

One Health NewsletterOne Health NewsletterOne Health Newsletter

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collaborative effort
by a diverse group of
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committed to

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One Health: The Environment

David A. Jessup, DVM, MPVM, Dipl. ACZM

To illustrate the basic concept of One Health, a Venn diagram with three interconnected circles, or a three legged stool, is often shown, with the circles or legs of the stool being human health, animal health and environmental health. A very important point is that these three are interconnected and dependent on one another for stability. Clearly optimal human and/or animal health cannot be achieved in a degraded or unstable environment. Yet, in recent years, a great deal of One Health writing and activity have focused on emerging infectious diseases, and the human-animal bond, often with little recognition of, or to the near exclusion of, environmental connections. This isn't in line with the writings of Virchow, one of the intellectual fathers of One Health, nor what those of us who studied under Calvin Schwabe learned. You cannot sit safely on a two legged stool. You cannot optimize health without understanding the environment.

An excellent example of this is provided by Lyme Disease in the North-eastern USA. With its emergence and spread in the 1980's, and epidemic of human cases, a first suspected cause was the concomitant boom in white-tailed deer populations, on whom the adult *Ixodes damani* ticks are found. Aggressive hunting seasons and deer population control were discussed as preventive measures. But, as it became clear that it was not the adult tick, that feeds on large animals like deer and people, but the second and third stage larvae that feed on smaller mammals, that transmits *Borellia bergdorferii* to people, the futility of those types of measures began to be understood. Reducing deer numbers might reduce the rate of collisions between cars and deer, but have little effect on the incidence of Lyme Disease in people.

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

<http://www.onehealthinitiative.com>

Human
health

Environmental
health

Animal
health

OHNL has a new website!

[www.floridahealth.gov/diseases-and-conditions/diseases-from-animals/
one-health-newsletter/index.html](http://www.floridahealth.gov/diseases-and-conditions/diseases-from-animals/one-health-newsletter/index.html)

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It was left to the classic work of Rick Ostfeld and partners to show that as old farmsteads reverted to forests, which were used for recreation by the adjacent suburban human population and their pets, a wide array of native vertebrates began to inhabit and populate these areas. As this proceeded, the developing ticks began using these wild animals and birds as alternative blood meal sources to the ubiquitous white footed deer mice. Since essentially all these hosts were much less competent vectors of the Lyme borellia than deer mice, forested areas with greater species biodiversity provided reduced risk of Lyme disease infections for people. A more intact and biodiverse environment was a healthier one for people and their animals. Understanding the local ecology and its environmental health implications made the difference.

On the west coast, specifically the Central Coast of California, protozoa and bacteria from animal and human feces, biotoxins (domoic acid and microtoxins) elaborated by nutrient fed planktonic organisms, and legacy pesticides and persistent organic pollutants can have health consequences for Southern sea otters and people. All of these have been shown to have anthropogenic and land

based sources and flow to the ocean as forms of pollution. And this degradation serves to simplify and destabilize the ecological relationships in marine environments. Damaging the health of the nearshore marine environment increases the risk of wild animal and human disease, and some evidence exists that pet animals using these waters can also become ill or die. Such basic actions as reducing and better controlling fertilizer use, vegetative buffer strips, artificial marshes, tertiary sewage treatment, converting from septic to sewage systems, and improving and replacing old sewage infrastructure can improve human, animal and environmental health. Here too animal and human health risks should decline as environmental health improves.

Jared Diamond points out that germs have had at least as profound an effect on human history as guns and steel. Rinderpest, the morbilivirus of ruminants, and the likely progenitor of human measles and canine distemper, had so devastating an effect on domestic stock the wide variety of wild hooved species of Eastern and Southern Africa, that it changed the economies, politics and societies of much of Africa for more than a century. Its effects on wild ungulates were so profound it actually changed the ecology of landscapes. The eradication of Rinderpest in Africa provides a profound example of the power of One Health and environmental knowledge when used to promote health and repel an invader. Although vaccination of livestock and wildlife played a very important role, what

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White-footed mouse. Photo credit: CDC

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veterinarians may not know, is that it was preceded by careful ecological study as to where and how to use it, and succeeded largely because it was strategically employed. Earlier efforts with more shotgun approaches did not succeed.

As veterinarians, when we fail to understand and appreciate the power of the environment to contribute to animal health, we fail our clients and our profession. In the 1950's and 60's pasture rotation, the drying and fallowing of land, and species rotation were recommended as a means of small and large ruminant internal parasite control. During the 1980s and 90's the heavy use and promotion of avermectin drugs to control these parasites lead to the false assumption that environmental control was a thing of the past. But, with the development of drug resistance, some small ruminant farmers are now hard pressed to find any effective wormers for their sheep and goats. Pasture and species rotation and use of environmental knowledge is now much more appreciated. This same scenario, but with orders more magnitude greater consequence, followed the dependence on, misuse and over use of, antibiotics for control of bacterial pathogens in human medicine and in agriculture. We focus on quick fixes and ignore the role of the environment in promoting and maintaining health at our peril.

The Greeks understood and warned us that hubris, the all too human assumption of knowledge and power, was a dangerous trait. As the One Health concept has developed and begun to be recognized, the veterinary profession has assumed a leadership role. This is good up to a point. But, ecology is a com-

plex and important field of biological study and few veterinarians have had even elementary courses in ecology, let alone advanced studies that provide insight into the complexities of disease across time, species and landscapes. As veterinarians, we tend to assume we know all we need to about the environment (s) in which we work. But we really don't, and to the extent we assume we do, and fail to attract, consult, involve and work with disease ecologists, we fundamentally fail the vision of One Health.

The big challenge we now all face, and one that will test whether we have learned how to really practice One Health, is global climate change. Will physicians, veterinarians, and ecologists work together successfully to mitigate some of the health consequences of this slow motion train wreck ? Or will we claim turf, promote our favorite quick fixes, and largely ignore one another. The answer to this question is up to us, up to you.

David Jessup is the senior wildlife veterinarian for the California Department of Fish and Game's Office of Spill Prevention and Response.

Will physicians, veterinarians, and ecologists work together successfully to mitigate some of the health consequences of climate change? The answer to this question is up to us, up to you.

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Land use and the roosting ecology of *Pteropus giganteus* reveals links to Nipah virus epidemiology in Bangladesh

Micah B. Hahn, PhD, MPH

Nipah Virus, an emerging zoonotic disease, has a complex epidemiologic story involving *Pteropus giganteus* (fruit bat) reservoirs, cultural and social practices, anthropogenic environmental change, and land use. In order to protect public health, we must understand the ecology of Nipah virus, a task that requires an interdisciplinary, One Health approach that can unravel this web of interconnections.

Nipah virus (family Paramyxoviridae, genus Henipavirus), is an RNA virus that causes respiratory illness and neurologic symptoms in pigs (1) and serious illness or death in humans (2). Infection is characterized by inflammation of the brain (encephalitis) or respiratory disease in humans (3). Severe cases progress to coma and death (2). The virus was first recognized following a major outbreak in pigs and humans in peninsular Malaysia and Singapore that occurred between September 1998 and June 1999 (4,5). Subsequent investigations for a wildlife reservoir of the virus found serologic evidence of Nipah virus in *Pteropus* fruit bats (“flying foxes”) (6). Nipah virus has also been isolated from *Pteropus* spp. urine and saliva and from swabs of partially eaten fruit (7,8). No other wildlife reservoirs have been identified in serologic testing of other bat species, birds, rodents, dogs, and pigs (6,9,10).

Although another epidemic has not occurred in Malaysia (11), outbreaks have occurred almost every year in Bangladesh since 2001 (Figure 1) (5; personal communication Hossain MS Sazzad). Nearly 200 human cases have been con-

firmed with a fatality rate near 80% (5; personal communication Hossain MS Saz-zad). Blood samples collected in India and Bangladesh from *Pteropus giganteus*, the only flying fox species found in Bangladesh, have tested positive for Nipah virus antibodies (9,12). Outbreaks separated by many months in different locations in Bangladesh, and genetic characterization of the virus in Bangladeshi patients, suggests repeated spillovers from bats to humans (13–15).

Case control studies have been conducted following Nipah outbreaks in Bangladesh to identify the transmission route from *P. giganteus* to humans and risk factors for the disease (11,16,17). Unlike the Malaysian outbreak, the major route of Nipah virus transmission from bats to humans in Bangladesh is likely via consumption of raw date palm sap (11). Collection of date palm sap is a common practice in the country. Sap collectors climb to the top of a tree (*Phoenix sylvestris*), shave the bark off one side, place a small bamboo tap at the base of the

Sap collector.

Photo credit: M. Hahn

Pteropus bat

Photo credit: Salah Uddin Khan

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shaved area, and hang a clay pot to collect the clear, dripping sap overnight (11). *Pteropus* bats have been documented in infrared photos drinking from pots, licking the shaved area on the tree trunk, and urinating while hanging near the collection pot (18).

In the morning, the collector gathers his pots and pours the sap from several trees into a common vessel for vending (11). One of the most common uses for the sap is to drink it fresh, early in the morning, before the process of fermentation begins to alter the taste (and alcohol content) (11,19,20). A case control study found that the risk of contracting the virus was 7.9 times higher for those who drank raw date palm sap compared with those who did not consume sap (11).

Research studies have identified that this is the most likely transmission route of the virus from bats to humans, but questions remain about the epidemiology of the disease (5). In particular, all documented human Nipah cases in Bangladesh have occurred in the central and Northwestern part of the country, known as the “Nipah Belt” (Figure 1) (5). The question of what drives these spatial patterns of outbreaks remains unanswered (5).

To address this question, our team from the International Center for Diarrheal Disease Research, Bangladesh (ICDDR,B) and the EcoHealth Alliance designed a “community level risk factor” study of Nipah virus infection. The objective was to better understand characteristics that put some villages at risk for outbreaks. This collaborative study utilized a One Health approach that relied on the expertise of epidemiologists, veterinarians, physicians, sociologists, wildlife ecologists, and statisticians to carry out a number of research components including surveys of human behavior, infrared camera observation of bat feeding behavior, and wildlife data collection.

The question of what drives the spatial patterns of Nipah outbreaks remains unanswered.

Figure 1. Location of human Nipah virus “spillover” cases from *Pteropus giganteus* bats in Bangladesh, 2001-11

Drinking raw date palm sap. A case control study found that the risk of contracting Nipah virus was 7.9 times higher for those who drank raw date palm sap (11).
Photo credit: M. Hahn.

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Our team also conducted a complementary study on *P. giganteus* roosting habitat and landscape-scale predictors of Nipah virus spillover. The objective was to assess ecological characteristics, including human population density, abundance of *P. giganteus* roosting colonies, and *P. giganteus* roosting habitat and forest structure, of villages in the Nipah Belt and to compare these villages to communities in the rest of country. Within the Nipah Belt, we compared villages where there had been cases of spillover to villages where no cases had been reported in order to strengthen our understanding of Nipah virus ecology in Bangladesh.

We found that compared with the rest of the country, the Nipah Belt has a higher human population density and patchier forests that are broken up by homesteads and agricultural land. In these patchy forests, we found several, small *P. giganteus* roosts scattered throughout the villages, while outside the Nipah Belt, it was

more likely to find a single, large roosting colony. In the Nipah Belt, the combination of more people and sporadic *P. giganteus* colonies could increase the likelihood that *P. giganteus* and humans will share food resources such as fruits from home gardens and date palm sap, which would increase the risk of Nipah transmission from bats to humans. The prevalence of Nipah virus within the bat population may also be affected by the size of the roosting colonies. One reason that fruit bats may be attracted to fragmented forests in the Nipah Belt is that these mixed landscapes may provide a more consistent food source than habitats comprised solely of pristine forest species (21). A survey of home gardens found that on average, a single Bangladeshi household is growing 34 tree species (22). Some have suggested that agroforestry may support larger *Pteropus* populations than would be viable without human cultivated crops (23), suggesting that the *P. giganteus* population in the Nipah Belt may expand alongside the human population (24). Our modeling results showed that along with annual precipitation, human population density and road density were the variables that best predicted areas of suitable *P. giganteus* habitat in Bangladesh.

Many questions remain. Our interdisciplinary team is trying to learn more about Nipah virus epidemiology and ecology as well as more fundamental questions about spillover risk and disease spread in the face of rapid population growth and environmental change. A key lesson is that although a detailed un-

Researchers focused on a single element in the virus system may be the missing piece that ties together the disparate strands of everyone else's research. But it will remain undiscovered unless we utilize the One Health framework to understand the relationship among our disciplines and have a common desire to integrate knowledge among them.

Bats in trees. Photo credit: M. Hahn

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Understanding of Nipah virus will emerge from the integration of multiple perspectives and disciplines, it is not realistic to expect a lone scientist to assess this web of drivers simultaneously. Therefore, our team members must be able to communicate with people outside of their area of expertise. Research focused on a single element in the Nipah virus system may be the missing piece that ties together the disparate strands of everyone else's research. But it will remain undiscovered unless we utilize the One Health framework to understand the relationship among our disciplines and have a common desire to integrate knowledge among them.

References available at: http://www.floridahealth.gov/diseases-and-conditions/diseases-from-animals/one-health-newsletter/ohnl-references/nipah_ref.pdf

Micah Hahn is an NCAR-CDC Postdoctoral Fellow. She recently completed her Ph.D. at the University of Wisconsin-Madison.

Rabies in Taiwan after 50 years—in wildlife

Jack Woodall, PhD

[Originally printed on the One Health Initiative website on April 17, 2013]

Three ferret-badgers were found dead on the island in 2012, between May and December, but rabies tests were only carried out in June 2013. The delay was presumably due to the extremely low index of suspicion, because Taiwan had been rabies-free since 1959. Since June, 41 more animals of that species have been found dead from rabies, plus a dead infected house shrew that had probably been bitten by one of them. The Animal Health Research Institute (National Laboratory) of Taiwan confirmed the infections by direct fluorescent antibody tests on the 2013 cases.

About 1000 Taiwanese are receiving rabies vaccinations; it may be supposed that these were hunters and others who had handled the carcasses. Ferret-badgers are hunted for their fur in the south of mainland China, where many human cases have been found in hunters. There was a rabies epizootic in ferret-badgers on the mainland in 2007-2008.

According to Tsai Hsiang-jung, Director-general of Taiwan's Council of Agriculture Animal Health Research Institute, analysis of the virus isolates from the ferret-badgers showed that they are about 90 percent similar to those found in mainland China and can be classified into 3 types. The findings suggest the virus has been lurking in Taiwan's mountainous areas for years before it was discovered, but he declined to speculate on how long the virus has existed here. A virology

Ferret-badger

Photo credit: Veterinary Virology

Micah Hahn

Photo credit: University of Wisconsin-Madison

moderator commented in a ProMED post that the heterogeneity of the isolates of rabies virus obtained from the Taiwan ferret-badger population suggests that the virus has been present there for a considerable period, and is not a recent introduction [1].

Asked if the disease could have been caused by smuggled animals from China, Tsai said health officials were not certain of this, but that there was a "very high possibility" this might have happened. This writer suggests that a search of old records might show that the ferret-badger population was once almost hunted out, and then replenished from the mainland [2].

No practical rabies vaccine has been developed for wildlife in China. Taiwan's official report to the OIE states that intensified vaccination of dogs and cats is being carried out in the areas where infected ferret-badgers have been found and that monitoring is ongoing. So far no dogs or cats have been found to be rabid.

Chinese authors publishing in 2009 cited lack of communication and co-operation among mainland China's Center for Disease Control and Prevention, Ministry of Agriculture and wildlife services from the Bureau of Forestry which make the situation there more complicated than canine rabies control. This is a clear case of an outbreak that demands a One Health approach, with close inter-agency collaboration.

*Since the time of writing in July, more cases have been found in ferret-badgers.

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Jack Woodall is a Co-founder and Associate Editor of ProMED-mail. He is also a member of the One Health Initiative team.

One Health Approach to a Mobile Medical Unit in Pasco County, Florida

Jenifer Chatfield, DVM, Raine Johns, JD, Mara Ricci, DVM, Andrea Mason, RN

According to recent estimates, Pasco County has the 2nd largest homeless population in Florida. While statistics on the homeless are notoriously imperfect, 2012 reports indicate that 4,502 people out of the overall population of

The introduction of rabies to wild animals in Taiwan is a clear case of an outbreak that demands a One Health approach, with close inter-agency collaboration.

Jack Woodall

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470,391 met the federal definition of homeless issued by the US Dept of Housing and Urban Development (HUD) and 14% are living below the poverty level.⁵ Pasco County has many rural areas and thus many of the homeless reside in wooded areas and tent camps increasing the likelihood of unintentional exposure to feral animals including cats, raccoons, pigs, and other animals. Through a collaborative effort, a One Health mobile medical unit (MMU) provided human medical care, legal services outreach, and veterinary medical prevention of zoonotic diseases to companion animals of the homeless in Pasco County, Florida.

History

In 2012, the public defender's office launched a MMU outreach program to provide routine and preventive medical care, as well as legal consulting services, to the homeless in Pasco County. On a regular schedule, the MMU travels to established locations used by the homeless such as ministries and shelters. A medical care provider sees patients on a walk-up basis from 9a-1p. Community partners, such as local hospitals and other health care providers, supply volunteer nurses as well as support staff and other allied health professionals. The MMU continues to expand its reach to diverse populations through cultivation of community partnerships throughout the county. The Florida Department of Health in Pasco County provides medical oversight for the MMU.

The Medical Reserve Corps (MRC) is a volunteer organization that supports public health in the face of disasters or during planned events. Once activated, members essentially become volunteer employees of the local public health department. The West Central Florida Medical Reserve Corps (WCFMRC) is well integrated with the regional veterinary medical association, the Pasco Hernando Veterinary Medical Association (PHVMA), with 12 PHVMA-member veterinarians credentialed with the WCFMRC.

Event

On June 20, two veterinarians and four administrative assistants provided zoonotic disease prevention to companion animals. Preventive procedures included a physical exam, rabies vaccination if indicated, flea prevention and gastrointestinal parasite control. Vaccination certificates were provided to the owners. Pursuant to Florida statute, this limited service clinic provided only immunizations or parasite control. In addition, people were seen aboard the MMU by the human medical provider for routine care. All patients/clients completed a short exit survey.

Results

Forty companion animals were seen by the veterinarians on duty in 3.5 hours while seventeen people were seen aboard the MMU by the ARNP on duty.

Dr. Chatfield and Dr. Ricci admire
one patient's hairdo.

Photo credit: J. Chatfield

Humans to the left, animals to the
right—and Keep it Moving!

Photo credit: J. Chatfield

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Additionally, three other people were identified as in need of mental health assistance based on significant behavior demonstrated during the event and appropriate actions, including outpatient case management, were initiated on their behalf. Patient/client exit survey results showed that: 48% of people stated their pets had never seen a vet; 74% routinely come into contact with animals that are not their pets and 36% of those animals are stray/feral cats and 9% are raccoons. Feral cats and raccoons are well-established reservoirs for serious zoonotic diseases. An encouraging statistic from the survey was that 9% of those utilizing services that day came for both animal and human medical services.

Discussion/Conclusion

This wildly successful event validates a large need among an often dismissed pet-owning population. In fact, many homeless persons claim to be pet owners.² Cost has been determined to be the most common reason for delinquent veterinary care among pet owners. It would seem logical that those in such dire financial straights as to be homeless, would be less likely to seek veterinary care. With the lack of routine preventive medical care and low-level housing circumstances, sometimes only tents, the homeless are certainly more vulnerable than the average person to zoonotic disease. Couple these circumstances with a general lack of education⁴ and a recipe for a public health disaster begins to emerge. This event provided a positive experience and introduced the idea of safe practices around animals to the homeless it served. In addition, the data collected provided a clearer picture of animal contact for area municipal leaders indicating that routine contact with feral/stray cats and raccoons (known rabies vectors in Florida) by a vulnerable population is occurring.

Photo credit: J. Chatfield

Photo credit: J. Chatfield

Photo credit: J. Chatfield

Organized and active outreach to this vulnerable population to prevent transmissible and zoonotic diseases should be a priority for public health and community partners.¹ Animal companions can help relieve the loneliness and negative health consequences that can accompany the newly homeless. Strategies for safely maintaining that beneficial human-animal bond should be promoted.³ Engaging local veterinary medical associations, departments of health, and service providers can work. After all, herd health is most effective when the entire herd is included.

Acknowledgements: Thank you to Merial for providing the rabies vaccines, certificates and Frontline topical flea preventive. Thank you to Novartis for providing the Capstar oral flea prevention. Thank you to MWI for providing other consumables and the Pasco Hernando Veterinary Medical Association for providing other supplies.

References available at: <http://www.floridahealth.gov/diseases-and-conditions/diseases-from-animals/one-health-newsletter/ohnl-references/mmu-ref.pdf>

Jennifer Chatfield, Raine Johns, Mara Ricci, and Andrea Mason are from the West Central Florida Medical Reserve Corp, the Pasco Hernando Veterinary Medical Association, and the 6th Circuit Public Defender's Office.

Outbreak Reports from around the World, 2nd Quarter 2013

Jack Woodall, PhD

Since the roundup in the last issue of OHNL, as of July 25 there have been the following notable reports -- among many others -- on ProMED.

H7N9 avian flu – the saga continues

Sporadic human cases of this strain of avian flu continue to appear; official figures are 132 confirmed cases in mainland China as of 30 June 2013, includ-

ing one confirmed new case. Another new case was confirmed on 20 July. But none have been found anywhere else except for a single case in Taiwan infected on the mainland.

MERS CoV – still no source found

As of 21st July, there have been a global total of 90 laboratory-confirmed cases of MERS-CoV infection, including 45 deaths. Most patients had unspecified underlying medical conditions and no history of contact with known MERS-CoV confirmed cases nor with animals. A sample of 62 South African bats of 13 species uncovered 5 alphacoronaviruse and a novel clade 2c betacoronavirus virus

What a GREAT TEAM!

L-R: Ryan Murphy (Public Defender's), Raine Johns , JD (Public Defender's and MMU Coordinator), Deborah Hensley (MRC Coordinator), Andrea Mason, RN (MRC volunteer/ PHVMA Liaison), Diana Mattox, DVM (Spay Pasco), Mara Ricci, DVM (MRC volunteer), Lyra Gobardi (PHVMA volunteer), Jenifer Chatfield, DVM (MRC volunteer), Jeri Chatfield (PHVMA volunteer)

Photo credit: J. Chatfield

isolate that is a close relative of MERS-CoV. The range of the bat that it came from extends from South Africa to Kenya and part of Ethiopia, but it is on the IUCN Red List of Threatened Species. The search for the animal reservoir continues.

New virus infections

A mysterious group of viruses known for their circular genome has been detected in patients with severe disease on two continents. Two papers published in June suggest that the viruses -- one of which also widely circulates in animals in Viet Nam -- could be involved in brain inflammation and paraplegia. Whole-genome sequencing confirmed that the virus from Asia, which the scientists have dubbed CyCV-VN, for cyclovirus-Viet Nam, is novel; it belongs to the genus Cyclovirus within the family Circoviridae.

Heartland virus, isolated from two farmers in Missouri who suffered from fever, fatigue, low blood cell counts and elevated liver enzymes in 2009 (not 2012 as indicated in the edition of this article in the First Quarter 2013 report), has now been isolated from Lone Star ticks in the state. Physicians should consider possible infection with Heartland virus if the tickborne disease it mimics -- ehrlichiosis -- fails to improve when antibiotics are given. The public, meanwhile, should continue to recognize the risk of ticks and rely on protective clothing, insect repellents and checking their skin for signs of ticks, he said. In addition, CDC recommends showering soon after going outdoors, removing attached ticks from the body with tweezers, and calling a doctor if illness develops after a tick bite.

Severe fever with thrombocytopenia syndrome (SFTS)

This newly-recognized, probably tick-borne, disease in China & Japan has now been detected in South Korea. As of 28 May 2013, the Korean Centers for Disease Control had recorded 8 deaths in elderly people, with 5 non-fatal cases, and had received reports of 47 cases from clinics; of these, 2 more cases were confirmed and 27 were negative by RT-PCR. There were 2 additional highly suspected cases.

Yellow fever – Africa

The largest Yellow fever outbreak in Africa in 20 years ended last year, in the Darfur region of Sudan, controlled by mass vaccination. But in July, dozens

more suspected cases were reported on the other side of the country that borders Ethiopia, and over 100 cases were notified to WHO from Ethiopia in May and June. There have been other outbreaks in both Congos. This seems to be a year in yellow fever's cycle when it is breaking out all across its African endemic zone.

In March, India ran out of yellow fever vaccine at government vaccination centers early in the year, so people were unable to travel to countries that require a vac-

Lone star tick

Photo credit: CDC

Aedes mosquito

Photo credit: CDC

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ination certificate before they will issue a visa. The Indian vaccine factory at Kasauli broke down over a year ago and has not been repaired, but importation of

vaccine resumed in July. Unfortunately, in the interim it was alleged that fake certificates were for sale, which could have posed a serious health hazard.

Rare and unusual cases

There have been reports of some unusual infections during this period.

Three members of one family who ate cooked buffalo fish are Mississippi's first recorded cases of Haff disease (buffalo fish poisoning), which is caused by an unidentified toxin. According to the Mississippi State Department of Health, approximately 30 sporadic cases have been reported since 1984, most in the summer months. So far, there have been no reported deaths linked to the disease.

A Swedish man who died of parrot fever (psittacosis) in southern Sweden transmitted the rare disease to at least eight people. Human-to-human transmission of this disease is exceptionally uncommon.

A rare case of severe infection in Canada with *Capnocytophaga canimorsus* by a nip from a pet dog left a woman in a coma and when she emerged from it, necessitated amputation of an arm and both legs. The bacterium is commonly found in dog saliva, but human infections are generally mild.

Iatrogenic infections

The case fatality rate (for CNS cases) in the USA resulting from injections with fungally contaminated steroids is now $61/716 = 8.5$ percent. Although the dates of onset of the newly reported cases are not given, it is likely that the increase is not primarily due to newly presenting cases but rather just newly reported cases. The weekly case count peaked in mid-October 2012. Another injectable corticosteroid produced by a compounding pharmacy, this time in Tennessee, has been found to be contaminated with a variety of agents causing illness in 25 people from four states.

At least nine people aged from 13-39 years in the USA (Illinois) have contracted *Pseudomonas aeruginosa* following upper ear piercings, which can deform the ear and spread systemically. Many had to be hospitalized.

First reports and undiagnosed illnesses

First reports were received of the following diseases in the countries affected: Zika virus in a tourist returning to Canada from Thailand, foot & mouth disease in cattle, strain A in Mongolia and strain O in Tibet, Schmallenberg virus in cattle in Serbia (positive serology), African swine fever in Belarus, porcine epidemic diarrhea in the USA, Seoul virus in Sweden (a pet rat), canine parvovirus in

a wolf in the USA, bovine tuberculosis in England in a seal and influenza A H1N1

Buffalo fish

Photo credit: MBJ

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in an elephant seal in USA waters. One has to wonder how seals manage to catch diseases from land animals.

Outbreaks in humans for which the diagnosis had not yet been reported as of 26 July occurred in India, China (viral pneumonia in medical staff), Uruguay (deaths among crew of arriving Chinese ships), USA (respiratory, mixed infections) and Benin, and in humans and horses in Australia (lesions on the tongue and gums). In animals, undiagnosed fatal cases in horses and bison and fish die-offs were reported in the USA, and in cattle in Australia.

Crop plant diseases

First reports were received of the following diseases: Stewart's wilt of maize in Argentina, leaf rust of coffee in Panama, pale cyst nematode in potato in Denmark, yellow mottle of rice in Congo DR, fireblight of apple and pear in Tunisia, Kazakhstan & Kyrgyzstan. As yet undiagnosed diseases have hit sugar beet in England and snake bean in Guyana.

For details of all the above, you can search the ProMED outbreak page on the OHI website or ProMED at www.promedmail.org.

Hendra Virus Vaccine: a classical example of One Health

Thomas P. Monath, MD

[Originally printed on the One Health Initiative website on May 30, 2013]

In November, 2012, Pfizer Animal Health launched Equivac®HeV, a vaccine for the prevention of Hendra virus disease of horses in Australia. Since horses are a major source of contact spread of Hendra virus to humans, the vaccine promises to make an important contribution to human health as well. Fear of acquiring the disease has also constrained equine veterinary practice in Australia.[1]

Development of Equivac®HeV was a collaborative effort between Pfizer and CSIRO's Australian Animal Health Laboratory. Testing of the vaccine in horses was performed at CSIRO's high-containment facilities at Geelong. Support for the development program was also provided by the Uniformed Services University of the Health Sciences and the Henry Jackson Foundation for the Advancement of Military Medicine in

the US. A provisional approval for limited use of the vaccine was obtained in early 2012, and full approval in November.

Hendra virus is a member of the Henipavirus genus, family Paramyxoviridae. The reservoir hosts of Hendra virus are fruit bats (flying foxes, *Pteropus* spp.), and spread from bats to horses is by contact, respiratory droplets, or food or fomites contaminated with bat urine, or by contact with other horses. Human cases have resulted from contact with infected horses. The disease was first described in 1994. Human and equine cases have been recorded in coastal Queensland and New South Wales and positive bats have been detected also in the Northern Territory. A total of 81 deaths in equids have been reported in 14 outbreaks with a 75% case-fatality rate, and 8 cases (4 fatal) have occurred in humans, all of whom had contact with sick horses, including horse trainers and veterinarians. The disease is manifested by severe systemic illness, respiratory symptoms or encephalitis.[2] Swine appear to be susceptible to experimental infection, and there is serological evidence of exposure was found in a single dog. A closely related bat-borne virus, Nipah virus in SE Asia has caused outbreaks in swine and humans.

The vaccine is a soluble, recombinant glycoprotein (G) of Hendra virus, and antibodies to the protein neutralize cell receptor binding of the virus. In addition to horses, the adjuvanted vaccine has been shown to protect ferrets against experimental infection.[3] The vaccine also cross-protects against Nipah virus.

The availability of Equivac®HeV should lead to rapid uptake by horse owners in Australia. The Equine and horse racing industry in Australia is large, contributing billions of dollars, and over 1% of total Gross Domestic Product.[4] The occurrence of at least one Hendra virus outbreak annually since 2006, and the high lethality of the disease, has raised considerable awareness. Vaccination of horses represents a strategy not only for protection of valuable animals, but also for prevention of human cases. Similar strategies for immunizing animals for the prevention of both animal and human diseases are used (rabies, Brucellosis, avian influenza) or have been considered (e.g. Bartonella, bovine tuberculosis, Lyme disease, Venezuelan equine encephalitis, Japanese encephalitis, Rift Valley fever). However, vaccination of horses against Hendra virus may turn out to be one of the most straightforward and demonstrably effective strategies of all.

References available at: <http://www.floridahealth.gov/diseases-and-conditions/diseases-from-animals/one-health-newsletter/ohnl-references/hendravaccine-ref.pdf>

Thomas Monath is a founding member of the One Health Initiative autonomous

pro bono team.

Vaccination of horses for Hendra virus represents a strategy not only for protection of valuable animals, but also for prevention of human cases.

Photo credit: CDC

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An account of recent One Health actions

Stephanie Crawford, BS, MPH(c) and Tracy Kolian, MPH

[Originally printed on the One Health Initiative website on July 10, 2013]

Where we live, work and play has a tremendous impact on our health. Over the past several months, this undeniable link between humans, animals, and our environment has brought growing urgency to the concept of “One Health.” Although this concept is not new, it is becoming increasingly important. As our world becomes more globalized and urban sprawl brings more development, humans are in closer contact with wildlife making them more susceptible to disease. Recognizing the delicate balance of these interactions is necessary to protect and promote the health of all species. By taking a look at some specific ways in which One Health has made an impact in communities across the nation over the past year, we can begin to see how collaboration across various scientific disciplines can benefit human, animal, and environmental health.

Several recent global news events brought greater focus on One Health. In early 2012, a new coronavirus, Middle East Respiratory Syndrome coronavirus (MERS-CoV), was first identified in humans.[1] According to the World Health Organization (WHO), the source of the virus is still unknown. However, new research suggests that the virus may have an animal reservoir.[2] Similarly, in March 2013, the Chinese Centers for Disease Control and Prevention confirmed the presence of a new strain of avian influenza A (H7N9) that had not been

previously reported in humans.[3] The virus has the ability to infect humans through contact with infected animals or exposure to environments that have been contaminated with infected animals.

Events like these emphasize the importance of understanding disease transmission between humans and animals and the role of the environment in the epidemiology of these diseases. In addition, these events stress the need for increased zoonotic surveillance worldwide to reduce the ever-increasing risk of newly emerging diseases.

Medical professionals from around the world have come together to discuss similar One Health issues and share successes of collaboration across disciplines. In June 2013, more than 500 of the world’s top scientific health professionals came together in Brussels, Belgium for The First World Research and Innovation Congress.[4] This event brought together key stakeholders in health care research to discuss issues facing health care worldwide and proposed strategies to overcome these challenges.

By taking a look at some specific ways in which One Health has made an impact in communities across the nation over the past year, we can begin to see how collaboration across various scientific disciplines can benefit human, animal, and environmental health.

There have been major One Health victories this year as a result of the collaboration of health professionals across various fields. In February 2012, the University of Texas MD Anderson Children's Cancer Hospital and Texas A&M University College of Veterinary Medicine teamed up to fight non-Hodgkin lymphoma in dogs using T-cell therapy, an immunotherapy that has been well tolerated in clinical trials on companion dogs and has provided a great comparative model for humans.[5]

In November 2012, the equine vaccine for Hendra virus was developed in Australia, promising protection for horses and with the potential for helping to prevent more human cases.[6] Many similar stories of One Health successes are coming to light as the gap between human and animal medicine narrows and the relationships between physicians, veterinarians, and environmental scientists continue to intersect.

One Health issues have also garnered recent attention among federal lawmakers. In May 2013, the Animal and Public Health Protection Act was introduced to the U.S. Senate.[7] This new legislation could mitigate the spread of disease by providing a more stable flow of resources to the National Animal Health Laboratory Network (NAHLN). The NAHLN monitors animal-borne diseases that pose a significant threat to animal and public health and is part of a nationwide strategy to coordinate all organizations involved in animal disease surveillance. The bill would provide more comprehensive national surveillance of emerging

infectious diseases and allow for more timely interventions. If it is passed it would be a great victory for animal and human public health. Consideration of the bill signifies the growing recognition of One Health issues and represents an important call to action at the national level to protect human and animal health.

References are available at: <http://www.onehealthinitiative.com/publications/An%20Account%20of%20Recent%20One%20Health%20Actions%20-%20Posted%20OHI%20website%20July%202013.pdf>

Stephanie Crawford is a Policy Center Intern and Tracy Kolian is the Deputy Director of the Center for Public Health Policy in the American Public Health Association.

Many stories of One Health success are coming to light as the gap between human and animal medicine narrows and the relationships between physicians, veterinarians, and environmental scientists continue to intersect.

Image credit: http://www.aphis.usda.gov/animal_health/nahln/

Brief Items in One Health

New MPH Program with Veterinary Epidemiology concentration

The University of North Carolina at Chapel Hill Gillings School of Global Public Health in collaboration with the North Carolina State University College of Veterinary Medicine is now providing a program designed to provide graduate training for veterinarians interested in pursuing public health careers. For more information about this program and how to apply, go to: http://www2.sph.unc.edu/vet_mph/

One Health Talk

One Health Talk is a new social network for open exchanges about One Health problems. It was developed by the University of Minnesota in conjunction with the Food and Agriculture Organization of the United Nations. It is the discussion arm of www.onehealthglobal.net. To participate in monthly discussions, visit: <http://www.onehealthtalk.org/>.

Items from the One Health Initiative:

One Health Initiative autonomous pro bono team's proactive One Health Projects (2009-2013)

This is a partial list of the many impressive contributions that the One Health Initiative team has made to this field. It is an excellent one stop shop for arguments supporting the need for One Health. <http://www.onehealthinitiative.com/publications/One%20Health%20Initiative%20Team%20%20Proactive%20Projects,%202009%20-%202013.%20August%2026%202013pdf.pdf>

Director of World Health Organization's Global Smallpox Eradication Campaign joins One Health Initiative Honorary Advisory Board

The One Health Initiative Autonomous pro bono team is delighted to announce that Dr. Donald A. Henderson, a physician, has accepted becoming a member of the team's Honorary Advisory Board. He said, "I am delighted to be asked to join the Honorary Advisory Board. It is a distinguished group and a worthy cause." The Advisory Board was established in 2010 and now has 29 distinguished members from within the U.S. and worldwide. Dr. Henderson, is presently a Resident Scholar at the Center for Biosecurity of the University of Pittsburgh Medical Center.

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Missouri Medicine devotes full issue to One Health

The Journal of the Missouri State Medical Association's May/June 2013 issue is titled "One Medicine: Collaborative Research on Human & Animal Disease". It includes the following articles: "One Medicine: collaborative research on human & animal disease for the betterment of both", "Promoting One Health: the University of Missouri Research Center for human animal interaction", "A brief history of animal modeling", "Not lost in translation: how study of diseases in our pets can benefit them and us", among many others. To see the full issue, visit: <http://www.onehealthinitiative.com/publications/One%20Medicine%20Book.pdf>

Online course promotes awareness and prevention of companion animal zoonotic diseases and collaboration among health professionals

The Center for Food Security and Public Health at Iowa State University College of Veterinary Medicine announces the first offering of a new web-based course, October 7-November 3, 2013. The Zoonoses: Protecting People and Their Pets course provides an excellent opportunity for animal and human healthcare professionals and students to refresh and gain knowledge of key zoonotic diseases. The course includes lessons, case studies, a discussion board, and online resources to assist in conveying zoonotic disease prevention measures to clients. The cost register for the course is \$50. To find out more and register, visit:

<http://www.cfsph.iastate.edu/Zoonoses-Course/index.php>

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

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Coming Events

2nd Global Risk Forum One Health Summit 2013

“One Health—One Planet—One Future: Risks and Opportunities”

Davos, Switzerland

November 17-20, 2013

<http://onehealth.grforum.org/>

3rd International One Health Congress

Amsterdam, the Netherlands

March 15-18, 2015

<http://www.iohc2015.com/>

Emerging Disease Symposium

Houston Zoo, Houston, TX

February 13-15, 2014

<http://www.houstonzoo.org/edsymposium/>

One Health Forum and Public Dialogue

MCPHS University, Worcester, MA

September 30, 2013

<http://events.constantcontact.com/register/event?oeidk=a07e85015u32c48f8be>

Zoobiquity Conference 2013

New York, NY

November 2, 2013

<http://zoobiquity.com/>

Bridging the Gap Between Animal Health and Human Health

Kansas City, MO

November 12-14, 2013

<http://www.animalagriculture.org/>

One Medicine Symposium: A One Medicine Approach to Pesticides

Durham, NC

December 12, 2013

<http://www.onemedicinenc.org/>

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Recent One Health Publications (continued)

Items from the One Health Initiative:

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