

ANTHROPOLOGY



ON METAPHOR: Reciprocity and Immunity

MICHAEL M. J. FISCHER
Massachusetts Institute of Technology

My reading of David Napier's article foregrounds or highlights (1) a key scientific "discovery" or observation; (2) the history of shifting high level metaphors as key new biological mechanisms are apprehended; (3) three key contemporary problems in immunological biology identified by Napier (transplantation, tumor immunology, autoimmune diseases); and (4) the ways in which popular culture takes up new scientific terminologies as folk "philosophemes" or cultural components for apprehending sociocultural change.

In this sequencing, I remain in the anthropological tradition recognized by Polish bacteriologist, virologist, and immunologist Ludwik Fleck (1962) in his 1935 now- canonical text on changing explanations for syphilis, and how the Wasserman test became the stabilizing diagnostic. Fleck positioned himself between the Durkheimians and the logical positivists (pragmatists). He argued "no epistemology without history," and that every good diagnostician understood that the warfare metaphor for illness (self–nonself in Napier's terms) was not how biology works and cannot explain why some infected people fall ill and others do not. Emily Martin (2004) made a similar argument, shifting attention also the circuits of how understandings and metaphors circulate among general clinicians, specialists, the media, and patients. Among the problems of communication is not just the failure to unpack metaphors, but allowing metaphors to function as *premature closure* of explanation.

Similar formulations to Fleck's are those of Bachelard (relations among relations), Canguilhem "milieux" (2001), and his student Foucault "epistemes" (1971, 1972–73). More important today are the ethnographies and social histories of using living tissue to explore biology in transplanation (Carrels 1912; see Landecker 2006), genetics (T. H. Morgan), immortalization of cell lines (George Gey; see Gey and Coffman 1952; Landecker 2006; Scherer et al. 1953), antiangiogenesis in tumor growth (Judah Folkman; see Fischer 2010; Fischer in press a), and today iPS or induced pluripotent human stem cells (Shinya Yamanaka; see Fischer in press b; Okita et al. 2007). These are but example tools for Napier's three problems of immunology.

KEY SCIENTIFIC DISCOVERY: REGENERATIVE MEDICINE AND FANCONI ANEMIA

Although David Napier's own intellectual Iliad into immunology begins with an anaphylactic attack he suffered in Virginia, and his pleasure in being the descendant of the founder of logarithms (important for calculating the replicating speed of antigens once they find hosts in our cell receptors), the key scientific discovery he offers in his article is that skin cells with Fanconi anemia (a hereditary blood disease) "could be reengineered to revert to stem cells, which could then be recommitted by use of a virus." This is the hope of regenerative medicine: helping the body to cure itself, in this case by "feeding or providing new viral information to" cells so they perform or work differently, replacing defective bone marrow cells.

At issue for Napier is the puzzle of viruses. Inert, they become vital when in touch with living tissue, and this provide an opening to histories of virologies and coming to see our "immune repertoire" as information search engines for extending our biological capacities and negotiating our biochemical surroundings.

HISTORIES OF HIGH-LEVEL METAPHORS AS KEY NEW BIOLOGICAL MECHANISMS ARE APPREHENDED

Among the most important of recent histories of biology are Lily Kay's (1999) demonstration that although information theory became the "lingua franca" of the life sciences in the 1950s and 1960s, it also mischaracterized the way in which the genetic "code of life" was "cracked," and Hannah Landecker's (2006) account of living tissue technologies and their philosophical implications. The cracking of the "code" was not done by the physicists and cyrptographers as innumerable popular science accounts would have it, but by biochemists. Lily Kay's now-classic

account, winner of the Ludwik Fleck Prize—for which she was denied tenure by her physicist and philosophy of biology colleagues—illustrates the point that high-level metaphors can function as premature closures for understanding, rather than as parts of the ongoing series of analogies that make investigation productive. Kay's account functions as an important *cultural* portrait of the disciplinary landscape in the 1950s and 1960s, and of the way metaphors both facilitate and (mis)channel interdisciplinary research programs.

Landecker's transit across a century of historical experiences with live tissue techniques (transfusion, maintaining a chicken heart outside the body, perfusing tissue outside the body, immortalized cell lines) also provides insights into disciplinary histories. Like Kay, Landecker turns our attention to the *cultural* philosophical metaphors for which biological investigations provide working vehicles: autonomy, immortality, mass reproduction, hybridization. Again, for scientific understanding, these metaphors are not premature closures, but umbrella terms for empirical work to be done at finer scales.

Napier draws attention to the shifting understandings of immunology beginning with the 1960 Nobel Prize for Medicine awarded jointly to Peter Medawar for demonstrating that mice would tolerate foreign grafts if injected with allogenic bone marrow at or before birth (so-called "acquired immunologic tolerance" or "immunological memory"); and to F. MacFarlane Burnet for the duality of antibodies (recognizing foreign, not recognizing self) or, rather, the logarithmic rate of antibody formation (showing how molecules can quickly replicate on binding to an injected antigen, and can provide a diverse repertoire). Antigens have many epitopes (amino acids or sugar residues) and each epitope can be recognized by many lymphocytes or response cells in lymph nodes. The numbers of potential responses is huge and so too therefore the repertoire of B and T cells.

As with information theory in genetics in Lily Kay's account, so too in immunology, systems theory with its feedback and notions of equilibrium became a dominant metaphor. Instead of one-time defenses against opportunistic attacks, the immune system, with its huge B and T cell potentialities, was said to learn and acquire future immunity. In popular discourse, we now joke about teaching our immune systems to tolerate more toxic environments. The "hygiene hypothesis" suggests that too much hygiene, as in Japan, can make our bodies more subject to allergies and other intolerances. At issue is a much more detailed set of research programs to explore biological regulatory systems at many different scales from Jacob and Monod's operon genetic regulatory mechanisms, to hormone replacement efforts, to reprogramming stem cells for regenerative medical therapies, toxicogenomics

to deal with multiple chemical sensitivity syndrome and asthma (Fortun and Fortun in press), sick building syndromes (Murphy 2006), public mobilization around air pollution in areas of conflict with international experts brought in to keep local ones honest (Tim Choy), ataxias (João Biehl), and “objective self fashioning” by experimenting with how one’s sense of oneself changes with different drug regimes (Joe Dumit, Nathan Greenslit).

A major puzzle is still those autoimmune diseases where the body seems to turn on itself. Napier notes in recent years the seeming increasing number of autoimmune diseases. In his 2003 book, Napier drew attention particularly to systemic lupus erythematosus (SLE), and that it seemed to afflict a disproportionate number of black women of childbearing age. The efforts today to design humanized mice is one new technology for new efforts to understand autoimmune processes.

Napier draws attention to three shifting ideas about immune systems after 1960: the systems network theory of Niels Jerne, the associative recognition theory of Melvin Cohen (a primary interlocutor for Napier), and diversified cells of Talmage and Burnet). The paradox of pregnancy draws Napier’s attention on several ground: is pregnancy itself a form of autoimmune processes in slow motion; does the reproductive biology of pregnancy have something to do with the alleged greater affliction of women by autoimmune diseases, and especially with the subsidence of autoimmune symptoms during pregnancy. Can this be a paradigm for thinking about human organisms in wider bioenvironments? Here Napier notes that most immunologists have had no particular training in reproductive physiology, that most have come out of bacteriology and parasitology, and are untrained in tissue culturing. As has often been noted, after World War II, embryology went into relative decline as a high prestige research frontier in favor of molecular biology (and the “invasion” of physicists into the field).

Today things have shifted, and epigenetics and developmental biology have reemerged as necessary research frontiers for solving, among other things, conundra of genetics, genomics, proteomics, and questions of regulatory systems.

TRANSPLANTATION, TUMOR BIOLOGY, AUTOIMMUNITY

Effective transplantation with minimal host-graft rejection has been both a surgical goal and a touchstone of anthropological inquiry beginning with Richard Titmus’s (1971) work on blood donation (social and moral effects of gift vs. commodity systems) and especially Rene Fox and Judith Swazy’s studies of heart transplants (1974) and artificial heart experiments (1992). The technical problems of matching, host-graft rejection, and living a lifetime with immunosuppression

have been matched with the psychological and social issues of gift giving, anonymity to prevent overidentification with body parts, and liminal psychotic phases of readjustment to new regimes of living and new familial and friendship relationships (Sanal 2011). Although kidney and to some extent lung and liver transplants have become more routine, newer efforts at limb, face and womb transplants are now on the agenda. Efforts in xenotransplantation and in basic understanding of transplant immunology are both contributors to basic immunological knowledge.

Tumor biology similarly is a rich research frontier, both in efforts to make antiangiogenesis a gentler way to deal with cancer tumors (by withdrawing blood flow to the tumors, rather than attempting the slash, burn, and poisoning of surgery, chemotherapy and radiation) and in efforts to create humanized mice that spontaneously produce human tumors on which drugs and mechanisms can be tested (rather than grafting tumors onto the mice, which involves stronger immunological differences). Autoimmunity may be open to investigation with similar technologies.

**THE WAYS IN WHICH POPULAR CULTURE TAKES UP NEW
SCIENTIFIC TERMINOLOGIES AS FOLK “PHILOSOPHEMES” OR
CULTURAL COMPONENTS FOR APPREHENDING
SOCIOCULTURAL CHANGE**

Among those who have used the notion of autoimmune diseases as a philosopheme for social and cultural analysis, Jacques Derrida (1994, 1996, 2001) is perhaps the most prominent, and is an example of “lively languages” (Fischer 2003, 2009, in press a) of contemporary theory that draw attention both to semiotic connections across strata of linguistic meaning, and to the poesis of new juxtapositions and meaning creation. Donna Haraway (“material-semiotic objects,” objects in the world that change the way language and concepts articulate, such as the series of cyborgs from mice with osmotic pumps to genetically humanized mice [1997]), and Avital Ronell (“test drives” [2005]) are, with Derrida, among the most rigorous and inventive of explorers of lively languages in this sense—uncovering alternative moral and social implications in new technologies. Autoimmune diseases became a frequent theme in Derrida’s later work. Fundamentalist religions, in a effort to get media publicity, through a “frenzy of position-taking” exhaust and undo themselves. The doubleness of the immune system as icon and research tool or object keeps coming back to haunt us in the biological figures that have become part of ordinary language for describing terrorism (Mitchell 2005:917). Mitchell points out the term *immunology* itself originally is from sociopolitical discourse, so

it is not surprising that there should be images of invaders and defenders, hosts and parasites, natives and aliens, borders and identities to be maintained. This is perhaps Napier's point, as well, but as I hope I have shown, operations at this metaphorical level need to be understood as parts of other series of analogies not as stabilized descriptions, because they work rather poorly for our increasing understanding of biology and ecology.

Napier takes an older Romantic path: the call to recognize Balinese and other "animist" or local traditions as more ecological in which selves are always permeable, in relation, and parts of larger feedback systems including reincarnating temporal ones (eternal return with differences). He points out that until the arrival of stem cell research, studying maternal–fetal relations was unsatisfying for immunologists because most have been trained in bacteriology and parasitology, not so much reproductive biology and little in tissue culturing. This seems more promising than the claim that as good animists, the Balinese make in general the best immunologists (Napier 2003:22). And the idea that B and T cells are repositories of reinventable nucleic histories is currently productive. What the body presents to an antigen is reciprocity, "whose purest form is the retrovirus where reverse transcriptase allows recuperation of a former self, . . . and the body reciprocates with the past in an attempt to create a new future" (Napier 2003:222). This is part of the rationale for comparative genomic inquiries into evolutionary history, which are now becoming important tools for understanding infectious diseases. As metaphor for multiculturalism, this may or may not have purchase, but Napier is surely right, as he puts it that we cannot get through life without having to *earn* our identities through interactions with difference.

CONCLUSIONS: ON METAPHOR: REGULATORY SYSTEMS, PROGRAMMING, AUTOIMMUNITY

Among the problems of communication (public, across disciplines, etc.) is the failure to unpack metaphors, a form of *premature closure* of explanation. Metaphors are generalizing. They take one field (the vehicle) and suggest an analogy or partial mapping onto a second field (the tenor), select common elements among otherwise a set of differences. This bane of journalism is all too briefly acknowledged in the slogans "finding the *right* metaphor" to make something complex accessible, or even "writing at an eighth-grade level" to make something accessible to a general audience. In scientific writing, such metaphorical usages are *pointers* to fields of difference or terms within a series or cascade of signifiers. Science never stops its mapping, its drilling down, and as knowledge changes, so too do high-level

metaphors. Key metaphors in the immediate post–World War II period were those of programming; more recently regulatory systems and autoimmunity have come to the fore. Just like identity politics, perhaps self–nonself has run its course, useful for certain contexts but not generally viable amid growing biological and ecological sensibilities.

[metaphor, science communication, immunology, biological sensibilities, autoimmunity]

REFERENCES CITED

- Canguilhem, Georges
 2001 [1952] *The Living and Its Milieu*. John Savage, trans. Grey Room 3:6–31.
- Carrel, Alexis
 1912 On the Permanent Life of Tissues outside of the Organism. *Journal of Experimental Medicine* 15(5):516–528.
- Derrida, Jacques
 1994 “The Aforementioned So-Called Human Genome.” *In* *Negotiations*. Pp. 199–214. Stanford: Stanford University Press. 2002.
 1996 “Faith and Knowledge: The Two Sources of ‘Religion’ at the Limits of Reason Alone.” English Translation 1998. *In* *Religion*. J. Derrida and Gianni Vattimo, eds. Pp. 1–78. Stanford: Stanford University Press.
 2001 “Above All, No Journalists!” *In* *Religion and Media*. Hent de Vries and Samuel Weber, eds. Pp. 56–93. Stanford: Stanford University Press.
- Fleck, Ludwik
 1962 [1935] *The Genesis and Development of a Scientific Fact*. Fred Bradley and Thaddeus J. Trenn, trans. Chicago: University of Chicago Press.
- Fischer, Michael M. J.
 2003 *Experimental Forms of Life and the Anthropological Voice*. Durham, NC: Duke University Press.
 2009 *Anthropological Futures*. Durham, NC: Duke University Press.
 2010 Dr. Judah Folkman’s Decalogue and Network Analysis. *In* *A Reader in Medical Anthropology: Theoretical Trajectories, Emergent Realities*. Bryon J. Good, Michael M. J. Fischer, Sarah S. Willen, and Mary-Jo DelVecchio Good, eds. Pp. 26–27. Chichester: Wiley-Blackwell.
 In press a *Lively Biotech and Translational Research*. *In* *Lively Capital*. K. Sunder Rajan, ed. Durham, NC: Duke University Press.
 In press b *Biopolis: Asian Science in the Global Circuitry*. EASTS (East Asian Science, Technology and Society).
- Fortun, Kim, and Michael Fortun
 In press *Experimenting with the Asthma Files*. *In* *Lively Capital*. Sunder Rajan, ed. Durham, NC: Duke University Press.
- Foucault, Michel
 1971 [1966] *Les mots et les choses* [The Order of Things]. A. M. Sheridan Smith, trans. New York: Pantheon.
 1972–73 *The Birth of the Clinic*. New York: Pantheon.
- Fox, Rene, and Judith Swazey
 1974 *The Courage to Fail: A Social View of Organ Transplants and Dialysis*. Chicago: University of Chicago Press.
 1992 *Spare Parts: Organ Replacement in American Society*. New York: Oxford University Press.

- Gey, George Otto, and W. D. Coffman
1952 Tissue Culture Studies of the Proliferative Capacity of Cervical Carcinoma and Normal Epithelium. *Cancer Research*.
- Haraway, Donna
1997 *Modest_Witness@Second_Millennium.FemaleMan©_Meets_OncoMouse™*. New York: Routledge.
- Kay, Lily E.
1999 *Who Wrote the Book of Life? A History of the Genetic Code*. Stanford: Stanford University Press.
- Landecker, Hannah
2006 *Culturing Life*. Cambridge, MA: Harvard University Press.
- Martin, Emily
2004 *Flexible Bodies: Tracking Immunity in American Culture from the Days of Polio to the Age of AIDS*. Boston: Beacon.
- Mitchell, W. J. T.
2005 Picturing Terror: Derrida's Autoimmunity. *Cardozo Law Review* 27(2):913–925.
- Murphy, Michelle
2006 *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers*. Durham, NC: Duke University Press.
- Napier, A. David
2003 *The Age of Immunology: Conceiving a Future in an Alienating World*. Chicago: University of Chicago Press.
- Okita, Keisuke, Tomoko Ichisaka, and Shinya Yamanaka
2007 Generation of Germ-Line Competent Induced Pluripotent Stem Cells. *Nature* 448:313–317.
- Ronell, Avital
2005 *Test Drive*. Champaign: University of Illinois Press.
- Sanal, Aslihan
2011 *New Organs within Us: Transplants and the Moral Economy*. Durham, NC: Duke University Press.
- Scherer, William F., Jerome T. Syverton, and George O. Gey
1953 Studies on the Propagation in vitro of Poliomyelitis Viruses: IV. Viral Multiplication in a Stable Strain of Human Malignant Epithelial Cells (Strain HELA) Derived from an Epidermoid Carcinoma of the Cervix. *Journal of Experimental Medicine* 97(5):695–715.
- Titmus, Richard
1971 *The Gift Relationship: From Human Blood to Social Policy*. New York: Pantheon.

Editors' Notes: Cultural Anthropology has published many articles on the history and anthropology of science, including Mette N. Svendsen's "Articulating Potentiality: Notes on the Delineation of the Blank Figure in Human Embryonic Stem Cell Research" (2011), Celia Lowe's "Viral Clouds: Becoming H5N1 in Indonesia," Michael M. J. Fischer's "Four Genealogies for a Recombinant Anthropology of Science and Technology" (2007), and Deepa S. Reddy's "Good Gifts for the Common Good: Blood and Bioethics in the Market of Genetic Research" (2007).

Cultural Anthropology has also published articles on conceptions of self and personhood. See, for example, Arafaat A. Valiani's "Physical Training, Ethical Discipline,

and Creative Violence: Zones of Self-Mastery in the Hindu Nationalist Movement” (2010), Tomas Matza’s “Moscow’s Echoc: Technologies of the Self, Publics, and Politics on the Russian Talk Show” (2009), Nancy Ries’s “Potato Ontology: Surviving Postsocialism in Russia” (2009), and Julie Livingston’s “Suicide, Risk, and Investment in the Heart of the African Miracle” (2009).