



UCLA Institute of the Environment and Sustainability
Center for Tropical Research

**November
2012**

CTR Newsletter

LETTER FROM THE DIRECTOR

Dear Friends,

2012 was an extraordinary year for the Center for Tropical Research. Major new grants were awarded, many papers published, and we have continued to expand our reach to the global community through new projects, collaborations and workshops.

But perhaps the most significant recent development is CTR's effort to create a Center for Integrative Development in Cameroon, dedicated to finding practical solutions to critical problems facing Central Africa. The new center is to be constructed on the campus of the International Institute of Tropical Agriculture on the outskirts of the Cameroon's capital Yaoundé and will form a regional hub for interdisciplinary research. Some of the facilities we plan to build include a distance learning center for U.S. and African students, a remote sensing and Geographic Information Systems research and training lab, molecular genetic and analytical laboratories, an incubator for start-ups and entrepreneurs, lodging and conference center, and a logistics and administrative office to assist international participants and help partner them with local researchers. Stay tuned!

We are delighted to count you as a friend of CTR and value your involvement and input.

A handwritten signature in black ink, appearing to read "Tom Smith".

Tom Smith
Director

CTR RESEARCH NEWS



November 2012 Feature Article

Exploring Cryptic Diversity with Indian and Pacific Ocean Big Fin Reef Squids

By *Samantha Cheng*, Ph.D. Graduate Student, Ecology and Evolutionary Biology, Institute of the Environment and Sustainability, UCLA



November 2012 Workshop Report

Building the Capacity to Control Animal-Borne Influenza in Cameroon and Egypt

By *Kevin Njabo*, Ph.D., Associate Director of Center for Tropical Research, Institute of the Environment and Sustainability, UCLA



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FEATURE ARTICLE

Exploring Cryptic Diversity with Indian and Pacific Ocean Big Fin Reef Squids
By **Samantha Cheng**



Freshly caught Sepioteuthis cf. lessoniana in Pulau Seribu Islands off of Jakarta Bay in Java.

The coral reef ecosystems of the Coral Triangle (Indonesia, Malaysia, the Philippines, Papua New Guinea) and the Southeast Asian Peninsula support the highest marine biodiversity in the world and new species continue to be discovered. These ecosystems are of major biological importance and are also the main source of protein and income in a rapidly developing region. Despite the importance of maintaining the health of these marine resources, there is a scarcity of research about the basic biology and ecology of many harvested organisms. This is primarily due to both the difficulty of conducting thorough surveys and the lack of scientific infrastructure supporting research efforts in the region. However, another significant difficulty is that marine environments are notoriously full of cryptic species (species that are so similar in outward appearance that they are mistaken for a single species until genetic or behavioral studies reveal otherwise), and the Coral Triangle has the highest rate of cryptic species discoveries in the world. It is especially difficult to monitor species effectively when what we think is one species is really three species!

Human communities living in the Coral Reef ecosystem depend heavily on artisanal fisheries. Artisanal fisheries are small-scale fisheries that are principally used for local subsistence, driving the economy and maintaining the food security of coastal communities around the world. Artisanal fishing communities are the first to suffer when the health of specific reef ecosystems suffers, adversely affecting harvests. Reef squids are a major

component supporting these fisheries in the Coral Triangle and this area contains the highest number of cryptic species complexes of reef squids in the world. The population of reef squids has been very difficult to monitor due to the small-scale nature of these fisheries. Little catch data is collected by monitoring officials and it is unclear what the status of these squid stocks is, whether they are underexploited, fully exploited or overexploited. To complicate the situation even further, while a tremendous tonnage of squid is harvested yearly (2.18 million tons in 2002), 25 percent of this catch cannot be identified to a species. Furthermore, for harvested reef squids, it is unclear how many species exist, where they exist, and how their populations are interconnected and change over time—all crucial and basic information to effectively manage a fishery. This region has the highest human population growth rates worldwide (2-3% annual increase), which could pose significant threats to food security and sustainability if not accompanied by appropriate development and management.

My preliminary research suggests that within one group of heavily harvested reef squids, what is commonly identified as a single species known as the big fin reef squid (*Sepioteuthis cf. lessoniana*) actually comprises multiple cryptic species that coexist within the Coral Triangle. In most ecosystems, species that play very similar roles and/or have very similar traits will compete with each other to exist within that particular ecosystem. Usually, the best-adapted species will dominate in an area and the less-adapted species will become locally extinct (i.e. will not exist in that area). If one of these species were able to play a slightly different role in the ecosystem, whether by feeding on different prey, mating at different times, or utilizing a different part of the habitat, co-existence (also called “sympatry”) is more likely. My research focuses on discovering what mechanisms – diet, behavior, and habitat – may play a role in maintaining the co-existence of these multiple species.



Current and former students from Universitas Syiah Kuala (left to right - Aidia MJ, Achmad Muhadjier and Zulkarnaini Ijul) measuring specimens in Banda Aceh.



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FEATURE ARTICLE (CONTINUED)



Left: Dissecting specimen fished near Waigeo Island in Raja Ampat. The presence of developing eggs indicates a mature female. Photo courtesy of Ross Pooley of Papua Diving on Pulau Kri.

Right: Fishing boats coming into the landing in Kota Banda Aceh in the early morning.

Issues such as overfishing and climate change alter ecosystem factors that determine the survival of populations and could alter the dynamics that allow these species to co-exist. For example, climate change will alter sea surface temperatures, which are a primary factor in determining reproduction times and growth for reef squids. Thus, understanding how different cryptic squid species respond to environmental changes is crucial for creating effective management and conservation plans. Understanding the factors that maintain species boundaries within sympatrically occurring cryptic species will provide more species-level and ecosystem-level detail for informing management plans for this fisheries stock.

During 2012, I visited Vietnam and Indonesia for my second field season. I traveled to Nha Trang, Vietnam, and to northern Sulawesi (Donggala and Manado), Pulau Seribu, Banda Aceh and Raja Ampat in Indonesia. I collected samples from local fish markets and fishermen in these areas to:

1. Identify cryptic lineages occurring in the area by collecting mantle tissue for phylogenetic analysis and delineation of range limits. GPS coordinates of fishing sites were also collected when possible.
2. Identify differences in size class and maturity by measuring the size of individuals at each location as well as looking at the degree of gonad maturity and calculating gonadosomatic indices. This is done to determine if co-existing lineages have different growth and maturity patterns, allowing them to prevent hybridization.
3. Identify differences in diet both between cryptic lineages at all locations and within lineages between locations in order to observe any likely differences in ecological niches for co-existing lineages. Squid are remarkably efficient eaters –generally chewing their prey into unidentifiable pieces. Thus, diet analysis will have to be conducted through DNA barcoding for prey species from big fin reef squid stomachs.

To further expand on the second point above, I also set up a long-term, collaborative study with Dr. Z.A. Muchlisin with the Faculty of Fisheries and Marine Science at Universitas Syiah Kuala in Banda Aceh. To determine if different lineages mature at different times, which limits the chances for hybridization, two undergraduate students are collecting samples of *Sepioteuthis* each month from the fish landings and markets and measuring growth and maturity over the year. Cryptic lineages are identified using DNA barcoding methods.



Fish market in Nha Trang, Vietnam.

This season's fieldwork in Vietnam was funded by a National Science Foundation "Partnerships in International Research and Education" (PIRE) grant under Dr. Paul Barber. The fieldwork in Indonesia was funded by a grant from the Explorer's Club.



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CTR UPDATES

Field Research Trips

[Anthony Chasar](#) traveled to Cameroon in May 2012 to continue NIH funded fieldwork on the ecological and social dynamics influencing spillover of avian influenza among species. During this fieldwork, it was revealed that large numbers of swine are raised specifically to sell over the Christmas and New Year's holiday period and are transported, sometimes great distances, from rural areas to metropolitan areas for slaughter. This means that a variety of influenza strains that are carried by pigs could be transported quickly across long distances. We will focus future sampling efforts on this holiday time period, gathering data on transport routes of pigs and associated rates and timing of influenza infections in order to understand how outbreaks may spread from one place to another.

[Jordan Karubian](#) traveled to Papua New Guinea and Australia with support from the National Science Foundation (NSF) to investigate the evolution of elaborate plumage traits in males and females of *Malurus* fairy-wrens birds. Jordan also spent time in Ecuador to continue his research on seed dispersal by long-wattled umbrellabirds. With support from the National Geographic Society, Jordan and local Ecuadorian researchers also outfitted umbrellabirds with GPS tags to assess how their movement patterns vary in relation to fruit availability. The research results show that birds travel much larger distances than previously suspected, suggesting that current reserve boundaries may not be sufficient for the long-term conservation of this species. Jordan is also using GPS units to track brown pelicans in the Gulf of Mexico in the wake of the Deepwater Horizon oil spill in an NSF-funded project. Working with postdoctoral fellow **Scott Walter**, Jordan has tagged 33 animals and has recorded large movements of over 100 kilometers in a day.

[Brenda Larison](#) visited Uganda and Kenya during July and August. In Uganda she visited Kidepo Valley National Park to collect biopsy samples from plains zebra. These samples will be part of a genetic study addressing the effects of isolation and small population size. She was assisted by **Gita Kolluru**, former postdoctoral scholar in UCLA's Department of Ecology and Evolutionary Biology and current professor at Cal Poly, San Luis Obispo. CTR director [Tom Smith](#) assisted Brenda with biopsy sampling at Lake Mburo National Park. Samples from Lake Mburo will be used both in the above mentioned study as well as for seeking the genes responsible for zebra stripe patterns and understanding what the advantages are of being striped. An article on the project was published on the CTR Website: <http://www.environment.ucla.edu/ctr/news/article.asp?parentid=10947>. Fieldwork was funded by the National Geographic Society.

[Kevin Njabo](#) led a field crew for CTR's avian influenza project in Menufiya, Egypt to collect samples from wild birds and domestic poultry in February and March, 2012. A major impetus for this surveillance effort was to identify the animal husbandry practices that contribute to the persistence of H5N1 in rural villages in Egypt's Nile Valley and Delta region. A similar effort was carried out in Cameroon in July and August. This fieldwork is part of a multi-country collaborative effort funded by the National Institutes of Health-Fogarty (NIH) International Center to examine spillover and transmission of avian influenza between wild birds, domestic poultry, swine, and humans.

[Hilton Oyamaguchi](#) conducted a common garden experiment in Brazil in Fall 2011 and Spring 2012 to test the heritability of morphological variation between populations of the lesser treefrog in the Amazon rainforest and the Cerrado. The aim of this study was to determine whether the observed variation in the morphology of treefrogs between these two habitat types is strictly a plastic response to different environmental conditions or if it has a heritable component. He carried out this experiment in collaboration with **Carlos Navas** of the Physiology Department at the University of São Paulo, Brazil and with **Ryo Okubo**, a recently graduated student from UCLA's Ecology and Evolutionary Biology (EEB) program. Ryo spent two months in Dr. Nava's laboratory running experiments after Hilton returned to the United States. This work was made possible by a generous donation from **Susan and Dan Gottlieb**, owners of the G2 Gallery in Venice Beach, California.



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CTR UPDATES

Field Research Trips (Continued)

[Kristen Ruegg](#) led a field research trip to the Washington Cascades to collect samples from Swainson's thrushes for genetic analysis of a hybrid zone between two forms of this species with divergent migratory pathways and overwintering locations. Joining her on the trip were UCLA graduate student, [Rachel Johnston](#), and CTR's recently appointed lab technician, [Sirena Lao](#). The samples they collected will be used by Rachel to identify genes that are important for migratory behavior, and by Kristen, Rachel and Sirena to study the dynamics of a hybrid zone between divergent migratory forms.

Recent Awards, Presentations, and Appointments

[Jaime Chaves](#) moved to the University of Miami in August for a postdoctoral appointment with **Albert Uy** to work on the genomics of Darwin's finches.

[Emily Curd](#) received a Mildred E. Mathias Grant and a Research Award from the UCLA Department of Ecology and Evolutionary Biology (June 2012) for her research on the roles of vegetation and soil depth in structuring soil bacterial and fungal communities and how this might affect soil organic carbon(C) metabolism. The soil is the largest terrestrial sink for C and it holds twice as much C as vegetation. Annual mineralization of this C into the atmosphere adds 10 times more CO₂ than that derived from burning fossil fuels, and some proportion of this is returned to the soil by C inputs derived from plants. Fungal and bacterial communities are major contributors to soil C metabolism and thus control much of the CO₂ flux between plant-derived carbons, the soil, and the atmosphere. Emily's research is being conducted at Sedgwick Reserve in Santa Ynez, California. The 5,896-acre reserve is part of the University of California Natural Reserve System, and is administered through the University of California, Santa Barbara (UCSB). Her awards will cover field expenses, microbial community enzyme function profiling, and DNA sequencing.

[G. Andrew Fricker](#) received a graduate researcher position for the summer of 2012 and the 2012-2013 school year for his research on tropical forests in Gabon and Panama. His research is conducted under the supervision of [Sassan Saatchi](#) and [Thomas Gillespie](#). He is using discrete-return lidar and large-footprint lidar to determine biomass distribution in Gabon and patterns of diversity and richness on Barro Colorado Island (BCI), Panama. He presented a poster on preliminary results of the research in Panama at the 2012 Ecological Society of America (ESA) conference in Portland, Oregon August 5th-10th, 2012 entitled "Coupling forest structure and sub-canopy topography to alpha diversity across spatial scales in the 50 ha plot Barro Colorado Island, Panama". He also gave an invited talk at the ForestSAT 2012 conference in Corvallis, Oregon September 11th-14th, 2012 entitled "Correction of Waveform Lidar Sub-canopy Elevation Model Using a Semi-automated Filter".

[Trevon Fuller](#) gave a presentation entitled "An integrated analysis system for detecting anomalous virus outbreaks from imperfect surveillance data" at the Chemical and Biological Defense Science and Technology Conference in Las Vegas, on November 17th, 2011. This presentation reported a modeling technique developed at CTR that correlates virus occurrences with environmental data measured with satellite images. This data is used to characterize the natural ecological niche of a virus, which is where you would expect to see the virus in the wild under normal circumstances. This allows decision makers to rapidly determine whether a new outbreak of the virus likely represents spillover from wildlife hosts or a deliberate/accidental introduction (such as terrorists releasing a recombinant virus). The presentation provided two examples of the approach: predicting geographic hotspots of monkeypox in Tropical Africa and mapping areas of influenza risk and sites of novel virus emergence in East Asia. CTR research on monkeypox was recently published in the journal *EcoHealth*: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3237841/>. Trevon also presented a poster entitled "A modeling approach to identifying geographic epicenters of novel influenza virus emergence" at the American Society of Tropical Medicine and Hygiene 60th Annual Meeting in Philadelphia on December 7th, 2011. CTR researchers are collaborating with the Center for International Cooperation in Agronomical Research for Development, EcoHealth Alliance, the Free University of Brussels, the Food & Agriculture Organization of the United Nations, and Oklahoma University to predict reassortment (the exchange of genes between influenza strains), which can produce novel viruses that are even more deadly to humans.



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Recent Awards, Presentations, and Appointments (Continued)

We have identified regions in China where different types of influenza overlap geographically, which serves as a proxy for the risk that new types of influenza could evolve in these regions. We also determined that sites in China where there is a high risk of new strains of flu evolving have high abundances of domestic ducks, swine, and intensive agricultural production. These environmental variables could potentially be used to predict reassortment events, which can help health authorities prevent the spread of new strains of influenza.

[Ryan Harrigan](#), [Trevon Fuller](#), and [Kevin Njabo](#) led training workshops in Cameroon and Egypt to train local biologists and veterinarians in the use of Geographical Information Systems (GIS) for predictive modeling of disease. The goal of the workshops was to build capacity in these two countries to predict and ultimately prevent disease outbreaks. The workshops took place in Yaoundé, Cameroon on August 13th-17th, 2012, and in Cairo, Egypt on February 28th-March 1st, 2012. See this newsletter's workshop report for more details.

[Adriana Garmendia](#), a graduate student from Mexico doing an internship at the UCLA Center for Tropical Research, attended the 97th Annual Meeting of the Ecological Society of America in Portland, Oregon, held August 5th-10th, 2012. She gave a presentation on "Landscape attributes impacting terrestrial mammal assemblages in the Lacandona Rainforest, Mexico" which is part of her dissertation research.

[Ryan Harrigan](#) presented a talk at the 2012 US-International Association for Landscape Ecology (US-IALE) conference, held in Newport, Rhode Island April 8th-12th, 2012, entitled, "Maximizing Evolutionary Potential Across a Southern California Urban Landscape".

[Jordan Karubian](#), CTR's Director for Latin America and Assistant Professor in the Department of Ecology and Evolutionary Biology at Tulane University in New Orleans, Louisiana, was recently awarded the annual Ernest A. Lynton Award for the Scholarship of Engagement for Early Career Faculty. This prize recognizes an early career faculty member who connects his or her teaching, research, and service to community engagement. Jordan developed his engaged style of research while working in Northwest Ecuador, an area with extraordinary species diversity and high concentrations of human populations. He has expanded his efforts to include both Papua New Guinea and the Gulf of Mexico where he lives and works. His research embodies the spirit and practice of engaged scholarship, and has received ample support from friends and members of CTR. We congratulate Jordan for his inclusive, collaborative, and problem-solving work that emphasizes the reciprocity and true partnership between community members and professionals, and for his receipt of this prestigious award. You can read a fascinating article about Jordan's work on the New England Resource Center for Higher Education website:

http://www.nerche.org/index.php?option=com_content&view=article&id=1007&Itemid=280

[Rachel Johnston](#) received a Research Award from the UCLA Department of Ecology and Evolutionary Biology in June 2012. She is using the award to study the genetic control of avian migration by comparing transcriptome-wide gene expression in migrating and non-migrating Swainson's thrushes.

[Kevin Njabo](#) travelled to Cameroon May 2nd-4th, 2012 to serve as a moderator for a Biorisk Management Training workshop, held at the Yaoundé Hilton Hotel, Republic of Cameroon. The workshop sought to promote biosafety and biosecurity training in the Central African region for scientists who conduct research on highly infectious diseases. The workshop was organized by Sandia National Laboratories in collaboration with faculty and scientists from the Center for Tropical Research (CTR), UCLA Jonathan and Karin Fielding School of Public Health, and UCLA Global Bio Lab (GBL). The workshop used classroom-based modules and was co-moderated by **Bill Arndt** and **Cecilia Williams** of the International Biological Threat Reduction (IBTR) program at Sandia National Laboratories, and **Sira Mady Dabo** from the UCLA School of Public Health and UCLA Global Bio Lab. The workshop was hosted by the UCLA International Research and Training Center in Yaoundé, Cameroon.



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Recent Awards, Presentations, and Appointments (Continued)

[Tom Smith](#) and [Kevin Njabo](#) led a workshop on REDD+ (Reduced Emissions from Deforestation and Forest Degradation) in Yaounde, Cameroon May 6th-9th, 2012. The purpose of the workshop was to officially launch the Dja Biosphere Regional REDD+ Project, in which CTR is collaborating with Global Green Carbon to use carbon financing to protect the Dja Biosphere Reserve (a UNESCO World Heritage Site) and a surrounding buffer zone. This project could have huge social and environmental benefits for the region. The workshop brought together high-level representatives from six Cameroon government ministries (Ministries of Forestry, the Environment, Agriculture & Development, Energy & Water, Industry & Mines, and Livestock & Fisheries) with representatives from 17 NGO's with an interest in the region. The workshop consisted of an educational overview of REDD+, a detailed discussion of the Stage 1 Dja REDD+ Feasibility Report, and roundtable discussions on the key components of the project's development. Other members of the team included [Tony Chasar](#) (CTR Staff Research Associate), **Kirsten McGregor** (President and Co-founder of Global Green Carbon), **Marta Suber** (Global Green Carbon REDD and Forestry Technician), and **Edward Mitchard** (Global Green Carbon Director of Carbon).

[Kevin Njabo](#) travelled to Kayseri, Turkey September 8th- 12th, 2012 to attend the 1st National Symposium (with International Participation) on Vectors and Vector-borne Diseases, organized by the Vectors and Vector-borne Diseases Research and Implementation Center of Erciyes University. Kevin presented his research on vectors of avian malaria in Africa and their blood feeding habits.

[Hilton Oyamaguchi](#) was invited to be a panelist at the Young Environmentalist Symposium at the G2 Gallery in Venice Beach, California, where he discussed frog conservation in Brazil and answered questions about environmental issues facing Brazil's Amazon region. He also presented his work on morphological variation in the Lesser Treefrog between the Amazon and Cerrado biomes at the 15th Annual Biology Research Symposium at UCLA, for which he received the outstanding poster presentation award. He also presented his work at the 1st Joint Congress on Evolutionary Biology in Ottawa and at the World of Congress of Herpetology in Vancouver August 8th-12th, 2012. In Vancouver, Hilton presented his evaluation of the effects of natural selection and genetic drift in the diversification frogs along the Amazon and Cerrado gradients, for which he received an honorable mention for the Henri Seibert Award from the Society for the Study of Amphibians and Reptiles. He received the Jorge Paulo Lemann Scholarship from the International Institute, UCLA, to continue his studies in 2012-2013.

[Chelsea Robinson](#) received a Graduate Research Mentorship Award for the 2012-2013 school year for her research on forest diversity along Volcán Barva in Costa Rica, which she conducts under the supervision of [Sassan Saatchi](#) and [Tom Gillespie](#). She is using active radar and lidar sensors to determine patterns of topography and forest structure and relating it to ground-collected data on tree taxonomic diversity and ground estimations of aboveground biomass. By extrapolating the relationship across the images, she will be able to effectively map diversity and aboveground biomass in this region. She presented a poster on preliminary results of this research at the 2012 Ecological Society of America (ESA) conference in Portland, Oregon August 5th-10th, 2012, entitled "Assessment of Variations in Taxonomic Diversity and Forest Structure Along an Altitudinal Gradient in Tropical Montane Forest of Costa Rica."

New Publications

[Jaime Chaves](#) made the cover of the Journal of Evolutionary Biology for his March 2012 paper entitled "Origin and population history of a recent colonizer, the yellow warbler in Galápagos and Cocos Islands."

Four CTR scientists and alums were authors on a new study published recently in the journal Nature. The study revealed that many of the world's tropical protected areas are struggling to sustain their biodiversity. CTR Senior Research Fellow [William Laurance](#), from James Cook University led the study.



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CTR UPDATES

New Publications (Continued)

[Eduardo Mendoza-Ramirez](#), a CTR alumnus who is now a postdoctoral researcher at Michoacan University of San Nicolas de Hidalgo in Morelia, Mexico, recently published an article entitled "Preliminary assessment of the effectiveness of the Mesoamerican Biological Corridor for protecting potential Baird's tapir habitat in southern Mexico" in the journal *Integrative Zoology*. The study, which was done in collaboration with [Tom Smith](#) and [Trevon Fuller](#) of CTR, designs optimal corridors that can be used by the tapir, an endangered species that is the largest land animal in Central America, to cross between patches of intact forest in the Yucatan Peninsula.

New Grants

CTR Receives New Grant Support

[Tom Smith](#) and CTR colleagues [Katherine Gonder](#) (University of Albany) and [Nicola Anthony](#) (University of New Orleans) received a five year \$5 million grant from the National Science Foundation Partnerships in International Research and Education (NSF PIRE) program. This exciting project will unite senior investigators, junior researchers and students from the U.S., Africa and Europe into a common research and education plan centered in Gabon and Cameroon, Africa. A major emphasis of the PIRE project will be to collectively build an undergraduate and graduate educational program that will partner U.S. and African students in a common learning environment and provide them with cutting edge skills in the biological, environmental and social sciences. The overall research goal of the grant is to develop an integrated framework for protecting and managing central African biodiversity under climate change that is both informed by evolution and sensitive to the socioeconomic constraints of the region.

[Tom Smith](#) and CTR were awarded a one-year \$100,000 grant from the National Institutes of Health (NIH) to examine the "Comparative Spillover Dynamics of Avian Influenza in Endemic Countries." Other partners on the grant include the EcoHealth Alliance, Stanford University and the University of Oklahoma. This award continues research support for the partnership on this topic provided for the past three years by the Fogarty International Center of NIH. The partners will collect and analyze data on wild waterfowl migration, poultry farm size, market dynamics and human contact networks with these sources of infection. CTR will collaborate with the other partners to combine the perspectives of spatial, network, and dynamical epidemiological models in a GIS-based database system to predict the spatial variation of influenza A transmission and risk of spillover.

Paul Barber's Research Group Receives New Grant Support

[Paul Barber](#) and his lab were awarded a National Science Foundation Partnership in International Research and Education (NSF PIRE) grant in collaboration with San Diego State University (SDSU), the Smithsonian, National Oceanic and Atmospheric Administration (NOAA), Moss Landing Marine Labs and National Evolutionary Synthesis Center (NESCent). The \$5 million grant is focused on understanding marine biodiversity patterns in Indonesia and how these may be impacted by anthropogenic stress. Paul Barber was also awarded a grant from the University of California-Historically Black College and Universities (UC-HBCU) initiative. This grant brings students from HBCU's to UCLA and to Indonesia to conduct biodiversity research and learn the ins and outs of applying to graduate school.



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WORKSHOP REPORT

Building the Capacity to Control Animal-Borne Influenza in Cameroon and Egypt

By Kevin Njabo



A female vet from GOVS samples a domestic duck for AIV in Egypt.

The Cameroon workshop, held in August, was attended by scientists from local government institutions including the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA), the Ministry of Scientific Research and Innovation (MINRESI), the University of Yaoundé I, and the Centre Pasteur of Cameroon (CPC). Although Cameroon has had fewer cases of H5N1 than Egypt, another type of flu, H1N1 swine flu, is an important pathogen in Cameroon's domestic animals, and CTR recently published an article on the first evidence of H1N1 in pigs in Cameroon (http://www.environment.ucla.edu/media_IOE/files/Njabo-Vet-Mic-Pandemic-A-2011-1f-55y.pdf). The H1N1 virus is a perennial public health issue. A salient example is the 2009 pandemic influenza virus, which was given the official name "H1N1 swine-origin influenza", but was popularly known as "swine flu". We know for sure that swine flu killed 20,000 people worldwide according to laboratory tests. However, based on statistical models that extrapolate from lab-confirmed deaths, it is likely the virus killed a total of 280,000 people, primarily in Africa and Asia. Furthermore, swine flu contained genes from influenza strains that normally infect birds and swine, so understanding the circulation of the influenza virus in animals is critical to preventing future influenza pandemics in humans.

This year, CTR researchers [Dr. Trevon Fuller](#), [Dr. Ryan Harrigan](#), and [Dr. Kevin Njabo](#) trained government scientists and academics in Egypt and Cameroon in techniques to predict and detect influenza outbreaks in wildlife and domestic animals. The ultimate goal of the workshops was to improve the capacity of local governments to predict and prevent future epidemics. These workshops grew out of CTR's participation in the Zoonotic Influenza Collaborative Network funded by the Fogarty International Center at the National Institutes of Health. At the first workshop, held in Cairo in February, CTR engaged Egyptian scientists from governmental agencies including the General Organization for Veterinary Services (GOVS), the National Laboratory for Quality Control of Poultry Production (NLQP), the Animal Health Research Institute (AHRI), and expert faculty at Damietta University. One of the most significant health risks in Egypt is the highly pathogenic H5N1 avian influenza virus. Since 2006, this virus has killed millions of birds in Egypt. Furthermore, the virus has jumped the species barrier to infect humans, resulting in 168 cases with a 36% fatality rate.



Dr. Kevin Njabo works with Dr. Judith Ndongo, a professor at the University of Yaounde I and Bavou Martial of Global Viral Forecasting Initiative (GVFI) to analyze data on influenza in wild birds in Cameroon using ArcGIS.



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WORKSHOP REPORT (CONTINUED)



Left: Dr. Trevon Fuller works with Basma Sheta and Louise Sarant to analyze data on influenza in wild birds in Egypt using ArcGIS. Right: Dr. Ryan Harrigan helps load geographic data on Egyptian birds into the ArcGIS software package.

The curricula of both workshops included:

- (1) Presenting the technical tools necessary to develop a predictive ecological model to identify at-risk areas for avian influenza in Egypt and swine influenza in Cameroon and surrounding regions. Such tools use geo-referenced locations of influenza cases and models risk based on their association with bioclimatic and satellite remote sensing data.
- (2) Producing models that compare transmission dynamics across countries/governorates and predicting transmission risks to humans. These comparisons can then be used to address whether different animal husbandry and/or cultural practices increase the risk of influenza in particular areas.
- (3) Formulating a strategy for bringing expertise, resources, and logistics to increase the capacity of Cameroonians and Egyptians to produce their own risk assessment maps in the future so that government ministries approve, guide, and receive the benefits of these research efforts.
- (4) Disseminating the results of spatial models to decision-makers and producing manuscripts from this work that can inform a broader scientific audience.

We are optimistic that teaching these state-of-the-art techniques for disease detection and prevention to our Cameroonian and Egyptian colleagues will help these countries combat avian flu and swine flu more effectively in the future.