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Toward an Anthropology of Immunology: The Body as Nation State

In this article I describe the main imagery currently used in popular and scientific descriptions of the immune system in the United States: the body as nation state at war over its external borders, containing internal surveillance systems to monitor foreign intruders. Although in some respects this is a boundary-oriented, internally flat system, in other respects it contains suppressed hierarchies that draw on cultural concepts of race and gender. I suggest what kinds of ideological work such imagery may be doing and what uses people make of it. Other models of the body and immune responses that build on different imagery are described.

In the new science of immunology, social differences—between men and women, managers and workers, or citizens and foreigners—are written metaphorically into the character of various immune system cells. As Haraway has put it, “the immune system is an elaborate icon for principal systems of symbolic and material ‘difference’ in late capitalism” (1989:4). In this article I explore some central images that dominate recent popular and scientific discussions of the immune system, spelling out in detail the kind of “social world” the immune system is now imagined to be. I will also suggest what kinds of ideological work this way of picturing the world might be accomplishing and indicate in a preliminary way what kinds of uses people are making of this imagery. Finally I will look comparatively at other ways the immune system might be conceptualized. Cross-cultural and historical comparisons can help us realize the historical specificity of our own body images and suggest the possibility of different ones.

Central Images in Popular and Scientific Literature on Immunology

For the analysis of popular imagery I draw on my examination of major mass media articles on the immune system published in the last five years.¹ These include material from mass-circulation magazines such as *Time* and *Newsweek*, as well as more specialized popular publications like *National Geographic* and *Discover*. I also draw on all the book-length popular publications on the topic I have been able to locate through standard bibliographic search techniques. These total some 10 volumes. Although I do not quote from all sources, the images I discuss are pervasive throughout.

The major metaphors used in popular accounts of immunology depict the body as a “regulatory-communications network” (Schindler 1988:1).² As Hara-

way's work has made plain, the body is seen as "an engineered communications system, ordered by a fluid and dispersed command-control-intelligence network" (1989:14). Whereas boundaries within the body are fluid and control is dispersed, the boundary between the body (self) and the external world (nonself) is rigid and absolute:

At the heart of the immune system is the ability to distinguish between self and nonself. Virtually every body cell carries distinctive molecules that identify it as self. [Schindler 1988:1]

Added to the conception of a clear boundary between self and nonself is a conception of the nonself world as foreign and hostile.

The immune system evolved because we live in a sea of microbes. Like man, these organisms are programmed to perpetuate themselves. The human body provides an ideal habitat for many of them and they try to break in; because the presence of these organisms is often harmful, the body's immune system will attempt to bar their entry or, failing that, to seek out and destroy them. . . . When immune defenders encounter cells or organisms carrying molecules that say "foreign," the immune troops move quickly to eliminate the intruders. [Schindler 1988:1]

As a measure of the extent of this threat, the body is depicted in contemporary popular publications as the scene of total war between ruthless invaders and determined defenders.³

If . . . we could become as tiny as cells or bacteria, and visit the sites of these superficially undramatic events, we would experience them as they really are—life and death struggles between attackers and defenders, waged with a ruthlessness found only in total war. [Nilsson 1987:20]

Inside the body, a trillion highly specialized cells, regulated by dozens of remarkable proteins and honed by hundreds of millions of years of evolution, launch an unending battle against the alien organisms. It is high-pitched biological warfare, orchestrated with such skill and precision that illness in the average human being is relatively rare. [Jaroff 1988:56]

Besieged by a vast array of invisible enemies, the human body enlists a remarkably complex corps of internal bodyguards to battle the invaders. [Jaret 1986:702]

A site of injury is "transformed into a battle field on which the body's armed forces, hurling themselves repeatedly at the encroaching microorganisms, crush and annihilate them" (Nilsson 1987:20). The array of forces at the body's command is extensive.

The organization of the human immune system is reminiscent of military defence, with regard to both weapon technology and strategy. Our internal army has at its disposal swift, highly mobile regiments, shock troops, snipers, and tanks. We have soldier cells which, on contact with the enemy, at once start producing homing missiles whose accuracy is overwhelming. Our defence system also boasts ammunition which pierces and bursts bacteria, reconnaissance squads, an intelligence service and a defence staff unit which determines the location and strength of troops to be deployed. [Nilsson 1987:24]

Small white blood cells called granulocytes are “kept permanently at the ready for a blitzkrieg against microorganisms” and constitute the “infantry” of the immune system (Nilsson 1987:24). “Multitudes fall in battle, and together with their vanquished foes, they form the pus which collects in wounds” (Nilsson 1987:24). Larger macrophages are another type of white blood cell that is the “armoured unit” of the defense system. “These roll forth through the tissues . . . devouring everything that has no useful role to play there” (Nilsson 1987:25).

Another part of the immune system, the complement system, can “perforate hostile organisms so that their lives trickle to a halt” (Nilsson 1987:24). These function as “‘magnetic mines’ [which] are sucked toward the bacterium and perforate it, causing it to explode” (Nilsson 1987:72). When complement “comes together in the right sequence, it detonates like a bomb, blasting through the invader’s cell membrane” (Jaret 1986:720).

A type of white blood cell, a T-lymphocyte for which the technical scientific name is “killer cell,” are the “immune system’s special combat units in the war against cancer” (Nilsson 1987:96). Killer cells “strike,” “attack,” and “assault” (Nilsson 1987:96, 98, 100). “The killer T cells are relentless. Docking with infected cells, they shoot lethal proteins at the cell membrane. Holes form where the protein molecules hit, and the cell, dying, leaks out its insides” (Jaroff 1988:59). The great variety of different “weapons” is a product of evolutionary adaptation to changing defense needs: “Just as modern arsenals are ever changing as the weaponry of a potential enemy becomes more sophisticated, so our immune system has adapted itself many times to counter survival moves made by the microbial world to protect itself” (Dwyer 1988:28).

Although the metaphor of warfare against an external enemy dominates these accounts, another metaphor plays nearly as large a role: the body as police state.⁴ Every body cell is equipped with

“proof of identity”—a special arrangement of protein molecules on the exterior. . . . these constitute the cell’s identity papers, protecting it against the body’s own police force, the immune system. . . . The human body’s police corps is programmed to distinguish between bona fide residents and illegal aliens—an ability fundamental to the body’s powers of self-defence. [Nilsson 1987:21]

What identifies a resident is likened to speaking a national language: “An immune cell bumps into a bacterial cell and says, ‘Hey, this guy isn’t speaking our language, he’s an intruder.’ That’s defense” (Levy, quoted in Jaret 1986:733).

T cells are able to “remember for decades” the identity of foreign antigens:

the intruders’ descriptions are stored in the vast criminal records of the immune system. When a substance matching one of the stored descriptions makes a new appearance, the memory cells see to the swift manufacture of antibodies to combat it. The invasion is defeated before it can make us ill. We are *immune*. [Nilsson 1987:28]

What happens to these illegal aliens when they are detected? They are “executed” in a “death cell” (the digestive cavity inside a feeding cell) (Nilsson 1987:25, 31, 76, 81). “When the walls have closed around the enemy, the execution—phagocytosis—takes place. The prisoner is showered with hydrogen per-

oxide or other deadly toxins. Digestive enzymes are sent into the death chamber to dissolve the bacterium” (Nilsson 1987:81).

A police state of course requires a highly trained administrative apparatus and field personnel. The body provides for these things in “technical colleges,” “training sites” located in lymph nodes, the thymus gland, and elsewhere (Jaret 1986:716; Nilsson 1987:26). “[Lymphocytes] are like blank pages: they know nothing, and must learn from scratch” (Nilsson 1987:26).

These metaphors work easily for those cases where one can see “missiles,” “mines,” “chemical warfare,” or sniper ammunition. They run into trouble when the defensive forces seem inescapably to operate by *consuming* their victims. We are accustomed to blowing up people on battlefields or poisoning them, but we are not accustomed to eating them. Notice in these examples how the metaphors move back and forth between warfare and ingestion. “Once [the white blood cell] has reached its target (for example a bacterium), it uses *phagocytosis*, a process which, quite simply, involves the defender eating the attacker” (Nilsson 1987:25). The antibodies attached to the enemy cells are not seen in this context as identity papers sought by the secret police, but as “appetizers” or an “aperitif” (Nilsson 1987:72, 78).

Feeding cells squeeze through the blood vessel wall and move toward the enemy, with amoeba-like movements. The antibodies stimulate their appetites and, on contact with the bacteria, the feeding cells immediately start to swallow them. The battle is in full swing. [Nilsson 1987:29]

In another example, “Powerful chemicals inside the macrophage will break down and destroy the components of the invading cells. The macrophage literally eats the enemy, digesting and metabolizing its materials” (Jaret 1986:718–719). Finally, when stimulated by T cells to attack viruses, macrophages are “whipped” into a “feeding fury.” “They don’t necessarily eat faster,” notes Dr. Richard Johnston, Jr., of the University of Pennsylvania School of Medicine, “but they kill better” (quoted in Jaroff 1988:59).

In the warfare metaphor, granulocytes are the infantry lost in large numbers; macrophages, the armored tanks. When ingestion enters the picture, we wind up with cannibalism: “During an infection, when millions upon millions of granulocytes are lost in the struggle against the invaders, part of the macrophages’ task is to ingest dead microphages—a phenomenon which might be described as a kind of small-scale cannibalism” (Nilsson 1987:25).

What is the relationship between the kind of popular accounts I have quoted so far and the language of more technical scientific publications? Although this is a question that will be investigated more fully in research I have not yet completed, at a general level it is clear that popular accounts often simply take the metaphors that occur in scientific writing a few paces further.⁵ For this analysis I am drawing on one year’s fieldwork in a university department of immunology, where I regularly attended classes, department seminars, and a journal club. I also attended all planning sessions of one research group within the department. In conjunction with the research of this group, I learned a standard experimental procedure (western blot) and helped carry out a series of experiments. I have consulted all texts currently required or recommended in graduate classes on immunology in this department and in graduate and undergraduate classes on immu-

nology in another division of the university (i.e., Hood et al. 1984; Kimball 1986; Paul 1989; Roitt, Brostoff, and Male 1985; Sell 1987; and Stites, Stobo, and Wells 1987).

One main image in virtually all scientific literature on the immune system is the distinction between self and nonself, a distinction that is maintained by a defense based on killing the nonself. The editorial from a recent issue of *Science*, "Recognizing Self from Nonself," begins: "Of all the mysteries of modern science, the mechanism of self versus nonself recognition in the immune system ranks at or near the top. The immune system is designed to recognize foreign invaders" (Koshland 1990:1273). A current clinical handbook begins, "The function of the immune system is to distinguish self from non-self and to eliminate the latter" (Kesarwala and Fischer 1988:1). And a textbook concludes its first chapter with a section headed "Self vs. Nonself": "Whatever the time frame, the development of immunocompetence represents a watershed in the life of the animal. At this time the organism learns to discriminate between 'self' and 'non-self'" (Kimball 1986:14).

Images of a police state with associated training of personnel to protect its borders come in too: defense is carried out by "professional phagocytes" (Stites, Stobo, and Wells 1987:170).

The cells and molecules of this defensive network maintain constant surveillance for infecting organisms. They recognize an almost limitless variety of foreign cells and substances, distinguishing them from those native to the body itself. When a pathogen enters the body, they detect it and mobilize to eliminate it. They "remember" each infection, so that a second exposure to the same organism is dealt with more efficiently. Furthermore, they do all this on a quite small defense budget, demanding only a moderate share of the genome and of the body's resources. [Tonegawa 1985:72]

Language like this is commonplace not only in texts⁶ but in explanations in seminars and classes. Once in a journal club discussion of an article on T cell functions, I counted dozens of uses of the words "kill" or "killing."

The Body and the Nation

These images of entities within our bodies relate in complex ways to social forms pervasive in our time. Consider, for example, Benedict Anderson and Ernest Gellner's descriptions of the modern nation state. Both writers stress the important role of communication in the identity of a nation state.

[The] core message is that the language and style of the transmissions is [sic] important, that only he who can understand them, or can acquire such comprehension, is included in a moral and economic community, and that he who does not and cannot, is excluded. [Gellner 1983:127]

Recall the emphasis placed on the immune system as a network of mutual communication and the glossing of an intruding foreign cell as "a guy who doesn't speak our language." Sometimes, as in this example, intruding foreign cells are explicitly compared to people of different national origin:⁷

When you are the ever-vigilant protector of the sacrosanct environment of a body, anything foreign that should dare to invade that environment must be rap-

idly detected and removed. However, finding certain invaders and recognising them as foreign can be very difficult. . . . It can be as difficult for our immune system to detect foreignness as it would be for a Caucasian to pick out a particular Chinese interloper at a crowded ceremony in Peking's main square. [Dwyer 1988:29]

Consider again the lack of mediating structures in the modern nation state between the individual and the state.

[Nation states] are poorly endowed with rigid internal sub-groupings; their populations are anonymous, fluid and mobile, and they are unmediated; the individual belongs to them directly, in virtue of his cultural style, and not in virtue of membership of nested sub-groups. Homogeneity, literacy, anonymity are the key traits. [Gellner 1983:138]

In the popular picture of the immune system, we see individual cells launched into the body to protect its homogenous interior against attack. These cells are individuals that roam fluidly in blood and lymph within the body: "The immune system consists of an interconnecting network of organs and tissues between which moves a heavy and ceaseless traffic of cells. This cellular traffic is borne along in the flow of blood and lymph" (Kimball 1986:131).

There are structures which produce and "educate" these cells, primarily the thymus and bone marrow. As I pointed out, these "educational institutions" are crucial for maintaining the common language that ties the population of cells together and enables it to distinguish self from nonself.⁸ But these structures do not themselves continue to govern the immune response after they have produced and educated the cells. As Jaret describes it, "the human immune system is not controlled by any central organ, such as the brain. Rather it has developed to function as a kind of biologic democracy, wherein the individual members achieve their ends through an information network of awesome scope" (1986:709).

Finally, it seems to be part of the defining character of the nation state that its domain is limited: "the nation is imagined as *limited* because even the largest of them, encompassing perhaps a billion living human beings, has finite, if elastic, boundaries, beyond which lie other nations. No nation imagines itself coterminous with mankind" (Anderson 1983:16). In the maintenance of boundaries, of course, lie many of the conflicts between nation states; and in the protection of its boundaries against invasion from other, equally powerful organisms, lie the bellicose activities of the immune system.

Although Anderson stresses the potentially egalitarian aspect of nations, in which internal hierarchies are flattened out in deference to defining national boundaries, Dumont stresses the way nationalist ideologies often carry within them a kind of suppressed hierarchy (Dumont 1986). For Dumont, nationalism involves the emergence of individualism and egalitarianism which "are a particular transformation on hierarchy . . . whereby hierarchy and its valuation of difference are suppressed. Racism is a property of suppressed hierarchy" (Kapferer 1989:164). Therefore, "Dumont sees nationalism, because it ingrains individualist and egalitarian ideology, to be potentially integral to the generation of a western totalitarianism, fascism and racism" (Kapferer 1989:164). The world of the immune system also contains a kind of suppressed hierarchy within its boundary-oriented, internally mutually interacting system of components. Compare two cat-

egories of immune system cells: phagocytes (macrophages are one type), which surround and digest foreign organisms; and T cells which destroy foreign organisms by shooting holes in them or transferring toxin to them. The phagocytes are a lower form of cell evolutionarily and are even found in such primitive organisms as worms (Roitt, Brostoff, and Male 1985:2.1); T cells are more advanced evolutionarily and have higher functions, such as memory (Jaroff 1988:60; Roitt, Brostoff, and Male 1985:2.5). It is only these advanced cells which “attend the technical colleges of the immune system” (Nilsson 1987:26).

There is clearly a hierarchical division of labor here, one that is to some extent overlaid with gender categories. Superficially, there are obvious female associations with the engulfing and surrounding of phagocytes and obvious male associations with the penetrating or injecting of T cells.⁹ In addition, many scholars have pointed out the frequent symbolic association of the female with lower functions, and especially with a lack of or a lesser degree of mental functions.

In addition, phagocytes are the cells that are the “housekeepers” (Jaret 1986) of the body, cleaning up the dirt and debris including the “dead bodies” of both self and foreign cells. (One immunologist called them “little drudges.”¹⁰)

The first defenders to arrive would be the phagocytes—the scavengers of the system. Phagocytes constantly scour the territories of our bodies, alert to anything that seems out of place. What they find, they engulf and consume. Phagocytes are not choosy. They will eat anything suspicious that they find in the bloodstream, tissues, or lymphatic system. [Jaret 1986:715]¹¹

Beyond this, when a phagocyte moves to surround a microorganism, the extensions of itself are called “pseudopodia” or false feet. These “feet” surround the particle and lodge it within (Jaret 1986:717; Jaroff 1988:57–58; Leijh, Furth, and Zwet 1986:46.2). To round out the images that may come to mind at the thought of two feet opening wide to engulf something foreign, this process of forming a pouch is explicitly called “invagination” (Vander, Sherman, and Luciano 1980:527). Still more fraught with psychosexual connotations is the fact that the “vaginal” pouch between the phage’s feet is also a “death cell,” which will execute and then eat its prey.¹²

The feminized, primitive phagocytes kill by engulfing and eating “the enemy.” They often die in the process, but their deaths are seen as routine and unexceptional. One type of phagocyte, the macrophage, often dies because it engulfs something *too big and pointed*, which punctures it (more fertile material for psychosexual analysis). Nilsson comments on an illustration of an asbestos fiber puncturing a macrophage: “It is no use: the asbestos does not break down and the macrophage is defeated” (1987:129).

The masculinized T cells however, kill by penetrating or injecting. They sometimes die, too, but their deaths take place on a battlefield where they shoot out projectiles and poisonous substances. Heroic imagery is brought directly to bear on them, as in one illustration, David (the T cell) takes on Goliath (the tumor cell). “A killer cell—here in monstrous guise—grips a protoplasm thread of the large tumour cell and starts to penetrate the enemy. Goliath meets David: the giant seldom survives the encounter with the little killer cell” (Nilsson 1987:100).

What Does the Imagery Do?

Immunology is a recent science recently institutionalized. Although such entities as macrophages, lymphocytes, antibodies, and antigens had been identi-

fied earlier, it was not until the mid-1960s that the concept of an immune *system* as such existed (Moulin 1989). Only then did macrophages, lymphocytes, and other cells come to be seen as a part of a mutually interacting, self-regulating, whole body system. It was generally not until the 1970s that departments of immunology existed in American or other universities. Popular depictions of immune system functions only began after this time and grew frequent only in the 1980s. Therefore, given that the modern nation state has been in existence for over a hundred years, it is perhaps not even particularly surprising that such imagery should be incorporated by a developing science. It might also seem that there would not be any ideological "work" for such imagery to do, since the forms they reflect are already so well entrenched as to be unquestionable.¹³

As a speculation I suggest that one kind of ideological work such images might do is to make violent destruction seem ordinary and part of the necessity of daily life. Perhaps when the texts slip between warfare and ingestion they in effect domesticate violence. In another scientific language, used by nuclear defense intellectuals, Carol Cohn (1987) suggests that words and images taken from the home and farmyard serve to blunt the reality of massively destructive forces. For example, getting to see a nuclear missile is called "patting the bomb," and missiles themselves are kept in "silos." In immunology the shifting of imagery from warfare to eating may similarly divert us from seeing that cellular events are constructed as total war. Destruction and death may appear to give way to friendly, sociable eating. Any diversion achieved could only be temporary: the overall picture conveyed by these texts is emphatically one of "the body at war." Some accounts even go so far as to warn us repeatedly against thinking any events inside the body are innocent: "superficially undramatic events" are really total war (Nilsson 1987:20); "tumour cells repos[ing] on a slide" are "no peaceful scene" (Nilsson 1987:102). What may seem innocent is really deadly: killer cells give cancer cells a "poisonous kiss," a "kiss of death," (Nilsson 1987:105) that dispatches them; the feeder cell encloses a bacterium in a "deadly embrace" (Jaret 1986:718; Nilsson 1987:25).

Another kind of ideological work may be accomplished when a structure is posited in the body with hierarchical relations among its parts, a structure that relates to existing hierarchies in society. In the tiny world of these cells we see stereotypically "male" penetrating killer cells and stereotypically "female" devouring and cleaning cells, male heroes and females in "symbiotic service," to use Jean Elshtain's phrase (1987:198). "Male" activity is valued as heroic and life-giving, and "female" activity is devalued as ordinary and mortal.

Jean Elshtain (1987), Judith Stiehm (1982), and Virginia Woolf (1929) have all argued in different ways that in Western culture warfare depends on females for whose sake male heroes can die. Maintenance of militarism depends on gender in the sense that there cannot be a "hero's" death without "little drudges" keeping things tidy at home. There is not a complete parallel in the cellular world, because the feminized macrophages are on the battlefield killing (by eating) invaders along with the masculinized T cells. However, there is a distinct replication of status difference between them in the many ways I have already discussed.

But it is not clear whether gender is the only overlay on this division of labor. Phagocytes are the cells that actually eat other cells belonging to the category "self," and so engage in a form of "cannibalism." William Arens has done a

study of the ideological use of the trait of cannibalism and finds it often if not always associated with the attribution of a lower animal nature to those who engage in it (1979). In immunology phagocytes are seen as feminized in some ways, but as simply "uncivilized" in other ways. These "cannibals" are indiscriminate eaters, barbaric and savage in their willingness to eat any manner of thing at all. The implications of this depiction, with its unmistakable overtones of race and class, will be explored below.

What Do People Do with the Imagery?

In my research I have begun to look at the way scientists and others react to immune system imagery when it is pointed out to them, as a way of seeing the role of these constructions in the definition of personal identity and the creation of cultural meaning. The scientists I have worked with have had a variety of reactions, but none has suggested it would be possible (or often, even desirable) to substitute different imagery for the current warfare/internal purity model. The head of the immunology research group in which I have been doing participant observation was attentive when I described my impression of the extent to which the imagery of warfare dominates department discussions, lab talk, and technical literature. He was intrigued enough to report to me later, at the end of a semester course he taught on the immune system, that he had tried to keep track of his own use of such talk. He said that in the first half of the course, on immunochemistry and genetics, he had used no language of warfare or killing. But he did use this kind of language in the second half, when he dealt with "applications." He saw this later language as simply a shorthand, used to give an easy handle to the complexities that students have already understood. "It is hard to avoid reference to the 'killer' cell, for example, or saying the T cell 'kills' the germ, even though the class understands that the T cell only acts when a complex combination of other factors are present," he told me. He referred to the first half of the course as the "conceptual" half, the second as the "applied" half.

When I asked if the two halves were independent, he replied with an emphatic "yes." He also thought that it would not affect the first half of the course at all if he had a different shorthand to use in the second half. If we spoke of the cells, say, as "controlling" rather than "killing," it still would not affect the chemistry and genetics, he claimed.

Another scientist, who is committed to writing biology textbooks so that they are less reflective of patriarchal and hierarchical assumptions in our society, was not fond of the warfare imagery. However, he commented to me that he was stumped by how else to describe the immune system. The warfare metaphor seemed to him in this case to be the only one that fit the facts.

For people who are suffering from immune system disorders, the warfare language can also appear unobjectionable. My own "buddy,"¹⁴ with whom I had innumerable conversations about the physical and emotional aspects of AIDS, never expressed any hesitation or criticism about the use of this language by medical personnel. However, he himself never used any military or nation state imagery to describe what was happening to him or what the medical treatments were supposed to do. Instead he used only the imagery of a clean house. The treatment involving ablation of his immune system by radiation, which he was hoping to

receive, would “clean out the HIV virus”; his brother’s immune system cells, injected by bone marrow transplant, would then “set up housekeeping” in his body.

Other HIV patients embrace the warfare imagery wholly and use it creatively to organize their experience of mortal threat.

We have grown up in our bodies, they are our native lands, and although we know their shortcomings by heart, we have a natural affection for them, warts and all. My country has occasionally disappointed me, but like a Resistance fighter, I’ll stop at nothing when it comes to throwing off the foreign viral yoke. The main thing is to adopt a guerrilla attitude and reverse our roles. To declare that impostors have taken over my body, that the virus has illegally usurped authority, and that I must set out to recover my morale and all biological ground lost so far. I’m in my own home, this is my body, and it’s up to AIDS to get out. [Dreuilhe 1988:8–9]

AIDS activists also create powerful images of collusion between the damage done by the virus to individual bodies and the damage they suspect some political authorities intend. For example, at a public hearing held by the Maryland Governor’s AIDS commission, July 10, 1990, an Act Up spokesperson made the following statement: “Schaefer [the Governor] is Hitler, AIDS is the holocaust, Maryland is Auschwitz. This is conscious genocide and can only be seen as the Governor’s desire to wipe out this population.”

Alternative Images of the Body

However creatively people attempt to forge meaningful uses of these bellicose nation state images, they are still working within what strikes me as a rather narrow range of options. An important role for anthropology is to use its technique of comparative research to make plain the historical specificity of the cultural options that occur to people and therefore their contingency. Other times and places may offer us other resources.

In some times and other cultures, images of biological organisms as engaged in all-out struggle to the death have not held sway. Daniel Todes has shown how in the late 19th and early 20th centuries Russian biologists rejected Darwin’s major metaphor, the struggle for existence, especially when it appeared in connection with Malthusian ideas about overpopulation. In developing an alternative theory of mutual aid, Russian naturalists argued four tenets:

the central aspect of the struggle for existence is the organism’s struggle with abiotic conditions; organisms join forces to wage this struggle more effectively, and such mutual aid is favored by natural selection; since cooperation, not competition, dominates intraspecific relations, Darwin’s Malthusian characterization of those relations is false; and cooperation so vitiates intraspecific competition that the latter cannot be the chief cause of the divergence of characters and the origin of new species. [Todes 1987:545]

In rejecting Darwin’s assumptions, Russians identified the idea of individualized competitive struggle as a product of English culture and society. Darwin’s use of this assumption was “the same as if Adam Smith had taken it upon himself to write a course in zoology” (Chernyshevskii, quoted in Todes 1987:541); a Rus-

sian expert on fisheries and population dynamics wrote that the English “national type accepts [struggle] with all its consequences, demands it as his right, tolerates no limits upon it” (quoted in Todes 1989:41).

This response to Darwin’s theory, common to Russian intellectuals of a variety of philosophical and political viewpoints, derived, as Todes persuasively argues, from several factors:

Russia’s political economy lacked a dynamic, pro-laissez faire bourgeoisie and was dominated by landowners and peasants. The leading political tendencies, monarchism and a socialist-oriented populism, shared a cooperative social ethos and a distaste for the competitive individualism widely associated with Malthus and Great Britain. Furthermore, Russia was an expansive, sparsely populated land with a swiftly changing and often severe climate. It is difficult to imagine a setting less consonant with Malthus’s notion that organisms were pressed constantly into mutual conflict by population pressures on limited space and resources. [Todes 1989:168]

A second example of an alternative form of imagery comes from the work of Ludwik Fleck. Fleck was a Polish biologist who during the 1930s and 1940s developed important diagnostic and prophylactic measures for typhus fever. He also published a monograph and many papers on the methodology of scientific observation and the principles of scientific knowledge. Although his work was not widely disseminated at the time of its publication, he anticipated many of Thomas Kuhn’s arguments (1962), published and acclaimed in the 1960s.¹⁵

In the 1930s, Fleck had already seen the limitations of the metaphor of warfare in immunology and conceived of another possibility. He described the prevailing idea of

the organism as a closed unit and of the hostile causative agents in facing it. The causative agent produces a bad effect (*attack*). The organism responds with a reaction (*defense*). This results in a conflict, which is taken to be the essence of disease. The whole of immunology is permeated with such primitive images of war. [1979(1935):59]

Out of his experience as a practicing biologist he thundered, “not a single experimental proof exists that could force an unbiased observer to adopt such an idea” (Fleck 1979[1935]:60). Instead of the organism as a self-contained independent unit with fixed boundaries, he proposed a “harmonious life unit,” which could range from the cell, to the symbiosis between alga and fungus in a lichen, to an ecological unit such as a forest.¹⁶

In the light of this concept, man appears as a complex to whose harmonious well-being many bacteria, for instance, are absolutely essential. Intestinal flora are needed for metabolism, and many kinds of bacteria living in mucous membranes are required for the normal functioning of these membranes. [Fleck 1979(1935):61]

Change in such a harmonious life form could be spontaneous (mutation), cyclic (aging), or simply change within the reciprocally acting parts of the unit. In the latter category fall most infectious diseases. But, and this is crucial,

it is very doubtful whether an invasion in the old sense is possible, involving as it does an interference by completely foreign organisms in natural conditions. A

completely foreign organism could find no receptors capable of reaction and thus could not generate a biological process. It is therefore better to speak of a complicated revolution within the complex life unit than of an invasion of it. [Fleck 1979(1935):61]

He meant that any “invading” organism had to have been living in our vicinity, symbiotically, long enough to be able to stick to *our* cells. The ability to generate a biological process could only come about from previous encounters. Thus, a previously minor organism could only rise to prominence within the body’s life unit, not invade it as a foreign “other.” In the overall scheme of things, this kind of “complicated revolution” would be a decidedly rare event, not one that was constantly on the verge of occurring.

It is interesting to speculate whether Fleck’s strongly stated objections to the warfare/internal purity model in immunology was influenced by his experience of the contemporary Nazi application of totalitarian practices to achieve the purity of the social body. By 1935 the removal, incarceration, or killing of German and Austrian Jewish, communist, and socialist physicians was well advanced.¹⁷ After Poland was occupied by the Nazis, Fleck was deported to Auschwitz and forced to produce typhus vaccines for the German armed forces (Trenn and Merton 1979:151). Speculation about the relationship between Fleck’s ideas and his Nazi experience is made more compelling by Claude Lefort’s observation that totalitarian regimes often produce images of themselves as a body:

At the foundation of totalitarianism lies the representation of the People-as-One . . . the constitution of the People-as-One requires the incessant production of enemies. . . . The enemy of the people is regarded as a parasite or a waste product to be eliminated. . . . What is at stake is always the integrity of the body. It is as if the body had to assure itself of its own identity by expelling its waste matter, or as if it had to close in upon itself by withdrawing from the outside, by averting the threat of an intrusion by alien elements. . . . The campaign against the enemy is feverish; fever is good, it is a signal, within society, that there is some evil to combat. [Lefort 1986:297–298]

As immunology describes it, bodies are imperiled nations continuously at war to quell alien invaders. These nations have sharply defined borders in space, which are constantly besieged and threatened. In their interiors there is great concern over the purity of the population—over who is a bona fide citizen and who may be carrying false papers. False intruders intend only destruction, and they are meted out only swift death. All this is written into “nature” at the level of the cell. It seems possible that Fleck may have wondered whether this imagery might make analogous social practices come to seem ever more natural, fundamentally rooted in reality, and unchangeable.

Within our own contemporary science there are hints of other models that might be used to describe immune responses. For example, Haraway suggests the work of Terry Winograd and Fernando Flores on cognition as providing a way of describing pathology without military imagery. By their account, a “breakdown” would not be “a negative situation to be avoided, but a situation of non-obviousness, in which some aspect of the network of tools that we are engaged in using is brought forth to visibility” (quoted in Haraway 1989:18). Instead of the defended self who destroys the foreign intruder lest it be destroyed, we would have

occasions when interaction becomes nonobvious, potentially creative situations that call forth clarification of the terms of the interaction.

One final possibility for an alternative perspective is present as a minor motif in some of the biological texts I have discussed. If the eating aspect of phagocytosis were allowed to dominate in significance over the destructive aspect, the macrophage might be said to catabolize and utilize the "invading foreign organism" in its own metabolic processes. In other words, the microorganism might be seen as food for the macrophage. Some standard sources make plain this aspect of what a macrophage does, telling us that when a macrophage ingests a microorganism, it "evokes a metabolic burst" which causes increased consumption of oxygen and production of substances which help digestion (Leijh, Furth, and Zwet 1986:46.2; Vander, Sherman, and Luciano 1980:528). But by no means do all texts mention these matters; never are they given very much attention or development in the overall picture. If the view that microorganisms serve as food for macrophages were given prominence, we could see this process as a food chain, linked by mutual dependencies. Instead of a life and death struggle, with terrorism within and war at the borders, we would have symbiosis within a life unit that encompasses the body and its environment, where all organisms are dependent on others for food.

None of these alternative metaphors would be sufficient by itself to encourage us to imagine—let alone bring into existence—different forms of organization in our society than those that now exist. But at the least they can serve to add substance to the question: are there powerful links between the particular metaphors chosen to describe the body scientifically and features of our contemporary society that are related to gender, class, and race?

Full consideration of this question would demand attention to issues I have not taken up here: what is the historical relationship between particular social formations and particular ideas about the body? Is there variation in scientific or popular body images from one kind of nation state to another? From one perspective within a given nation state to another? Although I hope to address these questions in future work, in this article my aim has been more limited: to suggest that as long as there is a possibility that scientific descriptions give an aura of the "natural" to a particular social vision, there is a place for comparative ethnography to set this vision in a context of other ways bodies might be imagined and societies might be organized.

NOTES

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¹Some portions of an earlier version of this section appeared in Martin (1989).

²This source is a booklet which is sent out if one calls 1-800-4CANCER and requests information on the immune system. My thanks to Martha Balschem for telling me about it.

³See Rather and Frerichs (1972) on early uses of military metaphors in Western medicine.

⁴At times the “police” become more like antiterrorist squads, as befits the task of finding enemies within, who are bent on destruction. Paula Treichler points out that the AIDS virus is a “spy’s spy, capable of any deception . . . a terrorist’s terrorist, an Abu Nidal of viruses” (1987:282).

⁵The study in which I am currently engaged, “Science and Knowledge of the Body,” focuses on how ideas and practices related to immunology develop over time in research labs, in urban neighborhoods, and in clinical settings. This research will doubtless modify some of the ideas suggested in this article.

⁶See also Roitt, Brostoff, and Male (1985:2.8) on the “kiss of death” and (1985:18.11) on immunosurveillance.

⁷The unselfconscious chauvinism and even racism of this remark (as of much else in Dwyer’s book) bears noting.

⁸See Gellner (1983:138) on the importance of educational institutions in the functioning of nation states.

⁹Lauren Berlant suggests to me that in early Renaissance imagery females are linked with others simply via their bodies, while males are always linked via a mediating tool, such as a weapon. That the macrophage engulfs only with its “body” may be part of what makes it seem female in our cultural tradition.

¹⁰Overheard by Paula Treichler, personal communication.

¹¹Recent work in anthropology has shown the very widespread association of females in funeral rituals with the cleaning up of the dirt and pollution of death (Bloch and Parry 1982). Especially as seen from the vantage point of men, women’s bodies produce most of the dirty, defiling stuff in the universe and are thus responsible for carrying away the filth of the corpse at funerals.

¹²In some ways these metaphors are presented so that their overall force is not obvious. In part the images occur in separate places, invagination in one account, pseudopodia in another. For materials that discuss the historical roots or psychoanalytic origins of the connection between the female and death, see Abraham and Torok (1986), Auerbach (1982), and Theweleit (1987). For another arena in which ominous danger is attached to images of the female “other,” see Said (1978:57).

¹³The phrase “ideological work” has been used by Mary Poovey (1988) to describe the active processes involved in the establishment and contestation of cultural systems of ideas and practices.

¹⁴The term “buddy” refers to a relationship between a trained volunteer and a person with AIDS.

¹⁵In Kuhn’s foreword to the recent reissue of Fleck’s monograph, he states (1979:viii) that he is “almost totally uncertain” what he took from Fleck.

¹⁶Lewis Thomas evokes powerful images of our symbiotic relationships with bacteria (1974:72–73), but when he describes immunological reactions, he adopts strongly military imagery: “we will bomb, defoliate, blockade, seal off, and destroy all the tissues in the area” (1974:78).

¹⁷“Between 1933 and 1938, 10,000 German physicians were forced from their jobs; many of these were compelled to flee the country, and others were killed in concentration or death camps” (Proctor 1988:282).

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