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**PATHOGENS AND THE
STRATEGY OF
PREPAREDNESS**

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ANTHROPOLOGY OF THE CONTEMPORARY RESEARCH COLLABORATORY (ARC) AIMS TO DEVELOP NEW TECHNIQUES OF COLLABORATION, MODES OF COMMUNICATION AND TOOLS OF INQUIRY FOR THE HUMAN SCIENCES. AT ARC'S CORE ARE COLLABORATIONS ON SHARED PROBLEMS AND CONCEPTS, INITIALLY FOCUSING ON SECURITY, BIOPOLITICS, AND THE LIFE SCIENCES, AND THE NEW FORMS OF INQUIRY.

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Pathogens and the Strategy of Preparedness

Lyle Fearnley

The Second World War was a watershed moment in terms of the mass mobilization of production and populations.¹ State interventions into these ‘social’ fields—including public health—extended the reach and intensity of warfare. As welfare historian Richard Titmuss observed, the twentieth century bore witness to an “increasing concern of the State in time of war with the biological characteristics of its people...[and] the quantity and quality of the population” (Titmuss 1958; Cowen 2005). Such government interest in “the social,” a substantive domain that Paul Rabinow describes as an environment containing both social and biological variables, can be traced back to at least the nineteenth century (Rabinow 1995). During the war, however, prior experiments in social planning were expanded into comprehensive welfare states. A typical example is Britain’s Beveridge report, compiled during the height of war in 1942, which proposed a new regime of universal social citizenship. The report defined public health as a national responsibility to be provisioned through a tax-funded health service. The British government enacted the Beveridge proposals in 1945; this model was subsequently imitated across the world (Porter 1999).

The notable exception to the creation of state-funded health services was the United States. This is not to say that social welfare and national health programs were never proposed. In 1942, the National Resources Planning Board, a government policy group formed of New Deal veterans, published a Beveridge-like report entitled *Security, Work and Relief Policies* (NRPB 1942). The report called for a broad extension of New Deal social programs, including universal access to health care. After the war, President Truman repeatedly called on Congress to enact a system of national health insurance. Yet for the most part these plans remained on paper, largely due to counter-lobbying from the American Medical Association and Congressional fears of “socialistic” medicine (Porter 1999, Starr 1982).

While typical histories of public health lament this failure (e.g. Rosen 1958, Fee 1994), in fact the U.S. exception went beyond the absence of universal social programs. Cold War governmentality can only be understood by examining how social policy and military strategy were intimately linked. The U.S. developed an alternative strategic approach to the problem of population health through the framework of civil defense. After signing the Civil Defense Act in

¹ This paper is one product of collective work around the problem of biosecurity undertaken by the Laboratory for the Anthropology of the Contemporary (Berkeley, CA). In particular, discussions with Stephen Collier and Andrew Lakoff helped elucidate concepts and theory.

1950, Truman announced that “people, property, and production” had become concerns of national as well as social security (Federal Civil Defense Administration 1951). The legislation was deeply rooted in postwar military strategy. Military planners declared that contemporary technologies of warfare (air war, atomic, chemical, or biological weapons) erased the distinction between battlefield and homefront (Sherry 1977; Yergin 1997). A 1950 National Security Resources Board (NSRB) report, entitled *United States Civil Defense*, argued that military defense must be supplemented with civilian resilience:

Since there can be no absolute military defense, an effective civil defense is vital to the future security of the United States because it might provide the means whereby this country, if suddenly attacked heavily and without warning, could get up off the floor and fight back (NSRB 1950a).]

Civil defense is characterized by a logic of preparedness rather than insurance. These are alternative technical approaches to dealing with future risks. Insurance mechanisms collectivize risk and distribute the costs of compensation across a population. They aim to minimize the effects of accidents or illness (considered statistically regular and routine) on both the social and individual body (Ewald 1991; Ewald 2002). Preparedness, on the other hand, is wholly oriented towards preparing for the exceptional event. A preparedness strategy aims to ensure the continuity of government and military capability through the protection of critical infrastructure (including the executive chain of command, key industries, and the living bodies who power the machines of production and destruction) in the midst of disaster. Interventions are discontinuous and sporadic rather than ongoing and adjustable (Lakoff 2005).²

The development of notifiable disease surveillance by Alexander Langmuir and the U.S. Communicable Disease Center (CDC) was perhaps the most important application of a preparedness strategy to the social field. According to Langmuir,

Surveillance, when applied to a disease, means the continued watchfulness over the distribution and trends of incidence through the systematic collection of morbidity and mortality data and other relevant data (Langmuir 1963).

Langmuir distinguished the surveillance of diseases from the surveillance of diseased individuals. In other words, he separated disease as a biological entity (the specific pathogen) from the social milieu of the host population. The object

² The concept of preparedness has been primarily drawn from conversations with Stephen Collier and Andrew Lakoff.

of government control efforts consequently shifted from the social determinants of risk to the epidemic event.

Langmuir's conceptual distinction caught hold during the early mobilization of civil defense against biological warfare. The biological weapon was perfectly captured by the concept of extra-social disease, for a deliberate epidemic would strike without correspondence to the statistical pathologies of the social. Langmuir (among others) called for an extension of the federal government's collection and analysis of morbidity reports. The result was a seemingly simple change to the morbidity reporting system. For the first time, a standard list of fifty-one diseases (classed as "of national importance") was agreed upon by all states and territories as the basis for national reporting. However, at stake was an overall shift in the *function* of the national reporting system, one characterized by Thacker and Berkelman as a shift from an "archival function prior to 1950 to one in which there is a timely analysis of data and appropriate response" (Thacker and Berkelman 1988, 174). To put it another way, this was a shift from using morbidity reports to guide general policy toward a mechanism of disease surveillance in which epidemic events prompted immediate, real-time responses. I call this normative form of surveillance a regime of *pathogen preparedness*: a particular understanding of disease (the specific pathogen) modulated by a particular logic of government (preparedness). The application of a surveillance function to the federal notifiable disease infrastructure brought the strategic logic of civil defense to the problem of disease control.

The Surveillance of Diseases: Removing Pathogens from the Social

Reflecting on the increasing worldwide adoption of disease surveillance in 1965, Alexander Langmuir recalled that "surveillance was first applied to a disease by the Communicable Disease Center [CDC] of the United States Public Health Service [PHS] in 1950" (Langmuir 1965). Langmuir, lead epidemiologist at CDC from 1949 to 1970, is credited by global health authorities with developing the concept and practice of disease surveillance (Declich and Carter 1994: 287).³ In 1950, as Langmuir tells it, the CDC was in the midst of a "large-scale malaria eradication program" when surveillance was first implemented (Andrews, Quinby, and Langmuir 1965).

³ The terms *disease surveillance*, *public health surveillance*, and *epidemiologic surveillance* are often used interchangeably to describe the concepts and practices at issue. Cf. Declich and Carter, 1994. I use *disease surveillance* because it emphasizes the focus on the technical element of monitoring microbes in human populations.

The malaria eradication program was an expansion of CDC's original project undertaken during the war. At the time, CDC was called by a more specific name, Malaria Control in War Areas [MCWA]. MCWA was charged with reducing the incidence of malaria in and around military bases: a mission phrased in the terms of national security more than public health. Yet the MCWA director, Joseph Mountain, had a vision that stretched beyond the war both temporally and spatially. In a January 1942 memo, Mountain argued that "the defense emergency could result in an improvement in civilian health; that after the war, services having to do with the general population could be developed" (Etheridge 1992). Following a merger with a couple of PHS laboratories, the MCWA became the Communicable Disease Center in 1946.

The creation of the CDC marks an important transformation for federal involvement with disease control. The federalist structure of government outlined in the Constitution left wide autonomy for disease control to states and municipalities. Those federal health programs that existed were primarily undertaken by the Public Health Service.⁴ Founded in 1798 as the Marine Hospital Service (MHS), assignments originally focused on providing medical care to the merchant and naval seamen who overwhelmed the facilities of port cities (Mullan 1998, 14-15). In the last decades of the nineteenth century, legislation reoriented the attention of the MHS toward the problem of disease imported by immigrants. MHS officers screened immigrants at all ports of entry (as of 1887 with the assistance of a bacteriological lab on Ellis Island) and had the authority to institute quarantine if necessary (Ibid., 25, 38). Around 1900, the service began to get involved in health problems afflicting the general population. The organization was accordingly renamed the Public Health Service in 1912. Yet while programs were undertaken against plague in San Francisco and typhoid in Oregon, the PHS lacked a permanent or continual involvement in health affairs. Each program was at the whim of both state authorities and categorical, program-by-program Congressional funding (Ibid., 39, 81). The CDC was the first permanent body focused on in-the-field investigations and interventions, programs organized in collaboration with state health officials. While begun as a minor subdivision of the PHS, the CDC now is considered one of the most important public health organizations in the world. The development of disease surveillance methods played a large role in the expansion of CDC's legitimacy and authority.

The malaria program was extended to civilian populations as early as 1945, one year before it was placed within CDC. By straddling the organization's foundation, the malaria program was in part a test-case for CDC's new responsibility for the health of the nation. In 1947, the program was assigned a five year term for the total eradication of endemic malaria from the United States population (Andrews, et al, 1950). A review of progress was undertaken

⁴ Although the military also played an important role, its focus is on the soldier not the citizen.

in late 1950 by Langmuir and two CDC colleagues. The results were both surprising and provocative. A simple look at reported cases in the U.S. showed a decline from 62,763 in 1945 to 4,241 in 1949. Yet Langmuir and his colleagues did not attribute this steep decline to CDC's control methods. Instead, they argued that "a change in the method of morbidity reporting...requiring the identification of patients...plus the elimination by states of obviously doubtful reports based on appraisal are responsible for the abrupt decline in reported malaria morbidity since 1947" (Andrews et al., 1950:).

Langmuir realized that control measures, no matter how powerful, were futile without accurate epidemiologic data regarding prevalence and incidence of disease. But reports alone were not enough. Every report of morbidity needed to be verified through diagnostic appraisal. CDC trained nurses reviewed each case in order to ensure accurate diagnosis. A final confirmation was often undertaken through laboratory analysis (Andrews et al, 1950).

Langmuir defined this process as the surveillance of diseases, distinguished from other public health methods that focused on the surveillance of diseased individuals (Langmuir 1963, 182). Rather than monitor the movement or prognosis of the diseased body, the surveillance of diseases focuses attention on the microbial agents themselves-the specific causes of disease. While the collection of morbidity reports was not itself new, disease surveillance looked at this data with a distinct functional vision. The object had changed: no longer did disease appear as a product of social risk. Rather than calculating social pathologies based on differential rates of disease, surveillance monitored the absolute number of cases in order to detect the appearance of an epidemic threshold. For example, in the case of malaria, two or three diagnostically confirmed cases was considered an epidemic requiring immediate federal attention (Langmuir 1963, 183). The emphasis on diagnostic accuracy should not be ignored either. By heightening the diagnostic accuracy of the reports, Langmuir was able to reveal a population of microbes living amidst human society. This parasitic population had a biological existence which was only partly determined by the social milieu of the human hosts. With proper control measures, the microbial population could be eradicated or wholly removed from the population (Langmuir 1965; Langmuir 1971; Langmuir 1976).

The nineteenth century moral epidemiologists had been the first to organize morbidity reports into coherent statistical investigations. Their inquiries attempted to correlate general patterns of social life (such as poverty, overcrowding, or alcoholism) with the prevalence of disease. Statistical epidemiology was able to reveal the conditions of existence that placed individuals at greater or lesser risk of disease, but these contributive factors could be endless. While this facilitated the dissemination of norms of health to fields as diverse as urban planning and education, ultimately it was nearly impossible to verify the efficacy of these interventions (Latour 20-21). An

alternate approach used morbidity reports as alerts that prompted the imposition of quarantines or *cordon sanitaires*. However, quarantine was widely regarded as both ineffective and excessive. The trauma it caused to the normal functioning of society (and particularly markets) was considered more harmful than the epidemics they were designed to prevent (Howard-Jones 1975). The traumatic impact of quarantine meant that this use of morbidity reports was typically limited to those considered to be a particularly “loathsome or dangerous contagious disease” (Mullan 1989). The number of diseases considered quarantinable under international law has remained between three and six since such standards were established.

Because Langmuir’s disease surveillance isolated the microbes themselves, it facilitated a targeted and self-limiting intervention whose success could be accounted for. During the malaria program, DDT was a highly touted new control method. But the drastic reduction in cases came not from extension of DDT-spraying, but rather from a more careful appraisal of case reports. With surveillance, the CDC was able to recognize that the malaria epidemic no longer existed, and the continuation of spraying was therefore unnecessary. Disease surveillance produced a method of disease control that was consciously discontinuous. Since disease was understood as a parasitic species, then it was apparent that epidemics of disease could emerge and disappear. Surveillance was the mechanism capable of revealing this emergence and disappearance, of discovering and tracking the epidemic event. Control measures guided by surveillance could be finely tuned to the contours (temporal and spatial) of the epidemic. Disease surveillance aimed neither to transform society according to norms of health, nor block and contain contagion. Rather, disease surveillance aimed to divorce the populations of pathogenic microbes from the population of the nation.

**Pathogen Preparedness:
Disease Surveillance for Biological Warfare Defense**

Langmuir is widely acclaimed for his elucidation of the methods of disease surveillance. His definition immediately became a foundational principle at the CDC, and was adopted by the WHO at the 1968 Technical Assembly (Langmuir 1971). Yet Langmuir was also instrumental in incorporating this abstract technique into an active infrastructure, known today as the National Notifiable Disease Surveillance System (NNDSS). The NNDSS standardized and intensified morbidity reporting procedures, allowing federal intervention into the health of the national population to move beyond an archival epidemiology. This was more than a straightforward expansion of federal public health. In fact, the construction of the NNDSS was deeply influenced by civil defense experts concerned about biological weapons. Langmuir was one of them. He mapped the practice of disease surveillance onto a broad civil defense strategy,

envisioning the NNDSS as a mechanism of emergency preparedness. Rather than a system designed to improve population health in broad terms, the NNDSS was built in order to detect an epidemic emergency, direct governmental response, and verify its successful conclusion. To complement this, Langmuir personally organized a corps. of epidemiologists called the Epidemic Intelligence Service (EIS). EIS officers were the emergency responders of this preparedness regime. Following the detection of epidemics, the EIS was sent to investigate and direct control measures. Together, these technical assemblages shifted U.S. federal public health toward a regime of pathogen preparedness.

The first law regarding morbidity reporting by the federal government was passed in 1878. It called for the Marine Hospital Service to collect reports on cases of cholera, smallpox, plague, and yellow fever from overseas consulates. A report of disease active in these foreign populations could prompt the closure of borders to travelers or immigrants from the affected countries (Koo and Wetterhall 1996, 4). The government began the routine collection of reports from states in 1893, indicating a shift in interest from exogenous sources of disease (immigrants and sailors) to the general health of the domestic population. Yet reporting from states was never consistent. Despite efforts in 1902 and 1912 to organize effective and standard weekly reports, it was not until 1928 that all states participated (Koo and Wetterhall, 1996: 5-6). Even then the accuracy and frequency of reports varied widely as different states reported different lists of diseases. The haphazard reporting system was a product of the federalist public health structure. Whereas states and even local governments can compel physicians and laboratories to report diagnoses through their constitutionally defined police power, the federal government relied (and continues to rely) on voluntary reports from the states (Centers for Disease Control 1996; Jajosky and Groseclose 2004).⁵ Ultimately, there was little the Public Health Service could do with morbidity reports beyond publishing them in its journal *Public Health Reports*.

The malaria eradication program demonstrated the lackluster data collection efforts of at least some states and subsequent large gaps in disease information at the national level. However, malaria was not the threat to the national population that prompted an extension of federal interest in disease. Malaria, as Langmuir had reported, was dying out in the U.S.; in fact, so were many other infectious diseases, from smallpox to tuberculosis. Some public health researchers were calling for a shift in resources to follow what is called the epidemiological transition- the shift from infectious to chronic disease as the prime causes of morbidity and mortality (Susser 1985, 149). Rather, the

⁵ Though CDC makes reporting a prerequisite for receiving certain kinds of funding. Cf.. GAO, "Information Technology: Federal Agencies Face Challenges in Implementing Initiatives to Improve Public Health Infrastructure": 9.

extension of morbidity reporting was organized by civil defense planners in order to better prepare for potential biological warfare.

In 1950, the National Security Resources Board (through its recently formed Office of Civil Defense) published two volumes which set out the role of civil government—including public health—in Cold War national security plans. The NSRB was formed under the National Security Act of 1947 and charged with “the coordination of military, industrial and civilian mobilization” (National Security Act, sec. 107). Assignments included organizing the “maximum utilization of the Nation’s manpower” and planning for the “maintenance and stabilization of the civilian economy in time of war” (Ibid.). In *United States Civil Defense*, the NSRB argued that the technical qualities of modern “air-atomic” war necessitated a fundamental reconsideration of national defense strategy. Defense of military installations alone was insufficient. Rather, “productive power” (based on industrial plant, critical infrastructure, and human labor) and civilian morale were essential components of the military machine and required equivalent defensive measures (NSRB 1950a: 1):

“The outcome of two world wars has been decided by the weight of industrial production in support of a determined fighting force. In any future war, it is probable that an enemy would at the outset attempt to destroy or cripple the production capacity of the United States and to carry direct attack against civilian communities to disrupt support for the war effort” (NSRB 1950a: 8).

Any city or factory was a potential target, and there was no way to know when an attack would come:

“The civil defense program for this country must be in constant readiness because for the first time in 136 years an enemy has the power to attack our cities in strong force, and for the first time in our history that attack may come suddenly, with little or no warning.” (NSRB 1950a: 7).

The logic guiding the NSRB civil defense guidelines went something like this: the destructive power of nuclear warfare, plus the limited ability to stop bomb-carrying airplanes, meant that deterrence rather than defense was the only practical strategy of national security; to deter enemy attack, the enemy must believe in the potential for retaliation in kind; therefore, the continuity of the industrial production, social support, and governmental infrastructure necessary for counterattack must be ensured following a catastrophic attack.

Yet ‘air-atomic’ war was not the only catastrophic threat that preoccupied civil defense planners. The NSRB directly addressed the problem of biological weapons and civilian defensive measures in a second volume published in

1950, *Health Services and Special Weapons Defense*. As with nuclear weapons, military defense was considered insufficient to maintain national security:

“Prevention of an overt attack with biological weapons is a military problem, but prevention of sabotage requires constant vigilance by civil agencies and civilians (NSRB 1950b, 25).

Whereas nuclear weapons were radically new, however, the NSRB considered biological weapons an extension of natural threats:

“Biological warfare against people should not be looked upon as some mysterious, uncontrollable means of wholesale destruction of life. Actually, nature has directed biological warfare against man for thousands of years, but health workers have devised and applied constantly improving preventive methods (NSRB 1950b, 25).

According to the NSRB, an “efficient defense system” against pathogenic microbes could be found in the basic techniques of public health (Ibid., 201). Such a defense system would be equally powerful whether the enemy was natural or Soviet. The NSRB constructed a historical narrative that today might be called ‘dual-use’: it implied that public health methods were equally effective for preventing natural epidemics and biological warfare. This was not to say that nothing needed to be done:

Today, with few exceptions, infectious diseases are well controlled in this country. The mechanisms, as well as the knowledge and experience to control biological warfare, whether waged by nature or by man, are present in our current health system. *The entire system, however, will need strengthening to be able to cope with enemy use of biological weapons* (Ibid., 25, emphasis added).

One domain in particular needed to be improved: the overall vigilance of society to biological pathogens. This could be best accomplished through an enhancement of technologies of detection and intelligence. Because of the unexpected and unusual epidemiology of biological sabotage, “routine detection methods would not be adequate to cope with such incidents” (Ibid., 205). While the reporting system during peacetime “probably is sufficiently effective for the most dangerous diseases...for civil defense health services, the problem is somewhat different and the system is probably not adequate” (Ibid., 170).

The NSRB argued that the most pressing need was the “nationwide refinement and reinforcement of the present [morbidity reporting] system” [170]. “The reporting of cases of disease caused by biological warfare attack would be a

necessary procedure to provide effective treatment and to limit the extent of damage to the population” (Ibid., 203).

They assigned the development of a strengthened national morbidity reporting system to the Public Health Service (Ibid., 205). Their suggestions would not go unheeded. A PHS meeting was called in 1950 to address the problem of biological warfare for public health. According to Langmuir, the product of the meeting was “common agreement that the basic need was for the development of strong epidemiological investigation of all types of epidemics occurring anywhere in the nation” (Etheridge 1992, 142).

Langmuir in particular saw the potential to map disease surveillance onto a civil defense infrastructure. During the war, he served on a high-profile epidemiological task force in the military which was ordered to track and control outbreaks of acute respiratory illness among soldiers. The wartime experience deeply changed his perspective on the mechanisms of public health. Before the war he had been a supporter of the Committee on the Costs of Medical Care’s 1932 report that called for a program of social medicine. The Committee claimed that “the real future is to have the health society control the distribution of medical services” (interview, 28). But “the war completely turned [him] on to epidemiology, four solid years of magnificent epidemiology” (Ibid.). This was a particular epidemiology inscribed by military demands and exigencies, “quite contrary to the study section research grant” epidemiology (Ibid.). Rather than long-term statistical investigations into the correlates of health and social conditions, military epidemiologists were tracking ongoing disease outbreaks in order to directly guide interventions.

After the war, Langmuir briefly taught at Johns Hopkins School of Public Health. There he met and befriended professor of epidemiology Kenneth Maxcy. Along with his academic duties, Maxcy served on the U.S. Committee on Biological Warfare. The highly classified committee, created in 1941, developed the program and strategy for biological warfare. Langmuir often filled in for Maxcy on the committee and when Maxcy fell ill with Parkinson’s disease, Langmuir took over full time. Beginning in 1947, Langmuir also served on the Army Chemical Corps. Administrative Council, the organization involved in offensive biological weapons research and production. By 1949, he had a higher security clearance than the surgeon general (Fee and Brown 2001).⁶

Biological weapons research in the United States (and to some extent microbiologic research more generally) skirted a fine line between defensive and offensive possibilities. The earliest investigations into the potential for

⁶ In later years (after the developments of interest in this paper), Langmuir also became assistant to the secretary of defense for research and development (1953-1959) and served on the DOD Committee on biological and chemical defense (1959-1961).

weaponized disease were undertaken in 1941 in response to fears that Axis powers already possessed usable biological weapons. From the beginning, research was justified (in Secretary of War Henry Stimson's words) "because of the dangers that might confront this country from potential enemies employing what may be broadly described as biological weapons" (quoted in Moon 1999, 218). Early responsibility for the research agenda was placed under the newly formed War Bureau of Consultants (WBC), a civilian organization made up of academic experts in microbiology, many of them taken from the major research universities. The WBC concluded in its first report [19 February 1942] that:

"Biological warfare is distinctly feasible. We are of the opinion that steps should be taken to formulate offensive and defensive measures...There is but one logical course to pursue, namely to study the possibilities of such warfare from every angle, make every preparation for reducing its effectiveness, and thereby reduce the likelihood of use (Moon 1999, 219).

And to blur distinctions between offense and defense further, "It is obvious that preparation for defense necessitates a knowledge of offense, and if this knowledge is not available from experience, it must come from the results of careful investigation" (Ibid.).

In 1942, President Roosevelt created the War Research Service as a department within the Federal Security Agency, the agency whose responsibilities were in social planning and public health. Roosevelt assigned pharmaceutical entrepreneur George Merck to direct the WRS in the research, development and production of biological weapons.⁷ The military took control of production once preliminary research seemed promising. In fact, as Stimson reported,

When War Research Service was first established, the primary considerations were research and secrecy so far as military participation was concerned. Therefore, this activity was placed in a civilian agency for more perfect cover (quoted in Moon 1999, 232).

By the end of the war, the U.S. biological warfare program had investigated eighteen diseases for possible weaponization. While many diseases proved promising, only a few were proposed for mass production (anthrax and brucellosis in particular). These successes paved the way for an expanding

⁷ Merck's company, meanwhile, had nearly perfected the mass production of antibiotics through the use of large fermentation plants. Fermentation methods greatly expanded the production potential for biological weapons as well. See Malcolm Dando, "The Impact of the Development of Modern Biology and Medicine on the Evolution of Offensive Biological Warfare Programs in the Twentieth Century" *Defense Analysis* Vol. 15, No. 1: 49.

program in the postwar period, especially before and during the war in Korea (Dando 1999, 49).

A structural contradiction plagued the biological weapons program, however. Throughout the 1940s, the program was justified as a method of heightening defensive capability against enemy use of biological weapons. However, while numerous offensive weapons, distribution mechanisms, and deployment strategies were developed, little success was achieved in the defense sector. In particular, although the very first report of the BWC had highlighted the potential enemy use of biological weapons against civilian populations (Moon 1999, 219), none of the biowarfare program's technical innovations (beyond the application of already existing vaccines and therapeutics) were designed for mass populations. Physical protection such as masks and clothes were unwieldy, expensive and probably ineffective outside the laboratory. Decontaminants, such as bleach and methyl bromide, were effective but obviously only in controlled or limited spaces (Ibid., 243-244).

Langmuir conceived of notifiable disease surveillance as precisely this missing link: a biological weapons defense system at the scale of the national population. In March 1951 he authored a piece entitled "The Potentialities of Biological Warfare Against Man." The article set out to provide a "logical statement of a 'theory of biological warfare'" that would supersede debates and controversy over the reality of the threat (Langmuir 1951, 387). Put differently, he wanted to provide a scientific complement to the strategies articulated in the *Health Services and Special Weapons Defense* manual. Many scientists at the time were skeptical about the feasibility of turning microbes into weapons. Langmuir bemoaned the lack of scientific appraisals. He wrote:

Several hundred scientific papers have been published from Camp Detrick. These have direct application to our problem. The author is unaware, however, of any comprehensive scientific statement of the broad aspects of the problem that has been published from an official source (Ibid., 388).

Most importantly, Langmuir's theory defined the scope of biological warfare as a problem for public health. He wrote that "the problem may be limited to known disease agents and the potentialities of their use, whether by inhalation or ingestion" (Langmuir 1951, 389). He set aside the "super agent" and the "uncontrollable epidemic" as threats too uncertain to rationally prepare for. Defining a problem is a key step in the construction of solutions. By focusing on known diseases, Langmuir placed a limit on the requirements of preparedness. The reforms later proposed for the NNDSS solved a problem defined here: the ability to detect and track cases of fifty-one known diseases.

In a second article, Langmuir outlined the vulnerabilities of an unreformed notifiable disease system. He described a scenario of potential biological attack:

Medical care facilities would be grossly overtaxed early in the epidemic. Emergency medical services would have to be organized as rapidly as possible. Laboratories would be swamped with specimens, but except in a few places personnel and facilities would be grossly unprepared to provide a prompt specific diagnosis. Depending on the agent used in the attack, *it might be days or weeks before an etiologic identification could be made* (Langmuir 1952, 236).

And in the absence of etiologic identification, therapy and prophylaxis through anti-microbial drugs or vaccines would be ineffective (Ibid.). Through the scenario, Langmuir laid out the core element of a public health response to biological attack: the identification of the causative pathogen. Langmuir proposed two mechanisms applying disease surveillance to heighten pathogen preparedness.

The first was a special corps of epidemiologists permanently prepared for rapid response to epidemics. Langmuir argued that “any plan of defense against biological warfare sabotage requires trained epidemiologists alert to all possibilities and available for call at a moment’s notice” (Langmuir and Andrews 1952, 237-238). This idea was the germ of the Epidemic Intelligence Service (EIS). First organized by Langmuir in 1950, the EIS trained an annual class of epidemiologists and placed them “on call” for epidemic alerts. Once an epidemic was reported, EIS officers would rapidly be deployed to the site where they would investigate and attempt to determine the etiology of the disease. After identification, they would assist states in the implementation of control measures and, when the epidemic had subsided, return to CDC headquarters (Langmuir 1980).

Langmuir also proposed a broad reformation of the national morbidity reporting system. He wrote that:

“...with a strong intelligence system, based on prompt morbidity reporting, the beginning of the epidemic might be appreciated hours or even days before it was clearly apparent to any single physician” (Ibid., 237).

He was aware that morbidity reports were notoriously imperfect. But he affirmed that:

“Morbidity reports are indispensable for immediate recognition of a disease situation which requires public health action...The protection of our communities depends upon immediate notification of the occurrence of these [notifiable] diseases so that, once a diagnosis is made, proper measures may be instituted” (Langmuir and Sherman 1952, 1250).

Langmuir’s “strong intelligence system” accurately describes the transformations to national morbidity reporting undertaken by the Public Health Service in 1950-51. In 1950, the PHS organized a Committee on Communicable Disease Reports in order to consider reforms. The Committee presented its proposals to the Association of State and Territorial Health Officers (ASTHO), the primary body for coordinating interstate health affairs, that fall. The plan outlined a number of arguments in favor of a standardized and intensified national notifiable disease system. Along with the archival collection of vital statistics, the committee argued that “civil defense against biological warfare requires immediate central notification of outbreaks of disease” (Public Health Service Committee 1951, 5). Rapid reporting and analysis would be essential for national defense as well as public health:

“Biological sabotage by water or food supplies or by aerial contamination of strategic buildings might produce serious consequences. Adequate defenses against such attacks are difficult to visualize but the importance of “epidemiological intelligence” and the thorough investigation of all epidemics as they occur is patently necessary. The proposal for regular reporting of epidemics and outbreaks has, therefore, not only a solid justification in the logistical development of the peacetime health program but also peculiar significance in the defense of the Nation” (Ibid., 11).

The Committee presented to ASTHO four major recommendations: 1) universal national reporting by States to the National Office of Vital Statistics; 2) a standard list of minimum notifiable diseases, divided into groups requiring immediate, weekly, or annual reports; 3) a “new mechanism” for the weekly reporting of epidemics and outbreaks; and 4) recommendations for a standard morbidity report card collected by the states from physicians (including a model card) (Ibid., 5).

Langmuir convinced the ASTHO to call a special conference in order to enact the federal recommendations. Langmuir appointed himself general chairman of the subsequently formed Conference of State and Territorial Epidemiologists⁸ and his CDC colleague Dr. R.E. Serfling as executive secretary. While

⁸ Later called the Council of State and Territorial Epidemiologists.

ostensibly the state epidemiologists held authority over morbidity reporting procedures, they were largely inexperienced and under the sway of the federal experts (Etheridge 1992, 32). Heavy lobbying by PHS included at least two presentations on civil defense and biological weapons (Flinn and Kiefer, 1951). The final report of the Conference in September, 1951 enacted all of the federal proposals (CDC 1951).

The NNDSS never detected a biological attack. The operation of the system can be seen only in its response to a number of natural epidemics. Perhaps the first major epidemic event occurred during the polio eradication campaign in 1955. Preparedness monitors disease reports for the threshold number of cases that indicates a possible epidemic (e.g. two or three in the case of malaria). Yet disease surveillance can equally monitor the *reduction* of cases to a threshold, including the threshold of “0” that indicates eradication (on smallpox, see Henderson 1980). During the polio campaign, Langmuir forcefully disagreed with public health measures that “allow the parasite to remain with us and continue to spread, presumably harmlessly, about the population.” Such measures are characteristic of an approach that attempts to mitigate or distribute harm, with a focus on overall population health. Langmuir argued, by contrast, that public health “should seek not just to alter the host-parasite relationship, but to disrupt it, so that the poliomyelitis viruses may be eliminated, even eradicated, from this country” (Langmuir 1955, 1011).

The Francis Field Trial was begun in 1955 with the first mass distribution of oral, live-virus vaccine to school children. Almost immediately, an epidemic of paralytic polio was detected by the NNDSS surveillance system. On April 25th, one case was reported from Chicago; the next day, five cases were reported in California. All had received vaccine produced by a single manufacturer. Epidemiologists at CDC feared a common-source epidemic, perhaps in the vaccines themselves, and on April 27th the surgeon general ordered the manufacturer to recall all outstanding batches of vaccine (Langmuir 1963, 184-185). With these batches eliminated, the vaccination program continued successfully.

What kind of intervention characterizes this pathogen preparedness regime? Perhaps it is easier to understand by looking at what it is not: it is not the production of health-oriented infrastructure, like water purification systems or sewers; it is not the collective financial insurance of medical costs or injury compensation; and it is not a system of collective prevention like mass vaccination. In short, it is not the construction of a modern biopolitical, or (to use Paul Rabinow’s gloss of Foucault’s term) welfare system (Foucault 2004; Rabinow 1995). Rather, it operates at a secondary level, monitoring for breakdowns in these systems and preparing for the appearance of pathogens from outside the system.

The extension and standardization of notifiable disease surveillance (in the NNDSS and EIS) must be understood as more complex than a “strengthening” of public health. The application of disease surveillance to biological defense produced a regime of pathogen preparedness. Pathogen preparedness adopted Langmuir’s maxim that the object of surveillance is disease, not individuals. In other words, disease is conceived as a specific pathogen (a microbial species) which can be removed from a population. Disease then is at least partly exogenous to the population and the social field. The biological weapon is a perfect example of exogenous disease: a deliberate epidemic strikes without regard to any calculable social risk or pathology.

Disease surveillance as pathogen preparedness embodies a discontinuous or sporadic temporality of government. Government intervention must correspond to the emergence and removal of disease from the population. This strategic tempo is characteristic of civil defense plans, as clearly laid out in NSRB’s *Civil Defense*:

Civil defense, during an immediate post attack period, will assume many responsibilities that must be relinquished as soon as established agencies of the Government can take over (NSRB 1950a, 7).

Contrast this with the insurance mechanisms characteristic of the modern social state. Whereas social insurance mechanisms continuously modify and secure the population through preventive and graduated interventions, disease surveillance monitors morbidity reports in order to prompt and guide specific, focused and limited responses. These responses aim to control or mitigate epidemic emergencies, but not to maximize general population health. The object of preparedness is not a healthy population, but the protection of the critical infrastructure that ensures a functional political order (Lakoff 2005). Since human bodies are an essential element in the operation of infrastructure, they too must be protected. Yet this protection is limited: it aims to prevent catastrophe, not ensure maximum vitality.

Histories of public health in the United States tend to present a narrative of stalled progress, a failure to enact the universalist insurance systems widespread in Europe. But this narrative conceals the production of an alternative governance of health, focused on preparing for and managing epidemic *emergencies*. This is quite different from social government but no less an assertion of state power. In fact, disease surveillance is a far more persistent governmental technology than insurance. While health insurance systems are widely considered to be in financial and political crisis today, disease surveillance has only increased in popularity. The contrast is clear in the recent response to emerging infections during the 1990s. While the so-called Clinton plan (1992) for health care reform ended in political failure, the

extension of disease surveillance garnered a remarkable consensus among experts and politicians alike (CDC 1994; Institute of Medicine 1992). Congressional funding led to nationwide infrastructural development, particularly through electronic databases and computer-aided analysis.

Disease surveillance in particular has influenced the development of global health governance. The WHO, like the CDC, is an administrative organization charged with global disease control but lacking sovereign police powers to routinely intervene in the affairs of member states (Fidler 2004). Comprehensive health intervention is replaced by a logic of pathogen preparedness: that is, a surveillance-based *production* of the emergencies that require discontinuous and localized expert intervention. Take, for example, the recently published WHO global influenza preparedness plan. The four WHO objectives outlined in the plan focus on the detection of epidemics and the coordination of targeted responses to “foci of infection” (WHO 2005). The plan makes no mention of the social and historical determinants of disease, nor the roots of epidemic influenza in industrial agriculture (see Davis 2005). But to lament these absences, even to speak these truths to power, is futile without a critique of the technology of health governance. For the WHO does not maliciously overlook the causes and determinants of disease: rather, a regime of preparedness cannot see them.

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