

Becoming a
Virus Hunter

by Donna Berry



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Virus Adventures: *Cmdr. Patrick Blair, Ph.D., Director, Respiratory Diseases Research, Naval Health Research Center, San Diego. Cmdr. Blair is pictured here in his San Diego office in front of photos that document his worldwide travels. The top right photo of his team in Banda Aceh is featured on the next page. (U.S. Navy Photo/Petty Officer 3rd Class Joshua A. Martin)*

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In 2002, he hiked along 20 miles of narrow mountain trail in Peru to reach three hillside towns in the Andes mountains. Lt. Cmdr. Patrick Blair was accompanied by Lt. Cmdr. George Schoeler, a Navy entomologist, Peruvian health officials and several mules loaded with supplies. The group's mission was to determine the cause of a disease outbreak that had sickened a number of people in the area, killing at least two. To identify what was making people ill, the team collected blood samples from humans and ectoparasites, along with tissue samples and blood from rodents and domestic animals. Surviving for two weeks on Meals Ready to Eat, Blair says the entire adventure "was a lot of fun." It was fortunate that he enjoyed the work, because he was learning how to be a virus hunter, and virus hunters must go wherever the viruses are.

Blair will tell you he has the best job in the Navy, but he never planned on becoming a virus hunter. He did not even plan on joining the Navy. But, through his research as a doctoral student in immunology in the early 1990s, he learned that one of the world's leading authorities in his field of study, Carl H. June, was a Navy physician. June was then the head of the Immune Cell Biology Program at the Naval Medical Research Institute and a professor at the Uniformed Services University of the Health Sciences in Bethesda,

Md. June is now retired and works at the University of Pennsylvania. Blair wanted to do post-doctoral research alongside June and had a choice: He could do it as a civilian or as a Navy officer. Becoming a Navy officer had the added allure of wearing what Blair calls "a cool uniform," so he chose that path, becoming Lt. Blair.

Since then, his career has taken him from Bethesda to Peru to Indonesia to San Diego. At each stop he has learned more about infectious diseases, how to find them and how to protect our military forces—and the general public.

At first, Blair continued his work as an immunologist in the Navy. He spent eight years working in a laboratory at NMRI and then at the National Institutes of Health through a joint Navy-NIH effort in transplantation and autoimmunity, until the Navy decided it was time for a change. That was when Blair's training as a virus hunter began in earnest.

Blair's first stop was the U.S. Naval Medical Research Center Detachment in Lima, Peru. The center is one of the Department of Defense's five overseas research laboratories tasked with conducting research on infectious diseases that threaten our armed forces. NMRC, like its counterparts, partners with the local military and civilian health authorities and collaborates with the U.S. Agency



Emergency Responders: (Above) Cmdr. Blair, pictured third from right, is surrounded by a team of Australian and New Zealand soldiers and staff from the Navy Medical Research Unit-2 who responded to Banda Aceh shortly after the December 2004 tsunami, which resulted in 130,000 fatalities. (Photo courtesy of Cmdr. Putnam)

Researchers: (Right) Senior lab technicians Darcie Baynes and Sarah Vu, at the Naval Health Research Center, San Diego. Testing at NHRC led to the identification of the first human cases of H1N1 flu in the U.S. (U.S. Navy Photo/Petty Officer 3rd Class Joshua A. Martin)

for International Development, the Centers for Disease Control, NIH and local ministries of health to track and research infectious diseases.

Once in Peru, Blair found himself spending much less time in the laboratory and more in the field, tracking down the root causes of illnesses. He considers himself fortunate to have been tutored there in the “tricks of the trade” by James Olson, a retired Navy Commander who worked for the CDC. Like June, Olson is widely known and respected in his field.

The work with NMRCD required Blair to travel all around South America. His field work included interviewing people

affected by disease and taking blood samples from them, as well as from local animals. Through these methods, a virus hunter can identify a virus and its methods of transmission. From there, a new or emerging disease can be tracked, its symptoms documented and its transmission mechanisms identified. This knowledge is used for prevention and treatment purposes—including the development of vaccines and therapeutics.

Back on that narrow trail in the Andes, Blair and his fellow virus hunters were on the path to identifying three diseases not previously known to circulate in the region. One of these resulted from a novel species of bacteria, a rickettsial

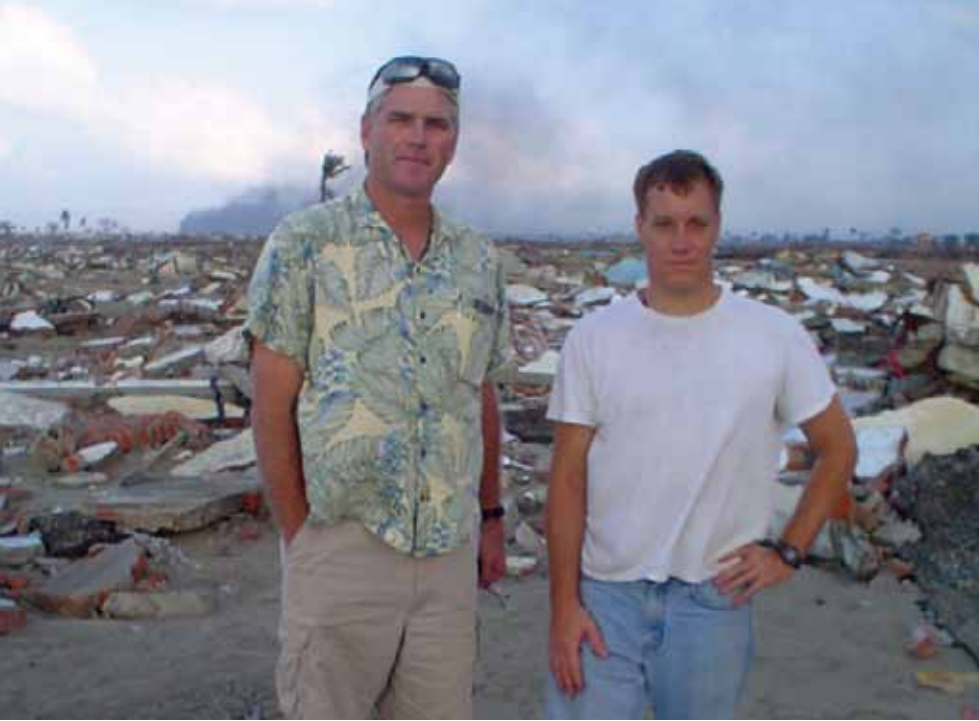
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agent that the team named *Rickettsia andeanae*, after the mountains in which they found it. Identifying these diseases helped the Naval and Peruvian team determine appropriate treatment for local villagers who had been affected—who subsequently recovered. Through these collaborative efforts, the Navy biomedical laboratories contribute to the health and understanding of disease transmission and protection in areas where they operate. This experience gave Blair tremendous satisfaction. That's when he says he "fell in love" with field work.

After two years in Peru, Blair's voyage took him to Jakarta, Indonesia, home to another DoD infectious disease research laboratory, the Navy Medical Research Unit-2. Again, Blair found himself canvassing the region to track disease outbreaks and establish surveillance networks. Highlights of his assignment in Southeast Asia included working in Cambodia with Cmdr. Shannon Putnam to establish a national disease monitoring network and working in the Indonesian city of Banda Aceh shortly after it was ravaged by the December 2004 Asian tsunami. After the earthquake and

resulting tsunami, health authorities were concerned that unsanitary conditions could lead to widespread outbreaks of infectious diseases. Scientists and clinicians from NAMRU-2 partnered with the World Health Organization and Indonesian Ministry of Health to monitor diseases in the affected region. Also while at NAMRU-2, Blair and his team identified the first human case of avian influenza (H5N1) infection in Indonesia and served as one of the country's reference laboratories for the diagnosis of human H5N1 infections from June 2005-January 2007.





Tracking Disease Outbreaks: (Left) Cmdr. Shannon Putnam and Cmdr. Blair stand where the 2004 tsunami came ashore in Banda Aceh. NAMRU-2 and other groups went there to establish a disease surveillance network. Health authorities were concerned that unsanitary conditions would lead to widespread outbreaks of infectious diseases. (Photo courtesy of Cmdr. Putnam)

Field Research: (Below) Cmdr. Blair and his team from the U.S. Naval Medical Research Center Detachment in Lima collect tissue and blood samples from an animal to identify the source of a disease outbreak in a remote area of Peru. (Photo courtesy of Cmdr. Blair)

But virus hunting was not Blair's only responsibility in Indonesia. In a world concerned about the potential spread of avian influenza, Blair and other scientists from NAMRU-2 advised the U.S. ambassador to Indonesia and assisted with the development of pandemic response plans for the region. Together with the CDC, Blair and the NAMRU-2 team developed and taught a course on laboratory and epidemiologic response to pandemic influenza to public health officials from dozens of nations. The level of responsibility that the Navy afforded him, the caliber of people he worked with and the measurable impact on human health were the hallmarks of Blair's service in the overseas Navy biomedical laboratories.

Since the summer of 2008, Blair has been stationed in San Diego, where he heads the Department of Respiratory Diseases Research at the Naval Health Research Center. The team monitors the health of military recruits across the United States and conducts surveillance onboard 20 ships in three fleets. Also, in partnership with the

CDC, Mexican health officials and the U.S. Department of State, the NHRC team provides surveillance of the U.S.-Mexico border. In the course of this work, they typically handle 5,500 virus specimen samples per year, which gives them significant diagnostic experience and frequently leads to participation in studies to test new diagnostic equipment. Most recently, Blair and his team have become critical players in identifying and tracking the emerging swine flu (H1N1).

In late March 2009, the team was participating in a study to test a new diagnostic tool when a sample was received from a 10-year-old DoD beneficiary. The tool confirmed an influenza diagnosis, but the team could not identify the exact type of flu. Following the study protocol, Blair's team sent the sample to a second laboratory for confirmation. The second lab was also unable to identify the influenza subtype and forwarded the sample to the CDC for further analysis.

In the meantime, the NHRC received a second influenza sample that could not



be specifically identified. This sample had come through a clinic on the border. An analysis conducted with an advanced diagnostic platform at NHRC suggested the second sample was a humanized swine influenza virus. Knowing that the CDC was about to declare the first sample as swine flu, Blair immediately sent the second sample to the CDC. "It occurred to us these were not isolated events," says Blair. The NHRC team quickly set up a phone conference with the CDC, and subsequently local health care officials, to alert them of the team's suspicion that a novel influenza virus had emerged. As a result, the CDC definitively identified the two samples

as the same virus that was just gaining attention in Mexico. These were the first two cases of H1N1 found in the U.S.

The virus hunters in San Diego were now inundated with new samples to test. In the two weeks that followed, NHRC received more than 2,000 samples—a volume equivalent to almost six months' work under normal circumstances. These included 300 samples from Mexico that NHRC agreed to analyze in order to alleviate the strain on overburdened Mexican public health officials. Driven by their dedication to protect the U.S. forces, the staff worked nonstop so that the

magnitude of the threat from this new virus could be understood.

For Blair, the Navy has been a rewarding experience. Beyond the travel to exotic places, Blair attributes the work's interesting challenges and the Navy's confidence in bestowing young officers with significant responsibility, relatively early in their careers, for his success and fulfillment. In addition, he knows his work has an impact. Blair credits the Navy, his exceptional colleagues and the opportunity to keep our men and women in uniform healthy as the reasons why he thinks his is the best job in the Navy. ■



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