatory Ecohealth interventions on domestic reinfestation of the Chagas disease vector Triatoma dimidiata after village-wide suppression of the vector population using a residual insecticide. The study was conducted in the rural community of La Brea Guatemala between 2002  
   
and 2009 where vector infestation was analyzed within a spatial data framework based on entomological and socio-economic surveys of homesteads within the village. Participatory interventions focused on community awareness and low-cost home improvements using local materials to limit areas of refuge and alternative blood meals for the vector within the home and potential shelter for the vector outside the home. As a result domestic infestation was maintained at \_\_ 3% and peridomestic infestation at \_\_ 2% for 5 years beyond the last insecticide spraying in sharp contrast to the rapid reinfestation experienced in earlier insecticide only interventions.  
Household model of Chagas disease vectors (Hemiptera: Reduviidae) considering domestic peridomestic and sylvatic vector populations. Journal of Medical Entomology http://www.bioone.org/doi/abs/10.1603/ME12096  
May 7 2013  
Published Abstract  
Disease transmission is difficult to model because most vectors and hosts have different generation times. Chagas disease is such a situation where insect vectors have 12 generations annually and mammalian hosts including humans can live for decades. The hemataphagous triatominae vectors (Hemiptera: Reduviidae) of the causative parasite Trypanosoma cruzi (Kinetoplastida: Trypanosomatidae) usually feed on sleeping hosts making vector infestation of houses peridomestic areas and wild animal burrows a central factor in transmission. Because of difficulties with different generation times we developed a model considering the dwelling as the unit of infection changing the dynamics from an indirect to a direct transmission model. In some regions vectors only infest houses; in others they infest corrals; and in some regions they also infest wild animal burrows. We examined the effect of sylvatic and peridomestic vector populations on household infestation rates. Both sylvatic and peridomestic vectors increase house infestation rates sylvatic much more than peridomestic as measured by the reproductive number R0. The efficacy of manipulating parameters in the model to control vector populations was examined. When R0 > 1 the number of infested houses increases. The presence of sylvatic vectors increases R0 by at least an order of magnitude. When there are no sylvatic vectors spraying rate is the most influential parameter. Spraying rate is relatively unimportant when there are sylvatic vectors; in this case community size especially the ratio of houses to sylvatic burrows is most important. The application of this modeling approach to other parasites and enhancements of the model are discussed.  
Vector blood meals and Chagas disease transmission potential United States. Emerging Infectious Diseases  
http://wwwnc.cdc.gov/eid/article/18/4/11-1396\_article.htm  
April 2012  
Published Abstract  
A high proportion of triatomine insects vectors for Trypanosoma cruzi trypanosomes collected in Arizona and California and examined using a novel assay had fed on humans. Other triatomine insects were positive for T. cruzi parasite infection which indicates that the potential exists for vector transmission of Chagas disease in the United States.  
Chagas Disease: Trypanosoma cruzi the first hundred years Triatomine Biology Chapter 8  
http://www.sciencedirect.com/science/bookseries/0065308X/75  
2011  
Published Abstract  
A complete picture of Chagas disease requires an appreciation of the many species of kissing bugs and their role in transmitting this disease to humans and other mammals. This chapter provides an overview of the taxonomy of the major species of kissing bugs and their evolution. Knowledge of systematics and biological kinship of these insects may contribute to novel and useful measures to control the bugs. The biology of kissing  
   
bugs their life cycle method of feeding and other behaviours contributing to the transmission of Trypanosoma cruzi are explained. We close with a discussion of vector control measures and the allergic complications of kissing bug bites a feature of particular importance in the United States.  
A method for the identification of guinea pig blood meal in the Chagas disease vector Triatoma infestans  
http://www.kinetoplastids.com/content/6/1/1  
Published Abstract  
Background  
In a SINE-based PCR assay a primer set specific for guinea pig genome short interspersed elements DNA was used to test the utility of genomic markers for identifying the source of vertebrate blood meals of Triatoma infestans.  
Methods  
The investigation consisted of two assays. In Assay 1 thirty-six insects collected from the Province of ZudaՁnez in Chuquisaca Bolivia were frozen 140 hours after feeding under controlled conditions on guinea pigs. The species of the vertebrate host was confirmed from dissection of the posterior part of the abdomen of each insect followed by DNA extraction and PCR amplification. Assay 2 investigated whether the technique worked under field conditions. We analyzed the bloodmeal of 34 insects collected from households and peri- domestic structures from communities where wild and captive guinea pigs occur. After collection the insects were maintained at room temperature for 2 months without feeding and then analyzed.  
Results  
In Assay 1 each of the 36 insects allowed to feed on guinea pig blood tested positive for guinea pig DNA. The guinea pig DNA was reliably identified in as little as 1 hour and up to 40 hours after feeding. For Assay 2 8 out of the 34 samples (23%) showed positive results with guinea pig specific primers.  
Conclusion  
The results in assay 1 demonstrated that DNA from the vertebrate host can be amplified 140 hours post feeding from the abdomen of the blood-feeding Chagas disease vector Triatoma infestans. The results in assay 2 confirmed that the procedure works on insects collected from households and peri-domestic structures and that the source of a blood meal can be determined at least 2 months post feeding.  
PCR reveals significantly higher rates of Trypanosoma cruzi infection than microscopy in the Chagas vector Triatoma infestans: High rates found in Chuquisaca Bolivia http://www.biomedcentral.com/1471-2334/7/66  
June 27 2007  
Published Abstract  
Background  
The Andean valleys of Bolivia are the only reported location of sylvatic Triatoma infestans the main vector of Chagas disease in this country and the high human prevalence of Trypanosoma cruzi infection in this region is hypothesized to result from the ability of vectors to persist in domestic peri-domestic and sylvatic environments. Determination of the rate of Trypanosoma infection in its triatomine vectors is an important element in programs directed at reducing human infections. Traditionally T. cruzi has been detected in insect vectors by direct microscopic examination of extruded feces or dissection and analysis of the entire bug. Although this technique has proven to be useful several drawbacks related to its sensitivity especially in the case of small instars and applicability to large numbers of insects and dead specimens have motivated researchers to look for a molecular assay based on the polymerase chain reaction (PCR) as an alternative  
   
for parasitic detection of T. cruzi infection in vectors. In the work presented here we have compared a PCR assay and direct microscopic observation for diagnosis of T. cruzi infection in T. infestans collected in the field from five localities and four habitats in Chuquisaca Bolivia. The efficacy of the methods was compared across nymphal stages localities and habitats.  
Methods  
We examined 152 nymph and adult T. infestans collected from rural areas in the department of Chuquisaca Bolivia. For microscopic observation a few drops of rectal content obtained by abdominal extrusion were diluted with saline solution and compressed between a slide and a cover slip. The presence of motile parasites in 50 microscopic fields was registered using 400 magnification. For the molecular analysis dissection of the posterior part of the abdomen of each insect followed by DNA extraction and PCR amplification was performed using the TCZ1 (5' CGA GCT CTT GCC CAC ACG GGT GCT 3') and TCZ2 (5' CCT CCA AGC AGC GGA TAG TTC AGG 3') primers. Amplicons were chromatographed on a 2% agarose gel with a 100 bp size standard stained with ethidium bromide and viewed with UV fluorescence.  
For both the microscopy and PCR assays we calculated sensitivity (number of positives by a method divided by the number of positives by either method) and discrepancy (one method was negative and the other was positive) at the locality life stage and habitat level. The degree of agreement between PCR and microscopy was determined by calculating Kappa (k) values with 95% confidence intervals.  
Results  
We observed a high prevalence of T. cruzi infection in T. infestans (81.16% by PCR and 56.52% by microscopy) and discovered that PCR is significantly more sensitive than microscopic observation. The overall degree of agreement between the two methods was moderate (Kappa = 0.43 α 0.07). The level of infection is significantly different among communities; however prevalence was similar among habitats and life stages.  
Conclusion  
PCR was significantly more sensitive than microscopy in all habitats developmental stages and localities in Chuquisaca Bolivia. Overall we observed a high prevalence of T. cruzi infection in T. infestans in this area of Bolivia; however microscopy underestimated infection at all levels examined.  
ADDITIONAL INFORMATION SOFTWARE PROFICIENCY  
EndNote X6 5 years  
Esri ArcGIS 10.1 8 years Genepop 6 years  
Graph Pad Prizm 6 2 years MATLAB R2012 5 years Microsoft Office 11 years Sequencher 5 years  
SAS JMP V10 Pro 6 years Structure 7 years  
INVITED PRESENTATIONS  
November 2012. Probing for indicators of Chagas disease risk. Meegid XI: 11th International Conference on Molecular Epidemiology and Evolutionary Genetics of Infectious Diseases Loyola University New Orleans Louisiana.  
September 2012. Landscape risk factors associated with Chagas disease infestation in Zurima Bolivia. Biology Symposium at the Universidad San Francisco Xavier de Chuquisaca Sucre Bolivia.  
January 2011. Home alone? Understanding the Spatial Distribution of a Chagas Disease Insect Vector Across Traditional and Sustainable Public Health Initiatives in La Brea Guatemala. Ecological Lunch Symposium at the University of Vermont Burlington Vermont.  
August 2010. What Can We Gain From Interdisciplinary Research? A Focus on Geographic Information Systems Spatial Statistics and Population Genetics. Biology Symposium at the Universidad San Francisco Xavier de Chuquisaca Sucre Bolivia.  
June 2010. Introduction to Spatial Analyses for La Brea Guatemala. Biology Symposium at the Universidad de San Carlos Guatemala City Guatemala.  
June 2010 Genetic Variability and Population Structure of Bolivian Triatoma infestans Across Communities. Biology Symposium at the Universidad de San Carlos Guatemala City Guatemala.  
April 2010. Spatial and Genetic Variability in Chagas Disease Vectors An Insight Into Possible Drivers. American Association of Geographers Symposium Washington District of Columbia.  
October 2009. Chagas Disease in Southern Bolivia: A Spatial Insight. Ecological Lunch Symposium at the University of Vermont Burlington Vermont.  
September 2009. A Comparison of Microscopy and Molecular Biology Techniques in Detecting T. cruzi in Triatoma infestans. University of Maine Orono Maine.  
October 2007. Analyzing Chagas Disease Transmission via Population Structure and Feeding Preferences. Ohio State University Columbus Ohio.  
August 2006. Feeding Preferences of Chagas Vectors in Chuquisaca Bolivia. McNair Scholars Seminar at the University of Vermont Burlington Vermont.  
April 2005. Transmission Dynamics of Chagas Disease Vectors Using Bloodmeal Analysis. URECA! Symposium at the University of Vermont Burlington Vermont.