Book Reviews

GENETIC NATURE/CULTURE: ANTHROPOLOGY AND SCIENCE BEYOND THE TWO-CULTURE DIVIDE. Edited by Alan H. Goodman, Deborah Heath, and M. Susan Lindee. Berkeley, CA: University of California Press. 2003. 311 pp. ISBN 0-520-23792-7. $24.95 (paper).

The slash in the title of *Genetic Nature/Culture* is a splice, an orthographic recognition that the anthropological orders of nature and culture are being recombined in novel ways in the age of genetics. If Lévi-Strauss saw the structures of kinship as reliably translating nature into culture, the authors in this volume regard the gene and genome as boundary objects fastening together a variety of heterogeneous relations between the biological and the social. Indeed, editors Lindee, Goodman, and Heath argue in their introduction that genomes are "emergent entities still under negotiation as territory, property, soul, medical resource, and national prize" (p. 1).

Such entities, at once organic and semiotic, demand new ways of writing across physical and cultural anthropology, across disciplinary distinctions that, for many anthropologists in the wake of the so-called "science wars" and of acid divorces between the subfields in some prominent departments, have often appeared as ideological, epistemological oppositions. The subtitle of *Genetic Nature/Culture, Anthropology and Science Beyond the Two-Culture Divide* (a reference to C.P. Snow's 1959 worry about the "two cultures" of the sciences and humanities), signals a welcome effort to remap the synthetic science of the human envisioned by such figures as Franz Boas. This book, introduced with a four-field-friendly foreword by former Wenner-Gren Foundation president Sydel Silverman, is a tutorial in how to speak in the same breath of iatrogenic disease and ideology, population genetics and practice, and DNA and discourse without engaging in the determinism of either genetic reductionism or cultural construction. Such a dialogue, I would offer, has been enabled by recent scientific accounts of genes as labile, mobile, and malleable items. In *The Century of the Gene*, Keller (2000; p. 7–8) writes that, in the age of functional genomics, "we can read at least a tacit acknowledgement of how large the gap between genetic 'information' and biological meaning really is." This gap between information and meaning is inhabited by such varied entities as retrotransposons, databases, biotech companies, and patient advocacy groups. The essays in *Genetic Nature/Culture* explore this newly populous zone, this promising space where physical and cultural anthropologists might rediscover and reinvent common connections.

Physical/biological anthropologists will discover fresh research and thinking on the assessment of human biodiversity (Soonyall and Templeton), the use of ancient biomaterials to sound the origins of anatomically modern humans (Kaestle), and the role of genetics in puzzling through human similarities and differences with nonhuman primates (Marks). We read about the divergence of Neanderthals, the fine-tuning of mitochondrial DNA methods for doing population history, and how thinking through the identity of Kennewick Man has required expertise in forensics, DNA methods, and Native American repatriation law. The essays by physical and biological anthropologists combine a rigorous attention to traditional questions in taxonomy and cladistics with a savvy sensibility about why such classificatory matters are both philosophically and politically complex. Jonathan Marks, to elaborate one example, deconstructs the popular pronouncement that humans and chimpanzees are 98% genetically identical, demonstrating that nucleotide homologies are dependent on assumptions about alignment and mutation, and that genetic comparisons rely for their social significance upon a faith that organisms can be equated with their genomes.

Cultural anthropologists will find renewed attention to how biogenetic relations are infused with symbolic meaning in the practices of kinship, and they will be intrigued to find the kind of biogenetically imagined kinship of David Schneider's *American Kinship* to reach into the social imagination of Icelanders worried about the commodification of genome databases (Rose), African Americans turning to genetics to anchor claims of ancestry in Africa (Kittles and Royal), and indigenous peoples who argue that the Human Genome Diversity Project does not provide a tale of relatedness meaningful to them, and, worse, continues colonialist politics of biological resource extraction from the underdeveloped world (Santos). Anthropologists accustomed to thinking about symbolism and hermeneutics will be productively challenged to grapple with such staples of population genetics as mutation, selection, inbreeding, and drift, alongside the ways that lay people make such concepts meaningful in their everyday lives. Karen-Sue Taussig, Deborah Heath, and Rayna Rapp discuss how people with achondroplastic dwarfism seek genetic knowledge about their condition even as they refuse its pathologization. Within the logic of what Taussig et al. call "flexible eugenics," heterozygosity and heterozygosity for dwarfing conditions are becoming new political categories of personhood. Members of the Little People of America are thinking critically not only about genetics, but about their own skeletal biology as well; physical anthropologists will want to take notice of the ways that their disciplinary concerns are now the explicit subject of disability politics.

Several essays draw on Paul Rabinow's concept of "biosociality." If sociobiology imagined culture to be grounded in a constraining biology, biosociality recognizes that Icelandic citizens, Little People, and Amazonian indigenous persons increasingly appeal to culture and practice to rethink their relations to their genes as property, inheritance, and collective responsibility. Chaia Heller and Arturo Escobar follow gene politics beyond the boundaries of human bodies, into discussions of genetically modified food and transnational accountings of plant biodiversity. Nonhuman, nonprimate animals make appearances too, as in Donna Haraway's essay on dogs, which slides easily between canine genetics, the history of domestication, and the world of increasingly reflexive dog breeding, and Sarah Franklin's chapter on Dolly the cloned sheep, which calls our attention to how practices of artificial selection are transforming in the age of nuclear DNA transfer.

If biosociality can help us analyze cultural practices based on engaging genes as scientific substance and social symbol, what might the new genetics say about such older

categories as race? Alan Templeton, revisiting the work of Sewall Wright, provides the latest biological account of the ephemerality of biological race, taking Gouldian arguments into the genomic era. Troy Duster, meanwhile, warns in his piece that even if "race" has become a phantasmatic category for population genetics, it may still be "rebiologized" as social conceptions of race are used to construct gene chips that claim to capture diagnostic population haplotypes. "Race" may thus be resubstantiated and reinvented in the artifacts of contemporary molecular biology, and it is worth watching what happens if "race" switches tracks from population to genomic rationalization. "Genes" these days are not simple tokens of genealogy, but are lively biocultural entities that travel not only through the conduits of our bodies, but through the channels of genetic engineering, government regulation, and technocratic social imaginations.

The essays in this book (conversant with the language of both molecules and meaning) represent the direction that anthropological scholarship might take when genes are no longer the sole property of the scientists who describe them, but are also crucial items in our wider patterns of culture.

STEFAN HELMREICH
Anthropology Program
Massachusetts Institute of Technology
Cambridge, Massachusetts

LITERATURE CITED

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DOI 10.1002/ajpa.20278
Published online 1 December 2005 in Wiley InterScience (www.interscience.wiley.com).

PRINCIPLES OF BRAIN EVOLUTION. By Georg F. Striedter. Sunderland, MA: Sinauer Associates, Inc. 2005. 363 pp. ISBN 0-87893-820-6. $59.95 (cloth).

From the beginning, evolutionary anthropology has had a predilection for the neurosciences. After the publication of *The Origin of Species*, a debate erupted between Richard Owen and T.H. Huxley concerning whether or not the "hippocampus minor" distinguishes human brains from apes. In the last few decades, many anthropologists interested in the evolution of the nervous system have become preoccupied with changes in the size of the whole brain and its large composite structures, leaving it to neuroscientists to work out the details of phylogenetic differences in the complex wiring diagrams that define each species. Unfortunately, there have been precious few attempts to integrate the findings from these divergent approaches. In this context, Georg F. Striedter's *Principles of Brain Evolution* is a most welcome contribution because it draws connections between evolutionary change in brain structure at both macro- and microanatomical scales. Instead of simply cataloging the bewildering abundant information available regarding neuroanatomic diversity, Striedter has extracted fundamental principles underlying brain evolution which have reverberating effects through different levels of organization.

In the first part of the book (Chapters 1–3), the reader is given a useful preview of these principles and the major themes to follow, along with a fascinating overview of the history of comparative neurobiology, an introduction to the basics of neuroanatomy, and a summary of the conserved developmental and anatomical "units" which constitute the raw material of brain evolution. Striedter's principles are then put to work at explaining phylogenetic variation in brain structure at progressively more microscopic levels of organization, from overall brain size (Chapter 4), to brain region size (Chapter 5), to the internal structure of brain regions (Chapter 6), and finally to the pattern of connectivity among brain regions (Chapter 7). Chapter 8 concerns the evolution of mammalian brains, with special attention to a uniquely mammalian innovation, the neocortex. Chapter 9 focuses on the evolutionary history of the human brain, including a discussion of novelties of primate neuroanatomy, brain-behavior correlates in primates, hominin fossil endocasts, and the evolution of brain language areas. Chapter 10 presents a concluding synthesis.

So, what are these overarching principles of brain evolution? There are two main rules that are revisited in the book: "late equals large" and "large equals well-connected." The "late equals large" principle, originally articulated by Finlay, Darlington, and others, means that adult brain structure is constrained to evolve by stretching the timing of well-established neurogenetic schedules. As a result, regions that are born late, such as the neocortex, grow disproportionately large with increases in overall brain size. The "large equals well-connected" principle is based on Deacon's observation that as brain regions become disproportionately enlarged (thanks to the "late equals large" rule), they develop more widespread connections with other brain regions. And indeed, just as predicted by these rules, neocortical axons form progressively more direct synapses with motoneurons in the spinal cord and brain stem as brain size increases in primates. These new connections confer enhanced voluntary control over dexterous movements of orofacial and manual muscles, as observed in large-brained primates.

Because these and many other predictable changes in neural organization follow from these principles, Striedter argues that absolute brain size may be the single most significant determinant of other neuroanatomical changes which relate to the evolution of behavioral capacities. Although researchers have traditionally preferred using relative brain size in analyses of brain evolution, with the effect of body size statistically factored out, Striedter points out that absolute brain size is more closely associated with important changes in internal organization such as the proliferation of cortical areas, segregation and addition of structural subdivisions, modifications of interconnections among regions, and increased modularization. Bringing absolute brain size to the forefront as an important correlate of microstruc-