

# One Health Newsletter

A quarterly newsletter highlighting the interconnectedness of animal and human health



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Volume 4 Issue 1

The One Health Newsletter is a collaborative effort by scientists and health professionals from the following organizations:

- Palm Beach County Health Department
- Florida Department of Health
- University of Florida
- Kahn/Kaplan/Monath/Woodall One Health Team



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**Editor:**

**Mary Echols, DVM, MPH**

Palm Beach County Health Department



*This newsletter is dedicated to enhancing the integration of animal, human, and environmental health for the benefit of all by demonstrating One Health in practice.*

## The making of an atlas of infectious diseases

Heiman F.L. Wertheim, MD PhD, Nguyen Thi Thanh Thuy, MSc, Le Viet Thanh, Peter Horby, MBBS FFPH, John P. Woodall, MA PhD

### Introduction

Infectious diseases occur on a global level without regard for political borders. Climate change, deforestation, large scale food production, urbanization, and globalization are important drivers of infectious diseases, largely because they can change the reservoirs where pathogens reside as well as the risk for human exposure. Several infectious disease textbooks and papers offer incidental maps of the (global) distribution of infectious diseases. However, none of them offer a comprehensive overview, and often it remains unclear how the map was made. Therefore, we believe there is a need for a concise and practical geographical overview of infectious diseases with up-to-date maps. The atlas should provide a global distribution of relevant infectious diseases 'at-a-glance'.

Such an atlas is expected to be published at the end of 2011 (Publisher: Wiley-Blackwell). The atlas will contain approximately 150 maps that illustrate the most current distribution of major or relevant infectious diseases. Every map will contain concise key information about the infectious agent including: ICD-10 code, reservoir, epidemiology, transmission, incubation period, clinical findings, therapeutic options, and key references. The atlas will also include thematic world maps of important drivers of infectious disease, including population density, climate, livestock density, poverty, sanitation, antibiotic use, immunization coverage and others. Since the distribution of certain infectious diseases changes in time, maps will be updated regularly, and made available online by 2012.

### Methods

Depending on the disease or driver that needs to be visualized, we conduct extensive data searches to identify the best available geospatial data. This requires regular personal contact with experts of specific diseases. For several diseases and drivers, good data or maps are already available. In such cases, we request permission to use these maps or data if needed.

Geo-located diseases are entered in a geo-database and visualized using ArcGIS (ESRI, USA) and quality checked. Sources are tracked and organized. We use ancillary data from accepted resources: population density, land cover, climate,



## In This Issue

### Articles:

*The making of an atlas of infectious diseases*

.....page 1

*Building local poultry businesses as a means of addressing protein malnutrition and poverty in a rural area of Kenya*.....page 5

*The National Park System, A Living Laboratory for One Health*.....page 7

*Studying the role of nature's benefits in human health and well-being: How the EPA is contributing to the One Health approach* .....page 8

*'Frontiers in One Health' UCDavis School of Veterinary Medicine Seminar Series* .....page 11

*Center integrates human, animal, environmental health*.....page 16

### Coming Events:

.....page 18

### Recent One Health Publications:

.....page 20

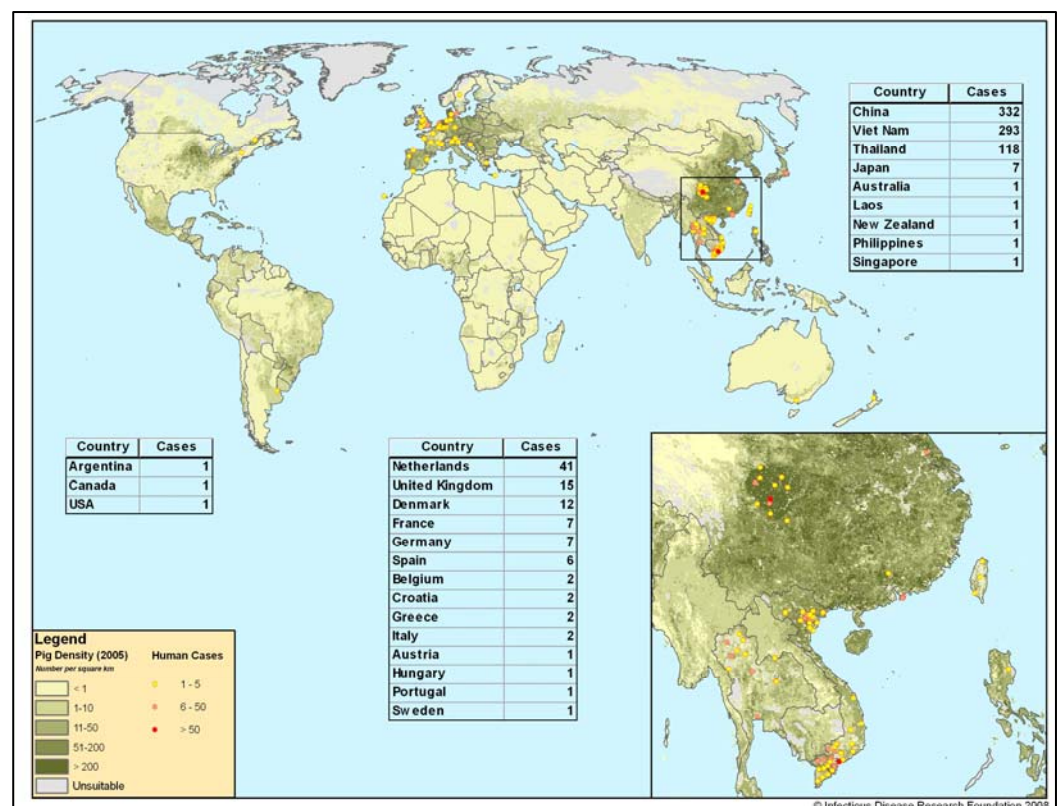
elevation, sanitation coverage, poverty, and others. Each map is sent out for expert peer review and adjustments are made accordingly.

### Results

By September 2010, 125 maps were made and the majority have been peer reviewed by almost 50 external reviewers. Below we provide you with some examples which should give the reader an idea of what we are aiming for.

#### Map 1. *Streptococcus suis* map (published in Clinical Infectious Diseases, 2009).

*Streptococcus suis* is mainly a pig pathogen that can cause severe sepsis and meningitis in humans who come in contact with contaminated pork products. For this map we geocoded all reported cases in the medical literature using Google maps. The number of cases per location is visualized. As the main reservoir of *Streptococcus suis* is swine, we included pig density data in our map (source pig density data: FAO). The map illustrates that *S. suis* is especially common in southeast Asia where undercooked pork products are often consumed. As *S. suis* is often misidentified by microbiology laboratories, the addition of the pig density data is useful as it shows where possible human cases remain undiagnosed (e.g. Eastern Europe).

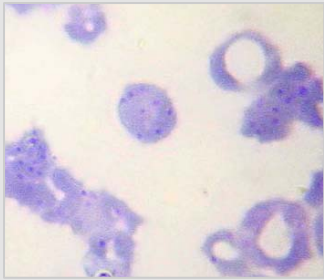


#### Map 2. Bartonellosis by *Bartonella bacilliformis*.

This disease is also known as Oroya fever, Verruga Peruana, or Carrion's disease and is caused by the bacterium *Bartonella bacilliformis*. Humans are the main reservoir and the disease is transmitted by the sandfly *Lutzomyia verrucarum*. The disease was originally restricted to high, dry mountain valleys from 500 m to as high as 3,200 m in the Andes of Colombia, Ecuador, and Peru, but since 1997 it has been spreading and has appeared in the low lying hills below 500 m elevation in coastal Ecuador. Species of sandfly belonging to the verrucarum group occur from high altitudes to the tropical lowlands. For this map we found data on reported cases after extensive searches of PubMed, Google and other sources. As cases occur in a restricted area in South America, a detailed map for this region was created. As bartonellosis is mainly present in the valleys of the Andean







*Bartonella bacilliformis*  
thin blood film

*Bartonellosis is mainly present in the valleys of the Andean region where the sandfly vector, Lutzomyia verrucarum, occurs.*

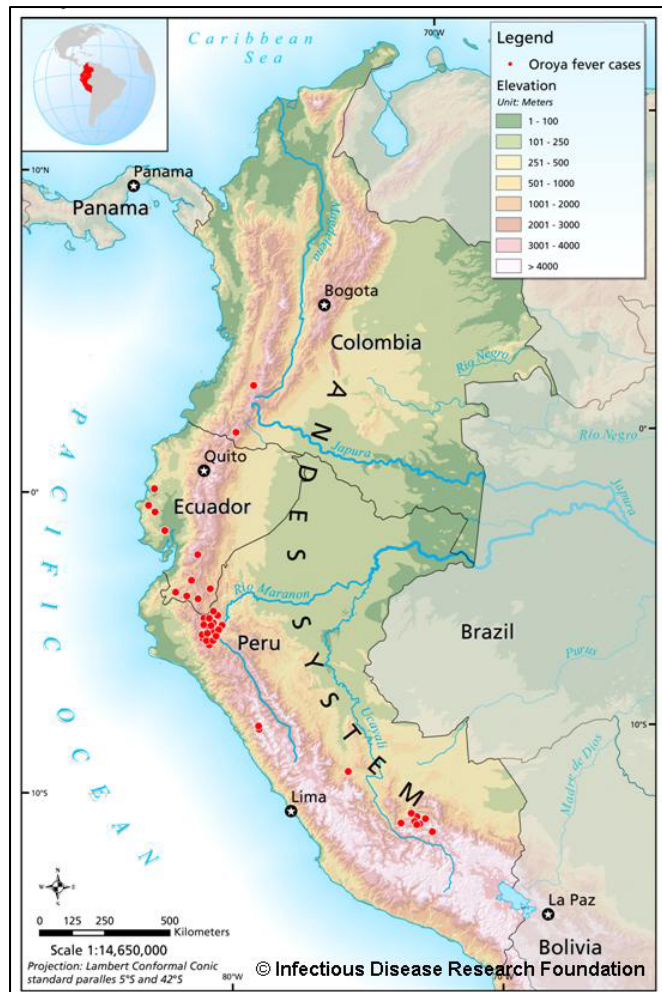


*Elevation is also visualized in this map for a better understanding of the disease distribution.*



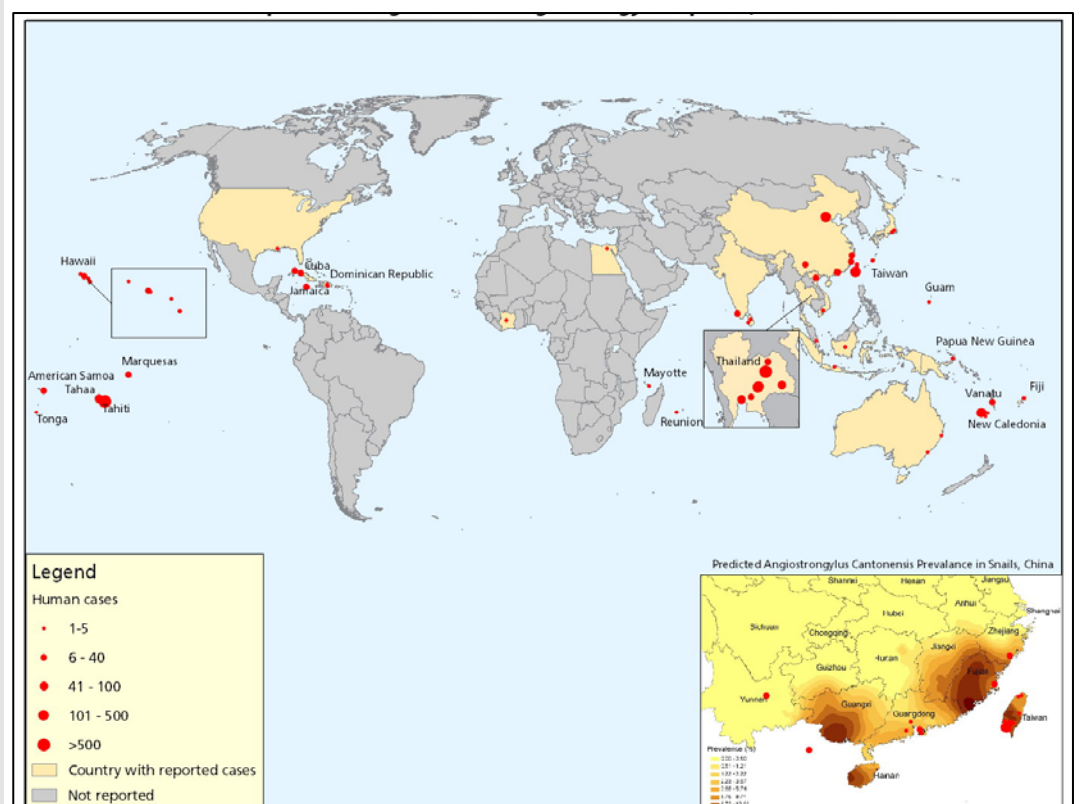
*Rats are the main reservoir for the parasite Angiostrongylus cantonensis which causes eosinophilic meningitis*

region where the sandfly vector occurs, elevation is also visualized in this map for a better understanding of the disease distribution.



**Map 3. Eosinophilic meningitis by *Angiostrongylus cantonensis*.**

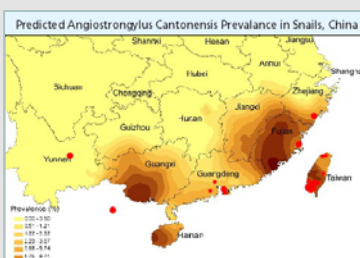
Eosinophilic meningitis is caused by the nematode parasite *Angiostrongylus cantonensis* also known as the rat lungworm. Rats are the main reservoir, particularly *R. norvegicus* and *Bandicotta* spp. Dogs, wild mammals and marsupials have been found infected, but do not contribute to spreading of the disease.



Vectors for transmission are snails, slugs and land planarians.



The giant African snail *Achatina fulica* is the major source of infection worldwide.



As the principal vector for *A. cantonensis* is the snail, we included a map showing the predicted *A. cantonensis* prevalence in snails in China.

The atlas will be published by Wiley-Blackwell at the end of 2011.



As of 2012, updated maps will be available online (open access), as infectious disease distributions are dynamic.

Vectors for transmission are snails, slugs and land planarians. The giant African snail *Achatina fulica* is the major source of infection worldwide; the imported South American golden apple snail, *Pomacea canaliculata*, has replaced it in Taiwan and mainland China. Transmission occurs after consumption of raw or under-cooked vector molluscs, inadvertently contaminated vegetables or vegetable juice, or fish, freshwater prawns, land crabs, frogs or monitor lizards that have fed on vector molluscs. For this map we geocoded human case reports in PubMed and other published references. As the principal vector for *A. cantonensis* is the snail, we included a map showing the predicted *A. cantonensis* prevalence in snails in China (source: PLoS NTDS, Feb 2009).

### Conclusion

We believe we are close to finishing the compilation of a world atlas of infectious diseases, including drivers of infectious diseases. For each map we try to visualize and explain the distribution. The atlas will be published by Wiley-Blackwell at the end of 2011. As of 2012, updated maps will be available online (open access), as infectious disease distributions are dynamic.

### Acknowledgements

This project is made possible with funding from the MusartE Continuendo Foundation (Netherlands), Infectious Disease Research Foundation (Netherlands), and the Wellcome Trust (United Kingdom). Any eventual royalties from the atlas will be used to fund the continuous updating of maps and will not benefit the authors.

We also would like to thank the members of the Atlas advisory board: Mary Wilson, Henri Verbrugh, Simon Hay and Jeremy Farrar.

**Heiman F.L. Wertheim, MD PhD\***

**Wellcome Trust Major Overseas Program, Oxford University Clinical Research Unit, National Hospital of Tropical Diseases, Hanoi, Vietnam; Centre for Tropical Medicine, Nuffield Department of Clinical Medicine, Oxford University, Oxford, United Kingdom**

**Nguyen Thi Thanh Thuy, MSc**

**Wellcome Trust Major Overseas Program, Oxford University Clinical Research Unit, National Hospital of Tropical Diseases, Hanoi, Vietnam;**

**Le Viet Thanh**

**Wellcome Trust Major Overseas Program, Oxford University Clinical Research Unit, National Hospital of Tropical Diseases, Hanoi, Vietnam;**

**Peter Horby, MBBS FFPH**

**Wellcome Trust Major Overseas Program, Oxford University Clinical Research Unit, National Hospital of Tropical Diseases, Hanoi, Vietnam; Centre for Tropical Medicine, Nuffield Department of Clinical Medicine, Oxford University, Oxford, United Kingdom**

**John P. Woodall, MA PhD**

**ProMED-mail co-founder and Associate Editor; Institute of Medical Biochemistry, Centre for Health Sciences, Federal University of Rio de Janeiro, Brazil (retd.)**

**\*Contact information: [Heiman.wertheim@gmail.com](mailto:Heiman.wertheim@gmail.com)**








Courtesy Thinkimpact

*About 26% of children less than five years of age in Kayafungo suffer from malnutrition, more specifically from protein malnutrition.*



**The women of *Mama Kulu* poultry business group**

*The goal was to help Kayafungo women create a social business raising poultry.*

## Building local poultry businesses as a means of addressing protein malnutrition and poverty in a rural area of Kenya

**Leslie Sadeghi**

When I think about One Health, I can't help but think how much its importance is overlooked in our world today. Being a third year veterinary student also pursuing a Master of Public Health, my passion is promoting One Health and this past summer I had just that opportunity. I went to Kenya as a global development intern with an organization called *ThinkImpact*, whose model involves creating social businesses to help alleviate poverty. A social business serves a social good, such as increasing sanitation through the sale of soap. Traveling to Kenya with a group of college students that were eager to help alleviate poverty through sustainable development, they constantly questioned why I, as a veterinary student, was interested in this trip when it had nothing to do with animals. However, my purpose was soon apparent as another intern and I helped create a social business consisting of raising and selling chickens.

Kayafungo location of Kenya is a rural, underserved area with a population of 43,000 that relies heavily on subsistence farming. They grow maize, beans, cassava, and a variety of fruits. If a family in the community is well enough off, they might also own some chickens, ducks, geese, goats, sheep, and/or cattle. While living in this community for a month, I learned that for them, owning livestock typically serves the purpose of a savings account- a place to store their money. Because of this, families rarely actually eat their livestock unless they are hosting guests or there is a special occasion or funeral.

This all seemed problematic to me, however, when I learned that about 26% of children less than five years of age in Kayafungo suffer from malnutrition. From general observations, it was evident that many children suffered more specifically from protein malnutrition. The nurses in Kayafungo call this *Kwashiorkor*, and the symptoms consist of a distended abdomen (from lack of abdominal musculature), edema, lethargy, flakey skin, decreased immune function (more susceptible to malaria), and stunted physical and cognitive development. This, of course, leads to less success in school and potentially less of a chance to alleviate poverty in the future.

We were not the only ones who recognized these dilemmas in the community. A local woman named Teracia Mavela already had a plan to tackle the issue of malnutrition herself- through starting a poultry business. She had tried twice on her own, but the first time all the chicks died due to disease and the second time a cat killed them all. When we met Mavela and learned of her plans, we knew right away this would be the social business we would help create. Rachel Estess, another intern, and I worked diligently with Mavela the rest of our time in the community. Rachel's goals were to help Mavela provide a foundation for the business, put together a manageable business plan, and return to the community in a year to further invest in the business and move it forward. My goals were to help Rachel and Mavela start the business, provide poultry management insight, and advocate for the business once I returned to the United States.

Why chickens? Chickens provide meat and eggs, which are not only a good source of protein, but also of iron, calcium, and vitamins A and D. Chickens are ubiquitous, easy to acquire, and if raised properly, can provide quick returns on investments. Mavela had some friends who also wanted to be a part of the business so they could pay

## Why chickens?

*Chickens provide meat and eggs, which are not only a good source of protein, and vitamins.*



Selena (left), Rachel (center)

*The mission was to train local women to begin chicken businesses, to support their families financially, and to address protein deficiencies in Kayafungo.*



Teracia Mavela

*The vision was to empower as many women as possible to become financially stable through their own poultry farming businesses, and to eradicate malnutrition in Kayafungo.*

for their children to go to primary school and eventually to college. The group of women, *Mama Kuku* or *Mother Hen*, met with Rachel and me to discuss the direction of the business and create a mission and a vision. Their three fold mission is to:

1. *Train local women to begin chicken businesses*
2. *Support their families financially*
3. *Address protein deficiencies in Kayafungo*

Their vision is *to empower as many women as possible to become financially stable through their own poultry farming businesses and to eradicate malnutrition in Kayafungo.*

The ultimate goals include recruiting other women to begin poultry businesses and attend three training sessions with training in poultry nutrition, husbandry, and general business skills. *Mama kuku* would buy the women's chickens and sell them to outside markets, while the women would be required to keep a percentage of their chickens and eggs to feed their children regularly. A large part of the business includes community education about nutrition and the importance of eating balanced diets. If the women can encourage their neighbors to either buy chickens or eggs from them to feed their families or regularly provide their families with meat or eggs, then the incidence of malnutrition in their community can be decreased.



Rachel (left), *Mama Kulu* group (center), Leslie (right)

We arranged for a nearby accountant to provide a financial training workshop for the women to learn the basics about starting a business and managing funds. This also provided the women with their first outside market- the hotel where the accountant works. Having markets outside of Kayafungo will help provide a more stable demand for the chickens and eggs.



Poultry husbandry training; Masha (right)





**Leslie and Teracia Mavela**

*The concept of One Health not only is necessary for a healthy population, but it also has the potential to be applied to sustainable development and poverty alleviation around the world.*

*The National Park System is a vast living laboratory of 84 million acres.*



*There is no better place to explore the nexus between human health, wildlife health and the planet we share!*



One of the most important steps in the process was introducing the women to Masha, a man who used to work for the Ministry of Livestock. He held a poultry husbandry workshop, taught them about vaccination protocols, and how to efficiently raise healthy birds to decrease the chance of losing their flocks like Mavela had before. For the women to be able to successfully serve their community and address malnutrition, the chickens must be healthy and raised effectively through the use of proper nutrition, management, and vaccinations. Healthy animals equal healthy people.

Rachel's business plan was accepted by *ThinkImpact* and she will be going back to Kayafungo next August to help the business grow. Through this experience, I realized the concept of One Health not only is necessary for a healthy population, but it also has the potential to be applied to sustainable development and poverty alleviation around the world.

**Leslie Sadeghi (Class of 2012) is a student at the University of Tennessee's College of Veterinary Medicine. [lsadeghi@utk.edu](mailto:lsadeghi@utk.edu)**



## **The National Park System, A Living Laboratory for One Health**

**CAPT Charles L. Higgins, MS, REHS, USPHS**

As the federal agency responsible for managing nearly 400 ecologically diverse units nationwide, the National Park Service (NPS) is uniquely poised to explore the One Health concept. A vast living laboratory of 84 million acres (nearly equal to the state of Montana), located in all climates and geography, containing 4.5 million acres of oceans, rivers and lakes, protecting at least 400 endangered species, and hosting almost 300 million visitors per year, there is no better place to explore the nexus between human health, wildlife health and the planet we share!

The NPS dual mission of resource protection and enjoyment and a synergistic partnership between the NPS Wildlife Management and Health Program and NPS Office of Public Health, places this agency in a perfect position to explore and implement the One Health concepts.

The NPS Wildlife Management and Health Program, located in the Natural Resources Stewardship and Science Directorate provides professional veterinary and wildlife management support to parks, regions and the NPS directorate on policy and technical aspects of wildlife management.

The NPS Office of Public Health, located in the Visitor and Resource Protection Directorate provides services in epidemiology, human disease surveillance and response, environmental health and health promotion.

Although located in different parts of the organization, these two programs recognized the overlap of many health issues and purposefully joined efforts for a collaborative approach. Recognizing this work as One Health, the NPS has identified four key focus areas to organize these mutual activities around.



*The National Park Service in a perfect position to explore and implement the concepts of One Health.*



**Jon Jarvis**  
Director of the National  
Park Service

*We define “public health” as an interrelated system that links human health to that of our natural landscapes and all other species.*

*Nature provides an array of “ecosystem services” that support all life on our planet, and are the foundation for human health and well-being.*

- ◆ **Unified Disease Surveillance** - A combined human and wildlife disease detection effort and system are being piloted to detect disease transmission and outbreaks (or in wildlife, large unexplained animal die-offs).
- ◆ **Interdisciplinary Response** - A team consisting of a physician, a wildlife veterinarian, and a public health consultant is available to provide immediate technical expertise and assistance to all park units on human and wildlife disease outbreaks.
- ◆ **Combined Research Agenda Projects** - The National Park Service will be exploring better ways to define disease transmission issues using a One Health paradigm. This approach is intended to provide a holistic understanding of disease transmission cycles, stresses on wildlife from human activities, and resource management issues.
- ◆ **Consensus Guidance** - Our goal is to use the One Health concept to provide NPS unit managers and staff with holistic, ecologically based science guidance that can be used when making decisions about wildlife and visitor protection. Potential conflicts between management action taken to protect wildlife and visitors can be minimized through a unified understanding of the interaction of animal health, human health, and the environment.

The Director of the National Park Service, Jon Jarvis, recently established an NPS Health and Wellness Executive Steering Committee. This committee, chaired by the Office of Public Health, is tasked with exploring the role of the NPS in improving our nation's health, while at the same time, continuing to uphold the core mission and values of the Service. The steering committee has issued a draft statement of purpose along with a set of guiding principles. First among these principles is a One Health approach.

- ◆ We define “public health” as an interrelated system that links human health to that of our natural landscapes and all other species

From its very inception, the national park system, along with other open spaces and natural places has contributed to the health and well being of the nation. Now with the exploration of the One Health concept, the NPS seeks to both illuminate and magnify this effect.

*CAPT Charles L. Higgins, MS, REHS, USPHS is Director of the Office of Public Health at the National Park Service. [http://www.nps.gov/public\\_health/index.htm](http://www.nps.gov/public_health/index.htm)*



## **Studying the role of nature’s benefits in human health and well-being: How the EPA is contributing to the One Health approach**

**Laura Jackson, PhD**

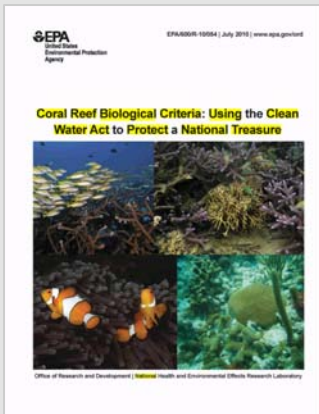
### **Issue:**

Forests, rivers, wetlands and beaches, even city parks, benefit human society in many ways. Natural areas provide resources like food, fiber and recreation; they also filter pollutants and store precious rainwater. These are just a few examples of nature’s benefits, or “ecosystem services” that support all life on our planet, and are the foundation for human health and well-being. Understanding the value of ecosystem services



*Using a systems approach, expands our options for addressing current and emerging environmental health threats*

*This framework will help encourage new scientific inquiry, direct habitat protection and restoration to where they are most needed, and support new economic markets*



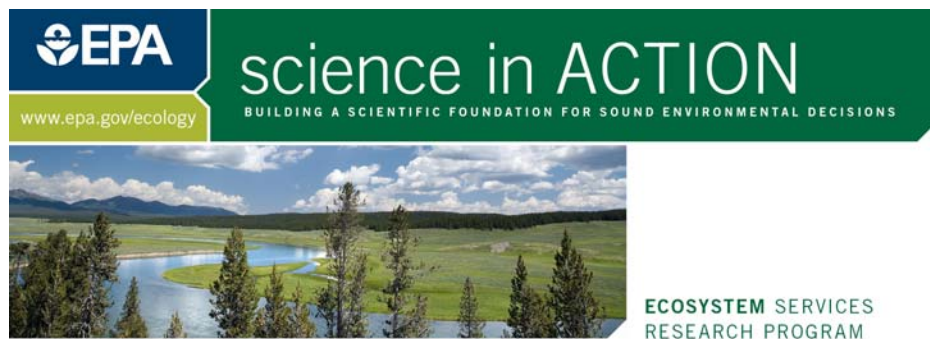
**EPA researchers recently published a manual describing how to protect coral reefs from land-based stressors.**

*Exploration into the many benefits of natural areas will deepen our understanding of the role of ecosystems in a sustainable society.*

to both human and animal health is central to the One Health concept.

EPA research has traditionally focused on air, land and water pollution and its risks to human and ecosystem health. Bringing the perspective of nature’s benefits to this research and using a systems approach, expands our options for addressing current and emerging environmental health threats. These include polluted and scarce drinking water, fish and shellfish contamination, and storm-related injury, disease and displacement.

Ecosystem services are also important to traditional cultures, spirituality, community ties, and other fundamental components of human well-being. Further exploration into the many benefits of natural areas will deepen our understanding of the role of ecosystems in a sustainable society.

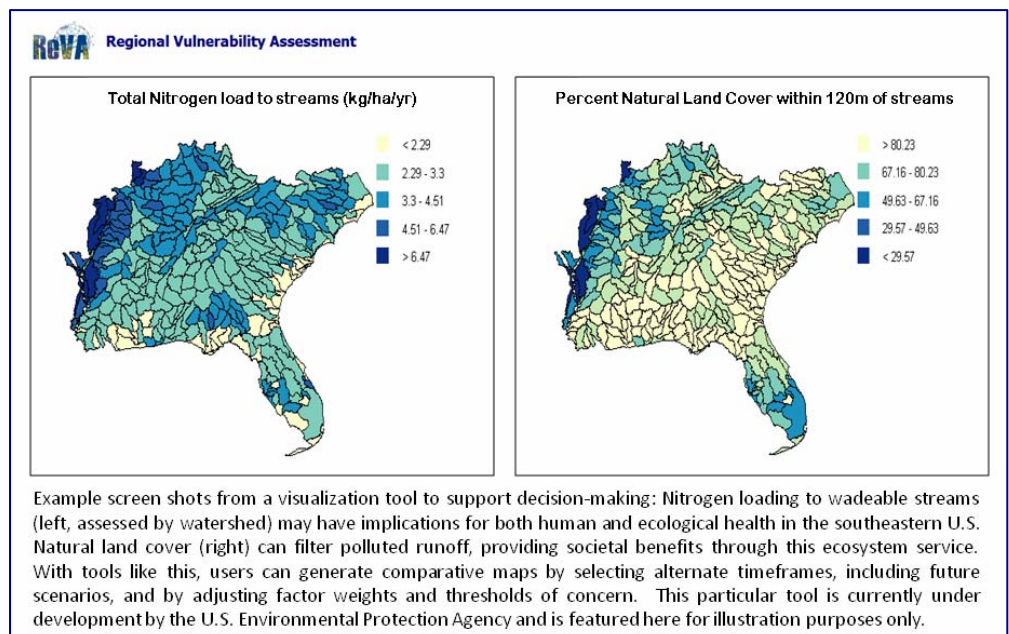


**Scientific Objective:**

EPA’s Ecosystem Services Research Program (ESRP) includes studies on the relationships between multiple ecosystem services and specific aspects of human health and well-being. Resulting information can support decisions about how we manage the benefits of nature and further clarify the importance of the environment in the One Health approach.

This framework will help encourage new scientific inquiry, direct habitat protection and restoration to where they are most needed, and support new economic markets for valuing and trading ecosystem services to maintain the flow of benefits. EPA researchers are developing ways to measure nature’s benefits and the costs of losing them, as well as examining what is causing environmental stress on their supply and quality.

Findings will populate interactive maps and models to show the human implications of policy action—or inaction—that affects the availability of nature’s benefits (See Figure 1, below).





*One of the collaborative studies currently underway involves connecting forest fragmentation, biodiversity loss, and Lyme disease risk.*



Reported Cases of Lyme Disease -- United States, 2005



1 dot placed randomly within county of residence for each reported case

*The EPA actively supports collaborative approaches, like the One Health concept, that highlight the importance of multidisciplinary perspectives to health.*



**Dr. Laura Jackson**

The Human Well-Being research initiative opens investigations across typically discrete scientific fields, requiring interdisciplinary collaborations and analyses that represent new challenges for EPA's ecologists. Like the One Health approach, it relies upon the collaboration of experts from a number of different fields. Activities include exploring and interpreting primary health data and social surveys; developing and using health and well-being indicators (such as health care and discretionary expenses, or pollution levels); and relating this information to the availability of ecosystem services.

Initial research leverages internal expertise, priority efforts of EPA collaborators, and existing tools for modeling economic and health benefits. The following studies are underway:

- ◆ Assessing the role of vegetative buffers in mitigating near-road air pollution
- ◆ Connecting forest fragmentation, biodiversity loss, and Lyme disease risk
- ◆ Developing an index of human well-being
- ◆ Quantifying air and water quality benefits from urban forests, using the U.S. Department of Agriculture Forest Service's i-Tree tool, for the ESRP National Atlas of ecosystem services, and for the Tampa Bay and Willamette River Valley studies
- ◆ Comparing health benefits, using EPA's BenMAP tool, from air quality modeled under biofuels and multiple-services scenarios in the Future Midwestern Landscapes study
- ◆ Mapping urban heat vulnerability from landcover, socioeconomic, and health data for the National Atlas

Greater understanding of the relationships between nature's benefits and human health and well-being will have broad applications for environmental management. Research findings can support urban planning by demonstrating the value of ecosystem services to urban infrastructure needs such as stormwater management.

Results will help target local to national ecosystem protection and restoration efforts to buffer communities from anticipated effects of climate change.

Studies can also inform human-health risk assessment by introducing nature's benefits as part of the environmental context in which cumulative community health risks are evaluated and addressed.

Human well-being is the centerpiece of the ecosystem services paradigm. Ongoing activities across the ESRP are demonstrating the relevance of ecological features and processes to humankind. It is EPA's research and communication on this topic that will resonate with decision makers by highlighting the societal implications of changes in the availability of nature's benefits. Through this work, the EPA is contributing to the continued acceptance of collaborative approaches, like the One Health concept, that highlight the importance of multidisciplinary perspectives to health.

**EPA's Ecosystem Services Research Program invites and encourages partnerships directed to this critical area of emphasis.**

***Dr. Laura Jackson is an interdisciplinary scientist with the U.S. EPA's Office of Research and Development, in Research Triangle Park, North Carolina. She is a Principal Investigator in the Ecosystem Services Research Program, and the program's lead for developing research to link ecosystem services to human health and well-being.*** Contact: [jackson.laura@epa.gov](mailto:jackson.laura@epa.gov)

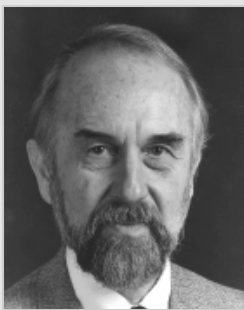




*UCDavis School of Veterinary Medicine annual seminar series 'Frontiers in One Health' brings together students, faculty, veterinarians, physicians and other members of the health care community.*



*Dr. Mary Croughan was one of the first MPVM students who studied under Dr. Calvin Schwabe.*



**Dr. Calvin Schwabe**

*She discussed her career as an example of the many avenues available to students in the pursuit of a one health approach to human, animal, and environmental health.*

## UCDAVIS SCHOOL OF VETERINARY MEDICINE SEMINAR SERIES 'Frontiers in One Health'

**Rebecca Smith (DVM candidate)**

Inspired by the Journal of the American Veterinary Medical Association (JAVMA) column, 'One Health Wonders', UCDavis School of Veterinary Medicine launched the first annual seminar series dedicated to these Frontiers in One Health for the 2009-2010 academic year and included the following presentations. The annual seminar series brings together students, faculty, veterinarians, physicians, and other members of the health care community in furtherance of their education and understanding of One Health principles.



**Mary Croughan and Dean Bennie Osburn**

**MARY CROUGHAN, PHD EPIDEMIOLOGY**

Chair of the UC Academic Senate, UCSF professor of Obstetrics

### 'The Role of the MPVM and Epidemiology in One Health'

In 1966, Dr. Calvin Schwabe established the Department of Epidemiology and Preventative Medicine at the UC Davis School of Veterinary Medicine, the first veterinary school program of its kind in the world. The author of more than 200 publications, he promoted the concept of "One Medicine," which attempts to bring together the fields of human and veterinary medicine. This idea spurred the creation of the Calvin Schwabe One Health Project which hosts this lecture series in support of the Project's mission. One of the first MPVM students who studied under Dr. Schwabe, Dr. Croughan discussed her career as an example of the many avenues available to students in the pursuit of a one health approach to human, animal, and environmental health. Over the years she has looked at issues such as Sudden Infant Death syndrome and how causes of death have changed over time.



**Carol Glaser and Dean Bennie Osburn**

**Carol Glaser, DVM, MPVM, MD**

Associate Clinical Professor at the UCSF Department of Pediatrics

### 'Human Health and Animal Health: Joining Disciplines'

Dr. Glaser holds DVM, MPVM, and MD degrees, completed a parasitology internship at the CDC, and completed a pediatric residency at UCSF. This educational diversity in the

*Dr Carol Glaser presented five case vignettes that highlighted the need for a one-health approach to medicine.*

*Sea otters serve as a good indicator of marine ecosystem health due to their position at the top of the food chain.*



*If something in the environment threatens the sea otter population, it may also threaten us.*

*Dr. Mazet's team identified the source of Toxoplasma, an organism that was recently discovered in the sea otters.*

*Toxoplasma can cause major problems not only for the sea otters but also for people.*

areas of veterinary medicine, human medicine, and public health make her a uniquely qualified ambassador of One Health principles. She presented five case vignettes that highlighted the need for a one-health approach to medicine. In four of the cases, physicians' inability to properly diagnose and treat the zoonotic diseases rat bite fever, bartonellosis, pasteurellosis, and toxoplasmosis severely compromised the health of their patients. Inaccurate diagnosis is harmful whether a zoonotic disease is overlooked or whether inappropriate diagnosis of a zoonotic disease prevents physicians from determining the actual cause of symptoms, as in the fifth case of a girl with an ovarian teratoma. Dr. Glaser's advice, then, is for human medicine clinicians to keep an open mind about unusual diseases, be aware of the limitations of standard laboratory diagnostics, and seek help from infectious disease specialists or veterinarians when presented with illnesses that may be due to a zoonotic disease.



**Jonna Mazet, DVM, MPVM, PhD**

Professor and Director of the Wildlife Health Center at UC Davis

#### ' Research at the Human-Animal-Environment Interface '

Interactions between animals and humans have increased substantially over the last few decades as we continue to expand development into previously uninhabited areas. Increased interactions have led to increased flow of pathogens between species, resulting in zoonotic diseases. The Wildlife Health Center was founded in the early 1990s in order to evaluate animal, human, and environmental health as well as to help address any issues that arise. With such a large coastline in California, it is important to monitor the health of the marine ecosystem. Sea otters serve as a good indicator of marine ecosystem health due to their position at the top of the food chain. If something we do on shore impacts the marine environment, we should see changes in the sea otter population. Likewise, if something else in the environment threatens the sea otter population, it may also threaten us. For example, *Toxoplasma* was recently discovered in sea otters; this parasite can cause major problems not only for the sea otters but also for the people living along the coast. Investigation revealed that the organism is shed in cat and wild felid feces, and entering the ocean from water run-offs contaminated with infectious fecal material. By figuring out the source of the problem in sea otters, Dr. Mazet's team was able to apply this knowledge to the same problem seen in humans and begin to work on remedying the situation.





*A bloom of Akashiwo sanguine algae along the California coast released a microsporine protein that acted as a surfactant, killing hundreds of birds when they lost the ability to waterproof their feathers.*



Moss Landing, CA

*By understanding an ecosystem and the interconnection of all of its individual parts, scientists can anticipate, predict, diagnose situations in order to appropriately intervene and medically manage the situation.*

*Dr. Natterson Horowitz's work with the LA Zoo's tamarin population showed One Health overlaps in clinical cardiology.*



Cotton top tamarin



**Dave Jessup, DVM, MPVM, Dipl. ACZM**

Senior Wildlife Veterinarian at the California Department Fish & Game

#### ' The Biggest Patient in the World: How We Diagnose and Treat Sick Ecosystems '

Dr. Jessup believes it is necessary to not only look at individual animals, but to also evaluate whole species and the overall health of an ecosystem. An example of this ecosystem approach is the mystery oil spill that occurred in Moss Landing, California. It began with hundreds of birds beaching themselves due to an inability to properly waterproof their feathers. The cause was a strange yellow-green material found on their ventrum ( belly and chest ). Going back to the area where the birds were found, investigators discovered a prominent scum line in the water that had attracted the birds. Analysis of the scum revealed that it did not consist of oil or commercial surfactant but was instead a microsporine protein released by a harmful *Akashiwo sanguine* algal bloom. In normal years, upwelling of cold water in the fall displaces nutrient-rich warm water coming into the Monterey Bay from rivers. This did not happen the year of the Moss Landing " spill ", however, and the resulting environmental conditions enabled the harmful algal bloom to develop. By understanding an ecosystem and the interconnection of all of its individual parts, veterinarians can anticipate, predict, and better diagnose similar situations that impact wildlife populations in order to appropriately intervene and medically manage the situation.



**Barbara Natterson Horowitz, MD**

Cardiology Professor at the UCLA School of Medicine

Featured in JAVMA: " One Health Wonders " October 2008

#### ' The Multispecies Approach to Medicine '

After several tamarins at the LA Zoo died of heart failure, Dr. Natterson Horowitz was asked to help screen remaining animals with echocardiograms in order to identify individuals at risk for heart failure so they could be started on appropriate medications. Examination of imaging results and post-mortem specimens resulted in the discovery that the tamarins' capture myopathy resembled human takotsubo cardiomyopathy, a fear-induced heart failure. Since this discovery, Dr. Natterson Horowitz and her colleagues, both physicians and veterinarians, have discovered other One Health overlaps in clinical cardiology. We can learn not only from the similarities but also the differences. For example, giraffes have a combination of high blood pressure ( 300/200 ) and ventricular

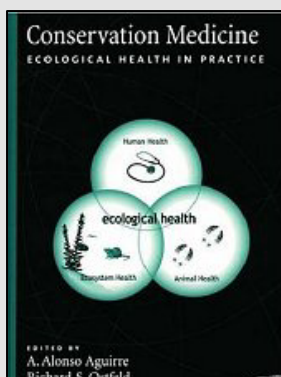
*By improving communication between human and animal medicine, the two disciplines can learn from one another.*

*St. Lawrence River beluga whales suffer from the highest rate of cancer in any wild mammal species.*



*The likely culprit is industrial pollution from the Great Lakes watershed drainage.*

*The public, government agencies, and wildlife advocates working to decontaminate the river help not only the whales but the people as well.*



hypertrophy that would render humans “ cardiac cripples ” but they appear to function just fine. Studying their physiology may help guide human medicine research. By improving communication between human and animal medicine, the two disciplines can learn from one another.



**Daniel Martineau, DVM, Dipl. ACVP**  
Professor of Pathology at the University of Montreal

#### **‘ Effects of Human Pollution on Beluga Whales in the St. Lawrence River ’**

Over the course of sixteen years, Dr. Martineau found that the leading cause of death in St. Lawrence River beluga whales was cancer. This population suffers from the highest rate of cancer in any wild mammal species ( 27% of adults ) yet no cancer was found in another population of the same species, a finding that raises the question of what is causing such high cancer rates in the St. Lawrence River beluga whales. The likely culprit is industrial pollution from the Great Lakes watershed drainage. Chemicals contaminants found in the river include PAH ( a carcinogen ), as well as PCB and DDT, compounds known to be toxic to both animals and humans. Toxins enter the whales when they feed at the bottom of the river and accumulate in their tissues throughout their lives. In addition to causing cancer, the toxins also compromise their reproductive ability and increase their susceptibility to disease by weakening their immune systems. Such health degradations are seen not only in the whales but also in the people living along the St. Lawrence River, who have a higher rate of cancer than people living in other areas of Canada. Humans and animals all share the same environment so the public, government agencies, and wildlife advocates working to decontaminate the river help not only the whales but the people as well.



**Alonso Aguirre, DVM, MS, PhD**  
Vice President of the Conservation Medicine Program Wildlife Trust  
Author of the book Conservation Medicine: Ecological Health in Practice

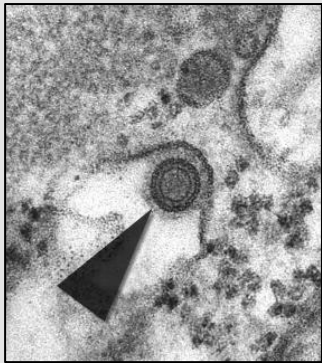
#### **‘ Challenges in Conservation Medicine ’**

Dr. Aguirre stressed the importance of studying and preserving biodiversity, preventing epidemics, and engaging local communities in research and conservation efforts that



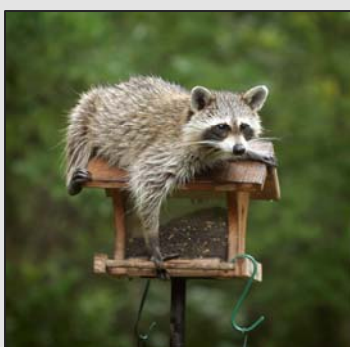


*We need to start looking at conservation medicine from a global perspective.*



Transmission electron micrograph (TEM) revealed some of the internal cross-sectional structural morphology of a rabies virion (arrow) in this central nervous system tissue specimen. The virion is adjacent to a Negri body, which is pathognomonic in the positive diagnosis for Rabies. Courtesy CDC

*Veterinary public health and the use of herd immunity models for domestic and wild animals continue to be prominent in the efforts for control of rabies in both animals and humans.*



impact the environment they live in. In recent years, the human population has increased rapidly and dramatically, resulting in ecosystem damage and the extinction of animal species. Our modern technology has led to increased human mobility, build-up of toxic chemicals, and climate change. These factors have contributed to the emergence of diseases such as avian influenza which impact not only health but economics as well. In order to effectively work towards preventing and resolving such issues, we need to start looking at conservation medicine from a global perspective.



**Charles Rupprecht, VMD, PhD (left)**  
Director of Rabies Control at the CDC

#### ' Rabies Prevention and Control '

Rabies manifests as an acute progressive encephalomyelitis caused by lyssaviruses. Viruses are maintained in hosts through point mutations and genetic drift and there are many variations of virus that result in clinical disease. Raccoons are the largest reservoirs of the virus in the United States for the half of the country east of the Mississippi River; in California skunks are of most concern. Bats also serve as rabies reservoirs. The CDC and other agencies are working not only on prevention and control but also elimination of the disease. Research has shown that it is possible to completely eradicate rabies from dogs. Veterinary public health and the use of herd immunity models for domestic and wild animals continue to be prominent in the efforts for control of rabies in both animals and humans.



**Brant Schumaker, DVM MPVM PhD candidate**

**Liz Van Wormer, DVM MPVM PhD candidate**

**Terra Kelley, DVM PhD candidate**

#### UCDavis Peer Presentation: One Health Inspiration From Within

**Dr. Schumaker** entered veterinary school with a strict small animal medicine emphasis because he thought it was the only way to build a career and make a living. During school he began to pursue wildlife medicine and is currently studying how diseases move between populations, particularly brucellosis which has a zoonotic potential for passing to humans through milk.



*The center also has funded a small-scale research projects including:*



- ◆ *comparing the ecological impacts of small and large dairy operations.*



- ◆ *a geographic and ecological analysis of rabies in bats in Illinois*



- ◆ *a study of microbial contamination in relation to food establishments*

*Emerging diseases, whether infectious or non-infectious, are often associated with changes in our natural or built environment.....all these things are interrelated.*

said John Herrmann, a professor of clinical veterinary medicine who directs the DVM/MPH program at Illinois. Similarly, veterinarians report outbreaks of many of the same diseases to agricultural officials, but those officials have no system for passing the information to public health agencies.

"The state agriculture department and the state health department are only a few blocks from each other in Springfield," Herrmann said. "But we still don't have an integrated surveillance system for sharing information."

Herrmann led the effort to create the Center for One Health Illinois, which is tackling this gap in surveillance by recruiting experts to build a system for sharing environmental and health data. Earlier this year the center brought potential partners together for a conference. Among the many ideas shared, participants discussed the barriers to quick and efficient data sharing. An outcome of that discussion was the creation of a demonstration project to develop an integrated surveillance system. The project involves experts at the local health department, the National Center for Supercomputing Applications at Illinois and the College of Veterinary Medicine.

The center also has funded a few small-scale research projects. These include an initiative aimed at comparing the ecological impacts of small and large dairy operations; a geographic and ecological analysis of rabies in bats in Illinois; a study of microbial contamination in relation to food establishments with and without health code violations in Champaign and Urbana; and a study of human and animal *Trichinella* infections on small hog farms in Romania. The center seeks to fund new studies that integrate human, animal, agricultural and/or ecosystem health.

The USDA funding has allowed the center to also "increase the public health exposure of our students," Herrmann said. It funds externships for some DVM/MPH students at the national Centers for Disease Control and Prevention, the USDA, the Food and Drug Administration and various other federal and state agencies. It also supplements course budgets so students can do more site visits and participate in outbreak investigations. For example, Herrmann recently took students to a poultry operation in northwest Illinois to do some environmental sampling. Other students traveled to Germany to visit and learn about a foreign animal disease facility and "the German equivalent of our CDC," Herrmann said.

In a world of increasing environmental pressures and burgeoning agricultural needs, Herrmann said, human communities can no longer afford to segregate their understanding of these influences on human health.

"Many of the determinants and contributing factors to human health are environmental in nature, including how our food is produced," Herrmann said. "So the safety of food and other consumer products is really important, as is the sustainability of those production systems. Emerging diseases, whether infectious or non-infectious, are also often associated with changes in our natural or built environment. We need to look at all these things, how they're all interrelated."

To contact John Herrmann, e-mail [jah1110@illinois.edu](mailto:jah1110@illinois.edu)

**Diana Yates - University of Illinois a Urbana-Champaign** [diya@illinois.edu](mailto:diya@illinois.edu)







## One Health Newsletter

### Contributors:

**Steven W. Atwood, VMD, MD, MRCVS, MPH (Cand)**  
University of Pennsylvania  
School of Veterinary Medicine

**Philip J. Bergman, DVM, MS, PhD**  
BrightHeart Veterinary Centers

**David L. Heymann, MD**  
Editor,  
Control of Communicable  
Diseases Manual  
Health Protection Agency  
London, UK

**William D. Hueston, DVM, PhD**  
Global Initiative for  
Food System Leadership  
University of Minnesota

**Laura H. Kahn, MD, MPH, MPP**  
Princeton University

**Lawrence C. Madoff, MD**  
University of Massachusetts  
Medical School  
and  
Massachusetts Department  
of Public Health.

**Leonard C. Marcus, VMD, MD**  
Tufts University Cummings  
School of Veterinary Medicine

*Continued.....*



*The One Health Newsletter is interested in publishing articles from a variety of view points and perspectives and any opinions and statements made in the Newsletter articles belong to the author (s), not the Editor, Editorial Board or Newsletter Contributors.*

### Coming Events:

#### North American Veterinary Conference (NAVC) 2011



“One Health” Session

Orlando, Florida (USA)

January 15-19, 2011

<http://tnavc.org/>

#### IMED 2011 (International Meeting on Emerging Diseases & Surveillance)

Organized by the International Society for infectious Diseases



Vienna, Austria

February 4 - 7, 2011

<http://imed.isid.org/>

#### 1st International Biosafety and Biocontainment Symposium

*Animal Production & Protection: Challenges, Risks, and Best Practices*

Baltimore Marriott Inner Harbor at Camden Yards  
Baltimore, Maryland

February 6 - 9, 2011



<http://arssymposium.absa.org/>



## Contributors:

**Thomas P. Monath, MD**  
Kleiner Perkins Caufield  
& Byers

**Glenn Morris, Jr., MD,  
MPH & TM**  
Emerging Pathogens Institute  
University of Florida

**Michael T. Osterholm,  
PhD, MPH**  
University of Minnesota

**Peter M. Rabinowitz,  
MD, MPH**  
Yale University

**Ralph C. Richardson,  
DVM, Dipl. ACVIM**  
Kansas State University

**James Steele, DVM, MPH**  
Professor Emeritus  
University of Texas

**Jedd D. Wolchok, MD, PhD**  
Memorial Sloan-Kettering  
Cancer Center  
Memorial Sloan-Kettering  
Cancer Center

**John (Jack) Woodall,  
MA, PhD**  
Director (retd.)  
Nucleus for the Investigation of  
Emerging Infectious Diseases  
Institute of Medical  
Biochemistry  
Federal University  
Rio de Janeiro, Brazil



## Coming Events:

### One Health 2011 Congress Melbourne Convention Centre



**Victoria, Australia**  
**February 14-16, 2011**

<http://onehealth2011.com/>

### OIE Global Conference on Wildlife

*“Animal Health and Biodiversity – Preparing for the Future”*



**Paris, France**  
**February 23 -25, 2011**

[www.oie.int/eng/A\\_WILDCONF/Intro.htm](http://www.oie.int/eng/A_WILDCONF/Intro.htm)

### 'One World – One Health: The power of collaboration through Interprofessional Education (IPE)'

**Vienna, Austria**

**August 28, 2011**

This meeting will be held in association with  
the [AMEE 2011 conference](#)



<http://www.veteducation.org/view2011.html>

### 13th ISVEE Conference, 2012 The International Society for Veterinary Epidemiology and Economics

*“Building Bridges - Crossing Borders”*

**Maastricht, Netherlands**

**August 20-24, 2012**

<http://isvee13.org/>





## One Health Newsletter

### Editor:

**Mary Echols, DVM, MPH**  
Palm Beach County  
Health Department

### Contributing Editor:

**Bruce Kaplan, DVM,  
Dipl. AVES (Hon)**

### Associate Editors:

**Meredith A. Barrett**  
University Program in Ecology  
Duke University

**Carina Blackmore, DVM,  
PhD**  
Florida Department of Health

**Jenifer Chatfield, DVM**  
Florida Department of Health

**Elizabeth Radke, MPH**  
University of Florida

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Florida Department of Health

**Gary L. Simpson, MD,  
PhD, MSc, MPH**  
Texas Tech University  
Health Science Center

**Danielle Stanek, DVM**  
Florida Department of Health



## Recent One Health Publications:

- ◆ **Building Bridges to Protect Health: Enhanced Partnerships among Animal, Human and Ecosystem Health Sectors in New Zealand**, Hillery A. Harvey, PhD, Fulbright New Zealand, August 2010

[http://www.fulbright.org.nz/voices/axford/2010\\_harvey.html](http://www.fulbright.org.nz/voices/axford/2010_harvey.html)

- ◆ **Overweight in dogs, but not in cats, is related to overweight in their owners**, Marieke L Nijland, Frank Stam, and Jacob C Seidell, Public Health Nutrition: 13(1), 102-106, June 23, 2009

<http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=6864556&fulltextType=RA&fileId=S136898000999022X>

- ◆ **Transmission Of Human Pathogen To Coral Reefs To Be Studied By UGA Researchers**, James W. Porter, Medical News Today, October 25, 2010

<<http://www.medicalnewstoday.com/articles/205372.php>>

- ◆ **When Hormone Creams Expose Others to Risks**, Tara Parker-Pope, [NYTimes.com/Well Blog](http://www.nytimes.com/Well_Blog), October 25, 2010

For other One Health publications visit the One Health Initiative website.



<http://www.onehealthinitiative.com/publications.php>

