efforts of mine could avail to make the book easy reading." In that book, under a rain of formulas and of sentences as profound as terse, the reader is soon battered into acquiescence. Having read *The Selfish Gene* I now feel that Fisher could have done better, although, admittedly, he would have had to write a different kind of book. It looks as though even the formative ideas of classical population genetics could have been made much more interesting in ordinary prose than they ever were. (Indeed, Haldane did manage somewhat better than Fisher in this, but was less profound.) But what is really remarkable is how much of the rather tedious mathematics that comes in the mainstream of population genetics following the lead of Wright, Fisher, and Haldane can be bypassed in the new, more social approach to the facts of life. I was rather surprised to find Dawkins sharing my assessment of Fisher as "the greatest biologist of the twentieth century" (a rare view, as I thought); but I was also surprised to note how little he had to reiterate Fisher's book.

Finally, in his last chapter, Dawkins comes to the fascinating subject of the evolution of culture. He floats the term "meme" (short for "mimeme") for the cultural equivalent of "gene." Hard as this term may be to delimit—it surely must be harder than gene, which is bad enough—I suspect that it will soon be in common use by biologists and, one hopes, by philosophers, linguists, and others as well and that it may become absorbed as far as the word "gene" has been into everyday speech. I suspect, too, that this chapter will do much to stimulate interest in processes of cultural evolution per se.

"Meme," however, is hardly a sop likely to placate the guardians of the nurturist view of the human psyche (and already I seem to hear one nurturist idea whisper to another: "If it should be true that we are descended from Dawkins's memes, let us at least hope that it will not become generally known!"). What is perhaps a little more serious is that the book may fail to appeal to philosophers and others around the camp of the humanities, not so much because of its "memes" and other upstart ideas of insufficient pedigree as because of its general lack of a measured and academic tone. It lacks, perhaps, an air of mystery and romance commensurate with its profound theme—one wishes almost for a French translation by Malraux to be rendered again into English. Perhaps I myself felt a lack of romanticism and found the colloquial style occasionally jarring because I have always felt the play by nature which Dawkins re-presents to us to be at best a kind of Chekovian tragicomedy and certainly to have more of the spirit of *Hamlet* than of *As You Like It*.

Obviously that is just a feeling, unscientific; certainly it is no sound reason for suggesting that the book should have been written differently. Yet for me some of the strongest associations conjured up in musing on passages of this book were indeed from romantic poetry. In concluding this review I will make bold to cite two scraps that occurred to me, hoping that they may help to inspire Dawkins or someone else to take up the questions of consciousness and purpose where this book has lightly laid them down.

One is from A. E. Housman:

> From far, from eve and morning
> And yon twelve-winded sky,
> The stuff of life to knit me
> Blew hither: here am I.
>
> . . . . . .
>
> Speak now, and I will answer;
> How shall I help you, say;
> Ere to the wind's twelve quarters
> I take my endless way.

What "stuff," what "I" does Housman have in mind here, memes or genes?

The other quotation is from Wordsworth and about Newton. How easy, how reasonable, to imagine an ethnographic historian of the future writing of Newton,

> This man, although celibate and childless, made great intellectual contributions to the technology of his time, and this technology soon permitted its exponents, largely of the Caucasian race to which Newton belonged, to disperse and multiply all over the world on a scale that had no previous parallel.

And, of course, to multiply Newton's genes. Yet how indignantly, I suspect, Newton would have rejected this statement as representing the "ultimate rationale of his existence"; and how much, I suspect, he would have preferred the tribute of Wordsworth:

> Where the statue stood
> Of Newton with his prism and silent face,
> The marble index of a mind forever
> Voyaging through strange seas of Thought, alone.

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A Setting for Cultural Evolution

The Valley of Mexico. Studies in Pre-Hispanic Ecology and Society. Papers from a seminar, Santa Fe, N.M., April 1972. ERIC R. WOLF, Ed. University of New Mexico Press, Albuquerque, 1976. xiv, 338 pp., illus. $20. A School of American Research Book. School of American Research Advanced Seminar Series.

The Valley of Mexico, occupying 8000 square kilometers at an average elevation of 2200 meters, was a nuclear region for pre-Hispanic settlement and cultural evolution. In June 1960, with support from the National Science Foundation, Eric Wolf assembled a group of interested anthropologists for the purpose of planning future research in the valley. One of the most important results of that conference was a division of labor in which a group under the direction of René Millon studied the urbanization of Teotihuacán, pre-Columbian America's largest city, while a group under the direction of William Sanders studied prehistoric settlement patterns elsewhere in the valley. In April 1972, with support from the School of American Research, Wolf organized a second conference to see what had been accomplished in the intervening 12 years. To judge by this volume, an extraordinary amount had been learned.

There are several compliments that should be paid at the start of this review, the first of which goes to Wolf himself. In an age when anthropology is threatened by fragmentation and overspecialization, Wolf remains a generalizing ethnologist with a strong interest in archeology, as his two conferences demonstrate. Part of this interest results from Wolf's early association with archeologist Pedro Armillas, to whom the book is dedicated; if the authors of this volume reach high, it is partly because they stand on the shoulders of pioneers like Armillas. Second, this book is further proof that the School of American Research, under the direction of Douglas Schwartz, is running one of the most productive seminar series in anthropology today. Third, we must compliment Sanders for the extraordinary number of good young archeologists turned out by his project: of the nine authors, four (Barbara Price, Michael Logan, Richard Diehl, and Jeffrey Parsons) are former Sanders students, and one (Richard Blanton) is in turn a student of Parsons. This volume includes

some of the best archeologists working in Mesoamerica, and if at times I seem critical it is because I expect so much of them.

The book is divided into three sections. In the first, Price and Millon discuss the adoption of a new chronological framework for the Valley of Mexico, one in which temporal phases and developmental terms are "divorced." In the second section, The Valley as an Ecological System, Logan and Sanders present a model for the evolution of urban civilization in the region. Those who have followed Sanders's career will not be surprised to find that factors of land and water are given considerable weight and that population growth, economic symbiosis, and hydraulic agriculture are seen as the major building blocks of complex society. Sanders is at his best when describing the natural environment of the valley (chapter 5) or reconstructing its agricultural history (chapter 7), using data on water flow, crop yields, and labor input that he has meticulously collected over the 20 years since he wrote a Harvard dissertation entitled "Tierra y Agua." Also in this section of the book, Parsons carefully documents the settlement and population history of the valley from 700 B.C. to the Spanish conquest, and Blanton evaluates the role of symbiosis in the cultural evolution of the region.

A third section of the book deals with the three major urban centers that arose in or near the valley in pre-Hispanic times. The earliest of these was Teotihuacán (150 B.C.–A.D. 750), which is covered here by one of the longest and most interesting articles Millon has written. Teotihuacán reached its peak at A.D. 600 with an urban expanse of 20 square kilometers and a population estimated at 125,000, making it one of the largest cities in the world at that time. To an as-yet-undetermined extent it was a planned city, laid out on a cruciform grid with major streets running north–south, east–west. The northwest quadrant included the "old city," and in the "outer city" there is evidence that there were ethnic enclaves from other regions of Mesoamerica. Urban residents lived in planned, stereotyped apartment compounds that held 60 to 100 persons, perhaps related by kin as well as shared craft specialization. Hundreds of these compounds housed obsidian workers (who perhaps supplied most of the obsidian blades used in northern and central Mesoamerica), potters, figurine molders, merchants, and other occupational specialists. Parsons's survey data show that at its height Teotihuacán drew an incredible percentage of the valley's population out of the rural hinterland and into the city. This is further discussed by Blanton in his application of the "rank-size rule"—a graphic means for comparing the populations of a given series of settlements, ranked in descending order of magnitude, against a "normal" rank-size distribution. Blanton's graphs show Teotihuacán to have been a "primate center," far larger than is "normal" when compared to secondary and tertiary centers nearby. Such a situation, Blanton suggests, also characterizes cities like Buenos Aires, and reflects the fact that Teotihuacán was the single major point of articulation between the Valley of Mexico and a vast economic network that included most of Mesoamerica. This is an important point, for it suggests that Teotihuacán can no more be "explained" by reference to local environmental factors in the Valley of Mexico than London can be "explained" by the fertility of the Thames River floodplain.

With the decline of Teotihuacán, the Toltec urban center of Tula (not far to the north of the Valley of Mexico) rose to prominence, reaching its peak around A.D. 1100. Diehl's paper examines this northern frontier area, suggesting that at its peak Tula covered at least 12 square kilometers, with an estimated population of 60,000. Tula also seems to have had multifamily residential compounds and a high proportion of craft specialists within the city, carrying on trade with areas as distant as Costa Rica or Nicaragua.

Following the decline, partial destruction, and diminished importance of Tula came the founding of Tenochtitlán in A.D. 1325. Tenochtitlán, capital city of the Aztecs and the last of the great pre-Hispanic urban centers in the Valley of Mexico, is described by Edward Calnek in the final paper of the volume. The city had the cruciform division into four quadrants seen earlier at Teotihuacán, but lacked the apartment compound; houses were smaller, residential aggregations more flexible, and social mobility perhaps freer in Tenochtitlán. The city was multiethnic and probably polyglot, although Nahuatl would have been its main language; like Tula and Teotihuacán, Tenochtitlán housed thousands of craft specialists. Calnek describes kin-based, corporate landholding units and a complex market system for the Aztec capital—institutions whose existence is suspected, but as yet unproved, for Teotihuacán.

The principal theoretical clash in this volume is over the suitability of an "ecological model" for explaining the rise of Teotihuacán, and the major protagonists are Sanders, Millon, and Blanton. Throughout the last decade, Sanders has consistently presented a model in which population pressure, agricultural intensification, and societal competition lead to urban civilization. Millon argues that "ecology" explains only a part of the urbanization of Teotihuacán, which he sees as a religious pilgrimage center, a "Vatican city," and a focal point for intellectual and artistic achievement, as well as a commercial metropolis. Blanton sheds some light on this disagreement by making it clear (although not in so many words) that Sanders's approach is somewhat less than ecology, and that Millon's view of ecology is understandably pessimistic because he equates it with what Sanders does. My own feeling is that Sanders and Millon are at opposite ends of the continuum of ways in which one can approach a complex problem: one can oversimplify it in order to get some analysis begun (Sanders), or one can express awe at the complexity of it all and criticize the oversimplification (Millon).

Consider some of the problems of the Logan-Sanders model. On p. 34, Logan and Sanders suggest that if "sedentary residence, differential access to both agricultural and nonagricultural resources, and intrasocietal and intersocietal competition" occur, a number of processes will result, one of which is "rank differentiation, and ultimately, class stratification." Now, some of us would argue the reverse: there will not be "differential access" (in the sense of preferential access, which is the way evolutionists use the term) until rank differentiation has taken place, since prior to that time it would violate the egalitarian ideology characteristic of prerank societies. In fact, the origins of hereditary ranking are not explained by any model known to me; I think they represent one of archeology's thorniest problems, involving major changes in ideology not explained by land, water, or population growth. Evidently Logan and Sanders do not see it as all that thorny, for on p. 50, in a discussion of Robert Netting's model for the surrender of autonomy to a prestigious mediator in times of dispute, they add, "and the last step necessary to produce a structural change is to make the position hereditary"—as if that were simply a minor problem to be worked out later.

Blanton presents more caveats about the Logan-Sanders model, cautioning that population growth may be more a product of sociocultural evolution than its prime mover. (I recall a demographer

once asking me, "How come we treat population as an effect, and archeologists treat it as a cause?") More important, Blanton hints that what passes for "ecology" in archeology is often monolithic and environmentally deterministic by comparison with the ecology done by modern zoologists. If an animal ecologist studies wolves, for example, he does not limit himself to their subsistence practices; he studies everything from their adult social behavior to the play of their cubs. Since human social and intellectual behavior is so much more complex, why should "human ecologists" limit themselves to the way people hunt or farm?

Blanton's comments remind us that there is a middle ground between oversimplification and awe. One can start with population growth, economic symbiosis, and hydraulic agriculture but observe that these variables explain less than 100 percent of the phenomenon under examination. Then one can begin to add the variables Millon feels have been left out, gradually increasing the complexity of the model until a more convincing approach to explanation has been made. However, this cannot be done by settlement-pattern survey alone; it requires extensive excavation, for almost none of the variables Millon feels Sanders has neglected can be studied through survey.

A few years ago I suggested that religion, ideology, and other forms of sociocultural communication would have to be added to Sanders's model before it would resemble a "human" ecology. On p. 247, however, Millon rejects this suggestion as well, arguing that such "all-encompassing" models are "untestable." This will come as a surprise to the present generation of animal ecologists, who test even complex models, one variable at a time, through rigorous sampling, measures of association, and mathematical simulation; it will also come as a surprise to archeologists such as Henry Wright, who have been following a similar approach in the Near East. But this is perhaps not a point worth pushing; it could be that Millon prefers his ecology reductionistic because it makes a good whipping boy and because Sanders, his oldest adversary, is also his favorite adversary. Millon's arguments would also be more convincing if he did not show, through his frequent use of "ecological" when he means "environmental," and through the restricted area that he considers to be the "environmental setting" of Teotihuacán, that his concept of ecology does not extend to the ecosystem. Blanton's rank-size graphs have already suggested that Teotihuacán's effective "environment" was nearly the whole of Mesoamerica.

Finally, I must comment on the new chronology proposed in this book. Annoyed by the "value-laden" nature of Mesoamerica's traditional terms for major segments of time—"Classic," "Formative," "Post-classic"—some conference members propose adoption of the chronology used by John Rowe and his associates in Peru. This chronology features the supposedly value-neutral terms "Initial Period," "Early Horizon," "First Intermediate," "Late Horizon," and so on (to which they add the North American abortion "Lithic"). I don't know whose idea this was, but it's the worst one he (or she) ever had.

I agree that we must divorce chronological periods from developmental stages, but the fact is that very few people are losing sleep over this problem in Mesoamerica; over the years, terms such as "Formative" have long since lost whatever developmental significance they might originally have had, and are being used primarily to refer to large blocks of time. And if one wants value-neutral terms, we already have them—the individual ceramic-style phase names for the Valley of Mexico sequence, such as Tzacualli, Tlamimilolpa, Xolalpan, and Tezoyuca-Patlachique. Most of these are so unpronounceable they could never take on developmental overtones. Seemingly, only Millon sensed that the wholesale transfer of a Peruvian chronology to Mesoamerica might not be much of a solution: "I argued that while [Rowe's terminology] was a value-neutral classification, it probably had little chance of acceptance in Middle America, given the deeply-rooted nature of the existing classification" (p. 24). The authors should have listened to Millon. I don't know how my colleagues will react, but I would have to be smeared with honey and buried up to my neck in a red ant hill before they could get me to accept yet another chronological scheme on top of the profusion we already have.

This volume captures much of the heat, and a great deal of the light, that must have been generated by the symposium. It represents the best in academic give-and-take: impassioned scholars, often strongly in disagreement, each supporting his case with reams of skillfully collected and carefully analyzed data. It is the reader who benefits from this clash of heavyweights, and who is left to search for the more holistic framework which might resolve our profound disagreements on the rise of pre-Columbian civilization.

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Investigations of a Little-Known Way of Life

Kalahari Hunter-Gatherers. Studies of the !Kung San and Their Neighbors. RICHARD B. LEE and IRVEN DEVORE, Eds. Harvard University Press, Cambridge, Mass., 1976. xx, 408 pp., illus. $18.50.

This is a long-awaited book. The research reported in it represents the first, and what perhaps will be the only, long-term study of contemporary hunter-gatherers by a number of specialists from different disciplines. As has been said so often by so many, the ways of life of hunters, which characterized most of our species' prehistory, are little known. Therefore detailed studies of the few groups who remain as hunter-gatherers are important for the insights they can provide into the conditions under which the biological and cultural evolution of our species occurred.

The book consists of 15 chapters representing the work of 17 specialists on subjects ranging from medicine to archeology to folklore. There is no overall synthesis and perhaps none is possible. Richard Lee does give an introduction that provides a background for the separate studies of the Kalahari Bushman (or "San," which the authors suggest as the preferred name).

The most important contributions to our knowledge of hunter-gatherers are to be found in section 2, Population and Health, and section 3, Childhood. In section 2, the chapters by Nancy Howell and by Henry Harpending provide the best data available to date on the demography of hunter-gatherers. Demography is, as statistics was once defined as, a science of large numbers. Hunter-gatherers living in small groups simply do not provide samples of the sizes that are necessary for conventional demographic analysis. But both Howell and Harpending, using different approaches, extract more information than one would expect, and they present their methods and results clearly. San children are nursed for a long time, until the mother's next pregnancy. The interval between pregnancies is at least three years. Births are