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The prisoner as model organism: malaria research at Stateville Penitentiary

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Abstract

In a military-sponsored research project begun during the Second World War, inmates of the Stateville Penitentiary in Illinois were infected with malaria and treated with experimental drugs that sometimes had vicious side effects. They were made into reservoirs for the disease and they provided a food supply for the mosquito cultures. They acted as secretaries and technicians, recording data on one another, administering malarious mosquito bites and experimental drugs to one another, and helping decide who was admitted to the project and who became eligible for early parole as a result of his participation. Thus, the prisoners were not simply research subjects; they were deeply constitutive of the research project. Because a prisoner's time on the project was counted as part of his sentence, and because serving on the project could shorten one's sentence, the project must be seen as simultaneously serving the functions of research and punishment. Michel Foucault wrote about such 'mixed mechanisms' in his Discipline and punish. His shining example of such a 'transparent' and subtle style of punishment was the panopticon, Jeremy Bentham's architectural invention of prison cellblocks arrayed around a central guard tower. Stateville prison was designed on Bentham's model; Foucault featured it in his own discussion. This paper, then, explores the power relations in this highly idiosyncratic experimental system, in which the various roles of model organism, reagent, and technician are all occupied by sentient beings who move among them fluidly. This, I argue, created an environment in the Stateville hospital wing more panoptic than that in the cellblocks. Research and punishment were completely interpenetrating, and mutually reinforcing.

Keywords

Human experimentation; Malaria chemotherapy; Biomedicine; Model organisms; Panopticon

1

I want to consider human experimentation as biomedicine. It is, after all, the head of the ethical pin for that sprawling, uneasy fusion of logical scientific methods with humanitarian medical aims.[1] At the medical end of the spectrum—in a late-stage clinical trial, say—the human subject is essentially a special kind of patient.[2] She retains all of the respect and most of the autonomy of a member of the general public. The procedure being tested on her can be expected

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[1]Peter Keating and Alberto Cambrosio articulate a vision of biomedicine that focuses on clinical research and large-scale trials (Keating & Cambrosio, 2001, 2002). I want to extend the discussion to the exploratory, experimental end of the spectrum.

[2]On the history of clinical trials, see Meldrum (1994); Marks (1997).

to help her and at a minimum must not injure her. But at the far end of the spectrum, where the outcomes are uncertain and the subject is treated as a special kind of model organism, her autonomy must be subdued. In this realm, the norms of ethical treatment and even of morality may clash with the dictates of logic and the standards of scientific practice. From that collision come sparks of insight into experimentation, biomedicine, and human nature.

Control, of course, is a central concern in any experimental discipline.[3] The fundamental principle of experimentation is to control, or hold constant, all variables but the one of interest. Control is also a noun, a procedure or the subject of a procedure designed to hold a variable constant. Without sufficient controls, the experiment is out of control; you don't know what causes what, you cannot interpret your results. In human experimentation, one of the biggest confounding variables is the agency of the research subjects. Human subjects don't follow guidelines, they forget, become distracted, or defy protocols out of stubbornness. The value of the data depends on the subjects' willingness to participate. This willingness is won through persuasion. But persuasion grades into coercion, where, in extreme cases such as Nazi experiments on pain thresholds, medical experimentation becomes a form of oppression or even torture.[4] Standards of human subjects research, from the Nuremberg Code to the Belmont Report, are designed, above all, to delineate the concept of consent.[5] Therefore, at the heart of human experimentation lie questions of will and submission.

Outside the laboratory, terms such as 'discipline' and 'control' take on more ominous overtones. In his history of the prison, Michel Foucault explored the concept and practice of discipline along the spectrum of punishment. As criminal punishment evolved from a motive of revenge to one of cure—as the locus of punishment was transferred from the body to the soul, in the words of one observer[6]—the taming and retraining of the will became increasingly important. The exertion of state power over criminals acquired a psychological, even a medical cast: the prisoner was to be remade into a constructive member of society. This concept of therapeutic punishment reached its apogee, for Foucault, in the panopticon, an architectural design developed by the eighteenth-century Englishman Jeremy Bentham. Initially conceived for prisons—though applicable to other institutions—the panopticon arranged prisoners and guards so that the guard could see all prisoners at all times, but the prisoners would never know when they were being watched. Discipline would become self-imposed; state power would be transferred into the very minds of the prisoners; control would be complete.

Thus, we have two continua, intersecting in a pun. First, there is human medical experimentation, with the alleviation of suffering at one pole and oppression at the other. Second, there is the prison system, in which punishment ranges from an instrument of humiliation and public revenge to a therapeutic tool of rehabilitation. Concepts of discipline and control are central to both, and therefore so are power relations and questions of agency, will, and consent.

These two lines meet historically in a series of experiments on prisoners at the Stateville Penitentiary in Illinois during the 1940s and 1950s. Begun during the Second World War and carrying through well into the Vietnam era, this research was army-sponsored and carried out by respected academic medical researchers.[7] The main objective was to identify and test new therapies for malaria, first for soldiers fighting in Japan, Korea, and Vietnam, and ultimately

[3] On experimentation in science, see Franklin (1986); Latour & Woolgar (1986); Galison (1987); Latour (1987); Le Grand et al. (1990); Holmes (1992).

[4] Muller-Hill (1988); Proctor (1988).

[5] NCPHSBBR (1979); Dörner et al. (1999). See n. 108 for discussions of the significance of Nuremberg.

[6] Foucault (1995), p. 16.

[7] The precise end-date for the Stateville project is hard to pin down, but it was between 1973 and 1976. The latest publication from the project that I have found is Arnold et al. (1973). In 1976, the federal government banned prisoner research.

for the public. During the course of this project, thousands of prison inmates were inoculated with malaria, dosed with experimental drugs, and subjected to other procedures, sometimes invasive and often non-therapeutic. They served as reservoirs for the disease and as a food source for the mosquitoes. They also recorded data, helped conduct the experiments, and assisted in writing up the results. Since the prisoners were serving out their sentences as they performed these functions—indeed, there was the possibility of early parole for participation—research and punishment were strangely mixed at Stateville, in a way unavoidably evocative of Foucault's discussion of the panopticon. Indeed, Stateville prison was a panopticon; designed on Bentham's model, it was the prime example in Foucault's analysis of 'panoptic' discipline. The Stateville malaria research project, then, was a remarkable experimental system that blurred the lines between punishment and research.

By the term 'experimental system', I mean the entire set of personnel, organisms, physical objects, and spaces involved in research. In sympathy with the action network theory of Bruno Latour and the Paris group, I view the experimental system as a network of personnel (researchers, technicians), research subjects (animals, patients), research objects (drugs, disease agents, reagents), and the research facility (hospital, laboratory, field station) that are involved in producing scientific knowledge.[8] Latour's strategy is to flatten the usual hierarchy of sentience so that non-human organisms and even inanimate objects acquire a kind of agency in shaping the outcome of the research. Thus, where Foucault explored the subtle ways in which agency could be taken from human beings, Latour grants it to non-human actors. In the Stateville malaria experiments, human beings undergoing punishment submitted to biomedical discipline. They volunteered to be objectified in a variety of ways. They left the literal panopticon to reside in the hospital wing, where they served out part of their prison sentence as model organisms, research objects, and reagents—they became 'epistemic things', in Hans-Jörg Rheinberger's phrase.[9] Although as prisoners they had already relinquished their agency, in the malaria project they also asserted agency in numerous ways, from manipulating the course of experiments, to cooperating with the researchers, to experimenting on one another and on themselves. Stateville, then, provides a rich playing field for exploring the relations of power, agency, and will in human experimentation.

As a historian of biomedicine rather than of prisons, my interest lies in the construction and evolution of the experimental system. In order for such a system to produce knowledge efficiently and reliably, each element in the system must adapt to the others. For example, the fruit fly Drosophila was not well suited to the experimental-evolution experiments to which the Columbia University researcher Thomas Hunt Morgan initially put it.[10] In part through adapting his experimental program to fit the kinds of data his flies could provide, Morgan and his students invented classical genetics. But this new program placed new kinds of constraints on the flies. Genetic 'noise' had to be muted—suppressors, lethals, modifiers had to be bred out in order to standardize the gene-mapping effort—and special new reagent stocks were created with gene combinations useful to the mappers. Other scholars have described the interplay between researcher and organism looking at mice, frogs, roundworms, microbes, and viruses.[11] In all of these cases, experimenter and organism shaped one another in the creation of a highly productive experimental system. I refer to this mutual shaping as tuning. Tuning may be seen as a kind of unconscious negotiation among the elements of the experimental system. We will see that the Stateville experimental system became finely tuned—largely, I believe, as a result of the fluid movement of prisoners among the various roles in the system. I suggest that this tuning facilitated not only the production of scientific knowledge but also a

[8]Latour (1987), Ch. 2, esp. pp. 78–84.
[9]Rheinberger (1997).
[10]Kohler (1994).
[11]Clarke & Fujimura (1992); Lederman et al. (1993); Summers (1993); Ankeny (2000, 2001); Creager (2002); Rader (2004).

Foucauldian process by which the prisoners willingly objectified themselves as partial payment of their debt to society. Discipline and control in the two senses sketched above worked together, mutually reinforcing one another.

Most human experimentation has not been so finely tuned. Previous studies have, with good reason, tended to treat the research subjects as victims and the researchers as oppressors. Susan Lederer has shown that well before Nuremberg there existed a well-formed, if not highly formalized, discourse on the conflict between scientific rigor and consideration for the rights of the patient or research subject.[12] In spite of this, examples abound of the infliction of suffering on unwilling or unwitting subjects. At the Tuskegee Institute in Alabama, thousands of poor blacks with syphilis were observed, but not treated, over a shockingly long period stretching into the 1970s, long past the point of any valid scientific data being collected, and during which effective therapies were developed.[13] And in the years during and after the Second World War—the heyday of human experimentation in America—the military injected plutonium into people to study the biological effects of radiation, subjected soldiers to poison gases, and conducted numerous other experiments on people.[14] These experiments infuriate because they violate basic proscriptions on objectification of human beings. Similar feelings color our reaction to the studies on the atomic bomb survivors of Hiroshima and Nagasaki.[15]

Further ethical concerns emerge when the research subjects are captive. At Holmesburg Prison in Pennsylvania, prisoners were subjected to painful and disfiguring procedures in the course of experiments for the perfume industry. Although they were technically volunteers, Allen Hornblum argued that these prisoners were coerced by being offered money, an incentive so valuable in a prison economy that it was impossible to resist.[16] We must acknowledge, though, a double-bind: any significant incentive or reward exposes the experimenter to charges of compulsion, but withholding compensation smacks of exploitation.[17] A further complication concerns racial and class divisions in human experimentation, which are accentuated when the research subjects are captive.[18] Scientists tend to be white, highly educated, and from the middle or upper social classes, whereas prisoners are often non-white, poor, and uneducated. Race and class are inevitable variables in the human experimentation equation. All this makes it tempting to interpret prisoner research in simple terms of the domination of one set of interests over another.

The Stateville malaria project denies us the luxury of simple ethical or moral formulas to help us make sense of it. The prisoners were subjected to degrading, painful, dangerous, even life-threatening procedures. They were unquestionably objectified, in many ways to a degree equal to or even exceeding the treatment of the subjects at Holmesburg or Tuskegee. And yet the subjects gave what all participants accepted as informed consent. In spite of the risks, the prisoners were willing, even avid, to participate.

Stateville, then, is a poor venue for passing surefooted ethical judgments. But it is a wonderful site for exploring the nuances of power, the negotiation of agency, and the sharing of control in biomedical research. At Stateville, biomedicine became panoptic. Research became punishment and punishment research. The phrase ‘prisoner as model organism’, then, stands for the prisoner in all his roles as a sentient, captive, epistemic thing. After setting the context for the Stateville project, we will survey the various types of roles in this experimental system:

[12]Lederer (1997).
[13]Jones (1993).
[14]Hornblum (1997), p. 1440; Moreno (2000), Ch. 5.
[15]Beatty (1993); Beatty & Sandager (1993); Lindee (1994).
[16]Hornblum (1998), p. xiv.
[17]E.g. Freyhofer (2004), pp. 97–98.
[18]Washington (2006).

the facility, personnel, disease agents, and research subjects. Prisoners served in each of these roles; moving fluidly back and forth, they helped make the boundaries among them permeable. This, then, is an exercise in cognitive dissonance, a deliberate effort to breach our usual analytical categories and look afresh at a disturbing chapter in the history of biomedicine—one whose most worrisome aspects may be those that trouble us least.

2

By 1944, when the Stateville project began, the Army had long been deeply interested in malaria. Until the mid-1920s, quinine was the only effective malaria therapy. Although quinine's native distribution was in South America, by the early twentieth century plantations in Java and Sumatra produced 95% of the world's supply. Given the geography of twentieth-century warfare, quinine was also a strategic military resource. Cut off from the Dutch-controlled Indonesian quinine plantations during the First World War, the Germans began to develop synthetic quinines. In 1926, German researchers tested the first synthetic antimalarial drug, pamaquine, or plasmochin.[19] It was extremely effective in combating malaria, and at first, its inventor, Peter Mühlens, claimed that it had no severe side effects.[20] Soon, however, occasional severe toxicity emerged. Wilhelm Cordes and other researchers at the tropical field hospitals of the United Fruit Company, where field tests were conducted, reported that some patients, particularly the West Indian migrants of African descent who dominated the plantation labor force, experienced cramps, nausea, anemia, and cyanosis when given the drug. Two patients died from it. Cordes wrote:

> One is tempted to think of an idiosyncrasy in certain persons. Or there may be an action of plasmochin [in which] it activates a hemolytic mechanism already prepared in a malaria-infected patient; it is, metaphorically, the match which sets the house on fire.[21]

Cordes's speculations were prescient; decades later, the idiosyncratic hemolytic anemia caused by synthetic antimalarials, mainly in blacks, became a vigorous area of research. The United Fruit Company physicians deemed plasmochin 'a dangerous drug', useful only under conditions of strict patient supervision.[22] Atabrine (quinacrine) and chloroquine followed in the 1930s, each with higher potency and lower toxicity. But they and their descendants continued to be plagued by this idiosyncratic but racialized anemia.

By the Second World War, it was the Americans who needed new antimalarials.[23] In 1942, the Dutch East Indies fell to the Japanese, leaving the Allies cut off from quinine supplies. Some atabrine was available, but not nearly enough; chloroquine was not available to Americans until 1946. Further, neither quinine nor atabrine (nor, for that matter, chloroquine) could prevent malaria, and neither could effect a 'radical' cure, that is, prevent relapses. Between 1942 and 1945, American forces reportedly lost some eight million man-days to malaria.[24] In 1943, General Douglas MacArthur reportedly exclaimed, 'Doctor, this will be a long war if for every division I have facing the enemy I must count on a second division in hospital with malaria and a third division convalescing from this debilitating disease!'[25]

The Americans mounted two responses. First, they would attempt to revive the moribund South American quinine industry.[26] And second, they would develop new antimalaria drugs. On 31

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[19] Slater (2004), pp. 114–116.
[20] Mühlens (1926).
[21] Cordes (1927), pp. 65–66.
[22] Phelps (1927), p. 75.
[23] On American antimalarial research during the Second World War, see Slater (2004), pp. 116–127.
[24] Baker (1963).
[25] Russell (1963).

July 1941, Vannevar Bush, head of the Office of Scientific Research and Development (OSRD), established a Committee on Medical Research (CMR), consisting of seven members, four appointed by the President and one each by the Secretary of War, Secretary of the Navy, and the Administrator of the Federal Security Agency.[27] All were either academic scientist-clinicians or government researchers. The CMR handled a number of medical military problems, including scaling up production of penicillin and the treatment of gonorrhea and malaria.[28]

The urgent need for new therapies in the field raised the question of human experimentation. On the gonorrhea project, Joseph Earle Moore, the distinguished Johns Hopkins syphilologist, was appointed head of a National Research Council committee on venereal diseases. Despairing of ever being able satisfactorily to cultivate gonorrhea in laboratory animals, Moore asked CMR whether and how he might get some human material. The response established the government's support for human experimentation: 'Human experimentation is not only desirable, but necessary in the study of many of the problems of war medicine which confront us'.[29] But there were some ground rules: 'When any risks are involved, volunteers only should be utilized as subjects, and these only after the risks have been fully explained'. The statement went on to stipulate that signed consent must be given and the consent forms filed properly for later access. Though later phrased more precisely, these are core points of the Nuremberg Code of 1947, the basis of modern human subjects research ethics.

The military was unwilling to use soldiers as experimental subjects, except where the experiments would directly benefit them, such as studies of combat fatigue. Instead, they used prisoners and conscientious objectors (COs)—populations that in the military's eyes had a debt to society. Prisoners were paid for their services; the COs were not.[30] The CMR program kicked off in the summer of 1942, when inmates at the Massachusetts State Prison Colony in Norfolk, MA, rolled up their sleeves to receive injections of bovine albumin.[31]

Late in 1943, a joint Board for Coordination of Malarial Studies was formed, with equal representation from OSRD, the Army, the Navy, the Public Health Service, and the National Research Council.[32] The Malaria Research Program, begun in 1944, was principally run by the Army and involved research at several sites. The US Penitentiary in Atlanta; the New Jersey State Reformatory in Rahway; and the US Army Disciplinary Barracks in Green Haven, New York all ran malaria programs.[33] But the largest, best known, and most productive was run by researchers at the University of Chicago and conducted at the Stateville Penitentiary, near Joliet, Illinois, about thirty miles from Chicago.

3

Stateville should not be confused with the nearby but much older and smaller Joliet prison, an emblem of hard luck and trouble in old blues and country-and-western songs. Built in 1925, Stateville was a relatively new and modern facility, designed as a maximum-security penitentiary to relieve crowding pressure from the old Joliet prison. During its planning, three administrators were sent to Europe to survey prison plans.[34] They were most impressed by Jeremy Bentham's eighteenth-century panopticon.[35] Rather than closing off inmates from the

[26]Steere (1945), p. 464.
[27]Stewart (1948), p. 98; Carden (1948).
[28]See Marks (1997), Ch. 4.
[29]Quoted in Moreno (2000), p. 29.
[30]Stewart (1948), p. 109.
[31]Ibid., p. 109; Moreno (2000), pp. 29–30.
[32]USOSRD & Andrus (1948), p. 668.
[33]On the Atlanta program, see Hornblum (1998), pp. 83–84; George (1946).
[34]Jacobs (1977), pp. 15–16.

rest of the institution, Bentham's design put them in plain sight, arrayed in a circle around a central guard tower. By simply rotating in place, a single guard could see every prisoner. Hidden behind blinds, the guard could not be seen by the prisoners. The prisoners, then, never knew when they were being watched—they knew only that at any moment they could be being watched. It was a design that, Bentham thought, ought to serve as the model for hospitals, factories, schools, and insane asylums, as well as prisons. Dizzy with reductionism, he thought the panopticon would solve an array of intransigent social problems: 'Morals reformed—health preserved—industry invigorated—instruction diffused—public burthens lightened … all by a simple idea in architecture!'[36]

Stateville was constructed on a panopticon model: its four main cellblocks are round structures, with the cells arranged around the periphery and a central guard tower, from which all cells can be observed. From the dining hall, a guard can rotate 360 degrees and view all four cellblocks. Except for solitary confinement, known as 'the Hole', Stateville was as clean, light, and airy as Joliet was filthy, dark, and wretched. Further, Stateville prisoners were given jobs—from breaking rocks to working in the X-ray department of the hospital—in order to make them useful to the prison and to make the prison useful to society. Although a single warden—during our period, Joseph E. Ragen, who served from 1936 to 1961—oversaw both Stateville and Joliet, the two prisons represented opposite philosophies of confinement and punishment.

'But the Panopticon was also a laboratory', wrote Michel Foucault in Discipline and Punish, 'a privileged place for experiments on men, and for analysing with complete certainty the transformations that may be obtained from them'.[37] The beauty of the panopticon, said Foucault, is that by virtue of its arrangement, the exercise of power is internalized, 'subtly present' within the system and even the subjects. The institution is opened, not only to the eyes of the staff but even to the public. The panopticon, he wrote, can be integrated into any social function: punishment, production, therapy, education, research. Although the panopticon was the original architectural device, Foucault did not believe that these functions could only be implemented in a round building with a central guard tower. 'Panopticism', the exercise of discipline through these mechanisms of openness, could take place in almost any setting; it was, to him, a 'political technology, that may and must be detached from any specific use'.[38] When Stateville prisoners left the cellblocks to stay in the hospital wing, where most volunteers remained for the duration of their tenure on the malaria project, they entered a world of control and power far more subtle than anything the prison designers could have imagined.

In the ideal panopticon, the prisoners never see a guard, but they are always under surveillance. Just so in the malaria project. Warden Ragen allocated the entire third floor and part of the second floor of the hospital building to the malaria project. 'I don't think I was ever in a cell block', recalled Ernest Beutler, a researcher on the project in the early 1950s. 'The prison grounds were beautiful. Floral patterns' adorned the walkways. Further, no guards were present in the project's working space. The researchers did have to pass through a metal detector every day on their way in to work, but once in the prison hospital, Beutler said, it felt just like working in any ordinary hospital laboratory.[39] But of course the experiments were in a prison. Prison rules and prison discipline applied in the hospital as well as anywhere else within the walls, and all of the malaria volunteers had been conditioned in the cellblocks prior to joining the project. Outside the normal prison routine, the malaria project epitomized Bentham's (and Foucault's) vision: 'a functional mechanism that must improve the exercise of power by making it lighter, more rapid, more effective, a design of subtle coercion'.[40]

[35]Bentham & Bozovic (1995).
[36]Ibid., p. 1.
[37]Foucault (1995), pp. 203–204.
[38]Ibid., p. 205.
[39]Beutler (2007).

4

The researchers on the project were mostly academic physicians from the University of Chicago with military appointments. The project leader was Alf Sven Alving, a nephrologist at the University of Chicago. Alving's biggest innovation was the development, in the early 1930s, of a model system consisting of dogs in which he had removed one kidney and 'explanted' the other, removing it from the body for experimental manipulations but leaving it connected and functional.[41] A malariologist would have had more insight than he into the scientific problems at hand in the Stateville project, but since the kidneys were often involved in toxic reactions to antimalarial drugs, a nephrologist was a logical choice as a guardian, a protector of health. Indeed, in the later years of the project, researcher Ernest Beutler recalled that Alving had very little input: 'He would come out every Friday and we would explain to him what we had done. He had virtually no intellectual input into any of the work, but he was the head of the project'.[42]

Most of the rest of the staff were young doctors, often just past residency, who were putting in their military service. Beutler, a lead researcher on the project in 1953 and 1954, exemplified the pattern.[43] Trained at the University of Chicago, both as an undergraduate in Robert Hutchins's innovative program and as a medical student, Beutler went on to a distinguished career in biomedicine; his last position was as chairman of the department of Molecular and Experimental Medicine at the Scripps Institute in La Jolla, California.[44] Interviewed in 2007, Beutler enjoyed a detailed and accurate memory of his experiences on the project, although he naturally carried biases, blind spots, and prejudices. Used with care, his recollections provide vivid detail of the daily practice of the project, corroborate both published and other narrative accounts, and give insight into the motivations and preconceptions of the researchers. [45]

Beutler recalled how he became involved with the project. 'My option', he said, 'was either being drafted as an enlisted man, or applying for a commission as a medical officer. Well, which would you do?'[46] The two-year tour of duty created a cohort effect; although there was some overlap, a large fraction of the project staff turned over every two years. Beutler's partner was Raymond Dern, an MD about ten years older than he. Four other MDs, all commissioned as Army majors, and a PhD biochemist rounded out the group.

Most of the rest of the personnel on the project were prisoners. One of those prisoners in the first years of the project was Nathan Leopold, a man familiar to students of early twentieth-century cultural history.[47] Convicted in 1924 of the cold-blooded 'thrill-killing' of a teenage boy, Leopold, along with his close friend (and, possibly, lover) Richard Loeb, were notorious celebrities. Leopold came from an upper-middle-class background, was educated and intelligent. Imprisoned for life plus ninety-nine years at Stateville, he joined the malaria project at its inception in 1944 and worked on it for three years, serving in every available capacity. His account is remarkably accurate and detailed. He correctly records dates, the names of researchers and drugs, particular experiments, numbers of patients, and even the biology of malaria—all of which can be corroborated through peer-reviewed medical articles, newspaper

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[40] Foucault (1995), p. 209.
[41] See, e.g., Rhoads et al. (1934).
[42] Beutler (2007).
[43] Ibid.
[44] Beutler died on 5 October 2008: Pearce (2008).
[45] My analysis draws on a range of sources in the theoretical literature on oral history, including Vansina (1965); Passerini (1987); Portelli (1990a); Tomes (1991); Chadarevian (1997); Portelli (1997); White (2000); Doel (2003).
[46] Beutler (2007).
[47] Leopold (1958). Leopold's memoir is discussed briefly in several accounts of prisoner research, including Hornblum (1998), pp. 81–82; Moreno (2000), pp. 32–44; Washington (2006), pp. 256–261.

accounts, or other sources. In other ways, his biases can be revealing.[48] These two memoirs, then, provide a uniquely detailed and binocular perspective on the Stateville malaria project.

5

The disease agent in malaria, one of several species of the genus Plasmodium, is an infectious protozoan related to slime molds. It has a complex life cycle requiring two hosts (insect and mammal) and involving both sexual and asexual stages, each of which lodges in different parts of the body. Four species of Plasmodium are known to cause human malaria. The two most medically important are P. vivax and P. falciparum. Falciparum malaria is short-lived, intense, and deadly. However, a single infection causes a single attack, after which the bugs are passed from the system. Vivax malaria, in contrast, is somewhat milder in its symptoms, but after the initial attack, the sexual stages lodge in the liver, where they periodically bloom into the bloodstream, causing relapses. In a given malarious region, one form or another typically predominates. The Stateville team used both falciparum and vivax malaria, although studies with vivax predominated because vivax malaria is the greatest danger in the regions of Asia where the American soldiers were, both at the end of the Second World War and during the Korean War.[49] The physiology of malarial relapse was therefore an important concern on the project.

For the most part, Plasmodium was an experimental reagent, rather than the principal object of study. (To a chemist, a reagent is a standardized chemical used as an ingredient; biologists have extended the term to include standardized organisms with known properties. I use the term in this broader sense, as something used to create experimental conditions.) The researchers needed to create a standard case of malaria, which could be used as a baseline against which to measure the properties of various drugs. Vivax malaria comes in many strains, each with different properties, including the way they respond to drugs.[50] The 1944–1946 research team soon settled on the Chesson strain, which produced relapses at a greater rate than other strains.[51] This is exactly comparable to choosing a research organism with a short generation time; it accelerates experiments. The tradeoff was that the Chesson strain was among the most virulent forms of vivax malaria. This tradeoff was easier because the experimental subjects were prisoners. The Stateville model system freed researchers to cause more suffering than was absolutely necessary in the interest of faster knowledge production.

Infection of humans with malaria occurs via the saliva of the Anopheles mosquito. The mosquitoes were laboratory-raised strains from the University of Chicago, bred within the prison laboratories. Prisoners received malaria either by intravenous injection of preparations of mosquito salivary glands or simply by being bitten by infected mosquitoes. The process of infection was standardized, such that the malaria ‘dose’ each man received would be consistent. Nathan Leopold provided an account of the inoculation procedure that matches the clinical description, except that it is more colorful and more detailed. They began by selecting ten hungry mosquitoes and placing each in a ‘separate little cylindrical plastic cage, with gauze covering the open top and bottom’. The men receiving the bites were divided into groups of three.

> Let us say A, B, and C were in a group. You took a mosquito, placed its cage on A’s forearm and watched carefully until the mosquito bit him. Then, when you were sure that the mosquito had inserted its proboscis well under the skin, but before it had had a chance to fill up with blood, you lifted the cage gently from A’s arm and placed it

[48] For discussion of the ways misremembering can be interpreted productively, see Portelli (1990b).
[49] Alving (1954).
[50] Ehrman et al. (1945).
[51] Alving et al. (1948b), p. 2; Craige et al. (1947).

> on B's. Here, too, the mosquito must have a chance to bite, but not to fill up with blood. Then you placed the cage on C's arm, and here you let the mosquito 'bite out'—drink its fill.[52]

Mosquitoes were therefore a reagent in the system, and a privileged one. Culturally, mosquitoes symbolize malaria more than do protozoans. In the laboratory, they need special care. And 'bite day' was a special day. Leopold fantasized about them in a way that hints at an almost sexual longing. Having served as a subject in a drug toxicity trial, he was already part of the project. 'But I wasn't satisfied', he said. 'I was determined that I was going to have malaria too—the real thing'.[53]

The 'real thing', whether vivax or falciparum malaria, meant high fever, often in excess of 105 °C; headache; joint pain; delirium; extreme nausea and consequent loss of appetite; chills and sweats; and enlargement of the spleen. Leopold wrote 'The headache characteristic of Chesson-strain malaria is, I honestly believe, unlike any other headache in the world. You think from moment to moment that your head is going to split, and you wish to gosh it would! … I've never been that sick—or half that sick—any other time in my life'.[54] In falciparum malaria, jaundice and enlargement of the liver may also occur. No longitudinal study was performed on the Stateville prisoners to assess the long-term effects of these regimens. Heart failure is now a known side effect of some synthetic antimalarials. Leopold suffered two heart attacks while on the malaria project and eventually died of heart failure in 1974.[55]

6

But malaria merely created the experimental conditions. Most of the experiments carried out at Stateville involved giving prisoners malaria and then treating it with a drug, unavailable to the public and of unknown potency or toxicity. Some drugs relieved the symptoms of malaria, others changed them, others added to them. By April 1945, the project focused on testing analogues of pamaquine in order to find drugs of comparable potency but reduced toxicity.[56] Chemically, these compounds are called 8-aminoquinolines. 'The 8-aminoquinolines were known to be dangerous; the brand-new ones would, of course, be more or less unpredictable', wrote Nathan Leopold. 'Everyone was just a little frightened of the 8-aminoquinolines'.[57] One of the new drugs, SN-8233, he went on, 'turned out to be a wildcat'. The three inmates injected with it all became extremely sick. Their white blood cell counts dropped precipitously and they were put on a continuous intravenous drip of penicillin. One of the men seemed to improve, but the following morning 'he complained of pain in the chest and left arm; at nine he was dead'.[58] The cause of death was heart failure.

With victory in Europe, a new drug, chloroquine, became available to American researchers. More potent than quinine or atabrine (quinacrine), yet far less toxic than pamaquine, chloroquine entered quickly into the Stateville drug arsenal. Questions remained about chloroquine's toxicity over the long term. The Stateville researchers designed a series of dosage regimens lasting from seventy-seven days to one year, and monitored a wide range of variables that covered all relevant major organ systems, visual acuity, dexterity, coordination, and gait, as well as general appearance and subjective symptoms. 'To accentuate toxic manifestations and establish the margin of safety', the authors wrote in a 1948 paper on the chloroquine toxicity studies, 'larger dosages than those necessary for suppressive treatment were administered'.

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[52] Leopold (1958), p. 310. His account is corroborated precisely, if in dryer language, in Alving et al. (1948b), p. 3.
[53] Leopold (1958), p. 313.
[54] Ibid., pp. 321–322.
[55] Heart failure is a known side effect of some synthetic antimalarials, including chloroquine. See Veinot et al. (1998).
[56] Alving et al. (1948d), p. 34.
[57] Leopold (1958), p. 317.
[58] Ibid., p. 320.

[59] In other words, they deliberately overdosed the prisoners in order to yield conservative, 'worst-case' results. The standards of science trumped those of medicine.

The most significant results to come out of the Stateville experiments were two new drugs effective in the treatment of malaria. The first was pentaquine, in 1947.[60] Though Leopold trumpeted 'The cure for malaria had been discovered!'[61] this was an overstatement. Pentaquine could have nasty side effects. In one paper, the authors noted that at therapeutic doses, the drug had rarely caused toxic effects in white patients. However, in double or triple the therapeutic dose, they indeed found the drug carried significant risk. One patient, case study 9, experienced severe epigastric distress, or stomach cramps, of an 'extremely painful' nature. This disappeared after three days but was followed by 'profound weakness, nausea, and almost complete anorexia [loss of appetite]', which persisted for the rest of the two-week trial. After six days, number 9 began to faint upon standing, and eventually even when sitting upright. The researchers timed him and found that on seven tests performed three weeks after the end of the treatment, he fainted in 42, 55, 68, 91, 46, 46, and 43 seconds, respectively. Four months after the treatment, number 9 could tolerate a 'short period of motionless standing'.[62] Other symptoms recorded among the volunteers included anoxia (loss of oxygen supply to the tissues), inability to perspire, impotence, and inability to ejaculate. Though celebrated in the media at the time, pentaquine proved an intermediate technology; later drugs proved more potent and less toxic.[63]

The other major drug was primaquine. Developed in 1950 at Columbia University, it made a small sensation when John Edgcomb and others from Stateville announced its development at the National Malaria Society meeting that year.[64] It appeared to be four times as potent by weight than pentaquine. By 1952, primaquine had become the central focus of the Stateville project. Ernest Beutler joined the project shortly after this shift in emphasis. He and Raymond Dern produced at least six papers on the drug, focusing mainly on its tendency to rupture red blood cells. A second group published further articles on primaquine, including tests of its ability to cure and to prevent both vivax and falciparum malaria, examinations of its effects in combination with other drugs, and studies of its toxicity in both black and white patients. The primaquine studies that have perhaps had the greatest biomedical impact concerned 'primaquine sensitivity', the analogue in primaquine of the plasmochin toxicity seen in the West Indian banana pickers back in the 1920s. About 10% of blacks respond to these synthetic antimalarial drugs with severe hemolytic anemia, a massive rupture of the red blood cells. In the late 1950s and early 1960s, the genetic and biochemical basis of primaquine sensitivity was worked out and the gene involved, known as glucose-6-phosphate dehydrogenase, or G6PD, joined the very short list of human genetic markers.[65] As the Stateville project continued into the 1960s, its focus shifted to examine the genetics of G6PD deficiency. The Stateville studies on primaquine sensitivity, then, became a standard example of idiosyncratic drug sensitivity, a mainstay of the budding—and today highly trendy—science of pharmacogenetics.

7

Neither drugs, nor mosquitoes, nor malaria itself had value on the project outside the prisoner subjects. As the media referred to them, the prisoners were the 'guinea pigs', vital to the study.

[59] Alving et al. (1948c), p. 60.
[60] Ibid.
[61] Leopold (1958), p. 325.
[62] Alving et al. (1948a), p. 20.
[63] Howard (1947).
[64] Edgcomb et al. (1950).
[65] See, e.g., Nance (1964).

[66] The project used about 200 experimental subjects in a given two-year period. All were men—Stateville was male-only. This obviously affected the data obtained from the project, especially since G6PD deficiency turned out to be a sex-linked genetic disorder.[67] Volunteers were recruited from the prison rank and file. Most of them had other jobs in the prison from which they took leave in order to participate. Nathan Leopold recalled being summoned from his position in the X-ray lab of the prison hospital and being introduced to Alf Alving, the head of the project, one day in 1944. This 'short, stocky gentleman' briefly explained the project to Leopold and the other X-ray staff, and wanted to know whether they thought there would be sufficient response among the inmates to make the project worthwhile. He would need about 200 volunteers. 'I told him that I was confident there would be no difficulty in getting twice or three times that number', Leopold wrote. Two weeks later, 'an announcement was read over the institutional radio, asking for volunteers. The men were instructed to turn their names in to the cell-house keepers. That first day 487 men volunteered'.[68] This method appears to have been standardized; Beutler recalled a similar process in the early 1950s.

> When we needed more volunteers I would go on the prison radio, or Ray [Dern] would, and we would briefly tell what we wanted to do and say that any men who are interested in participating in this should come up to such-and-such at such a time and we would talk to them further.[69]

As model organisms, the prisoners offered numerous advantages. First, the prisoners could be assumed to be biologically identical to soldiers and other human beings, and yet intermediate between animals and patients in terms of ethical restrictions. Although potential contaminating factors of captivity are now known, such as immune suppression due to stress, they were unknown at the time. Prisoners also offered advantages common to any good biological model system. They were standardized environmentally if not genetically, and were available in unlimited numbers.[70] 'An abundance of normal volunteers, in the younger age groups, living under standard conditions of diet and daily routine, made controlled clinical testing of antimalarial drugs possible', wrote Alving in 1948.[71] Such control could not be had with civilians. 'How would you get people to come back every day for 2 or 3 months, hospitalized for 2 or 3 weeks at a time?', asked Beutler. 'You couldn't do that with people who were working. You could do it with army troops, [but] they're much less volunteers than prisoners'.[72] The military, recall, had rejected the idea of experimentation on soldiers, feeling, apparently, that it could not afford the risks.

What the researchers did not mention was that, logistics aside, many of the experiments performed at Stateville almost certainly could not have been performed on civilians or even on other 'controllable' subjects such as enlisted soldiers. Because prisoners were captive and undergoing punishment, the researchers, the prison authority, the military, and the public were comfortable subordinating the subjects' health, well-being, and rights to the needs of the research. Not just a controllable population but an indebted population made it possible to use the Chesson strain of Plasmodium rather than less convenient, more benign strains, or to carry out overdosing experiments in order to define the 'margin of safety'. The suffering the prisoners would endure would be counted as part of their punishment, would be credited against their

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[66]'The prisoners have turned guinea pigs for the government', wrote journalist George Wright (1945). See also Howard (1947).

[67]The classic pattern of a sex-linked disorder is of a non-symptomatic mother passing it on to half of her sons, who show the trait. Females have an XX chromosome constitution. A mother with a recessive mutation on one X carries but does not express the trait. Her sons, who are XY, each have a 50% chance of inheriting the chromosome with the mutation. Not having a second X to compensate, those boys will show the disease trait. This is sometimes called 'knight's-move' inheritance.

[68]Leopold (1958), p. 305. Alving confirmed this, less precisely, in print, writing 'Approximately 500 inmates volunteered to act as subjects' (Alving et al., 1948d, p. 2).

[69]Beutler (2007).

[70]This was widely recognized as an advantage of using prisoners. See Hornblum (1997).

[71]Alving et al. (1948b), p. 2.

[72]Beutler (2007).

debt to society. In short, in the military, coercion is part of a contract and therefore explicit; in prison it is panoptic.

The researchers pushed up against even the rudimentary and elastic ethical standards for postwar prisoner research. Leopold reported on a planned experiment to identify where in the human body the dormant stages of the parasites lodged. The protocol was to infect prisoners with malaria, let it run, and then biopsy the major organs. The Malaria Board, however, turned down the request, ruling that basic knowledge of Plasmodium biology and the necessary surgical techniques were both too scanty to justify the experiment. No effective method was then known for suturing homogeneous organs such as the liver; there was a substantial risk of death by internal hemorrhage. The doctors were 'bitterly disappointed', wrote Leopold. 'We volunteers were disappointed too. That would have been a job eminently worth doing'.[73]

Another advantage of the prisoners was that they came conveniently in two color-coded strains. Both black and white prisoners were used, although generally not in the same experiment. 'We knew it was only the blacks who were primaquine sensitive', said Beutler. 'So that was very important. Second place, the blacks didn't get malaria. They're resistant to vivax. So we used black prisoners for studies of hemolysis, we used white prisoners usually for malaria'.[74] Since taking malaria by mosquito bite was the highest-status job, white prisoners were therefore preferentially given the more privileged tasks. Thus, a complex set of medical observations and stereotypes was impressed upon the experimental design of the Stateville trials.

The prisoners had one quality that might make a mouse researcher envious: volition. The prisoners were counted on to execute complex and imprecise instructions in some of the experiments. Nathan Leopold recalled one unpleasant experiment on the elimination of a drug from the system. He was to take the experimental drug, called SN-11437, varying his fluid intake. 'On one occasion I would limit my fluid intake sharply; I would drink as little water as possible'. Each time he urinated, a blood sample would be collected. 'The next time, fluids would be forced; I'd drink as much as I could possibly hold'. Though the researchers may have set a schedule for water intake, only the prisoner could determine how much he could 'possibly hold'. As in the first test, 'every urine sample and every blood sample would be tested as before. That wasn't quite so comfortable. I drank water till I was waterlogged. Naturally I had to urinate frequently, and every time I urinated I had to have a venipuncture so that my blood [drug] level could be determined'. This meant phlebotomy a dozen times a day, 'and it would have been more had I not lain down on a bed to avoid sloshing when I walked'.[75] The researchers could incorporate the prisoners' desire to participate into their experimental design. Of course, they likely had to cope with occasional resistance as well (see below). Volition was a parameter that had to be managed, perhaps even standardized.

In addition to serving as research subjects, the prisoners occasionally served as the object of research. Beutler described one set of experiments, which he admitted could not and should not be performed on humans today. They involved transfusing blood from one prisoner to another, to compare the life cycle of blood cells of primaquine-sensitive and normal patients. One prisoner's blood made everyone it was injected into sick with fever, nausea, and other symptoms. The prisoner was African-American, had served in the South Pacific during the Second World War, used intravenous drugs, and shared needles, which he said he sterilized by running them under hot water. The researchers seized the opportunity to explore an apparent new transmissible disease agent. They injected the pathogenic blood into healthy prisoners in various amounts and correlated the magnitude and kinds of symptoms with dosage. They also

[73]Leopold (1958), p. 324.
[74]Beutler (2007).
[75]Leopold (1958), p. 313.

asked prisoners to drink the toxic blood, in 5 ml or 50 ml quantities, to determine whether the agent could be transmitted via the digestive system. Symptoms were seen only with intravenous injection. The paper was published in the Journal of the American Medical Association in 1955.[76] This prisoner, then, was treated as a disease vector: he was functionally equivalent to a mosquito. Most incredibly, the panoptic ethics of the Stateville experimental system permitted research with unavoidably cannibalistic overtones—and its publication in a leading medical journal.

Prisoners also served as reagents. A mosquito needs to eat, whether or not it is at that moment serving as a disease vector. 'We had a job which was sort of a premium job, that some of the prisoners would get, and that is they got extra pay for feeding the mosquitoes', Beutler recalled.

> And the way they fed the mosquitoes is … to rub their forearms with sweat, put them in the mosquito cage, and let the mosquitoes drink blood. And they got paid an extra five or ten dollars for that. That was a much sought-after job.

One prisoner, however, seized power from the researchers (or from the mosquitoes):

> One of the guys who was doing this had figured out a way to keep his arm just out of reach of the mosquitoes, and then he would, you know, go like this and rub his arm as if he'd been bitten up, but the mosquitoes weren't getting any.

Again, a sexual overtone in the description of mosquito bites. 'So you know, he was conning us out of this money'.[77]

Mosquitoes do not naturally have malaria, of course; in order to serve as vectors they had to be infected. The researchers also used prisoners for this task.[78] Leopold recalled:

> There was a patient raising gametocytes; that is, he was going to run malaria long enough for the sexual form of the parasite, the so-called gametocytes, to develop in sufficient numbers to infect mosquitoes with malaria. It is a long and grueling task. Wallie was a very sick boy.[79]

Thus, prisoners served as the disease reservoir for the project. They were an all-purpose resource: research subject, reagent, and research object.

8

At the other end of the usual research hierarchy, the prisoners also served as research staff: a feature of the project that dramatically shifts the power relationships among the elements of the model system. 'Our technicians were prisoners, our secretary was a prisoner, the only person who was not a prisoner up there was the nurse', said Beutler. Although the researchers had to pass through a metal detector each morning and they worked in a locked prison ward, 'we were actually up there with 20 or 30 prisoners', he said, with 'no guard. There was a civilian female nurse and there was one other army officer, Ray Dern, and myself'. The technicians worked hard, he recalled. 'Of course we had to train them from scratch. They didn't have college degrees, they didn't really have much training, but that was fine'.[80] One such technician in the early years of the project was Nathan Leopold. Leopold joined the project first as a technician, in fact; his intelligence and diligence in the hospital X-ray lab commended him as a potentially valuable technician in the malaria project. He described campaigning long and hard to be given malaria, so that he could feel part of the core of the project.

[76]Beutler & Dern (1955).
[77]Beutler (2007).
[78]Alving (1948b), p. 3; also, some cultures were maintained in psychotic patients at the Manteno State Hospital, Manteno, IL.
[79]Leopold (1958), pp. 314–315.
[80]Beutler (2007).

Leopold expressed the delicate balances of power and loyalty involved in being a prisoner-technician. He promised to carry out his instructions to the best of his ability, and not to discuss details of the project with anyone. He would ensure that the research was carried out properly—but he would not break the prisoners' unwritten code of loyalty. Describing a conversation with Alving, he wrote that he told the boss:

> If, for instance, I learn of any volunteer trying to cheat by not taking his pills or by taking other medication, I will see to it that it stops, though I probably won't report it to you. But if by full cooperation you mean that I will report who steals an extra slice of bread from the chuck wagon, then you'll have to find yourself another boy.[81]

Leopold understood the technician's role as a gatekeeper for the flow of resources—data from prisoners to doctors, food from prison to prisoners—and saw that he had to uphold both the scientists' and the convicts' codes of integrity in managing those resources. Further, the flow of knowledge went both ways. 'The docs knew all about malaria and all about medical procedures', Leopold wrote, 'but they didn't know the first thing about the prison. Such matters as how to go about sending for a patient assigned to the laundry were deep mysteries to them'.[82] It does not matter to what extent Leopold was playing to his audience here. Whether he actually stopped cheating among the volunteers without reporting it is immaterial. The point is that these remarks express the peculiar diplomacy demanded of the prisoner-technician—a role that must have played out in various ways in the actual experiments.

Technicians do the repetitive, often technically challenging but monotonous tasks critical to any large-scale experiment. For example, each mosquito that bit a prisoner had to be dissected to determine the level of malarial infection in its salivary glands. First, the technician anesthetized the mosquito with chloroform or ether. Then he dumped the unconscious mosquito into a 'killing box' and immediately removed the wings and legs. 'This is done to prevent the escape of the infected mosquito, should it recover consciousness', Leopold wrote. He would then lift the tiny carcass onto a numbered microscope slide, and

> With the mosquito lying on its left side, head pointing to your right, you place the slide under a dissecting microscope and carefully cut off the head with a scalpel, just at the neck. You put a small drop of normal saline solution on the slide, just to the right of the decapitated trunk, and with a dissecting needle you gently press on the upper part of the thorax. A drop of 'gunk' comes out of the thorax, and this you place in the drop of saline solution. It should contain the salivary glands … Carefully you sift through the material in the drop with your dissecting needles, pushing aside each bit that does not contain salivary glands. At last you see something silvery shining in the turbid drop … Carefully, carefully you tease them free from contaminants.[83]

After the salivary glands were dissected, their parasite load had to be determined. This was done by smearing the gland across a slide and counting the number of parasites in the microscope field—and then repeating the procedure ninety times. Leopold learned how to do this as well, but it was tedious and prone to error, especially with mosquitoes with high parasite loads. Leopold recalled developing a better method. 'Working on my own time in the evenings, I counted the parasites on several dozen slides, field by field, and demonstrated that the number of parasites per microscopic field falls into a Gaussian distribution', or bell-shaped curve. He calculated the standard error for different sample sizes and showed that it increased only from

[81] Leopold (1958), pp. 308–309.
[82] Ibid., p. 306.
[83] Ibid., p. 311.

3% to 4% if the number of fields counted was cut from 90 to 45.[84] For a time, he wrote, he worked sixteen- to twenty-hour days.

Such participation demonstrates a remarkable blurring of the line between researcher and research subject, between investigator and captive. In a small way, the research subject had joined the researchers. The magnitude of Leopold's intellectual contribution is less important than the fact of it; it created in him an allegiance to the researchers that made him especially valuable as a technician-liaison between researchers and research subjects.

Another important ancillary role for prisoners was as secretaries. When Ernest Beutler was asked where he wrote the scientific and medical articles that came out of the project, he said that the papers were written at Stateville:

> EB: What I did is I dictated into a tape recorder and had Henry, who was our secretary, transcribe it.
>
> Interviewer: And he was a prisoner?
>
> EB: He was a prisoner.[85]

Note the use of the prisoner's first name, which Beutler recalled effortlessly after more than forty years. At times, the prisoners recovered a measure of identity, humanity, through their participation in the project. Although the researchers probably did not discuss with their secretaries the fine points of experimental design or the writing of scientific papers, the prisoners taking dictation and typing up the results were nevertheless exposed to the rarified atmosphere of research medicine.

Nathan Leopold gives us some insight into the kinds of experiences Henry might have had. During the two months of writing-up at the end of the first two years, 'There was a great deal of digging records out of the files, a great deal of statistical analysis and summarizing of results. On much of this I was permitted to help'. He claimed to have assisted in the preparation of eighteen of the twenty-two papers published in the first years of the project.[86]

As secretaries for the project, finding references, producing manuscripts, prisoners were active creators of knowledge—not merely vessels for observation. Further, this role could give prisoners authority over other prisoners. At times, Leopold had authority for selecting the prisoners who were accepted into the project. When the skeptical prison 'tough guys' got wind of the chance for early parole, he wrote, they

> came to me and coaxed, threatened, and wheedled to have their names put at the head of the volunteer list. I wasn't having any. They all took malaria, all right, but they took it in their regular turn … Here was one place where being a big shot didn't make the slightest difference.[87]

He even assisted in finding the records on individuals' participation in the project, to document their cases for early parole.

The secretaries and technicians on the project, then, breached several barriers that normally are quite firm in research. By using prisoners as research staff, the malaria project pierced the membrane that normally separates researcher from research material. More important, they created an alliance between the military–university–prison establishment and a select group of the normally powerless class of prisoners. In so doing, they drove a wedge through the prisoner

[84]Ibid., p. 316.
[85]Beutler (2007).
[86]Leopold (1958), pp. 337.
[87]Ibid., p. 330.

class, creating insiders and outsiders within the project. Prisoners exerted power over other prisoners. Perhaps most astonishing, this arrangement resulted in prisoners experimenting on prisoners and even on themselves. Leopold claimed to have counted parasites in his own cells.[88] In such cases, panoptic discipline was complete: the authority figures—the military researchers—recede into the background, leaving only the prisoners avidly imposing biomedical discipline on one another and on themselves.

It is difficult to assess how much the prisoners actually understood about what they were getting into, but the Stateville project was ethically progressive by the standards of the day. 'They actually signed informed consent [forms] that were witnessed', said Beutler. The consent form was almost fact-free. On paper, the prisoners agreed to participate in 'investigations of the life-cycle of the malarial parasite' and to 'accept all risks connected with the experiment'. No explicit risks—or even experimental drugs—were mentioned on the form.[89] Perhaps the doctors explained the risks orally. Nathan Leopold wrote, 'The docs explained in great detail to each and every volunteer before he was used just what it was planned to do. We were told that there was danger, that we might be sick, that we might die'. He continued, 'No man was coerced or even persuaded … Every man who went on the project at Stateville did so because he wanted to, almost because he insisted on it'.[90] In short, the prisoners likely had at least a qualitative understanding of the risks—and certainly, this would have increased over the years as gossip circulated through the prison. 'They really were volunteers', Beutler insisted. But in prison, the concept of 'volunteer' is complicated.

9

Why did they do it? The incentives to participation, as recorded by researchers and participants, were mercenary, corporeal, and philosophical. First, volunteers were paid between $25 and $100.[91] This apparently was required as a term of the federal research support. Nathan Leopold claimed to protest this payment vigorously and that he was ultimately persuaded to accept the money and donate it to charity.[92] Such statements sell books and Leopold surely knew it. But his avid participation in the malaria project is a matter of record.[93] Even if we cock an eyebrow at his flag-waving altruism, we cannot dismiss the possibility—even the likelihood—that a sense of larger purpose conditioned his responses. In the shadow of unpopular wars such as Vietnam and Iraq, it is easy to forget how much support there was for the Second World War, and it is plausible that patriotism played some role in the prisoners' enthusiasm to participate, at least in the first years of the project. Also, it may have been difficult for the men to gauge the level of suffering they were letting themselves in for. Even after word had spread among the prisoners, pain is such a subjective thing that it would be easy to underestimate how onerous participation could be.

Other incentives were more homely. The men were issued pajamas and bathrobes and they had a tub and shower—amenities unavailable or rare in the cellblocks. Leopold wrote that they could play dominoes and cards, and Beutler said, 'it was really probably more pleasant for them to be in this hospital unit where they could play cards with their friends than to be on the rock pile or the laundry or whatever else their work assignment would be'.[94] Neither man mentions the fact that, at any given time, many prisoners with these freedoms were nauseous,

[88]There is a long tradition of medical researchers experimenting on themselves; in a way, this act strengthens the bond between Leopold and the malaria researchers. See Franklin & Sutherland (1984); Altman (1998).
[89]Pappworth (1967), p. 62; Hornblum (1998), p. 82.
[90]Beutler (2007); Leopold (1958), p. 307.
[91]Alving et al. (1948b), p. 3. Beutler recalled the men receiving either $10 per year for drug testing or $25 per year if they took malaria.
[92]Leopold (1958), p. 310.
[93]See also Moreno (2000), p. 34.
[94]Leopold (1958), p. 330; Beutler (2007).

delirious, too weak to sit upright, and fainted dead away if they tried. Still, each participant doubtless enjoyed these creature comforts at some point.

Another incentive, elusive and for many illusory, was the prospect of suspension of discipline within the prison. Leopold wrote that Warden Ragen initially ruled that no one on the project should be put into 'the Hole', or solitary confinement. If a man got a disciplinary ticket, it would simply be placed on file until the end of the projec:, in other words, indefinitely. Inevitably, one prisoner pushed this too far and defied a guard, claiming 'Go ahead, write me up and see how far you get with it. I'm a malaria volunteer. You can't do anything to me'. Warden Ragen rescinded the amnesty. Thereafter, Leopold wrote, volunteers were sent to the Hole if they misbehaved, 'but they were brought out whenever necessary to have parasite counts made'.[95] When punishment and research conflicted, punishment trumped, even at the risk of contaminating the data by introducing uncontrolled variables such as new disease agents, poor hygiene and nutrition, and mental anguish.

The illusion of the suspension of discipline may indeed have been one of the strongest incentives to participate. The research project spanned the regular prison hierarchy, requiring the explicit support of the warden, occasional concessions from the guards, and the direct participation of the prisoners; further, it involved administration by researchers outside the regular strata of prison life. Leopold wrote that the project

> put the administration and the cons on the same side of the fence, partners in a common endeavor … Here the officials, the inmates, and, of course, the project staff were all pulling together.

Any sense of 'all pulling together', however, required the prisoners to join an effort initiated and managed by figures of authority—doctors, the military, and the prison administration. Participation—utility—was contingent upon subordination.

Once enrolled, however, the prisoners found ways to take ownership. The malaria volunteers acquired a unique status of moral privilege. Their sense of prestige was such that, Leopold wrote, they drew up a certificate for Warden Ragen, making him an honorary malaria volunteer.[96] Ragen was notoriously arbitrary and authoritarian, an 'old-school disciplinarian', despised by the rank and file.[97] Since all malaria volunteers were prisoners, the prisoners' gesture deliciously inverts the notoriously rigid authority structure, blurring the distinction between warden and ward. It creates a new meaning of citizenship: within the confines of the prison world, the malaria volunteers could see themselves as the prison's moral elite.

The final incentive was the ultimate suspension of discipline: early release. As mentioned above, the suffering of malaria was treated as part of the volunteers' punishment. In true panoptic fashion, this punishment was considered so severe, and its social value considered so great, that participating in the project could buy down a prisoner's sentence. In February 1947, Illinois Governor Dwight H. Green announced that all malaria volunteers would have their cases reviewed by the parole board. Those who had served their minimum sentence would be considered for parole.[98] Beutler too mentioned this. The prisoners, he said, 'knew they could go to the parole board and they could say, "To help atone for my bad deeds, I allowed the doctors to give me malaria and took the drugs". Whether it helped them or not, I don't know, but they had the opportunity to do that'.[99] On the strength of his participation in the malaria project as well as numerous other constructive activities in the prison, Leopold began appealing

[95]Leopold (1958), p. 329.
[96]Ibid., p. 330.
[97]Jacobs (1977), pp. 29–30.
[98]Howard (1947).
[99]Beutler (2007).

for commutation of his sentence as soon as he finished on the malaria project, in 1947. These requests were denied—there were still those in the judicial system who would have him hanged—but he was ultimately granted parole in 1958, shortly after he became eligible.[100]

The incentive of early parole neatly illustrates the tensions inherent in human experimentation. The offer of freedom is arguably the height of humanitarian treatment; yet its very value as a reward makes it a means of coercion. The average Stateville volunteer received parole about two years early. But of course it also blurs the line between medical research and Foucault's dyad of discipline and punishment. In a panoptic sense, participation in the malaria project made better prisoners. The prison staff and even the Governor believed the project stimulated prisoners' consciences, encouraged altruism and responsibility. They saw the malaria project as rehabilitating.

10

Foucault writes that the panopticon's enclosed nature

> does not preclude a permanent presence from the outside … In fact, any panoptic institution, even if it is as rigorously closed as a penitentiary, may without difficulty be subjected to … irregular and constant inspections.[101]

The Stateville malaria project was surely among the most publicized classified research projects of the period. The results were published relatively rapidly in peer-reviewed medical journals, usually in a burst at the end of a two-year cycle. This is in great contrast to other classified wartime research, such as radar, the scaling up of penicillin, or the Manhattan Project.[102] Further, as we have seen, even experiments detailing ethical lapses were published openly in the peer-reviewed literature. The project was also exposed, albeit in a highly controlled fashion, to the public. Life magazine covered the first bite day, publishing a photo essay on it in their 4 June 1945 issue.[103] Local radio stations came out for live broadcasts. Leopold claimed it was the first time convicts had spoken over the air from Stateville.[104] Not that they expressed their own opinions or feelings. Writers from the radio station prepared the script for the prisoner interviews. The reporters all wanted a statement from Nathan Leopold, Stateville's biggest celebrity (the Life photographers made sure to catch him as well). 'Warden Ragen talked to all of us who were going to speak over the air, cautioning to us about the necessity of adhering strictly to our script and not ad-libbing', Leopold wrote.[105] Though tightly controlled, this public exposure aided the panoptic qualities of both research and punishment. The prisoners were presented as happily rehabilitating. They became something of heroes; their sacrifices for the war effort were celebrated. Under the gaze of the scientific community and the public, the project's ethical lapses were hidden in plain sight, and its morally therapeutic qualities were stressed.

This publicity backfired in one important and potentially damaging way. The Stateville experiments became an important exhibit in the Nuremberg medical trial of 1947. The chief expert witness for the prosecution was Andrew C. Ivy, a physician at the University of Illinois school of medicine in Chicago. Ivy's task was to differentiate between the presumably ethical human experimentation conducted by Americans and others, and the culpably unethical Nazi experiments. The gambit worked, although defense counsel argued that the differences between Stateville and Dachau were insignificant. Indeed, counts 2 and 3 in the allegations of war crimes

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[100] Wright (1949).
[101] Foucault (1995), p. 207.
[102] Groves (1983); Rhodes (1986); Neushul (1993); Brown (1999).
[103] Prison Malaria: Convicts Expose Themselves to Disease So Doctors Can Study It." Life Magazine, Jun 4, 1945, 43-46.
[104] Leopold (1958), p. 327.
[105] Ibid.

against the Nazi doctor, Karl Brandt, included a description that differs from the Stateville project only in the magnitude of the resulting deaths:

> From about February 1942 to about April 1945 experiments were conducted at the Dachau concentration camp in order to investigate immunization for and treatment of malaria. Healthy concentration-camp inmates were infected by mosquitoes or by injections of extracts of the mucous glands of mosquitoes. After having contracted malaria the subjects were treated with various drugs to test their relative efficacy. Over 1000 involuntary subjects were used in these experiments. Many of the victims died and others suffered severe pain and permanent disability.[106]

But the United States did not formally adopt the Nuremberg Code, and the Stateville project proceeded apace, benefiting from that period's ambiguity toward prisoner experimentation.[107]

Indeed, many of the Stateville experiments violated the Nuremberg Code. The Code states that human experimentation should benefit the research subject, that it should avoid unnecessary suffering, that the results must justify any suffering, and that it should be conducted only by scientifically trained researchers. Any candid interpretation of the Stateville malaria experiments must conclude that in some ways they were clearly unethical by the international standards of the day.

Less clear is the question of consent, subject of the first and longest point of the Nuremberg Code: a condition Nuremberg deemed 'absolutely essential' to ethical human subjects research. It might seem obvious that prisoners cannot truly consent; by definition, they are in a coercive environment. Yet at Stateville, both researchers and research subjects seem truly to have believed that the prisoners freely consented. More prisoners wanted to participate than could; at least some, like Nathan Leopold, lobbied heavily to participate in more experiments than they were asked to and requested to participate in the most dangerous and painful experiments, even though those experiments brought no greater material rewards than the less dangerous ones. Clearly, simple self-interest does not completely explain the phenomenon. Further, because they acted as technicians and secretaries for the project, the Stateville prisoners were in some ways more fully 'research participants' than those taking part in a modern clinical trial. The Stateville project, then, is no simple case of the exploitation of prisoners. Harrowing experiments were indeed practiced on sentient, fully capable human beings. More haunting still, however, is how willing those men seem to have been to have these practices performed on them, and even to perform them on one another. Volunteers seem never to have been lacking, even for the most grisly experiments. When told that, with their help thousands of GIs might be spared malaria, wrote the New York Times, 'the prisoners respond immediately and enthusiastically'.[108] Although there are obvious problems, mentioned above, with admitting that the prisoners did truly consent, it is almost as troubling to frame consent as a concept so nebulous that no participant may correctly identify it.

11

Clearly, we need a more delicate analytical tool to tease out the tangled threads of subtle coercion and volition at Stateville. Although other scholars have argued that Foucault's analysis of the panopticon does not fit other cases of prisoner experimentation, it seems strikingly apt in the case of Stateville.[109] It may be that the architecture of Stateville prison shaped the panoptic qualities of the malaria research project, but the point is secondary. More

[106] Katz et al. (1972), p. 293; Moreno (2000), pp. 63–71.
[107] For more on the ethical confusion in the postwar era, see Hornblum (1998). On Nuremberg, see Dörner et al. (1999); Freyhofer (2004); Weindling (2004). On Ivy, see Harkness (1996, 1998); Moreno (2000), pp. 65–71; Freyhofer (2004), pp. 95–103.
[108] Laurence (1945).
[109] Alford (2000).

important are the ways in which Foucault's concept of panopticism helps explain the 'tuning' of the elements of the Stateville experimental system.

For example, the prisoners' selfless volunteerism is predicted under panopticism. Foucault calls old-style discipline and punishment a 'discipline-barricade' environment. In such a prison, such as Holmesburg prison or Joliet, force is brutal and explicit. It is, wrote Foucault, 'turned inwards towards negative functions: arresting evil, breaking communications, suspending time'.[110] Such a situation fosters self-interest and crushes altruism, both on the part of the prisoners and on that of the prison staff. In contrast, the Stateville project bears hallmarks of the 'discipline-mechanism', which Foucault places at the other extreme from the discipline-barricade. In a discipline-mechanism, punishment and rehabilitation are intermingled and self-imposed. Prison functions that combine them seamlessly become the most productive, partly because they are self-sustaining. The Stateville experiments epitomize this process. By giving prisoners every role in the experimental model system, the project tacitly reinforced the disciplinary aspect of the research. The painful and often life-threatening symptoms the prisoners experienced would have been classified as torture in a discipline-barricade environment. But at Stateville, prisoners avidly requested to be bitten and even cheerfully administered bites to one another.

Further, panopticism predicts that the usefulness and the virtue of the project would be highlighted, and perhaps exaggerated, by all participants. Nathan Leopold, savvy manipulator of the system that he was, understood that the surest route to freedom was to convey to the prison and to the public not only that he was no longer dangerous but that he was positively useful. Interviews, memoirs, public-relations statements, and newspaper articles all portray the Stateville project in a positive light, as putting the prisoners to good use. The public nature of such statements supports their panoptic quality: they fit Foucault's model precisely if we read them as persuasive rhetoric rather than literal truth.

Other aspects of the Stateville model system suggest that panopticism ran very deep through the malaria project. The absence of guards in the hospital and laboratories, the assignment of responsibility to prisoners—including responsibility over prisoners—the creation of an image of openness through magazine articles and radio programs, all fit within the panoptic perspective, in which surveillance is no longer only or even mainly practiced by recognized authority figures. It is distributed, so that it appears to come from within the prisoner himself and from outside the prison walls by the public. Panopticism, writes Foucault, constitutes a 'mixed mechanism', in which education, medical treatment, production, and punishment are interpenetrating.[111] The doctors and even the prisoners themselves became de facto prison guards. Experimental malaria, drug treatment, and the production of scientific knowledge became part of the prisoners' discipline and punishment. Such a mixed mechanism, Foucault continues, allows the relations of power and knowledge to be 'precisely adjusted, in the smallest detail, to the processes that are to be supervised'.[112] With prisoners serving every role on the project, such fine-tuning occurred easily and naturally. Leopold would stop cheating but not report it; nor would he report the stealing of food. The researchers granted power to the prisoners by allowing them to explain how the prison operated. The exercise of power shifts partly to the inmates, and to that extent it is present in numerous subtle ways within the panoptic environment, increasing its efficiency by increasing the points of contact among the subjects.

Although the malaria project took place in the prison hospital, outside the literal panopticon, it may have been more panoptic than the cellblocks. Punishment and research were blended.

[110] Foucault (1995), p. 206.
[111] Ibid.
[112] Ibid.

The location of the project, within the prison but in the safer and more neutral subdomain of the hospital, free of the presence of guards, helped make discipline invisible. The prisoners, as experimental subjects in a noble and high-profile project, were simultaneously privileged (morally) and yet subordinated. Coercion was generated through incentives, many of which were distributed by other prisoners, through the spirit of wartime volunteerism, status within prison culture, and in other ways. The use of prisoners as technicians and secretaries shifted the dynamics of the researcher–subject relationship while providing the researchers with free help and giving a few intelligent and reasonably trustworthy prisoners opportunities for intellectual and physical stimulation. And finally, the design of the experiments themselves, which played a kind of shell game by constantly shifting (and even blending) the subjects and objects of research, made every task feel important. Under such conditions, the metric of a prisoner's utility—and therefore of his moral status within the project—was the amount of suffering he endured. Foucault could hardly have asked for more.

Panopticism thus dovetails with the exigencies of human experimentation. In a productive model system, researchers, research subjects, disease agents, disease vectors, and the physical environment of the research must be tuned to one another. The peculiar sharing of power and authority in the Stateville project contributed to the tuning of these various elements. The army doctors soon learned the ropes of working in the prison environment. The prison experimented with different sets of constraints, freedoms, and responsibilities in order to have the project run smoothly. The prisoners found ways of exerting power and control that could invert power relationships without destabilizing the project that gave them that agency. When their exercise of power did disrupt the larger system—as when the prisoner challenged the malaria volunteers' disciplinary immunity—the system recoiled and recalibrated. As individual prisoners moved from technician to research subject and back, they learned techniques and established practices to minimize the discomfort of those who were ill or in pain. And doubtless the disease agents themselves were tuned to the workings of the project. The mosquitoes became disease vectors by biting men drawn from the same population they would then infect. The Chesson strain of Plasmodium vivax likely became less virulent as it was passaged from prisoner to prisoner, through no intention of the researchers but simply as a result of interaction with its host.[113] The elements of the model system adapted to one another, creating an integrated system that advanced the agenda handed down from the military brass to the university researchers and finally to the prison administrators.

The selection of prisoners as the model organism for government-sponsored research into new malaria chemotherapies set the basis for a unique experimental system that served the dual ends of punishment and knowledge production. Within this system, the prisoners' roles in the research evolved and expanded. The fluidity of those roles helped integrate the functions of the project and tune them to one another. The ease with which that integration occurred is logically admirable but morally troubling. This is the essential tension in experimental biomedicine on human subjects. Straddling the threshold of the intolerable, the Stateville malaria project challenges us to reflect on the moral implications of combining cool, rational curiosity with humanitarian concern for individual welfare.

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[113]Personal communication, Dr Isabelle Coppens, Johns Hopkins Malaria Research Institute, 13–14 January 2009.

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