

Analysis of USAMRIID Bio-Hazardous Materials Operations, Reston, Virginia 1989

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USAMRIID stands for the U.S. Army Medical Research Institute of Infectious Diseases. It is located at Fort Detrick, in Frederick Maryland. CDC is the common reference to the Center for Disease Control and Prevention in Atlanta, Georgia.

Contraction of the Ebola Zaire virus causes the ultimate destruction of the organs and flesh of the human body in horrific and unimaginable ways. The outer layer of the tongue, the back of the throat and the windpipe lining painfully slough off. Testicles and labia turn black. As the circulatory system fills with clots, putrefaction begins and within a few days everything from one's brain and internal organs to the body's skin liquefies. Blood oozes non-stop from every opening, from around the gums, eyeballs, and nipples. There may be massive vaginal bleeding.

With nothing to hold totally rotten organs in the body, there is an eventual "bleeding out" through the rectum. A spewing plume of Ebola rich slime in search of another victim. There is no vaccine, a nearly 90% fatality rate, and no cure...but death, in as little as five days.

Uncovered in 1976, the Ebola strain was named after the place where first observed, Zaire on the continent of Africa. The occurrence of and number of deaths from Ebola have been few, given its potential. But, it is a persistent disease, most recently taking more than 240 lives in a Kikwit, Zaire outbreak in 1995. And newer strains of Ebola are emerging, any one of which could conceivably mutate into something even more devastating than Ebola Zaire.

Subsequent to Richard Preston's 1994 *Hotzone* revelations, Dr. C. J. Peters MD, the officer having overall command of the Reston incident, had much to say about the episode in a 1997 co-authored history of his thirty years "battling hot viruses around the world." For example, when on the 27th of November 1989 he learned of the first possible Ebola outbreak in mainland USA, he wrote of his thinking at the time that "...we could [*have*

been] facing something none of us [*had*] ever seen before, something not experienced since smallpox days, or maybe since the great plagues of the Middle Ages. [*It could have been*] the Andromeda Strain."¹

That potential remains today, both abroad and in the United States.

This analysis is a description of the events surrounding what was early on believed to be America's first outbreak of Ebola Zaire and provides a critical evaluation of the strategic and tactical operations efforts at Reston Virginia, in 1989. It indicates how ill prepared to handle matters of such consequence both the Center for Disease Control and the United States Army had been. The CDC lacked, at the very least, proper equipment. The Army operated with mostly an untrained force of volunteer enlisted types, in a *can do* manner consistent with an outdated wartime doctrine of personnel *expendability*.

It is hoped that CDC and USAMRIID have learned from a fiasco that, only through good fortune, ended well.

The Outbreak

A summary of the major events connected with the occurrence is as follows:

- 11/01/89 - A month after a shipment of monkeys arrives at a Reston, Virginia commercial quarantine facility, an emerging medical problem is recognized by a staff veterinarian. USAMRIID is asked for help.
By the month's near end, samples taken from the facility and analyzed indicate the presence of Ebola.
- 11/30/89 - The facility is reconnoitered in anticipation of clearing out the diseased monkeys. Nothing is done to safeguard civilian employees.
- 12/01/89 - Effort to clear the facility of those monkeys perceived at greatest risk of having the disease.
- 12/04/89 - Civilian worker hospitalized and Army given the right to enter the facility to euthanize all animals.
- 12/05/89 - Building entry and downing of all remaining monkeys.
- 12/07/89 - Downing completed and decontamination begun.
- 12/21/89 - Decontamination completed.

In the Beginning

After learning of the potential problem in Reston, VA, the Army inquired into the validity of the suggestion that an

Ebola virus was loose within the confines of the United States.

On Thursday November 30, 1991 a Colonel Gerald “Jerry” Jaax and his wife Lieutenant Colonel Nancy Jaax, a Major Powell, Captain Haines, Captain Denny, Sergeants Klages and Amen, as well as an animal caretaker by the name of Marhl Gibson were designated as the vanguard of an effort to confirm and eradicate any existing virus.

Unknown at the time were so many things as to stagger the imagination of a Stephen King. And, though Preston’s book deservedly glorifies the heroism and dedication of USAMRIID’s members, the Hazardous Materials operation was a debacle that one participant unflatteringly referred to as a classic military case of “Cluster Fuck.” If the virus had proven to be Ebola Zaire and not a new and less virulent strain, these events could have devastated a great deal more than the handful of people assigned the responsibility of confining and destroying so deadly an agent.

Turf Wars

The first hurdle to overcome was territorial: would the Army’s USAMRIID or the Center for Disease Control take “command” of the overall operation?

Decisions about territorial responsibility should have, decades before, been resolved. Given the nature of their organizational interests, backgrounds and objectives, both the Army and CDC should have foreseen such a crisis, setup territorial responsibilities and developed appropriate procedures. They should have obtained and trained the human resources, as well as acquired and maintained the technology necessary to accomplish swift, safe and effective containment, decontamination and disposal operations. Neither the Army nor the Center for Disease Control did these things.

Reconnaissance

On Thursday November 30th, preparations for team entry began. In order to evaluate facility circumstances and determine how USAMRIID might best administer a solution to a building potentially full of suspected Ebola Zaire infected monkeys, Eugene Johnson, civilian employee and chief of logistics and safety for the Reston operation, and a Sergeant Klages, entered the building. They examined its layout, entrances, exits, unprotected openings and the like. Johnson and Klages hoped to learn everything they could about the areas in which they would be working.

They, admittedly, missed one means of access; which might have been used by unauthorized entrants – including children from an adjacent school or already frequently appearing and questioning media types – or provided a means of egress for monkeys in flight.

This error could have proven disastrous.

Later in the same day Lieutenant Colonel Nancy Jaax, veterinarian and chief pathologist at USAMRIID and Colonel C. J. Peters, MD, chief of the assessment division at USAMRIID and overall leader of the Reston biohazard operation, performed their own reconnaissance of the specific area where the monkeys were housed. Their purpose was to determine the condition of the most seriously exposed monkeys and what problems the entry team would encounter: blood, body fluids, powerful jaws with long and sharp incisor teeth as well as, something apparently not fully realized, the potential for mayhem.

Army evaluations were all performed without the benefit of full protective equipment. Only Colonel Jaax and Colonel Peters wore anything at all: surgical masks and rubber gloves. The building was still occupied by a number of corporate employees, both of the administrative and animal handling kind. None of them were directed or advised to wear respiratory or other protective equipment.

As neither USAMRIID nor CDC thought they would arbitrarily seize the facility, and thereby usurp the civil rights of the civilian property owner, much was done to avoid legal wrangling and media interference. This was done, perhaps, to the detriment of all human life at the scene... and beyond. By delaying entry, they were increasing the possibility of the virus spreading.

Entry

On the next a.m., Friday December 1st, Colonel “Jerry” Jaax and Captain Haines were the first to enter and begin the clearing of the area containing the animals believed most at risk, room H. Neither Jerry Jaax or Haines had ever before worn a fully-encapsulating body suit. This was an act that might be compared with putting two otherwise intelligent people in a Bradley tank, loaded with equipment they know nothing about and tele-transporting them into a classic tank battle. The likelihood of their being effective or of even surviving – given that Ebola Zaire virus was suspected to exist at the Reston facility – is about the same for both situations.

Stripping off their clothes, in an unheated van parked adjacent to the building, they donned surgical scrubsuits. Stepping from the truck and proceeding across a lawn, they entered a storage room of the Reston facility. There, they donned Recal encapsulating suits and yellow boots. Beneath these, they wore sneakers. Duct tape was used to seal those points where gloved hands and booted feet met the sleeves and pantlegs of the Recal suits.

Colonel Jaax and Captain Haines then made their way through a darkened and closed-at-both-ends passageway connecting the storage area with room H, without benefit of hand carried or overhead lighting. In fact, five days passed before this area was appropriately lighted.

The passageway was classified a “gray” area: what might have been more appropriately been called a warm zone, as it was situated between the hot and cold zones of a hazardous materials incident operation.

A short while later, the Colonel's wife, Lieutenant Colonel Nancy Jaax and a Captain Denny similarly donned Recal suits and proceeded to carry out their assigned mission: anesthetizing sixty-five monkeys, first with a double dose of ketamine – a general anesthetic, then with Rompun – another anesthetic, and finally using T-61 – an euthanasia agent. After putting the animals “down,” Nancy Jaax and Denny began the necropsy procedures of collecting liver and spleen samples. The remains of the creatures were then triple-bagged for later incineration or, in some cases, a fuller evaluation at USAMRIID lab facilities in Maryland.

By 0100 hours of Saturday December 2nd, after hours of laboratory analysis at USAMRIID Headquarters, indications of Ebola were deemed obvious. There remained no doubt in the minds of the staff. But, the “plague” and its handling would have to wait. For, unbelievably, despite the enormous amount of accumulating evidence that they were facing a potential Ebola outbreak, no one of responsibility initiated action appropriate to the perceived condition. No effort was made to take legal possession of the complex for reasons of public safety. Nothing was done to warn or safeguard the civilian employees. Nothing was done to prevent the suspected presence of the disease from spreading from the facility. Employees were permitted to come and go freely - to their homes, churches, and all manner of places of public assembly.

The USAMRIID assault, if you will, would not begin again until the morning of Tuesday December 5th, and only then following a major event at the quarantined facility on the morning of the 4th. Long weekends, bankers hours and fear of attorneys had come to the Army...at the expense of public safety.

The major event was an illness of a civilian worker that prompted Dan Dalgard, the veterinarian at the Reston Primate Quarantine Unit, into “allowing” USAMRIID to take control and responsibility. CDC, responsible for the people end of the problem, directed that the man be sent to Fairfax Hospital! A not-to-reasonable place to send someone who might be carrying Ebola Zaire.

But, in fairness to the CDC, nothing in Preston's text indicated that CDC was made aware of Colonel Nancy Jaax's assured findings of Ebola virus, established during the extended examinations of the preceding Friday evening into early hours of Saturday morning. And, USAMRIID's Colonel Jerry Jaax had definitely not been told of a worker being hospitalized by CDC, until immediately before the Army began operations in the monkey house on the morning of the 5th. Clearly, despite the illusion of cooperation, CDC and USAMRIID turf issues and communication remained a real problem.

Planning for Re-entry

In anticipation of re-entry, the Army had put its operations “team” together on Monday, the morning of

the 4th. Consisting of mostly 18 year old men and women, these folks were unfamiliar with encapsulating suits, any of the tools they would be working with, the behavior of monkeys, or of the full potential of the medical problem they were facing. They were youthful enlisted personnel, who volunteered knowing that to refuse would affect their conduct and proficiency ratings: evaluations of import in determining worthiness for promotion. These were people who, at 18, might still perceive themselves as invulnerable. People untried in stressful situations, whose panic might imperil the mission and all the personnel present. They were young and brave and uninformed individuals whose lives were being manipulated and endangered in a most ashamedly cavalier fashion.

Eugene Johnson, the chief of logistics and safety for the Reston operation, sat at home - alone - on the night preceding the operation thinking of and evaluating every possible move or gesture imaginable, and the impact(s) of each and all collectively. He conjured up everything and anything useful to the putting “down” and elimination of 450 potentially infected monkeys. Throughout that night, he produced copious notes on how best to perform each required act: a script of sorts. This script and its methods would then be seen for the first time, implemented and put to use within but a few hours of its birth.

There was no review, no analysis, no critique, no practice, only one intelligent but tired man's best efforts at biohazard containment and the handling of creatures with primitive habits, incredible strength, agility, capable jaws and teeth. Beasts believed to be carrying a disease transmitted by blood, mucus, decaying body tissue and conceivably airborne pathogens. All of which covered the facility's floors, cages, walls, atmosphere and the bodies of 450 monkeys.

Furthermore, independent of the clear Ebola hazard, captive Rhesus and cyanomolgus macaques carry a chronic infection called simian herpes B, which causes encephalomyelitis, an inflammation of the brain and spinal cord leading to paralysis. Unable to move, an infected patient will remain alert until just before death from rampant bacterial infections and respiratory distress syndrome. About 85% of the macaques alone are known to be afflicted with herpes B. And a bite from such an animal is usually fatal and known to be responsible for at least twenty-three deaths.² [*Indeed, exposure to any of the fluids of such an animal may prove fatal. In December of 1997, a 22 year old researcher at the Yerkes Regional Primate Research Center, an extension of the Emory University's medical school in Atlanta, died six weeks after a rhesus monkey flung urine or feces at her face, striking her in the eye - one of those pathways providing ready access to the central nervous system.*]³

Additionally, returning our thoughts to the Army's re-entry planning efforts in Reston, there was little-to-no thought given to the need for supplies beyond surgical instruments and animal remains packaging. Food, fluids

for workers devastated by profuse sweating associated with wearing encapsulating suits, auxiliary lighting, back-up personnel, rest and relief requirements, even toilet facilities all remained wanting. Indeed, as all were forbidden to use the building's bathroom, personnel had to relieve themselves in nearby "secluded areas behind pine trees."⁴

Nor, it seems, was any thought given to the possibility that the monkeys might not cooperate with their program

Re-entry

On the 5th of December, the group — broken into two-person teams — again entered the facility. Measures used to put down the sixty-five monkeys on December 1st were again implemented: open cage, force monkey to rear and pin it there with nothing more refined than a mop handle, inject it first with ketamine contained in a syringe located in the socket end of a stick-like device, then Rompun and finally, just before opening an animal and removing tissue samples, the euthanasia drug T-61.

An area was set aside within the facility that provided for the dissection of the beasts. Their blood was permitted to exit the room into a floor drain, accompanied with what was believed to be adequate amounts of bleach to kill the virus and prevent the disease from reaching the public sewers...they hoped. Preston, in his book The Hot Zone, stated that the drain did, in fact, connect with a public sewer system. Not made clear was whether or not body tissue of even small amounts was restricted from entering the drain. As any number of creatures having a liking for flesh exist in the sewers, and there can be no assurance that every molecule of tissue was doused with bleach, it is conceivable that contaminated tissue could have been consumed or otherwise made contact with Reston's sewer inhabitants. As research has never found the initial source for the virus, it is not known whether the disease may be transmitted by insects and rodents for example.

At the end of this, the first day of an overwhelming effort, personnel learned there was no food, no salt rich fluids to replace electrolytes lost through sweating, or any provisions made to eventually furnish same: they went to Taco Bell!!! After a job well done, what more could you ask from your leadership?

On the 6th of November, one of the monkeys escaped, as its cage was opened. Such an event should have been anticipated, given the inexperience of the teams and the difficulty of working in entry suits. Efforts to net the animal proved impossible and served only to agitate the remaining monkeys. Using a pistol was ruled out in fear

of a loose round ending up somewhere unwanted. And, not surprisingly, no one had thought of bringing a dart gun or other immobilizing device. Ultimately, it was decided to let the critter roam freely and to make a more concerted effort the following day.

On the 7th, the last of the monkeys was downed, including the "escapee" which, after being chased for two or more hours with a net, managed to jam itself into a crevice leaving only its rump unprotected. The creature was quickly injected with ketamine, Rompun and T-61, then triple-bagged in preparation for incineration like the others.

Decontamination

That afternoon, the decontamination efforts began: chipping, scrubbing and bleaching. They would continue for eleven days, followed by the strategic placement of patches containing a particularly difficult to kill spore: *Bacillus subtilis niger*. When exposed extensively to formaldehyde vapors, the spores die. Their death presumes all else to be dead. The "perfect" decontamination.

At 1800 hours on December 18th, electric fry pans, on high, volatilized formaldehyde crystals. For three days, the building was thus *cooked* until USAMRIID's standard of acceptable decontamination was reached. With their objective accomplished: all life within the facility, including viral, was dead.

Epilogue

In January, but one month later, another outbreak of the by then named *Reston* strain of Ebola virus occurred amongst a newly arrived batch of imported monkeys and was contained. More precisely, it was self-contained. The virus killed them all.

Those humans contracting the *Reston* strain recovered. Unlike *Ebola Zaire*, evaluations have shown that *Reston* provides no hazard to human life...thusfar. But, that is something that could not have been anticipated in November-December of 1989. Nor should it have been, as the prudent always err on the safe side of disaster.

In fact, the leader of the Reston bio-hazard operation, Dr. C. J. Peters, would later write of the episode, "If it happened again and our tests showed Ebola *Reston*, I don't think I'd be confident enough to say, 'Okay, this one isn't dangerous to humans, lets not sweat it.'"⁵

As Dr. Peters is no longer with USAMRIID, one can only hope his successor feels the same way.

Footnotes:

1. Peters MD, C. J. and Olshaker, Michael, Virus Hunter - Thirty Years of Battling Hot Viruses Around the World. New York: Doubleday, 1997, p.235.
2. *Ibid.*, p.169, p.257

3. Rick Bragg, "A Drop of Virus From a Monkey Kills Researcher in 6 Weeks," The New York Times (December 14, 1997), 21.
4. Peters and Olshaker, op. cit., p.263.
5. Peters and Olshaker, op. cit., p.271.

[All characters and events elaborated upon are taken from the depiction provided by Richard Preston in his best selling non-fiction novel The Hot Zone, published by Random House, Inc. of New York. This evaluation of United States Government operations is provided as a model of how things were done and should NOT have been done, under the circumstances presented by the book's author. It should in no way be considered a criticism of those who risked their lives confronting what was believed to be Ebola Zaire, nor of Richard Preston or Random House, Incorporated. They have all provided an incalculable service: first, because of the performance and candor of the participants and, second, because of the work of the author and publisher to make those efforts known.

Revisions to this author's original analysis of 1995 were made following the 1997 publication of Virus Hunters by Dr. C.J Peters, MD and Mark Olshaker.]