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Book Review: Dangerous Places: Health, Safety, and Archaeology edited by David A. Poirier and Kenneth L. Feder

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DANGEROUS PLACES: HEALTH, SAFETY, AND ARCHAEOLOGY, edited by David A. Poirier and Kenneth L. Feder 2001, Bergin and Garvey, Westport, CT, 264 pages, 15 figures, 13 plates, \$65.00 (hardback).

Reviewed by Kathleen L. Wheeler

Field archaeologists often have an intuitive sense of when they are working with "clean" or "dirty" dirt. Long years of practice have often been sufficient to warn fieldworkers of impending dangers related to petroleum, insects, or sunstroke. The authors of the present volume offer compelling evidence that not all safety issues can be addressed with adequate clothing, sun block, or a developed sense of smell.

The book is divided into two sections, with Part I addressing Biological Hazards, and Part II addressing America's Colonial and Industrial Legacy. In the first section, eight articles range from insect- and animal-borne diseases, such as Lyme Disease and rabies, to airborne molds, fungi, and spores. The seven essays in the second part of the book deal with the outcome of 19th- and 20th-century practices that leave hazardous residues, such as arsenic, lead, and unexploded ordnance.

In Chapter One, Nicholas Bellantoni reviews the hazards of Lyme Disease in terms of exposure while out in the field. He discusses how ticks transfer the *Borrelia burgdorferi* microorganism into human hosts, how to

remove ticks as soon as possible, how to recognize the symptoms of the disease, and what kind of treatment options are available. The best course of action is prevention, including tucking pants inside of socks, wearing light-colored clothing against which the tick will be visible, applying an insect repellent, and frequent inspections of clothes and body. A vaccine is currently available but requires three doses administered over the course of a year to be effective.

Tom Morganti and Nan Tarrt prepare a short discourse on rabies in Chapter Two. They identify rabies as a fatal disease once the neurotropic virus reaches the brain. The virus is transmitted through the bite of an infected animal or through contact between the saliva of a dead infected animal and an open wound. All feral animals behaving in an uncharacteristically friendly fashion should be considered potential carriers of the rabies virus and should be avoided. Chief vectors of rabies to humans in Northeastern America tend to include raccoons, foxes, skunks, and bats, but a small percentage (7%) of non-wild (i.e., domesticated) animals accounted for the transfer of the rabies virus in 1997. If there is any chance of infection, thoroughly wash the wound with soap and water, secure the body or carcass of the transmitting animal (if possible), and seek medical attention immediately. The rabies anti-serum has a high rate of efficacy if treatment is begun in the first hours (or days) after exposure.

In Chapter Three, T. Michael Fink and Ken K. Komatsu discuss the dangers of coccidioidomycosis, or "Valley Fever." Coccidioidomycosis is a pulmonary infection caused by the inhalation of the soil-dwelling fungus, *Coccidioides immitis*, which is endemic in the desert regions of Arizona, California, New Mexico, western Texas, and northern Mexico. The *C. immitis* fungus can become airborne in situations archaeologists know all too well, such as the raising of dust from shoveling, troweling, and screening, or simply wind-blown dust. Because of the prevalence of the naturally occurring fungus in desert soils, prevention is not altogether easily achieved. Dust masks reduce the risk of contracting coccidioidomycosis but are not completely effective in preventing the inhalation of the fungus.

Cloth bandanas are no protection against *C. immitis* infections. The authors somewhat contradict themselves when they add that the use of High Efficiency Particulate Air-filter (HEPA) respirators will protect field personnel from *C. immitis*, but that "no mask will provide 100% protection" (p. 25).

T. Michael Fink advises archaeologists on rodent-borne hantavirus and plague in Chapter Four. The hantavirus is the causative agent of Hantavirus Pulmonary Syndrome (HPS), a potentially fatal respiratory illness, and is transmitted through contact with certain kinds of rodents and their excreta, nests, and carcasses. Because rodents and archaeologists tend to co-occur in certain settings—burials, caves, downcutting features, and historic structures—it is important to understand the health risks when these two populations meet. Plague (bubonic, septicemic, and pneumonic) is transmitted between animals by the bite of fleas, particularly among populations of small mammals (rabbits and prairie dogs) and rodents (ground and rock squirrels, various species of wild rats and mice). Fink offers guidelines for protection against hantavirus and plague, which include inspection of sites for evidence of rodent activity, trapping or poisoning rodents, and general sanitation practices to thwart the incursion of rodents. High Efficiency Particulate Air-filter (HEPA) respirators can lower the risk of hantavirus transmission, but dust masks and bandannas are not recommended. Plague can be avoided with insect repellent (or flea powder for pets), and through the use of rubber gloves when handling carcasses of wild animals.

Rob Ferguson outlines the dangers of mycotic infection in Chapter Five. Fungi such as *Histoplasma capsulatum*, *Cryptococcus neoformans*, and *Coccidioides immitis* contain spores that can be released into the air through archaeological excavation or screening of dirt. Inhalation of these spores into the lungs can result in mycotic infection. Ferguson focuses on the most commonly encountered mycotic infection, *Histoplasma capsulatum*, which is found in soil contaminated by bird or bat excrement. Field crew can be protected by the proper use of tight-fitting HEPA masks, along with disposable hooded overalls, shoe covers, and rubber gloves.

In Chapter Six, Paul S. Sledzik introduces some of the more dangerous molds, fungi, and spores found at archaeological sites, including anthrax (caused by spore-forming *Bacillus anthracis*), aspergillosis (caused by *Aspergillus* mold species), blastomycosis (a soil-borne fungus), Cryptococcosis (caused by fungus *Cryptococcus neoformans*), Mucormycosis (a number of diseases caused by fungi within the order Mucorales), and Tetanus (caused by the bacillus *Clostridium tetani*). Sledzik provides general safety guidelines, which include the use of a dust mask to reduce exposure to aerosolized fungi, and protective clothing.

In Chapter Seven, Thomas A. Crist outlines the risks of contacting smallpox when archaeologists encounter human remains in burial features. He also provides a brief history of the most common historical infectious diseases, such as anthrax, cholera, tuberculosis, and yellow fever and warns that spores causing anthrax and tetanus may remain viable in soil for decades. Within burial environments, skeletonized human remains do not pose much risk for contagious viruses, except under very specific conditions where infectious disease organisms may persist for decades or centuries. Sealed burial containers (e.g., airtight cast-iron coffins) or a constantly cold environment can inhibit the natural decomposition processes and thus preserve soft tissue that contain smallpox or other viral organisms. Working with either of these two burial contexts requires vigilance and extreme caution, so as not to reintroduce pathogenic microorganisms. Even in settings where risk is low, basic principles of hygiene—wearing gloves, and washing hands and face before eating, drinking, or smoking—go a long way toward protecting the archaeologist in the field and the lab.

In the eighth and final chapter of Part One, Leslie Hunt Driscoll reviews the risk that parasites pose for archaeologists. The life cycle of most parasites requires a hospitable environment or a living host to sustain them, and these conditions are not often met in archaeological contexts. It is important for archaeologists to be aware of the various parasites one may encounter in a local setting, however. In the American northeast, fieldworkers should protect themselves against the parasitic ticks

that introduce Lyme disease, human ehrlichiosis, and babesiosis. Parasites, such as worms and *Giardia*, can be ingested through infected water and food sources, so it is recommended that liquids be boiled and food thoroughly cooked.

In Chapter Nine, John L. Konefes and Michael K. McGee open Part Two with a discussion of health concerns resulting from the historical practice of using arsenic in embalming fluids. The custom developed during the Civil War as a means of preserving bodies of Union soldiers long enough for the transport home, and persisted until about 1910. Arsenic toxicity is high, and exposure can result from ingestion, inhalation of arsenic-impregnated soils, and skin contact. Precautionary measures against arsenic poisoning include protective work clothing and care in washing before eating, drinking, or smoking.

Allen W. Hatheway describes in Chapter Ten some of the potential risks associated with residues from as many as 50,000 former manufactured gas plants (FMGPs), which left tar residuals, cyanide, ammonia, and lampblack. FMGPs were typically located in central business districts and can pose dangers to urban archaeologists. In conducting investigations at these or any derelict industrial sites, archaeologists can protect themselves with sound advance research, avoiding human entry into confined air space, and wearing Level "C" personal protective equipment.

The below-ground hazards of the urban environment are explored further in Michael Roberts' Chapter 11. Waste products from dry-cleaning and tanning processes, collapsing excavation trenches, machine-related accidents, and a variety of chemicals used in Boston industries are all potential dangers to the archaeologist. Roberts advocates awareness, OSHA compliance, and discussion of HAZMAT issues prior to commencing field investigations to avoid health-related impacts.

Dana C. Linck and Joe W. Vann III expose in Chapter Twelve the very real dangers of unexploded ordnance (UXO), particularly at "Formerly Utilized Defense Sites" (FUDS). Under the Defense Environmental Restoration Program, FUDS are being investigated in greater numbers by the Department of

Defense. The authors illustrate several examples of explosive ordnance that may be encountered in the field or inadvertently brought back into the laboratory. Although "sweeps" to detect, detonate, and remove UXOs are generally conducted in advance of the archaeological survey, it is possible that others remain behind, and it is critical for archaeologists to be aware of this prospect.

Cece Saunders and Susan R. Chandler explore the risks of lead poisoning in Chapter Thirteen. Documentary research on prior site use can alert archaeologists to the potential of lead contamination, especially at munitions-related industries, lead smelting sites, paint shops and sandblasting sites, and paint, varnish, and putty manufacturers. Even highways with high volume of traffic may have residues of lead gasoline. At the Derby and Central wharves at the Salem Maritime National Historic Site in Massachusetts, the dangers of air-borne lead were mitigated by excavating in nonsummer months, when soils were less likely to be dry and windborne. Other precautions against lead poisoning require keeping contaminants on site, wearing protective clothing, and securing access to the site.

Ronald L. Reno, Stephen R. Boyd, and Donald L. Hardesty review the toxic materials associated with western ore-processing sites in Chapter Fourteen. The most common toxic materials are mercury, lead, and cyanide, and the authors present a case study of work conducted at a superfund site in northwestern Nevada, where the EPA had identified mercury as a hazard. Workers were supplied with Tyvek suits, latex gloves, and respirator masks in areas with poor ventilation. Heat stress was a problem at the site, however, where temperatures reached 100°F, and the authors found that working without hoods and venting of work suits helped relieve heat stress while providing adequate protection from the mercury contamination.

Finally, James C. Garman offers practical steps in Chapter Fifteen to providing safe working conditions to archaeological workers. First and foremost, Garman advocates designating a Safety Manager to oversee OSHA compliance and potentially hazardous substances. Implementation of a safety plan

involves assessing a company's practices, training and education, standard first aid, and training sessions specific to a job. The success of a safety program usually requires not only commitment to worker safety, but also setting an example through leadership.

The book is highly informative and a "must read" for Project Managers who put personnel into the field, and for the field crew who may encounter hazardous situations. The science of safety is an ongoing process, and most authors added contacts or references for readers persuaded to learn more about particular topics. I would have liked to see more information about where HAZMAT training courses are offered, how much these cost, and how to contact suppliers of specialized equipment. I also was slightly overwhelmed with some of the terminology in the book. In reading the first section, I found myself reaching for the dictionary on several occasions to contend with the highly technical medical language. Latin names for the various fungi, bacteria, and infecting agents (e.g., *arthroconidia*) were often not "translated" for the non-specialist, which could leave the reader uncertain about the very processes of contamination the author is trying to elaborate. Perhaps this is a minor point, as the exact mechanism of viral infection is less important than the means by which archaeologist can protect him- or herself.

A second edition of the book might benefit from additional illustrations, particularly of the critters against which we need to maintain vigilance. I am thinking in particular about the *Ixodes dammini*, *I. Pacificus*, and *I. scapularis*. It would be useful to know their common names, how big (or insidiously small) they are, in what seasons they may most commonly be encountered, and if there are ticks that present no apparent danger at this time. In the Table of Contents, there is no List of Figures, Tables, and Plates, which might also be helpful.

Other than that, the 15 chapters should go far in shaping a revised response to archaeological field conditions, beginning with documentary review of potential industrial or contamination dangers; consultation with HAZMAT engineers or archaeologists with experience in similar settings; and a height-

ened sense of personal protection. Field survey through the woods of rural northeastern New England may continue to require no more protection than insect repellent, sun block, and clothing that covers the arms, legs, head, and hands. As archaeologists become more involved in evaluating former military sites (as bases continue to close) and urban and industrial contexts, however, the health risks rise. Moreover, as we investigate more of these sites, archaeological training should encompass HAZWOPER (Hazardous Waste Operations and Emergency Response) training for Project Archaeologists and field crew who will be exposed to the health risks.

Some basic principles of common sense still prevail in all settings, as nearly all authors note. Hands need to be washed prior to any hand-to-mouth contact, which includes cigarette smoking. Gloves may soon become standard field equipment. Field crew should be aware that air-borne diseases can be transported to the tops of beverage containers under windy conditions, and these ought to be washed clean before opening. Bandannas are NOT sufficient protection against any kind of pathogen, although they may pose some relief from dust. Finally, field workers have the right to know about any possible dangers and the right to demand safe working conditions from their employer.

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