LIFE HISTORY EVOLUTION

A Biological Meta-Theory for the Social Sciences

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CHAPTER 1

Life History Theory: An Overview in Abstract

As defined by the Cambridge Dictionary, the *social sciences* are a federation of disciplines dedicated to the "study of the customs and culture of a society, or a particular part of this subject, such as history, politics, or economics."[1] Oxford Dictionaries[2] identify the "scientific study of human society and social relationships" as the unifying principle around which the social sciences are organized. Merriam Webster[3] expands on this definition without changing its substance: "A branch of science that deals with the institutions and functioning of human society and with the interpersonal relationships of individuals as members of society." As can be seen in these and other definitions, the social sciences are bound together under one banner by virtue of their shared mission to explain human nature and society. Equally important to note, the social sciences have unity of purpose even as they have no meta-theory; no foundation from which variables can be connected, causally sequenced, or ultimately explained.

Many social scientists feel the absence of such a meta-theory. Take the celebrated sociologist *Charles Murray*, who, as previously described (Hertler 2017), intuited the biological unity underpinning the divisions of class about which he wrote in *Coming Apart: The State of White America 1960–2010.* At one point, Murray explicitly predicted that "advances in evolutionary psychology are going to be conjoined with advances in genetic understanding, leading to a scientific consensus…" This is actually part of a longer quote that Murray originally wrote as a contributor to *Culture and Civilization: Volume 2: Beyond Positivism and Historicism.*[4] In both works, Murray continues describing his intuition thus:

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> There are genetic reasons, rooted in the mechanisms of human evolution, why little boys who grow up in neighborhoods without married fathers tend to reach adolescence not socialized to the norms of behavior that they will need to stay out of prison and to hold jobs. These same reasons explain why child abuse is, and always will be, concentrated among family structures in which the live-in male is not the married biological father. These same reasons explain why society's attempts to compensate for the lack of married biological fathers don't work and will never work.

Charles Murray is not alone. Social scientists of every variety routinely struggle to glean patterns, relate individual traits to group norms, and infer causal relationships among correlated variables.

Evolution has been advanced as this missing meta-theory. And of course, it is only through evolution that humans have been embedded within the natural world. Prior to evolutionary theory, most understood animals to be of a different order; subservient beasts to be exploited for the good of mankind. An evolutionary perspective, properly absorbed, contextualizes humans as *Eukarya, Animalia, Chordata, Mammalia, Primates, Hominidae, Homo, Sapiens*. Evolutionary branching inferred through geologic time tells us so much about our function, origins, and history. Evolution's unifying utility has long been recognized within the biological sciences, as demonstrated by the following excerpt from Henry Ward Beecher's *Evolution and Religion* written in 1885 (Beecher 1885/1934; pp. 50–51):

> The theory of Evolution is the *working* theory of every department of physical science all over the world. Withdraw this theory, and every department of physical research would fall back into heaps of hopelessly dislocated facts, with no more order or reason or philosophical coherence than exists in a basket of marbles, or in the juxtaposition of the multitudinous sands of the seashore. We should go back into chaos if we took out of the laboratories, out of the dissecting rooms, out of the fields of investigation, this great doctrine of Evolution.

Faith in evolution's synthesizing ability was likewise precociously expressed in the writings of Robert G. Ingersoll (1900) and is similarly found amidst the inadmissible evidence of expert scientists testifying in the 1925 *State of Tennessee v. John Thomas Scopes*. Evolution's sway extended steadily over the life sciences following the *modern synthesis*, wherein the likes of *J. B. S. Haldane* and *Ronald Fisher* reconciled the work of *Darwin* with that of proto-geneticist, *Gregor Mendel*.

For many social scientists, however, evolution was established as something to respect, but was also subject to neglect. Evolution remained a rarified background theory that seemed of little import to the questions that most social scientists were absorbed in asking and answering. A general reading of evolutionary theory provided the social scientist with some direction concerning human universals, but less so of particulars. Evolution may for instance explain what is common to all cultures, while not sufficiently explaining differences between cultures; just as evolution seemed to specify species-specific norms without thoroughly explaining differences within and between populations. As can be seen in the following quote, this is precisely the point that Marvin Harris, the anthropologist featured in Chapter 13, makes in his magnum opus, *Cultural Materialism: The Struggle for a Science of Culture*:

> Natural selection, however, has repeatedly been shown to be a principle under whose auspices it is impossible to develop parsimonious and powerful theories about variations in human social life. (Harris 2001; p. 121)

Some social scientists had gone as far as *Comte*,[5] absorbing the general positivist doctrine wherein social science was grounded in natural science. Nevertheless, they were far from genuinely embracing *E. O. Wilson's* call to *consilience*, a form of scientific convergence wherein social science is reducible to natural science.

It is not to say that what may be regarded as classical evolutionary theory had nothing to say on the matter of cultural and personal differences, but only that such knowledge was not easily accessible, sharp or unified, leading many social scientists to regard evolution only as a useful backdrop. For in truth, throughout the 1960s and 1970s, evolution slowly enlarged its explanatory sphere to include the domains customarily reserved to the social sciences. It was during this fecund time when cooperation was explained via *inclusive fitness*[6] (Hamilton 1964) and *reciprocal altruism*[7] (Trivers 1971). Also within these decades, a rationale for sexual reproduction was expressed in the form of *Muller's Ratchet*[8] (Gabriel et al. 1993), a foundation for group selection was laid through the *selfish gene*,[9] and an explanation of senescence and death was articulated in *The Disposable Soma Hypothesis*[10] (Kirkwood 1977; Kirkwood and Austad 2000).

In these same progressive decades, E. O. Wilson and Robert H. MacArthur (1967) were terrorizing the flora and fauna of small islands within the Florida Keys, tarping and gassing entire ecosystems in an effort to learn about migration and the growth of populations. From this work on *island biogeography* (MacArthur and Wilson 2001; Losos and Ricklefs 2009), combined with input from Dobzhansky (1950), Pianka (1970), Roff (2002), Charnov (1993), Stearns (1992), Harvey and Clutton-Brock (1985), came *Life History Theory*, an evolutionary framework immediately, urgently, palpably, directly, and compellingly relevant to the social sciences and their shared mission to explain human nature and society.

Life history evolutionary theory remains obscure enough for a synopsis to be required even within some biological and evolutionary journals and books. Life history evolution is considered by some to be a sub-discipline or *mid-level theory* (Buss) within evolutionary biology. Beyond situating it thus, there have been many approaches to its description. Reznick (2014; p. 268) describes life history as "a composite of all the variables that contribute to the way in which an organism propagates itself"; Flatt and Heyland (2011) style life history as *the unfixed journey between egg and corpse*; Schechter and Francis (2010) explain life history as a kind of *developmental biography* of organisms; Braendle et al. (2011) explain that life history evolution measures the variability in the trade-offs between somatic investment and reproductive investment that takes place between the start and end of life. From these explanations, life history evolution can be seen to take shape as a biological theory of development. In explaining life history theory, it is also customary and indispensable to describe the seven *biodemographic* variable sets that are subsumed within its framework: (1) size at birth, (2) growth pattern, (3) age and size at maturity, (4) number, size, and sex ratio of offspring, (5) age-and-size-specific reproductive investments, (6) age-and-size-specific mortality schedules, (7) length of life (Stearns 1992; Braendle et al. 2011; Hertler 2017). These and other variables were found to cohere as a complex that varied along a continuum. Some organisms rush through life, investing in quantity of offspring and speed of intergenerational turnover, whereas other organisms mature, mate, and age slowly, investing in bodily maintenance and quality of offspring.

Another useful illustrative approach is to pick contrasting exemplars along the life history continuum. For these purposes, the elephant and the mouse are commonly drafted to good effect. The elephant weighs approximately two hundred pounds at birth, grows slowly, reaches sexual maturity around fourteen years, attains to an adult weight of over 10,000 pounds, has few offspring on which parental care is lavished, and is long-lived, affording substantial intergenerational overlap and interaction wherein offspring can be guarded, reared, and enculturated. By contrast, the mouse[11] weighs approximately one gram at birth, grows rapidly, reaches sexual maturity in eight weeks, attains to an adult weight of only 20 odd grams, has many offspring, provides only about a month of suckling, followed by rapid dispersal and early reproduction. From this, it can be seen that the elephant and the mouse are living out their lives on vastly different timescales. The mouse life course, including growth, maturation, mating and aging, is compressed into a fraction of the elephantine life course. The elephant is therefore said to have a slow life history, and the mouse a fast life history. Sometimes *r* and *K* are used synonymously with *fast* and *slow*, respectively—terms which originate in the mathematical proofs of life history theory.[12] The terms *r*-selected and *K*-selected were originally applied to denote *fast* and *slow* life history strategies, respectively, early in the development of life history theory when population density was believed to be the principal driving force of life history evolution. As will be discussed in the chapters that follow, other selective pressures have partially eclipsed this early predominance of population pressure. To avoid giving the impression that we still subscribe to such early density-dependent theories, we will use the acronyms *fLH* to denote *fast life history* and *sLH* to denote *slow life history* in the prefices of the derivative expressions *fLH*-selected and *sLH*-selected. These neologisms will be used throughout the present volume as modernized substitutes for the older terms, except when quoting older sources that employed the original notation, such as the work of J. P. Rushton.

Initially, life history theory placed humans on a continuum with other organisms, while explaining species-specific means on the aforementioned biodemographic traits. As valuable as that was in and of itself, approximately thirty years ago, life history evolution began a course of expansion wherein biodemographic variables across animal species were joined to the study of individual and social variation within the human species.[13] As previously described (Hertler 2017), a paper by J. P. Rushton (1985) entitled, *Differential K Theory: The Sociobiology of Individual and Group Differences*, marked a transition in life history research. Rushton described *intraspecific* variation where before focus had been on *interspecific* variation, with the effect that,

> In the thirty years since the initial articulation of Rushton's Differential *K* Theory, a host of research and theoretical developments have documented the physiological, behavioral, social, and cultural ways in which

> human life history variation is expressed (Weizmann et al. 1990; Chisholm 1999; Figueredo et al. 2005; Gladden et al. 2008; Walker and Hamilton 2008; Griskevicius et al. 2011; Sherman et al. 2013; Wenner et al. 2013). (Hertler 2017)

Slowly, but ineluctably, life history theory began to broach precisely those domains the social sciences take as their province of expertise and interest. With unremitting research, individual traits, such as *personality, intelligence, education, temporal orientation*, and *risk assumption*, fell under the province of life history evolution, as did cultural metrics, such as, *enculturation, social capital, altruism, cooperation*, and *competition*.

All such variables are in some manner related to developmental speed and life span and so are inextricably temporal. This connection is more apparent in some variables than in others. Education easily exposes the relationship. Some invest only in a primary education, others in various levels of higher education. The point at which one transitions from *education* to *application* depends on predicted life span. A graduate degree represents a long-deferred investment in one's future and is only economically viable if there is a future in which to reap returns. Large brains and intelligence are the biological corollaries of education, and so, these variables function under the same evolutionary logic. A large brain is a capital investment that necessarily slows growth, delays maturity, and requires much in the way of bioenergetic resources to build and operate. Living until maturity, and through a fraction of an adult life, is the necessary return that justifies the investment. Cooperation, too, becomes more rationally justifiable and evolutionarily possible to the degree that life spans are sufficiently long to capitalize on investments in reputation building and monitoring. We have already noted that some organisms simply don't have sufficient life spans to have elephantine life histories. Similarly, not all human populations and population members will realize the longest deferrals to bioenergetic capital, enculturation, and education.

Uniquely, while life history theory was explaining these individual and social variables, it was also yoking them together, all while relating them back to the seven biodemographic variable sets enumerated above. In this way, life history evolution is much like a loom. It provides a framework upon which strands of knowledge can be strung and also woven together, resulting in a coherent fabric of knowledge. Life history might be more productively related to a chain wherein the individual variables comprise the links of that chain. As do links, individual life history traits can be shifted independently to some degree; but with sufficient movement, begin to move neighboring links, and then the chain as a whole, creating coordinated evolutionary responses. Alternatively, one might think of industrial production, where, in a manufacturing setting, under the law of supply and demand, innovation and capital are brought to bear on any component of the production process retarding the others. All points of production are interdependent, and total production is reduced to the most inefficient stage. Again such metaphors are productive of relaying how life history traits can show partial independence amidst general interdependence. What we should here emphasize however is that life history is not likened to a meta-theory, loom, framework, chain, or industrial process simply on the grounds of perspective and theory. The variables that life history subsumes are actually coordinated and predictably regulated within persons and populations. So this is not just a way of looking at the world; it is a theory informed by an empirical reality.

We here give fair warning that breadth and depth of life history evolutionary research (Vandermeer and Goldberg 2013) cannot be compassed by this, or indeed any, single volume. Without even broaching the primary literature, one can read of the mathematical foundations (Charnov 1993; Roff 2002) and genetics (Flatt and Heyland 2011) of life history evolution; or how life histories relate to immunology (O'Neal and Ketterson 2012), trade-offs (Crews and Ice 2008), mating (Reichard and Boesch 2003; Morris 2009), senescence (Reznick 2014), and hormonal regulation (Zera and Harshman 2009) within plants (Silvertown et al. 1997), parasites (Bush et al. 2001), primates (Lancaster and Kaplan 2007; Mitani et al. 2012), hominids (Hawkes and Paine 2006), hunter-gatherer peoples (Hill and Hurtado 1996/2011; Howell 2010), and modern humans (Chisholm 1999; Buss and Hawley 2011; Weiss and Adams 2013). Notwithstanding, at this point, we have at least made life history known by an abstract, and incomplete sketch. Leaving to preceding books on life history evolution their respective foci, it is our goal to dress this skeletal explanation with the sinew of detail and the muscle of evidence so as to validate the meta-theoretical pretensions we attribute to life history evolution. Following from the scope of the social sciences, we are here concerned with life history evolution as it bears upon human persons and populations, leaving to previous volumes the burden of reviewing relations to animals and plants, and much of the literature prior to the articulation of *Differential K Theory*. Even so defined and delimited, we can review but a fraction of the field.

Having defined our objective, we now turn to method. As social scientists ourselves, we understand life history evolution to offer untold explanatory power and unprecedented interdisciplinary coherence. Yet, life history evolution is as foreign as it is indispensable. In recognition of its foreignness, we specifically avoid continuing in the current course, condensing the corpus of life history research into a popularizing monograph. Instead, our method is to assemble selections of founding and eminent authors ranging across social science disciplines, with the end of showing: (1) that some authors can be considered proto-life history theorists in that they intuited some of life history evolution's fundamental patterns and processes; (2) how these works can be better understood after relevant reinterpretation; (3) that life history theory exposes connections among the seemingly unconnected constructs studied by social scientists; (4) the relationship between population means and cultural patterns; and (5) the manner in which evolutionary life history theory specifies hypothesized directions for arrows of causal influence, which are often utterly confused and internally contradicted within the social sciences. This approach recognizes and validates the insights, approaches, and variables already extant within the social sciences; it uses the building blocks from which social science has been constructed, adds new ones, and then reorders them all into a coherent architecture.

A look at the first working title of this monograph summarizes our approach: *A Biological Meta-Theory for the Social Sciences: Reading Geographers, Demographers, Historians, Anthropologists, Sociologists, and Psychologists in Life History Evolutionary Perspective*. Though the title changed, the approach did not. As was seen, to broadly sample social science disciplines, we include geography, demography, history, anthropology, sociology, and psychology. To provide further range, we review major works of three founding or eminent authors—doyens within their respective disciplines. Thus, a comprehensive overview is provided by reviewing six disciplines, eighteen authors, and eighty-two[14] volumes published between 1734 and 2015. To anticipate any misconstrual, however, it is important to clearly state that this is *not* an anthology. In contrast to an anthology, the writings of the social scientists listed as *featured authors* will not be summarized. All eighteen authors are well published; most are prolific. The renowned historian *Arnold Toynbee* is a case in point. Toynbee has written approximately twenty books, not including his twelve volume *A Study of History* herein reviewed. Toynbee and the other seventeen selected authors defy condensation and beg to be read at length for their own sake. Alternatively, each chapter starts with a brief survey of the author's life and work, but quickly moves on to treat those aspects of the author's work, generally a recurrent theme or overarching theory, viewed thereafter in life history perspective. Following these two introductory parts, chapters conclude with two closing parts, the first of which includes broad theoretical discussion of the selections using life history theory, followed by a final section treating necessary and extant research in support of that perspective. The theoretical discussions proffered within each chapter's third part are explicitly sequestered from the empirical surveys traduced within each chapter's fourth part, allowing us as writers to offer coherent narrative interpretations, and you as readers to identify those aspects of our interpretation that are wrought of inference and that which rests on research. Assisted by this structure, we can, without halter or trace, transform a catalog of facts into an explanatory vision. Of final note, each of these six sections will be bound by a meta-narrative, making grand themes and important connections explicit. There will then be an epilogue reflecting on the book at the most abstracted level. These latter two features will build coherence, compensating for the back and forth inherent in this volume, being that it is organized around featured authors whose work does not reliably afford treatment of topics and themes in the most strategic order. With the topic, scope, and structure described, we lastly turn to content, specifying the featured authors and outlining their treatment.

Section I, containing the second, third, and fourth chapters, assembles enduring concepts from three eminent geographers: *Ellsworth Huntington, Alfred Crosby*, and *Alan Baker*. Huntington was a geographer acutely aware of population differences created as a function of selection. Huntington wrote of demography as much as geography, for he understood that non-random migration was as influential as differential ecological adaptation. Consistent with a general evolutionary understanding, populations then change through *founding effects* and *migration*, as much as *natural* and *sexual* selection. Though not available to Huntington who wrote most prolifically in the earliest part of the twentieth century, life history evolution is indispensable to understanding the dynamics of climatically induced evolution across populations treated, for instance, in *The Principles of Human Geography* and *The Human Habitat*. Crosby, a geographer of a different cast of mind, established a basis for human social ecology as contained within the *physical* and *community* ecology, a contrast defined and differentiated by Huntington. Uniquely, Crosby describes assemblages of *portmanteau biotas*, a concept recognizing associated microcommunities of animals and plants within which human societies are ensconced, and to which they respond culturally and evolutionarily. Crosby historically reinterprets the clash between European and Amerindian populations during the *Age of Exploration* through the lens of *portmanteau biotas*, concepts, and consequences on which we expand. Lastly, Alan Baker's work documents the fulfillment of the *Neolithic Revolution* with its mature societies resting on a foundation of staple grain crops. In *Studies of Field Systems in the British Isles*, Baker examines agriculture and its laboring class, while in *Man Made the Land*, he takes up the social outgrowths of agriculture. As clear in Baker's studies of the French and English peasantry, much of the social changes following from agriculture are corollaries of population density. As will be detailed in this fourth chapter, coinciding with sedentary civilizations, one sees population life history traits changing in their mean values and lengthening at their extreme tails.

Section II, containing the fifth, sixth, and seventh chapters, assembles indispensable concepts from three eminent demographers: *Richard Price, Thomas Robert Malthus*, and *John Landers*. Two centuries ago, Richard Price assisted in compiling the *Northampton Table*s, allowing lives to be insured with probabilistic rationality. This was part of a life's work concerning the measurement of mortality risk. Though such early demographic investigations gained predictive power, explanatory power lagged behind. Herein we reread Price's work on mortality risk using life history evolution, which, after all, is organized around mortality and longevity, making it an invaluable aid in understanding the actuarial *life table*.[15] As can only be explained at length, it is apparent that Price, in measuring mortality, was indirectly measuring life history, and in applying his researches to life insurance, was in effect originating postmortem parental care. With eminently unpropitious timing, Malthus wrote of resource competition just as humans were bursting the bonds of *organic economies*; though, with world population increasing sevenfold in the two hundred odd years since *An Essay on the Principle of Population*, population density and resultant resource competition take on a new importance. Although the significance of mortality regime has superseded its overall significance, *population density*, and the resource competition it brings, was the variable around which life history theory was originally constructed. With the coming of density and accompanying competition, we use life history theory to show how populations change and stratify as they vie to survive and reproduce. As we argue, the slowing of life history is a consequence of population density that Malthus could not suspect, but might have appreciated. Finally, Landers is a demographer of preindustrial Europe, acutely aware of bioenergetic resources as they are spent and accrued in a careful calculus. As if on a balance sheet, output must match input. Landers also provides one of the most detailed demographic studies of eighteenth-century London, combining mortality data with fertility, population structure, and migration. As does the life history researcher, Landers pursues a more complete bioenergetic balance sheet than does Price or Malthus, reflecting demography as a discipline plotting ever closer to studying these many variables as a yoked complex.

Section III, containing the eighth, ninth, and tenth chapters, assembles crucial concepts from three eminent historians: *Arnold Toynbee*, *William McNeill*, and *James Casey*. Where Edward Gibbon studied the Decline and Fall of Rome, Toynbee more generally studied the decline and fall of civilizations. Civilization *challenge* is followed by creative and adaptive *response*, or otherwise conquest and collapse. Across all studied civilizations, Toynbee returns to the theme of internal cohesion and its relation to external competition. In doing so, Toynbee touched upon some universal truths that underlie the cyclical view of history, though he emphasized the spiritual and circumstantial to the detriment of the geographical and biological.[16] Nevertheless, Toynbee's insights can be productively reinterpreted with life history evolution, such that his valid universal insights can be qualified by particular inter-population variation, which ultimately chains cultural decline to its biological substrates. Like Toynbee, McNeill is a world historian, but one with a bent toward epidemiology. Most directly in his *Plagues and Peoples*, McNeill considers the role of disease-induced mortality, infection, and transmission alongside the more traditional historical topics of war and conquest. From its founding, life history has incorporated population density and mortality rates into its quantitative formulae and qualitative theory, making it an ideal framework from which to reconsider McNeill. Unlike the world historians featured above, James Casey dedicated his career to Early Modern Spain. Yet, so much is compressed into this time and space. *Family and Community in Early Modern Spain* interweaves the study of knights, nobles, and lords, with the study of marriage and weddings, as well as ancestry, clan, honor, and commonwealth. Books such as, *The History of the Family*, afford a detailed study of land use, husbandry, population dynamics, and economic analyses of local populations. Casey's emphasis on patterns of kinship, inheritance, and relations between sexes and across generations lends itself to evolutionary analysis, which is capable of elegantly explaining connections among these disparate areas when studied jointly.

Section IV, containing the eleventh, twelfth, and thirteenth chapters, assembles vital concepts from three eminent anthropologists: *George Peter Murdock*, *Lawrence Keeley*, and *Marvin Harris*. If only for his *Atlas of World Cultures*, Murdock would merit his position of prominence among anthropologists, and inclusion in the proposed volume. Therein, Murdock catalogs more than 1000 discreet populations of peoples that are too often amalgamated at the level of the nation-state. For each of these ethnically informed cultural populations, Murdock provides nearly fifty points of tabular ethnographic codes, including mating systems, kinship networks, levels of consanguinity, post-marriage living arrangements, type and intensity of agriculture, settlement patterns, and social fluidity, which are then combined with environmental statistics such as latitude, and primary and secondary climate classifications. Sharing Murdock's cross-cultural classificatory enthusiasm, in this eleventh chapter we ask and answer questions concerning *Galton's Problem*, finding commonalities among contiguous cultures to extend, not simply from contiguity, but from shared selective pressures. Influencing psychologists like Steven Pinker[17] and historians like Azar Gat,[18] Keeley was at the forefront of scientifically deciding between Rousseau, who saw civilization as corrupting noble savages and peaceable peoples, and Hobbes, who saw a war of all against all waged between peoples, clans, and tribes except if dominated by a Leviathan capable of monopolizing power and violence. Keeley came down firmly on the side of Hobbes, demonstrating the rampant violence and persistent warfare of pre-state societies. In the absence of life history theory, Keeley, and anyone else studying declining violence through modernity, is reduced to positing a host of explanations piecemeal, and thereafter insufficiently explaining the positive feedback effect wherein decreasing violence begets decreasing violence. However, Keeley explicitly abjures biological explanations of violence; a point we directly address on our way to evolutionarily interpreting his findings. Lastly, Harris, our final anthropologist, has taken the vagaries of culture and grounded them in ecology. From burning witches, to worshiping animals, to proscribing foods, Harris finds religious and cultural idiosyncrasies to proceed from ecological vagaries. Where one would have thought these foreign cultural practices produced of historical accident and chance events, underlying connections are exposed through a series of books written by Harris. More than this, Harris broaches social structure, demographic constraint, race, death, sex, and fertility, all of which are traced back to some knowable ecological determinant from which they probabilistically derive. Yet, like Keeley, Harris pointedly rejects sociobiological explanations. He believed evolutionary explanations of cultural differences to be *impossible, insufficient*, and *unnecessary*. As we explain, these assumptions stem from a misunderstanding of how rapidly populations can evolve, an unfamiliarity of life history theory and other sociobiological explanations that explain intraspecific diversity, and overconfidence in *phenotypic plasticity*[19] and environmental explanation.

Section V, containing the fourteenth, fifteenth, and sixteenth chapters, assembles fundamental concepts from three eminent sociologists: *Montesquieu, Michael Mann*, and *John Goldthorpe*. Montesquieu has contributed to moral philosophy and literature, but is also credited with founding sociology as a discipline. His contributions were not only early, but distinctive. Perhaps owing to his living prior to the gelling of disciplinary boundaries, Montesquieu incorporates what would now be understood as political science and ecology into his sociological studies. He concluded that sociopolitical systems were outgrowths of ecological conditions and so cannot be unthinkingly transplanted from locale to locale. Already extant[20] are evolutionarily informed studies of Montesquieu's thesis using variables such as group-mean intelligence, which validates the relation between ecology and the development of monarchies, republics and despotisms. However, this fourteenth chapter shows that this is but a part of a larger process. Human populations respond to ecological conditions through changes in mean intelligence, but also through changes in other life history traits. Consequently, it is inter-population life history means that were obliquely observed by Montesquieu to give rise to sociopolitical differences. Then, there is Mann's four volume study on the *Origins of Social Power*. Written over decades, subsuming much of his career as a sociologist, Mann's *magnum opus* pursues one grand theme: *Societal aggregation from tribe, to fief, to city-state, to nation, to empire*. Mann uses the term, "patterned mess," in recognition of cultural, historical, and temporal particularities which overlay sociological laws as they have operated through time. Modern theories of gene-culture coevolution work precisely in this way, in that they operate on a fundamental level, even as surface features vary. So when Mann studies internal divisions and external competition as they ebb and flow creating regression and progression along this continuum of aggregation, we are now able to partially explain this as a function of variation across aggregate life history continua. *The Sources of Social Power* affords an introduction to social stratification, pursued more exhaustively through the re-examination of the works of John H. Goldthorpe. Goldthorpe's interest in social stratification parallels that of Charles Murray, whose work has been previously reinterpreted using life history evolution.[21] Like Murray, Goldthorpe is a sociologist in search of a meta-theory. In his *Sociology as Population Science*,[22] Goldthorpe believes that sociologists at large share "the goal of developing sociology as a science in a sense that allows for a meaningful degree of continuity with the natural sciences…" We second this statement, while contending that life history evolution is the specific branch of the natural sciences most capable of fulfilling Goldthorpe's vision. We read Goldthorpe's writings in support of that contention, most specifically as demonstrated through the example of class structure's flux and fixity.

Section VI, containing the seventeenth, eighteenth, and nineteenth chapters, assembles necessary concepts from three eminent psychologists: *Raymond Cattell, John Bowlby*, and *Urie Bronfenbrenner*. Cattell left his mark on intellectual theory and applied intelligence testing, while further distinguishing himself as a personality trait theorist of prodigious talent and prolific authorship. As an intelligence researcher, he is known for distinguishing *crystallized intelligence*, akin to stored knowledge, from *fluid intelligence*, akin to raw reasoning ability. Likewise, he delineated personality into component parts, finding sixteen traits after applying the factor analytic technique he learned from his mentor, Charles Spearman. Though intelligence and personality each qualify as sub-disciplines within psychology, both are subsumed, along with other traits, under the meta-theory of life history evolution. The relationship is profound, though not straightforward. As described in this seventeenth chapter, both intelligence and personality vary along a life history continuum, such that as life history slows, population mean intelligence increases, as do personality traits like risk aversion, conscientiousness, anxiety, and agreeableness. Nevertheless, this effect occurs on average, and there is strategic variation occurring, which obscures the relationship between intelligence, personality, and life history. Once understood, these relationships color and clarify Cattell's life's work. Introductory psychology classes and texts invariably feature attachment theory, which is rightly regarded as a pillar of the field. The acknowledged founder of attachment theory, John Bowlby, resisting the tide of psychoanalysis and instead pursuing a more biological explanation of parent–child relations, characterized insecure attachment variants as a dysfunctional miscarriage of mother–infant bonding. Contrary to Bowlby's assumptions, the supposed pathology of the insecure attachment is reframed by life history evolution as strategic adaptation wherein early sexual debut, mate diversity, young age at first reproduction, and a high number of offspring are evolved and developed in response to high rates of extrinsic mortality. The nineteenth and final chapter recalls the work of Urie Bronfenbrenner, who, through his *Bioecological Systems Theory*, understood an individual as developing within a nested system of concentric influences. While psychologists have uniformly emphasized home and family as mutative, Bronfenbrenner gave great weight to what behavioral geneticists now call the *extra-familial environment*, in recognition that influence comes also from school, parish, and neighborhood. More than this, Bronfenbrenner incorporated even the economy, government, and culture into his developmental scheme, knowing that these macroscopic realities trickle-down to influence more local systems, if not the child directly. Life history theorists[23] have extended ecological systems theory such that it incorporates natural ecological systems, not limited to temperature, humidity, parasite prevalence, resource availability, and population density. These natural ecological factors are critically important when "examining group-level patterns of behavior and individual differences because they sequentially reverberate upstream toward higher ecological and social levels-ultimately constraining and/or orienting human behavior toward particular patterns of functioning."[24] An evolutionary view of Bronfenbrenner's *Ecological Systems Theory* then clarifies the extent and direction of influences, while also adding a basement layer of natural ecology that constrains all other levels of influence.

It must first be said of these eighteen academics that some could not have known about life history evolution being that they died before the theory was articulated. Among the more contemporary, we have no evidence of any acquaintance. On the other hand, some featured authors are more generally aware of sociobiology and evolutionary psychology. Among these are Lawrence Keeley and Marvin Harris. As mentioned, both Keeley and Harris, the former still living, the latter recently deceased, would disagree with any reformulation of their work using sociobiology or any of its variants, life history theory not excepted. Keeley once delivered an invited address to the *Human Evolution and Behavior Society,* which was decisively negative in tone. Nevertheless, his inclusion in this volume mirrors the motivation for extending the aforementioned conference invitation to Keeley; namely that his work, in our estimation and in that of other evolutionists, is consonant with a sociobiological perspective. Similarly, Harris was known to supplant all other theories in favor of his *Cultural Materialism*, sociobiology not excepted. Notwithstanding, as Kuznar and Sanderson (2007) wrote, Harris can be brought along in spite of himself to, perforce, rectify the rejection of sociobiology that underlay nearly every one of his theoretical missteps. So this is part distinction and part disclaimer: *The views we express are our own; the interpretation we provide is imposed upon the work of each featured author in a manner that they could not anticipate or might actively reject.*

Something that also bears general note prior to closing this introduction, are three ideological orientations, more apparent to us in retrospect than in prospect, which preponderate among this selection of authors. First, is a penchant for dissent. Perhaps it was representative of their genius and reputation that most led paradigmatic reorientations. John Bowlby for instance integrated an ethological view into a primarily psychoanalytic psychology, just as Thomas Robert Malthus presaged contemporary concerns about population growth and resource scarcity. Second, we could not fail to take note that so many, such as Arnold Toynbee and William McNeill, are macroscopic in their perspective; and relatedly, many, such as Michael Mann and Alan R. H. Baker, insist on interdisciplinarity. Lastly and relatedly, we found a preponderance of hedgehogs that at first glance look like foxes. In 1951, applying Archilochus's dichotomy to a study of Tolstoy's view of history, intellectual historian *Isaiah Berlin* parsed thinkers into *hedgehogs* who knew but one thing, and *foxes* who knew many. The hedgehog is the specialist like Berlin himself who dedicates a life to a theme, whereas the fox is the intellectual omnivore who can write cleverly about a variety of topics, but whose work lacks unity of purpose. We say these authors at first appear to be foxes because they study across disciplines, centuries, and datasets. Notwithstanding, as they do so, they bring to bear analytical approaches and systematic views emblematic of the hedgehog. So, though Toynbee studied twenty-one civilizations instead of one, their decline and fall is his focus, just as when Harris studies myriad practices across many cultures, ecological explanations are consistently applied. These featured authors are not hedgehogs of the hyper-specialist species, now so common in academia, but rare process oriented hedgehogs who have a grandparent that was part fox.

Knowledgeable of purpose, structure, and content, we invite you, dear reader, to embark with us through a great intellectual journey and learn alongside us from carefully selected works of great value, the lessons of which are enhanced and clarified by the application of this unifying life history evolutionary perspective and the emerging science of social biogeography to which it gave rise.

Notes

1. http://dictionary.cambridge.org/us/dictionary/english/social-science.
2. https://en.oxforddictionaries.com/definition/social_science.
3. https://www.merriam-webster.com/dictionary/social%20science.
4. Horowitz, I. L. (2010). *Culture and Civilization: Volume 2: Beyond Positivism and Historicism*. New Brunswick, NJ: Transaction Publishers.
5. Comte, as in Isidore Marie Auguste François Xavier Comte, is the nineteenth-century French Positivist who hierarchically chained disciplines such that social sciences were reducible to natural sciences, natural sciences were reducible to hard sciences, and hard sciences were reducible to mathematics.
6. Inclusive fitness is a theory recognizing the adaptive value of kin-based altruism, and so it is also sometimes described as kin selection. By either name, this is an evolutionary rationale alike for nepotism and parental self-sacrifice. What matters is the representation of one's genes in the population, not solely the persistence of genes within one's self. Therefore, sacrificing oneself for two brothers, sisters, or children is then a wash genetically, and therefore possible evolutionarily. More precisely, self-sacrifice was thought antithetical to evolution as conceived in the spirit of Spencer as survival of the fittest, wherein nature was thought to be invariably red in tooth and claw. Inclusive fitness showed that kin-based altruism could in fact evolve and was indeed as self-interested as survival itself from the genetic perspective.
7. Reciprocal altruism is the necessary counterpart to inclusive fitness, as the latter only explained altruism directed at kin. Reciprocal altruism on the other hand demonstrated an evolutionary rationale for cooperation between non-kin, which is the basis for coalition formation, communal endeavors and business arrangements. Viewing cooperation between non-kin prior to this theory was not unlike trying to understand free trade under the mercantilist system with its ideas that gain by one country could only be had by loss to another. Therefore, reciprocal altruism as an insight was comparative to *Ricardo's Law of Comparative Advantage*, which specifies that trade can benefit both parties because of asymmetries in capacity, resources, and climate.

8. As described in Hertler (2017), Muller's Ratchet, named for H. J. Muller, refers to the way in which asexually reproducing organisms accrue mutations across generations, which cannot be shed (Muller 1964). Mutations ratchet upward. Sex brings genomic recombination; and recombination allows mutations to be purged and counterweighted (Felsenstein 1974; Crow 2005).
9. The selfish gene reversed the traditional relationship assumed to exist between bodies and the genes that construct them. The body or organism was traditionally understood as the unit of selection thought to be the focus of all forms of selection. Subsequent to this theory, the gene is widely assumed to be the unit of selection, and organisms are relegated to the role of vessels and propagators. To be fair and clear, we should note that it may not be typical to associate group selection with the selfish gene even as we have elsewhere argued for the soundness of this position (Woodley of Menie et al. 2017). Furthermore, Dawkins, the originator of the selfish gene theory, would likely object to our association, as he has repeatedly attached the soundness of group selection.
10. The disposable soma hypothesis reorients attention away from persons and toward genes. In this sense, it is reliant on the selfish gene concept mentioned just previously. As the theory articulates, bodies are just the genes method of making more genes. The body then is a disposable vehicle for the propagation of genes through time and across a lineage.
11. Among mammals the "fastest developer" may well be the streaked tenrec (*Hemicentetes semispinosus*), whose young are weaned in about 5 days and begin breeding as early as 3–5 weeks of age (Feldhamer et al. 2007).
12. The mathematic proof for r/K is described in Chapter 6.
13. As do other animals, humans have a species-specific mean, allowing them to be compared with other animals. However, they also have a range of variation around that mean. In this way, life history is similar to height, weight, and many other human variables.
14. These eighty-two volumes were those formally listed on the original proposal, though more were read and reviewed during the writing process.
15. Farr, W. (1857). On the Construction of Life-Tables; Illustrated by a New Life-Table of the Healthy Districts of England. *Proceedings of the Royal Society of London, 9*, 717–721. http://macaulay.cuny.edu/eportfolios/oppen09/files/2009/08/Eyler_pp66-86.pdf.
16. Toynbee, A. J. (1957). *A Study of History: Volume I: Abridgement of, Volumes 1–6* (p. 570). New York: Oxford University Press.
17. Pinker, S. (2012). *The better angels of our nature: Why violence has declined*. New York: Viking.
18. Gat, A. (2006). *War in human civilization*. New York: Oxford University Press.

19. Phenotypic plasticity refers to the ability of an organism's ability to flexibly change behavior in response to environmental demands.
20. Vanhanen, T. (2009). *The limits of democratization: Climate, intelligence, and resource distribution*. Augusta, GA: Washington Summit Publishers.
21. This refers to *The biological backstory of coming apart: The state of white America 1960–2010: Invoking the explanatory power of life history evolution*, a Palgrave Pivot in production.
22. Goldthorpe, J. H. (2015). *Sociology as a population science*. New York: Cambridge University Press.
23. Figueredo, A. J., Brumbach, B. H., Jones, D. N., Sefcek, J. A., Vásquez, G., & Jacobs, J. (2007). Ecological constraints on mating tactics. In G. Geher & G. Miller (Eds.), *Mating intelligence: Sex, relationships, and the mind's reproductive system* (pp. 337–364). New York: Psychology Press.
24. Cabeza de Baca, T., & Figueredo, A. J. (2014). The cognitive ecology of Mexico: Climatic and sociocultural effects on life history strategies and cognitive abilities. *Intelligence, 47*, 63–71.

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PART I

Huntington, Crosby, and Baker

CHAPTER 2

Ellsworth Huntington's Victorian Climatic Writings

1 Ellsworth Huntington's Climate-Colored Glasses

Descended from Puritan stock migrating to Plymouth in the seventeenth century, Ellsworth Huntington was born in 1876, the son of a clergyman. From that Puritanical stock, he inherited a measure of compulsion, and also that people's penchant for keeping account, and taking oneself to task through journaling. This ancestral habit, together with elements of modern record keeping and scientific notation, yielded field notes, at once prolific and meticulous. These many notes became as many publications. When Mrs. Huntington donated her husband's papers to *Yale University Library*[1] in 1968, they spanned 135 linear feet, being comprised of 28 books, parts of 29 others, and more than 240 articles (Martin 1973). Huntington had much to say. He was an underpaid Yale University research associate, thinking, writing, and theorizing on the fringe of the geology department prior to geography, his own discipline, having attained to full recognition. It may have been precisely from this tenuous position that much of his productivity came, for it at once rendered Huntington impecunious and interdisciplinary. As did Washington Irving, Charles Dickens, Alexandre Dumas, and many another author, Toynbee wrote his way out of straightened economic circumstances. More importantly, not being ensconced within an established discipline, he was not entangled in its conventions. Representative of many another student that had the advantage

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of becoming personally acquainted with Huntington, Arnold Joseph Toynbee, the comparative historian featured in Chapter 8, remarked, "Huntington had a mind that perceived the possible connections between things that pedestrian minds, plodding along in blinkers, overlooked"[2] (Martin 1973; foreword by Toynbee).

Long before, Huntington distinguished himself as a student, but was far from satisfied by achieving within established forms. By the time he was twenty-one, Huntington evinced implacable wanderlust that eventually took him across many a continent and country. In his travels through Asia Minor, one can see an eclectic combination of experiences, not likely to be gained by a single academic in the present. For example, one of Huntington's official missions was to find reed beds, topography, fossils, and related markers of bygone moisture in demonstration of climatic changes. In doing so, he recalled a harrowing experience in which his party secured a watering hole in the desert, ransoming access to it for the bread of another party. He often managed natives in his employ and learned from them, while more generally the logistics of these surveys necessitated his becoming acquainted with the peoples and cultures of each region he visited. In the early 1900s when Huntington was conducting his most intensive fieldwork, the Modern West was equipped with rails and roads, but Huntington preferentially studied the geography of Africa, Asia, and the Middle East where transportation still relied on pedestrian and animal power. As such, Huntington became as much anthropologist as geographer.

Over a long career Huntington's irrepressible intellectualism was brought to bear upon the Caspian Sea (1907), the Arabian Desert (1912a), Asia (1912b), tropical America (1914a, b), Australia (1920a), Korea (1920b), Mexico (1920c), Northern Europe (1922a), China (1925a), Russia (1925b), and Iceland (1943). Only the subjects of his investigations were more varied than the region; for indeed, Huntington studied race (1915, 1924a, 1932), economics (Huntington 1916; Huntington et al. 1933), agriculture (Huntington and Cushing 1919), statistics (Huntington and Cushing 1920), business (Huntington and Williams 1922), peat deposits (1922b), sun spots (1923a), epidemics (1923b), suicide (1925b), non-random migration (1927), paleoclimate (1913a, 1925c), dendrology (1913b), eminence (Huntington and Whitney 1927), not to mention civilizational decline (1919a), the dysgenics of war (1919b), cranial volume, and cognition (1919c). Huntington (1938) devoted a book-length treatise to the single subject of seasonal differences in births as they regionally varied, a topic previously addressed by anthropologist *Edvard Westermarck* and statistician *Corrado Gini*, and which has lately been revisited by Martinez-Bakker et al. (2014). Also, he wrote extensively on eugenics in the 1930s and 1940s (Huntington 1935). Moreover, Huntington investigated maternal aging as it affects offspring sex (1938) in such a way that conforms with the *Willard-Trivers Hypothesis* wherein high maternal condition[3] relates to male-biased births (Cameron 2004; Almond and Edlund 2007). Further still, Huntington conjectured on lifespan and sex ratio, while at the same time discussing intelligence and eminence, criminality, longevity, parasites, and weather; much else that is the stock and trade of contemporary life history theorists. These are not juxtaposed randomly; Huntington was sensing some deep underlying connection between such variables.

2 Mapping the Distribution of Civilization

Except in the most obscure works, despite the region or topic of study, *climate* was the great theme of Huntington's life.[4] Tenacity of pursuit was paired with talent, making for a presciently sophisticated study of climatic variables (Huntington 1944) as they related to human populations. Huntington expressed keen interest in paleoclimate, inoculating him from the assumption that present and past climate approximated one another. In *World Power and Evolution*, he devotes numerous pages and presents several graphs relative to this topic, which are then paired with informed speculation as to how more favorable conditions of the past could have precipitated heights of social complexity. For instance, he addresses the auspicious climate occurring in fourteenth century Italy, noting that this stimulated the forerunners of fifteenth century Renaissance masters (Huntington 1919b). Other nations and regions, before and after, showed similar, but short-lived, efflorescence. This *march of civilization* was like a program running in the background of Huntington's mind for decades, until he wrote pointedly on the subject in *Climate and Civilization* (1924b) and thereafter in *Mainsprings of Civilization* (1945).

Also, ever aware of the effects of migration, Huntington wrote of the "active evolution" that "has been the case in higher latitudes and more variable climates" (Huntington 1927; p. 50). At the same time, he recognized the curvilinear effect of latitude, as seen in his discussion of, for instance, herding peoples living far north in the range of the Arctic Circle wherein winter is almost *unbearably miserable*. Huntington was correct; there is a fair amount of human biodiversity existing among human populations, especially those separated by major geographical features. He was correct also in associating this biodiversity with: (1) location, (2) landforms, (3) water bodies, (4) soil and minerals, in addition to (5) climate. Directly after describing these aspects of what a modern researcher would call *physical ecology*, Huntington, along with Cushing, wrote of a climate's associated plants and animals in what amounts to a delineation of *community ecology* from *physical ecology* (Huntington and Cushing 1922). For instance, Huntington (1919b) references the rainfall, soils, temperature, and related physical ecological variables that determine whether one will find "the moss and lichens of the barren tundra," the vigorous forests of Appalachia, the "orchids, twining vines, and mahogany trees" or the "grasslands…in the plains and deserts in the western cordillera." Pathogens and parasites are joined to plants, as Huntington further explored his implicit understanding of community ecology:

> The parasitic phase of climatic influences includes all diseases which are due to parasites or viruses, and which have a distinct regional distribution by reason of climate. Malaria, yellow fever, African sleeping sickness, yaws, pellagra, hookworm disease, and the more severe forms of dysentery are examples of diseases that are found mainly in the warmer portions of the earth because those are the regions most favorable to certain parasitic organisms and their carriers. (Huntington 1938; p. 21)[5]

Beyond relating physical ecological variables to the community ecological variables to which they give rise, Huntington considered climate as it variously imposed constraints and afforded opportunities to mankind during the Neolithic revolutionary transition to sedentary agriculture.

Huntington understood climate, along with the plant and animal life that it engendered, and which alternately helped and hindered mankind, to ultimately explain the distribution of civilization. Pursuing that theme, and in an effort at impartiality, Huntington enlisted the expertise of 213[6] persons, of whom twenty-six Americans, eight British, eight continental Europeans, seven Latins, and six Asians participated by placing 185 slips of paper with country names on them, into one of ten envelopes, forming an ordinal hierarchy of civilization. These responses were compiled and converted into an ordinally tiered *Distribution of Civilization*

(Martin 1973; p. 113). In that map, *civilization* is concentrated in Western Europe and diminishes as one progresses across Eastern Europe through the interior of Asia, before rising to high heights in Japan. There are pockets of *high civilization*[7] approximately near Argentina and within South Africa, but mostly they are restricted to East Asia and portions of America and Australia settled by the English. Alternatively, *low* and *very low* levels of civilization predominate at absolute latitudinal extremes, corresponding to the tropics and tundra.[8] This comports to Huntington and Cushing's (1922) presentation of eleven climatic zones, which were thought to differentially support civilization. Therein, among so much else, one will find complex considerations of the salubriousness of temperate forests, alongside details on the poverty of tropical soils.

3 Mapping the Distribution of Life History

Huntington's mapped *Distribution of Civilization* is no doubt a cacophony of error, bias, and ethnocentrism. For all that, it is of profound interest in that it would very likely correspond with broad continental clusters of life history speed, were it likewise mapped and superimposed.[9] How did this distribution come about? Only in its totality can this book begin to cobble together an answer. In due course, we will expose causal connections, for example, with soil and agriculture in Chapter 4, mortality regime in Chapters 5 and 9, population density in Chapter 6, family organization in Chapter 10, and mating practices in Chapter 11. Before more doggedly pursuing the question of *why* life history varies between populations distributed across locales, latitudes, and continents, it is here necessary to establish that it does so vary; to establish the basic fact of our immediate thesis: *50,000 years of post-migration evolution in Eurasian climates created life history variation across continental populations, which, in some measure, underpins the above-mapped tiers of civilization.*

Huntington died before life history theory was born. Huntington stressed direct effects of climate on individuals[10] in the vein of van der Vliert (2009). Nevertheless, he clearly divined evolutionary responses (Huntington 1929), as when he stated, "…throughout the thousands of years which brought about these changes, all the races apparently retained the indelible constitutional impress of the climate of their common birthplace" (Huntington 1919b; p. 9). Nevertheless, he often separated evolution from climate,[11] seeing them as separate, rather than searching for the ways in which climate created a selective regime, which, in turn, altered an evolutionary trajectory. Lamentably, evolutionary responses to post-migration evolution into Eurasia remain misunderstood and underappreciated within all social science disciplines. Too often, differences in civilization are assigned to culture (Lowie 1917), in a process of circular reasoning. Where ecology is judiciously considered as an impetus, direct effects on individuals are emphasized above evolutionary responses within populations. The absence of life history evolution from explanatory narratives remains an impediment to progressing toward a biological reckoning. Only with it, one can see how approximately fifty thousand years of evolution could have produced biological differences from which variegated civilizations are *partially* wrought. As detailed subsequently, migration did not simply proceed slowly within the Upper Paleolithic Era, with temperature targeting traits piecemeal, rather it accelerated into the Neolithic Era, with an utter inversion of selective pressures operating on the life history complex as a unit.

The ecologies of Africa and Eurasia contrast starkly, such that, with migration, one set of selective pressures waned, while a new set of selective pressures waxed. In combination, the selective regime turned suddenly, not like a car, but like a skid-steer or tank, the wheels or tracks of which run in opposite directions. More precisely, the northerly migrant to upper Paleolithic Eurasia suffered from *migration load*, as he coped with seasonal cold imposed by the physical ecology; but at the same time benefited from *ecological opportunity*, as he was relieved from the parasites and pathogens that were such deadly components of Africa's community ecology (Hertler 2015). Physical, anatomical, cognitive, and behavioral traits which had previously been adaptive and remunerated by natural and sexual selection were, in some cases, ill-suited for this new environment. Some traits became superfluities that northerly environments failed to actively maintain, but which nonetheless were not harmful to their holders. Other traits became actively maladaptive and were quickly selected against.

At issue is then the speed of response to the above described inverted selective pressures. Huntington believed that Darwin overemphasized gradualism,[12] as well he may have (Garland and Rose 2009) from a combination of circumspection and humility. Similarly, later evolutionists have overemphasized gradualism in response to incredulous disbelievers, Neo-Lockeans, the stir of Gould's *punctuated equilibrium*, fears of biological determinism, and a lay reluctance to accept evolutionary thinking applied to human behavior. Compounding the error is a related fiction whereby human evolution purportedly ceased. In that view, the

Environment of Evolutionary Adaptedness was located somewhere in the distant past (Woodley of Menie and Sarraf 2018). For some, that past was prior to settlement, when all humans lived in hunter-gatherer bands; for others, it stretched back 100,000 years or more prior to migration out of Africa. Through the work of Lynn (1991) and Rushton (2012), we now understand that an enormous amount of evolutionary change has occurred following migration into the colder climates. Additionally, *The 10,000 Year Explosion* (Cochran and Harpending 2009) and related works (Scott and Turner 2000; Wills 2011; Jablonski and Chaplin 2000) demonstrate the acceleration of evolution thereafter. The civilizations and cultures that humans create decidedly do not obviate further adaptation; instead, they represent complex anthropogenic selective regimes that accelerate the evolutionary process along a range of trajectories. Like a prism that breaks white light into many colors, the complexities of civilization manufacture many more niches, into which variegated types evolve (Armstrong et al. 2014; Woodley et al. 2013; Woodley and Fernandes 2014).

At present, we have established two points: First, African and Eurasian populations faced very different selective regimes, wrought by extremely different physical and community ecological features, and second, evolution proceeds apace much more rapidly than is generally appreciated. To these two points, a third must be appended. Having established motive and capacity, this third point pertains to method. To understand the method by which humans evolved, one must replace *massive modularity* with life history. Massive modularity refers to each aspect of human cognition and behavior being *modular*, meaning independent. To the extent that human behaviors are independent of one another, it would be difficult to envision post-migration evolution creating population-level variation across so many traits, and the culture at large. Life history theory solves this problem. These behaviors and traits are not in fact modular, but are instead part of the life history complex. When the life history complex slows, all constituent traits, to greater and lesser degrees, change in a recognizable direction. Thus, there is no need to posit a mass of separate mutations across the genome that independently arose and were independently preserved in reaction to a range of selective pressures. Instead, life history is an integrated complex on which every population varies. Eurasian selective regimes non-randomly preserved and perpetuated somewhat more *sLH*-selected migrants, and thereafter, increasingly *sLH*-selected inhabitants of future generations.

4 The Life History Response to Eurasian Ecology

In supporting all that went before, Phillipe J. Rushton's work is of immediate relevance. Rushton (1985) is the founder of *Differential K Theory*—the first systematic application of life history theory to understanding differences between human populations. Rushton's *Race, Evolution and Behavior*,[13] a book summarizing a decade of his research backed by approximately one thousand references, demonstrated that *Mongoloid* populations had the most extremely *sLH*-selected population mean, with the *Negroid* mean being most *fLH*-selected and the *Caucasoid* mean being intermediate.[14] Therein and elsewhere, one finds, among other variables, population differences across what have come to be known as *biodemographic, psychosocial, and psychological* life history traits (Figueredo et al. 2004, 2013, 2014). Looking to individual traits, migration evoked forward thinking, planning, impulse control, and other cognitive-behavioral forms of executive control. Population mean intelligence, conscientious action, future-oriented preparation, and parsimoniousness inclined, while parental effort outstripped mating effort, monogamous pair bonding preponderated over polygynous harem formation, and reproduction, instead of taking place early and often, was deferred and moderated.

Though Rushton's research defies condensation, for the sake of example, consider life history traits associated with mating effort. Native Chinese, Japanese, Korean, and related *Mongoloid* populations show behavioral signs of reduced mating effort in their low rates of sexually transmitted disease,[15] intercourse frequency, extra-marital copulation, extra-marital births, and extra-marital affairs, as in their late age of first intercourse and late age of first pregnancy (Rushton 1988, 1999a, b, 2000). These behavioral differences might be readily assigned to purely *cultural* origins, save that they are paired with evidence of reduced prostate cancer (Santner et al. 1998), genital size, combined testes weight (Dixson 2009), skeletal muscle mass (Rushton 2000; Silva et al. 2010), and twinning rates (Rushton 1996), which are evident alongside restricted beard growth (Santner et al. 1998; Wu et al. 2012), sperm counts (Iwamoto et al. 2007; von Eckardstein et al. 2001), and functional testosterone expression (Lookingbill et al. 1991; Zitzmann and Nieschlag 2001; Greaves 2001). These data were cataloged in Hertler (2015), wherein their significance as markers of mating effort is established in a comparative psychological review. In turn, mating practices, and their underlying dispositions, have profound implications for family organization and the organization of civilizations, topics that will be pursued in Chapters 10 and 11.

Whether aggregated on the *fast* or the *slow* end of the spectrum, the coordination of life history traits imparts coherent life strategies, the *ultimate* evolutionary logic of which can be appreciated. In closing, we look ever so briefly toward candidate *proximate* mechanisms theoretically responsible for producing coordinated life history responses. In insects (Travisano 2009) and bacteria (Zera and Harshman 2009), there is experimental evidence of life history change in coordinated response, coordinated responses that are hypothesized to relate to regulatory genes which have downstream (Lande 1982; Flatt and Heyland 2011; Muehlenbein and Flinn 2011), *pleiotropic* effects on *reaction norms*, growth rates (Stearns 1989), and also degrees of *neoteny* and *paedomorphia* (Hawkes 2006). Correlations among life history variables are also maintained by bioenergetics tradeoffs, wherein investments in one area necessitate compromises in other areas (Calder 1984; Charnov 1993; Braendle et al. 2011; Hill and Hurtado 1996/2011). Lastly, there is strong evidence that evolution acts on the production, or sensitivity to, hormones (Dowling and Simmons 2009; Réale et al. 2000; Zera and Harshman 2001; Flatt et al. 2005), with effects on developmental speed, senescence rates, reproductive (Rushton 2000), and developmental schedules (Finch and Rose 1995), all of which comprise the stock and trade of life history theory.

Notes

1. Yale provides the following online catalogue, guiding interested readers to some of these many materials: http://drs.library.yale.edu/HLTransformer/HLTransServlet?stylename=yul.ead2002.xhtml.xsl&pid=mssa:ms.0001&query=india&clear-stylesheet-cache=yes&hlon=yes&big=y&adv=&filter=&hitPageStart=176&sortFields=&view=c01_18.
2. As discussed by Martin (1973; p. 239), by the 1930s, the maturing discipline of geography *slipped past* Huntington, as he was increasingly a grand generalist amidst precise specialists.
3. Maternal social dominance has more lately come to the fore as an addition predictor of male-biased sex ratios within the Willard-Trivers Hypothesis.
4. Martin speaks of Huntington's controversial position among peers within the then emerging discipline of geology. He was, and continues to be (Lewis 2011; Livingstone 2011), attacked as a determinist, and for

various other positions he held. Nevertheless, Martin points out that his body of work defies the critic who would select a single sentence, paragraph, chapter, or book, and denunciate on its basis. Martin has digested Huntington's writings *en masse* and notes that they defy distillation in piecemeal. Only by reading through many of Huntington's works, in other words, can the reader begin to grasp at Huntington's grand themes and contextualize the meaning of any particular. Unfortunately, Huntington's frank style and bold theorizing invited attack. He would properly disclaim the tentative nature of his theses, but thereafter support them to the utmost. Consider also, Huntington's implicit refutation of the charge, embedded within musing on his intellectual evolution:

> … Although I am primarily a student of environment I am gradually coming to the conclusion that at any given moment inheritance is more important than environment. But of course inheritance owes much to past environment through the selective action of that environment and perhaps through its direct effect in causing mutations. About ten years ago I came to the conclusion that I was growing one-sided. I started life as a firm believer in the idea that the world's salvation was to be attained through education, religion, good government, and social reform. Then I studied physical environment and health, and was switched from cultural to physical environment. At that stage I began to study genetics and the results of recent biological research. The result is a book now in press called The Character of Races, and a firm conviction that any man who asserts that either inheritance, physical environment including food, bacteria, climate, etc., or social environment including all the cultural elements is more important than the others is talking through his hat. Each is essential just as air, drink, and food are essential to human life. Thus from my point of view the man who ignores or minimizes the importance of race and inheritance weakens my confidence in his judgement just as does the man who ignores the importance of health, or of social organization. (Martin 1973; p. 203)

Similar statements can be found in the preface to *World Power and Evolution* (Huntington 1919b; p. 8), in *The Character of Races* (Huntington and Whitney 1927; p. 286), and in *Season of Birth* (Huntington 1938; p. 439).

5. Huntington goes on to contrast the above with the epidemic disease of temperate regions.
6. Of the 213 solicitations, 137 replied, but only 54 participated fully as per Martin (1973).

7. This is the first of many times that the term, *high civilization*, appears in this volume. This precise term, or some variant thereof, is employed by several featured authors. It may mean something somewhat different to each author, but, as for our interpretation, it is circumscribed. Alike eschewing value judgments and hierarchical arrangements, we see it only as reflecting complexity.
8. Akin to a societal version of Maslow's hierarchy of needs, Huntington identifies climatic allowances for abundance to support the luxury of teachers, scientists, artists, and clergymen (Huntington and Cushing 1922). Huntington recognizes density as a precondition to advanced civilization. Only with sufficient density can people combine in the formation of law courts, museums, schools, and churches. This concept will be discussed at length in subsequent chapters, such as Chapter 4 featuring Baker.
9. Where Huntington no doubt saw high and low civilization along some hierarchy of development, life history variation, though it might overlap, would simply map differential adaptation. There is no good or bad life history speed, only ecologically induced variation.
10. For a moment, it seems that Huntington might draw Lamarckian lessons from epigenetic observations of egg development, but his later discussion of toads puts this to rest. He notes that experiments with toads show much the same findings, in that an acquired characteristic (Huntington does not use the term) is inherited. Before moving on, he ascribes this to the eggs within the mother having been exposed to the same temperature as the mother herself. Later, Huntington continues in the same vein, this time reviewing mammals. He notes that longer tails and larger feet seem to be induced by mice gestated in hot conditions. He seems not to consider changes induced via gestation to be adaptive. Instead he seems to consider them simple differences and infers that they are developmentally instilled; making here implicitly the distinction between genetics and the building of a body according to a genetic blueprint. In a later work, Huntington returns to observations of what may well have been epigenetic phenomena: "We may be dealing with what Martin (1973) called 'temporary inheritance.'" Huntington continues, summarizing Martin's findings: "He suggests that, if a certain response to an environmental condition is repeated often enough, the capacity to respond increases, and may even be transmitted to offspring" (Huntington 1938; p. 445). However, here, epigenetic observations lull him into Lamarckian assumptions: "I cannot enter into the matter further here, but many of our facts seem to fit such an hypothesis better than the more orthodox belief that new qualities arise only through mutation and selection" (Huntington 1938; p. 446).

11. Cabeza de Baca et al. (2017) recently critiqued van Lange et al. (2017) climatically inspired explanations of violence for failure to distinguish between levels of causation; in other words for failing to specify whether certain climates potentiated the evolution of violence, or simply fostered violent behavior within individuals only so long as they continue to experience those climatic conditions. The same criticism could be leveled at Huntington. In many a passage, one is not certain whether he is referencing evolved or facultative responses to climate. However, there are some passages where he clearly does endorse either evolutionary or facultative responses. So he certainly believed in both responses, leaving uncertainty only as to what degree of importance he placed on each level of explanation.
12. Huntington (1919b) discusses Darwin on page 148 of *World Power and Evolution*. It is therein that Huntington charges Darwin with having overemphasized gradualism. Though the error is supportable, Huntington's alternative is not. Huntington put his stock in mutations. These he thought were responsible for the creation of diversity. Now this is no doubt true; all variation ultimately comes of mutation. However, at least in *World Power and Evolution*, Huntington creates a view of evolution wherein mutations spontaneously arise and are selected for and against based on climatic factors and related selective pressures. Again, this is of course true, but where he errs is by failing to combine this with a parallel process wherein existing variation is non-randomly selected to the end of creating directional selection and evolutionary change within the population. Of course, it is difficult to impute this or any misunderstanding to someone as prolific as Huntington, as Martin (1973) warns.
13. Rushton's initial work, as is said, focused on life history differences expressed across human populations. However, Rushton and collaborators, as well as other researchers and research groups, went on also to describe life history variation within populations; such research will be presented in later chapters.
14. Rushton was aware of fine racial and regional differences within more discreet populations, though, possibly in connection to past data collection practices, he used the following broad groupings: *Mongoloid, Caucasoid*, and *Negroid*. In addition to these terms having an anthropological history, available data sets that Rushton used did not consistently use population distinctions that were more finely variegated, leaving him to employ these essentially continental-level distinctions.
15. As was said in Hertler (2015), "it is important to note that rates of sexually transmitted disease (STD) may provide a proxy for rates of sexual behavior, as implied herein; however, intervening factors, such as medical treatments and prophylactic devices, could alternatively account for reported differences in STD prevalence."

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CHAPTER 3

Alfred W. Crosby: Adapting Within a Matrix of Flora and Fauna

1 The Walt Whitman of World History

For his enduring neologisms, because of his ability to find the extraordinary within the ordinary, and due to the "generosity of his range," Kevin Reilly, in his foreword to *Germs, Seeds, and Animals*, says of Crosby that "we might well think of him as the Walt Whitman of world history." Reilly is paying tribute to Alfred W. Crosby, a historical geographer who lectured at Washington State University, Yale University, and the University of Helsinki before being appointed Professor Emeritus of History, Geography, and American Studies at the University of Texas at Austin. Crosby wrote informative narratives of the 1918 influenza epidemic (2003), while also authoring *Children Under the Sun: A History of Humanity's Unappeasable Appetite for Energy* (2006). More representative of the tenor of his career, Crosby provided a thorough re-examination of history based on ecological principles, which might be called *Ecological History* (Crosby 1972, 1986, 2015). Within the framework of ecological history, Crosby most elegantly and consistently treated interactions between cultures. Crusades, landings, invasions, colonization, settlement-none of this, Crosby made us to understand, could be rendered intelligible without reference to ecology.

The *Age of Exploration* marks a transition. European expansion was abortive before Columbus sailed the ocean blue in 1492, but successful thenceforward. The Norse voyages and the Crusades (Crosby 1986) are exemplars of failed forays into foreign lands. Nordic explorations

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sent forth neither expeditions nor settlers in sufficient numbers to sustain a colony in Vinland (Crosby 1986). Furthermore, the population size of the Norsemen in Europe hindered the spread of *crowd disease*, while the northerly ecology hindered the spread of *zoonotic disease*. In consequence, rather than Eurasian pathogens affecting native communities, as would happen in the Age of Exploration, the Norsemen often fell victim to American diseases (Crosby 1986). The incessant attack of a still vigorous Native American culture was yet another source of Norsemen mortality. Similar circumstances surrounded the ill-omened series of medieval crusades. Even though the number of pilgrims, merchants, mercenaries, knights, and nobles swelling the ranks of the crusades was vastly superior compared to the few Norsemen who settled in North America, according to Crosby (1986), the outcome remained the same. Except for less than a hundred years, and a few principalities and counties, the Europeans were unable to maintain ongoing control in the Levant (Crosby 1986). Specifically, four factors are associated with the eventual downfall of the Latin power and possessions in the Levant: (1) unwillingness to marry and breed with the local population, such as Levantine Christians; (2) the pervasiveness of vector-transmitted diseases such as malaria; (3) the existence of novel crowd diseases; and (4) a comparable level of sociopolitical complexity between Caliphates, Sultanates, and Latin Christian invaders.

A series of later local conquests foreshadowed a change of fortune. Portugal and Spain were chief among European nations successfully conquering isolated communities, such as the islands of Madeira and Porto Santo, the Azores, and the Canary Islands. Opposite earlier experiences, ecological disturbance now paved the way to conquest. However, this change of fortune was relative; rather than having immediate success, Portuguese and Spanish settlers faced considerable challenges, and in some instances, these challenges were ironically the product of their own ecological alteration. For instance, Crosby (1986) described how, after the Portuguese released domesticated rabbits, they became pestilential competitors for cultivated crops, as in nineteenth-century Australia and twentieth-century America. Eventually, the settlers were forced to abandon the colony and settle in the nearby island of Madeira, where the local environment was adequate for sugarcane and other export crops. As Crosby (1986) describes, Europeans more decisively rode a cresting wave of ecological fortunes during the Spanish conquest of the Canarian Guanches. This is one of the first accounts of a society facing extinction after contact with Europeans. Although the Guanchian economy relied on agropastoral practices, no reports of crowd diseases were known before the Spanish voyages (Crosby 1986). The geographical isolation, added to the small population size of approximately 100,000 natives spread across the archipelago, proved protective factors against the occurrence of major epidemics[1] (Crosby 1986). In contrast to the Guanches who became almost extinct, the Spanish population grew within that insular island ecology, alongside their domesticated flora and fauna, newly introduced vermin, and invasive weeds. Similar events transpired decades later in the Americas, the outcome of which Crosby would spend a career describing and explaining (Crosby 1972).

2 The Columbian Exchange

In the Age of Exploration, ecological fortunes inverted, such that, what was once a headwind acting against expansion, became a tailwind facilitating centuries of colonization and conquest. As Crosby details, the conquest of the Americas was not solely the product of European technology, but rather extended from recurrent biotic incursions leading to the eventual displacement or disappearance of endemic taxa (Crosby 1972, 1986, 1993). These ecological invasions included an array of non-human species ranging from domesticated animals and plants to vermin, weeds, and pathogens (Crosby 1993). At the end of this ecological clash, the Old and New World became ecologically homogenized with much of the original variation now lost, except for remote tropical regions that still preserve high ethnic and biological diversity (Crosby 1986). This homogenization, involving the transmission of species between ecologies, has been called the *Columbian Exchange* (Crosby 1972). From hence, Crosby viewed European imperialism as the outcome of an underlying ecological imperialism. However, if the ecology of the Neo-Europes, so successfully exploited by European colonizers, was salubrious, bounteous, and advantageous, why did native communities living in these regions remain at a pre-state level (pre-Columbian Amerindian states were located far from these locations before the Columbian exchange)? To answer this question, we have to follow Crosby back into prehistory, past the point where human societies began to differ in political complexity.

Based on the paleoanthropological literature, Crosby (1986) concluded that as late as 100,000 BC, no significant differences existed among human populations (i.e., anatomically modern *Homo sapiens*).

Furthermore, this pattern may have persisted until 45,000 BC, a period that has been associated with human global migrations and the increase in cultural expressions (i.e., behaviorally modern *Homo sapiens*). Moreover, sociopolitical and cultural complexity probably only became pronounced around 10,000 BC. At least by that time, Eurasian populations of mammalian megafauna began to dwindle and then disappear; and whither it went, so did the possibility of continuing to lead a hunter-gatherer existence. Climate fluctuations at the end of the Pleistocene may have combined with habitat alteration, and interspecific parasite transmission from human to animal, to hasten the rate of megafaunal extinction (Crosby 1972, 1986).[2] All the same, these extinctions assuredly occurred in tandem with, and were causally aided by, human migrations (Crosby 1986). Whatever the proportional contributions among the cacophony of causes, with recurrent extinction events of Eurasian megafauna, Eurasian hunter-gatherers were forced to either abandon their local territories or adopt alternative subsistence economies. Communities unable to relocate apace with decreasing populations of megafauna became reliant on fallback foods, such that, with time, small game and plants became staple foods. It was from such Malthusian constraints that sociopolitical complexity extends. Hunter-gatherers turned husbandmen and herdsmen, and thus came the *Neolithic Revolution*, which witnessed the rise of settled societies surviving on cultivated cereal crops. Before the Neolithic Revolution marked the end of Paleolithic ways, human groups displayed similar levels of sociopolitical complexity—complexity which was restricted on the one hand by incessant mobility, and on the other hand by the small group sizes that necessarily followed from range requirements prior to intensive land management.

Even as we can intelligibly date its advent to 10,000 BC, the Neolithic Revolution affected societies to greater and lesser extents, descending upon some full and fast, and on others partially and slowly.[3] According to Crosby, the differential descent of Neolithic ways was due to geographical factors. Considering each continent to roughly resemble an ellipse, the major axis of Eurasia runs horizontally from West to East, whereas that of Americas runs vertically from North to South, an argument further developed by Jared Diamond (1997). With that in mind, we turn to four consequences of Neolithic revolutionary change as they differently affected Eurasian and American peoples. First, these continental features allowed Eurasian farmers and herders to successfully relocate cultivars far from the region of original domestication with higher relative success rates (Crosby 1986). After all, relocating a plant 1000 miles along an East–West axis risks unsuitable soil ecology and moisture presence; but, in addition to these factors, relocating a plant 1000 miles along a North–South axis risks unsuitable seasonality and temperature extremes. As such, Amerindian societies faced the geographical challenge of transferring their symbiotes across the long, narrow American continents extending North to South across innumerable lines of latitude (Crosby 1986). According to Crosby, a second significant difference between domestication in Eurasia and the Americas was the total number of animal domesticates. Except for the dog, which was domesticated before the Neolithic Revolution, the number of livestock species domesticated in Eurasia was higher compared to the Americas (Crosby 1986). Between 10,000 and 4000 BC, Old World animal domesticates included cats, donkeys, horses, sheep, goats, pigs, cattle, reindeer, geese, chickens, ducks, and the water buffalo, among others, whereas the Americas were restricted to llamas, guinea pigs, turkeys, and a few additional inconsequential species (Crosby 1972, 1986). Therefore, a vast array of floral and faunal domesticates allowed the concentrated cohabitation of thousands of individuals, facilitating the rise of towns and eventually city-states (Crosby 1986). Crosby (1986) relentlessly oriented scholarly attention to the fact that farmers and herders modify their local ecologies, directly by replacing forests with farming and grazing land, and indirectly by displacing local flora with exotic weeds and non-native animals disruptive to the trophic chain and ecological balance created by endemic species (Crosby 1972, 1986). The third and final point relates to disease. Agriculture served as a magnet for vermin and pests, both of which increasingly came to live in proximity to humans (Crosby 1986), which as we have already seen, were increasingly aggregating into towns and cities along with their domesticates. Disease flourished in these newfound assemblages of densely concentrated species. Again, however, Eurasian and Amerindian populations were differently affected. Old World societies suffered from pathogens such as smallpox, chicken pox, measles, rubella, diphtheria, whooping cough, scarlet fever, dysentery, bubonic plague, influenza, malaria, yellow fever, and much else (Crosby 1972, 1993). Alternatively, Amerindian diseases were largely restricted to intestinal parasites, yaws, syphilis, hepatitis, encephalitis, polio, and tuberculosis.

When European and Amerindian societies eventually clashed during the Age of Discovery, disease was at the vanguard. Crosby (1993) referred to the outburst of Old World communicable diseases *as virgin-soil epidemics* (VSEs). Visitation, migration, warfare, dispossession, murder, oppression, overwork, and malnutrition promoted the persistence and transmission of these pathogens (Crosby 1972, 1986, 1993). Taken alone, smallpox decimated North American natives. In the 1630s, smallpox killed half of the Huron and Iroquois populations, whereas in the eighteenth century it eliminated half of the Cherokees, and Catawbas (Crosby 1993). Crosby (1972) provides grim estimates concerning the lethality of these diseases at large. Between 1616 and 1622, multiple indigenous settlements, including villages near Plymouth Bay, were left abandoned (Crosby 1972). Between 1780 and 1851, the Dakota suffered at least nine epidemics among which were smallpox, measles, cholera, and whooping cough (Crosby 1993). Crosby mentions how, in some Amerindian cultures, the terror of contagion was such that individuals displaying early symptoms of smallpox or other Old World pathogens committed suicide, as did several Cherokees in 1738. Similarly, in 1837, in the midst of a smallpox outbreak, many Blackfeet opted for a similar resolution (Crosby 1993). All told, between 50 and 90% of the Amerindian population died of foreign pathogens (Crosby 1972, 1993), such that the impact of these VSEs on Amerindian populations easily outstripped plague-induced mortality visited upon European populations. For Crosby (1972), the effects of VSEs extend beyond the expected increase in death rates. By affecting almost every individual in the population, VSEs had a significant negative impact upon social organization. Crops, herds, and trades were left unattended, and the few unaffected people were unable to support the afflicted. Therefore, individuals requiring a minimal level of care to survive died from either resource scarcity or lack of assistance (Crosby 1993). Moreover, diseased individuals became more vulnerable to other pathogens (Crosby 1972). Since VSEs affected both commoners and nobles, social disruption was amplified after the death of military, political, and religious leaders (Crosby 1972, 1993).

3 Symbiotic Portmanteau Assemblages

The scholarly community is indebted to Crosby for having traced the differential development of the Neolithic Revolution through a causal chain through to disease, and thereafter for applying this knowledge in explanation of the Columbian Exchange. Crosby's ecological history delivered one further culminating insight, ordering all his particular researches under an organizing principle termed *portmanteau assemblages* (Crosby 1986). Portmanteau assemblages refer to a matrix of coadapted ecological associations between humans and domesticated flora and fauna, vermin, weeds, and pathogens, which act together as a unit in competition with rival assemblages upon contact. It is to this unifying concept of portmanteau assemblages that we turn with our life history framework. Before doing so, we beg leave to make one slight alteration. It seems fitting to amend the original expression, again *portmanteau biota*, to *Symbiotic Portmanteau Assemblages* (SPAs). The change jettisons what we see as artificial anthropocentrism implicit in the original idiom. While Crosby's original term denotes evolved mutualisms, and even evolved mutualisms among nonhuman species, our revised term more fully recognizes that mutualisms often spread forth absent human intervention. This includes relationships between exotic herbivores and exotic weeds, as well as between exotic weeds and exotic pollinators.

Ahead of viewing the clash of SPAs during the Columbian Exchange, we emphasize three generalities. First, populations stop spreading at the frontiers of their SPAs. In other words, the ultimate demographic limits of any Neolithic Expansion mapped onto the ultimate biogeographical limits of its SPA. As much is evident in examining boundaries among the major human *genetic clusters* as they are distributed across continents. With that said, it is important to distinguish between the truly *native* flora and fauna of a region, and the SPAs associated with the so-called indigenous societies.[4] Second, it is important to recognize that the competitive strength of one human society with respect to another is largely based on the relative strength of their SPAs. Biologically productive SPAs generate a resource base sufficient to support "large, dense, sedentary, and stratified societies," which thereby develop superior subsistence and military technologies. From hence, one may argue, all human *civilizations* and *empires* are ultimately based on SPAs as their *sine qua non*. Third, all human post-Neolithic SPAs always were, and continue to be, *invasive* assemblages of species. SPAs evolved over multiple millennia by human–nonhuman coevolutionary processes as *constructed niches*.

Now to turn to the Columbian Exchange in an attempt to understand this unequal contest. All post-Neolithic societies necessarily possess their own SPAs. One SPA can replace another SPA only where it is ecologically supported. Eurasian SPAs expanded at the expense of American SPAs most rapidly and roundly on *isothermal lines*. In other words, the *Niña*, *Pinta*, and *Santa Maria*, together with all the ships sailing in their wake, carried Eurasian SPAs across an ocean of longitude to destinations of similar latitude. Eurasian SPAs displaced indigenous American SPAs most readily in the *Neo-Europes*, geographical territories located below the Tropic of Capricorn and above the Tropic of Cancer, including the temperate zones of Chile, Uruguay, Argentina, Australia, New Zealand, Canada, and the USA (Crosby 1986). This tells us where and why Eurasian SPAs could compete, but not why they dominated. We are thus left with the inevitable question: *What characteristics allowed one SPA to "competitively exclude" another?* Although our list is not exhaustive, Fig. 1 works toward an answer to the question above by presenting conceptual schematics concerning the complexity of various SPAs.

As can be seen, relative to American SPAs, Eurasian SPAs are more complex agglomerations of interdependent species. Within that matrix are many food and forage crops that combine with meat and milk animals to sustain beyond subsistence. There is then a caloric foundation for capital accrual and technological complexity. From hence came technological innovations in shipbuilding and weapons manufacturing that, respectively, brought Europeans to American shores and aided in their conquest of Amerindians. At the same time, within the Eurasian SPA are crowd diseases that became endemic, but which proved epidemic for Amerindians. Indeed, disease proved the principal agent of lethality and societal disruption (Crosby 1972, 1993). To illustrate the point, smallpox reached the Island of Española in 1518, from whence it was carried to Puerto Rico and Cuba (Crosby 1972). After afflicting and decimating the insular populations, a soldier in Cortes's army transported this *Shirt of Nessus* to Mexico. In the mainland, that pathogen significantly weakened the Aztecs before and during the Spanish conquest.[5] A similar pattern occurred in Guatemala, with at least two outbreaks between 1520 and 1521 severely affecting the Mayan communities in the region (Crosby 1972). During this time, the disease was transported to South America, swiftly propagating through the continent. Although it is still debated whether the Inca Huayna Capac was killed by an endemic or an invasive disease,[6] his death, compounded by the concomitant deaths of key political and military figures (Crosby 1972), inaugurated a disruptive Civil War between Huayna Capac's sons, Huascar, and Atahualpa (Diamond 1997). Other pre-Columbian societies in South America were also afflicted by various epidemics, such as that which killed thousands native to Río de la Plata in 1560, and that which, two years later, befell pre-Columbian communities

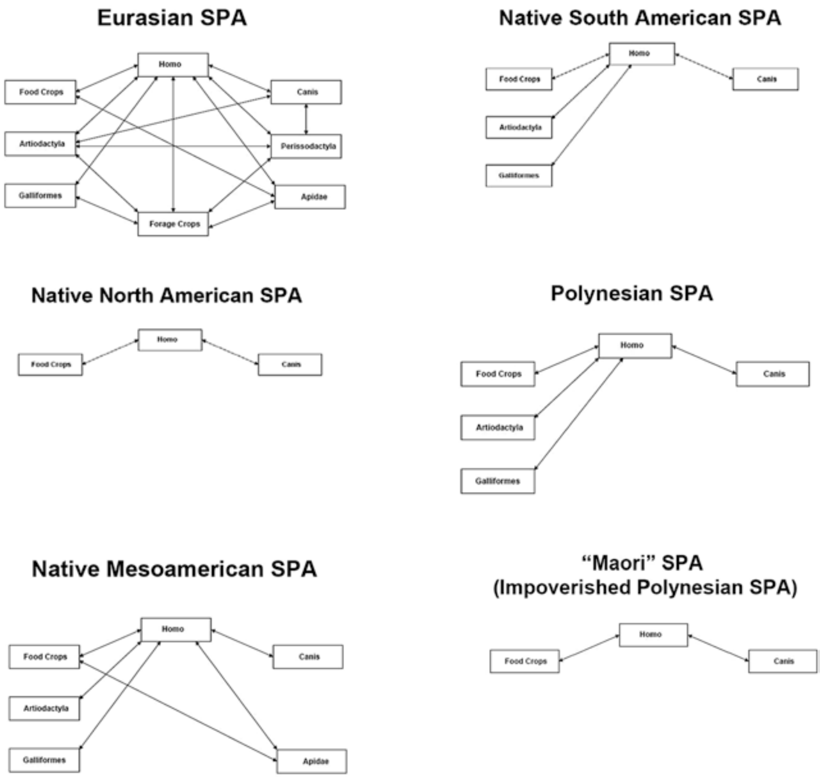

Fig. 1 Conceptual schematics for three major symbiotic portmanteau assemblages

in Brazil (Crosby 1972). Thus, we can envision Hernán Cortés casting anchor and rowing ashore with cocked pistol and drawn sword ready to finalize a conquest that would be all but won by the diseases he harbored in his person, and the pigs he stowed in his hull.

SPAs drive life histories, with their constituent elements affecting constituent life history traits. This is because SPAs subsume ecological factors that directly calibrate life histories. As will be pursued in Chapters 5 and 9, mortality regime influences population mean life history speed, and, as we have seen, SPAs include lethal predators, parasites, and pathogens. As will be pursued in Chapters 4 and 6, population density regulates population mean life history speed, and, as we have seen, SPAs include flora and fauna that either support density by their abundance, or preclude density by their parsimony. With respect to the Columbian Exchange, the act of invasion, so destructive of Amerindians together with their SPAs and sociopolitical structures, systematically selected for relatively *fast life history* survivors. This is significant to the unequal outcome of the Columbian Exchange insofar as our reading of the historical record suggests that *slow life history* populations tend to outcompete relatively *fast life history* populations, all else being equal.

4 Europeans and Amerindian Life Histories Before and After the Columbian Exchange

We end by reviewing those indirect markers of life history suggestive of life history speed differences between European and Amerindian populations, before and after contact.

Contemporary paleopathological examinations support Crosby's observations concerning the lethality of crowd diseases. However, recent publications offer an in-depth perspective on the morbidity patterns in Amerindian societies and their corresponding life histories prior to the European conquest (Alchon 2002; Martin and Osterholtz 2016; Storey 1985; Verano 1997; Wilson 2014), information that was either unavailable or limited at the time Crosby published his work. Although pre-Columbian societies were not exposed to temperate crowd diseases, skeletal analyses across Pre-Columbian sites support the notion that Amerindian communities did experience infections (Grob 2009; Martin and Osterholtz 2016), with risk factors, such as population size, or the presence of urban centers, facilitating the propagation and persistence of certain parasites (Drake and Oxenham 2013; Steckel et al. 2002). The archaeological data has also been used to calculate life expectancy at birth, as well as fertility and mortality rates (McCaa 2005). For example, according to recent examinations, Coastal Ecuadorian communities (900 BC–400 AD) experienced a life expectancy at birth ranging from 29 to 34 years, and a maximum longevity ranging from 48 to 58 years, with over 20% of the remains of 93 individuals examined exhibiting skeletal evidence of infections (Ubelaker and Newson 2005). With respect to the Amerindians in the Ecuadorian prehistoric highlands, the skeletal evidence points to a life expectancy at birth of 28 years and a maximum longevity of 53 years. Relative to the Coast, the highlands had a lower percentage (9.9) of skeletal remains displaying any evidence of infections (Ubelaker and Newson 2005).

Due to the fact that life history is also affected by resource abundance, osteological markers, such as the occurrence of *porotic hyperostosis* and *cribra orbitalia* (Steckel et al. 2005), provide additional information regarding the nutritional status of the individuals examined. These skeletal conditions are associated with a maize-based diet, anemia, and the occurrence of intestinal parasites like hookworms (Ubelaker and Newson 2005). A similar pattern was observed in the Mexican Basin wherein Tlatilco (1400–900 BC), Cuicuilco (600–150 BC), Tlajinga (250–600 AD), and Cholula (900–1500 AD) all contained populations reaching moderate fertility levels, and exhibiting a life expectancy at birth between 20 and 40 years old (Morfin et al. 2005). Osteological examinations also indicate some degree of variation in infection rates. According to Morfin and colleagues (2005), cross-population differences may be due to the effects of population density, as well as the precarious sanitary conditions associated with urbanization. Remains collected from classic and post-classic Mayan sites (800–1000 AD), such as Copán, Jaina, and Xcaret, further demonstrate the nutritional stress experienced by individuals living in pre-Columbian settlements (Storey et al. 2005).

Colonizing Americans of European ancestry fared better in some health indicators and worse in others. Although these Euro-Americans had a higher stature, and fewer instances of anemia and hypoplasias, they also exhibited poor dental health and higher incidence of traumas (Steckel and Rose 2005). In some regions, life expectancy for colonizing Europeans was slightly higher than that of the preceding Amerindian communities. For example, Euro-Americans in the Ecuadorean highlands (1540–1858 AD) reached a life expectancy at birth of 34 years, a maximum longevity of 58 years, and an average age-at-death of 32 years (Ubelaker and Newson 2005). Therefore, prior to the Columbian exchange, between Amerindian and the eventual European settlers, some life history indicators did not differ significantly, whereas others display a minor variation. This slight difference, however, became considerably noticeable after the European contact, with health declining, mortality rates rising and life expectancy at birth collapsing (Crosby 1972, 1986, 1993; Steckel 2005). Overall, the evidence supports Crosby's position. Life in pre-Columbian Americas was not ideal, with population size and urbanization impacting the health of its inhabitants through the mediums of malnutrition and infectious disease (Steckel et al. 2002; Steckel and Rose 2005).[7] We would add, however, Eurasian SPAs created a selective regime exclusively affecting Amerindians, which greatly accelerated life history speed, exaggerating preexisting life history variation between European and Amerindian populations through hundreds of years of colonization.

Notwithstanding the above-described insights provided by disease prevalence and longevity data, further analyses are required to substantiate Amerindian life history traits as they varied before and after European contact. Still, the current evidence indicates Eurasian SPAs not only facilitated the conquest and colonization of the Americas, as evidenced by the prosperity of European settlements, but that they also impacted the life history of indigenous populations, inflicting a destabilizing effect that lingered for more than 600 years. Thus far, the signature of that destabilization is read in indicators of social, political, and economic development, as well as in prevailing life history strategies (Figueredo et al. 2017; Peñaherrera-Aguirre et al. 2018; Thornhill and Fincher 2014). Crosby's ecological interpretation of history provides a strong scaffold to empirically test the pervasive effects of the Neolithic Revolution, as well as the causal pathways through which ecology influences the wealth and political stability of contemporary nation-states.

Notes

1. At the end of the Spanish campaign, epidemic-induced mortality edged toward twenty percent, although Crosby (1986) recognized this estimate may be unreliable.
2. Even though most paleontological or historical reviews do not associate the disappearance of the Pleistocene megafauna with the Columbian exchange, Crosby (1972, 1986) considered the former provided additional evidence regarding the impact of an invasive species upon a native ecology.
3. When we return to Crosby's Columbian Exchange, for instance, we will see that, relative to Eurasia, the Neolithic Revolution came late to the Americas (Crosby 1986).
4. In a way, no human society outside Africa is truly "indigenous."
5. For example, after the successful campaign of Cuitláhuac against Cortes, the Mexican lord was killed by the disease (Crosby 1972).
6. Historical accounts suggest it was an Old World pathogen such as smallpox or measles (Crosby 1972).
7. For example, medical examinations in Waorani populations in Ecuador (Kaplan et al. 1980) concluded that before contact epidemics were nonexistent and diseases were non-lethal. This supported the historical trend of negative health outcomes associated with state-level organizations; nevertheless, negative health outcomes were rapidly exacerbated after 1492 (Steckel 2005).

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CHAPTER 4

The Historical Geography of Alan R. H. Baker: Scratching Out a Living After the Neolithic Revolution

1 The Historical Geography of A. R. H. Baker

The featured author of this chapter, geographer and historian *A. R. H. Baker*, studied at *University College London*; an institution with a strong geography department buttressed by major national libraries and rich archives. Outstripping these advantages of scholarly infrastructure, Baker was so fortunate as to study under *Clifford Darby*, one time department head at University College. In an obituary written in 1992, Baker wrote to eulogize Darby's "circumspection in the use of historical sources"; praising also Darby's "pragmatism in research methodology," as well as his "careful attention to issues of literary style and written expression" (Black and Butlin 2001a; p. 2). Having internalized and elaborated on Darby's instruction, Baker in his turn has been lauded for advancements he occasioned in "quantification and model-building" (Dennis 2001; p. 18), for his "incorporation of ideological issues in the production of historical geographies" (Butlin 2001; p. 126), and for his "careful reading of hitherto unexamined documents from the deepest archival vaults" (Heffernan 2001; p. 203). Baker is further celebrated by his colleagues (Black and Butlin 2001b) for a "rare combination of…exceptional intellectual gifts" and a "creative vision" that came together with a "flair for writing and the dissemination of knowledge" (Black and Butlin 2001a; pp. 12–13).[1] Even concentrating on Baker's publications of the middle 1970s (Baker 1972, 1973a, b; Baker and Butlin 1973; Baker and Harley 1973) recalls London, with its arcades, avenues, and alleys.

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Tapping a rich vein, one finds that Baker is a historical geographer of the French, more so even than of the English, peasantry. He has studied the French peasant's environmental laboring conditions, and the larger social systems in which they lived. Finally, Baker's repute comes as much from his own writings, as his ability to aggregate and edit the writings of others. In *Man Made the Land*, for instance, Baker, along with coeditor J. B. Harley, collected and collated papers on Britain's climate during the Neolithic (Manley 1973; Thirsk 1973a), investigations into the Domesday book as they provided insights into land utilization (Darby 1973), the founding and desertion of towns (Beresford 1973), and several important studies of the pre-industrialized roots of industrialized nations (Thirsk 1973b; Harley 1973; Yelling 1973).

Baker harkens back to the work of Darby (1973) in what amounts to a lifelong effort to resist the reductive disciplinary boundaries threatening to wall geography off from history. This is Baker's refrain, and it is this, more than any particular study of time or place, that warrants closer scrutiny.[2] Baker came to understand that human history is constrained by natural geography, but, at the same time, humans are active shapers as much as passive recipients of that geography. Beyond Darby, Baker surveys more than a century of geographical historians that defy the general trend in which geography was progressively estranged from history. Notable among those surveyed are *James Bryce* who saw geography as the key to history, *H. B. George* who argued that history is unintelligible without geography, *Frederick Jackson Turner* who associated settlement patterns with geographic features, *Jules Michelet* who believed that "history is entirely geography" (Baker 2003; p. 19), and *Lucien Febvre* who insisted historians practice geography and geographers practice history. Notable among more contemporary colleagues, Baker quotes the American historian, *Edward Fox*, who, in his *History in Geographic Perspective*, recalls a bygone day wherein "history and geography were once assumed to be sister sciences so close in method and focus as to verge on representing two aspects of a single subject" (Baker 2003; p. 23).

2 Straddling the Divide

Actuated by the above-described conviction, Baker made a career of straddling the divide between these two disciplines. His doing so is quite literally evident in *Geography and History*, a book in which Baker most overtly laments the cleaving of history from geography. For Baker (2003; p. 4), the geographically minded historian should:

> …embrace not only almost every conceivable aspect of human activity but also many features of the natural world: for example, not only canals and criminality but also cotton and climate, not only mining and music but also marshlands and malaria, not only factories and fears and but also forests and furs.

For context, it must be understood that Baker was stemming the tide of augmenting disciplinary specialization. By way of example, opposite Baker was Richard Hartshorne, who, in his *The Nature of Geography*, argued for a firewall between the two disciplines. In opposing Hartshorne and others of his turn of mind, Baker, at one and the same time, appeared reactionary and progressive. Even while geography influences human history more so than the other way around,[3] there are profound ways, such as agriculture, in which humans change their geography. In recognition of this, Baker surveys writings on land use, including deforestation, riverine improvements, and hydrological management. Anthropogenic action is emphasized by highlighting the work of *R. L. Sherlock*, who wrote *Man as a Geological Agent* in 1922. Additionally, referencing *French* (1963), Baker (1975; p. 14) details four ways, distinguished by widespread application, prominence of effect and scope of use, wherein man acted the part of geological agent in Russia: (1) *The changing distribution of forest*; (2) *the changing steppe*; (3) *the reclamation of swamps*; and (4) *change since the Revolution*. Then, in *Studies of Field Systems in the British Isles*, Baker reviews agriculture and its laboring class, while in *Man Made the Land*, he takes up the social outgrowths of agriculture. Thereafter, Baker then jointly treats land, soil quality, husbandry, sociability, and community character, as they are in turn related to modernity, which, through its railroads and companies, opened markets and changed mores.

Distilled to its utmost, Baker equates geography with place, and history with time, coming to the logical conclusion that the former can only be artificially disentangled from the latter. A life's work with a foot in each field, if it does not make Baker something of an evolutionary ecologist, does trend in that direction. Alan Baker's work documents the fulfillment of the Neolithic Revolution with its mature societies resting on a foundation of staple grain crops. At Baker's insistence over a career, many in his field implicitly absorbed a view of ecology as dynamic, with persons increasingly changing the environments in which they live. To modify this view, it is only necessary to add that humans then, as they changed the environment, were changing their selective regime. They were becoming in some sense partially *autonomous agents in their own evolutionary process*.[4]

3 Baker in Life History Perspective

As seen in the second chapter, historically minded geographers like Huntington had recognized the differential effects of various ecologies. In this context, we have described some of the ways in which Eurasian ecologies directly slowed population mean life history. Though Baker is cognizant of the important effects of pristine ecologies, he better appreciates the manner in which humans have fundamentally changed each environment they occupied. In this context, we can now describe some of the ways in which Eurasian ecologies indirectly accentuate the slowing of life history, specifically within the last 10,000 years since their intensive cultivation.

As Baker details, it was only since the *Neolithic Revolution*, with its transition from hunting and gathering to settled agriculture, that mankind, on balance, became a relentless geological agent.[5] The Neolithic Revolution allowed people in many ecologies to stop following nature's bounty as it migrated in herds and bloomed in vegetable matter, and finally to settle, thereby expanding the notion of private property and fostering capital investments. Of all revolutions, it was the Neolithic Revolution that was most important,[6] for it augmented sedentary living, population aggregation, social stratification, strategic specialization, and complex civilization. With the Neolithic came new restraints as well as new possibilities. The Neolithic Revolution affected all of what might be called *arable lands*; that is, places that were neither too dry nor too cold, or which would otherwise disallow cultivation. That being said, within the broad category of arable lands, there was a range of fertility, the peak of which was not in the south, but far north in temperate latitudes. In particular on the coastal regions of Eurasia, below sixty latitude, and extending to the moister parts of the interior, there existed temperate forest stands and grasslands holding unrivaled agricultural potential. It is in these regions, by virtue of being extreme, that we can so easily see the effects that soil fertility had on human evolution through the medium of improved husbandry.[7] It was in these temperate latitudes that mankind showcased its ability to act the part of geological agent.

Each environment is said to have a carrying capacity relative to any particular organism. Human size and caloric needs demand correspondingly large ranges. Obligate thermoregulation, the maternal demands of gestation and lactation, combined with inefficient water use and energy-hungry brains demand still further resources, which correspondingly puts pressure on any habitat. The world's dry desert lands provide a close living to a precious few. The same can be said of the windswept tundra. Most regions above 65 degrees north latitude shade into permafrost, again, providing in a niggardly manner to a scant population. Deep enough into prehistory it was hydraulically blessed southern latitudes that supported the greatest number of humans. Indeed, these areas that fostered the evolution of humans continue to support considerable human populations and hold much of the world's biomass and biodiversity. Historically, moist lands within equatorial latitudes put forth sufficient abundance to support hunter gatherers, which then split, fission–fusion like, into family units and larger bands as the environment permitted. Yet, prey animals and gathered foodstuffs could only support so many and no more. At the same time, efforts to increase yields through slash and burn agriculture sacrificed wild foodstuffs to a temporary glut of agricultural surplus. Unfortunately, many tropical soils, in addition to being acidic, are impoverished. The standing biomass of these regions would seem to contradict such a statement, but it is in fact the prodigious biological activity of the tropics that is precisely to blame for the poor agricultural potential of tropical soils. Soil nutrients are rapidly converted into living material. If a tree branch falls, it is consumed by termites in a fraction of the time that it would take for its temperate counterpart to disintegrate into the soil. To release nutrients, and avoid their reuptake, forests are burnt, and crops planted in the rich ash. But it is the nature of tropical soils to rapidly lose these artificially released nutrients to lower soil horizons where they can neither be tapped by cultivated plants nor reached by primitive ploughs. Migration out of Africa lifted these constraints.

Mesopotamia, that *cradle of civilization*, through its rivers and oases, allowed for a measure of agriculture upon which an *oriental despotism* quickly effervesced, only to be constrained some centuries later by water availability. Yet, there was another class of biome into which humans migrated more steadily and lived more stably, after the last glacial maximum. This was the temperate biome; lands north of the tropics, but south of the tundra; spared from drought, but also from saturation; supportive of biology, though lacking in hivish biodiversity. These temperate zones, which can roughly be parsed into temperate forests and temperate grasslands, assumed great significance, bringing humans on a very different evolutionary path as compared with the tropics from which they migrated. As described in Figueredo et al. (2017), temperate forests have unique properties: They are heuristic markers of convergent climatic factors. These climatic factors include parameters relevant to physical ecology, community ecology, and soil ecology. In reference to physical ecology, where temperate forests stand, water is relatively abundant, temperature is seasonally variable, and altitude is not excessive. In reference to community ecology, temperate forests are subject to seasonal cycles that discourage the proliferation of harmful ectoparasites, such as malarial mosquitoes; but more than this, the tannin containing leaf litter may further discourage the proliferation of common *endoparasites*, such as helminth worms. In reference to soil ecology, temperate forests uniquely maintain richness in the upper soil horizons through their deciduous cycling of leaf litter; a process that neither sequesters richness within vegetable matter, nor allows it to leach deep within the earth. These aspects of temperate forest biome physical, community, and soil ecology make for bounteous lands, not in the state of nature, but only through cultivation. To conclude by way of contrast, temperate lands naturally offer little, but can be made to offer much; while tropical lands naturally offer some, but cannot sustainably be made to offer much more.

As Baker documents, with hoe and plough and with ox and yak, man broke through the steady but scant bounty of nature in what became regions of Europe. The primitive scratch plough tilled deep enough to reach the mineral-rich soils, drawn up and redeposited in the upper soil horizon for millennia, by oak and aspen, birch and beech, maple and sycamore, chestnut and elm. Of note, the trees themselves had to be laboriously cleared, but the labor was repaid through the provision of useful timber for housing and shipping. These broadleaf deciduous forest stands supported all those generations of Baker's French and English peasants. Temperate grasslands are important too, though their importance rose in accordance with industrial agriculture and improved ploughing technology. Together, in these temperate zones, more than in any other, man's actions increased the carrying capacity of the land. Certainly in broad outline, and often in meticulous detail, Baker recognized and wrote of all this. What he seems not to have appreciated, and what we presently suggest, is all this amounts to changes in the selective regime under which humans evolved. Moreover, the slowing of life history can be read into trends tracked by Baker. Baker's English and French peasants were far removed from the equatorial environments in which their distant ancestors evolved; environments that returned subsistence as a matter of course, and rewarded intensive agriculture with short-term and restricted gains. Instead, migrants found themselves within a cold and predictably variable environment wherein that free grant of subsistence was denied them, after the several thousand years of unsustainably harvesting herd animals. Though temperate lands did not grant a natural livelihood, they could be made fertile. Temperate regions were such that high effort garnered high yields. This selective regime, proffering competitive advantage for food, land, mates, status, and wealth, directly evoked forward thinking, delay of gratification, augmented intelligence, and conscientiousness. What is more, these temperate lands were eventually made to yield surpluses, which supported population density; population density in turn positioned humans to create cities and civilizations, which became selective regimes unto themselves, rewarding intellectual endowment, enculturation, as well as the attainment of specialized knowledge and skills. Under this anthropogenic selective regime, the more thorough exploration of which is deferred until Chapter 6, life history slowed, and with it, agreeableness, conscientiousness, and cooperation waxed. These traits allow affiliation. They are necessary to the communes created by French peasants in the 1800s that Baker (1999) so studiously documents.[8] To this cooperative consequence of slowing life history is added competitive consequences, some of which are cognitive effects. With density and the slowing of life history comes intellectual gains, at least at the population level. The more intelligent are selected under these conditions. People become smarter and more differentiated from one another. These are the origins of highly specialized intelligence, which have been described as *CD-IE* effect or *cognitive differentiation integration effects*.[9]

All can be traced back to that extra bushel of grain per hectare; the surplus on which the army marched, the monarch ruled, the clergy presided, the artist created, the student learned, and the teacher taught. That same surplus afforded improved lands, steady supplies, capital investments, productive surpluses, and, thereby, myriad expressions of *high culture*.

4 Support and Future Investigation

Again, we contend that many of the advances in technology, cooperation, and civilization described by Baker are, in part, outward manifestations of a *sLH*-selected syndrome that increasingly evolved through much of the history preceding Baker's area of specialization. Thus, Baker is eminently correct to assert that geography has shaped human history, even as he may not have been thinking of evolutionary history. To conclude, we provide some citations and data in support, first of the uniqueness of temperate ecologies, and second of the slowing effects they imparted to the evolutionary process.

In Figueredo et al. (2017), a *brumal factor*, which was a composite of temperature and altitude, as well as a *hydrological factor*, to mark water availability, overlapped significantly within the temperate broadleaf deciduous forest biome across the sixty-six studied nations. In addition to demonstrating temperate biomes to covary with multiple climatic indexes, as mentioned previously, the leaf litter of temperate trees contributes to the formation of rich brown *alfisols* and fecund *inceptisols*, "receptive to generations of preindustrial cultivation" (Figueredo et al. 2017; Hertler and Peñaherrera 2017). This same study also showed temperate trees inversely correlated with parasite burden and excessive mortality, while positively correlating with egalitarian distribution and cognitive evolution. There is much literature suggesting that nations with full or partial temperate broadleaf deciduous forest biomes excel on life history metrics like intelligence (Lynn 2003; Barber 2005), conscientiousness (Hertler 2015), and life span (Hertler 2017). The same is true for wealth (Lynn and Vanhanen 2002), economic development (Lynn 2001), and equality (Lynn and Vanhanen 2006). Furthermore, these disparities across nations are recapitulated with high fidelity across racial groupings within nations (Lynn 1996; Rushton 2000, 2012).

Cold Winters Theory, the idea that seasonal cold drives cognitive evolution and civilizational development, predicts some of the above without reference to trees or soils. Emphasis on temperate biomes, however, may extend and qualify Cold Winters Theory in that it better explains why such slow life history traits reverse course as winters become even colder in the boreal and arctic zones. Still further, a biome approach is more consistent with Baker's main message of *man as geological agent* in that it describes the evolution of Eurasian populations, not just as they passively suffered the selective pressures of Eurasian ecology, but as they anthropogenically changed their selective regimes by harnessing Eurasian potential. Like Cold Winters Theory, this biome approach emphasizes direct effects of climate on human evolution, but also lends itself to emphasizing those ecologies with the greatest *potential* carrying capacity. Carry capacity, capitalized on by agriculture, can thereby lead to population density, and thereafter social complexity.

Notes

1. Moreover, Baker is respected for an ability to meticulously delve into detail even while engaging in summation and integration; for his ability to pursue geography even while integrating a deep knowledge of history; and for his ability to organize facts even while relating them to a strong methodological and theoretical philosophy (Black and Butlin 2001a; p. 2).
2. As reviewed by Baker (2003; p. 28), Darby identifies pathways whereby geography and history intersect to form an *intellectual borderland*. Whether geography determines history, or history changes geography, Darby found it "difficult to delimit the frontier" between these disciplines, both because "the geography of the present-day is but a thin layer that even at this moment is becoming history" and because "art as well as nature has gone into the making of most landscapes."
3. Certainly, there is a disparity between the two disciplines, in that a proper study of history must take geography into account, even while geography itself can retain its isolated disciplinary integrity. This is at least true with respect to history, though, as an aside, geography may itself owe intellectual debts to geology within a Comtean hierarchy.
4. Some have described this as *self-domestication* (Brüne 2007), but this term neither fully, nor fully accurately describes the many changes to the selective regime that humans have insinuated into their environments.
5. There is no doubt that humans altered Eurasia in the upper Palaeolithic, most notably by way of depopulating, and in some cases eradicating, herds of large herbivores. Cities and farms also obviously impart environmental changes that may have a host of evolutionary implications. It is worth a quick digressive comment, however, only to note that one should not underestimate the totality of anthropogenic environmental change by looking exclusively for marked examples of this variety. For instance, even wild reindeer herds of the Sami Laplanders are partly domesticated, just as the Amazonian tropics contain much secondary growth and introduced species. A careful survey reveals humans having positioned many a species into long-run mutualisms.
6. The Neolithic Revolution's only rival claimant to the title of most important revolution is the Industrial Revolution, though the former was a precondition for the latter.
7. These northern soils were naturally fecund and continued to be in part because their waning fertility was supplemented by innovation and improvement in agriculture techniques as described by Baker and Butlin (1973; p. 630):

> …by letting the arable land lie fallow for a period of time; by convertible husbandry; by manuring with free-ranging, tethered, shepherded or folded livestock; by turf manuring; and ultimately by the cultivation of nitrogenous crops and by the application of purchased organic and inorganic fertilizers.

This combination of natural endowment and careful management allowed high cereal yields prior to the thirteenth century, which were thereafter sustained.

8. Baker (1999) provides an intensive review of the French peasantry in their efforts to "reduce risk and uncertainty" by forming "voluntary associations developed to provide…new ways of managing risks to themselves, their families, their properties and their livelihoods" (Baker 1999; p. 100). These are people coming together to further reduce uncertainty and even extrinsic mortality. A house ignites, a coalition of neighbors bring their buckets to bear in brigade, saving life-giving shelter; a head of household is disabled and so dues are used to provide for his family; a crop is blighted, therefore foodstuffs are redistributed to forestall starvation. The early instantiations of corporate alternative risk-management associations are partly reviewed in Chapter 5 featuring Richard Price.
9. Subsequent chapters will return to CD-IE effects, which, suffice it to say at present, represent a branching specialization of cognitive ability. This evolutionary process mirrors the expanding business that, beyond a certain point, begins to divide into departments and higher specialist consultants and workers.

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PART I

Section Metacommentary

These three bodies of work, those of Huntington, Crosby, and Baker, were selected advisedly to build upon each other theoretically and empirically. Together, they can be seen to weave strands of social science into the nomological network of the natural sciences. Locating the basis of human social structure and subsistence within its physical, chemical, and biological substrates forges the first links in an explanatory chain wherein the governing principles of life history evolution order and organize social scientific data, as is the main goal of this volume.

Huntington and Cushing (1922) pioneered in making explicit the distinction between *physical* and *community* ecology, where the former consists exclusively of the non-living (*abiotic*) ecological elements, such as temperature and precipitation; whereas the latter consists exclusively of the living (*biotic*) elements, such as predators, parasites, and prey. They further theorized that physical ecology *determined* community ecology, which is the first major link in what would later become known as *social biogeography* (Figueredo et al. 2017). These constructs capture the contexts and setting in which the entire drama of human evolution has been playing out, and at the same time established the basic framework within which we could begin to comprehend the biophysical bases of the natural selective pressures to which all humans were subject, ancestrally, and at present.

Crosby's work continues the integrative process that Huntington started in that it extends the chain of causation, from *physical* to *community* ecology, to now encompass *social* ecology. Technically, social ecology constitutes a part of community ecology, with the proviso that it is limited to the *conspecific* portion of the community ecology, involving interactions only among members of the same species. Nevertheless, as including humankind within the natural world is not the norm within the social sciences, we therefore reserve a special place for *human* ecology.

Still, as Crosby makes clear, this human ecology does not stand alone. All human societies are surrounded and pervaded by an entire micro-community of other animals and plants (and this does not even count the internal microbiota that every individual contains!) Following Crosby's concept of *portmanteau biotas*, we refer to these species assemblages as *Symbiotic Portmanteau Assemblages* (SPAs). Crosby's brilliantly original lesson, herein duly absorbed and extended, is that human societies are situated within what ancestrally were geographically delimited microecological contexts. In association with a variety of other species with which they coevolved, human societies then tended to share the same or similar fates as their respective SPAs. As they are associated with human societies, such multiple-species assemblages also exist amidst social insect colonies. For example, while studying one particular species (*Pseudacteon wasmanni*) parasitizing fire ant (*Solenopsis geminata saevissima*) colonies, Wasmann (1918) identified the following *inquilines*: 16 species of staphylinid beetles, 4 species of pselaphid beetles, 2 species of phorid flies, 1 species of lygaeid bug, 1 species of cydnid bug, 1 species of myriapod, 1 species of bethylid wasp, 1 species of silverfish, and 2 other species of ant! This one microecosystem alone appears to be at least comparable in complexity to many human SPAs.

Crosby established a basis for human social ecology as contained within the physical and community ecology defined and differentiated by Huntington. Building on such seminal works, Baker adds greater resolution to the dimensions of time and space in relation to human history and geography, between which he highlights both theoretical and empirical interconnections. Looking ten or more millennia into history, Baker begins with the Neolithic Revolution, during which humans first cultivated crops and domesticated animals. As do Huntington and Crosby, Baker examines the geographical and climatological factors facilitating husbandry, but uniquely, Baker continues on to explain how historical geography shapes social structure. In doing so, Baker implicitly shows how variations among agriculturally modified environments produce divergent societies. Armed thus, one can return to Crosby with a better understanding as to why one society might dominate another, as did Europeans dominate Amerindians. For in truth, Crosby got ahead of himself in identifying ecological contributions to intercontinental conflict, without first specifying how each respective ecology of origin evoked divergent societal structures prior to contact.

From an evolutionary point of view, these two propositions are cut from the same cloth. The conclusion that historical geography determines social structure, as documented by Baker, is presumably derived from the implicit recognition that certain social structures were comparatively more adaptive within a given ecological context. The conclusion that the expansion of certain social groups was only made possible by the expansion of accompanying *portmanteau assemblages* of non-human species that they brought with them, as documented by Crosby, is presumably derived from the same premise. Otherwise, for example, both the colonizing European settlers and the colonized Native American peoples might have fared equally well when the introduced Eurasian SPA destabilized, and partially displaced, the Native American SPAs.

Nonetheless, Baker takes the important next step, implicit in modern SPA theory, appreciating more explicitly that humankind did not simply adapt to the physical and community ecology as it was originally encountered. Instead, humans initiated a process that we now call *niche construction*, wherein each human society, or regional metapopulation of human societies, generated its own system of symbiotic interrelationships amidst a selected assemblage of species. Acting the part of geological agent, man created unprecedented microecologies. Even as Crosby recognizes this process, Baker more precisely emphasizes its historical importance. On the other hand, Baker did not deal with such phenomena as the Columbian Exchange and thus made no predictions regarding what would happen should distinct SPAs later come into contact. Thus, each author tells part of the whole: Huntington describes ecology as it was, Baker describes ecology as it was modified, and Crosby describes the clash of human civilizations via their respective ecological proxies.

Our own analysis of relative SPA systems' complexity expands upon the narrative. In accordance with these extensions of the work of Huntington, Crosby, and Baker, we have also generated and tested theoretical predictions concerning how the aftermath of the

Columbian Exchange shaped subsequent life history evolution and post-colonial development among aboriginal Amerindian populations. Biodemographic data from archeological, historical, and contemporary sources generally supported our prediction that the sudden invasion of the Eurasian SPA into the Americas destabilized the niche-constructed environment within which the natives had coevolved over the preceding several millennia, and to which they had become adapted, the result of which was to shift those populations toward faster life history strategies in the wake of what was, to them, a sustained ecological catastrophe.

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PART II

Price, Malthus, and Landers

CHAPTER 5

Richard Price: The Schedules of Mortality

1 Richard Price: Life and Works

Into a gabled-roofed structure of two stories, solid yet unadorned, on the 23rd day of February 1723, came Richard Price, son of an austere religious dissident living under the *restraint of the gospel* (Cone 1952; p. 9). *Observations on the Importance of the American Revolution and the Means of Making It a Benefit to the World*, a pamphlet written in 1785 wherein Price lauded Americans as existing in the space between primitive barbarity and debauched decadence, proved Price a principled cosmopolitan, rather than a parochial partisan. Price maintained a warm correspondence with Arthur Lee, Joel Barlow, Benjamin Franklin, John Adams, Thomas Jefferson, Benjamin Rush, Josiah Quincy, Ezra Stiles, and other American revolutionaries, while concurrently communicating with many an Earl, Viscount, and Prime Minister with a heavy hand on the levers of governmental power within Britain. As he extolled the genius, and appreciated the friendship of other leading men of his age, so he was extolled for his "excellent understanding…boldness and freedom of thinking" and appreciated for "the purity of his views, and the simplicity of his manners." (Cone 1952; p. 4). Condorcet estimated Price as, "one of the formative minds of the century"[1] (Cone 1952; p. 5). A strong liberal and Unitarian Minister, Richard Price, earned a reputation as a "voluminous writer on religion, morals, politics, and mathematics"[2] (Price 1903). Even dissenting contemporaries at odds with Price's political radicalism conceded his *goodness, gentleness, humility, honesty,*

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sincerity, and *disinterestedness* (Cone 1952; pp. 2–3). In short, he was a good man in a great age.

Through a lifetime of intellectual accomplishment, his study of life and its insurance is remembered (Mayhew 2014). Standing upon the shoulders of the Reverend Thomas Bayes, John Graunt, Sir William Petty, and the Astronomer Edmund Halle, Price studied mortality and insurance most extensively in the following 1783 publication: *Observations on reversionary payments on schemes for providing annuities for widows, and for persons in old age; on the method of calculating the values of assurances on lives; and on the national debt*. To this was added, *An Essay on the Population of England, From the Revolution to the Present Time*. Both works went through multiple editions and were expanded with appendixes. At large, Price was trying to glean broad themes on life and death as they differed between city and countryside, men and women, past and present, war and peace, fatherland and colony, plenty and famine, health and disease.

Like any scholar, no matter how ingenious, Price had his critics. Among contemporaries, Reverend John Howlett criticized Price for applying what was essentially a proto-Malthusian calculus, reminiscent of a mercantilist vision of economics applied to human demographics. Price, Howlett seems to charge, looked at population as a balance sheet, whereupon gains to one side of the ledger were made out of losses from the other. Contrasting with Price's belief that London's population grew at the cost of depopulating and impoverishing the countryside, Howlett compared London to the *mouth* of the nation, the feeding of which only distributes nutriment to the rest of the body. Howlett cited the growth of Bristol, Birmingham, Liverpool, and Manchester as evidence that London grew with, and not at the expense of, the nation at large. Even Price's straightforward interpretation of war as a drain on population was likewise stood on its head by Howlett. While conceding to Price that war, especially when considering non-combatant casualties of famine and disease, can function to decrease the population, Howlett argued war is apt to stimulate population growth among the farmers and manufacturers that keep men in the field.[3]

2 Insuring Against Mortality

Aided by the haughty conceit of hindsight, one could continue on in the vein of Howlett, finding ever more faults in the accuracy of Price's data and the soundness of his conclusions. Yet, that would miss the point—the point that Robert J. Mayhew (2014; p. 30) makes. Mayhew, though a biographer of Malthus, capably explains the significance of Price's work on mortality:

> When Richard Price stood on the podium on November 4, 1789, he was one of the most respected and revered scholars of his age, that reputation the result of four decades of patient inquiry. The full range of his achievement has been well analyzed…, but one key element of that achievement, one motif in his great melody was his work on population and insurance. In many ways, Price's core concern—to quantify mortality rates to allow for successful life insurance schemes based on mathematically robust tables of life expectancy— sounds prosaic enough, but it in fact fitted into a far more grandiose socioreligious vision of revolutionary and Utopian progress.

Mayhew's provision of context is all important. Reading Price's work on mortality is rarely inspiring, but becomes so when situated within this larger "socioreligious vision." Price's *vision* came of the intersection of religion and reason made possible by the waning of the latter and the rising of the former during the *Enlightenment*. In illustration of the point, we find Price's interpretation of God's plan, not to be submission to divine will or ascetic neglect of self in preparation for a transcendent afterlife, but to encompass the advancement of liberty, dignity, free will, individuality, and intelligence as a means of improving the worldly present. It can thereby be understood how, in service of the same God, Price studied tables of mortality, whereas his forbearers mortified the flesh.

The underlying conditions actuating this transition from sacred to secular, or one might more properly say from theism to deism, are detailed by McNeill (1998; pp. 262–263), the world historian featured in Chapter 9. McNeill, in his *Plagues and Peoples*, describes an early modern Europe wherein "sudden and unexpected death remains a real and dreaded possibility in everyone's life experience." Again and again, McNeill hammers home the point that epidemic plague introduced erratic unpredictability into human lives—a reality which purportedly encouraged traditional religious belief and devotion to a personal God.[4] By way of contrast, during the Enlightenment, small medical advances combined with unplanned ecological adjustments, to *relax the dominion of epidemic disease over human minds and bodies*.[5] The observations of McNeill and Mayhew, as they are, respectively, related to the

Enlightenment generally, and Price as an actor within that age, insightful as they are, have been limited to descriptions of passively determinant forces. As will be developed within the subsequent section, however, something more biological and active may have been afoot. Pursuant to this possibility, we take up three points in this coming section: Most prosaically and importantly, we are first obliged to explain how mortality relates to life history. Second, we argue that declining mortality risk across millennia of human history occasioned the slowing of life history, a precondition for achieving the *high civilization* characteristic of the Enlightenment. Third, we argue that the Enlightenment not only was partially made possible by reduced random mortality, but was itself partially responsible for further reducing mortality and slowing life history.

3 Intrinsic Versus Extrinsic Mortality

Within the evolutionary literature, a distinction is made between types of mortality[6] (Stearns and Hoekstra 2005)—the logic of which Price would have valued. On the one hand, there is *extrinsic mortality*, mortality which can be neither predicted nor controlled; on the other hand, there is *intrinsic mortality*—mortality which can be predicted and controlled (Ellis et al. 2009; Griskevicius et al. 2011). The epidemic death occasioned by plague when it first afflicted Europe and smallpox newly introduced into the New World Amerindian populations are examples of highly extrinsic mortality. On the other hand, *cold winters* (Lynn 1991; Rushton 2000) exemplify intrinsic mortality, in that they are easily predicted and their accompanying mortality risks can be mitigated or even nullified with sufficient preparation (Hertler 2016). These contrasting types of mortality have opposite effects on life history. In the main, extrinsic mortality evokes *r*- or *fLH*-selecting evolution, whereas intrinsic mortality evokes *K*- or *sLH*-selecting evolution. The excessive random death imparted by extrinsic mortality sources retards fitness-relevant returns to protracted gestation, extended juvenile periods, parental care, deferred reproduction, and related *K*- or *sLH*-selected developmental features. Such *K*- or *sLH*-selected strategies, pursued amidst extensive extrinsic mortality would, on average, cause an organism to die before it reproduced. Therefore, the reduction in extrinsic mortality is a necessary condition for the slowing of life history speed; but, importantly, it is not sufficient. *Only intrinsic mortality actively slows life history.* Take, again, the cold winter. This source of intrinsic mortality actively drives *K*- or *sLH*-selected evolution because provisioning, saving, collecting, storing, future-oriented thought, parental investment, intelligence, conscientiousness, and corresponding *K*- or *sLH*-selected behaviors distinctly reduce the probability of death for parent and offspring. To conclude by way of an analogy, liken mortality to an absolute number. As the number alone specifies size, the sign specifies direction; so it is with mortality. The absolute rate of mortality effects evolutionary speed, but only by knowing whether mortality is extrinsic or intrinsic, can we know the direction the evolutionary process will take along the life history spectrum.

Now to qualify this dichotomy with appropriate nuance: First, as might be imagined, some mortality risks fall out along a continuum, even while others are more categorically situated. The second point, building on the first, is that these classifications are not immutable for all time (Hertler 2017). More accurately, a mortality risk can sometimes transition from extrinsic to intrinsic, or otherwise fall further down a continuum of controllability. For humans, predicting and controlling mortality risks, and thereby changing them from extrinsic to intrinsic, have been achieved through a complicated history of *gene-culture coevolution*. All traditional sources of human mortality, *predation*, *starvation*, *violence*, and *war*, have become less acutely extrinsic, drifting down the aforementioned continuum of controllability over the course of human evolutionary history. Consider predation first. Partially as an outgrowth of cognitive evolution at the species level, prior to civilization, and enabling the achievement of that state, mankind already had several defenses against predation, a source of mortality that remains extrinsic for most species. Fire and weapons were undoubtedly instrumental. And then there was safety in numbers. Aggregation is a common anti-predatory defense employed, for instance, by herds of ungulates (Levin 2009). As mentioned, however, predation is only one source of extrinsic mortality. Starvation is another. Exchanging nomadic hunting of thinning herds for shepherding flocks of domesticates, while at the same time substituting the gathering of wild foodstuffs for the harvesting of cultivated crops, brought starvation further down the mortality gradient,[7] making it less common and more preventable. Relatedly, as civilized life and social order augmented, the immanent destruction of nomadic brigandage on settled communities was exchanged for the slow and sustainable tribute to a warrior caste, guaranteeing the industrious husbandman would reap some proportion of what he had sown. Still later, life became insulated from internal violence via laws and law enforcement. Thereafter, life became further insulated from disease through inoculation and sewage systems. The foundational achievement of civilization, and a precondition[8] for high culture, is, in these many ways, the ability to stave off mortality and to make its coming more predictable.

These many reductions in extrinsic mortality risks, with the concomitant imposition of intrinsic mortality risks, were instrumental in slowing human life histories, with consequent evolution of longer lives, larger brains, as well as augmented intelligence, parental investment, education, enculturation, cooperation, restraint, conscientiousness, and future-oriented investments. In our view, these were prerequisites out of which the biological capital was wrought, necessary to create the person and productions of men like Richard Price. *Human Accomplishment* documents the effect, with author Charles Murray describing eighteenth-century London as "jammed with men of immense accomplishment…" (Murray 2003; p. 48). By way of illustration, Murray can easily point to men such as Adam Smith, Edmund Burke, James Fox, Edward Gibbon, and Oliver Goldsmith. "By the late 1720s," Murray (2003; p. 50) writes, "England's combination of economic prosperity, social stability, and civil liberties had no equivalent anywhere on the continent." This is nothing if not the signature of an unprecedented slowing of life history.[9]

Going further afield, one might say that the Enlightenment was both a *product of past evolution* and a *driver of future evolution*. Price and contemporaries achieved insight into, and an increasing mastery over, nature, not excluding human nature. Faster and more fully than ever before, humans in this time and place became their own selective agents. Not from the top-down consciousness of one man or mind, but from the bottom-up as an organic aggregate, humans anthropogenically engineered their selective regime rather than passively suffering under it. The further reduction in extrinsic mortality was part and parcel of this larger process. By way of example, consider the small practical advances in social order occasioned by Benjamin Franklin, as discussed in Hertler (2017; pp. 39–40):

> They [Enlightenment era Americans] were trying, and largely succeeding, in creating predictable and orderly environments that were conducive to their slow life history strategy. In actualizing this selfish imperative, they helped the communities they lived in. By way of example, consider the thirty odd years that Benjamin Franklin graced early 18th century

> Philadelphia. Exemplifying the slow life history, Franklin reacted against correlates of extrinsic mortality such as disease, the robbery of his home, the threat of the frontier, the specter of foreign invasion, and the burning of the southern end of town, by agitating for hospitals and refuse removal, instituting a night watch and lighted streets, organizing and serving in the state militia, submitting the Albany Plan of Union, and promoting fire brigades and fire insurance.

Being an Enlightenment scion in the mold of his good friend Franklin, Price did his share, as citizen and scientist, to further the cause. As progressive citizen, Price strove to make rulers accountable to the office they held and the people they served. This was part of a larger process of curtailing capricious and despotic abuses that, in earlier times, deprived subjects of life and the resources necessary to sustain and perpetuate life. So, where early civilization witnessed the rise of a ruling class that protected the populace from the extrinsic threat of nomadic raiders, by the eighteenth century, the civilizing process progressed such that it began to protect the populace from its protectors.

Then, as mentioned, Price functioned more directly like a cog in this progressive Age of Reason in the character of a social scientist studying mortality. Life insurance schemes arising from the researches of Price, and those like *John Graunt* (1676) who came before him, were a slightly different species of guarantee. Life insurance was the guarantor of the lineage when the life had failed.[10] Life insurance was what rendered unto the family line, what all the other guarantees had failed to render unto the insured. From a genetic perspective, guaranteeing a life or a lineage amounted to something not far from being one and the same. Those genetics lost with the parent's life, because of the proffered dividend, were more likely to live on in the children of the deceased. Life insurance is the guarantee, in a real sense, of *parental effort*, a *K*- or *sLH*-selected marker. The *K*- or *sLH*-selected expend much of their lifetime and energy in rearing their young, whether by direct investments such as holding, lactation, and teaching, or by indirect investments such as collecting and hunting, or its modern-day equivalents, earning and providing. The life insurance dividend, often taken on the life of the breadwinner, then serves to supplement the loss of indirect parental effort, and the theretofore irreplaceable resources lost to the offspring with the loss of the provider.

Condensing the foregoing discussion to its utmost, we interpret the study of mortality by Price during the Enlightenment as an unconscious, though active, expression of niche construction by a *K*- or *sLH*-selected person within a *K*- or *sLH*-selecting social system, having the effect of further slowing life history toward the *K*- or *sLH*-selected end of the life history spectrum.

4 Comparative Evidence

It is principally incumbent upon us to proffer evidence of mortality's relationship to life history. To this end, consider the following selection of animals catalogued by Hertler (2017; p. 29), all of which show untoward longevity, a signature of slow life history:

> Creosote and Yucca of the Mojave Desert (Sussman et al. 2014; Bellingham and Sparrow 2000), the many succulent species within the Grand Canyon of Arizona (Bowers et al. 1995), cave salamanders (Speakman and Selman 2011), Siberian actinobacteria (Sussman et al. 2014), and the great majority of Antarctic plant species (Green et al. 2007)…Quahog clams (Bodnar 2009; Philipp and Abele 2009), tortoises and turtles (Gibbons 1987), elephants (Wiese and Willis 2004), arboreal primates (van Schaik and Isler 2012), bats (Wilkinson and South 2002; van Schaik and Isler 2012), and birds, specifically parrots and cockatoos (Young et al. 2012).

Not incidentally, the outsized lifespan of these organisms is paired, in every instance, with an uncommon degree of insulation from unpredictable mortality. The first five listed are insulated from unpredictable mortality by the harshness of the ecologies in which they live. Alternatively, the latter six examples all gain a measure of protection, specifically from the extrinsic mortality risk of predation, via a developed defense. As for the clam, turtle and tortoise, that defense is a shell. The elephant has its formidable bulk, allowing an adult to walk safely amidst a pride of lions, while the arboreal primate takes to the trees where ground predators cannot follow.

Bolstering these observations, and following from classical predictions (Medawar 1957; Williams 1957), is Holmes and Austad's (1994) article entitled, *Fly Now, Die Later: Life-History Correlates of*

Gliding and Flying in Mammals. This publication establishes the life history effects of flying via mortality reduction, as does Wilkinson and South's (2002) comparative study of bats with analogous terrestrial rodents. Moreover, Reznick[11] et al. (2004) observed deferred senescence in guppy populations insulated from extrinsic mortality risks, whereas Rauser et al. (2009) reported experimental studies establishing the predicted causality underlying this correlation (Hertler 2017). Similarly, experimental populations of bacteria link extrinsic mortality to rapid aging (Rauser et al. 2009). Further still, experimentally parasitized fruit flies show more rapid senescence, paired with a compensatory rise in mating effort (Polak and Starmer 1998), both of which are *r*- or *fLH*-selected traits (Hertler 2017). Later, many other studies would use this model genetic organism to demonstrate the effects of mortality on longevity and similar trade-offs predicted by life history theory (Travers et al. 2015; Gasser et al. 2000). As with Drosophila, extrinsic mortality drives longevity and related life history evolutionary effects among social insects (Negroni et al. 2016), including ants (Keller and Genoud 1997), bees (Rueppell et al. 2007), and termites (Keller 1998). Similar effects are found across a swath of sampled amphibians (Johnson et al. 2012) and terrestrial animals (Ricklefs 2010). Lastly, life history theory also explains the sex-based longevity differences (Kruger and Nesse 2006) and sex ratio statistics (Leimar 1996; West and Sheldon 2002; Collin 2006) that so confounded Price (Cone 1952).[12] In short, extrinsic mortality's effect on evolved longevity, a hallmark biological marker of the slow life history, is established via the weight of convergent theoretical, biogeographic, observational, and experimental evidence across taxa.

Chapter 16 demonstrates how individual traits, such as longevity, are in fact integrated into a life history complex. As for our more general thesis relating to civilization as a *product* and *driver* of *K*- or *sLH*-selecting evolution, this can only be implicitly developed in subsequent chapters: (1) Chapter 6 relates mortality to population density, the other driver of life history speed; (2) Chapter 9 describes why life history did not slow uniformly across all geographical areas; (3) Chapter 14 treats government as it is relevant to life history; and (4) Chapter 15 correlates life history evolution with the development of civilization outside of the specific role of mortality.

Notes

1. Not unlike other towering intellectuals of the age, Price at once played the part of "a penetrating philosopher of questions of free will and determinism, an eloquent apostle of liberty, [and] a leading mathematician and Fellow of the Royal Society" (Mayhew 2014; p. 30).
2. As characterized by Walter Ashburner, son of Samuel Ashburner of Boston, in an introduction to *Letters to and From Richard Price 1767–1790*, published in 1903 by John Wilson & Son.
3. When Howlett begins to discuss migration to colonial possessions, he most precisely defines the relationship between population loss and replacement. Mass emigration does of course detract from the population of the mother country, but not without the counterbalance of early marriage and augmented fecundity. Those left behind have more ample means of substance in direct consequence of excess population being siphoned off. Howlett rests upon the authority of Benjamin Franklin, quoting his 1751 essay on *The Peopling of Countries*, wherein the population of a country is likened to a *polypus* (an archaic appellation for polyp); such that one can "take away a limb, its place is soon supplied; cut it in two, and each deficient part shall speedily grow out of the part remaining."
4. What is most interesting, not only in that it is a feat of synthesis, but in its implicit description of Price's life and work, is the following connection made by McNeil (1998, pp. 262–263):

   > The retreat of plague and malaria and the containment of smallpox were thus essential preparations for the propagation of deistic opinions of the kind that became fashionable in advanced circles in the eighteenth century. A world in which lethal infectious disease seldom seized a person suddenly in the prime of life no longer stood so much in need of belief in Divine Providence to explain such deaths.

5. This is a close paraphrase and reordering of McNeil's words, the original of which is as follows: "Before the findings of the astronomers and mathematicians of the seventeenth century could become a basis for a popularized world view, therefore, epidemic disease had also to relax its dominion over human minds and bodies."
6. A terminological word of caution: The contrasting terms *extrinsic* and *intrinsic* mortality are differently used elsewhere to denote aging from without and aging from within; for an example of such unrelated usage see Koopman et al. (2015).
7. This claim is made for settled agriculture as it benefited mankind in the fullness of time, across locales, and at large. No doubt, many earlier

agriculturalists had a less varied and more impoverished diet than their hunting and gathering counterparts.

8. The word *precondition* is here used advisedly. It is important to understand that the reduction in extrinsic mortality only enables the evolution of a slow life history, but it is the introduction of intrinsic mortality that compels such an evolutionary course.
9. This theme will be explored in a future work, roughly titled, *Evolutionarily Explaining the European Enlightenment*. Though we are here focusing on extrinsic mortality reductions, these are paired with agricultural surplus, economic growth, and demographic increase over millennia of adaptation to civilization, group selection, and sexual selection, as well as altering mortality regimes.
10. Though it largely fell outside the scope of Chapter 4, Baker (1999), in his *Fraternity among the French peasantry: Sociability and voluntary associations in the Loire Valley, 1815–1914*, describes small-scale community organizations that reduced extrinsic mortality risks from fire, starvation, famine, and crop failure by distributing risk across all community members.
11. See Reznick et al.'s original study for nuances, caveats, and qualifications of interest that are beyond the scope of the present review.
12. Price's curiosity on this score is described by Cone (1952; p. 47): "Price's data revealed it [sex ratio] as 20:19, while Dr. William Derham found it to be 14:13. The female life expectancy was greater, however, because the male led a more hazardous and irregular life, and had 'some particular delicacy' of constitution. Eleven years later Price still puzzled over these phenomena. He sent to the Royal Society a paper from Dr. Joseph Clarke of the Dublin Lying-in Hospital. The facts were as Price had stated them in 1775. Dr. Clarke, who had become interested in these matters from reading Price's articles, argued that the male fetus was larger than the female. Therefore it required more nutrition and was more liable to injury at birth."

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CHAPTER 6

Thomas Robert Malthus, Stratification, and Subjugation: Closing the Commons and Opening the Factory

1 Scourge of the English Poor

A faithful husband and ordained divine, Thomas Robert Malthus, was cast in his epitaph as "one of the best of men and truest philosophers," possessing "spotless integrity," a "native dignity of mind," "sweetness of temper," and "urbanity of manners and tenderness of heart." The selfsame man was a "mischievous reptile," the "scourge of the English poor," "deserving to be drawn and quartered or slung in a gibbet" (Mayhew 2014; pp. 1, 88; Bashford and Chaplin 2016; p. 4; Bonar 1887; Malthus 1815; Woodley of Menie et al. 2017).[1] Fully reconciling these versions of Malthus, the famous and infamous purveyor of population panic, would take us excessively far down the rabbit hole of intellectual history, only at the bottom of which, the life and work of Malthus can be fully and fairly judged. We can, however, like the frogs on the edge of the well, look, even as we do not leap. First, it is important to note that Malthus wrote *An Essay on the Principle of Population*, his crowning achievement, in 1798[2]; a time before which all societies "exhibited an oscillatory system of negative feedbacks in which any increase in resources led population to rise, which in turn reduced per capita income and resource availability" (Mayhew 2014; p. 2). He was thus valued for exposing what was recognized by some as a demographic reality and scientific truth. This, along with his amiable temperament, actuated the good opinion many had formed of him as a man of integrity, and a scholar of note.

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Contrawise, in using lessons of the past as cautionary tales for the future, Malthus perpetrated a species of heresy that would be brooked, neither by the progressive edge of the European Enlightenment that was just then waning, nor by the optimistic fringe of the Romantic Movement that was just then waxing. Tensions with the Enlightenment past were felt first on the home front; for Malthus's father, Daniel Malthus, was a disciple of John Wilkes and friend to Jean-Jacques Rousseau (Bashford and Chaplin 2016). Accordingly, it may not be surprising that Malthus was ordained a minister within the Church of England against his father's wishes. By writing, *The Crisis, a View of the Present Interesting State of Great Britain, by a Friend to the Constitution*, a pamphlet now lost to posterity, Malthus entered into the lists of a propaganda war surging within an England attempting to maintain order, just as France erupted in revolution. At such a time when Godwin, Condorcet, Paine, and like-minded scions of the *Age of Reason* were planning for a society that could and should be, Malthus only saw what was and had been. Malthus wrote in the wake of the French Revolution with all its progressive excess, in considered reaction to Godwin who would remake society in the mold of "reason, sincerity, mutual benevolence, and common ownership of property (including spouses)" (Malthus 1798/1992; introduction by Donald Winch, p. xxiii). In spite of William Godwin's (1820) discursively ambling over six hundred pages in attempted refutation of Malthus, Malthus persisted in his views on the understanding that a "portrait of a society based purely on universal benevolence was unrealizable."

As Bashford and Chaplin (2016; p. 1) explain, Malthusian doctrine "seemed to entrench and naturalize rather than ameliorate poverty, just when a new generation of Utopians was imagining a brighter and better future." *William Wordsworth*,[3] *Samuel Taylor Coleridge*, *Robert Southey*, *William Hazlitt*, *Lord Byron*, *James Fennimore Cooper*, *Mary Shelly*, and *Charles Dickens* numbered among the utopian progressives that alternately critiqued and considered Malthusian forebodings (Mayhew 2014; Crook 2015). Dickens, having had a life not dissimilar to the poor protagonists that he created (Forster 1892), took Malthus to task most directly in a *Christmas Carol*, which featured Ebenezer Scrooge as a Malthusian caricature, and most earnestly in *Oliver Twist*, which featured a deserving orphan ill-used by prevailing social stratification. To be sure, he also had impartial critics like *Ester Boserup* who produced data-driven arguments rather than *ad hominem* attacks. Then, there were

Julian Huxley and *Fairfield Osborn*, in addition to members of the *Royal Society* and Parliament who can be counted among Malthus's supporters. Nevertheless, it was the vituperative vitriol of the Romantic literati that provide the most lasting characterizations of Malthus, as detailed by Woodley of Menie et al. (2017), Soloway (1990), and Mayhew (2014).

Detractors certainly persist, as exampled by Marvin Harris, the anthropologist featured in Chapter 13 of this volume. Harris charges Malthus with inverting the logic of the demographic transition: Cycles of high infant mortality and high birthrates were, for Malthus, the cause, not the consequence of poverty. In other words, Malthus holds that if the poor would just reduce their birthrate, they would cease to be poor; alternatively, Harris holds that if the poor would just become wealthy, they would cease to have high birthrates. Harris goes on in this manner for several more pages wherein he alleges that Malthus was the tool and ideologue of the capitalist class; that he blames the poor for being poor; that his funding sources compromised his objectivity; and that he strategically misrepresented facts.[4] Of the most damning charges leveled at Malthus by Harris is the implication that he was not in fact concerned with fertility control. What he wanted, Harris believed, was population increase, with his only concern being that this takes place within the confines of marriage. So he advocated for late marriage and marriage itself, but for unrestrained procreation within the confines of marriage. The alleged rationale is to produce many persons as cheap labor for industrial capitalism, but to ensure that they were produced within an intact family unit that would fund their growth and development so as to avoid encumbering the state with such responsibilities. Notwithstanding, Harris allows this much:

> Despite the mendacity of Malthus' political morality, and the shadow it casts over our own time, his contribution to an understanding of some of the factors involved in demographic processes must inevitably be acknowledged. He was among the first, for example, to see the relationship between birth control and death control. Indeed, it is to Malthus that we owe the idea that human population growth is subject to systematic controls—however much he sought to replace them with the least effective or humane measure—and that, in the absence of one kind of control, others are certain to be employed. (Harris and Ross 1987; p. 153)

Though Harris's critique is herein dilated on, other featured authors within this volume take seriously a Malthusian past characterized by "positive checks of poverty, disease, and war upon population growth" (Goldthorpe 1987; p. 28), and a Malthusian future wherein population growth is outstripping soil fertility (Crosby 1986). Delving further would amount to jumping into the well of controversial intellectual history. With a brief excursion into context, we proceed from controversy to content.

2 Population Pressure

Malthus was inarguably a hedgehog, with his single idea being *population pressure*. That being said, Malthus was foxlike in his ability to explore any and all kinds of causal influences and derivative consequences as he alternately assumed the role of economist, demographer, historian, philosopher, and political scientist in his exploration of population pressure. "The magpie" that was Malthus, "made his marvel" that was his essay on population, partially from the intellectual ether of his day[5] (Bashford and Chaplin 2016; p. 53). "Malthusianism existed before Malthus." Just as Malthus provided a most elevating shoulder upon which Darwin was able to see further, so he too, for all his original insight, had many a shoulder to stand on. Bashford and Chaplin (2016) demonstrate as much by showing Malthusian forebodings first extant, not in the nineteenth century, but in the sixteenth century, adumbrated in the work of *Niccolò Machiavelli*, *Giovanni Botero*, *Jean Bodin*, and *Thomas Hariot*. *John Graunt*, in his *Natural and Political Observations Made upon the Bills of Mortality*, written in 1622, invented "an arresting statistical hypothesis of geometric progression, expressed as doubling, that would be central to Malthus's analysis" (Bashford and Chaplin 2016; p. 31). Lastly, from citations by *Ezra Stiles* and *Richard Price*, "it is well known that Malthus inherited a kernel of an idea about rapid population growth from *Benjamin Franklin*" who wrote *Observations on the Increase of Mankind* in 1751 (Bashford and Chaplin 2016).[6]

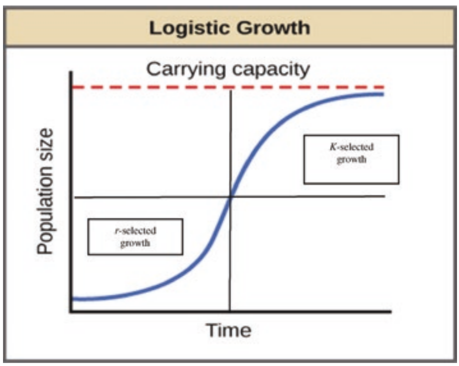
Knowing of no historical precedent wherein "the tortoise of food production" overtook "the hare of population growth" (Malthus 1798/1992; introduction by Donald Winch, p. xxxi), Malthus alternately feared and pitied the fecundity of the lower strata, who, in their misery, looked to God or government for what might only be lastingly obtained by self-discipline, family planning, moral restraint, delayed marriage, limited births, and economic preparedness. Malthus went so far as to express concern about benevolent inclinations among the upper strata who would invite the poor to feast with them, not knowing that in doing so they were encouraging still more supplicants who would swell the hall until all were beggared. Social stability itself was tied to population control.[7] For Malthus, mobs were symptomatic of population excess, and revolutions often prompted by discontented and starving masses looking to government fiat instead of personal choice, to alleviate their sufferings. Public policy, like private philanthropy, amounted to feeding the people, not teaching them to fish; it was, in fact, a solution that exacerbated in the long-term, the very problem it ameliorated in the short-term (Malthus 1798/1992, 1820/2005). As part and parcel of progress from a *savage* to a *civilized* society, Malthus counseled the replacement of *negative* and *immoral* population restraints of famine and war, with *positive* and *moral* population restraints of fertility control through delayed marriage (Bashford and Chaplin 2016; p. 168).

Just as an organism is not adapted to future exigencies, but to past conditions, so Malthus's writings were informed, not by the future of sustained industrialization and agricultural plenty, but by a past wherein Malthusian traps had in fact ensnared many populations within the New World, and the Old (Gat 2006; Harcourt 2012; Basener and Ross 2004; Brander and Taylor 1998; Woodley of Menie et al. 2017). Malthus was in Mayhew's terms, an *untimely prophet*. He had identified a grave threat to humanity, just as it was attenuated across the industrializing West. As he could not have envisaged the full impact of industrialization and its resultant demographic transition, so Malthus could not have envisaged the biologically based compositional changes that populations were undergoing as they labored under intensive Malthusian competition. Only when Malthus is read alongside Darwin, Galton, and Rushton, can Malthusian competition be seen to generate the heights of *sLH*-selection to which some segments of modern populations have evolved after a millennium of competition within the fecund temperate biomes of the world. This is a silver lining that Malthus, dismal though he was, might have appreciated.

3 Population Density: A Driver of Life History Speed

Malthus's relevance to the current volume extends from evolution generally, to life history specifically. This is because life history is really a theory arising out of population genetics. As described by Vandermeer and Goldberg (2013), it was first and foremost a theory of population dynamics with precursors stemming back to the 1930s, as seen in the work of Nicholson and his colleague Bailey, wherein population density was regulated from within via conspecific competition, and from without via parasite and pathogen pressure. Pianka (1970) credits Dobzhansky (1950) with formulating the basic idea of life history evolution. Indeed, Dobzhansky had echoed Darwin in noting a relationship between density dependence and climate, such that organisms in temperate climates struggle with *physical ecology* over and above *community ecology* (Roff 2002). Relative to similar insights, Vandermeer and Goldberg (2013) partially credit the early work of Cole and Lack, as well as the speculations of Cody (1966). Such prefigurations aside, life history theory is more traditionally and solidly traced back to MacArthur and Wilson (1967) who "coined the terms *r*-and *K*-selection"; which Roff (2002, pp. 77–78) explains, "are derived from the standard model of population growth in ecology." Within this model of population growth, Roff continues, "the logistic equation in which the per capita growth rate declines linearly with density relative to some carrying capacity, *K*." The rapidity of *r*-selected population expansion is favored when density is low; but as density approaches the saturation point, the *K*-selected are favored (Roff 2002). In further explanation, consider the graph (Fig. 1).

Fig. 1 Environmental carrying capacity in relation to logistic population growth



There are two population parameters. The asymptote at the top is *K*, again denoting the *carrying capacity* of the environment; a value that cannot be exceeded, at least not sustainably over the long-term.[8] The other value is *r*, which denotes *biotic potential*; meaning the maximum rate at which a species could theoretically reproduce. As can be seen in the lower left quadrant of the graph above, there is rapid phase growth. This then reaches an *inflection point* at the exact center of the graph whereat growth is most rapid. As the s-shaped curve progresses beyond the inflection point, growth slows; and, as it progresses to the top-right quadrant of the graph, growth is slowed to the point of stopping. This is the point at which density-dependent resource competition mounts, and in response, the population is pressured to evolve toward a *K*-selected reproductive method, putting competitive quality above sheer quantity. To summarize, low population density, which corresponds to high resource availability, will support rapid growth. Once higher population density is approached, the selective regime becomes different, favoring a tactical shift toward fewer offspring of superior competitive ability, capable of securing remaining resources. The process is comparable to *ecological succession* (Selleck 1960; Horn 1974). After a territory is cleared by some disturbance, whether by fire, landslide or lava flow, pioneer species invade via, for instance, superior dispersal ability, nitrogen-fixing capacity, efficient asexual reproduction, or rapidity of growth. As the process of ecological succession progresses toward the *steady-state* or *climax community*, opportunistic pioneer species are progressively replaced by what are alternately known as *late seral*, *late-successional*, or *equilibrium*[9] species, which are more *K*-selected. In certain conditions, for instance, annuals and pines will, in the course of ecological succession, be replaced by perennials and oaks.

Chapter 5 just detailed how mortality regime is the determinant of life history, and so it is; or should we more properly say that it is one of two determinants. Again, as the original formula and early theory show, population density was thought to regulate life history prior to mortality regime being specifically discussed. In the literature, one will see a disconnect with earlier work on population genetics, clutch size or any aspect of animal biology reflecting population density, but with later literature, applying life history theory to human populations, emphasizing mortality regime (Sherman et al. 2013). Sometimes, in the latter literature set, population density is mentioned only as historical commentary before mortality regime is stressed. Certainly, population density alone had some difficulty explaining empirical observations, and life history's explanatory power was greatly augmented in the 1980s when the role of mortality was specifically seized upon. Nevertheless, we caution against viewing these as competing explanatory theories, and thus creating a false dichotomy. Both population density and mortality regime are causal. Furthermore, one has to also understand that they are not commonly independently causal, but are in most cases functionally inextricable. This is not to say that they are two sides of the same coin, as either can act autonomously as a driver of life history evolution. Still, consider that parasites and pathogens, combining to cause a highly extrinsic mortality regime, will keep population density low. Were there few agents of extrinsic mortality, population would grow and then would be high. And so, we point out, that in nature, low density and high extrinsic mortality statistically co-occur, as does high density and low extrinsic mortality.[10]

Armed with both explanations and some knowledge of their interconnection, we can now see why human life history speed very likely slowed dramatically through the Neolithic Revolution, especially in temperate regions. This dramatic slowing occurred when density and mortality aligned, both pushing humans toward *K*- or *sLH*-selected extremes. *High density and low mortality is not a common combination*. By way of support, consider that many animal species are either subject to high extrinsic mortality or low population density. Many ungulates herd together, thousands strong, but are subject to intense predation; on the other hand, many carnivores are atop the food chain and so experience little extrinsic mortality, but exist only at low densities due to the trophic inefficiency of making animal flesh out of animal flesh. Human adaptations, such as the use of fire and weapons, limited extrinsic mortality through predation. Migrating into temperate climates reduced parasite and pathogen loads, further reducing extrinsic mortality, thereby satisfying one precondition on the evolutionary path to their current life history speed. Already having the advantage over the carnivore of being omnivorous animals, humans, in transitioning to agriculture, anthropogenically raised the carrying capacity of their environment. So, especially within temperate latitudes with sufficient moisture, we get the ultimate slowing of life history through that combination, so rare in nature, and previously unprecedented in the course of human affairs, of *low extrinsic mortality* and *high population density*. The progression toward the rule of law and governments capable of dispassionately dispensing justice extended this further by subduing conspecific conflict, which was the most conspicuous remaining contributor of extrinsic mortality. Chapter 4 began to explain, and Chapters 10 and 15 will repeat the refrain, of life history evolutionary effects that follow from sustained periods of high density and low mortality. Suffice it to say here, under such conditions, human competition becomes the most potent selective pressure; and so humans ratchet themselves ever further down the life history continuum through an intraspecific variant of *Red Queen*[11] events. Thus, it may have been that Malthusian competition contributed to the evolution of men such as Malthus.

4 Density-Dependent Life History Effects

We now detail density-dependent life history effects, both correlational and causal. As a beginning, note that when, for example, a large ungulate species is introduced to a new habitat, free of large predators (low extrinsic mortality), and not yet saturated by competitors (low density), it tends toward an *r*- or *fLH*-selected evolutionary trajectory, which entails smaller body sizes and earlier births (Ellis et al. 2009; Raia and Meiri 2006; Raia et al. 2003; Novosolov et al. 2013).[12] In this example, we see the ability of population density to operate alone, without reference to mortality regime. Here, there are no appreciable mortality pressures, either intrinsic or extrinsic, and so the shift toward *r*- or *fLH*-selected reproduction evidently follows from newfound release from density pressures.[13]

In addition to density-dependent effects on life history being supported via theory (Stearns 1977) and modeling (Bassar et al. 2016), experimentally induced high densities have been shown to slow the life histories of killifish (Sng et al. 2017), Trinidadian guppies (Bassar et al. 2015), and lizards (San-Jose et al. 2016). Consider also that density predicts sexual reproduction. For instance, the cladoceran[14] *Moina macrocopa*, a facultatively sexual species,[15] switches from asexual to sexual reproduction once food scarcity signals population density (Figueredo and Wolf 2009). Moreover, density-dependent chemical cues potentiate sexual reproduction within the rotifer *Brachionus plicatilis* (Stelzer and Snell 2003). Still further, density is one of the three factors inducing sexual reproduction within the planktonic crustacean, *Daphnia magna* (Kleiven et al. 1992). These are not just isolated examples. Silvertown (2008) surveyed 248 studies, compiling 69,000 individuals, across 2000 populations of 218 species, in 74 plant families to find clonal species more apt to be rare or endangered, and to disproportionately occupy a habitat's less dense fringes and margins. Both the particular and general findings are relevant in that sexual reproduction imposes the *twofold cost of sex*: the cost of having sperm-producing males restraining the rate of increase, and the cost of passing on half, instead of a full, complement of genes to one's offspring (Smith 1978, 1993). Sexual reproduction is woefully inefficient, but is favored for its ability to purify deleterious mutations (Kondrashov 1988) and engender parasite resistance (Hamilton et al. 1990), both of which factors yield superior offspring capable of competition within dense assemblies of conspecifics.

Notes

1. "It may appear to be hard that a mother and her children, who had been guilty of no particular crime themselves, should suffer for the ill-conduct of the father; but this is one of the invariable laws of nature; and knowing this, we should think twice upon the subject, and be very sure of the ground on which we go, before we presume systematically to counteract it" (Malthus 1798/1992; p. 266). These statements of Malthus are likely those that make him easily cast as inhumane and call down the above-quoted aspersion. It is important, however, to understand that such statements were actuated by a presumed knowledge of unintended consequences, similar to that discussed by Charles Murray (1984). The remedy becomes worse than the disease; indiscriminate alms giving was, for Malthus, an engine of population expansion resulting in a positive feedback effect with the end of increasing poverty and want.
2. The 1798 publication date refers to the first of six editions.
3. Malthus insisted against Wordsworth that nature was *niggardly*, not *numinous* (Bashford and Chaplin 2016; p. 4).
4. As an example of the latter, Harris charges, based on citation of a letter, that Malthus did not believe the poor laws encouraged early marriage, as he publicly professed them to do. In this vein, Harris quotes one of the Malthus's last essays in which he seems to profess knowledge of what is now known as the *demographic transition*; namely that with a certain degree of wealth and material comfort, family size is self-limiting:

   > Yet it is unquestionably true, that the laws of private property, which are the grand stimulants to production, do themselves so limit it, as always to make the actual produce of the earth fall very considerably short of the power of production (Malthus 1830: 36). (Harris and Ross 1987; p. 150)

5. …a natural theology of life on Earth, an assertion of the value of population to states and empires, a theoretical but also numerical science of political arithmetic, and a political economy of population and empire

that assumed that populations could be classed into historic stages of development based on material. (Bashford and Chaplin 2016; p. 53)

6. This might be thought just another point of intellectual context were it not for one consideration; namely eighteenth-century America amounted to a demographic experiment in which population growth could be observed without its customary restraints. Small populations rather suddenly transplanted amidst large tracts of land, and placed alongside open frontiers whose expansionary value was recognized by Webb and Turner, assumed growth parameters that were heretofore unobservable. Being an American phenomenon, it was natural that Franklin observed this unexampled instantiation of geometric population growth. In turn, being a European, it was natural that Malthus would contrast the geometric population growth of America with the arithmetic resource accrual that had been restraining European population expansion for centuries (Bashford and Chaplin 2016).
7. Generally in support of this contention, relations between population pressure and social stability across more than a thousand years of European history are documented by economic historian David H. Fischer (1996).
8. To envision the carrying capacity, picture the rim of a pot, past which it will not hold water.
9. These terms taken from the entry on *climax communities*: https://en.wikipedia.org/wiki/Climax_species.
10. See Schröder et al. (2014) for interesting caveats to this generality.
11. *Red Queen* refers to Lewis Carroll's character in *Through the Looking Glass* who explains that one has to run faster and faster simply to stay in the same place. As such, the Red Queen has come to describe an evolutionary process in which competition drives, for instance, speed, as the fastest cheetahs catch the slowest antelope. In consequence, both species become faster, even as neither gains a competitive edge over the other by so doing.
12. This is often seen on newly inhabited islands and is, in some part, related to the *island rule*, wherein large and small species begin to converge toward intermediate sizes (Faurby and Svenning 2016).
13. We here alert the reader to an interesting nuance. Size in ungulates, most especially elephants, is an evolved antipredator tactic. Becoming so large, necessitates the slowing of life history, as more time will be required between generations to gestate and grow. So in the case of an elephant species occupying a predator-free island, we also see it released from having to maintain a large size, where that large size once moved predation much further down the scale of controllability, such that it is restricted as an extrinsic mortality threat. Even thus is it difficult to separate mortality and density.

14. As described by Poynton et al. (2013), Cladocerans are important food animals in aquaculture, key grazers in freshwater ecosystems.
15. Facultatively sexual species are those which can switch between sexual and asexual reproduction, which contrasts with species such as humans wherein sexual reproduction is obligatory.

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CHAPTER 7

Famine, Pestilence, War, and Death: John Maxwell Landers' Four Horseman Spurring Humans Faster Along the Life History Continuum

1 The Historical Evolution of Urban Populations

"What is now known about the pre-nineteenth century urban population of Europe?" This important question was asked by Professor *Jan De Vries*, and the answer he provided, "surprisingly little," unleashed the motive force of renowned British historian and anthropologist *John Maxwell Landers*. Born in 1952, Landers was educated at *Haberdashers' Aske's School Elstree, Southgate Technical College*, a subsidiary of *Hertford College, Oxford*. From thence, he obtained a bachelor's and master's degree in the Human Sciences. Landers then pursued graduate work in historical demography at the *Cambridge Group for the History of Population and Social Structure*, before receiving his Ph.D. in 1984 from *Churchill College, Cambridge*. After serving a stint as a demand analyst for the planning division of *Shell UK Ltd*., Landers joined the Anthropology Department of *University College London* as a Lecturer in Biological Anthropology. From 1991 to 2005, he was a University Lecturer in Historical Demography and Fellow of *All Souls College, Oxford*. Landers is now a Doctor of Letters of the *University of Oxford* and a *Fellow of the Royal Historical Society*.

Through all this, Landers labored to supplement "the meagerness of the existing literature" with respect to "the historical evolution of urban population" (De Vries 1984; p. 17). The course of his career was canalized; its trajectory already evident in his dissertation title: *Some Problems in the Historical Demography of London, 1675–1825*. In analyses

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of historical demography that spanned two millennia, Landers strove to understand changing social organization, urban or otherwise; both within-populations across time and through cross-population comparisons. Along with Vernon Reynolds, Landers (1990) edited, *Fertility and Resources*,[1] while also editing, *Historical Epidemiology and The Health Transition* (1993).[2] Landers (1993) thereafter examined historical urban demography in a slate of peer-reviewed articles, ultimately leading to the publication of his first book, *Death and the Metropolis: Studies in the Demographic History of London, 1670–1830*. Therein, Landers elucidated a series of demographic events culminating in outsized mortality rates. Within the *long eighteenth century*, 1675–1825, Landers cast infectious disease as a driver of biodemographic and social characteristics,[3] even as he focused on proximate mechanisms to the relative exclusion of distal implications. His first realization was that demographic changes, such as historical variations in mortality, could not be explained simply in terms of changing real incomes. Intuiting underlying complexities, the models proposed by Landers can be seen as a cascade, with, for instance, migration transmitting parasites to urban areas that functioned as endemic foci of infection, which, in turn, altered age-specific mortality.[4]

2 Fertility, Infection, Technology, War, and Death

The most relevant further thrust into interdisciplinarity came in 2003, with the publication of, *The Field and the Forge: Population, Production, and Power in the Pre-Industrial West*. The title, *The Field and the Forge*, is shorthand for pre-modern *organic* societies versus modern *mineral* societies; or one might say, the farm versus the factory. Thus, Landers' (2003) thesis relies on Wrigley's (1990) prior distinction between *organic* and *mineral* economies. Within that dichotomized structure, organic economies depended on vegetation and animals for both energy and raw materials. Consequently, organic economies were bounded by seasonal and agricultural rhythms and subject to Malthusian checks. Everything followed from energy constraints. Energetic restriction limited specialization, metalworking, transport, and, more distally, the ability for societies to internally stratify and differentiate from one another. This cascade of consequences is explained directly by Landers (2003; p. 17):

> The fact that workers could bring so little energy to bear meant that productivity was correspondingly low, and low productivity made for general scarcity, which condemned the majority of the population to poverty and ensured that the demand for non-subsistence goods remained weak.

Beyond hard limitations on surplus production imposed by organic economies, governments struggled to tax and take what surplus was produced. For governments constrained by the niggardliness of organic economies could not afford the bureaucratic infrastructure that might otherwise have raised revenues by means of efficiently taxing available wealth. Extending both from inefficiencies in production and taxation, governments labored to maintain a military arm strong enough to coerce what obedience was not freely granted. Trade and transportation were likewise constrained. Yet, most fundamentally, restricted energy within organic societies imposed demographic constraints that interpolated intervals of cessation and contraction upon trajectories of growth. Black coal would change all. Post-Industrial Revolution mineral economies, extracting the energy of anthracite and making with it iron and steel, broke through the ceiling of energetic constraint. Escape velocity had been reached. Unmoored from energetic constraints, all aforementioned concomitant constraints were lifted.[5]

The organic–mineral distinction is sometimes depicted as simplistic,[6] though it may be more productively seen as heuristically valuable for its guiding function. Like any heuristic, it has boundaries to its application and exceptions to its generalities. As reviewed by Goldstone (2002), pre-industrial Europe and Northeast Asia were unmistakably differentiated in, for instance, their activities and occupations. Even then, these societies supported large urban centers, extensive manufactures, intricate webs of internal trade, far-flung networks of external trade, high levels of complexity, and abundant human capital—all in spite of restricted energy inputs. Thus, while having heuristic value, the organic–mineral distinction insufficiently explains pre-industrial demographics, necessitating supplementary analyses of other ecological factors. The case of Medieval Europe is central to understanding this argument, and comparatively rich in data, permitting an analysis that may exemplify an evolutionary understanding of pre-industrial biodemography.

Any effort to expand on Landers' cascade of consequences requires ecological variables predating, in a chain of causation, economic, militaristic, and technological changes. And so, even as we recognize the importance of the proximate causes populating The Field and the Forge, we presently attempt to review ultimate causes, adding primary links to the causal chain. Importantly, Landers recognized this distinction between *proximate* and *ultimate* determinants of demographic phenomena. Furthermore, he explicitly acknowledged that historical analysis necessarily centers on proximate explanation, while implicitly acknowledging its inability come to grips with ultimate explanations: "…in historical studies, we generally lack the information required to fit the model in its entirety, but we can still identify the effects of a number of proximate determinants." By leaving aside ultimate causes, and thus evolutionary reasoning, Landers discussed demographic (e.g., fertility) strategies as *rational*, *effective,* or *beneficial* within an economically informed energetic framework. Productive as this inquiry was, an evolutionary analysis with a focus on life history strategy, is clearly needed. With it, one can avoid relying on purely economic or cultural explanations of family planning choices, for instance.[7]

3 Climate, Life History, and Demography: Evolutionary Links

In climatology, it is well recognized that there are entire cascades of consequences issuing from a single event. Take volcanism for instance. Volcanic activity often perturbs atmospheric conditions, thereby influencing oceanic currents, which, in turn, may well affect circumpolar ice caps; still further, the resultant release of freshwater can affect oceanic salinity, with resultant changes in oceanic currents and coastal land temperatures. The indirect effects of such phenomena upon plant life are also so well known that data from both *paleo-palynology*, the study of ancient pollen, and *paleo-dendrochronology*, the study of ancient tree ring growth, are routinely used as reliable and valid markers of climate change. However, what is somewhat less well-recognized is that indirect effects do not stop there. The implications of plant growth for human agricultural production are self-evident, and the alteration to the ecological carrying capacity of the environment is a logically necessary consequence. Growth or decline in human population density must automatically ensue, especially in principally agrarian societies. Furthermore, intraspecific competition for limited resources is obviously exacerbated during times of resource scarcity. In humans, this competition might take the form of elevated intergroup conflict, such as organized warfare.

These latter relations are studied within the emerging application of life history evolution known as *social biogeography* (Figueredo et al. 2017). The basic principle of the cascade of consequences has been summarized succinctly as follows:

1. *Physical ecology*
2. *Community ecology*
3. *Social ecology*
4. *Cultural ecology*
5. *Cognitive ecology*

Thus, changes in the climate (physical ecology) trigger changes in populations of human cultivars as well as parasites (community ecology). From thence, the cumulative effects of climate change, food abundance, and parasite load produce changes in the structure and function of human societies with respect to their social, cultural, and cognitive ecologies.

Using that social biogeographical framework, we now follow the cascade of consequences as it played out within medieval history, before the transition to mineral economies. The *High Middle Ages* roughly coincide with what has been called the *Medieval Warm Period*,[8] AD 950–1250 (Lamb 1965, 1995; Mann et al. 2009; Sicre et al. 2008). This period was characterized by diminished volcanic activity, which facilitated a rise in average temperatures throughout much of the world. In Europe, this warming led to widespread, bountiful harvests and, accordingly, increases in human population size (Fagan 2008).[9] However, while containing this warm interlude, the Middle Ages at large were bounded by episodes of consequential climate change. The *Early Middle Ages* were inaugurated by a massive volcanic eruption occurring in AD 535–536, occasioning years of climatic change (Gunn 2000; Keys 2000). Originating in the Indonesian Archipelago, specifically from either Mount Toba or Krakatoa, this explosive eruption discharged colossal quantities of dust, ash, and acid into the atmosphere, producing a veil of aerosol particles obscuring much of the sun's incoming radiation.[10] Reduced insolation produced extreme cold and, consequently, widespread crop failures throughout the Northern Hemisphere for nearly a decade, with more persistent *global cooling* lingering for the next three centuries. Ironically, the very period that has been metaphorically referred to as the *Dark Ages* turns out to have been literally *dark* at the outset. Similarly, multiple convergent lines evidence suggests that the so-called *Little Ice Age* (Fagan 1999), coinciding with the start of the *Late Middle Ages* and leading into the Early Modern Era, was triggered by a 50-year-long episode (AD 1275–1325) of volcanic activity (Larsen et al. 2008; Miller et al. 2012). The atmospheric aerosols from these volcanic explosions again produced ice-cap expansion and anomalously colder summers. As before, the more severe effects were abrupt and immediate, but persistent climatic effects lingered for centuries, probably maintained by the sea-ice/ocean positive feedback loops.

The cascading consequences initiated by global cooling subsequent to the catastrophe of AD 535 are detected in tree ring thickness of bristlecone pines in Western North America (Salzer and Hughes 2007). Likewise, this change in climate caused unprecedented droughts in Mesoamerica, contributing to the collapse of the theretofore flourishing *Toltec* city-state of *Teotihuacan* (Keys 2000). Then, there were famines in the north of China potentiating the near-depopulation, by as much as seventy-five percent, of the *Wei Empire*—the causal ripple of which may explain subsequent shifts in the surviving population toward Buddhism, as the *Mandate of Heaven* had been evidently lost by the ruling elites (Gunn 2000). In the century that followed that catastrophe, the newly reunited Roman Empire of the Circum-Mediterranean region lost fully half of its territory (Keys 2000). The weakening of the population by hunger due to food scarcity, plus more localized disruptions of rodent populations, led to the outbreak of *Bubonic Plague*, which had hitherto been endemic and isolated, but which became epidemic and pandemic. At one point, the *Plague of Justinian* was killing up to ten thousand people a day in Constantinople and, at least according to Procopius, is estimated to have ultimately killed anywhere from fifty to one hundred million people throughout Europe and the Eastern Mediterranean region. Furthermore, Procopius (550/1935) also documents the outbreak of various wars and social disturbances during that period.[11] The climate change occurring during the beginning of the Late Middle Ages in Europe followed suit. Torrential downpours occurring during the summers and autumns of AD 1314–1315 caused massive flooding, leaving crops rotted in the fields. These same floods drowned livestock and thereafter actuated the *Great Cattle Plague* of AD 1315–1321, an epidemic of bovine Rinderpest affecting weakened cattle, which reportedly killed over sixty percent of the surviving cows and heifers. These disasters cumulatively led to what has been called the *Great Famine* of AD 1315–1317[12] which may have killed between ten and twenty-five percent of the populations of many European towns and cities. The resultant weakening of the human population by famine is believed to have set the stage for the *Black Death* epidemic of AD 1348–1351 (Jordan 1997), which was yet another outbreak of Bubonic Plague, variously estimated to have killed between one-third and two-thirds of the population of Europe.

But wait, there's more! A variety of authors have documented the adverse effects of the associated famine and pestilence upon the structure and function of the European societies of the Late Middle Ages, with organized warfare degenerating into brigandage and general lawlessness as social order and political authority deteriorated (Froissart 1404/1858; Goldsmith 1995; Huizinga 1924; Jordan 1997; Rosen 2014). Some have even concluded from all this that climate change almost routinely triggers social conflict and even genocide (Alvarez 2017). For example, using legal records, Gurr (1981) reconstructed homicide rates through English history. According to his calculations, during the thirteenth century, English cities, such as London and Bristol, had homicide rates below 15 per 100,000 individuals. This pattern changed drastically in the fourteenth century, with London increasing its rate to 44 per 100,000, whereas Oxford reached a rate of 110 per 100,000[13] (Gurr 1981). More recent examinations support Gurr's conclusions. For example, Eisner (2003) collected enough historical data from England, Scandinavia, The Netherlands, Belgium, Switzerland, Germany, and Italy[14] to create a *History of Homicide Database*. This database relied on national statistics, offering annual causes of death including homicide, and direct judicial or constabulary information concerning alleged murders. Eisner's (2003) calculations concluded that the average homicide rate during the thirteenth century and the fourteenth century was of 32 per 100,000 people.[15] Although Eisner provides averages for both centuries, the secular trend indicates an increase in homicide rates from the thirteenth century to the fourteenth century—a pattern consistent with Gurr's observations. Similarly, a slight increase was observed during the fifteenth century, with an average rate of 41 per 100,000 (Eisner 2003). Interestingly, even though the murder rate then decreased, during the fourteenth century, at the time of the crisis of the Late Middle Ages, it rose to 1178. With respect to battle deaths, the pattern indicated a general decrease in mortality rates (Eisner 2011).

Although one may consider the wealth associated with aristocracy, including monarchs, would offer a general protection against lethal violence, historical reconstructions indicate otherwise. For instance, 26 percent of Male English Aristocrats died due to violent causes between 1330 and 1479 (Hollingsworth 1965). Similarly, Eisner (2011) found the average regicide rate for the Early Medieval Period reached 1615 per 100,000 ruler-years. This value fell to 1221 per 100,000 ruler-years during the High Middle Ages and fell to 848 per 100,000 in the Late Middle Ages. As with the Four Horsemen of the Book of Revelations, *Famine*, *Pestilence*, *War*, and *Death*, it appears that these ostensibly unrelated calamities routinely follow closely upon one another, in a tragic cascade of consequences.

Returning more directly to the main point of this chapter—integrating Landers' work on medieval era demography into our chosen meta-theory—we do well to recall the preceding two chapters wherein the major driving forces of life history evolution were reviewed. Although the single selective pressure shaping life history strategies was originally believed to be population density, it was later overshadowed by the effects of extrinsic morbidity and mortality, especially among adults (Ellis et al. 2009). Recall, in this technical usage, *extrinsic* means uncontrollable by any genetically evolvable mechanism of the affected organisms. Unpredictable and unstable environmental hazards thus have a tendency to render the schedule of morbidity and mortality uncontrollable at nearly any age. Given these considerations, it is easy to predict that the famine, pestilence, war, and death, imposed in such abundance during the Early and Late Middle Ages, would bias natural selection to favor faster life history strategies for the duration of the affected historical period. As with the complex interplay among the forces unleashed by volcanic activity, sea ice, and ocean currents, there are also positive feedback loops at work that augment the complexity of human social biogeography.

It turns out that *fLH*-selected and s*LH*-selected human populations construct substantially different societies (Figueredo et al. 2017). Most s*LH*-selected societies are designed to be more socially egalitarian, communitarian, peaceful, and orderly, sporting a proliferation of cooperative networks and specialized division of labor that vastly enhance their economic productivities beyond what one would expect from an equal number of rugged, self-reliant individualists. In contrast, *fLH*-selected societies more closely resemble a Hobbesian *bellum omnium contra* *omnes*, with little social or economic cooperation, weakened to nonexistent central authority, and generally lower levels of rule governance among the population. Such *fLH*-selected societies are thus generally deficient in stable social institutions extending beyond the reach of kin networks, economic specialization and productivity, embodied human capital, and general cognitive development. The social, political, and economic chaos that predominates in *fLH*-selected societies thus feeds back upon itself. Faster life history strategies are further favored by evolutionary selection via: (1) the uncontrollable hazards to human development of economic deprivation and malnourishment; (2) hazards to health of untreated parasitic infections; (3) hazards to life and property due to unbridled criminality; and (4) hazards to the very fabric of society by the despotic kleptocracies that flourish in the absence of democratic institutions. The climatic shifts bracketing the High Middle Ages, in their punctuated alterations to the selective regime prevailing within Eurasia during the Neolithic, demonstrate the ecological substrate upon which *sLH*-selected societies ultimately depend. The historical record teems with examples of disintegrating social fabric following from twin eruptions of extrinsic mortality, the effects of which were to temporarily and partially expose Eurasia to relatively more *fLH*-selected mortality regimes. These two climatic perturbations undercut the stability upon which complex, stratified, centralized, and redistributive societies rested.

4 Evidence from Nordic History

In demonstrating the recovery of social stability within the Medieval Warm Period, we provide further supporting documentation regarding the effect of climatic variation on social complexity as exampled by Nordic societies. In the Nordic Lands, during the Early Middle Ages, warfare was largely reduced to raiding among rival chiefdoms over ephemeral plunder, devoid of any longer-range objectives or political consolidations. Lawlessness was rampant, as illustrated by the original meaning of the word *Viking*, which essentially means *pirate*. Contrast that with the behavior of the same ethnic group under the selective regime of the Medieval Warm Period, with its milder climate and boosted agricultural production. In doing so, consider the career of the Norwegian King *Haraldr Hárfagri* (*Fairhair* or *Finehair*; AD 850–932), who unified and pacified the Kingdom of Norway, as documented by Sturluson (1230/1976a). Throughout most of the following century, the Kings of Norway that succeeded him sought to consolidate these gains and establish Christianity throughout the realm. Under Harald's great great-great-grandchild, the Norwegian King *Saint Olaf II Haraldsson* (AD 995–1030), a Christian legal system and an ecclesiastical organization with a proper financial system was established. Furthermore, Saint Olaf established peace and security, renewed and enforced old laws, and simultaneously reduced corruption and intimidation (Jones 1984; Sturluson 1230/1976b).[16] The return to better and more stable societal organization once again enabled an anthropogenic selective regime favoring the *sLH*-selected. Again, this ethno-cultural group is but one instance of a general trend unfolding throughout Europe during the Medieval Warm Period.

Next, we briefly cite evidence of heightened mortality at the end of the Medieval Warm Period. Even though lethal violence is associated with reproductive success in some small-scale societies (Chagnon 1988; Escasa et al. 2010), it is resource monopolization that generated fitness differentials during the Middle Ages. Thus, Europeans involved in violent conflict experienced lower, not higher, reproductive success relative to that of commoners thriving as merchants (Clark 2008).[17] Following Hollingsworth's reconstructions (1965), Clark (2008) compared the life expectancy of English aristocrats between the fourteenth and the fifteenth century, documenting a spike in mortality. According to Clark, mortality due to violence not only impacted life expectancy for young aristocrats, but also affected the fertility rates of this group. Violence undermined whatever reproductive advantage that might otherwise have accrued to wealth and nobility. It was not until the eighteenth century, when homicides' rates and battle deaths declined, that aristocrats outcompeted the fertility of commoners (Clark 2008). Therefore, we have evidence, not only of heightened mortality as the Medieval Warm Period gave way to the Little Ice Age, but resultant effects on elite fertility, from which we can justifiably infer life history effects.

Chapter 4 has dilated upon the importance of soil and climate in producing Eurasian agricultural yields—yields, we point out, that afforded some measure of abundance above and beyond subsistence even before the transition to mineral economies. Chapter 5 explained Eurasian physical and community ecological factors by which intrinsic mortality predominated over extrinsic mortality. Chapter 6 then explained the relevance of densely assembled populations. Recall then, climatic conditions prevailing within the Early and Late Middle Ages disrupted all such factors. These factors are ultimate causes! They are drivers of life history evolution. As they changed, so did the population mean life history trajectory for European populations. We have here, within the historical record, an approximate *repeated measures design*—an experimental design wherein changes to a baseline are measured, as an independent variable is repeatedly introduced and removed. The climatic effects of the Early and Late Middle Ages are the most severe disruptions to the climatic stability prevailing after the last glacial maximum and through the Neolithic Era. Population life history means, inferred through the foregoing review of social history, can be seen chasing after these climatic variations as they shifted first this way, and then that, and then back again. All these considerations clearly apply to the social conditions in the Early and Late Middle Ages. We propose that these changes were, at least in part, due to the slowing of life history strategies consequent to the reduction in the extrinsic morbidity and mortality of the European population. The coming transition from organic to mineral economies emphasized by Landers remains greatly important, especially for its effects on absolute demographic increase; yet, this is postscript instead of preface.

Notes

1. *Fertility and Resources* is subtitled, *Thirty-First Symposium Volume of the Society for the Study of Human Biology*.
2. The broad-scoped and multi-disciplinary book titled, *Fertility and Resources: Thirty-First Symposium Volume of the Society for the Study of Human Biology*, following a symposium that took place at Magdalen College, Oxford, in April 1989, organized by the editors. The symposium itself was divided into the sections of control and distribution of fertility, fertility trends, fertility, and cultural factors. While the book was not organized into subsections, it had a broad scope that encompassed several fertility-related themes: (1) broad principles behind animal fertility variation; (2) discussion of fertility trends in pre-industrial Europe; and (3) reports and analyses of modern patterns of fertility in Third World countries.
3. The main idea of Landers' thesis within this work parallels evolutionary works by Corey Fincher, Randy Thornhill, Charles Nunn, and Sonia Altizer (cf. Nunn and Altizer 2006; Thornhill and Fincher 2014).
4. The cascade proceeds with recursive effects, as in time the development of resistance in urban centers can render new immigrants more susceptible to contamination than the average local metropolitan individual. Thus,

population dynamics are of central importance to Landers' thesis, given that he recognizes that population differences exist and affect their interaction and consequences to each. The topic of between-population differences would be explored more profusely in his later publications.

5. As warfare is commonly thought of as a destructive phenomenon, it may seem paradoxical at first that, by Landers' reckoning, it was warfare that evoked mineral economies. However, the genuine paradox is found in the self-defeating strategy of expansion. Organic economies, ever hungry for *energy inputs*, turned to territorial expansion to take what they could not produce. While they sometimes had sufficient energy inputs to field armies of conquest for the purposes of territorial expansion, organic economies did not naturally have, nor did conquest provide, energy inputs sufficient for sustainable growth. Given restricted energy inputs, military expenditure drains economies, while creating casualties and destroying estates, both of which were, because of these self-same energy inputs, prohibitively expensive to replace. It appears to Landers that the only escape was to developing mineral economies, which at once augmented the effectiveness of armies and navies, while making it less necessary to use those armies and navies to confiscate resources from rivals. Again, we stumble upon a cascade effect in pre-industrial societies: from the harshness of organic economy and the necessity for more resources to warfare, to unsustainable growth, and ultimately to the development of mineral economies. The scramble for energy inputs among rival societies produced *Red Queen Effects* by ratcheted up competition leading toward mineral economies. Several times, Landers used the term Red Queen, as below:

   > Sometimes total output was increased by allowing more of a given factor, such as labor, to be applied productively at lower unit returns. Such Red Queen innovation was common in pre-industrial agriculture because demand pressure often made it necessary to raise total production at the price of declining returns. (Landers 2003; p. 49)

   This is a term traced to Lewis Carroll, whose fictional Red Queen explains that one has to run ever faster simply to stay in the same place. This is the nature of evolutionary competition, as animals become locked in arms races, each evolving adaptations to keep ahead of the other. Often, relative positions stay the same. Though applied most often to interacting organisms, Red Queen Effects can be applied to groups. Though this is a fascinating line of historical pursuit, and one we were also tempted toward by Toynbee, it is better broached within a book on group selection.

6. While he may have garnered critics who perceived this work and his broad collection as somewhat disjointed or difficult to demonstrate conclusively (e.g., Moakyr 2005), Landers' efforts are more commonly seen as an original view on history. As Landers (1992, p. 47) himself pointed out, although certain analyses may be at first perceived as simplistic or Eurocentric, "it remains true that the range of possible relationships between demographic variables and their determinants is not unlimited and that it can be usefully elucidated by historical studies." Thus, Landers examined historical examples, not to understand only those particular cases, but rather to identify patterns, forces, and pressures that, while not repeating exactly in the same way, permit us to understand trends in the stages of how societies develop, thus aiming to establish the "limits of the possible, and the contours of the probable […] than to truly historical concerns with the specificity of time and place" (Landers 1992, p. 47).
7. For instance, "smaller families" are chosen so that "parents could concentrate more attention on each child" (Landers 1990, p. 94). This is certainly partially true, though such choices may themselves be consciously and unconsciously influenced by other factors—in addition to being related to evolved life history strategy.
8. The Medieval Warm Period is at least characteristic of the North Atlantic.
9. Unfortunately, this global warming also produced massive *mega-droughts* in other regions of the world, such as Western North America, West Africa, and Equatorial East Africa (Herweijer et al. 2006; Seager et al. 2007; Shanahan et al. 2009).
10. The energy released by that explosion is estimated to have been equivalent to have been about two billion times that of the atomic blast that destroyed Hiroshima. The mysterious "dry fog" that it produced was reported by multiple chroniclers from Europe to China (e.g., Procopius of Caesarea 550/1916).
11. Such effects were not unique to that singular event. In a study of a range of small to complex societies in Ancient Mexico and Central America, the effects of multiple instances of explosive volcanism of varying severities were explored (Sheets 2012). Thirty-six cases were sampled, spanning a range of social complexity and political organization from egalitarian communities of hunter-gatherers and horticultural villagers to sociopolitically stratified states. All were adversely affected by the climatic and ecological dislocations caused by the explosive eruptions.
12. The temporal extent of the Great Famine is sometimes extended by historians as far as AD 1322.
13. It is estimated that one-third of the homicides in Oxford were perpetrated between unacquainted low-status males.
14. Of note, the author considered the Italian estimates as unreliable.

15. When looking to individual countries featured in this analysis, England exhibited the lowest rate out of the seven countries (23 per 100,000 individuals), whereas The Netherlands and Belgium had the highest (47 per 100,000).
16. To continue with the example of the Norse (Chibnall 2006):
    - Although since about AD 820 the Vikings had been raiding along the Seine, in AD 911 the Norse leader Rollo established a legitimate Duchy of Normandy in the north of France by a treaty with King Charles III of West Francia and agreed to end his brigandage henceforth;
    - In AD 1060, these same Normans initiated the conquest of Sicily and established first a principality and then by AD 1091 a full-fledged Norman Kingdom of Sicily;
    - In AD 1066, these same Normans initiated and completed the conquest of England and established a lasting and stable monarchy under William the Bastard.

17. Conflict's fitness payoffs and life history effects, as they differed in northerly and southerly climates, will be taken up in Chapter 12.

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PART II

Section Metacommentary

In Part II of this volume, we started with the work of Price. Price was an interesting case as he was both a meticulous scholar and an agent of social change. In the first of these roles, he addressed scientific questions now known to be crucial to understanding life history evolution. Although the earliest models of life history evolution assumed that population density was the most important selective pressure shaping life history, later research revealed that the severity, predictability, and controllability of the morbidity and mortality to which populations were subject loomed larger as determinants (Ellis et al. 2009). Furthermore, the consequences of mortality change as a function of age; for example, adult mortality selects for faster life histories much more than does infant mortality. Mortality's asymmetrical effects across the lifespan are probably attributable to the fact that infant mortality could often be mitigated by parental care, whereas adult mortality could not be as readily attenuated, reflecting the age-old conundrum, "*quis custodiet ipsos custodes?*" Evolvable behavioral adaptations such as parental care could thus render partially intrinsic, what was previously extrinsic.

More than simply aggregating mortality rates, Price's visionary life tables enabled proactive preparations for predictable mortality outcomes by empirically observing relative mortality frequencies in the population, from which expected individual deaths could be estimated via extrapolation. This permitted microeconomically optimized social adaptations to make provisions for surviving dependents of the deceased, extending human parental care and kin-selected altruism beyond the grave. The social impacts of Price's efforts were thus a premier example of niche construction. However morbid it might have seemed to critics, Price's careful calculations promoted the rational management of the individual and societal risk associated with death itself. This virtual taming of the *Chaos Dragon* (*Tiamat*) had been, since six thousand years ago "when kingship came down from Heaven," the socioreligious aspiration of civilized peoples of Sumerian and Akkadian city-states. As originally predicted by Price, the aggregate slow life history strategies of populations became self-reinforcing through positive feedback loops, albeit in novel and unanticipated ways.

Malthus, on the other hand, steadfastly defended the relevance and ramifications of raw population pressure on the human condition. Like Price, Malthus was also driven by humanitarian and meliorist motives, hoping to blunt the brutal consequences of overpopulation with respect to resource availability. Also similarly to Price, Malthus' *positive* prescriptions are characteristics of a *sLH*-selected extended phenotype's efforts to control environmental conditions. Bids to restrain population increase from outpacing resource production are seen in Malthus' advocacy of financial prudence and foresight, alongside restricted births within the context of delayed marriages. Although Malthus' tough mindedness on such matters was itself caricatured by critics as cold, cruel, and calculating, his expressed moral intentions were to avoid the otherwise inevitable human suffering that would ensue from the famine, pestilence, and civil strife that he saw as the natural *sequelae* of overpopulation.

The work of Landers takes us back to the physical and biological bases of human subsistence, situating human population dynamics, including age-dependent regimes of morbidity and mortality, within the bioenergetic constraints imposed by the sustaining ecology. In contrast to Malthus, Landers reminds us that these forces are only partly anthropogenic. Like Baker, covered in Section I of this volume, Landers derives social phenomena from what Marx and Engels (1848) called "the material conditions of existence," which are themselves rooted in the biophysical realities of the prevailing subsistence economy. Nevertheless, Landers sees the pre-industrial organic economies, represented by the *Field*, as setting this dismal *Malthusian Trap*, while he sees the post-industrial mineral economies, represented by the *Forge*, as providing a partially anthropogenic way out. However, the *Forge* offers reprieve rather than release, as contemporary industrial societies are now butting up against the planet's limited supplies of non-renewable mineral and fossil fuel resources. Ultimately, our collective salvation might therefore not lie "among these dark Satanic mills" (Blake and Keynes 1809/1952).

Thus, Landers recognized that the anthropogenic historical forces, which we here present as instances of niche construction, were *proximate*, and at the mercy of exogenous, and largely unknown, *ultimate* determinants. We ended our consideration of Landers by locating some of these ultimate determinants in recently described climatological phenomena; phenomena which we subjected to extended analysis descriptive of their social *sequelae*. Notable among these is the baneful influence of volcanic activity upon the planetary climate, which appears to have intermittently, unpredictably, and uncontrollably altered the bioenergetic constraints imposed on human populations by their prevailing subsistence economies. These constraints are typically referred to in ecology as the *carrying capacity* of the environment and notably symbolized by the *K* of early "*r-K*" life history theory. Such variations of extrinsic origin unexpectedly wreak havoc upon human population dynamics and life history strategy, potentially confounding even the most prudent management schemes recommended by Price and Malthus. Indeed, many of the civilizational collapses, such as that experienced by the Classic Lowland Maya during the Medieval Warm Period, formerly attributed almost exclusively to human selfishness and shortsightedness (Diamond 2005), are now largely attributed to repeated and prolonged periods of drought (Kuil et al. 2016; Turner and Sabloff 2012). As with the European crises of the Late Medieval Period, these climatic disturbances were indeed exacerbated by "complex human-environment interactions," which added a partially anthropogenic catalyst to the catastrophe. Although the ultimate causes might have been the sudden and unexpected lowering of ecological carrying capacities, rather than the surpassing of those natural limits by unbridled population growth, the human behavioral contributions to, and sociological consequences of, the resulting crises were closely parallel to those originally foreseen by Malthus.

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PART III

Toynbee, McNeill, and Casey

CHAPTER 8

Arnold Joseph Toynbee: The Role of Life History in Civilization Cycling

1 A Life in Comparative History

"His name was a burden in itself…" It is thus, that William McNeill, the world historian featured in the subsequent chapter, opens his biography of Arnold Joseph Toynbee, so named for a *famed* uncle and *spectacularly successful* grandfather. Only *heroic* achievement wrought of native ability, cultivated through stalwart industry, enabled Toynbee to shoulder, and then supersede his burden. Toynbee's industriousness was legion. Forsooth, with respect to any notion of balance, or of happiness, his industriousness was ruinous. Like a sprinter exploding forth at the sound of the starting shot, Toynbee began each day the same as the last; with a "fanatical, and on occasion, frenetic dedication to work," against which his mother warned and his wife remonstrated. One son recollected his father, his face a "mask of nervous irritation," rebuking him as a *nuisance* for intruding upon the silence so necessary for sustained work. Through the early derangement[1] of his father and later estrangement from his mother, through the First and Second World Wars, through the caprice and subsequent separation from his first wife,[2] through crises of faith and fits of ennui, through the political apostasy of one son and the suicide of another…through all, Toynbee labored.

Expansive though it is, *A Study of History*, most especially its first six volumes, was written in the spaces and summers afforded by the completion of innumerable commissioned works. But there it was always in his thoughts; this grand comparative study of civilizations generated

S. C. Hertler et al., *Life History Evolution*,
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of "prolonged, private, privileged study" (McNeill 1989; p. 133).[3] As a student *greedy* for accolades, Toynbee wished to become a *gigantic historian*; proportions that did indeed accrue to him, not simply from breadth of focus and voluminous output, but also from the philosophical largess pervading his writings. Even as sweeping histories fell from favor, Toynbee always insisted that particular events derive meaning from their place within the whole. To an extent this is true, but, belying this rationalized apology, was a native aspect of temperament bent to the rise and fall of civilizations that played out amidst his nursery toys and marked his earliest composition.[4] In actualizing his ambition, Toynbee increasingly aroused the professional scruples of contemporary academics, one of which regarded Toynbee as more prophet than historian.[5] In his later years, Toynbee conducted an intensive study of Hannibal, which had the intended effect of rehabilitating his credentials among the mass of specialist historians then extant, and rapidly proliferating. Barring this attempt at ingratiation, Toynbee characteristically set his chin at defiance, as can be seen in his defense of H. G. Wells', *The Outline of History*.[6] In a thinly veiled self-defense nested within the introduction to the first of twelve volumes, Toynbee swipes at the carping specialists, happy to *traverse their tiny allotments*, while failing to appreciate what they could neither conceptualize nor attempt: A "long journey through Time and Space…re-living the entire life of Mankind as a single imaginative experience" (Toynbee 1951; volume I; pp. 4–5).

2 Firefly Flashes of Historical Insight

Nearly thirty years after reading Oswald Spengler, *teeming with firefly flashes of historical insight*, Toynbee registered his reaction, replete with the consternation that his great project had been anticipated: "I wondered at first whether my whole inquiry had been disposed of by Spengler before even the questions, not to speak of the answers, had fully taken shape in my own mind"[7] (McNeill 1989). Yet, as Toynbee ultimately recognized, Spengler explicated the laws of civilizational cycling without satisfactorily explaining the nature of their processes. If Spengler told *what*, Toynbee could explain *why*. Like Spengler, Toynbee saw patterns amidst historical noise. These cyclical patterns, recurring across millennia, presented themselves to his attention the more he read and wrote. Though he had not yet composed *A Study of History*, or so many other volumes on which his reputation would rest, Toynbee's philosophy of history matured in the 1920s. What he then sorely lacked was a cache of data accruing to decades of reading, so indispensable to the comparative historian. Much reading, and also traveling, working, writing, teaching, and lecturing, eventually yielded the empirical store of knowledge that came to fill twelve volumes of his magnum opus, which might otherwise have been communicated in two volumes if restricted to presenting his patterned philosophy of history.[8] From his hard-won perch, Toynbee could, for instance, recognize cultural continuities extending between distant civilizations through the medium of universal religions: Modern Western civilizations were affiliated through the Christian Church to Hellenic Civilization; Asian civilizations were affiliated through the Mahayana to the Sinic Civilization; Hindu Civilization was affiliated through Hinduism to the Indic; Iranic and Arabic civilization through Islam to the Syriac (Toynbee 1951; volume VII; p. 393). Repetition of this empirical process of comparison would follow for scores of pages, rendering Toynbee's conjectures compelling.

For Toynbee, decline and fall inevitability arose from inextricable *flaws in human nature*. Following the dissolution of one civilization, either through catastrophic war, overextension, or the disaffection and disenfranchisement of the populace, a "dominant minority" regroups, stabilizes and brings peace to the region, and anon, forms a new state. Initially, this dominant minority wins the allegiance of the masses. By and by, the leadership falters and degrades, and tries to compel with force what it had earned with ability.[9] From such decline comes the fall:

> We have seen that, if and when a civilization begins to lose its creative power, the people below its surface and beyond its borders, whom it is all the time irradiating with its influence and attracting into its orbit, begin to resist assimilation, with the result that the society which, in its age of growth, was a social unity with an ever expanding and always indefinite fringe, becomes divided against itself by the sharp lines of division between a dominant minority and an internal and an external proletariat. The minority, having lost the power to influence and attract, seeks instead to impose itself by force. The proletariat, inwardly alienated, remains in, but not of, the disintegrating society until the disintegration has gone so far that the dominant minority can no longer repress the efforts of the proletariat to secede. In the act of secession, at length accomplished, a new society is conceived. (Toynbee 1951; volume I; pp. 187–188)

By virtue of its brevity, the foregoing passage is but an imperfect ambassador, but nonetheless tolerably represents the Toynbean process of internal decadence, decline, decay, and dissolution. Be that as it may, there is another aspect to the final process of dissolution: Loosed from within, bonds are sundered from without. This more complex interaction between internal weakness and external pressure is captured metaphorically by Toynbee (1951; volume I; p. 135) as he likens a defunct civilization to an "old tree whose roots decayed until the wind tore them up and overthrew the solid trunk." When despotic compulsion replaces voluntary allegiance, citizens of the state and subjects of the empire, in spite of some semblance of outward conformity, withdraw their allegiance, and though they may not transfer it to a rival state, leave their own state open to capture and conquest (Toynbee 1951; McNeill 1989).

Failure of the dominant minority, whether through ineptitude or treachery, is compounded by the proletariat's own declension; a disease which taints the "soul and life-blood and marrow and pith and essence and epitome" of the civilization (Toynbee 1951; volume V; p. 200). Victory brings with it complacency; sustained security elicits relaxation and invites decadence. By way of example, in Rome, after Hannibal was vanquished and Macedon could no longer mount a challenge, hegemonic security ushered in an advanced state of decay, such that a handsome boy and a container of caviar were more valued than land. Once this malady is advanced, not even a philosopher king, acting competently as well as benevolently, can revive the state whether or will he tries to revert to what was (*archaism*) or summon what could be (*futurism*). Indeed, the very attempt to escape the present is symptomatic of decline. However, centuries may separate the onset of declension and the culminating fall. The process of declension is so protracted because Toynbee locates its beginning phases at the point where most see only the peak of mature strength. A stellar analogy suggests itself in reviewing Toynbee's writings; truly, a civilization is like a star in all its phases. There is a time in which a star's gasses are just coalescing, just as a civilization's peoples first cohere into a body politic; this is followed by a steady, mature phase for both star and civilization; thereafter, expanding enormously, a star becomes a red giant, just as the civilization becomes a universal state or vast empire; this is followed by the star either collapsing into a black hole or white dwarf, like the universal empire that creates a power vacuum as it recedes to a small dense nucleus or scatters its remnant peoples to the winds. So, like the star that has expanded into a red giant, the civilization that has expanded into a universal state is in its early phases of decline, unsustainably irradiating power and prestige throughout the world to the detriment of its internal cohesion.

3 The Hallucination of a Wanderer Lost in the Forest

Though he rested his hopes of surpassing Spengler via superior causal explanation, it was precisely in the arena of explanation that Toynbee first faltered; for, at the outset, he seemed to reject the lens of Western science, with its fixed laws and reductive methods, in favor of mythical and religious allegory, pivotal leadership, and particular descriptions. Being thus broadly skeptical of reductive arguments, it follows that he specifically rejected nascent biological and environmental explanations of civilization, likening their logic to the "hallucination of a wanderer lost in the forest, who has turned and turned again in an ever narrowing circle till he cannot see the wood for the trees" (1951; volume I; p. 270).[10] Even while valuing an inch of progress gained toward understanding human nature above all rival forms of knowledge,[11] Toynbee foreclosed on the promise of what we would now call evolutionary ecology; at least he did so initially for reasons evident in his philosophical introduction to *A Study of History*. He cannot justly be blamed for so doing. After all, nascent biological and ecological theories of civilization were then suffering from a want of data in the fields of evolution, genetics, ecology, and paleoclimate. Additionally, as a matter of course even now, biological explanations are treated separately from ecological explanations, rather than viewing ecology as constraining biological evolution. Compounding these impediments, Toynbee demanded that any correlations generated by reductive theories "must be demonstrated to be fixed and permanent." A scientific *law*, he insisted, "must maintain itself in every instance under all conditions" (Toynbee 1951; volume I; p. 253). Such a demand could neither be met by evolution, which is after all a historical process (Eldredge 1991; Avise 2007) subject to randomness (Bonner 2013), founder effects (Bhattacharya et al. 2007; Slatkin and Excoffier 2012), accidents of migration (Cavalli-Sforza 1966; Harpending et al. 1993), and bottlenecks (Ambrose 1998; Hawks et al.

2000), or by climate, which varies across locales of the same biome, and has been subject to significant change even within recorded history (Hetherington and Reid 2010; Trauth et al. 2007; deMenocal 2011; Donges et al. 2011; Stewart and Stringer 2012).

Notwithstanding these exacting expectations, we do well to recall that *A Study of History* was written over decades by an author learning, maturing, and changing. While he continued to reject population dysgenics as a reason for civilizational decline,[12] subsequent volumes belie Toynbee's initial repudiation of reductive accounts; volumes which manufacture multitudes of generalizable laws lending themselves to biological interpretation. Take the slate of *challenges and responses* appearing in the second volume, delineated into *The Stimulus of Blows*, *The Stimulus of Pressures*, and *The Stimulus of Penalization*. Civilizations are born of blows, which must neither be *insufficient* nor *excessive*. Moorish incursions, first on the Aragonese and then on the Castilian border, stimulated Spanish Christian populations to ever higher heights of civilization; then, there is the stimulation of the temperate zone, lying between the climatic harshness of Maine and Canada and the permissiveness prevailing below the *Mason Dixon Line*[13]; or consider the penalization and persecution differentially expressed in the Jewish diaspora. Toynbee is in effect cataloguing selective pressures as they are discussed within the evolutionary literature. As our premise runs, *Toynbee was ever and anon describing human evolution, as traduced through civilizational history*. As such, the evolutionary explanation might be harnessed to produce several volumes of reinterpretation on the rise, decline and fall of civilizations as they are treated in A Study of History. An applied review of group selection, for instance, might illuminate state formation and dissolution. Likewise, Toynbee's climatic interpretations are prime for evolutionary ecological explanation. Notwithstanding, we must be satisfied with using life history theory to skeletally reinterpret the patterned rise and subsequent internal decadence that seems to recur as inevitably as organismic senescence.

"Abel has been slain by Cain." At least so it was in the long view of history. Towers, walls, moats, and defensive structures of all varieties demonstrate that early outposts of civilization were mercilessly raided by unsettled nomads, with many an Abel killing many a Cain. However, in the fullness of time, "Western Civilization has swept Nomadism off the face of the Earth, almost without noticing what it has been doing, as one incident in the titanic social revolution…". This is evolution! The settled agriculturists represented by Abel were relatively more *sLH*-selected, conceivably being non-randomly higher in conscientiousness, altruism, future-oriented anxiety, planning ability, intelligence, and other traits associated with slow life histories. Thereafter, as settlements grew to towns, cities, and nation states, they neutralized the threat of nomadic raids from without by degrees, only to replace it with the threat of decay from within. Extending the cooperative venture of small settlements to the national level, however difficult to initiate, proved more difficult to maintain. Virile, new societies ran the gauntlet, effectively defending themselves from nomadic raiding, not to mention rival states. At birth then, they are systematically *sLH*-selected, relative to their nomadic rivals. The selective pressures associated with state formation, however, slowly relax as the state matures. Entropy ensues. It does so especially when civilizations become hegemonic universal states free from the fitness-enhancing group selective pressures that come in the guise of war and competition. Within walls erected against external conquest, no matter if they are the stone ramparts of Constantinople, riverine, or montane barriers, or a phalanx of mercenary arms, there arises a changed selective regime, increasingly opening niches to the *fLH*-selected who become Machiavellian leaders, free riders, psychopathic manipulators, thieves, mendicants, adulterers, and dissidents. The *fLH*-selected throve in the randomness outside of the walls, and now come to thrive on the increasing anonymity, trust, and abundance, within the walls.[14] Like a parasitized host, *sLH*-selected founders slow the process of decline that comes before the fall by imposing rules, regulations, and penalties not limited to corporal punishment, shaming, banishment, branding, disfiguring, disenfranchising, and executing. Notwithstanding, the self-interested, again stemming disproportionately from *fLH*-selected populations, need not themselves bring the state to its knees; no, they only need to undermine the social contract, betray the trust of the populace, and attenuate returns to disinterested patriotism, all of which prostrates the state internally, leaving it ripe for external conquest.

Biology is at the center of this reinterpretive thesis. Civilizations rise in part from the biological capital in their possession; biological capital that is maintained via Toynbee's concept of *civilizational challenge* with its stimuli of *blows, pressures*, and *penalizations*, which are nothing but unidentified instantiations of group selection. After sweeping away all rivals, the hegemonic state removes the *challenges and responses*, or in other words, the group selective pressures characteristic of the growth phase.

Decline follows. Recall, we are never told what it means for the "soul and life-blood and marrow and pith and essence and epitome" of peoples to degrade. Substitute soul and its related derivatives for *fLH*-selected biological capital, and we may have our answer. It would then follow that even a reactionary philosopher king cannot revitalize the civilization, as civilizational strength is lost with biological capital.

4 The Tipping Point

If this simply reads like a reiteration of Toynbee and like-minded declinists, one should not fail to appreciate the species of decline we are advancing. Once more, the internal decay is, in part, a biological decay.[15] Decadence is regression; a slide back toward a more *fLH*-selected point on the life history continuum. As Toynbee did himself, the reader may fail to appreciate the evolutionary processes evident in the pages of A Study of History. It is customary to mentally segregate biological evolution from historical events. Yet, an eruption of recent literature speaks to the contrary, and in various ways, blurs such boundaries, suggesting humans, complete with the cultures they create, are both products and drivers of evolution (Henrich 2015; Laland et al. 2010; Richerson et al. 2010; Gintis 2016; Boyden 2013).

Moreover, before dismissing the possibility, call to mind arguments from Chapter 2, wherein the speed and nature of evolution were addressed. Exampled by Jewish, Tibetan, and Inuit populations (Winegard et al. 2017), evolution effects detectible, directional population-level change in the course of three or more generations, which corresponds to the time frame of decline documented by Toynbee and other declinists. In addition, recollect that the present species of evolution does not proceed piecemeal, but rather changes the constituent traits comprising the life history complex *en masse* (Werner 1988; Stearns 1989; Wolf et al. 2007). Going further, evolution does not require death, but only differential reproduction (Betzig 1986; Birkhead and Møller 1996). In other words, a Ciceronian patriot need not die, but only has to be outnumbered by the progeny of self-serving masses. Well before eradication, there comes a *tipping point*, for life history speed and other factors, biological and bio-cultural, that hollows out the population, leaving it vulnerable to internal capture by self-serving leaders, and to external conquest by more *sLH*-selected rivals.

Notes

1. Toynbee's father, Harry Toynbee, had become depressed and thereafter institutionalized while Arnold Toynbee was yet young. In addition to depriving him of the support of his father, this event instilled in the younger Toynbee a fear that he would follow in his father's footsteps, and in kind, lose his rational faculties (McNeill 1989).
2. In his preface to the seventh volume of *A Study of History*, Toynbee remarks on an excessive interregnum between this volume and the last. In between came the Second World War, and what he alludes to as turmoil within his life comparable to that outside his life:

    > The world around me and within me had, indeed, met with a number of challenging and transforming experiences in the course of the nineteen years and more that, by the summer of a.d. 1946, had already passed since the first of the original notes for the book had been written. The focus and perspective in which the earlier millennia of the Age of the Civilizations presented themselves to the eyes of our generation had been appreciably modified in the meantime by further discoveries in the field of Archaeology. The prospects of a contemporary Western Civilization, … had become clearer and graver since the National Socialist movement in Germany had given to Western Man—and to his non-Western contemporaries likewise—a horrifying practical demonstration of the moral depths to which the heirs of a Christian civilization were capable of dragging themselves down. A new dimension of the Spiritual Universe had been brought to light by the psychologists, and a new dimension of the Material Universe by the atomic physicists. An Einstein and a Rutherford, a Freud and a Jung, and a Marshall and a Woolley, as well as a Gandhi, a Stalin, a Hitler, a Churchill, and a Roosevelt, had been changing the face of the Macrocosm; and at the same time my inner world had been undergoing changes which, on the miniature scale of an individual life, were, for me, of proportionate magnitude. (Toynbee 1951; volume VII; p. vii)

3. Jealous of the time invested in his writing of *A Study of History*, Toynbee's wife dubbed it the *nonsense book*, a name which Toynbee became accustomed to and began to use himself.
4. His earliest surviving composition features rivals *Peppo* and *Pug* vying for supremacy: "Your generation will grow slovenly and cowardly and shall be beaten down by the nation called men. … But soon men will begin to

fight each other and get disorderly, and then will Peppo's children rule all men" (McNeill 1989; p. 8).

5. This was Pieter Geyl quoted by McNeill (1989; p. 256).
6. Illustrative of his defensiveness in this regard, this is the referenced passage wherein Toynbee seemingly uses H. G. Wells as a stand-in for himself, as he defends the grand project of historical synthesis:

    > At the furthest, the term is extended to cover the interim reports upon such work which are contributed to learned journals or to synthetic histories. There is a strong tendency to depreciate works of historical literature which are created by single minds, and the depreciation becomes the more emphatic the nearer such works approximate to being 'Universal Histories'. For example, Mr. H. G. Wells's The Outline of History was received with unmistakable hostility by a number of historical specialists. They criticized severely the errors which they discovered at the points where the writer, in his long journey through Time and Space, happened to traverse their tiny allotments. They seemed not to realize that, in re-living the entire life of Mankind as a single imaginative experience, Mr. Wells was achieving something which they themselves would hardly have dared to attempt—something, perhaps, of which they had never conceived the possibility. In fact, the purpose and value of Mr. Wells's book seem to have been better appreciated by the general public than by the professional historians of the day. (Toynbee 1951; volume I; pp. 4–5)

7. As per McNeill, this is taken from Arnold J. Toynbee's, *Civilization on Trial*, pp. 9–10.
8. First, it should be said that there are many editions of Toynbee's *A Study of Civilization*, only some of which are unabridged within twelve volumes. The reference to his philosophy of history being presented in two volumes refers to the abridgement undertaken by D. C. Somervell, partially with Toynbee's cooperation, which achieved its length by excising, not only digressions and asides, but the historical examples that supported Toynbee's cyclical view of civilizations.
9. Toynbee compares the flute of the snake charmer with the whip of the overseer, noting that when the charm ceases to work, the whip is resorted to, but this only hastens dissolution and revolt.
10. In spite of this philosophical position as set forth formally in the introduction to *A Study of History*, there and elsewhere, Toynbee goes on to treat the ideas of Huntington with due consideration, while also invoking environmental explanations in subsequent volumes. For instance, in

volume II, in an annex or appendix beginning on page 413, Toynbee is most clearly favorable to Huntington, and heaps great honors upon his head, including that of broadly agreeing with his thesis of climatic effects and climatic variation through time. Toynbee begs only to differ with Huntington on the application of his theory in two particular instances; these are times where Toynbee perceives inconsistent application, and takes Huntington gently to task. Toynbee follows his own theory that climatic stress is stimulating; those environments most stimulating do not permit ease, because ease promotes indolence; but neither are they too harsh, because this becomes crushing.

11. This valuation is taken from the following excerpt:

> Yet, if it were true, as has already been suggested in this chapter, that a mile gained in the progress of Man's control over Non-Human Nature is of less importance to him than an inch gained in the enhancement of his capacity to deal with himself and with his fellow men and with God, then it was conceivable that, of all Western Man's achievements in the twentieth century of the Christian Era, the feat that would loom largest in retrospect in the epimethean view of Posterity might be the breaking of new ground in the field of insight into Human Nature. (Toynbee 1951; volume VII; p. 496)

12. In volume four, beginning on page 14, Toynbee overtly rejects eugenic arguments; insisting that the decline of the civilization does not derive from the decline in its biological capital.
13. The great problem with Toynbee's survey is this overgeneralized dichotomy between permissive and harsh ecologies. There is little attention to what the individual stressors are; specifically whether they can be met or managed, even as he is elsewhere and otherwise sensitive to such distinctions. We see this in one critique of Huntington, in which Toynbee charges inconsistency. Partial desert climates, he thinks, should be ranked as more stimulating in Huntington's scheme. To his utmost credit, Toynbee recognizes a golden mean in climate, such that he realizes, for instance, extremely high latitudes can be excessively cold. However, while he recognized that a climatic stressor can pass beyond the point of diminishing returns, Toynbee did not consider whether that stressor could be managed with ingenuity or had to be passively suffered, as Huntington seemed to do.
14. In addition to regression along the life history continuum, social amplification epistasis models can potentially explain some of the variances. Social epistasis is the accumulation of spiteful and deleterious mutations

accruing to a population that has stayed itself from the sharpest cutting edge of evolutionary selective pressures by virtue of anthropogenically engineered environments. Woodley of Menie, Sarraf, Pestow, & Fernandes (2017).

15. We use the word decay here for the sake of continuity, and because the *sLH*-selected society is really in the process of decay. Notwithstanding, the reader should note that *fLH*- versus *sLH*-selection should *not* be read as inferior or superior; one is not inherently better than the other. From a Darwinian perspective, this process is just a response to selective pressures.

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CHAPTER 9

William H. McNeill: Epidemiological and Biogeographical Perspectives on Civilization

1 Painting on a Big Canvas

With an interlude at *Cornell University* where he took his Ph.D., William H. McNeill spent his academic life at the *University of Chicago*, from whence he obtained his bachelor's and master's degree, before returning to serve as *Robert A. Millikan Distinguished Service Professor Emeritus* in the Department of History. Alan R. H. Baker, our geographical historian featured in Chapter 4, credits McNeill with having revivified *a new world history* in the cast of Oswald Spengler and Arnold Toynbee. Indeed, McNeill (1989) admired Toynbee sufficiently to write his full length biography. In turn, Toynbee admired McNeill, saying of his *The Rise of the West*, that it is "the most lucid presentation of world history in narrative form that I know."

Reading McNeill's account of Athens (1979; pp. 94–148) justifies Toynbee's high opinion. Therein, McNeill contrasts Athenian culture circa 500 BC with that of 400 BC. In that space of time, Athens transitioned from the head of *Delian League*, to subsidiary within the Spartan-led *Peloponnesian League*; from hegemon of the Aegean to subordinate polis; from democracy to oligarchy; and from the collector to the payer of tribute. McNeill's narrative of Athenian decline is especially interesting when read in the context of group and individual selection, as described in *multi-level selection theory*[1] (Keller 1999; Reeve and Keller 1999; Leigh 1999). Athens in the year 500 BC had checks to social stratification naturally arising from the use of the phalanx and trireme; for,

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whether guarding the flank of one's fellow soldier or pulling on an oar for the polis, most men found place and esteem within the social nexus. In turn, the encomiums and emoluments accruing to elites were but little resented because they were thought to have been well-earned. This period of Athenian history was further marked by solidarity, political involvement, public service, a tradition of heroism that was emulated, and a robust set of freedoms that were defended. From this state of affairs, McNeill describes decline toward mutual distrust, disinvestment in public life, cession of political responsibilities to professionals, outsourcing of military duties to mercenaries, and philosophical specialization that was erosive of civic engagement. Reminiscent of Toynbee, McNeill locates Athenian civilizational decline precisely in the midst of cultural efflorescence. The most lasting and valued cultural exports of the Athenian world, Platonic philosophy, Euripidean tragedies, and Gorgian skepticism, for example, were symptomatic of decadence. McNeill seems to be suggesting that the spare, hard, cohesive aggregates, supportive of civilizational growth, are like the stem of a plant from which the flower of complexity, culture, and learning briefly blooms. McNeill's own metaphor is geological:

> Civilizations may be likened to mountain ranges, rising through aeons of geologic time, only to have the forces of erosion slowly but ineluctably nibble them down to the level of their surroundings. Within the far shorter time span of human history, civilizations, too, are liable to erosion as the special constellation of circumstances which provoked their rise[2] passes away, while neighboring peoples lift themselves to new cultural heights by borrowing from or otherwise reacting to the civilized achievement. (McNeill 1963; p. 249)

While McNeill could descend into particulars of individual civilizations, as he did in the case of Athenian culture, "his comparative advantage as a historian lay…in painting on a big canvas" (McNeill 1992; p. xv). Cataloguing historical anecdotes from which he wrought broad generalizations, McNeill was able to proceed from induction to deduction with incredible celerity. Drawing on his stock and trade as a world historian, McNeill demonstrated competence in the areas of specialization for all those authors preceding him in this volume: In his treatment of biogeography, McNeill (1963) reads like Huntington; in his treatment of frontier communities, McNeill (1983) reads like Crosby; in his treatment of agricultural yields, McNeill (1963) reads like Baker; in his treatment of mortality, McNeill (1998) reads like Price; in his treatment of population, McNeill (1990) reads like Malthus; in his treatment of procreation, McNeill (1979) reads like Landers; all while treading comfortably in the wake of Toynbee.

2 Epidemiological World History

For all the acknowledged similarities with other world historians like Toynbee,[3] McNeill distinguished himself, not by exhaustively cataloguing societies, but by writing something approaching what might be called *bio-history*, as can be seen in an autobiographical accounting:

> I have emphasized the role of demography in human affairs and tried to show how politics rides on currents of biological ebb and flow. Only by recognizing these levels of human life and the constraints and possibilities they offer to conscious and deliberate management can we expect to become more nearly able to navigate successfully amidst the tumult of our times. (McNeill 1990; p. 70)

Demographic pressures were appreciated as the forerunner to conflict and social change in McNeill's reckoning. Altogether, McNeill is Malthusian. By way of example, he describes Japanese imperialism as motived by domestic population pressures. The Japanese, like the Germans, were looking for *lebensraum*. Further afield, McNeill convincingly traces the assassination of Archduke Ferdinand by Gavrilo Princip to population expansion beginning around 1750; population expansion that advanced in retrained sawtooth fashion before rocketing upward on the contrails of industrialization. The association, not claimed as deterministically causal, but only weakly predisposing after a general fashion, comes in the belligerency between nations, stoked by the dispossessed masses bereft of space and place. As envisioned by McNeill, "global growth of population is the most fundamental and pervasive disturber of human society in modern times." Punctuated population growth can predispose persons to rove in bands, affiliate with dissidents, and defy the social order that has not the room to offer them a place at the Table,[4] as it seems to have done with Princip. McNeill also recognized, at once, the challenge and reward of the Neolithic Revolution. Newfound mastery of ecological constraints purchased agricultural surplus at the price of wearisome fieldwork, "fundamentally at odds with humankind's propensities as shaped by the hunting experience" (McNeill 1998; p. 59).

Most uniquely, McNeill was epidemiologically astute. He was chief among a very few authors convincing the "historical profession that disease must be taken seriously as a historical force" (McNeill 1992; p. xi). McNeill's focus on disease as it is differentially present across time, ecologies, and population densities, threaded through several early publications. For instance, in, *The Shape of European History* (1974), malarial mosquitoes migrating from Western Africa are discussed as they affected early Christian Europeans; in *The Great Frontier* (1983), the Black Death is related to the wages of labor; and in *The Global Condition* (1992) there is consideration of how *diseases of civilization* transitioned from epidemic to endemic. McNeill's epidemiological applications were thereafter collected and expanded upon in his celebrated *Plagues and Peoples.*

One can properly read McNeill as the historian most sensitive to what is referred to as *mortality regimes* by evolutionists. Arising from McNeill's expertise in both geography and epidemiology, many a passage within Plagues and Peoples show forth an inherent appreciation of mortality regimes as they vary along the *latitudinal diversity gradient*, the drastic ecological changes found along the north-south latitudinal axis (Phillimore 2014):

- "As we have just seen, in sub-Saharan Africa humankind continued to confront biological checks that remained powerfully effective even after human hunting skills had upset the older balances of nature among large-bodied creatures. But when human communities learned to survive and flourish in temperate climes, they faced a simpler biological situation. In general, lower temperatures meant less propitious conditions for life" (McNeill 1998; p. 47).
- "The result is a sharp climatic difference between northern and central China. Among other things, the warmer, moister condition of the South allowed a greater variety of parasites to flourish than could survive in the North. Throughout the Yellow River flood plain, the severe winters killed off parasites that lacked dormant forms capable of resisting prolonged freezing" (McNeill 1998; p. 103).
- "Malaria, although occurring occasionally in the North, is a modern health problem only in the South" (McNeill 1998; p. 105).

As with *latitudinal diversity gradient*, even as McNeill does not use the terminology, he implicitly accounts for both *physical ecology*, abiotic features of landscape and climate, and *community ecology,* the matrix of biological creatures that alternately serve as competitors and resources.

3 Mortality Regime and Ecology

In *Plagues and Peoples,* McNeill (1998; p. 52) condenses into one paragraph, three reasons why the importance of disease diminished for Eurasian migrants, relative to African populations:

> ….it seems probable that outside the tropical zones where humanity had itself evolved, disease organisms were not very important. Parasites that could spread from host to host by direct bodily contact, like lice, or the spirochete of yaws, could survive in temperate climates within small and migratory hunting communities. As long as the infection acted slowly and did not incapacitate the human host too severely or too suddenly, such parasitisms could and probably did travel with hunting communities from humanity's tropical cradlelands throughout the earth. But the array of such infections and infestations was vastly diminished from what had thriven in the tropical luxuriance of humanity's oldest habitat.

McNeill's excerpt leaves us with much to unpack. First, there is the raw effect of migration; literally the release that came of leaving. Upper Paleolithic migrants to Eurasia, in leaving *humanity's oldest habitat,* benefited from *ecological opportunity,* wherein exquisitely evolved parasitic life cycles were disrupted by the abrupt movement of human hosts to harsh northern ecologies. Without reference to the term, McNeill (1998; p. 47) elsewhere marks the concept, as when he wrote of the "initial absence or near-absence of organisms capable of living parasitically on or inside human bodies." Second, release from parasite pressure did not come simply from moving; it came from moving north (Hertler 2015). Even while fleas, ticks, lice, and other *endo-parasites* fared better because they sheltered in the homeostatically controlled tropics of the human body, sources of new infections were curtailed by cold, as were mosquitoes, flies, and many other disease vectors. Third, the concept of *density dependence* explains differences in disease prevalence and lethality between tropical Africa as compared with temperate Eurasia. Relative to this last point, African zoonotic diseases can remain unchecked in their virulence for centuries, as they have the luxury of killing their hosts outright without ending the homeostatic conditions necessary to their existence. Tsetse flies, black flies, sand flies, and mosquitoes can simply travel from one host to another without relying on a cough or sneeze in close quarters. These zoonotic diseases are then more lethal precisely because they are effectively *density independent*. In contrast, classic Eurasian diseases are *density dependent* and so only arise with sufficient population and routinely evolve toward non-lethal virulence as a necessary precondition for successful propagation and persistence. Given a seasonally cold external environment, pathogens who kill only a moderate fraction of their hosts risk thinning the herd sufficiently to render reaching the next host improbable.

Anyone studying the history of early modern and late modern Europe may well balk at any description of populations being sheltered from disease. After all, plague, smallpox, yellow fever, tuberculosis, and dysentery might be thought equally potent analogues to the zoonoses of the south. In reality, the period of potent disease pressure was short lived. Only in the last few millennia of the 50,000 post-migration years of human evolution within Eurasia, was there anything like epidemic disease; and even then was it sporadically suffered within newly emerging metropolitan communities. Only since trade was established between populations, sufficiently dense and densely aggregated, was epidemic infection supported. McNeill himself said as much in noting that epidemic disease exerted extreme pressures on cities like Lisbon and London bringing back *fevers and fluxes* from foreign shores, even while Western Europe "as a whole was scarcely affected" (McNeill 1998; pp. 129–130). Daniel Defoe's *Journal of the Plague Year* is not accidentally set in a large port city, as these epidemic diseases required a "community of between 40,000 and 300,000 persons in order to survive" (McNeill 1976, p. 63). In the same source, on the same page, McNeill goes on to state that, "clearly, such a disease could exist on a permanent basis only among 'civilized' societies, where human populations are comparatively dense and communication nets far-flung." Again, only with density, was pathogenic island hopping from one *98.6* degree outpost to another made possible. Even as the great epidemic diseases rocked European and Asian populations, their effects were broad and diffuse, not clearly dysgenic, and also transitioned from being epidemic to being endemic over the course of two centuries (McNeill 1992). Thereafter, vaccines implemented in the late 1700s began to create herd immunity for diseases like smallpox.

Though biogeographical differences in the incidence and prevalence of disease were recognized as consequential by McNeill, it is not clear that their evolutionary significance was appreciated. Once diseases were less common and less lethal, it became possible for human populations to evolve toward a slower life history; an evolutionary strategy that was predicated on life being *probabilistically* longer and surer. The reduction in mortal disease allowed every future-oriented investment to take on new value: Altruistic acts were more likely to be reciprocated; conscientious agricultural improvements became practicable; parental investment was less likely squandered, as was enculturation, learning, resource creation, and capital accrual.

We would be remiss if we did not mention the following: Northerly migration into cold latitudes made *sLH*-selected, future-oriented behaviors, not only viable, but necessary. The seasonal cold that attenuated disease burden concomitantly augmented climatic threats. Cold can kill hosts as well as parasites. Therefore, those same future-oriented behaviors listed above became necessary as well as practicable, as did other conscientious and future-oriented actions representative of the *sLH*-selected behavioral repertoire. The coming cold is an apt example of *intrinsic* mortality, as discussed in Chapter 5, because it can be predicted, and correspondingly controlled. Methods of control include food growing, gathering, preserving and storage, preparing of skins and shelters, and collecting cordwood and faggots for future fires.

4 Evidence of the Latitudinal Diversity and Consequent Effects on Human Life History

Herein, we have provided a narrative, explanatory of life history variation across populations. Some of the connections and finer details presented are wrought of long experience with life history evolutionary literature. Inevitably, there is some measure of extrapolation in the application. Even so, the central tenets of the foregoing section of this chapter can be pointedly supported with citations; indeed, some have already been so supported in previous chapters. Most notably, chapter two, relating to Huntington's writings, provides evidence of broad population differences in mean life history as documented by the work of J. P. Rushton. Also, in Chapter 5, referencing Richard Price, we have already established the relevance of mortality regime.

Going further, we provide evidence on three points: (1) migration curtailed disease-induced mortality; (2) disease-induced mortality remained high at lower latitudes, and most extreme within tropical

Africa; and (3) sustained disease-induced mortality is highly extrinsic and therefore selects for mating effort against parental effort, and more generally for fast life histories.

Relative to our first point of evidence, the work of Phillips et al. (2010) establishes the general trend for migration's ability to disrupt host-parasite associations. More than this, Bordes et al. (2010; p. 92) dilate upon multiple reasons for declining disease prevalence amidst cold northerly latitudes: (1) the increase in parasite mortality, (2) the decrease in parasite transmission "in various major parasite taxa such as helminths, intestinal protozoans, some viruses, and bacteria," (3) the declining commonality among invertebrates that serve as necessary intermediate hosts, (4) the decline in vector viability, and (5) the decline in species richness among hosts, which functions to restrict the range of reservoirs within which parasites can shelter. Finally, Bar-Yosef and Belfer-Cohen (2001) report survival rates soaring for those humans crossing out of "the disease-plagued belts of Africa." At the same time, these authors contrast southerly zoonoses with *measles*, *mumps*, *rubella*, *influenza*, and other density-dependent diseases commonly affecting Eurasian populations, which are "self-limiting in isolated populations below a certain threshold size."

Relative to our second point of evidence, we now present a tabular compilation of parasite distribution as extracted from Wertheim et al.'s (2012) *Atlas of Human Infectious Diseases*:

#	*Parasite*	*Distribution*	*Geographic regions*	*Prevalence*
1.	Amebiasis	Equatorial	Endemic in Mexico, India, South Africa, some Central and South American countries, and Asian Pacific countries	Not reported
2.	Anisakidosis	Cosmopolitan	Increasingly common in Western European countries and the USA due to the increasing popularity of eating raw fish	Not reported
3.	Babesiosis	Temperate	Temperate climates often containing white-tail deer populations	Not reported
4.	Capillariasis	Equatorial	Philippines, Laos, and Thailand	Not reported

(continued)

#	*Parasite*	*Distribution*	*Geographic regions*	*Prevalence*
5.	Clonorchiasis	Equatorial	Principally Southern China	35 million
6.	Cysticercosis	Cosmopolitan	Endemic full life cycle principally within equatorial areas	Not reported
7.	Diphyllobothriasis	Temperate	USA, Northern Europe and similar climates	Not reported
8.	Dracunculiasis	Equatorial	Sub-Saharan Africa, South Sudan particularly and Southern Asia	Not reported
9.	Echinococcosis	Temperate	North China, and Alaska and similar regions	Not reported
10.	Eosinophilic Meningitis	Equatorial	Largely South China, Africa, and Caribbean	Not reported
11.	Fascioliasis	Equatorial	South China, Thailand	10 million
12.	Filariasis	Equatorial	Sub-Saharan Africa and Southeast Asia	120 million
13.	Hookworm	Equatorial	Sub-Saharan Africa Southeast Asia	740 million
14.	Leishmaniasis, Cutaneous	Equatorial	South America, Bolivia, Peru, Brazil	Not reported
15.	Leishmaniasis, Cutaneous and Mucosal	Cosmopolitan/ equatorial	Stretches to Spain and Italy in northern limits, though present in Middle East and parts of sub-Saharan Africa	1.5 million yearly
16.	Leishmaniasis, Visceral	Cosmopolitan/ equatorial	Most common in Mediterranean in the old world and the Amazonian region in the new	500,000 annually
17.	Loiasis	Equatorial	Principally sub-Saharan Africa, concentrated in tropical rainforests	12–13 million
18.	Malaria, *Plasmodium falciparum*	Equatorial	Concentrated in sub-Saharan Africa, though with distribution pervasive across equatorial regions	500 million in Africa
19.	Malaria, *Plasmodium knowlesi*	Equatorial	Southern Asia	Not reported

(continued)

#	*Parasite*	*Distribution*	*Geographic regions*	*Prevalence*
20.	Malaria, *Plasmodium ovale*	Equatorial	Principally sub-Saharan Africa, though with distribution throughout old world equatorial environments	Not reported
21.	Malaria, *Plasmodium vivax*	Equatorial	Large areas of sub-Saharan Africa, India, Southeast Asia and northern South America	132–391 million cases yearly
22.	Onchocerciasis	Equatorial	Some cases in South and Central America, though concentrated in sub-Saharan Africa	37 million almost exclusively in Africa
23.	Opisthorchiasis	Cosmopolitan/ equatorial	Many cases in Southern Asia, but about one-third of cases found between Northern China and Europe	Approximately 15 million
24.	Paragonimiasis	Cosmopolitan	Africa to Canada	20 million in China alone
25.	Schistosomiasis, Africa	Equatorial	Principally sub-Saharan Africa; secondarily eastern South America	207 million worldwide, 80% in Africa
26.	Schistosomiasis, Asia	Equatorial	Southern Asia	1 million
27.	Strongyloidiasis	Equatorial	Sporadic cases in North America and Europe, but endemic and hyper-endemic only to areas in sub-Saharan Africa and South America	Not reported
28.	Trypanosomiasis, African	Equatorial	Sub-Saharan Africa	50,000–70,000 yearly
29.	Trypanosomiasis, American	Equatorial	Central and South America	7.6 million

In view of the third column, contemplate the ubiquity of equatorially distributed parasites. With that distribution in mind, we turn to our third point of evidence. The disease burden documented above imposes a highly potent form of extrinsic mortality. Consider that even when these parasitic infections are predictable, they are rarely controllable. Some of the waterborne pathogens could potentially be avoided or boiled; some are contracted through unshod feet treading upon contaminated soil and so can be thwarted by a simple pair of shoes; still others can be minimized by the *behavioral immune system*.[5] The behavioral immune system might also be particularly important in curtailing STDs and other diseases contracted through human association. These controls, to the extent that they are implemented, lamentably only nip at the margins. Despite any and all efforts, *the under-5 mortality rate per 1000 live births*, while it may be as low as six in industrialized countries, climbs to 150 for West and Central Africa. Or more simply, consider that *9 out of every 10 childhood deaths from malaria* occur in Africa (Wertheim et al. 2012). No doubt privy to such data, Quinlan (2007) states, parental effort, if it is to evolve, must effectually restrict child mortality. Extrinsic mortality imposed by pathogen and parasite pressure is precisely that which renders intensive parental care ineffectual and even maladaptive (Quinlan 2007; Chisholm 1999). As Quinlan (2007) notes, "it is difficult to imagine" how "parental care could affect exposure to vector-borne pathogens like malaria." Vector-borne disease effectively increases the so-called *saturation point*; the point beyond which increased parental effort may not evolve (Quinlan 2007). "At high pathogen levels," Quinlan concludes, "survival may be more a matter of chance than child care." Under such conditions, mating effort rises relative to parental effort (Figueredo et al. 2005; Ellis et al. 2009; Klug et al. 2012), with the now familiar complex of life history traits following in the *fLH*-selected direction.[6]

Notes

1. For an extended description of Multi-Level Selection Theory, see *Levels of Selection* (Keller 1999). Briefly, multi-level selection theory is predicated on the "fact that the gene can reside in both individual organisms and groups of organisms," such that:

    > In classical Darwinian Theory, the individual remains a level of aggregation upon which evolution operates, but it transitions from the only level of selection, to one of several levels of selection. All other levels of selection are groups of various sizes. More specifically, families, bands, tribes, regions, states, nations and ethnic populations are candidate groups that comprise the remaining levels of selection. (Woodley of Menie et al. 2017)

Consider also that McNeill's work more generally lends itself to a group selectionist interpretation, as when he writes, "some populations flourished and expanded at the expense of others that either lost their corporate identities after being engulfed by an expanding neighbor or were biologically extinguished" (McNeill 1990; p. 50).

2. When Toynbee spoke of "soul and life-blood and marrow and pith and essence and epitome" we invoked the concept of *biological capital*. Here, in McNeill, we have an equally vague usage: "erosion as the special constellation of circumstances which provoked their rise." Akin to Toynbee, we read "special constellation of circumstances" as waning selective pressures, especially group selective pressures.
3. Recalling Toynbee, McNeill describes how the threat of catastrophic confiscation of life and property at the hands of nomadic raiders induced early agriculturalists to pay rent and taxes to specialists in arms and ruling elites (McNeill 1998; p. 72).
4. Recall here Malthus's analogy using a banquet to suggest that charity compounds the very problem it aims to ameliorate.
5. The *behavioral immune system* refers to behaviors and habits undertaken to avoid contracting disease in the first place; examples include washing hands, avoiding feces, and shunning contact with strangers.
6. It should be noted that any such variance, like all life history variance within species, is moderate. Parental effort reduces mortality in every human population, even as its efficacy with respect to mortality prevention has caused modest evolutionary differences at the level of broad continental populations.

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CHAPTER 10

James Casey: Extrapolating from Early Modern Iberia

1 The Sociological Laboratory of Early Modern Spain

James Casey is professor and *Emeritus Reader* for the *School of History* at the *University of East Anglia* where he teaches and writes about family structure and parochial communities in sixteenth- and seventeenth-century Spain. His publications include, *The Kingdom of Valencia in the Seventeenth Century* (1979), *The History of the Family* (1989), *Early Modern Spain: A Social History* (1999), and *Family and Community in Early Modern Spain: The Citizens of Granada 1570–1739* (2007).[1] In his preface to *The History of the Family*, R. I. Moore remarks on Casey's placement of the family in broad intellectual and historiographical perspective; perspective that situates the family unit as the fundamental atom from which the molecules of culture are fashioned. This summation could not be more apt. In this as in other works, Casey implicitly asks, how family organization affected social organization, and how social organization recursively affected family organization. Casey partly confines his studies to Early Modern Spain, but even thus geographically restricted, the complexity of his topic is legion. So, while his spatial and temporal scope is more circumscribed than that of Michael Mann, the sociologist introduced in Chapter 15, or that of world historian William McNeill just discussed in the previous chapter, it is not surprising that

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Casey explicitly struggles to find intelligible themes amidst disorienting detail. For instance, in his introduction to *The History of the Family*, Casey discusses the proliferation of detail, which threatens to derail the scholar's organizational efforts, even as it impresses and informs. "The tunnels being sunk into the past are numerous, short and uncoordinated," Casey (1989; p. xii) writes, "with the consequent risk of fatigue, asphyxia or a cave-in." To avoid asphyxia and related risks, Casey reviews historical and ethnographic data within theoretical frameworks developed by Montagne, Morgan, Montesquieu, de Tocqueville, Durkheim, Engels, and Chateaubriand, among other forerunners of modern historiography, economics, and sociology.

Casey intensively researches regional variation in *lineal descent*, *consanguinity*, and *patterns of inheritance* as they alternately impede or impel state formation. First, citing nineteenth-century anthropologist Lewis H. Morgan, Casey exposes the general correlation between patrilineal descent and the development of *high civilization*. As economic development ramped up and capital accrued, "…households began to acquire patrimonies, which men wished to transmit to their offspring. This led to efforts to monopolize the sexual services of wives, with a view to establishing clear lines of paternity"[2] (Casey 1989; p. 6). With augmented concern over female chastity came greater disapproval of premarital liaisons, elopement, bastardy, and autonomous partner choice. "Eventually," Casey (1989; p. 6) explains, "the state rendered the tribe redundant, and left the conjugal family household as the basic focus of human loyalties." Second, there is *consanguinity*; that is, having common blood, denoting genetic relatedness. *Endogamous* marriages, wherein mates are found among kin, increase consanguinity; whereas *exogamous* marriages, wherein mates are found among non-kin, decrease consanguinity. There are two competing interests, one recommending endogamy and one recommending exogamy. Couples have to avoid inbreeding depression, the risk of which increases with genetic similarity to one's mate. On the other hand, females can be looked upon as a resource which the family is loath to give over to outsiders.[3] Different cultures walked on different sides of this line. As contrasting examples, Casey puts forth Germanic peoples who married out, and Arab peoples who married within the clan. Recurring over generations, being on one or another side of this divide has implications that redound all the way to the highest level of state organization. Casey notes that the endogamy practiced by Islamists, for instance, created consanguineous conglomerates that frayed as relatedness diminished. In turn, exogamy created more extensive communities that cohered over broader regions. Third, "nothing perhaps contributed more to the fashioning of family structure," Casey advises "than the system of inheritance" (Casey 1999; p. 197). To simply tabulate inheritance misses the significance of its social function as a barometer of conflict and cooperation between families, and among generations (Casey 1999; p. 199). Even subtle distinctions between the *bride wealth* of Northern Europe, and the *dowry* of more southerly regions, can mark profound differences in motivation and expectation. The former is apt to signify a contribution to an autonomous household, with the effect of strengthening its head; while the latter may represent an ongoing controlling interest in the bride by empowering her male relatives at the expense of her husband (Casey 1989; p. 77). Vying back and forth between patrilineal and mixed power relations was represented in law, with the Lateran Council of 1215 bolstering the bridewealth, and the thirteenth-century revival of Roman Law codifying the dower tradition. With the operation of these systems over time, the Anglo-Saxon home became more fully autonomous than its southern European counterpart, saddled as it was with competing claims of two lineages (Casey 1989; p. 78).

2 The State and the Family Unit

Together, these three sociological variables are greater than the sum of their parts. Joined by a *spirit of capitalism*, a *market economy*, and the *division of labor*, lineal descent, consanguinity and patterns of inheritance each had a role to play as drivers of state formation, and markers of progress toward social complexity. When property was unambiguously transmitted through a single lineage, when exogamous marriages were practiced, and when inheritance became reliably transmitted, there was progression toward "an integrated and egalitarian community, overriding particular bonds of family and favor." This is what de Tocqueville recognized as a *democratic society*: "an economic and political framework within which competition for status is regulated by universal and standard rules, free of the patronage and corruption which characterize less highly integrated societies" (Casey 1989; p. 165). Patrimonial government and corrupting patronage, having weakened in the solvent of Republicanism, allowed de Tocqueville to report that "in America a man never obeys another man, but only justice or the law." However, the American republic was but the culminating end. In transitioning to modern state forms, national governments had to take care not to stoke lineal resentments. Public order had to be imposed, but nepotistic leanings, like clannish resentments, had to be delicately adjudicated. Spain exemplifies the kin-based fractionalization that always threatened to degenerate into factionalism (Casey 1989). Alternatively, take France on the eve of the Revolution. As late as 1789, *lettres de cachet*, and the exceptions for nobility that they embodied, were just giving way to due process, which was to become a marker of nineteenth-century liberalism. States came to monopolize force, eventually outlawing the vendetta, blood feud, and duel, along with brigandage and banditry (Casey 1989; p. 58).

By the end of this tenuous process of state building, with its fits and stops, ebbs and flows, and with its groping and halting progression toward social accretion, one finds an interesting process of segmentation. We wind up with a notion of *family*, fully distinct from that of *nation*. This is, however, hardly where the story starts. Probably extending into prehistory, the two concepts were one. There were hunter-gatherer bands, and thereafter enlarged tribal units of extended kin. The nuclear family was harder to recognize amidst the larger mass of grandmothers and grandfathers, aunts and uncles, nieces and nephews, first and third cousins. Paternity was less certain, and what male parental care there was, tended to be distributed across many men, and consigned to many women and children. Of course, this was not to say there was no paternal recognition, special emphasis, or favoritism. Indeed, there was nothing like a Platonic commune, in which all parents raised all children. Still, it is a far cry from the archetypical Victorian family. To the degree that kinship bands persisted, they acted simultaneously as an impediment to autonomous household formation, and to formal state formation.

3 The Evolution of Family Structure as a Barometer and Driver of Social Change

James Casey's work integrates the study of family into the history of nation building. Only with these two topics so consistently treated alongside one another is it possible to make inferences into the interaction between the two. Casey shows how the modern nation state matured and solidified alongside the nuclear family. Again, clannishness and tribalism slowly acceded to concepts of citizenship, with the family unit comprising the atom of the state. One can group these sociological variables into clusters, occupying opposite extremes along a spectrum of social complexity. We maintain that these many variables have overlapping relevance with life history evolution, as it is discussed psychologically with respect to individuals, and sociologically with respect to populations. Exchanging extended kin groups, consanguineous bloodlines, polygynous mating systems, finite movable property, small dual inheritance, and nepotism, for nuclear families, exogenous marriage, monogamous mating systems, bourgeois capital, large patrimonies, and republicanism, marks the transition from *fLH*-selected to *sLH*-selected social organization. As Casey contends, changes in family organization underlay changes in social organization. Building upon this insight, we contend that changes in family organization and social organization were alike driven by ecological conditions and engendered evolutionary change.

To understand the relevant ecological conditions, it should be noted that the aforementioned differences in family organization, relatedness, mating systems, property, inheritance, and law, change as a function of time, yes; but also as a function of space. At present, there is a crude correlation running north and south across lines of latitude. Families tend to become more nuclear, and states solidify, as one moves north. Being that this is the tenth chapter, many of the population correlates and ecological explanations for this phenomenon have been implicitly reviewed; nevertheless, there is more to add, and much to consolidate.

Speaking in gross generalities, moist, southern climates yield year-round provisions in moderate proportions. Extreme density is not supported. Tropical fauna and flora provide a level of freely given subsistence that discourages intensive agriculture, but more importantly, tropical soils do not long reward intensive agricultural labors when applied. Slash and burn agriculture may produce high yields for a year or three, only to deplete the soil, leaving that exploited area less capable of providing calories than in its natural state. Arid southerly climates support much fewer people, and generally impose a nomadic existence. In neither case do populations become particularly dense. Low density, herding, and foraging promote mobile bands of kin, which, all else being equal, tend to mate endogamously by virtue of propinquity. Without abundance granted by the soils, without the necessity for expensive structures, and without the ability to accrue significant capital, female choice does not emphasize cognition, conscientiousness, social competition, or organizing ability, but instead tends to physicality, genetic diversity, social dominance, and disease resistance as marked by symmetry. In turn, sexual selection, as it is expressed through male choice, may well be weaker in many southern climates, as offspring of short-term unions are more readily reared to maturity. Under such ecological conditions, males tend to mate more polygynously and females tend to mate more promiscuously. This has the dual effect of increasing male versus male conflict and paternal uncertainty. Males are correspondingly less often assiduously sequestered within a nuclear family unit, and less likely to exclusively bestow all their labor on one mate. In other words, male labor is at once less important in southerly climates, and also less concentrated. The consequence is often tribal organizations with strong matrilineal leanings, wherein maternal uncles and grandfathers are more important than fathers.

Competition among mating males is invariable, but the form of that competition is quite the opposite. Men will wrangle with one another to obtain preference, whether bestowed directly by the female, or indirectly through a match made by the female's parents. But the form of competition that they engage in can vary by the stage on which they have to perform. Likewise, female choice can change, with profound effects on male behavior. Both male competition and female choice are aspects of sexual selection, which together can drive the evolution of life histories toward the *r*- or *K*-selected ends of the continuum. To the extent that ecologies impose extrinsic mortality, they select for male aggression, increased mating effort and reduced parental effort. Ecologies imposing strong intrinsic mortality have quite the opposite effect. In this vein, we must recall from prior chapters that the consequences of migration were manifold. One was faced with an abundance of game that allowed carryover of nomadism so long as it held out. However, when supplies were eventually depleted, the hoe was put to ground, and cereal crops became the source of most calories. During this Neolithic Revolution and its transition to agriculture, selection, both natural and sexual, rather rapidly began to favor what we now recognize as the *sLH*-selected complex of traits, most importantly conscientiousness, restraint, forward thinking, and fidelity. Men were of the utmost significance in this transition. Females had always been burdened by pregnancy and nursing, while doing much of the work of gathering and processing foods, as Huntington (1927; p. 163) states:

> The women, as in so many tropical countries, seem to work harder than the men, and one sees them manning the innumerable boats, rowing hard against the tide, or walking under heavy loads balanced at the ends of poles across their shoulders.

Males on the other hand could more readily divert time away from hunting, fighting, display, courtship, and leisure. Directly under the influence of northern ecologies, and indirectly under the influence of female choice as it reflected these newfound ecological exigencies, males rapidly evolved in a more *sLH*-selected direction.

Much of this selection centered on the variety of dispositions denoted by the personality trait *conscientiousness*, which is itself understood as a component of life history. Conscientiousness is really a hybrid of labor and loyalty. As David Buss said long ago, conscientiousness predicts the predisposition to work hard at accruing resources, and *also* the propensity to dedicate those resources to mate and child. Conscientiousness correlates with somatic effort, which is a form of bodily maintenance described in the life history literature; and consequently is predictive of longevity. Further still, conscientiousness imparts future oriented cognition in the form of forward thinking, planning, and self-restraint. As population density augmented within these temperate regions, so did social complexity; and with social complexity came emphasis on other *sLH*-selected traits, such as general intelligence and the more complex aspects of executive functioning. With all of this, high-quality virginal females became a commodity, as did conscientious and intelligent males. The selective pressures coming from females were mutually reinforcing because of shared ecological motivations. *Quality* and *quantity* of offspring were bestowed upon those females securing faithful and industrious husbands; at the same time, males that dedicated, not only sperm, but also labor and resources to one mate and her offspring had to have reasonable assurance of paternal certainty. Paternal uncertainty, in other words, could coexist easily with low male investment, but was incompatible with high male investment. At the same time, with males having to work hard to support the offspring of one woman, polygyny became more difficult to bear, and thus became correspondingly rare. Nuclear families were also favored by two additional aspects of this *sLH*-selected evolutionary response; first, slow life histories are associated with delayed maturation and menstruation, so women become fertile later; separately, *sLH*-selected females often marry and mate later; and finally, they also tend to have longer inter-birth intervals. Collectively, this lengthened generational turnover and made grandparenting less viable, with the effect that assistance to nursing and pregnant females more consistently devolved upon husbands as opposed to grandmothers.

From all that went before, one can see the ecologically driven effects of migration on family organization. In turn, nucleated family organization redounded to broader social organization in two ways. First, small, sedentary, autonomous family units labored in the fields, accrued wealth from the richness of the soil, and began transferring land, housing, and eventually liquid capital to their children. With this turn inward, away from tribal organization, nuclear family units had to find alternate means of managing collective action problems, mediating disputes from within, and resisting attacks from without. In other words, in these and many other ways, they had to govern themselves. Such necessities put a premium on *sLH*-selected dispositions to monitor and cultivate reputation, cooperation, and reciprocal altruism. Second, and relative to Casey's discussion of consanguinity, there is another important nuance to appreciate. The transition to nuclear families enabled, as much as necessitated, the transition to mature, non-tribal, governmental organization. Conflicts could be more impartially adjudicated, and power-sharing could be more equally applied within communities comprised of nuclear families with circles of insular nepotism that did not extend in long chains to innumerable extended kin. This avoided the shearing of societies along a fault line of kinship, which might have caused group fission among populations in prehistoric Africa, which did bring schism to seventh century Islamists, and dogged stable government in Renaissance Italy as the *Medici* vied with the *Pazzi* and other rival families for the reigns of state power. Imperfectly, haltingly, but eventually, kings replaced chieftains, law supplanted whim, consistency replaced severity in the sphere of punishment, tribalism gave way to republicanism, and the office eclipsed the office holder. In the fullness of time, a new social order was woven, partly because lineages were separated into the individual strands of the nuclear family. We cannot neglect to mention, however, that this process also potentiated slowing among individual life histories. The individual men and women of Neolithic evolved toward *sLH*-selected life histories, making them more efficient building blocks of city-state, duchy, canton, electorate, and nation. Northerly climates primed the pump, creating an initial impulse toward *sLH*-selected individuals, and nucleated families. This process invoked mature states, which then became anthropogenic pressure cookers, rewarding the *sLH*-selected with progeny.

4 An Imperfect Survey of Suggestive Data

We have allowed ourselves free reign! What could be done in reacting to such a complex coming together of *family* and *nation* as it relates both to James Casey's historical legacy and the mass of life history evolutionary literature? Indeed, this is the purpose of the third section of each chapter. However, the fourth section of each chapter is written to shore up our theses with reference to appropriate literature, evidence, and observation. More so than in other chapters, we can do this but imperfectly.

As before, prior chapters pull much of the documentary load. In Chapter 2, we have seen broad continental differences in life history speed across populations, which again proceed from fast to slow across Africa, Europe, and Asia. Chapter 4 demonstrates the importance of soils; lessons which should be recalled in connection with Chapter 6 wherein the selective pressures accruing to dense populations were discussed. Finally, Chapters 5 and 9, as before mentioned, document the importance of differing sources of mortality, *extrinsic* versus *intrinsic*. Added to this, subsequent chapters, such as Chapter 15, will continue to track state formation and concomitant higher levels of social organization. This releases us to focus on family organization as it relates to sexual selection, and state formation as tracked through markers of social stability.

A map, being a picture, is worth a thousand words. These juxtaposed maps show broad continental differences in family organization. Produced by A. H. Bittles and M. Black,[4] the map on the left charts consanguineous unions, which, as denoted by darker shades, preponderate in southerly latitudes. Produced by the University of Toronto,[5] the map to the right depicts the distribution in family organization, with polygyny preponderating in Africa and monogamy preponderating in temperate Eurasia (Figs. 1 and 2).

This first map is broadly reflective of the literature on consanguineous unions, which are well known to prevail in southerly states (Bittles 2001; Bittles and Black 2010), such as Saudi Arabia (El-Hazmi et al. 1995; El-Mouzan et al. 2007), Kuwait (Al-Awadi et al. 1985), Jordan (Hamamy et al. 2007), Oman (Rajab and Patton 2000), Qatar, Yemen (Tadmouri et al. 2009), Iran (Asadi-Pooya 2005), Sudan (Ahmed 1979), Iraq (Hamamy and Al-Hakkak 1989), the United Arab Emirates (Bener et al. 1996), Pakistan (Bittles et al. 1993; Grant and Bittles 1997), and throughout much of Africa (Lamdouar 1994; Mokhtar and Abdel-Fattah 2001;

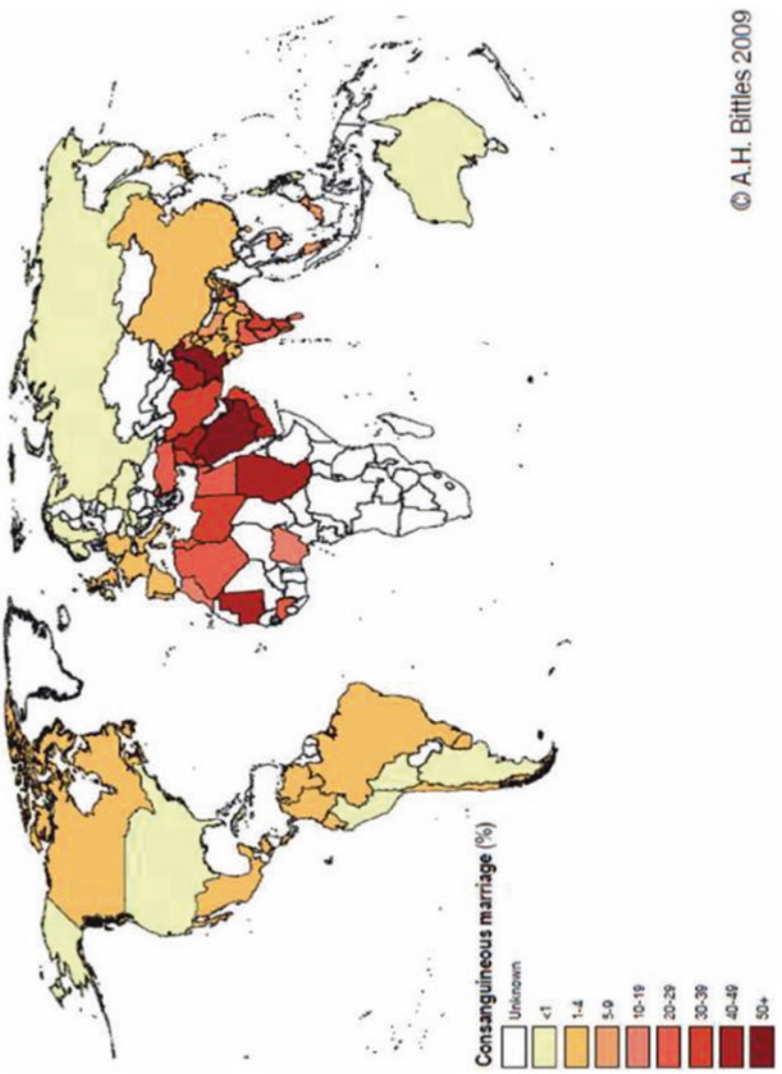

Fig. 1 World map of consanguineous unions produced by A. H. Bittles and M. Black

Fig. 2 World map of family organization produced by the University of Toronto

Hammami et al. 2005; Kerkeni et al. 2007; Anwar et al. 2014). By comparison, consanguineous unions are rare in Europe, and even within Europe show a relationship to latitude judging by papal dispensations affording exceptions to canonical prohibitions (McCullough and O'Rourke 1986). In turn, consanguinity has effects on social organization, lowering the degree of democratic participation (Woodley and Bell 2013), increasing financial burdens (Jaber et al. 1998; Weller et al. 2012), and reducing educational and occupational attainment (Khlat 1988).

The second map is broadly reflective of the literature on polygynous unions, which are well known to prevail in southerly latitudes. Since George Peter Murdock's (1957) classic survey of human mating systems, the distribution of polygyny has been recognized as geographically skewed, with Benin (Klissou 1995), Zaire (Magnani et al. 1995), Senegal (Cudeville et al. 2017), Togo (Cissokho 2017), and other parts of Africa having high prevalence (Konotey-Ahulu 1970; Welch and Glick, 1981; Hayase and Liaw 1997; Antoine 2006; Andrews 2009). Polygyny also remains common in the Middle East (Mason 2010). Biogeographical differences are reflected in law (Berger 2012), with, for instance, Islamic nations permitting polygyny (Badawi 1976), while it is outlawed in much of the European West (Kaufman and Bailey 2010). These extant biogeographical differences extend partly from ecological dissimilarities. Much mating literature on animals suggests that bi-parental care evolves only to the extent that it provides considerable improvement in reproductive success (Orians 1969; Emlen and Oring 1977; Kleiman and Malcolm 1981; Black 1996; Gowaty 1996). Life history constraints and the altricial state of human young require intensive maternal care and some form of cooperative breeding, whatever the environmental conditions (Muller and Thompson 2012), but the exigencies of northerly latitudes, perforce, enlist intensive paternal assistance (Frost 2006; Cant 2014). Cochran and Harpending (2009; p. 104) cogently contrast these broad continental conditions, citing African women as "largely self-supporting," in contrast to "much of Eurasia," wherein "hard work from two parents barely allowed break-even reproduction."

Having established latitudinal variation across rates of consanguinity and polygyny, it now remains to consider their combined effect on social organization. Instability, from within and without, augment with polygyny and consanguinity. Even after simultaneously considering competing explanations, consanguineous mating negatively predicted democratic government across seventy nations; findings which Woodley and Bell (2013) attribute to (1) individualism and individual rights being overwhelmed by kin-based collectivism; (2) kin loyalties trumping power-sharing with non-kin; and (3) the tendency for groups of related elites to practice resource predation and nepotism. In turn, Henrich et al. (2012) have demonstrated rape, murder, assault, robbery, fraud, gender inequality, domestic violence, child neglect, abuse, accidental death, and homicide to follow from non-monogamous males that emphasize mating effort over parental effort. The consequence is that, as one progresses from Asia, to Europe, to Africa, or in other words from slow to fast along the life history spectrum as it applies to continental populations, one increasingly finds delayed state formation,[6] alongside markers of instability once the state is formed, as indicated by delayed acquisition of sovereignty, territorial modifications, and recent subordination by other nations.

Notes

1. This information taken from the University of East Anglia's profile page on Professor Casey: https://www.uea.ac.uk/history/people/profile/j-casey.
2. The ability to accrue and transmit wealth to one's offspring made males ever more conscious about what evolutionists refer to as *paternal certainty*. Paternal uncertainty will be discussed later in section three of this chapter.
3. Casey cites Emperor Charlemagne and his several spinster daughters as an example of such reluctance.
4. This map was cited by Anwar et al. (2014), and was taken from *consang.net*: http://www.consang.net/index.php/Global_prevalence. The map is produced by Dr. Alan H. Bittles and Dr. Michael Black of Murdoch University, who graciously allowed its reproduction in the current volume.
5. This map of marital composition has been cropped to show Eurasia and Africa. It is provided by the University of Toronto's Open Access Database: https://www.utoronto.ca/news/massive-open-access-database-will-answer-your-questions-about-human-cultures.
6. This metric can be fraught with problems, but in aggregate has some validity. One potential objection may be Africa's recent history of colonization, but it should be borne in mind that we are discussing the ability of nation states to remain stable from both internal disorder and external threat. Dates of nation formation are referenced from the United States Central Intelligence Agency's *World Fact Book*: https://www.cia.gov/library/publications/the-world-factbook/fields/2088.html.

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PART III

Section Metacommentary

One of the major challenges addressed by Toynbee was the age-old mystery of civilizational decline. Why do human societies at the peak of their power and prosperity suddenly begin to disintegrate previous to catastrophic collapse? His predecessor, Spengler, had already described this process of decline in grim detail, but Toynbee did not consider that the *causal* explanations proffered were satisfactory. For example, although decaying civilizations were sometimes dealt the *coup de grace* by foreign invaders, such as hordes of nomadic barbarians, Toynbee theorized that vulnerability to such assaults from outside imperial dominions ultimately stemmed from weakness festering within. Without controverting Toynbee's thesis, the collapse of the Classic Lowland Maya, discussed in Part II of the present volume, illustrates that natural catastrophes can serve in the stead of civilizational rivalries as external, extinguishing events. Such extrinsic dislocations are capable of tipping an already weakened and unstable social system over the edge into total ruin.

In Toynbee's view, the rise of civilizations is powered by the existential challenges they face, and are somehow able to overcome. Mastering such adversities builds strength, fostering the expansive and exuberant vitality of civilizations during their stages of growth and efflorescence. Paradoxically, it is the eventual *victory* over such trials and tribulations, and not the occasional defeat or setback, which engenders decline. Again, according to Toynbee, such rot begins to set in from within when civilizations reach the *pinnacle* of their mature strength and cultural achievement. Although Toynbee rejected biological reductionism, evolutionists such as we cannot help but speculate that the disintegration from within, occasioned by whatever *pax imperialis* has been imposed by the triumphant social system, extends from relaxed selective pressures and the accumulating load of socially deleterious epistatic mutations in the population that would inevitably follow (Sarraf and Woodley of Menie 2017; Woodley of Menie et al. 2017b).

Within the logic of a multilevel selection model, the newfound security from external threat and internal stability tips the evolutionary balance from favoring group-selected altruistic behaviors (adaptations to intergroup competition) to favoring individually selected self-interested ones (Darwin 1871; Woodley and Figueredo 2013a, b; Woodley of Menie et al. 2017a). The social corrosion from within the decadent civilization that Toynbee describes fit such a model perfectly. It is unfortunate that the science of evolutionary genetics was not yet advanced enough to proffer this seemingly plausible explanation during Toynbee's lifetime.

Furthermore, although the security and stability derived of *pax imperialis* achieved by a mature civilization may ultimately sow the seeds of its own genetic fraying by reducing the force of purifying selection (the selective elimination of deleterious mutations), its more proximate and immediate effect is to favor the proliferation of slower life history strategies within the population. As the impetus to establish lasting social order was probably driven proactively by already elevated levels of law-abiding, civic-minded, collectivistic, kin-selected, prudent, and provident slow life history strategists, this effect exemplifies the self-reinforcing feedback processes that perpetuate the dominance of ever-slower life history strategies within a population. Roads, canals, aqueducts, sacred temples, and other works of monumental architecture are not constructed by short-term thinkers seeking instant gratification. Neither are elaborate moral or legal codes, advanced systems of government, or far-flung networks of peaceful commerce and cooperation. This kind of activity is niche construction at its finest, with slow life history strategists adaptively feathering their own ecological nest. Metaphorically, Darwin's heart would swell with pride to witness this adaptive spectacle.

Tragically, such magnificent achievements cannot but sow the seeds of their own eventual destruction, not by fault of their *failure*, but by virtue of their *success*. The silent and unnoticed shift in regimes of selective pressure, which these changes set in motion, immediately starts to undo all that has been accomplished. If Toynbee struggled to surpass his master, Spengler, at crafting depressing narratives, McNeill was almost miraculously able to exceed them both. Unlike Toynbee, McNeill does not eschew, but instead embraces, and enthusiastically promotes, biologically informed explanations for social phenomena. McNeill enriched descriptive historical accounts of civic disintegration, while extending beyond Spengler and Toynbee in recognizing the paramount importance of infectious *disease* in shaping human history and steering the fate of civilizations.

We have previously considered the role of various plague outbreaks as indirect and almost incidental *sequelae* to climatological catastrophes in the form of ensuing famines, and the wars that almost inevitably break out over these sudden resource limitations. McNeill went beyond this to examine disease as a *primary* cause in its own right, whether epidemic and acute, or endemic and chronic. Even as they are sometimes follow upon some other catastrophe, outbreaks of pestilence are as often the prime causal force in a newly unleashed wave of horror. In this, McNeill anticipates the emphasis placed by modern evolutionary life history theory upon regimes of extrinsic mortality as being the main drivers shaping life history evolution. Although McNeill did not address life history strategy directly, and it is unclear whether he was aware of the theory at all, he did address many of the *civilized* behavior patterns that are known correlates, if not direct consequences, of slower life histories (Figueredo et al. 2016). He unabashedly related these hallmarks of slow life history social behavior to reduced disease burden (favorable community ecology), a circumstance that he ultimately attributes to climatic factors (favorable physical ecology).

Finally, Casey brings us home to the basic building block of human society, the family. Though projecting ripples of influence through to the highest levels of social complexity, slow life history strategies most immediately impact face-to-face interactions with close conjugal and consanguineal kin, strengthening long-term pair bonds among sexual partners, long-term biparental care of offspring, and long-term nepotistic bonds among extended family members. Perhaps most notably, Casey emphasizes patrilineal reckoning of descent as a near precondition for the intergenerational transmission of paternally controlled resources, which brings with it a cascade of effects beginning with the need for paternal certainty, extending to the necessity for maternal sexual fidelity, and ending with family units organized around monogamy. The consequent whole facilitates *high civilization*. Each effect in this cascade alternatively allows and compels male parental effort, which is notoriously difficult to recruit in the face of the paternity uncertainty naturally concomitant to the realities of internal fertilization among mammals. This account is completely consistent with our theoretical interpretations of life history strategy's many indirect effects on social structure. As with the applied work of Price on life insurance payments to surviving kin, this strengthening of the frankly patriarchal basis of the nuclear family had the effect of extending male parental care beyond the grave. The shift in nepotistic effort by extended family members, away from dowry, to bride wealth systems, facilitated the transition to patrilineal inheritance. It did so most obviously by socially incorporating joint offspring into the patriline, but also by eliciting exogamous marriages, which in turn, attenuated the matriline's continuing claim upon the mother. With time, more reciprocal and cooperative conjugal alliances emerge between previously discrete kinship groups. Both customs served to foster slower life history strategies and favored the growing influence of higher, over lower, levels of social complexity, such as the more genetically diversified *state* over the consanguineous *tribe*.

All three authors covered in Part III thus provide detailed historical descriptions of the effects upon the human social ecology of the physical and community ecologies that undergird it, elucidating many of the proximate causal mechanisms by which those effects are mediated. These accounts are all fully consistent with our grand vision of social biogeography as intellectually reconstructed through the lens of life history theory.

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PART IV

Murdock, Keeley, and Harris

CHAPTER 11

George Peter Murdock: Stemming the Tide of Sterility with an Atlas of World Cultures

1 Murdock's Cross-Cultural Analytical Method

After serving in *World War I* as first lieutenant within a field artillery division, George Peter Murdock went on to graduate with a bachelor's degree in history from Yale University. Thereafter, Murdock studied law at Harvard for two years, before succumbing to an intrinsic interest in culture that directed him on a world tour, after which he returned to Yale to pursue a degree in anthropology.[1] A quondam president of the *American Anthropological Association*, Murdock was also a recipient of the *Viking Fund Medal* (1949), the *Herbert E. Gregory Medal* (1966), the *Wilbur Lucius Cross Medal* (1967), and the *Huxley Medal* (1971). Citing his first publication in 1931, and his last in 1981, an obituary (Spoehr 1985) recalled fifty years' service, much of which extended through anthropology's critical adolescence[2] (Goodenough 1964, 1994).

Some of the works Murdock went on to write were solid, standard anthropological studies. Take, for instance, *Our Primitive Contemporaries* (1934), which was something of a compendium of customs and cultures, paired with images of artifacts, relative to Tasmanians, Dahomeans, and sixteen other ethnicities besides. Such contributions were tiles of achievement in the mosaic of Murdock's career, during which he demonstrated scholarly generativity (Murdock 1970, 1980), administrative service and teaching excellence. However, the honors heaped upon Murdock's head while living, like the eulogiums he received once deceased, marked nothing so much as his collection and organization of data. Murdock's *novel, vital,*

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and *authentic*[3] empirical system calls to mind an anthropological variety of Toynbee's *A Study of History*. White and Brudner-White (1988; p. 59) celebrate Murdock, "truly a remarkable man, whose vision was ahead of his time," for his empirical escape from procrustean theories:

> Murdock was for decades the preeminent spokesman of the empirical tradition of direct comparison of societies. His monumental task, along with others, was to create a complex scientific apparatus by which anthropology could eventually become both a comparative and a formal science, capable of testing and falsifying theory against a worldwide data base.

White and Brudner-White put this achievement in context with the help of Marvin Harris, the anthropologist featured in Chapter 13. At that time, anthropology, at large as a discipline, was trending toward rejecting the *scientific mandate* by dispensing with cross-cultural comparisons altogether. Murdock's *Social Structure* (1949) struck a dissonant chord, jarring the harmony of many contemporary anthropologists and then giving over the search for historically detectable, anthropological laws. Such dissonance is on full display when, in the preface of Social Structure, Murdock begins by atypically acknowledging Franz Boas for his efforts in deconstruction,[4] but ends thus:

> Boas himself, who has been extravagantly overrated by his disciples, was the most unsystematic of theorists, his numerous kernels of genuine insight being scattered amongst much pedantic chaff. He was not even a good field worker. He nevertheless did convey to his students a genuine respect for ethnographic facts and for methodological rigor. In the hands of some of his followers, however, his approach degenerated into a sterile historicism consisting of rash inferences concerning prehistory from areal distributions. With others it became converted into an unreasoning opposition to all new trends in anthropology. (Murdock 1949; p. xiv)

Two minds could not be more at odds as were the orderly systematizer pursuing knowable anthropological laws and the postmodern pyrrhonist deconstructing prevailing frameworks while disallowing their replacement. More than his *Social Structure*, or any work, Murdock's *Atlas* would stem the tide of relativism.

2 Murdock's Project and Galton's Problem

Murdock contributed serial installments of coded cultural information, which, in 1967, was published as the *Atlas of World Cultures* featuring 862 societies. Thereafter, serial contributions to the journal *Ethnology* continued, bringing the total from 862 to 1264 by 1971. As Murdock (1981) explained by way of introduction to a selective revision culling 563 societies from the larger sample, certain continental classifications amassed groupings that were sometimes too large, as with Asia and Africa, and other times too small, as with Europe. Murdock corrected the imbalance by sundering the Sahara from Africa and the Near East from Asia, both of which were added to Europe to form a *Circum-Mediterranean* region. The result is the following modification of continental clusters:

- *Africa*, exclusive of Madagascar and the northern and northeastern portions of the continent
- *Circum-Mediterranean*, including Europe, Turkey and the Caucasus, the Semitic Near East, and northern and northeastern Africa
- *East Eurasia*, excluding Formosa, the Philippines, Indonesia, and the area assigned to the Circum-Mediterranean but including Madagascar and other islands in the Indian Ocean
- *Insular Pacific*, embracing all of Oceania as well as areas like Australia, Indonesia, Formosa, and the Philippines that are not always included therewith
- *North America*, including the indigenous societies of this continent as far south as the Isthmus of Tehuantepec
- *South America*, including the Antilles, Yucatan, and Central America as well as the continent itself

Even as they may be wanting in many ways, such modifications of the continental clusters are not without logic. For instance, the Near East and Saharan African peoples may in fact have more contact with Europeans than with peoples of the Far East or Sub-Saharan Africa. As seen in maps of the Roman Empire, the waters of the Mediterranean Sea bound its coastal regions in networks of war and trade. After all, the Crusades, like the Reconquista and the original Islamic incursions it reversed, are histories of vying Circum-Mediterranean populations. At the same time, Africa and Asia were, to some extent, divided by ecological boundaries: the former by increasingly desiccated, non-coastal sections deep within the Sahara, and the latter by the Polar desert existing within the late Neolithic (Hetherington and Reid 2010; p. 224). Of further note, the Near and Far East were also more permanently separated—within lower latitudes by the Tibetan Plateau stretching 600 miles North to South and 1600 miles East to West, with an average elevation of 4500 meters; within middle latitudes by 500,000 square miles of barren Gobi Desert; and within the highest extent of latitude by tundra and permafrost.

As to content, Murdock coded all societies systematically across the following metrics: subsistence economy, mode of marriage, family organization, marital residence, community organization, patrilineal kin groups and exogamy, matrilineal kin groups and exogamy, cognatic kin groups, cousin marriage, kinship terminology for cousins, type and intensity of agriculture, settlement pattern, mean size of local communities, pottery, house construction, hunting, fishing, animal husbandry, agriculture, and so on. Murdock operationalized an ordinal classification scheme for the foregoing variables, which was represented by a code, and so could be presented within a table. For instance, the variable, *segregation of adolescent boys*, could be coded *A* for absent, *P* for partial, *R* for complete segregation from the nuclear family, *S* for complete separation from all family, and *T* for those societies sequestering adolescent boys among themselves, while segregating them from the group at large. With information so thoroughly collated, patterns emerge. For instance, we find that Africa has the lowest rates of monogamy, as per page 164, Figure 11.1. Specifically, in the *World Ethnographic Sample* (Murdock 1957), on which the Atlas was based, monogamy was recorded 8 times in Africa, 43 times in the Circum-Mediterranean, and 34 times in East Eurasia. Conversely, general polygyny was recorded 92 times in Africa, as compared to 17 times in the Circum-Mediterranean, and 21 times in East Eurasia.

Having coded hundreds of cultures across a wide variety of traits in his Atlas of World Cultures, Murdock is known primarily as a meticulous systematizer. But what was Murdock's overarching goal sustaining him through all this toil and tedium? Murdock's *cross-cultural analytical method* was designed to break down cultural variation into its most fundamental units—units of *cultural universals*, which were the basic elements or building blocks from which different cultures were composed. This method is roughly equivalent to what is called the *comparative method* in evolutionary biology and anthropology (Mace et al. 1994). From this analytical perspective, like elements comprising compounds in chemistry, or atoms residing within molecules, the basic structure of a culture could, in principle, be reconstructed by a comprehensive knowledge of these constituents. With the constituent parts so delineated, patterns existing among different cultures could presumably be inferred statistically by use of correlational analyses. For example, one may find a small but statistically significant positive association ($\varphi = .166$) between the presence of male genital mutilation and the presence of polygyny in the Murdock et al. *Standard Cross-Cultural Sample.* In principle, co-occurring *clusters* of such traits could be spatially aggregated (Korotayev and Munck 2003).

Although this seems to us as a capital idea, it drew criticism from the outset. One critical strain came from the purported irreducibility of *emergent* cultural properties. Take, for instance, the seminal work, *Patterns of Culture*, by the early Boasian anthropologist Ruth Benedict (1934), insisting that the whole of a culture was more than the sum of its parts. Benedict's holistic approach, termed *configurationalism* by Salzman (2001), stood in marked contrast to the elementistic one championed by Murdock. Another, and perhaps more serious, threat to the validity of Murdock's overall systematizing project has historically been *Galton's Problem.* At the 1888 meeting of the *Royal Anthropological Society* in London, *Sir Edward Burnett Tylor* presented an early example of the cross-cultural analytical method, using a sample of 350 pre-industrial societies to illustrate the *cultural adhesions* or statistical associations present among different traits, such as post-marital residence and reckoning of descent (Dow and Eff 2013). This work was critiqued at that same meeting by *Sir Francis Galton*, father of modern psychometrics and co-developer of the *correlation coefficient*,[5] for violating a statistical assumption. Specifically, Tylor's measures of association required that the data points deriving from his sampled pre-industrial societies be independent of one another. Yet, as Galton made clear, contiguous or adjacent cultures interacted with one another in various ways that inevitably interfered with this assumption due to their spatial proximity. Galton's Problem thus throws the inferential validity of Murdock's entire cross-cultural analytic project into question and has resulted in its widespread and persistent disrepute within traditional anthropological circles (Dow and Eff 2013; Eff 2001).

3 Social Biogeography

Murdock's cross-cultural systematizing marks a grand social scientific venture. Following from its meta-theoretical scope, we find Murdock, like many another author in the present volume, unwittingly measuring cross-cultural variation in life history speed. Murdock's venture touches the hearth and hearthstones of our own ambitions as life history theorists. After all, *Differential K Theory* endeavored to explain cross-continental life history variation—variation we continue to investigate under the broad banner of *social biogeography*.[6] As such, in endeavoring to measure life history variation as it is expressed across nation-states, we find ourselves in the position of Murdock, and Tylor before him, confronted with Galton's Problem. Thus, we take up Galton's Problem in reviewing Murdock within life history perspective, for its direct implications for *An Atlas of Cultures* and its concomitant implications for social biogeographical applications of life history theory.

Recent work has confirmed the quantitative impact of such confounding effects, but has nevertheless proposed innovative mathematical solutions involving the statistical control of *network autocorrelations* among spatially contiguous societies (Dow 1984, 1993; Dow et al. 1984). Dow and Eff (2013) have described the general form of the mathematical problem as follows:

> In the geographical literature the similarity of variable scores within spatially proximate clusters of sample units is widely known as spatial autocorrelation. Simply stated, *spatial autocorrelation* implies that what happens at one location in space is in some way related to what happens at nearby locations. More generally, *network autocorrelation* implies that the attributes of each node in a network can be predicted in part from knowledge of the attributes at related nodes, conditioned on the strength of the pairwise ties. (pp. 2–3)

Thus, it has become possible, both in principle and practice, to control statistically for Galton's Problem using autoregressive methods via the construction of such quantitative models.

Such ingenious mathematical solutions, however, have also been recently criticized as being too conservative in that they arbitrarily assign causal priority to the phylogenetic origin of a trait, whether by cultural diffusion or demic migration, over the maintenance of a trait by ongoing selection (Thornhill and Fincher 2013). In other words, such statistical controls may well be effacing ongoing, ecologically maintained, evolutionary variance. By statistically controlling for spatial contiguity among cultures, the effects of current adaptation (by means of continuing selection) to similar environments might be attenuated from its veridical magnitude or even completely lost. Thus, one would make a type two error, or false negative, rejecting evolved differences that are indeed present and persistent.[7] The problem of spatial contiguity in anthropology is isomorphic to that of phylogenetic relatedness in biology in that similarities among spatially contiguous cultures often stem from shared cultural ancestry, whether by diffusion or migration. Autoregressive statistical controls for spatial contiguity among different cultures thus have the same effects as phylogenetic controls for shared ancestry among different species. Both methods arbitrarily privilege the *origin* of a trait as a causal hypothesis over its *maintenance* by ongoing selection within the current ecology. This favoring of one alternative causal explanation over another violates the most basic principles of the method of multiple working hypotheses (Chamberlin 1897) and strong inference (Platt 1964). But precisely how might one critically examine such multifactorial causal influence both empirically and quantitatively? For this, one would have to go beyond simply showing the existence of spatial autocorrelations. One would have to show that the autoregressive effects in one variable, the putatively causal one, may be *driving* (presumably via natural-selective pressures) the autoregressive effects in cultural traits among spatially contiguous groups. To demonstrate the principle espoused by Thornhill and Fincher (2013), this putatively causal effect should be a contemporary ecological pressure as opposed to an ancestral phylogenetic signal.

4 Proof of Concept

There is no published article, the citation of which would solve Galton's Problem, whether in confirmation or disconfirmation of Murdock's systematizing endeavors. Therefore, as a proof of concept, we present some preliminary analyses in advance of their publication within the primary literature. The information comes from a cross-national data set compiled for a recently published work on the social biogeography of homicide[8] (Peñaherrera-Aguirre et al. 2018), which was itself originally obtained from the last and most complete international homicide database published in 2012[9] by *UNODC*, the *United Nations Office on Drugs and Crime* (2013). Instead of using network autocorrelations, we performed this proof of concept by constructing a simpler ordinal variable representing the sequential distance "Out-of-Africa" for each national polity. This method simultaneously reflects common human origins and subsequent outward migrations. This reduced the complexity of the mathematical problem, from one of estimating *network* autocorrelations, to one of estimating *serial* autocorrelations for each national polity with each spatially adjacent one within that ordered sequence.

Having allowed for a glimpse behind the methodological veil as it relates to the data set and statistical analysis, we do the same regarding the actual variables employed. Using a natural logarithmic transformation, we relate *parasite burden*[10] to the aggregate life history strategy. More precisely, proof of concept will come from relating slow life history speed positively to life expectancy, and negatively to infant mortality, adolescent fertility, and total fertility rates (World Bank 2012). Finally, we add ethno-linguistic diversity, a cultural criterion, as multiply-operationalized by a linear composite of (1) ethnic diversity, (2) linguistic diversity, and (3) religious diversity (Alesina et al. 2003). Within the analytical framework just described, we ran three discreet analyses: the first generated simple correlations, and the second two generated correlations accounting for lag in time and distance in space.

The first analysis ran simple bivariate correlations among four variables: (1) ordinal distance out-of-Africa; (2) natural logarithm of parasite burden; (3) slow life history; and (4) ethno-linguistic diversity. From so doing, we find ordinal distance out-of-Africa correlated negatively with the natural logarithm of parasite burden, positively with slow life history, and negatively with ethno-linguistic diversity. Additionally, the natural logarithm of parasite burden correlated negatively with slow life history and positively with ethno-linguistic diversity. Lastly, slow life history correlated negatively with ethno-linguistic diversity, although less so than parasite burden in absolute value, indicating, at most, partial mediation of the effects of parasite burden on ethno-linguistic diversity.[11] What all this can be taken to mean is that, as humans expanded out of Africa, their parasite burden was decreased by living in more temperate climates, their life history strategy significantly slowed as a result of the reduced extrinsic morbidity and mortality, and their ethno-linguistic diversity was consequently reduced. These results suggest that the decrease in parasite burden, concomitant to migrating out of Africa, directly influenced both the slowing of life history and the reduction in ethno-linguistic diversity.

The second set of analyses estimated (lag = 1) serial spatial autocorrelations among parasite burden, slow life history, and ethno-linguistic diversity with respect to ordinal distance out-of-Africa.[12] As can be seen in tabular form,[13] all serial spatial autocorrelations were positive in direction and substantial in magnitude. Using data generated from the second analysis, a third analysis estimated simple bivariate correlations among serial spatial autocorrelations for each of the four major variables.[14] To clarify, this third analysis repeats the first, using data from the second. In other words, bivariate correlations are once again generated, but now using data generated from the serial spatial autocorrelations, as can be seen in an appended table. In doing so, we find: (1) the ordinal distance out-of-Africa of each society correlated negatively with the serial autocorrelations among their successive parasite burdens; (2) the serial autocorrelations among successive parasite burdens correlated positively with both those among their corresponding slow life histories and those among their corresponding ethno-linguistic diversities; and (3) the serial autocorrelations among successive slow life histories correlated positively with those among their corresponding ethno-linguistic diversities, indicating complete mediation of the effects of serial autocorrelations among successive parasite burdens on those among their corresponding ethno-linguistic diversities.[15] What all this can be taken to mean is that, as humans expanded out of Africa, the serial spatial autocorrelations among contiguous societies were significantly reduced for all three variables of current interest: (1) parasite burden, (2) life history strategy, and (3) ethno-linguistic diversity. Perhaps more importantly, what this shows is that the cross-national pattern of serial autocorrelation in ethno-linguistic diversity is plausibly attributable to the serial autocorrelations in parasite burden and life history strategy. The cross-national serial autocorrelations in parasite burden may be mostly driving ($r = .675$); those in life history strategy are partially driving ($r = .452$). This means that the cross-national serial autocorrelations in parasite burden may be *indirectly* driving ($r = .305$) those in ethno-linguistic diversity through their effects on life history strategy. These results therefore suggest that the decrease in the serial spatial autocorrelations among contiguous societies in parasite burden that was concomitant to migrating out of Africa had direct and indirect effects: It *directly* facilitated corresponding decreases in the serial spatial autocorrelations among contiguous societies in life history strategy; and *indirectly* facilitated the corresponding decreases in the serial spatial autocorrelations among contiguous societies in ethno-linguistic diversity through their effects on those in life history strategy.

These findings are consistent with the empirical results reported in Fincher et al. (2008) as well as in Fincher and Thornhill (2012), although life history strategy was not identified in either work as an important mediator of these effects. Perhaps more importantly, these findings are consistent with the line of theoretical argumentation advanced in Fincher and Thornhill (2012) regarding the importance of contemporary ecological selective pressures, as opposed to phylogenetic or cultural inertia. Truly, the selective pressures exerted by human parasite burden upon human life history strategies appear to be a major influence in generating the patterns of spatial autocorrelation observed in the cross-cultural distribution of ethno-linguistic diversity.

Getting back to Murdock's overarching project, as we have interpreted it here, this means that Galton's Problem has not proven fatal to the validity of the enterprise. If applied advisedly, with the proper precautions, the cross-cultural analytical method pioneered by Murdock, and supported by so much of his meticulous work in systematizing and cataloguing the most elementary particles of culture, can still be useful in contemporary work, such as the emerging field of social biogeography.

Notes

1. This opening information was obtained from the *New World Encyclopedia* at the following Web address: http://www.newworldencyclopedia.org/entry/George_Peter_Murdock.
2. These biographical details were taken from the National Academies of Sciences, Engineering, and Medicine's 64th volume of biographical memoirs, available at the following Web address: https://www.nap.edu/catalog/4547/biographical-memoirs-v64.
3. These adjectives were used by White and Brudner-White (1988).
4. As Murdock discusses, some of Boas' deconstructive efforts centered on early evolutionary theories.
5. In association with Karl Pearson.
6. See Chapter 7, which reviews the work of Landers, for an example of social biogeographic life history applications.
7. In evolutionary biology, the effects of *phylogenetic inertia* and those of current ecological adaptive pressures are two alternative hypotheses which should be accorded comparable weight as possible causal determinants, whether acting singly or jointly. To clarify, phylogenetic inertia often creates incongruity between an organism's adaptations and environmental demands. This arises when the organism's adaptations are honed by past selective pressures, which are presently different.

8. Although the present analyses do not encompass the homicide data.
9. Using data from the previous year.
10. Following Thornhill and Fincher's just emphasis on this variable, and its action as an agent of extrinsic mortality.
11. The following provides a higher level of detail, quantifying the effects of this first analysis for the interested reader:
    The first analyses done on this cross-national sample were estimating the simple bivariate correlations among the four major variables; this was done using the continuous parameter estimation model (CPEM; Gorsuch 2005), by multiplying the standardized scores of each variable by that of each of the other variables and then averaging across all observations. Table 1 displays the following results: (1) Ordinal distance Out-of-Africa (OOA) was correlated negatively with the natural logarithm of parasite burden (LPB), positively with slow life history (LHS) and negatively with ethno-linguistic diversity (ELD); (2) LPB correlated negatively with LHS and positively with ELD; and (3) LHS correlated negatively with ELD, although less so than LPB in absolute value, indicating only at most *partial* mediation of the effects of LPB on ELD. This last result was also obtained using CPEM, where the expected indirect effect of LPB on ELD, as mediated by LHS, was estimated by multiplying the bivariate correlation of LPB and LHS with that of LHS and ELD: $(-.802) * (-.595) = .477$, which was statistically significant ($p < .05$). The residual direct effect of LPB on ELD was estimated by subtracting this estimated indirect effect from the total effect, as indicated by the bivariate correlation of LPB and ELD: $(.230) - (.477) = -.247$, which was also statistically significant ($p < .05$), hence the only *partial* mediation reported.
12. More specifically, the second set of analyses estimated the means of the first (lag = 1) serial spatial autocorrelations of LPB, LHS, and ELD, with respect to ordinal distance OOA; this was also done using CPEM, by multiplying the standardized scores of each variable by the one immediately preceding it in the OOA sequence, then averaging across all observations.

Table 1 Raw CPEM bivariate correlations

	OOA	*LPB*	*LHS*	*ELD*
OOA	1.000			
LPB	−.315	1.000		
LHS	.486	−.802	1.000	
ELD	−.194	.230	−.595	1.000

Note CPEM correlations = $\Sigma(zX * zY)/n$

Table 2 CPEM first (lag = 1) serial spatial autocorrelations

	Means
LPB_{Lag1}	.607
LHS_{Lag1}	.792
ELD_{Lag1}	.501

Note CPEM spatial serial autocorrelations = $\Sigma(zX_{OOA} * zX_{OOA-1})/(n - 1)$

13. Table 2 displays the serial spatial autocorrelations of LPB, LHS, and ELD, which were all positive in direction and substantial in magnitude.
14. This analysis was done using CPEM, by multiplying the standardized scores of the autocorrelation coefficients of each variable by that of each of the other variables and then averaging across all observations. Table 3 displays the following results: (1) Ordinal distance Out-of-Africa (OOA) was correlated negatively with the first (lag = 1) serial autocorrelations of the natural logarithm of parasite burden (LPB_{Lag1}), positively with slow life history (LHS_{Lag1}) and negatively with ethno-linguistic diversity (ELD_{Lag1}); (2) LPB_{Lag1} correlated positively with both LHS_{Lag1} and ELD_{Lag1}; (3) LHS_{Lag1} correlated positively with ELD_{Lag1}, although less so than LPB_{Lag1}, indicating *complete* mediation of the effects of LPB_{Lag1} on ELD_{Lag1}.
15. This last result was also obtained using CPEM, where the expected indirect effect if LPB_{Lag1} on ELD_{Lag1}, as mediated by LHS_{Lag1}, was estimated by multiplying the bivariate correlation of LPB_{Lag1} and LHS_{Lag1} with that of LHS_{Lag1} and ELD_{Lag1}: (.675) * (.452) = .305, which was statistically significant ($p < .05$). The residual direct effect of LPB_{Lag1} on ELD_{Lag1} was estimated by subtracting this estimated indirect effect from the total effect, as indicated by the bivariate correlation of LPB_{Lag1} and ELD: (.421) – (.305) = .116, which was not statistically significant, given that this residual direct effect was under the $r > .15$ cutoff ($p < .0495$) for a sample size of $N = 172$. This result supports the claim of *complete* mediation reported in this case.

Table 3 Correlations among CPEM first (lag = 1) serial spatial autocorrelations

	OOA	*LPB_{Lag1}*	*LHS_{Lag1}*	*ELD_{Lag1}*
OOA	1.000			
LPB_{Lag1}	−.475	1.000		
LHS_{Lag1}	−.544	.675	1.000	
ELD_{Lag1}	−.203	.421	.452	1.000

Note All correlations coefficients tabulated are statistically significant, given that the two-tailed probability under the null hypothesis for a sample size of $N = 172$ of any correlation coefficient > .15 is $p < .0495$

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CHAPTER 12

Lawrence H. Keeley: Pre-state Societies in the Hobbesian Trap

1 The Myth of the Noble Savage in an Evidentiary Solvent

Prehistory was not a peaceful period (Gat 2010; Guilaine and Zammit 2004; LeBlanc and Register 2003; Otterbein 2004; Pinker 2011). Contrawise, current evidence suggests small-scale societies experienced high mortality rates due to homicide, feuding and inter-group conflict (LeBlanc and Register 2003; Guilaine and Zammit 2004; Otterbein 2004; Wrangham et al. 2006; Gat 2008; Pinker 2011; Wrangham and Glowacki 2012; Walker and Bailey 2013; Lahr et al. 2016).[1] Not more than twenty odd years before, this recognition of pre-state violence, though now so thoroughly documented, was scarcely suspected. Born in 1948, Lawrence H. Keeley, this chapter's featured author, passed in October 2017 when this monograph was in preparation. An obituary[2] recalled, without elegiac hyperbole, that Keeley was, "instrumental in shifting debate from whether conflict occurred in the past, to asking how prevalent war was, and why it occurred." For indeed, Keeley was one of the pioneers examining cross-cultural data to determine the pervasiveness, intensity and lethality of war in pre-state societies (1997, 2014). By examining the ethnographic and archaeological record, Keeley (1997) calculated numerous indicators of intergroup aggression in small-scale societies, the following three of which will be reviewed by turns: *per capita lethality*, *percentage of the population mobilized*, and the *frequency of intergroup conflict*.

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Deflating the *myth of the noble savage*, Keeley's *War Before Civilization* (1997)[3] parses between *absolute* and *per capita* deaths arising from conflict; confirming that the former is, as all expected, higher in nation states; but that the latter is, in fact, far higher in pre-state societies.[4] By way of example, the percentage of European and U.S. male deaths in nation-state conflicts during the twentieth century, together with its World Wars, was less than 1.0%; whereas estimates from small-scale societies ranged between 8.3 for the *Gebusi* of Papua New Guinea, to 59.0 for the *Jivaro* inhabiting the Ecuadorian and Peruvian Amazon (Keeley 1997).[5] Alternatively, take the example of *Maori*,[6] a representative pre-state society studied by Keeley. Maori's 16.7% death toll, exceeds that of Athens at the *Battle of Marathon*, tallying to 1.9%, or the Union at the *Battle of Gettysburg*, tallying to 3.7%. On to the second of these three metrics: As mature states suffer less per capita death, so they commonly mobilize less of their population. In Keeley's reckoning (1997), ancient states, such as Imperial Rome (circa 200 AD), mobilized two percent of its male population for combat. These estimates pale when considering the mobilization of male warriors in societies, such as the *Mae Enga* in Papua New Guinea, where 40% of males went to war. These figures are only approached by modern nation states in their most acute times of existential crisis, as when France mobilized 43% of its male population during *World War I*, or when Germany mobilized 32% of its male population in *World War II*. Turning finally to the frequency of intergroup conflict, this varies in the same direction across several levels of social and political complexity. As in the case of the late Roman Republic and the early decades of the Roman Empire, Keeley estimates ancient nation-states to fall into conflict every 6.5 years (Keeley 1997), with most conflicts being classified as civil wars and revolts, rather than clashes with other states. This pattern was accentuated in modern states, for the data collected by Keeley (1997) indicates that between 1800 and 1940, countries went to war once every 25 years. Alternatively, following the work of Otterbein[7] (1989) and Ross (1983),[8] Keeley concluded that most socially and politically simple societies (e.g. bands and tribes) engaged in raids, ambushes, massacres, small-scale battles, and like forms of lethal intergroup violence, more or less continually.[9]

2 The Irrelevance of Biology

Before binding life history theory to lethal coalitional aggression, it is pertinent to reconcile Keeley's position with contemporary evolutionary perspectives. Despite often being cited in evolutionary publications, Keeley skeptically received "selectionist" explanations of the prevalence and intensity of intergroup conflict across the societies he studied. Keeley's concerns are most pointedly evidenced in a subsection of War Before Civilization entitled, *the irrelevance of biology*. Therein, the author reflects on how biological treatments ostensibly fail to acknowledge cooperative tendencies, and the degree to which such cooperation hinders violent aggression:

> The Hobbesian 'war of all against all' might be used to describe some solitary species of nonhuman animals, but it cannot be applied to any known human society. All societies, however bellicose or violent, use social and cultural devices to preserve havens of peace and cooperation within a group- even if only within a small band or village. If humans can occasionally construct huge societies involving hundreds of millions of individuals within which homicide is nearly eliminated, there is no biological reason why such social units could not include all of humanity. Regarding humans' inborn capacities, it is far easier to explain peace than war. (Keeley 1997; p. 158)

As can be seen, Keeley pits *cooperation* against *conflict* without proper perspective on group membership. Rather than the Hobbesian *war of all against all*, pre-state intergroup conflict exemplifies a *war of us against them*.[10] In other words, agonistic interactions are directed to the in-group, while antagonistic interactions are directed to the out-group. Cooperation is not a force to end all violence; it is rather a feature of human nature to curtail within group violence.[11] As Keeley himself elsewhere allows, humans often cooperate in conflict: "It is hardly surprising that violence, whether against other species or against other humans, often involves cooperation" (Keeley 1997; p. 158).

Apprehension extends from misunderstanding, as is evident in a recent publication wherein Keeley (2014) equates "selectionist" approaches with genetic correlates of behavior as manifest within individual persons. However, rather than genes sequestered within single group members being the sole units of selection, current evolutionary perspectives consider the effect of selection over higher-order units (Alexander and Bargia 1978; Keller 1999; Okasha 2006; Traulsen and Nowak 2006; Wilson and Sober 1994). The issue of cooperation is at the center of these publications. Hence, current evidence suggests intragroup cooperation and lethal intergroup conflict coevolved (Bowles 2009; Choi and Bowles 2007; Mathew and Boyd 2011), with *groups* being selection loci. Rather than considering cooperation and competition as two separate phenomena, the current evolutionary debate revolves around which cooperative mechanism (e.g. kin selection, indirect and direct reciprocity, or cultural group selection) better fits the patterns observed during intergroup aggression. For instance, an interpretation based on *kin selection* and *inclusive fitness* attributes risk assumption, heroism and cohesion among group members to their higher genetic relatedness, relative to the out-group with which they are contending (Patton 2000). Therefore, the *benefits* obtained from the attack, interacting with the degree of *kinship*, should be higher than the *costs*, as represented by Hamilton's kin selection equation[12] (Hamilton 1964). Alternatively, direct and indirect reciprocity, facilitated by recognition and reputation tracking of individual members, explains cooperative enterprises in larger, unrelated groups (Gilby 2012; Nowak and Sigmund 2005; Trivers 1971). By thus cooperating with others in a raid or massacre, bravado and altruism impart prestige that translates into fitness gains via increasing access to females, copulations, and impregnations (Chagnon 1988; Patton 2000). Moreover, cultural group selection, or *strong reciprocity*, considers the role of punishment, and biased transmission of cultural variants in enforcing intragroup cooperation (Bowles and Gintis 2013; Egas et al. 2013; Henrich 2004; Richerson and Boyd 2005). Furthermore, groups prescribing cooperation among ingroup individuals during intergroup clashes, all else being equal, are predicted to displace, assimilate or annihilate the competing group (Boyd and Richerson 2005). Consequently, even though originally considered by Keeley as a counterargument to "selectionist" perspectives, cooperation, culture and its evolutionary correlates, are now fundamental elements in understanding the behavioral ecology of lethal intergroup aggression through a multilevel selection lens.

3 Life History and Pre-state Conflict

Just as ecology ultimately influences life history speed, so it predicts the frequency and intensity of warfare. For instance, investigating the effects of resource unpredictability in 186 predominantly preindustrial societies, Ember and Ember (1992) found natural disasters and the threat of famine predictive of war frequency in small-scale societies. Similarly, parasite stress, another evolutionary correlate of life history, positively predicts non-state wars and civil wars (Thornhill and Fincher 2014; Letendre et al. 2010).[13] It is also clear that, in predisposing ecological conditions like those just reviewed, sexual selection can favor aggression in pre-state societies. For example, young *Nyangatom* males who raided neighbors, reported having more offspring and wives as they aged. Similarly, among *Yanomamo* in Venezuela, *unokai* males (men who killed other men in raids or ambushes) had more children and wives than non-warrior males (Chagnon 1988). Whereas among the *Achuar* occupying the Ecuadorian Amazon, males were rated as more attractive, when more martial (Escasa et al. 2010). It is likewise clear that pre-state conflict can profoundly affect populations. In demonstration thereof, a cross-cultural study surveying pre-state societies in Papua New Guinea and Irian Jaya found survivors of social extinction apt to be absorbed by larger groups after inter-clan clashes (Soltis et al. 1995). That group size and strength can appreciably wax and wane in response to small scale pre-state violence, is bolstered by chimpanzee raids wherein body mass increase (Pusey et al. 2005), altered female inter-birth intervals (Williams et al. 2004), and post-conflict displacement have been observed (Pusey et al. 2005; Wilson and Wrangham 2003; Wrangham and Peterson 1996; Crofoot and Wrangham 2010). Unfortunately, amidst this fast accreting body of research, there is no attempt to more specifically examine the association between life history and war-induced mortality rates in small-scale societies, which begs the question: *Do variations in life history strategies influence the frequency and intensity of intergroup aggression, as would be the case if life history was a first cause; or does lethal aggression between groups impact life history, as would be the case if warfare was the first cause?*

Much of what is known about life history and lethal conflict comes from the analysis of databases concerning modern nations. For instance, slow life history strategists living in nation-state societies, though expressing high in-group prosocial tendencies, have been found to have low levels of *Negative Ethnocentrism*, measured by (1) prejudice to out-groups, (2) low motivation to exhibit prejudice towards out-groups, (3) feelings of threats from out-groups, and (4) racism (Figueredo et al. 2011). Inter-regional examinations, based on Spanish, Italian, and Mexican data, have found a similar connection between life history and intra-group egalitarianism (Black et al. 2017). Similarly, Figueredo et al. (2017) collected ecological and demographic data from 66 contemporary national polities. Although life history predicted within-group peace (operationalized as low perceived crime rates, low homicide rates, low violent crime rates, low civilian access to weapons, and low perceived corruption), no association was found between life history and between group peace (a higher order factor built upon inter-national peace and infra-national peace).[14] Within the confines of nation states, life history is a significant predictor of intragroup competition; however, the connection between life history and inter-state peace was fully mediated by within-group peace. As for the conflict expressed within pre-state societies, extrapolating from ethnographic data can in some measure rectify the want of data. Instead of within-group peace extending to cooperative exchanges between neighbors; within-group cooperation coevolves with lethal intergroup competition in pre-state societies (Choi and Bowles 2007; Bowles and Gintis 2011). Thus, cooperative behaviors are selected due to the benefits obtained by collectively targeting other communities. Some of the benefits include: access to resources, capturing females, decreasing the risk of suffering future raids and massacres, cementing alliances with other communities, and the eventual displacement and/or extermination of the rival group (Gat 2008; Wilson 2013; Wrangham and Glowacki 2012).

After immersing ourselves in some pertinent facts and sources, as we have now done, let us progress towards a positive proof, even at the risk of making interpretative leaps over gaps in the literature. It seems that life histories are affected by conflict; but whether conflict slows or speeds life histories is dependent on context. Specifically, Keeley's research informs the important contextual features: (1) frequency and intensity, (2) scale, and (3) per capita combatant ratios. First, with reference to *frequency and intensity*, we simply conjecture that there is some point of sheer attrition beyond which populations are either decimated or unable to attend to the non-violent responsibilities of living. More often than not, these conditions favor the occurrence of fast life histories. Second, with reference to *scale*, it would seem that smaller scale violence in the form of raids and ambushes systematically selects for faster life histories, while larger scale violence in the form of battles and wars systematically selects for slower life histories. Large scale battles and long enduring wars are frequently decided by commissars, differentiated units and siege technology, logistical feats that concentrate fighting force, tactical and strategic ingenuity, orchestration of supply chains, synchronized drill, the ability to accrue and advantageously deploy resources, the capacity to secure loans and manipulate currency, not to mention the characteristics of discipline, subordination and cooperation.[15] Third, life history speeds as the number of *per capita combatants* rises. When, as is often the case in pre-state conflicts, a great proportion of a population is directly embroiled in violent conflict, slow life history strategies are undermined. Such conditions expose the mass of society to extrinsic mortality threats, with consequent shifts towards mating effort, high birth rates, and shorter inter-birth intervals; or, in other words, a selective regime prioritizing the replacement of population members. In contrast, when a small proportion of a population is exposed to such extrinsic mortality threats, there is that much less by way of directional selection towards the *fLH*-selected end of the life history spectrum. What is more, when large scale war efforts are carried on with a low per capita combatant ratio, it drafts whole sectors of the population into supporting roles. Just as frequently, *sLH*-selection regulates the diversification of cognitive abilities (Woodley et al. 2013). This degree of cognitive specialism is reflected in civilian leaders of the military, the engineers overwhelming the enemy with innovation, and the medical personnel keeping effectives in the field.

4 A Stimulant to Further Research

There is copious evidence of lethal conflict in extinct and extant pre-state societies. Further, small-scale lethal conflict of this variety is associated with life expectancy, longevity, fertility, inter-birth intervals among other life history indicators. Still, no extant research bears on whether intergroup aggression is, or is not, correlated to a latent higher-order life history factor. Indeed, preliminary analyses indicate the factor structure of life history in small-scale societies differs from that of contemporary nation-states, with fertility rates being considerably susceptible to the amount and access to resources.[16] Thus, rather than generalizing the findings between life history, within-group peace, and between group peace from nation-states, further research is needed to examine in detail, the link between conflict and life history in pre-state societies. Additionally, statistical analyses examining models from a "life history first" or "conflict first" perspective are needed to discern the degree of theoretical and methodological parsimony offered by these approaches. At this time, the evidence would support both models, confounding any possibility of reaching a solid conclusion. The need for such analyses however, does not negate the existence of feedback loops, with the effects of life history increasing warfare, which itself would select for faster life histories. Whatever future research indicates as to the nature of the relationship, the available evidence would signify a significant connection between these variables. Despite current limitations, Keeley's work offers a rich context for the development of further hypotheses regarding the role of life history in the evolutionary origins of lethal intergroup conflict.

Notes

1. Upper Paleolithic sites, such as *Jebel Sahaba*, exemplify the fact clashes were not a single event, but rather a chronic phenomenon (Wendorf 1968).
2. This obituary was posted December 8, 2017 in *Anthropology News*, a publication of the *American Anthropological Association*. In addition to crediting him with revolutionizing the study of pre-state societies, this obituary details Keeley's achievements in microwear analysis for which he received an *Award for Excellence in Lithic Studies* presented by the *Society for American Archaeology*. The eulogium can be read in full at this address: http://www.anthropology-news.org/index.php/2017/12/08/lawrence-h-keeley/.
3. Keeley is also the author of *Experimental Determination of Stone Tool Uses*, though more than any other featured author in this volume, Keeley's publications are nearly exclusively within the primary literature.
4. In the case of battles, contenders usually agreed to a time and place for the confrontation (Keeley 1997); though, these and other trappings of *ritual* belied the lethality of such clashes.
5. In *War Before Civilization*, Keeley further describes multiple instances of massacres in small-scale societies, from Crow Creek, South Dakota (1325 AD), where 60% of the individuals in the village were killed, to the archeological site of Talheim, Germany (7000 years ago), with a death toll of 34 people.
6. The Maori are indigenous Polynesian peoples of New Zealand.
7. In Otterbein's (1989) cross-cultural research with fifty societies, only five were described to rarely suffer intergroup conflicts.

8. Ross found that 13% of a total of ninety societies experienced either none or few conflicts.
9. The following provides the interested reader with further ethnographic details of Keeley's findings:
   Due to the political and social similarities of extant bands and tribes to human societies in the past, Keeley (1997) included in his list, the percentages of individuals killed in various prehistoric archaeological locations such as the Nubian site (117) of Jebel Sahaba (between 14,000 and 12,000 BC), which at the time of the publication of War Before Civilization, exhibited the highest percentage of war deaths (40.7%) in a pre-historic society. In addition, close to half of males (47.7%) and half of the females (45.0%) in site 117 died due to intergroup conflict. Furthermore, rather than being a single event, for F. Wendorf (1968), the violence observed in Jebel Shaba indicated frequent confrontations, as demonstrated by the healed forearm fractures found in some individuals. Although evidence Paleolithic intergroup conflict is still debated, the extent of Mesolithic massacres bolsters the fact that lethal coalitional aggression occurred in small scale societies in the past. Another revealing case is Ofnet, Germany. Keeley (1997) describes the presence of two caches containing the skulls of 34 of individuals. Ofnet not only indicates the presence of Mesolithic lethal intergroup conflicts, but as Keeley acknowledges, the caches may not only be interpreted as a sign of "trophy" hunting during these confrontations. Due to the presence of males, females and children, the site once again corroborates the indiscriminate nature of lethal intergroup aggression, a pattern found in earlier sites such as Jebel Sahaba where males, females and children were also the target of lethal violence (Wendorf 1968).
10. Humans use several mechanisms to discriminate between in-group and out-group members, expressing agonistic interactions with the former and antagonistic interactions with the latter. This ability, however, requires two behavioral and cognitive phenomena: *discrimination* and *cooperation*. Although individuals living in tribes (i.e. rank societies), chiefdoms and states, often use symbolic markers enabling individuals to discriminate group membership (Boyd and Richerson 2005), lethal intergroup conflict has also been observed in bands (Boehm 2013; Lahr et al. 2016; Otterbein 2004; Pinker 2011) where symbolic group distinction (e.g. through ornaments) is either partially manifested or absent (except for linguistic markers; Flannery and Marcus 2012). A potential mechanism enabling group recognition in the absence of symbolic indicators is familiarity (e.g. within group kin and allies; Fried 1967). Hence, the frequent contact between co-residents may decrease the risk of being confused as a member of the rival group during an inter-group confrontation. The discrimination exhibited by chimpanzees targeting

specific outgroup individuals would support this hypothesis (Wrangham et al. 2006; Wrangham and Glowacki 2012), with a higher risk of attack depending on the sex, age, reproductive status, and numeracy of the victims at the time of the attack (Wilson et al. 2001; Wilson and Wrangham 2003). However, the degree of social discrimination exhibited by chimpanzees is not limitless. On the contrary, females who dispersed from the attacking group, had been observed to be attacked by the invading party, suggesting frequency of contact plays a role in recognizing an individual as a member of the group (Chapais 2009).

11. Sociobiologists are not arguing in the wake of Freud for some notion of Thanatos; any violent capacities built into human nature promote individual and group fitness, and have not the end of purposeless destruction.
12. Within Hamilton's kin selection equation (Hamilton 1964), benefits obtained from *attack* are represented by (b) *degree of kinship* is represented by (r) and *costs* are represented by (c).
13. Although the link between parasite stress and lethal conflict has been described before, for the current purposes, further evidence is required to determine the degree of social and political similarity between insurgents and/or belligerents in civil wars, and pre-state societies.
14. It appears that life history in nation states is a significant predictor of the level intragroup competition, however, the connection between life history and inter-state peace is fully mediated by within-group peace.
15. Some of these demanding features of war are broached by Landers (2003), most especially on page 205, section 9.1: *High-Level Warfare: Force, Time, and Space*. Landers (2003; p. 331), continues on to describe the increasing emphasis on coordinated movement above individual valor:

    > More time and money was invested in infantry training from the later seventeenth century, but the aim of the training was to render men passive, obedient cogs in a larger machine on and off the battlefield rather than to foster individual-level skill. The bulk of this training expenditure therefore represented what we have termed an 'organization cost', and it went along with more sophisticated unit organization, support services, and chains of command, all of which allowed the deployment of larger forces to good effect.

16. When considering the association between life history and lethal intergroup aggression, it is relevant to consider any differences between life history indicators found in small-scale societies and those exhibited by modern states. Variations in life history across populations had been attributed to differences in extrinsic morbidity and mortality corresponding to each ecology (Stearns 1992; van Schaik and Isler 2012; Hawkes 2006; Kappeler et al. 2003). Consequently, environments in which individuals suffer from either a high risk of predation, parasitism or

lethal intraspecific aggression, are expected to display faster life histories (Brumbach et al. 2009; Ellis et al. 2009). Different from modern nation-states however, pre-states societies without birth control (deemed natural fertility populations), display variations with respect to how life history indicators load into a single life history factor (Peñaherrera-Aguirre et al., unpublished analyses). Hence, whereas in states, total fertility rate has a negative loading in a life history factor (Figueredo et al. 2017), in twenty-two small scale societies, total fertility was not significantly associated with the life history factor or other life history indicators, such as life expectancy (Peñaherrera-Aguirre et al., unpublished analyses). This pattern may be attributed to the moderating role of resource acquisition (Walker et al. 2006). Hence, individuals living in wealthier families, have lower inter-birth intervals, an early age at first reproduction, and higher fertility (Clarke and Low 1992; Skjærvø et al. 2011; Mace 1998). This pattern has also been reported in states prior to the demographic transition, with wealthier classes displaying lower infant mortality rates (Clark 2008; Low 2015). Moreover, these effects are not restricted to female life history. For example, a generalized linear mixed model examining biographical data from Roman kings, consuls and emperors concluded that magistrates with longer lifespans had more offspring (Peñaherrera-Aguirre et al., in preparation). Thus, future research analyzing the link between warfare and life history strategies in natural fertility populations, should take into consideration the moderating effects of resource accessibility.

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CHAPTER 13

Marvin Harris: Ecological Anthropology and Cultural Materialism

1 A Theory for All Seasons

Born 1927, anthropologist Marvin Harris went on to promulgate his doctrine of *Cultural Materialism*, an ecologically reductive conceptualization of culture, from his post at Columbia University throughout the 1960s and 1970s. Verging on the hagiographic, Kuznar and Sanderson class Harris "among the paradigm masters of modern social thought," judging him "without equal in anthropology…as a critic of the theoretical follies of others" (Kuznar and Sanderson 2007; pp. 12–13). In part, such adulation is elicited by Harris's intellectual breadth, for, as Kuznar and Sanderson (2007; preface) state:

> Harris's substantive work ranged from exploring the social variability of racial classifications in Brazil and Mozambique, to explaining the origin of the state, warfare, male dominance, food preferences, and cannibalism, to uncovering the causes of culture change in contemporary American society.

There was still more. Harris broached the sacred cow and the abominable pig (1987), while also submitting rationalist explanations for witches (1974), incest avoidance, death, sex, fertility (Harris and Ross 1987), potlatch, sex ratio (1974), food (2009), population density (1964), postmodernism (1998), social criticism (1989), homosexuality (Harris and Ross 1987), race, and racism (1981). Take the witch, for example. Where European witchcraft persecutions were emblematic of premodern

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irrationality, Harris chained their bloody eruptions to food prices, as they fluctuated and peaked. Following this, Harris understood the execution and banishment of witches to be a method of fertility control, as explained more fully by Harris in 1974 and discussed at length by Harris and Ross in 1987.

One can read his more popular books and believe Harris to be on an entertaining tour of anthropological oddities. Notwithstanding such variegated pursuits, Harris, like Michael Mann, the sociologist treated in Chapter 15, was only omnivorous at the level of content. The unifying principle behind these many investigations was *Cultural Materialism*, Harris's systematic anthropological approach imposing the divisions of *infrastructure*, *structure*, and *superstructure*, respectively, inspired by White's (1949) distinctions between *technology*, *social systems*, and *ideology* (Dow 2007). Cultural Materialism is a tripartite scheme capable of pursuing causal explanations in an ordered manner. Causality is first sought in the infrastructure, then the structure, and only if it is not found therein, the superstructure. Infrastructure includes the *mode of production*, including work patterns, ecosystems, and the technology of subsistence, while not excepting the *mode of reproduction*, which refers to demography, mating patterns, fertility, natality, mortality, contraception, abortion, and infanticide, among others. Structure refers to aspects of the domestic economy, including family structure, domestic division of labor, education, domestic discipline, hierarchies, and sanctions. Lastly, superstructure refers to macrosocial features such as art, music, literature, rituals, symbols, myths, religion, and taboos.

Within the context of ranging far and wide in the realm of scientific metaphysics, replete with discussions of Bacon, Darwin, Pearson, Hume, Comte, Popper, and Kuhn, alongside the concepts of probability, induction, deduction, positivism, and empiricism, Harris (2001; p. 26) explains that Cultural Materialism is a *research strategy*, not a *scientific theory*, with relevance to process more than subject (Dow 2007). As per its name, Cultural Materialism was a materialist explanation of culture; that is, a view wherein culture is reducible to lower-order precursors that could be studied and understood. Causality flows from low to high *most of the time* or *in the long run*. Probabilistic tendencies thereby replaced invariable determinism. Also, Harris allowed for "nonlinear, recursive effects" whereby influence flowed back from structure and superstructure, rather than only deriving from infrastructure. Notwithstanding, Harris was commonly regarded as a "vulgar materialist" and "rigid determinist" (Kuznar and Sanderson 2007; p. 4). Flying in the face of criticism, Harris dismissed the anthropological dogma of the day. Culture, he insisted against Franz Boas and his many students, did not emerge sui generis or in other words, on its own, with neither precursor nor antecedent.

As described by Allen and Orna Johnson in their preface to *Cultural Materialism*, the anthropology of the times was swinging far toward unrestrained relativism and outright anti-science. Harris called this *cultural casuistry*, and he would have none of it. There is instead a *cultural causality* whereby unconscious and material forces guide cultural evolution (Harris 1991). "The time is ripe," Harris (2001; p. 26) later wrote, "to replace the inchoate and unconscious paradigms under whose auspices most anthropologists conduct their research with explicit descriptions of basic objectives, rules, and assumptions." It was for this war on all fronts against all other theories that Harris was once regarded as "one of the most controversial anthropologists alive;" an anthropologist who is said to have sailed against the headwinds of "mainstream…anthropological thought" (Martin 2007; p. 261). Fellow dissenting anthropologist Richard L. Currier identified a ruthless "zeal to unmask false prophets," allowing Harris to range "so easily through the cacophony of competing paradigmatic voices" and demystify "their sacred litanies with…uncompromising effectiveness" (Kuznar and Sanderson 2007; p. 12). Boasian historical particularism, ethno-science, structuralism, interpretivism, unbridled eclecticism, postmodernism, and other formulae forfeiting empirical truths to politicized cant were all alike challenged by Harris (2001).

2 One Theory Too Far

As we have seen, Harris, in Enlightenment tradition, rejects postmodernists denying the existence of knowable truths, relativists demoting science to a coequal position with other explanatory endeavors, and also contemporary anthropologists advancing species of obscurantism and radical environmentalism. Harris, however, may have played the part of "maverick proponent of a materialist view of culture" (Kuznar and Sanderson 2007) against one theory too many. *Sociobiology*[1] was that theory. "Looking back over those areas in which Harris's explanations seem to falter," Stephen K. Sanderson (2007; p. 215) writes, "I cannot help but notice that in every single case it is because he [Harris] failed to take sociobiology seriously;" a judgement shared by William Irons, Napoleon

Chagnon Lee Cronk, and likeminded *Darwinian anthropologists* contributing to Kuznar and Sanderson's tributary volume of edited papers compiled from two conferences[2] held in 2002 honoring the recently deceased Marvin Harris.

As can be seen in the following excerpt taken directly from Harris (2001; p. xviii), Kuznar, and Sanderson correctly convey Harris's disavowal of sociobiological theory in all forms: "Cultural materialism, for example, stands opposed to biological reductionist materialisms such as those embedded in racial, sociobiological, or ethological explanations of cultural differences and similarities." At the opening of his critical salvo, Harris (2001; p. 119) suggests that sociobiology and Cultural Materialism might be thought "natural allies" than otherwise (Harris 2001; p. 119), but goes on thus:

> In every other respect however, the two strategies are far apart. Cultural materialists of course accept Neo-Darwinist principles when applied to the explanation of the social life of infrahuman species, but we insist that the same principles are capable of explaining only an insignificant proportion of human sociocultural differences and similarities.

Returning to Sanderson, we find that his researches empirically challenge cultural materialist explanations of war, male domination, potlatch, male sex drive, incest avoidance, and family size. Sanderson's discussion of fertility and family size is particularly germane. Referencing a prior quantitative study (Sanderson and Dubrow 2000), Sanderson (2007) showed that the economic value of children, Harris's litmus test for whether or not couples will procreate,[3] failed to explain any significant portion of the variation in actual births (Sanderson and Dubrow 2000). Rather than economic value, Sanderson (2007) validated infant mortality as the determinant of birth rates. Additionally, Sanderson characterizes Harris's view of reproduction as wanting precisely because it ignores the significance of mortality within the context of life history evolution. Articulating an alternative conceptualization, Sanderson properly summarized a central tenet of life history theory, namely that high infant mortality favors an *r*-selected strategy, whereas low infant mortality favors a *K*-selected strategy.[4]

Harris is not an untutored environmentalist rejecting sociobiology on ideological grounds as much as a proto-ecologist fighting a rear guard action against the evolutionary consequences of ecological variation. Harris is included in this volume, in part, because his overt disdain for sociobiology was alloyed with covert sympathies. In allowing for a human nature, Harris already had *one foot placed squarely in the Darwinian camp* (Kuznar and Sanderson 2007; p. 10). Influenced as he was by Boas and Marx (Margolis and Kottak 2007), Harris never considered following with his other foot to stand fully against the prevailing environmental winds. Nevertheless, Harris advances arguments that could be construed as group selectionist (Harris 1991; p. 64), not to mention his quondam overt admission of group selection (Harris 2001; pp. 60–61). Additionally, Harris stresses copulation, nutrition, and nepotism, all of which suggest that Darwinian thinking undergirds Cultural Materialism (Kuznar et al. 2007). Furthermore, Harris's emphasis on *biopsychological constants*, *biogramas*, *mating*, and *economizing behavior* justifies Kuznar and Sanderson (2007; pp. 9–10) in drawing parallels between him and his "sociobiological protagonist E. O. Wilson."

3 Forced Phagocytosis: Incorporating Harris into the Sociobiological Schema

A survey of Harris's writings reveals a conviction, expressed early and often, that sociobiological explanations of cross-cultural variation are *impossible*, *insufficient*, and *unnecessary*. Addressing each of these convictions in turn will show Harris wrong in rejecting sociobiology, while affording opportunities to demonstrate life history evolution's reparative utility.

First, for the *impossible*. Harris (2001; p. 121) asserts, "Natural selection…has repeatedly been shown to be a principle under whose auspices it is impossible to develop parsimonious and powerful theories about variations in human social life" *Gradualism*, the view that evolutionary speed is slow, so much so that it nearly maps onto geological time, functions as a primary support for Harris's position. The reader will recall both the term and the objection it raises from Chapter 2. Therein, we discussed psychological impediments and alternate theories that, together, are annihilated by the *10,000 Year Explosion's* evidentiary record of Neolithic Era human evolution (Cochran and Harpending 2009). Still more can be done to put gradualism to rest. Previously cited evolutionary experimentalists, Garland and Rose, further discuss Darwin's original writings[5] (2009; p. 4), asserting that Darwin's "mistake…came from his gradualist preconceptions," which overemphasized slow accretion and imperceptible change. Indeed, references to gradualism riddle *On the Origin of Species*[6] even while, within a few generations, breeding experiments instill tameness in foxes, boldness in guppies, and longevity in fruit flies. What is more, the strong selective regimes imposed through breeding experiments are sometimes found in nature, as in plagues and ethnic conflicts. If he is like other critics of human evolution holding fast to gradualism, Harris may also have focused on the survival of organisms, rather than on the reproduction of gene frequencies as they change within and between populations. Finally, to dilate upon a point also previously raised, life history evolution obviates the need to posit particulate, trait-by-trait evolution. Instead of intelligence, executive control, conscientiousness, parental care, enculturation, somatic effort, and future-oriented thought, among others, all being separately acted on by different selective pressures, the whole of this life history complex waxes and wanes in connection with intrinsic and extrinsic mortality. Momentarily putting aside the complexities of population density, there is then one variable (life history) being regulated by one selective pressure (mortality regime), which nonetheless creates a host of downstream effects relevant to much of what anthropologists and other social scientists call culture and civilization. Outside of the life history literature, such coordinated evolutionary responses are embodied in concepts such as *neoteny* and *heterochromy*, from whence come patterned, "adaptive morphological configurations with minimal genetic changes" (Hawkes 2006; p. 61).[7]

Second, for the *insufficient*. Harris pontificated on the anthropologist's role, believing it to entail explanation of "similarities and differences in human cultural expression throughout the world and throughout history and prehistory." Similarly,the United States in explaining "biologically given commonalities" and "cultural similarities," Harris warned, one must not neglect the "rich cultural diversity that is such an important part of the subject matter of anthropology" (Kuznar and Sanderson 2007; p. 9). Harris allowed that evolution explained *biologically given commonalities*, but deemed it *insufficient* for its supposed inability to explain *cultural diversity*. By this standard, Harris had cause for complaint in 1979 when he first broached the subject. Later, however, *cold winters theory*, *adaptive diversification*, *antagonistic pleiotropy*, *mutation balance*, *frequency dependent selection*, *environmental heterogeneity*, and the *extended phenotype* (Dawkins 2016; Hertler 2015; Lynn 1991; Penke et al. 2007) went far to remedy this deficiency. Subsuming some of those theories mentioned above, and complementing others, we contend that life history theory is the precise variant of sociobiology that can successfully explain cultural diversity on evolutionary grounds. Even confined within our research group in recent years, life history evolution has had a hand in explaining some of the socio-biogeographical variation in conscientiousness (Hertler 2016), violence (Cabeza de Baca et al. 2017), homicide (Peñaherrera et al. 2018), anxiety (Fernandes et al. 2017), life expectancy and reproduction (Hertler 2017a), class stratification (Hertler 2017b), intellectual evolution (Woodley of Menie et al. 2017), intelligence (Figueredo et al. 2017), fertility (Cabeza de Baca et al. 2017), and the rise of Western civilization (Woodley and Figueredo 2014). Moreover, many of the preceding chapters apply life history theory to explain cultural variation.

Now, for the *unnecessary*. Harris (2001; p. 127) arraigns sociobiologists on crimes against parsimony. Whereas he sees Cultural Materialism as minimizing their use, he sees sociobiologists unnecessarily invoking drives and instincts at every turn. Wholesale denial of evolved biogeographic variation, or at least its importance, spans Harris's career. It is present in his racial studies of South America (1964) and prominently placed in *Cultural Materialism*, his magnum opus written thirty-seven years later, as seen in the following excerpt:

> …acculturation and diffusion between every continent and every major race and micro breeding population prove beyond dispute that the overwhelming bulk of the response repertory of any human population can be acquired by any other human population through learning processes and without the slightest exchange or mutation of genes. (Harris 2001; p. 125)

In essence, Harris stakes all on *phenotypic plasticity*, the ability of one phenotype to flexibly adapt to a wide range of environmental contingencies. Certainly, humans are distinct in having the most extreme degree of phenotypic plasticity; it is from thence that humans can borrow, imitate, and exchange customs and innovations. At the same time, one has to look no further than to Harris's (1964) investigations into ethnic diversity to find evidence of consequential evolved diversification. Harris found South America's highlands, tropical and temperate southern regions populated by predictable distributions of Amerindians, Africans, Europeans, and their hybridized offspring. Though he finds such a pattern recapitulated in North America, Harris nevertheless fails to invoke evolution in explanation. If not for some measure of evolutionary adaptation to their climates of origin, why did Amerindians hold the highlands, while being so roundly displaced by Europeans in the temperate south and Africans in tropical lowlands?[8] Harris is right to say that Amerindians could occupy the temperate south and coastal regions of South America; it was not outside their *fundamental niche* (all ecological conditions that an organism can occupy without reference to biotic competition); and in fact, not outside their *realized niche* (the ecological conditions that an organism actually occupies in competition with other organisms) (Rhodes et al. 1996; Peterson et al. 2011) until Europeans came and brought over African slaves. Once this happened, Amerindians, as pure types or European admixtures, were driven into a more finite realized niche within the highlands, with genetic differences equating to vital functional differences (Gibbon et al. 2011).[9]

4 Empirically Differentiating Between Cultural Materialism and Life History Theory

Ecological variation has produced evolutionary variation at the *physical* level as illustrated by facial morphology (Evteev et al. 2014), sinus volume (Butaric 2015), intra-ocular tension (Mansour 1991), cranial volume (Ousley et al. 2009), pelvic structure (Patriquin et al. 2003), skin color (Jablonski 2004), hair type (Garn 1951), tooth morphology (Scott and Turner 2000), bone mineralization (Himes 1988), body mass, and limb length (Harcourt 2012). This is not to mention *physiological* variation across human populations, such as vasodilation (Bassett et al. 1992), hormone levels (Platz et al. 2000), and sweat response (Wesley and Maibach 2003), which is then, of course, paired with evidence of *genetic* variation (Tishkoff and Kidd 2004). Even while acknowledging that they are less strictly determined, are we then to make an exception for psychological and sociological traits, believing them appreciably unaffected by evolution?[10] Life histories are regulated by evolutionary, developmental, and facultative responses to environmental conditions, allowing for conscious decision-making and early plasticity, yes, but ultimately imparting a measure of genetic constraint. Life history traits have heritability estimates ranging between 0.4 and 0.6, consistent with heritability estimates that have long been generated for its constituent traits, such as personality and intelligence.

Evolution produces adaptation to past environments. Being a historical process subject to blind, bottom-up forces, it has no teleological ability. As such, evolved organisms are subject to *mismatch*, which is when an organism incongruously acts in a different present, as it acted in a bygone past. Mismatch consequently provides a means of empirically differentiating between Cultural Materialism and life history evolution. Cultural Materialism logically predicts little to no mismatch, emphasizing, as it does, phenotypic plasticity and facultative adaptation to the environment; whereas life history evolution countenances a moderate amount of mismatch following from its moderate heritability estimates.

As this is the evidentiary bar, it is here we engage. Nevertheless, space affords but one focused example. We look to the multiethnic USA with its long-standing populations derived from African and European extraction. This amounts to a litmus test in that Europe and Africa imposed very different mortality regimes on its populace. Grossly generalizing,[11] mortality was highly intrinsic in Europe effecting slow life histories and highly extrinsic in Africa effecting fast life histories. As life history theory would predict, these differences persist to a recognizable extent. As reviewed in Hertler (2015), population mean differences persist on the following metrics: intelligence (Jensen 1977; Herrnstein and Murray 2010), delay of gratification (Zytkoskee et al. 1971; Price-Williams and Ramirez 1974), future planning (Ruiz and Padilla 1977), high school graduation (Heckman and LaFontaine 2010), participation in higher education (McDaniel et al. 2011), test scores (Jencks and Phillips 2011), retirement investment (Xiao 2008), earnings (Straight 2001), and savings controlling for earnings (Madrian and Shea 2000; Authors 2012), rates of future discounting (Poulos and Whittington 1999; Andrade and Petry 2014), sexual activity, unprotected intercourse (Waddell et al. 2010), illegitimacy (Tucker and Mitchell-Kernan 1995), impulsivity, arrests (Fite et al. 2009), criminality (Petersilia 1983), incarceration (Brewer et al. 2014), and recidivism (Harer 1995; Harer and Steffensmeier 1996). In addition to these psychological and sociological life history variables, biological life history variables fall out in the predicted direction across the following metrics: life span (Crimmins and Saito 2001), menarche (Chumlea et al. 2003), birth weight (Geronimus 1996), sexual activity (Zelnik and Shah 1983), births (Ventura et al. 2001), fertility (1), twinning rates (2), maturation speed (Rushton 1985), and reproductive effort (5). Cultural Materialism is incapable of explaining why these differences persist and cohere in a correlated complex.

Let us conclude on a conciliatory note. Harris is herein included, not to disprove Cultural Materialism, but to show its value as an organizing lens capable of illuminating more consciously chosen and intricately detailed cross-cultural differences, which are nevertheless layered over influential evolved variation. His allusions to phenotypical plasticity, like his marginalization of evolution, rather than being categorically wrong, were skewed towards an extreme, unsupported by all that is known about the heritability of human behavior. In sum, we agree with Kuznar and Sanderson in that "Harris's rejection of Darwinian modes of explanation was highly unfortunate and has stood as an unnecessary roadblock to the advancement of a more general, synthetic theory of society and culture." Likewise, we agree that this synthesis can, and is, taking place in spite of Harris.

Notes

1. *Sociobiology* is a term coined by entomologist E. O. Wilson (1975) as he described the biological aspects of interaction, such as communication, cooperation, and altruism, for instance. The term sociobiology has, for some, fallen out of favor, with its researches now being conducted under the banner of evolutionary psychology. Life history theory was articulated before Wilson's sociobiology, but might be taken to be a species of sociobiology.
2. *Marvin Harris and the Controversy Surrounding Cultural Materialism: Retrospective and Future Potential* was the 2002 annual meeting of the *Central States Anthropological Society* in East Lansing, Michigan, organized by Joyce Lucke and Lawrence A. Kuznar. *Culture, People and Nature: The Role of Marvin Harris in Anthropological Theory and Practice* was organized by Maxine Margolis and Conrad Kottak in the same year and sponsored by the same institution.
3. Sanderson, however, might underestimate Harris's respect for mortality as a driver of fertility. For example, after a long section on population growth in which Malthus was mentioned several times, Harris writes thus:

   > A part of the general theory of the demographic transition is that as economic prosperity reduced infant and childhood mortality, it eventually brought about a structurally related decline in the perceived necessity of large families. The obverse logic of this is that high infant mortality (and the poverty so often responsible for it)

> has been a principal reason for high birth rates. We have seen how Malthusian ideology stood this view on its head, blaming excess fertility for poverty. But, to suggest that there is some universal principle, correlating poverty with high fertility, whichever way the causal arrow points, represents a dangerous oversimplification. (Harris and Ross 1987; p. 136)

4. Beyond this, however, we refer the reader to Kuznar and Sanderson (2007) for a more exhaustive vindication of sociobiology.
5. Darwin's quote that directly actuated this discussion is as follows:

   > Natural selection will always act very slowly, often only at long intervals at time, and generally on only a very few of the inhabitants of the same region at the same time. I further believe, that this very slow, intermittent action of natural selection accords perfectly well with what geology tells us of the rate and manner at which inhabitants of this world have changed.

6. We do not mean to unsympathetically criticize Darwin. In Chapter 2, we ascribed caution and natural diffidence as motivating what may have been an overemphasis on gradualism. Darwin's revolutionary idea expressed within Victorian England was bolder than can be reconstructed. Emphasizing gradualism may have stifled the initial incredulity expressed by some critics. Also, however, Darwin operated without a modern understanding of genetics and without the now extant evidence of rapid evolution. Lastly, we note that one has to distinguish between microevolution, evolutionary change within a species, and macroevolution, evolution that results in speciation. Of course, the former is faster than the latter. And so, any criticism of gradualist statements in Darwin's work must parse between these forms of evolution.
7. Lastly, we might also buttress these theoretical proofs by reference to single nucleotide polymorphisms relative to general cognitive ability, which have undergone directional selection as compared as per a sample of ancient genomes (Woodley et al. 2017).
8. We recall the reader's attention to Chapter 3 wherein Crosby's research is used to discuss SPAs.
9. Following from the *Symbiotic Portmanteau Assemblages* discussed in Chapter 3, adaptation to novel environments is partly as a matter of biology and partly as a function of arriving with co-adapted domesticates and crops.
10. Being that this is the thirteenth chapter of this book, evolutionary diversification across biogeographic regions has already been demonstrated. Consider that in Chapter 2, Differential *K* Theory, again the application of life history to humans, explained broad continental variation.

In Chapter 3, we discussed cultural variation as an intrinsic outgrowth of niche seeking and niche construction. Also, temperate biomes were treated in Chapter 4 in relation to the evolutionary processes that they engendered within select European populations.

11. These continents, Europe and Africa, are large and variable in their climate and ecology, both of which have also varied in time. Selective regimes differ in Africa, especially between its Saharan and Sub-Saharan sections, but also as one progresses towards South Africa, and then this is just macrovariation, leaving more localized differences in altitude and water availability untouched. Europe, tough temperate generally, may impose severe cold far north and dry desiccation in some of its southern-most expanses. And again, this is not to mention paleoclimate.

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PART IV

Section Metacommentary

Murdock's major contributions were in methodology and bore little relation to our integrative theme of life history theory. Nevertheless, the cognitive schemata undergirding all of the sweeping *big history* covered in Part III of this volume are ultimately based on the comparative method. The derivation of general principles from the welter of historical and ethnographic facts, whether formal and quantitative or informal and qualitative, derives from cross-geographic and cross-historical comparisons spanning the diversity of human societies across space and time. Murdock's approach was pre-eminently formal and quantitative. Having fashioned the tools, Murdock then harvested all relevant data for conducting systematic and evidence-based cross-cultural comparisons.

Nevertheless, Murdock's methodology was, and remains, under repeated assault relative to *Galton's Problem*, which again concerns the lack of independence among data deriving from contiguous human societies, not mutually isolated from each other. We reported our own quantitative exploration on a sampling of contemporary human societies to determine whether these concerns were justified, finding that substantial and statistically significant serial autocorrelations did in fact exist among spatially adjacent national polities. However, we found that the serial autocorrelations among the ethnic diversities of each successive society were attributable, in a substantial and statistically significant degree, to those among their corresponding parasite burdens, and further, that this relation was entirely mediated by the corresponding serial autocorrelations among their aggregate societal life history strategies. This makes theoretical sense, as elevated parasite burdens are a major source of extrinsic morbidity and mortality in human populations and are known evolutionary and developmental accelerators of life history speed.

What this means for human evolutionary ecology is that much of the statistical non-independence among adjacent societies is driven by environmental factors inherent in the ambient physical and community ecologies and might thus reflect similar current regimes of selection more than shared genetic or cultural ancestry. As the goal of social biogeography is to understand precisely those relationships, it might therefore be a big mistake to use statistical legerdemain to remove (*pre-whiten*) those effects from the cross-cultural data. We therefore conclude that Galton's dreaded problem might not be much of one in social biogeography, unless one was to unaccountably ignore the biophysical and bioecological factors that ultimately underlie the spatial correlations. If one were to do that, however, one would hardly be pursuing the principal objectives of social biogeography!

One surefire way that human societies can influence each other is through the violent intergroup competition known as organized warfare. One of Keeley's most significant accomplishments was empirically dispelling the *Myth of the Noble Savage* that had, at least since Rousseau, cast ancestral, pre-state societies as falling from grace into a presumably unnatural state of intergroup violent conflict prompted by achieving a more civilized condition (the putative original sin in this fanciful tragedy). Some contemporary self-styled pundits also hasten to add that being European somehow exacerbated the expulsion of those so afflicted from the peaceful Eden of idyllic primitive life. Prior to this loss of innocence, we presumably spent much of our time braiding each other's hair and worshipping the Mother Goddess (Gimbutas 1993).

Keeley counters that the observed *per capita* rates of mortality from warfare in both extinct and extant pre-state societies far exceeds those of modern nation states, even during historically recent periods of so-called *total warfare*, such as World Wars I and II. Most curiously, however, Keeley did not see natural selection as either cause or consequence of chronic warfare. We find this theoretical position odd in that the casualties of warfare may account for over half of all adult male deaths in certain extant, small-scale pre-state societies. Assuming *non-random* mortality, it follows that violent conflict must represent a selection coefficient of considerable magnitude. To address this question, we reported ethnographic data indicating that successful warriors in such groups have distinguishing phenotypic (and presumably genetic) characteristics, which are favored by females through sexual selection. As it confers elevated levels of both survival and reproduction, at least in these small-scale societies, victory in warfare is therefore unlikely to be the result of purely stochastic processes. Truly, given those conditions of natural, social, and sexual selection, how can adaptations for warfare not evolve?

Finally, our treatment of Keeley's work turns to the evolutionary effects of chronic warfare upon aggregate societal life history speeds. Such predictions, however, are difficult to derive with much certainty. One might imagine that warfare would inflict elevated levels of extrinsic morbidity and mortality, but for the well-grounded suspicion that such deaths are selective and non-random, rendering them at least partially intrinsic. Similarly, one might imagine that warfare might serve to selectively reinforce human aggression and brutality by releasing *the beast within*, but for the observed tendency of more well-organized and internally cooperative societies to win conflicts ensuing between large-scale, sociopolitically complex cultures. The proverbial jury is still out on disentangling these complex causal relations and paradoxical feedback loops, but one might nonetheless conclude that the so-called *irrelevance of biology* is just as much a myth as that of the Noble Savage.

The situation is quite similar with Harris, who, with his research program of *Cultural Materialism*, innovatively explained ecological determinants relevant to cultural anthropology. Harris nevertheless suffered from the same *biophobia* as Keeley, when contemplating biological explanations on the human side of the person–environment interaction. He insisted that none of the cultural adaptations that he so systematically documented had any evolved genetic basis whatsoever, other than a generalized problem-solving ability that was species typical to humans, and thus invariant across cultural groups. These adaptations were attributable to a combination of individual learning through the intelligence-based solving of adaptive problems, and the social transmission of cultural traditions through explicit teaching, mentoring, and social modeling. This is not the place to debate the merits and limitations of modern gene-culture coevolution theories, but suffice it to say that, at this point in our state of knowledge, these differences of opinion regarding the presumed mechanisms of cultural evolution are purely speculative. We know that cultural transmission can be facilitated by genetic microevolution, but we also know that it can also occur without the benefit of any change in the genetic substrate. Grandiose *pronunciamentos* and emphatic declarations to the contrary seemingly serve ideological rather than scientific functions.

There was a dimension of the polemic between Harris and Chagnon (1968) regarding the functions of Yanomamo warfare, however, that was unrelated to the possible role of genetic influence in its origin or maintenance. This additional disagreement was over whether Yanomamo warfare primarily served group-level or individual-level interests. Harris' favored theory was clearly about *group* advantage. The essentials of this theory were that a need for more warriors to bolster the strength of the group promoted higher levels of female infanticide; consequently, the reduction of the number of females in the group unintentionally controlled future population growth, thus preserving a greater number of wild peccaries in the environment as prey items for future food. This account cannot be easily reconciled with the idea that any material advantage from those behaviors should accrue exclusively either to the individual or to the immediate family practicing them. If anything, optimal sex ratio allocation models based on individual selection theory would predict that if everyone else in your group is producing more *male* offspring, as by practicing female infanticide, then you should be producing more *female* offspring, as your daughters would possess heightened reproductive value by virtue of reduced intrasexual competition. Conversely, Chagnon's theory that individual warriors are simply interested in capturing more women for themselves as wives, based on purely *sexual* motivations, would be hard to reconcile with the idea that any collective advantage to the group as a whole should somehow stem from that behavior. As Harris rejected that any of this was due to genetic selection, this was never framed by anyone, then or now, as a classic group selection versus individual selection controversy. Nevertheless, the ultimate beneficiaries of the putative "function" attributed to the behavior were quite different for Harris and Chagnon, and partially reflected the differences in perspective between traditional cultural anthropology and sociobiology in interpreting who or what cultural adaptations were ultimately "for."

Nevertheless, Harris distinguished himself as a strict *functionalist* within cultural anthropology, and his extensive explorations into the adaptive functions of a wide variety of cultural traits that were previously quite poorly understood represent significant contributions in their own right. As evidenced by the lasting impact of nineteenth-century natural history and the continuing relevance of naturalistic observations in ethology, *pure description* retains an important place of honor within empirical science and serves to establish the necessary evidentiary foundations for all subsequent causal theorizing.

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PART V

Montesquieu, Mann, and Goldthorpe

CHAPTER 14

The Baron de Montesquieu: Toward a Geography of Political Culture

1 The *Immortal*[1] Charles-Louis de Secondat, baron de La Brède et de Montesquieu

Tracing "his lineage to both the nobility of the sword and that of the robe" (Rahe 2009; p. 18), Montesquieu assumed his place as a man of letters in the *Age of Reason*. Montesquieu earned that place through his authorship of an epistolary novel critiquing France in spite of its censorious monarchy (Montesquieu 1964),[2] as a curator of quips, observations and insights into taxes, power, perception, ambition, and society (Montesquieu 2012),[3] and as a great declinist after linking expansion and empire with decline and fall (Montesquieu 1965) in his *Considerations on the Causes of the Greatness of Romans and their Decline* (Carrithers et al. 2001; Courtney 2001a, b).

The temper of his writings comported with the constrained and conservative Scottish, English, and American Enlightenment Projects. Yet, Montesquieu lived in an increasingly progressive France wherein his acquaintance with, and respect for, the common law of the *Ancien Régime* appeared stodgy alongside a *bomb-thrower*[4] like Voltaire, while his reverence for, and defense of, Christianity appeared arcane alongside a deistical atheist like Diderot. Indeed, Montesquieu drew the ire of Condorcet and likeminded reformists because he chose to explain what was, rather than dictate what should be (Carrithers 2001b).

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As Rahe (2001; p. 76) states, "description is subordinate to prescription throughout." The contrast between Montesquieu, who was neither *strident* nor *doctrinaire*,[5] and his fellow Frenchmen is summarized expertly by Carrithers (2001a; p. 14):

> Unlike those later caught up in the momentum of events swirling beyond their control after 1789, Montesquieu was no revolutionary reformer seeking to hack through the dense underbrush of the present, imperfect world in order to completely weed out existing practices not in keeping with a radical blueprint whose superimposition on the present would require dislocating changes.

Montesquieu's allegiance to church and state, king and country, with all respective forms and flaws, came of an intellectual kinship with *Edmund Burke*, an archconservative envisioning human societies as an organic nexus of law, religion, and custom, such that each generation is bound by its ancestors and beholden to its heirs.

Not to overextend the comparison, but Montesquieu indeed saw elements of society in mutual relation, "ultimately linked together, as in a chain" (Carrithers 2001a; p. 15), to the end that isolated change in one quarter "produces everywhere a species of dissonance" (Rahe 2009; p. 165). Montesquieu was decidedly more utilitarian than humanitarian, for he denounced financial peculation, agitated for freedom of conscience, despised despotism, and decried harsh punishment, secondarily from high-minded ideals aimed at advancing social justice and improving the lives of subjects, and primarily relative to policy and political stability (Montesquieu 1964; p. xviii; in the introduction by George R. Healy). In this way, he was as pragmatic as America's *Father Abraham*,[6] who weighed abolition only so far as it figured in the balance of federal persistence.[7]

2 A Temple to Boredom and to Patience

"Here I am at book XXIX, and I have not begun it without making new sacrificial offerings and without having built a temple to Boredom and to Patience" (Montesquieu 2012; p. 579). Thus, Montesquieu spoke as he struggled to write *The Spirit of the Laws*. Likewise recorded in his *Pensées*, we find Montesquieu reckoning with challenges of organization and synthesis alongside the tedium and toil: "I have labored for twenty straight years on this work, and I still do not know whether I have been courageous or reckless, whether I have been overwhelmed by the size or sustained by the majesty of my subject" (Montesquieu 2012; p. 558). Montesquieu's efforts were not in vain! A score of years, along with overriding patience and uncommon brilliance, generated a *classic in the pantheon of Western philosophy*. The Spirit of the Laws drew praise, frequently unalloyed praise, from Rousseau, D'Alembert, Marat, and other fellow Frenchmen, while finding equal favor across the pond, across the channel, and across the continent (Carrithers 2001a). Rahe (2009; p. xviii) most fully documents the influence of this Enlightenment classic and the authority that accrued to its author:

> All in all, it would be fair to say that *De L'Esprit des Lois* was a publishing phenomenon. It was that, and it was much, much more. For, as the eventful second half of the eighteenth century began, Montesquieu's great work became the political Bible of learned men and would-be statesmen everywhere in Europe, and beyond. In Britain, it shaped the thinking of Edmund Burke, Edward Gibbon, William Blackstone, Adam Smith, Adam Ferguson, William Robertson, John Millar, Lord Karnes, and Dugald Stewart among others…In Italy, it had a profound effect on Cesare Beccaria, and in Germany, it was fundamental for Georg Wilhelm Friedrich Hegel. In France, it was the starting point for all subsequent political thought. Its impact can hardly be overestimated.

The Spirit of the Laws was published in 1748, positioning it to influence the scholar–statesmen of British America. In The Federalist, James Madison called the author of The Spirit of Laws an "oracle," and both Madison[8] and Alexander Hamilton spoke of him as "the celebrated Montesquieu." "They sensed what subsequent scholarship has shown to be true: That no political writer was more often cited and none was thought to be of greater authority in the era of American constitution-making" (Rahe 2009; p. xix).

Acknowledged or unacknowledged, directly or indirectly, Montesquieu's ideas wend through the words of many a modern author. When reading them side by side, it would seem that Montesquieu was Huntington's preceptor. Serving as a more contemporary example, Vanhanen[9] (2009; p. 5), in his investigation of biogeographic differences in intelligence, acknowledges Montesquieu's influence prominently within his introductory chapter of *The Limits of Democratization*:

> Montesquieu was the first to pay serious attention to the impact of climate on human nature, and thence on political and other human conditions. He argued that many variations in human conditions can be traced to great differences in geographical and climatic conditions in the world. He assumed that temperature influences the human body and the mind and passions of people, and that consequently there are many differences in people's mores, manners, and characteristics between hot and cold climates. He assumed that such differences in human nature are reflected in social and political institutions.

In this, there is not a whiff of overstatement. Montesquieu was pursuing radically new lines of inquiry (Brewer 2008), such that, in his day, under the French Monarchy, casual familiarity with The Spirit of the Laws was dangerous (Gay 1969). Montesquieu broke the bonds of parochialism to launch "a new type of social science that blended politics and history with emerging lines of thought best described as comparative, anthropological, ethnological and sociological" (Carrithers 2001a; p. 11). In doing so, Montesquieu rejected chance as the explanation of governmental systems (Carrithers 2001a). As Marvin Harris would later insist with respect to mores, Montesquieu discovered order and logic even amidst apparently *whimsical* and *bizarre* laws of nations (Rahe 2009).

The content of his loosely arranged tome extends from the functionalist philosophy, part Burkean and part Lincolnian, described in the previous section. Nevertheless, unique to Montesquieu, and nearly novel at the time, the interconnected fabric of society was understood to be constrained by climate. He theorized that "each form of government is associated with a ruling principle: Monarchy with honor; Despotism with fear, democracy with equality" (d'Alembert 2015; p. 6).[10] Physical and environmental factors, not limited to climate, topography, terrain, and soil quality, elicit social practices such as slavery, polygyny, despotism, or servility (Carrithers 2001a; Montesquieu 1984). For instance, hot climates are enervating, promoting passivity, idleness, a "paralyzing diffidence," and an "extreme sensitivity to erotic pleasures." Within hot climates, Montesquieu likewise found less in the way of *curiosity, noble enterprise, generous sentiment* (Rahe 2009; p. 156), in addition to less sexual restraint; with the collective result being that "despotism [is] unavoidable in hot climates" (Rahe 2009). Alternatively, extending from Sweden to Spain, are temperate climates, which are *more conducive to liberty* because of their balance between extremes of temperature and extremes of soil fecundity (d'Alembert 2015; Rahe 2009; Montesquieu 1984, 2015).[11]

3 A Life History Accounting of Governmental Forms

Caveats crowd upon the mind's field. Putting them aside for the sake of clarity, we advance the following thesis: *population level life history speed partially predicts governmental organization*.[12]

As Montesquieu posited, ecology is indeed related to government, but that relationship is, in the main, indirect. If Huntington, in a post-Darwinian era of science, could not get beyond the immediate effects of climate to carefully consider its evolutionary consequences, Montesquieu, in a pre-Darwinian era of philosophy, could have no hope of so doing. Not to deny direct ecological effects as described by Montesquieu, but it is extremely important to note that a share, one might be so bold as to say the lion's share, of ecological influence on governmental forms is mediated by evolutionary adaptation. Without recognizing evolutionary responses as powerful intermediaries, correlation is confused with causation. For instance, when associating republican forms with niggardly soils, Montesquieu would have done better to associate the soil with an evolutionary stimulus, and only thereafter to governmental forms. Of course, it is Montesquieu's bold line of inquiry rather than the accuracy of his conclusions for which he is justly celebrated.

Extending from ecology as a first cause, there are vast differences in behavior that separate the ends of the life history distribution, some of which difference obliquely effects polity organization. After all, what is evident on a personal level will be so on population level. The meta-effect might not be straightforwardly additive or cumulative, but, after appreciating all appropriate nuance,[13] it is our point that culture and civilization are, in part and after some fashion, reducible to the aggregate biological composition of the population. This granted, fast life history populations are *fLH*-selected for all life history traits, which implies the now familiar aggregate of biodemographic, sociological, and psychological factors. With respect to specific life history traits as they relate to societal organization, intelligence, an individual psychological factor within the life history framework (Vanhanen 1997, 2000, 2004; Lynn and Vanhanen 2002),[14] has received the most attention. Certainly, intelligence may be a prerequisite to avoiding demagoguery. The legerdemain of the specious argument, like the artifice of Machiavellian policy, is unthinkingly consumed by ill-informed and uneducated populations of lower intelligence. Intelligence, paired with education, may well function in tandem, affording an understanding of abstract principles, such as the separation of powers, the ability to distinguish between offices and office holders, and other Republican elements. Beyond elevated general intelligence, *sLH*-selected populations are apt to branch out at their extreme end like a candelabra neuron[15] with its variegated dendritic arbor. This phenomena, described as *cognitive differentiation integration effort*, or *CD-IE effects* (Woodley et al. 2013; Fernandes 2014; Woodley and Fernandes 2014), may well supply the biological capital out of which governmental theorists and bureaucratic staffers, respectively, create and perpetuate the complex state.

Yet, other life history traits may be as important. We presently emphasize life history traits relative to *cooperation* and *family organization*. With respect to *cooperation*, population-level conscientiousness, a *sLH*-selected personality variable (Figueredo et al. 2005, 2006; Hertler 2016), may inform loyalty and conventional adherence to established authority (Hertler 2015a, b). Agreeableness, another personality trait that, on average, is found among the *sLH*-selected (Figueredo et al. 2014; Manson 2015), may play a similar part. Cooperation is also fostered by the *sLH*-selected cognitive features collected under the category of *executive control* (Wenner et al. 2013). Emanating from the frontal cortex, executive control imparts restraint, planning, and future-oriented thought, and in turn raises the threshold for violence, impulsivity, and hedonism. Implications for rebellion and revolution follow from such traits. The *sLH*-selected are expert in solving *collective action problems*, allowing cooperative irrigation, election of delegates, formation of joint stock companies, creation of factories, and formation of hierarchical bureaucracies. From these inclinations, slow life history populations are more apt to rise above the basest Malthusian constraints which might otherwise precipitate conflict and strife, to create stable governmental structures capable of ritualizing factionalism and conflict within established, non-violent forms.

Alongside mating competition, *family organization* is an exceedingly influential factor in governmental stability because it informs the role of men, and the structure of the family, or in other words, the atoms from which the state is constructed. As first introduced in Chapter 10, polygyny[16] and monogamy are, respectively, *fLH*-selected and *sLH*-selected mating styles. Polygynous mating systems exaggerate reproductive variance, lavishly rewarding some males with outsized paternity, at the expense of others consigned to reproductive oblivion (Darwin 1962; Low 2003). "Males are not expected to become parental," Shuster and Wade (2003; p. 317) remind us, "when male aggressiveness and display enhance male mating success." Instead, these are the conditions for contest competition wherein males compete, fight, and kill for reproductive access. In contrast, *sLH*-selected societies are more strictly, or at least socially, monogamous, with males being sequestered in stable relationships, routinely becoming fathers and providers apt to engage in parental effort above mating effort. As Betzig (1986; p. 88) noted, *despotism*, "virtually invariably coincides with the greatest degree of polygyny, and presumably, with a correspondingly high degree of differential reproduction."

Cooperation, family organization, and other relevant traits broadly affect what might be called *tractability*, the degree to which a population can be ordered and controlled by its leaders. The slower the life history speed, the more tractable the population; the more prone it is to organization; the easier its component individuals can be aggregated into coherent societies. Hobbesian fears of anarchy apply to all societies, but most pointedly to societies composed of *fLH*-selected populations over which it is more difficult to establish a monopoly of violence. Recalling life history speed to be fastest in Africa, slowest in Asia, and intermediate in Europe (Rushton 2000), there is the expectation that African populations will organize generally into smaller and less stable structures, such as tribes and chieftains prone to fission and fusion, whereas Asian societies will organize generally into larger and more stable structures, such as nations and empires prone to continuity and collectivism.[17] Then, there is Europe. Being intermediate in life history speed, it follows that European societies would be intermediate in their governmental organization. They neither have the raw freedoms of historical African societies nor the steady obedience to emperor or empire characteristic of many Asian societies. Instead, Europeans, on balance, have proved tractable enough to form stable societies that rule over large spaces and across much time only via a dynamic stability generated of opposing forces. Opposing parties, individuals, powers, and factions form and fight, but importantly, they often do so within routinized and ritualized forums, tugging and towing across a centrist position. In illustration, many European polities, especially Western European polities modelled on the Anglo-Saxon tradition, have systems of checks and balances wherein powers are divided between executive and legislative, judicial and executive, local and federal, lay and ecclesiastic. Moreover, the intermediate life history speed of Europeans may also broadly inform the West's traditions of Republican forms, delegated powers, and popular participation.

4 Available Support

Some of the above assertions have been supported. Specifically, in Chapter 2, while presenting the work of Ellsworth Huntington, J. P. Rushton's findings were reviewed as they broadly establish life history differences across continental populations. Further, in Chapter 10, which treated family sociologist James Casey, connections between life history and mating systems have been explored; suffice it to recall on this score that ruler polygamy, measured by harem size across 186 societies, was found predominately in Africa, and overwhelmingly below the 40th parallel as per a review by Betzig (1986; pp. 92–93; Table 5.1). Before leaving the subject, it is only proper to also refer to Low's (1988) global maps positively associating pathogen stress with polygyny, which can be read alongside Murdock's investigations, some of which were reviewed in Chapter 11.

Vanhanen, previously quoted, used mean temperature to predict intelligence, which in turn predicted democratization. While from a life history perspective, Vanhanen's model misinterprets climate in some of the ways that it is misinterpreted in Montesquieu's and Huntington's writings, it nonetheless clearly associates intelligence, a robust life history correlate at the population level, with democratization. Vanhanen (2009; p. 241) remarks that democratization is expressed most commonly within European countries, or their former colonial possessions, what Crosby (1986) has called *Neo-Europes*. Vanhanen's intelligence-based model thereafter correctly predicts lower levels of democratization in Africa, but seems to falter when applied to Asia. Above, we have subsumed intelligence into life history theory and substituted *democratization* for *social stability*; with that, we find a model congruent with Rushton's cross-continental divisions across the life history continuum.

We could productively review, qualify, and critique additional publications by Vanhanen (1989, 1990, 2000, 2004) and other works coauthored with Richard Lynn (2012a, b), as they are generally supportive of our thesis when their emphasis on intelligence is properly contextualized within life history theory; however, we forebear because doing so will not answer the following question: *Is biogeographical life history variation associated with governmental forms in any fine grained analysis extending beyond the broad intercontinental differences marked out by Rushton*? As a start to answering such questions, Figueredo et al. (2017) studied the social biogeography of sixty-six countries within Africa, Europe, and Asia, ultimately explaining eighty-eight percent of the variance in aggregate cognitive abilities, but also in related life history correlates featured within an integrated model of social biogeography. The physical ecological conditions valued by Montesquieu as direct determinants were here found to influence, along with concomitant community ecology conditions, the following biometric markers of life history: social equality, within-group and between-group peace, sexual equality, macroeconomic diversification, and human capital. Lastly, though it cannot yet be cited, we refer to emerging data collection, the qualitative viewing of which suggests a positive relationship between slow life history speeds and the durability of national sovereignty as variously measured by *date of state formation, last date of territorial acquisition*, and *external conquest*.

Lastly, we close by recalling just a fraction of those caveats, the consideration of which would have swallowed up our thesis before it was born, and which even now threatens to dilute its impression. *Consanguinity*, the relatedness of groups, according to an investigation by Woodley and Bell (2013), supersedes intelligence in predictive power, such that consanguineous populations less often proceed to democratization. Then, of course climatic factors, such as resource distribution and geographic boundaries, do in fact have direct effects, as Montesquieu claimed. Further still, there are accidents of history, influential individuals, repressive regimes (Weede 1993), corporate structures (Korten 1998), income inequalities (Burkhart 1997), economic systems (Bourguignon and Verdier 2000), educational attainment (Castelló-Climent 2008), infrastructure (Brown and Mobarak 2009), and infectious disease (Briscoe 2003; Kalipeni and Oppong 1998; Hotez and Thompson 2009). These are all important! Not to reverse the effect of our current attempt to reconstitute life history effects into the broader explanatory matrix, but we would be remiss if we cast life history into the lists as simply one among many variables that get some small share of the explanatory spoils. On the other hand, it is not exactly that we claim for it a larger share; but recall that life history theory is itself a multifaceted variable, which has connections, both causal and correlative, with nearly all the aforementioned factors. Yes, disease and natural disasters can directly affect government, but they have had evolutionary effects on the life history speed of those populations living amidst disease and disaster; yes, economic systems, corporate structures, and income distribution can directly affect government, but to some extent these factors are constrained by life history, and so are partly expressions of it; yes, intelligence and education alternately potentiate or restrict democratization, but intelligence and education are increasingly understood as lower order life history variables. In other words, we warn of speciously separating these factors, as they influenced the evolution of life history speed among populations, or are otherwise partially expressions of that life history speed.

Notes

1. The Italian proto-criminologist Beccaria, in his *On Crimes and Punishments*, wrote of the *immortal* Montesquieu (Carrithers 2001b).
2. Montesquieu, C. (1964). *The Persian letters.* Indianapolis, IN: Hackett Publishing Company.
3. - "The higher taxes are, the more inclined good people are to shun collecting them. The higher taxes are, the less inclined good people are to scruple about cheating on them" (Montesquieu 2012; p. 574).
   - "If I wanted to know a prince's power, I would not bother entering his palace, looking at the beauty of his gardens, the wealth of his retinue, the servility of his courtiers…Royal splendor always begins with these two points: rich citizens and well-paid soldiers" (Montesquieu 2012; p. 614).
   - "One scarred man [secondary to smallpox] will make more of an impression than a hundred successes [of inoculation]. One needs to know how to calculate" (Montesquieu 2012; p. 663).
   - "Their ambition is like the horizon, which is always moving before them".
   - A state of nature leaves man like animals, at the mercy of might (as per d'Alembert 2015; p. 4).
4. This descriptive phrase relating to Voltaire taken from Rahe (2009; p. 16).
5. On the other hand, we do not forebear to point out how in certain instances Montesquieu succumbed to idealism. One of those instances relates to his strangely inverting what an evolutionist would see as the natural order of things. Specifically, he believed, according to Healy (1964), that the family should be preferred to the individual, the nation to the family, the region to the nation, and the human species to race or region. This is contrary to kin selection theory (Hamilton, 1964a, b),

and thereafter genetic similarity theory (Rushton et al. 1984), both of which theories explain the evolutionary impulses to do exactly opposite Montesquieu's prescription.

6. This appellation for Abraham Lincoln was sometimes bestowed by newly liberated slaves.
7. The comparison between Montesquieu and Lincoln is apt because both appear to have had liberal sentiments and humane inclinations, and both subordinated these sentiments and inclinations to matters of policy, political concern, law, and social stability.
8. As an interesting aside, which is documented by Carey (2012) and can be seen directly in the *Federalist* (Hamilton et al. 2005), Madison ended up rejecting Montesquieu's authority as it related to the size of republics. Whereas Montesquieu insisted on limited extent and population to ensure unity, Madison dispenses with the need for unity, and with it, the territorial constraints unity imposes.
9. Having reviewed Montesquieu's general position, Vanhanen (2009; p. 6) goes on to revive it. In doing so, he specifies the following thesis:

   > So my theoretical argument is that the great variation in the level of democratization can be traced causally first to the variation in the distribution of important power resources, further to the variation in the average mental abilities of nations, and finally to the variation in climatic conditions.

   As can be seen, Vanhanen's ultimate goal was to explain the present distribution of democracies. As discussed at length, Vanhanen observes, as did Montesquieu after his own fashion, that popular participation, or what one might term democracy or liberty, shows a skewed geographic distribution, being concentrated in colder climates. For Vanhanen, *democratization* is the variable of interest, which is proximately explained by variation in *national intelligence* and *resource distribution* which, in turn, are ultimately explained by variation in *mean annual temperature*. This research is quite important, though our own thesis embeds intelligence, and to some extent resource distribution, within a larger life history framework.
10. Or as said by the same author at greater length and in more detail: "In monarchies, education ought to have for its object politeness and reciprocal civilities: in despotic states, terror, and the debasing the spirits of men. In republics they have occasion for all the force of education: it ought to inspire a sentiment which is noble, but hard to be attained, that disregard to our own interest from whence the love of our country arises" (d'Alembert 2015; p. 7).

11. Though the extrapolations from the topic are perhaps ill-founded, Montesquieu notes a connection between maturation rate among women and climate in the following passage:

    > It is certain that women are nubile in warm climates at eight, ten, twelve years of age, and are immediately old; that is, that childhood and marriage are almost always together. (Montesquieu 2012; p. 224)

    The exaggeration of the point in no way invalidates it; life history theory, especially through Rushton's early researches, suggests faster maturation of more *fLH*-selected populations living in tropical regions.
12. Here, the concept of the *extended phenotype* is applicable. One can say that governments are, in some abstracted way, extended phenotypes of group level life history values. The extended phenotype is a behavioral disposition that is part of an organism's evolved architecture. It often serves the same function as a physical feature, as will be further discussed in Chapter 16.
13. Here, we relegate any further caveats to this footnote to preserve the flow of the main thesis. Suffice it even here to say, we are not insisting that group properties are straightforwardly or solely reducible to the aggregate of individual properties. Amidst the power of individual leaders, randomness, emergent effects, and much else, we only claim that the individual has some bearing on the whole.
14. Vanhanen studied climate and intelligence independent of life history theory.
15. Also known as Purkinje cells, these are concentrated in the cerebellum and seem to have the most complex interconnecting dendritic branches of all the neuronal types.
16. Montesquieu speaks of the rapid maturity of women in hotter climates as a stimulus to polygyny. In this way, he was sensing connections among life history correlates. However, like later social scientists, in inferring a direct causal relation among these variables, he was necessarily blinded to third factors and more overarching explanatory frameworks.
17. One might remonstrate: larger societies and settled civilizations were once absent in, for instance, Northern Europe, while they were present, for instance, in Egypt and throughout the Middle East. Yes, it was so. Climate has been inconstant, and mean life history speeds of populations are as well. We are in no way arguing that this was always the state of affairs. As Huntington states, there was a *March of Civilization*, such that high civilization crept northward through recorded history. In an area that deserves significant scholarly attention, there is likely an evolutionary basis that partly corresponds to this northward march.

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CHAPTER 15

Michael Mann and Societal Aggregation: From Tribe, to Fief, to City-State, to Nation, to Empire

1 Introduction

Born in 1942 in *Manchester*, attaining undergraduate and doctoral degrees from *Oxford University*, Michael Mann went on to become Distinguished Research Professor of Sociology, *University of California Los Angeles*, and Honorary Professor, *University of Cambridge*.[1] Mann has his share of specialized monographs (Mann 2005), formal lectures (Mann 2001), book chapters (Mann 2007, 2013), edited volumes (Watt and Mann 2011), journal articles (Mann 1977, 1980, 1995, 2010), collaborations (Kane and Mann 1992), and editorials (Mann 2015). Described as *breathtakingly ambitious*,[2] his major publication, overshadowing all others, written over decades, subsuming much of his career as a sociologist, is *The Sources of Social Power*, published in four volumes:

- Volume I: A History of Power from the Beginning to 1760 (1986)
- Volume II: The Rise of Classes and Nation-States, 1760–1914 (1993)
- Volume III: Global Empires and Revolution, 1890–1945 (2012)
- Volume IV: Globalizations, 1945–2012 (2013).

The Sources of Social Power considers how four forms of social power, *ideological*, *economic*, *military*, and *political*, contribute to societal aggregation from tribe, to fief, to city-state, to nation, to empire. The Sources of Social Power can read like William Durant's *Story of Civilization* (1954), or some

S. C. Hertler et al., *Life History Evolution*,
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analogous work of world history, but for its empirically informed sociological framework. Mann worked at the macrolevel of several academic disciplines against the *twin evils of contemporary sociology*, which, as he explains (Mann 2013), were *abstract theory* and *abstracted empiricism* (Mann 2013). Mann is a pattern finder, not a storyteller providing unsystematic philosophical commentary (Mann and Haugaard 2011). In speaking about the four sources of social power, Mann (1986; p. 28) writes thus:

> That is the key to the importance of the power sources. They give collective organization and unity to the infinite variety of social existence. They provide such significant patterning as there is in large-scale social structure (which may or may not be very great) because they are capable of generating collective action. They are "the generalized means" through which human beings make their own history.

As the above-quoted passage illustrates, Mann is a synthesizer. He gains from this macroscopic perspective the ability to delineate patterns amidst noise. As he attests in his foreword, to write on this scale and scope requires sources to be plundered more than read, with titles, abstracts, and tables of contents standing in for chapter and verse. It is only through these means that he positions himself as a *historically minded macrosociologist*.

Military organization, Mann explains, is essentially concentrated coercive violence; it is "the most concentrated, if bluntest, instrument of human power" (Mann 1986; p. 26). Nevertheless, Mann asserts that states can gain "greater autonomous power when social life generates emergent possibilities for enhanced cooperation and exploitation of a centralized form over a confined territorial area" (Mann 1986; p. 27). This and similar statements repeatedly demonstrate the ideological, economic, and political power that are layered onto military power, which collectively combine control and direct the state. These four sources of social power were first coordinated and deployed to control cohesive nation-states in Europe during the long nineteenth century. More than developing a dominant theme, the Sources of Social Power possesses considerable range in that it treats census taking, taxation, state declension, and cultural conflict. There is also treatment of changing social relationships within modernity, the contrasting political ideologies of capitalism and communism, the contrasting worldviews of secularism and religion, and the contrasting levels of organization represented by nationalism and globalism. Still further, Mann considers Marxian ideology through a dispassionate, empirical, historical lens; traces the consequences of Jeffersonian Democracy within the context of the American Revolution; and considers the interaction of organic industrialization as expressed through British policy.

It is difficult to judge whether Mann is hedgehog or fox. Perhaps he defies categorization. His range would certainly make him a fox, given that his study of society starts *from the beginning* instead of from any finite date. It then extends into the present, providing detailed analyses, for instance, of recent American presidencies. Quite to the contrary, however, if one exchanges *process* for *content*, that is if one focuses on Mann's analytical framework rather than the content analyzed within that framework, a hedgehog will appear-his grand pursuit: *Social power.*

2 Caging

One of Mann's grand themes is *caging*. Volume one, focusing on initial societal formation, studies caging most intensely as illustrated by the concept being featured across twenty-four consecutive pages (pp. 105–127) and being indexed twenty-two times besides. Caging's relevance to later sociological history persists as demonstrated by the concept recurring more than thirty times in the three remaining volumes. It is difficult to characterize caging as it is situated within Mann's study. Just prior we used the term *grand theme*, as if it were one of several. Perhaps we could have said, *the grand theme*, but this might be misguided overstatement. Really, the correct appellation would be *hallmark precondition*; that is, caging is necessary for social complexity; it is a prerequisite for complex civilization. But it is high time to directly define caging. *Caging* denotes the restriction of individual latitude and freedoms. To be caged is to be obliged to participate in society. The absence of civilization was the default condition, Mann explains, because mankind actively avoided state structure and social stratification. The authority of Montesquieu supports Mann's position. Speaking of primitive peoples not chained to the land with property, agriculture, or homes, Montesquieu avers:

> These people enjoy great liberty. For as they do not cultivate the earth, they are not fixed, they are wanderers and vagabonds; and if a chief would deprive them of their liberty, they would immediately go and seek it under another, or retire into the woods and live there with their families. (Montesquieu 1984; XVIII, Chapter XIV, p. 343)

Thus, man in a state of nature is not caged, but as society grows up around him, he is bound in a multitude of ways as explained by Mann (1986; p. 124):

> Civilization was an abnormal phenomenon. It involved the state and social stratification, both of which human beings have spent most of their existence avoiding. The conditions under which, on a very few occasions, civilization did develop, therefore, are those that made avoidance no longer possible…The population was caged into particular authority relations.

Some bonds strongly and recognizably tether; others weakly obligate and subtly ensnare. The caged human is then yoked to society not only by Rousseauian chains conspicuous for their heft, but also by Lilliputian threads, which, in combination, are no less restrictive. Eventually, the person is metaphorically fettered hand and foot as he is literally caged within a society. There are at once too many obligations to leave, and nowhere to go. So long as society remained primitive, "escape from the social cage was possible." Mann writes that in such a society, "authority was freely conferred, but recoverable; power, permanent and coercive, was unattainable." Consider Tacitus's description of the Germanic tribes of the Roman era, who, far from accepting the dictatorial powers of an emperor, might merely democratically choose an Alaric within a time of external pressure. Or consider the weak leadership of the North American Indian Chief described fictionally by Cooper (1985) and anthropologically by Harris. Natal civilizations lacking a strong cage often required elites to rule as much with carrot as with stick. The populace, small and mobile, had to be cajoled and convinced as it would only tolerate so much despotism and tyranny. By contrast, in a strongly caged society, elites can exert power, restricting the rights of subordinates while heaping them with obligations.

There are three main processes that lead to caging, which seem to progress in temporal order. Caging was initially an exclusive outgrowth of *ecology*. In addition to directly taking up seminal ecological explanations, *war*[3] and *population density* are additional agents of caging that will be subsequently discussed.

It is important to understand that societies do not become caged by top-down prescription simply by the will of elites; they become caged as a result of "boundedness, tightness and constraint" arising from ecological conditions, which are preconditions to elite control. Consider that the first high civilizations came not from Sub-Saharan Africa or Northern Europe, but from Mesopotamian and Northern African dominions, as discussed by Mann (1986; p. 93):

> I suggest further that this was the dominant ecological and cultural pattern of the ancient Near East. Scattered across the region grew various segmental concentrations of populations of tens of thousands in irrigated river valleys and oases, separated by inhabited but marginal steppes, mountains, and plains. This contrasted with Europe, where more even ecology encouraged continuous distribution of population, a looser, and an absence of moderately caged, segmental cultural identities. It is why civilization arose in the Near East, not Europe.

Take high Egyptian civilization as a particular. Its despotic pharaohs came into being because they existed on a thin alluvial strip in a sea of sand, as Mann (1986; p. 108) explains:

> Irrigation agriculture was decisive in generating civilization, stratification, and the state in Egypt…Throughout ancient history, the Nile trench supported the highest population density known to the world. Because of the ecological barrier presented by the surrounding deserts, it was the most trapped. Once irrigation filled up the trench, no evasion was possible: As productivity grew, so too did civilization, stratification, and the state.

Though it peaked some five thousand years ago, the Egyptian state caged its people nearly as effectively as the modern state. In sum, Nile River settlements of Egypt were some of the earliest complex civilizations in part because their ecology was so conducive to caging. The Nile River banks were very hospitable to life so that there was a compelling incentive to stay, while the surrounding desert was very inhospitable to life so that there was no practicable way to leave. Neither despotic exploitation nor onerous taxation could overcome such push and pull in combination. This induced stable aggregations, lending of power, stable bonds, complex interactions, and embedded interdependencies, all of which promoted caging.[4]

The relative moisture of Europe occasioned caging by a different route. This route was warfare. Warfare here is meant to include feudal conflicts, in addition to war between city-states and nation-states. In any event, warring factions exposed isolated families to harm and plunder, rape and pillage. Though there may be ample resources and arable land outside a fief, for instance, there is no guarantor of person or property. So as population density waxed, populations were compelled to aggregate around castles, within city walls and under the protection of mounted and armored nobles. Later, populations aggregated into city-states and thereafter into nation-states. Aggregations became larger, and protectors became more powerful. In these instances, serfs were caged by bond, indenture, or fealty to a lord, who in turn might be bound by oath to a king. Again, it was the fear of aggression that occasioned these feudal arrangements and gave force to their caging effects. The walls of a city, Mann (1986) reminds us, are a concrete symbol of caging; and the *protection racket* that was an agreement to exchange freedom for safety.

The last instrument of caging may well have been unbridled population density. In the early forms of hydraulic caging, an artificial density operated. However, with enough time, high birth rates, and decreasing death rates, population swelled in areas further north with ample water supply. It is no coincidence that Harris (Harris and Ross 1987; p. 4) also finds this to be so, writing that "concentrated settlements and high regional densities…are known everywhere…to have preceded the rise of the state." The caging effects of density are best demonstrated by reference to Frederick Jackson Turner. Turner (1921) bases his *Frontier Thesis* on something akin to caging. Briefly, Turner locates early American monetary equality and egalitarianism in the American frontier, which acted the part of a safety valve for excess population. Given the vast Western holdings of nineteenth-century America, the poor, dispossessed, and fiercely independent had an alternative to wage labor and other modes of competition within settled states. Squatter, settler, farmer, rancher, leather stocking adventurer, what have you, there were viable modes of making your own way in the wilds, and so long as there was, the bars of the cage were not sufficiently close to prevent escape. After the last of the farmsteads were granted, Horace Greeley's advice to move West became less actionable. Land, especially high-yield farm land, became scarce. Later, some would try to escape the cage and its wage labor by settling in the dust bowl, only to be devastated by successive droughts. Defeated, these peoples returned to the East, or moved further West to find new cages in the coastal plantations of California, as so vividly dramatized by John Steinbeck. So, with population density augmenting, land became scarce, the cage tightened, and an aging America began to resemble Europe in its stratification, wealth disparity, and restricted economic mobility (Harris 2001; Murray 2012; Hertler 2017).

3 The Evolutionary Effects of Caging

As Mann (1986; p. 124) states, in the later stages of the caging process, it becomes difficult for individuals to "turn their backs on emerging authority and inequality as they had done on countless occasions in prehistory." With augmenting density, rebellion replaces migration as the means of escape. From the presence of an onerous cage offering a marginal existence, and the absence of free lands for migration, comes Revolution. The cage became oppressively small and restrictive in Revolutionary France (Carlyle 1888; Skocpol 1979). There was no vestige of latitude, and neither distracting circus nor sufficient bread to serve as balm for the absence of that latitude. Consecutive crop failures linked to volcanism, economic woes associated with the American Revolution, and unrest inspired by Enlightenment ideology were among the factors that stressed the caging bars of the *Ancien Regime* to the breaking point when pressed by bourgeois revolutionaries (Scherger 1904; Jordan 1993; D'Arrigo et al. 2011). Yet, as the severed heads of Robespierre or Danton could attest, there is not always sufficient appreciation of the function of the cage. The societal cage as discussed by Mann does not simply oppress; it ties persons together into a society which functions much like an organic entity as appreciated by Burke (Burke 1790/1992; Hirst 1935; Butler 1984). There is good as well as bad that the cage imposes, and there is good as well as bad that will occur when the cage is thrown off precipitously; after all, the rule of law, protection of person and property, and republican forms are as much part of the cage as oppressive taxation, political persecution, and systemic corruption (Burgess 1915).

One of the beneficial[5] effects of caging is an evolutionary effect. The work of Baker, featured in Chapter 4, and of Malthus, featured in Chapter 6, are both presently relevant in introducing that evolutionary effect. The latter generally shows the effects of population density on life history. In that vein, as density augments, classical life history theory predicts that slow life history strategists will gain advantage by producing few offspring in which they invest copious biological and capital resources (Stearns 1992; Figueredo and Wolf 2009). The former shows that Europe and parts of Asia lagged behind regions of Northern Africa and the Middle East because they were settled later and lacked hydraulic caging effects. However, at the same time, these regions of Eurasia had the greatest agricultural potential, which eventually came to support the highest densities in the world. Thus, we know from these prior chapters that population density, at least when expressed within a certain context, decelerates life history, and that this process proceeded first in the south, but was eventually accentuated in the north. The point of the present section is to build on our understanding of population density as it relates to Mann's concept of caging by peering between the bars of the cage so that we might understand what precisely accomplishes this evolutionary slowing of life history.

In the first place, a mature state, that is to say a tightly caged society, monopolizes violence (North et al. 2009). The fast life history trait of aggression (Figueredo et al. 2011), and the high testosterone that partly actuates it (Beehner et al. 2009; Hau et al. 2010), becomes selected against. Impulsive violence brings execution, banishment, or incarceration where it once brought status, reputation, and safety (van der Dennen 2007; Kiernan 2016). Relatedly, state prohibitions on blood feuds, honor killings, and random acts of murder (Athanassakis 1992) reduce the extrinsic mortality that evokes faster life histories, as described in Chapter 5 through the work of Richard Price. Secondly, the mature state typically is a guarantor of property as well as person (Rowley 1993). This is significant because slow life history strategists tend toward resource accrual; they are more apt to be parsimonious savers (Brumbach et al. 2009) because they are ever mindful of the morrow (Hertler 2016). This is only an effective strategy to the extent that one actually lives to see the future for which they are preparing. Thirdly, a caged state provides targets for conscientiousness, which is a personality trait that relates to life history on a behavioral and biological level (Figueredo et al. 2014; Hertler 2016). Baubles that enhance status, housing that increases safety, and food that ensures life are rendered accessible within the caged society to the conscientious who are willing to work toward their attainment. Fourthly, the complexity common to the cage rewards executive control which confers delayed gratification and superior planning. More generally, caged societies offer a broader stage in which intelligence can be leveraged toward the ends of survivorship and reproductive success. Specialty niches arise that can only be filled by the intelligent and innovative (Woodley and Fernandes 2014). Certainly, both executive functioning and intelligence are subordinate life history traits, and specifically *sLH*-selected markers. Fifthly, the enhanced ability to stratify and separate persons within a caged society enhances competition which is translated into differential reproductive success by sexual selection. So within a caged society, female choice will most commonly shift toward markers of wealth and status at the same time as they are differentially distributed among males.

In summary, the cage creates a novel selective regime, *an anthropogenic selective regime that has been so thoroughly modified by humans as evokes the evolution of sLH-selected extremes beyond that which could have arisen from unaided, natural ecology*. However, as we discuss at length in the subsequent section, it must be understood that this is an oversimplification in that *sLH*-strategists do not thrive in all cages, irrespective of conditions. Caged societies with rampant corruption, poor policing, unenforced or arbitrary laws, for instance, may in fact be as inimical to *sLH*-strategists as is the state of nature. Still, on balance, in mature and functioning governmental cages, the *sLH*-strategists can use superior conscientiousness, executive functioning, and intelligence to attract mates, accrue resources, and convert them into competitive offspring, all while having his person and property safeguarded.

4 Toward an Evolutionary Synthesis

The slowing of life histories is followed by a cascade of changing behavioral (Figueredo et al. 2004), cognitive (Rushton et al. 2008), and reproductive (Quinlan 2007) metrics as supported by studies of executive control (Wenner et al. 2013), specialized intelligence (Woodley 2011), general intelligence (Kaplan et al. 2000; Rushton 2000, 2004), conscientiousness (Figueredo et al. 2004, 2007, 2013), future orientation (Figueredo et al. 2006), parsimony (Hertler 2016), and sexual selection (Geary 2003; Figueredo et al. 2006). This much is established on firm theoretical and empirical grounds. As for how population level life histories speed or slow across these many metrics, explanation has heretofore centered on mortality regime and population density.

Mortality regime, it will be recalled, favors fast and slow life histories to the extent that extrinsic or intrinsic deaths occur (Chisholm et al. 2005). Again, fast life histories are a response to high levels of arbitrary and uncontrollable mortality (Brumbach et al. 2009) denoted by the term *extrinsic*, whereas slow life histories are a response to high levels of comprehensible or at least controllable mortality, denoted by the term *intrinsic* (Griskevicius et al. 2011). Additionally, population density, to reiterate lessons from chapters past, is a classic driver of life histories. Specifically, population density theoretically slows life histories, making populations more *K*- or *sLH*-selected (Reznick et al. 2002; Roff 2002; Hawkes 2006; Ellis et al. 2009; Vandermeer and Goldberg 2013). There is some empirical support for this theoretical relationship. For instance, Luckinbill and Clare (1986) found that high population density was a necessary condition for the successful breeding of senescent-resistant drosophila. Also, without density pressures, populations like that of the American colonists expand rapidly as observed by Benjamin Franklin (Franklin 1751; Zirkle 1957; Wells 1992). Think, too, of the rapidly reproducing pioneer tree species that occupy a newly burnt acre, only to be replaced over the next few decades by slower life history counterparts as the carrying capacity is once more approached (Whitmore 1989; Slik et al. 2002).

These two drivers, *mortality* and *density*, are often discussed in isolation. Recently, however, Hertler and Peñaherrera (2017) presented a Punnett square in which population density served as one variable and mortality regime served as the other. In this way, one can marry high density and high extrinsic mortality; high density and low extrinsic mortality; low density and high extrinsic mortality; low density and low extrinsic mortality. Only one of these four conditions, high density and low extrinsic mortality, is theoretically capable of producing exceptionally slow life history populations. So density is a precondition to slowing, but must be present alongside low extrinsic death. With that, it is now relevant to integrate caging into this scenario. We are not aware that the concept of caging has been previously considered within a life history framework. Nevertheless, we submit presently that the cage may well denote the global selective regime to which a population is exposed. In this sense, the cage subsumes mortality and population density alongside other factors which drive both the biological and cultural evolution of a society. In this way, Mann's portrayal of caging is reinterpreted both in its cause and in its effects: With respect to cause, mortality and density emerge as instrumental drivers within the cage; and with respect to effect, resulting changes are evolved as much as derived. To adopt Mann's own macroscopic approach, we envision the slowing of life history to occur in a cage that has some of the following properties: (1) high density in which specialized niches are formed, and wherein persons compete within a socially complex matrix; (2) low extrinsic mortality that does not undercut the biological and social capital investments upon which mature societies and slow life histories depend; (3) high intrinsic mortality which actively selects for coping mechanisms within the arsenal of the *sLH*-strategist, whether they be intelligence, deferral of gratification, or delayed reproduction; (4) laws that govern outside the whim of leaders allowing rewards to accrue to investment, labor, and savings; and (5) the predominance of legal precedent, protection of person and property and republican forms over oppressive taxation, political persecution, and systemic corruption. These are some of the conditions that slowly emerged over the last three millennia in Eurasia, and which have historically been aspects of the cages known by the names of England, France, Germany, Holland, Spain, and Japan.

Notes

1. http://www.sociology.ucla.edu/faculty/michael-mann.
2. Contemporary sociology.
3. Here, Toynbee's discussion of nomadism is relevant. Toynbee describes the battle between settled agriculturists and nomadic raiders, as the latter pushed the former into more cohesive social bodies.
4. Consistent with Mann, *Marvin Harris*, also treated within this volume, remarks on the extensive logistical difficulties of controlling a preindustrial population unless aided by ecological circumstances, including monopolization of freshwater, precious metals, or fossil fuels. Even more directly, Karl Wittfogel (1972), cited by Harris, distinguishes between feudal kings and hydraulic emperors in a theory of social organization centered on water availability.
5. The word *beneficial* cannot rightly be used in an objective evolutionary sense. It is used here loosely to denote the slowing of life history, which implicitly would appear beneficial to many observers who equate the values of slow life history living with ability, wellness, and the absence of pathology.

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CHAPTER 16

John Harry Goldthorpe: Weighing the Biological Ballast Informing Class Structure and Class Mobility

1 Introduction

British sociologist *John Harry Goldthorpe*, born 1935, studied at the *Department of Social Policy and Intervention* at the *University of Oxford* where he dedicated his career to understanding social stratification from a macrosociological perspective. *Family Life in Western Societies* is a perfect illustration of why Goldthorpe merits inclusion in this monograph. Therein, he details the demographic work of Malthus across several pages, cites relevant works of Murdock, and dedicates a whole chapter to the ecological systems theory of Bronfenbrenner. As it is with authors, so it is with topics. Goldthorpe treats sex ratio, family life, reproductive practices, the demographic transition, labor force economics, longevity, social mobility, monogamy, homogamy, divorce, and even the age of first birth as it differs across class.

Beyond the content of his work, and looking now at principle and perspective, one can likewise see similarities with other featured authors in this volume. Sociology is riddled with classificatory schemes and temporal frameworks: Comte and Main's conception of societal progress, Spencer's hierarchical classification of types, Marx and Engels' class theory, and Durkheim's systems. Goldthorpe reviews these with due deference, but is too much the empiricist to be doctrinaire when it came to his own attempts at schema construction (Goldthorpe 1981) or modeling (Erikson and Goldthorpe 1993). Goldthorpe actively defends a positivist, empiricist approach to social science, validating pretentions

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to objective, knowable truths against those many radical relativists for which social science "represent[s] merely the rationalization or intellectual camouflage of the status quo" (Goldthorpe 1996; p. 120). Even while admitting that statistical procedures are *doubly constructed* in that select variables are culled from a larger set of possibilities, and thereafter treated with select analytical tools, Goldthorpe insists that this is part and parcel of *normal scientific practice and progress*. In the end, rival studies and various techniques can be compared, so as to correct one another (Goldthorpe 2016).

More than defending and exemplifying the inductive, empirical process of science, Goldthorpe productively walked the line with respect to scope, being averse to hyper-specialization and grand synthesis in equal measure. Goldthorpe himself (2016; p. 57) contrasts holistic and individualistic extremes, insisting the scope of sociology be the empirical study of "aggregate-level, probabilistic regularities, emergent from the states and behavior of individual members of populations." Whether because class is a multiply determined amalgamate, or stemming from intellectual predilection, Goldthorpe (1996) recognized that grand sociological phenomena defied the conceptual powers of hyper-specialists. Citing Goldthorpe, Bryant (2006; p. 75) discusses hyper-specialization as a "faddish fascination" with historical "uniqueness" and "contingency" that "has deflected social science from its mission to identify omnitemporal laws and causal universals," as sought for by Comte, Spencer, and Marx. On the other hand, Bryant cites Goldthorpe as a critic of grand synthesis, concerned about the ability to differentiate between theory and data at the local level. Goldthorpe is in short, a cautious hedgehog. Really, he is like many another featured author in balancing between Berlin's categorical extremes. He is neither dilatant nor pedant.

2 Social Class and Social Mobility

Looking across Goldthorpe's writings, one finds an attempt to define class and its correlates, to describe the organic societal features that perpetuate class stratification, and an analysis of policies meant to permeate class boundaries. First, for the correlates of class. Goldthorpe numbers income, employment, status, educational attainment, and vocational position among the defining features of class. In addition to such obvious class correlates, there is fertility. Higher classes were more likely to use contraceptives, whereas lower classes were more likely to contract unintended pregnancies. Family planning differentials were also observed in the age of first birth, with first births prior to twenty years being most common in the lower subset of classes. Though there is a tendency for smaller families across classes at present, many of these class-related demographic differences were present since sound data collection began in the 1880s. Perhaps indicative more broadly of parental investment, class positively predicted breast feeding, with nursing mothers becoming less common in a stepwise fashion with descent into the lower classes. Goldthorpe describes infant mortality statistics that are generally low, but which are approximately twice as high in the lower classes as compared with the uppermost class. Class also separated, in the same direction, paternal involvement, corporal punishment, bedtime routines, and reading. Arguing for a unified approach to class that packages the variables described above, Goldthorpe (1987) laments that "differences such as those in mortality, fertility, and childcare have been presented as interesting facts in their own right and little more." We mention here only that the want of such a unified approach extends from the inability of *standard social science models* to explain why these latter three are strong correlates of class.

Goldthorpe is as much interested in cross-class mobility as in class itself. Collapsing across some nuance and much noise, Goldthorpe finds class to be "highly resistant to change." Goldthorpe (1980; p. 86) continues, remarking, "…no greater degree of openness has been achieved in British society over recent decades," in spite of "legislative and administrative action." Marxist Theory predictive of proletarianization and mass subordination is no more empirically supported than is Liberal Theory, its optimistic counterpart conjecturing unprecedented openness deriving from industrialization, capitalism, and free markets. Naturally then, Goldthorpe has made efforts to examine the reasons for class stability, which he finds in differential educational opportunity, childcare at dissimilar social levels, children's progress in school, success on examinations, participation in higher education, and "professional and academic qualifications for highly-rewarded and highly-esteemed occupations" (Goldthorpe 1987; p. 169). Intergenerational wealth is of course not neglected. Inheritance of property is a self-evident mechanism by which class status propagates through family lines. Further still, neighborhoods, in that they diffuse general standards of living (Goldthorpe 1987), have inertial properties. Additionally, Goldthorpe (1987; p. 164) found that marriage, on balance, perpetuated class distinctions. The practice of *homogamy* prevailed. Homogamy is the coupling of like partners on a variable; in this case, class. This is an illustration of what is otherwise known as *positive assortative mating*. Though there are tales, as well as many a real-world example, of beautiful lower-class women ascending several class rungs on the ladder of marriage, statistically speaking, this happenstance is atypical. Goldthorpe's finding in this respect echoes the later work of Charles Murray, whose *Coming Apart* documented intellectual and educational homogamy, which Hertler (2017) interpreted as positive assortative mating on the basis of life history speed (Figueredo and Wolf 2009; Wolf and Figueredo 2011).

Distilling the above, class might be said to be perpetuated organically, meaning largely from the bottom-up by decisions of individual actors, whether it be in practicing homogamy, transmitting educational legacies, or by transferring wealth from father to son. But what of the state's ability to interfere with this self-perpetuating process? Grave! *Grave* is the term Goldthorpe applies in judging the success of the general strategy of egalitarian reform instituted by British liberals and social democrats. Goldthorpe repeatedly comes back to asking why class boundaries are relatively impermeable even in the face of natural market pressures and engineered social policies:

> …if…a significant amount of unexploited ability does exist among the members of less advantaged classes, why have educational expansion and reform and generally increased pressure for meritocratic selection not produced some consistent movement towards more equal class competition. (Goldthorpe 2000; p. 244)

Goldthorpe's answer is multifactorial. He speaks of limited peer pressure and parental encouragement as potentially explaining lower uptake of educational opportunities among the lower classes. Much later, Goldthorpe (2000; p. 56) identifies indigenous, local processes of social selection that "have proved hard to eradicate" even in the face of national educational initiatives. Further discussion suggests that his answer to the above question is that simply granting access is insufficient. You must not only lead the horse to water, but force him to drink. Focusing solely on educational access, "neglects the fact that educational decision-making remains conditioned by the class situations in which it takes place…". Building on this explanation, Goldthorpe charges that extant policy is unequal to dislodging entrenched elites:

> social inequalities via legislative and administrative measures of a piecemeal kind that can be carried through without venturing too far beyond the limits of 'consensus' politics…this strategy grossly misjudges the resistance that the class structure can offer to attempts to change it; or, to speak less figuratively, the flexibility and effectiveness with which the more powerful and advantaged groupings in society can use the resources at their disposal to preserve their privileged positions. (Goldthorpe 1980; p. 252)

These politicians and their policies betray "a serious underestimation of the forces maintaining" class distinctions, which Goldthorpe estimates will be overcome only by significantly altered legislation or class revolution (Goldthorpe 1980; p. 252).

3 Biological Ballast

To summarize, Goldthorpe has found (1) many social and bio-demographic variables to be class correlates, (2) class to cohere as a reliable constellation of variables, (3) class mobility to have but a muted response to social policy, (4) social mobility to only briefly and partially change in response to organic and engineered social revolutions, such as industrialization and communization, but (5) to more consistently undulate in an un-patterned manner across time and nations. Distilled to its utmost, class is coherent bundle of variables whose dynamic stability is only modestly responsive to social policy and temporarily disrupted by societal transitions.

Such macroscopic themes came at the expense of a lifetime in which particular time periods were intensively studied and then compared with broader historical trends. In identifying these five themes, Goldthorpe has accomplished much. However, Goldthorpe is less successful when he undertakes the "ultimate goal of explaining why social classes exist" (Goldthorpe 2000; p. 206) and in attempting to elucidate intractable limitations on mobility.

Restricted explanatory success may arise from a failure to consider biological foundations of class stratification. Goldthorpe sometimes mentions "physical and cognitive capacities," but these never figure deeply into his understanding of how class originates and is maintained. While he better understood the extra-economical aspects of class, in this sense Goldthorpe is no different from his general characterization of British sociologists who are "consistently wary of anything that smacked of genetic determinism or biological explanations of human behavior" and who "generally have rejected sociobiology" (Goldthorpe 1996; p. 10). Perhaps this stems from his ideological commitment to egalitarian principles of equality. Born the son of a colliery clerk,[1] Goldthorpe exemplified the social mobility which he investigated as an academic and hoped for as a humanist. Whether for this reason or another, Goldthorpe (1980; p. 251) identifies with social mobility, not simply as a social phenomenon to be empirically investigated, but as a "goal to which we have a value commitment: namely, that of a genuinely open society." When considering *striking inequalities* evident in, for instance, transmissibility among fathers and sons from *service-class* to *working class*, Goldthorpe (1980; p. 252) writes thus:

> Where inequalities in class chances of this magnitude can be displayed, the presumption must be, we believe, that to a substantial extent they do reflect inequalities of opportunity that are rooted in the class structure, and are not simply the outcome of the differential 'take-up' of opportunities by individuals with differing genetic, moral, or other endowments…

In saying this, Goldthorpe explicitly disallows a serious causal role to sociobiology, or as he unfortunately states, *Social Darwinism*. He fails to take seriously what John Adams and Thomas Jefferson, *the north and south poles of the American Revolution*[2] and de facto leaders of their respective parties, described as "a natural Aristocracy among men; the grounds of which are Virtue and Talents." "All are subject by nature to equal laws of morality, and in society have a right to equal laws for their government," Adams wrote, "yet no two men are perfectly equal in person, property, understanding, activity, and virtue, or ever can be made so by any power less than that which created them."

While acknowledging that *inequalities of class structure* are *not simply the outcome* of intrinsic "virtues," *genetic, moral* or otherwise, we understand life history variation to partially underpin class distinctions. What is Adams's *natural aristocracy* comprised of, if not augmented intelligence, planning, conscientiousness, delay of gratification, future oriented thought, enculturation, education, and other life history correlates. Often, we have suggested that the variable under study by a featured author should be subsumed into a life history framework. Class is different. It is the variable that most globally overlaps with life history. More than anything else, class is a lay description of life history. Both are multifactorial constructs, which furthermore share many of the same particular traits; only class focuses on the sociological derivatives of life history without recognizing their biological origins. Likewise, class aggregates its variable set with no reference to a binding agent, whereas life history variables are bound *logically* by the pace of living and time relevant investment, and *causally* by population density and mortality regime. Understanding class principally as a manifestation of life history explains the many correlates of class, the reason why class coheres as a construct, why class stratification exists, and why it persists even after implementing egalitarian social policy.

Therefore, we contend that class is in some ways a reflection of life history speed: social stratification derives, in the main, from evolved life history variation *within* populations; just as mean differences derive, in the main, from evolved life history variation *between* populations. The latter part of this last sentence is one to mark and ponder. Thus far, we have described life history as it varies between populations, but Goldthorpe's studies of social class afford a perfect entry into discussing life history as it varies within populations. There is more life history variation within broad continental populations than between them. The same is true for individual life history traits. Why? In answer, we have to review two indispensable concepts. First, neither population density nor mortality regime, again the two drivers of life history speed, remains fully stable. Populations are thus evolving in response to moving targets. The optimal life history speed may have, for instance, slowed and speeded as plague ebbed and flowed across early modern Europe. Intermittent and incomplete stability naturally pulled for the evolution of a life history *continuum*, rather than an *optimum*. The second indispensable concept explains why life history speed would vary considerably within populations even if both mortality regime and population density remained absolutely stable. We reference previous literature on the *coral reef model* (Figueredo et al. 2010) and *environmental heterogeneity* (Penke et al. 2007; Dubuc-Messier et al. 2017) to establish the plain fact that environments are multifaceted. Within human populations, this multifaceted heterogeneity augments as a function of interdependence and density. There opens a range of niches that can be successfully occupied by as many variants across the life history continuum. Within a large city, one can function as a *sLH*-selected police chief or an *fLH*-selected psychopath; their extremely different means can bring the same end, both accrue resources and convert them into progeny.[3] Thus, in addition to the drivers of life history speed being short-lived and showing incomplete stability, all human societies, and most especially dense, mature civilizations, offer a variety of niches which can be exploited by a spectrum of life history speeds.

Social class once related to rank and privilege as ensconced in title and law. Concepts like the *Great Chain of Being*, wherein everyone had his place under God, Pope, and King, bolstered class distinctions. To the degree that societies have been affected by the Industrial Revolution, free market capitalism, and meritocratic selection, class distinctions came to rest more fully on distinctions in ability, and thereby differences in life history speed.[4] There remain many vestigial barriers to class mobility, preventing closer approximations to life history distributions. Nevertheless, caution must be used when attempting to separate artificial class distinctions from those that are in fact secondary outgrowths of the life history continua. What follows is one of the more subtle points we advance, and its underappreciation is responsible for manufacturing what would otherwise be recognized as impossibly utopian policy. This is the concept of the *extended phenotype* (Dawkins 1982). The phenotype is the organism as built by the genotype. The phenotype then includes all that we see: bones, wings, teeth, and nails, as well as skin, scales, hair, and tails. Now the extended phenotype is just as rightly part of the phenotype, but is not a physical feature, but a behavioral disposition. The camel's humps and squirrel's' scatter hoard, the whale's blubber and the termite's nest, the peacock's plume and the bower bird's bower, like the turtle's shell and the beaver's dam are all, respectively, representative of phenotypes and extended phenotypes. The dispositions to hoard, build, collect, and dam are all outgrowths of a bio-pattern, just as enculturation through education, making, saving, and transmitting wealth, and exploiting opportunities through planning and preparing, are all manifestations of a *sLH*-selected phenotype. There is a still more subtle point: *sLH*-selected persons, with probabilistic certainty, will ascend to the upper echelons within complex and orderly environments, not incidentally because these societies are in some ways an outgrowth of the *sLH*-selected extended phenotype. The *sLH*-selected are thereby thriving in their self-constructed environments, as does the beaver thrive in his dam. Such features are treated by Goldthorpe as impediments to mobility, which indeed they are, but they also must be recognized bio-behavioral outgrowths of *slow life history* strategists that are neither randomized nor destructible.

Certainly, one is free to pursue social policies aimed at social mobility. Indeed, there are many social policies present and possible, which productively target vestigial impediments to equality of opportunity. However, attempts at forcing mobility rates beyond social stratification as informed by life history speed, transitions from removing impediments to thwarting the strategy of *sLH*-selected persons who have attained to the higher classes, or, alternatively, attempting to artificially impose a *sLH*-selected extended phenotype on an *fLH*-selected segment of the population. In neither preface nor epilogue, or anyplace between, are social policy positions promulgated; the present paragraph not excepted. We mean not to warn that the boundary between natural and artificial impediments should not be crossed, but only to confirm and explain the existence of such boundaries.

4 Support

That class stratification is only subject to modest and temporary flux through the winds of progressive social policies, organic social change, and socialistic economic regimes, as documented in Goldthorpe's own work, are suggestive of biological ballast. Before considering life history specifically as that species of biological ballast, consider first that there is indeed a genetic component to social class. Intelligence (Jensen 1968), educational attainment (Teasdale and Sørensen 1983; Miller et al. 1996), personality (Bowles and Gintis 2001; Duckworth and Weir 2010; Perkins 2016), economic earnings (Liu and Zeng 2009), and criminality (Van Dusen et al. 1983) are all partially genetic determinants of social class stratification. Heritable determinants have also been attributed to class as an aggregate construct (Herrnstein and Murray 1994; Clark 2008, 2009). The same is true of life history. First, sexual decisions, marriage, divorce, fertility metrics, total family size, parenting behaviors, though they might just as easily be thought markers of class, are substantially heritable expressions of life history speed (Figueredo et al. 2006). Then, there are aggregate estimates. As reviewed previously (Hertler 2017), and as introduced in fourth section of Chapter 13, life history heritability estimates range from 0.52 to 0.68, inducing Figueredo et al. (2006) to conclude that, "life-history strategy is predominantly under the control of regulatory genes that coordinate the expression of an entire array of life-history traits." So life history and class are both partially heritable as aggregates, and furthermore share constituent traits, which are themselves partially heritable.

Then, there is the issue of class and race, two concepts that are mutually instructive, and which are jointly presented here for the express purpose of demonstrating a life history basis for class. Life histories cut across race and class; *race represents life history variation between populations*, while *class represents life history variation within populations.* Economically and statistically speaking, some races are disproportionately represented in higher or lower classes within mixed race societies. In demonstration thereof, consider the following graph produced by the *United States Census Bureau*,[5] which illustrates decades of data depicting stable differences in household income across Black, White and Asian groupings (Fig. 1).

En masse, the trend lines rise and fall, representing fluctuation in macroeconomic indicators of national wealth; yet, by contrast, relative positions do not change. At every year for which there is data, Asian American households take in approximately twice as much as African American households. We cannot stress enough that this economic stratification across racial categories is partially affected by bondage, peonage, segregation, and ongoing discrimination (Daniel 1972; Woodward, 1955, 1981, 2008; Harris 1964). A chapter, nay a book, of caveats and qualifiers could intervene. Notwithstanding, if injustice and discrimination were the primary determinants of class, Asian Americans would fall intermediately between African and Caucasian Americans. Instead, it is Caucasian Americans that occupy this intermediate position, exactly as explained by Rushton's (2000) applications of life history theory to broad racial groupings. Bolstering a life history narrative, cross-racial economic earnings correspond to some of the most biological life history traits that are not subject to discriminatory attitudes or policies:

> Gamete production and multiple birthing; speed of menstrual cycle; speed of sexual maturation; age of first sexual intercourse; number of premarital partners; frequency of premarital intercourse; frequency of sexual fantasies; frequency of marital intercourse; number of extramarital partners; permissive attitudes; low guilt; primary sexual characteristics; secondary sexual characteristics; biologic control of sexual behavior; androgen levels; sexually transmitted diseases. (Rushton 2000; p. 166)

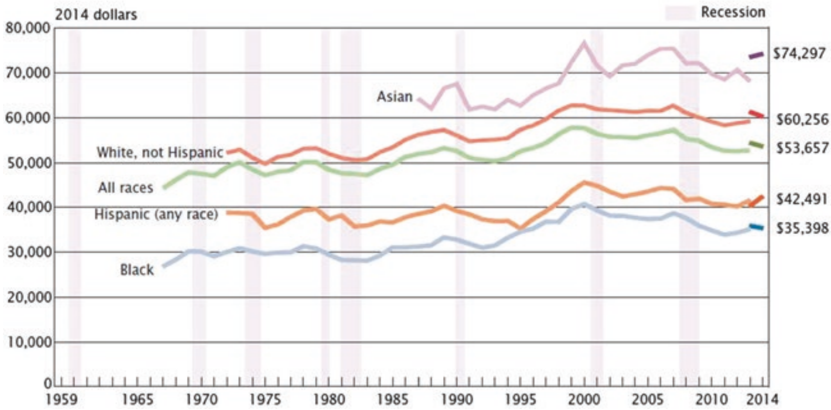

Fig. 1 Real Median Household Income by Race and Hispanic Origin: 1967–2014. *Note* The 2013 data reflect the implementation of the redesigned income questions. See Appendix D for more information. Median household income data are not available prior to 1967. For more information on recessions, see Appendix A. For more information on confidentiality protection, sampling error, nonsampling error, and definitions, see ftp://www.ftp2.census.gov/programs-surveys/cpc/techdocs/cpsmar15.pdf (*Source* U.S. Census Bureau, Current Population Survey, 1968–2015 Annual Social and Economic Supplements)

What we have then are racial differences overlapping with class stratification. Race categorization predicts class status, at least as it is approximated by this crude proxy of economic earnings. To highlight the relevance of juxtaposing race and class, we again repeat that life history evolution underpins class differences as they are alternately expressed within and between races. Moreover, recall that class itself overlaps with life history in its description, in its being partially heritable, and in that both social class and life history have partially heritable constituent variables. Notwithstanding, only further research will more pointedly demonstrate that class stratification exists, and class mobility is limited, because both are ultimately constrained to some degree by a process of life history evolution which maintains intra-population variation.

Notes

1. https://en.wikipedia.org/wiki/John_Goldthorpe#Early_life.
2. This characterization was made by patriot, revolutionary, and physician Benjamin Rush who was instrumental in fostering the correspondence from which these quotes are taken.
3. Diversity along the life history continuum is very likely maintained by *negative frequency dependent balancing selection*, an evolutionary process wherein a trait or strategies fitness is pitted against its frequency.
4. As we make this claim, we acknowledge that these self-same conditions were productive of generating more obvious class distinctions. For instance, under these conditions, greater wealth was available, which could be spent on distinguishing baubles, the use of which was no longer controlled by law.
5. https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-252.pdf.
6. This book is written in collaboration with Catriona Llewellyn and Clive Payne.

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PART V

Section Metacommentary

The Baron de Montesquieu made several major contributions relevant to this present volume's central theme, although he died two centuries before life history theory was even proposed. His classic work, *De L'Esprit des Lois*, is said to have prefigured the field of political sociology, and perhaps even entirely invented it. Moreover, contained therein was a radical new theory that derived human sociopolitical forms from climatic factors, thus anticipating the development of social biogeography.

Furthermore, the theorized effects of climate on sociopolitical organization were not represented as direct, but instead as mediated by what we now call *psychological* factors. He characterized these as the ruling principles of *virtue*, *honor*, and *fear*. Although these do not correspond exactly to modern conceptions of the psychosocial *sequelae* of life history strategy, one can nonetheless roughly associate them with the discrepant cognitive social schemata, respectively, characterizing slow and fast life history populations. Specifically, the principles of *virtue* and *honor* would be preferentially associated with societies dominated by *Mutualistic Social Schemata*, a correlate of slow life history strategy, and the principle of *fear* would be preferentially associated with societies dominated by *Antagonistic Social Schemata*, a correlate of fast life history strategy (Figueredo and Jacobs 2010; Figueredo et al. 2018; Figueredo et al. 2016; Figueredo et al. 2018).

In the mid-twentieth century, Mann continued to advance political sociology in parallel with the development of life history theory, if still in ignorance of its existence. Mann independently recognizes a principle that he called *caging*, which was the geographic or climatic constraining of a human population to areas of higher population density than their surroundings, thereby compelling them to conform to limitations upon freedom from a variety of social constraints. The river valleys in Mesopotamia and Egypt were surrounded by barren deserts, so that leaving the heavily settled areas would have imposed severe fitness costs on individuals living within them. As a result of those fitness trade-offs, such individuals were inclined to accede to onerous social constraints rather than attempt to turn desert nomad, for they did not have a viable analogue to America's Western frontier, which for centuries absorbed the disgruntled and dispossessed (Turner 1921). Such *Hobson's choices* include the imposition of social inequality upon subordinates by dominant individuals or groups, leading to differentials in reproductive fitness. These differentials in reproductive fitness, called *skew*, are well-established evolutionary realities documented in the behavioral ecology literature on nonhuman animals (*e.g.*, Vehrencamp 1983), especially among cooperative breeders such as meerkats (Bell et al. 2014).

Additional effects of *caging* upon the complexification of social organization, that neither Montesquieu nor Mann were in any position to foresee, were several phenomena, discovered only within recent decades, facilitating the evolution of division of labor. One was the disruptive, centrifugal selection generating greater inter-individual variation in personality within social species as a result of heightened intraspecific competition, sometimes called the *coral reef model* (Figueredo 1995; Figueredo et al. 2005; Figueredo et al. 2010). In this model, inter-individual variation helps reduce competitive pressure from conspecifics by diversifying the resources exploited by the population, thus permitting peaceful coexistence at higher densities (for comparative examples of such ecologically driven intraspecific character displacement in octopus behavior and cognition, see Kuhlmann and McCabe 2014; Mather et al. 2012; Mather and Kuba 2013).

The slower life history strategies partially selected by high and stable population densities give rise to related phenomena including the diversification and dissociation among the different facets of the general life history factor (*K*) by slower life history strategists, called *strategic differentiation-integration effort* (*SD-IE*; Woodley et al. 2013); and the diversification and dissociation among the different facets of the general intelligence factor (*g*) by slower life history strategists, called *Cognitive Differentiation-Integration Effort* (*CD-IE*; Woodley et al. 2013). Contemporary research in social biogeography has shown both of these effects to be predictive of greater macroeconomic diversification in modern societies, and thus increases in aggregate wealth and human capital (Figueredo et al. 2017). In spite of its beneficial effects on aggregate material gains, however, Marx and Engels (1848) correctly observed that social division of labor sets the stage for the development of social stratification and inequality.

This naturally brings us to our discussion of Goldthorpe, who sought to understand the underlying causes of class stratification in complex societies. Goldthorpe found surprisingly high intergenerational stability of class status, in spite of the sustained efforts of many a social reformer working throughout the entire Late Modern Era to enhance inter-class mobility. Less surprising to some, were the substantial and statistically significant associations between class status and various indicators of life history strategy, although Goldthorpe did not refer to them as such. We characterize this as less surprising because, after all, the original meaning of *proletarius* in Latin is "a man whose only wealth is his offspring, or whose sole service to the state is as a father."

If the biological basis of the intergenerational transmission of social class is indeed life history speed, then we should find that the latter is substantially heritable. Empirically, that has indeed been found to be so, with estimates of broad-sense heritability coefficients ranging from $h^2 = 0.61-0.68$, of which as much as $D^2 = 0.14$ might be non-additive genetic variance (Figueredo et al. 2004; Figueredo and Rushton 2009). Furthermore, if the assortative mating by social class reported by Goldthorpe also has a biological basis in life history speed, then we should find substantial assortative mating coefficients for life history in modern Western-derived societies. Empirically, that has also been found to be the case, with estimates of assortative mating coefficients for romantic partners (opposite-sex lovers) and assortative pairing coefficients for social partners (same-sex friends) averaging about $r = 0.30$ across four different societies, speaking two different languages on both sides of the Atlantic (Figueredo et al. 2015). These factors would no doubt exacerbate the intergenerational stability of social class and even help preserve some of the non-additive genetic variance across sexually produced human generations.

In summary, the benefit of hindsight lets us clearly see how Montesquieu, Mann, and Goldthorpe independently anticipated various contemporary empirical findings, as well as theoretical perspectives, derivable from the social biogeography of human life history strategy.

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PART VI

Cattell, Bowlby, and Bronfenbrenner

CHAPTER 17

Raymond B. Cattell: Bequeathing a Dual Inheritance to Life History Theory

1 The Half Has not Been Told

Raymond Bernard Cattell was born on the 20th of March 1905, amidst the waning inertia of Victorian culture and the waxing ethos of postmodern relativism. Raymond Cattell is featured alongside Gordon Allport and Hans Eysenck in introductory personality psychology textbooks as they provide historical background on the *lexical*[1] hypothesis from which the *five-factor model*[2] derives (Ryckman 2000). Cattell is equally likely to be identified for articulating the distinction between *crystallized intelligence*, defined as accumulated and stored knowledge, from *fluid intelligence*, understood as raw reasoning ability (Horn and Cattell 1966a). Like a South American temple lost in all but peak amidst the overgrowth of the surrounding jungle, one finds these two salient productions sitting on a broad base of intellectual output. For in truth, Cattell was prolific; possibly more prolific than any other social scientist featured in the present volume, having produced treatises, papers and books on leadership (1951), ethics (1948a), aging (Horn and Cattell 1966b), anxiety (Cattell and Scheier 1958), creativity (Drevdahl and Cattell 1958; Cattell and Drevdahl 1955), motivation (1966a), music (Cattell and Saunders 1954), biometrics (1965), temperament (1934), interest (1935), attitude (1950a), humor (Cattell and Luborsky 1947), status (1942), perseveration (1946), culture (1949), sex differences (1948b), syntality[3] (1948c, 1950b), heritability (1963), and complementarity (Cattell and Nesselroade 1967). Cattell even attempted to construct his own system

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of "scientific" religion in the form of *Beyondism*,[4] the purpose of which was to safeguard civilizations from existential "dysgenic threat" (Cattell 1972, 1987). Barring all exaggeration and overstatement, these are to name but a few of his manifold contributions.

Analytical rigor was brought to bear on these many topics. Perhaps extending from his research assistantship with Charles Spearman, who in turn was influenced by Karl Pearson and Sir Francis Galton[5] (Ryckman 2000), Cattell's career was empirically and statistically driven, exampled by his publications on orthogonality (Cattell and Tsujioka 1964), validity and reliability (1964), methodology (1988), ipsatization[6] (Horn and Cattell 1965), refraction factors (1961), the Cattellian data box (1966b) projective and personality assessment (1944), and, of course, factor analysis (1952, 1958).[7] However, one might be rewarded by the view of these individual stones of achievement, clearing the undergrowth more importantly reveals how all such works figure into the larger temple that Cattell built to his personal philosophy of science. Within that larger philosophical structure, Cattell's writings on intelligence and personality assume the relevance, without which they might become museum curios, picked up, admired, and replaced in reviewing the history of psychology.

2 Cattellian Conceptions of Intelligence and Personality

From an early phase of his career, Cattell is best known for his two-factor model of human intelligence (co-developed with John Horn), which posits that general intelligence, or *g*, can be delineated into two orthogonal domains—those of *fluid* and *crystallized* ability (following convention herein abbreviated to *gf* and *gc*, respectively). Fluid ability, or *gf*, enables the solving of abstract problems that are *culture reduced*. Culture reduced problems can be deciphered via the application of native ability, decontextualized with respect to culture, such that no cultural-idiosyncratic knowledge is needed. An example of a *gf* measure is the *Raven's Progressive Matrices* test, wherein inductive reasoning supplies the rules necessary for identifying the missing piece in a wallpaper-like mosaic from among various patterns and sequences. The ability to infer and utilize rules in solving these sorts of problems purportedly means that all individuals, irrespective of culture, can solve them via the application of universal abstract reasoning mechanisms. By contrast, crystallized intelligence encompasses the ability to acquire and utilize knowledge in solving problems. This capacity is considered highly culturally relative, with different cultural systems imposing constraints on the sorts of knowledge that can be acquired. Relative to fluid intelligence, crystallized intelligence is theoretically more sensitive to exposure, education, and enrichment, even as natural ability will greatly influence the beneficial effects thereof.

Cattell began his career with a concentration in intelligence research (Tucker 2009) before being disoriented and derailed by detecting the *Flynn effect*, a point to which we later return.[8] Erroneously believing his ideas invalidated (Woodley of Menie et al. 2017c), Cattell turned personality researcher. In that capacity, Cattell was among the first to identify a five-factor structure among lexical personality adjectives and was also the first (although this is evidently very little known) to have identified a hierarchical (i.e., co-existing with lower-order factors) *Big Two* among the items comprising his personality inventory (Cattell 1973). The hierarchical Big Two were independently (re)discovered in the 1990s, firstly by Jerry Wiggins (1991) with his broad personological dimensions of *Agency* vs. *Passivity* and *Communion* vs. *Dissociation*. Wiggins (1968) was in fact the first to coin the term "Big Two" in relation to the early work of Hans Eysenck, who initially identified Neuroticism and Extraversion as the major dimensions of personality, before adding Psychoticism to the model, yielding the "Big Three" model for which Eysenck is most famous. John Digman (1997) identified two super factors, *Alpha* and *Beta*, lurking behind the *Big Five* advanced by Costa and McRae: *Openness to Experience*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism*. These broadly correspond to the conceptual coordinate system embodied in Wiggins' Big Two and were in turn subsequently renamed *Stability* and *Plasticity* by Colin DeYoung and colleagues (2002). Cattell's early advocacy for two factors is often overshadowed by his delineating these into sixteen, but at the same time, he continued to understand these sixteen as grounded within a smaller number of overarching factors. In the classic *lumping* and *splitting* debate in personality psychology, Cattell putatively comes down on the splitting side (Cattell 1943), but at the same time is sympathetic to lumping (Cattell 1945).

3 Embedding Cattellian Contributions Within Life History Theory

Cattell's contributions to intelligence research and personality theory are both advantageously treated in life history perspective, and so they will be, each in their turn. First, with respect to intelligence, Cattell (1950c) was himself among the first to notice the Flynn effect in his efforts to detect *dysgenic* effects on IQ performance, which, 14 years previously (Cattell 1936), he had predicted should be reducing IQ by between 1 and 1.5 points per decade. Disheartened by this seeming paradox, which would subsequently be termed *Cattell's Paradox* (Higgins et al. 1962), Cattell lost interest in the issue of dysgenics for many decades. Despite this, *Cattell's Paradox*, which has been solved via the *co-occurrence model* (Woodley of Menie et al. 2017b), coupled with Cattell's initial research on the Flynn effect, has led to novel thinking—thinking which ties the co-occurrence model in particular to life history via *Investment Theory* (Cattell 1957). Cattell's (1957) investment theory is based on the idea that there exists a relay between *gf* and *gc* in development, whereby *gf* regulates or gates the acquisition of knowledge or investments into *gc*. Cattell perceived an individual's level of *g* (i.e., the correlation between *gf* and *gc*) as being a consequence of this interplay in development between these two factors (Horn and Cattell 1966b). The investment model has been used to account for both the phenomenon of *ability tilts* (i.e., the tendency for one ability grouping to be overdeveloped relative to another, net of *g*) and also *differentiation-integration effects* (i.e., where abilities become more loosely or even more strongly correlated among themselves as a function of level of *g*, as is the case with certain personality traits and age) (Coyle 2016). In other words, general intelligence is not simply parsed into fluid and crystallized intelligences; rather, fluid intelligence constrains the scope and directs the content on which crystallized intellectual investments are made.[9]

Distal reformulation of investment within the rubric of life history theory was achieved using the *Cognitive Differentiation-Integration Effort* (CD-IE) model (Woodley 2011). This CD-IE model posits that, despite not having much of a main effect on *g*, life history speed should nevertheless influence the strength of the correlations among abilities. For instance, within the CD-IE model, the *sLH*-selected show a more thoroughly differentiated cognitive profile marked by specialized abilities; in contrast, the *fLH*-selected show a more uniform cognitive profile marked by general abilities. The degree of ability differentiation has implications for adaptation. Specifically, the differentiated cognitive profiles common to highly *sLH*-selected individuals allow adaptation to highly specialized and stable niches within highly complex and stable environments. In contrast, the uniform cognitive profiles common to highly *fLH*-selected individuals facilitate adaptation to unpredictable environments. Thus, the *sLH*-selected are constrained specialists while the *fLH*-selected are obligate generalists. At the risk of belaboring the point, we state again, while *fLH*-selected generalists can contingently switch between unstable environment niches, the *sLH*-selected are ecological specialists, apt to divide labor within dense, stable environments; environments that on average pay returns to hard-won and long-deferred specialized somatic and educational attainments. There is no question of inferiority or superiority, only a matter of differential adaptation. This is part and parcel of the trade-offs integral to life history theory. To illustrate the point, we recall a lesson imparted by John Landers (2003) as he traduces the hard choices and trade-offs of the husbandman wherein maximizing yields was always pitted against mitigating risk. Sowing only a fickle, high-yield crop maximizes caloric returns per hectare at the cost of increasing the risk of crop failure and creating dependency on trade, whereas sowing a range of resilient, lower-yield crops fosters self-sufficiency and diversifies risk at the cost of reducing caloric returns per hectare. Accordingly, the differentiated *sLH*-selected cognitive profile renders the individual like a highly specialized part valued for its function in a complex machine, while the *fLH*-selected cognitive profile renders the individual a rudimentary machine unto itself. Embedding Cattell's investment model within life history theory, with its emphasis on trade-offs between specialized plasticity and generalized preparedness, furthermore advanced our causal understanding of the Flynn effect, which is itself a consequence of increasing levels of cognitive specialization associated in time with societal and demographic shifts betokening greater *sLH*-selection (Woodley 2012). What is more, in thus enveloping Cattell within the folds of life history theory, we better comprehend atoms of individual intellect as they interface with cultural systems.

We now turn from intelligence to personality. Amidst a landscape riddled with trait theorists converging toward a consensus, Cattell was at one and the same time sympathetic to more extreme lumping and splitting. In this way, Cattell stands apart for intelligently chaining lower-order to higher-order factors and for the implicit evolutionary savvy with which those lower-order factors were articulated. This is true for each level of hierarchical organization. Whether looking to his two meta-traits, his five global factors, or his sixteen primary factors, we find Cattell intuitively *carving nature at its joints.* First, the lumping sympathies that impelled Cattell's two-factor solution have relevance to life history theory's *general factor of personality* (GFP), whereby all personality traits are loosely intercorrelated under the influence of relative life history speed (Figueredo et al. 2004; Musek 2017). Proving similarly applicable to life history theory are Cattell's five global factors.[10] Take for instance, the global factor of *Extraversion vs. Introversion,* connoting a general tendency for people to seek or to avoid affiliation with others. Especially when viewed alongside attachment theory (Bowlby 1969), the Extraversion vs. Introversion factor parses between fast and slow life histories as they, respectively, invest in exploitation or affiliation, short-term mutualisms or long-term bonds, mating effort or parental effort. Finally, in the capacity of splitter, Cattell articulated sixteen lower-order personality traits pertinent to the strategies employed at either end of the life history continuum. For instance, *Rule-Conscientiousness*[11] predicts moral, staid, and dutiful behavior on the high end, thus overlapping with *sLH*-selected behavior, while predicting expedience, libertinage, and self-indulgence on the low end, thus overlapping with *fLH*-selected behavior. Extremes foster antagonism. Highly rule-conscientious *sLH*-selected elements will impose order, laws, norms, precedents, and consequences to strategically interfere with *fLH*-selected elements and the stochasticity upon which they thrive (Woodley of Menie et al. 2017a).

4 Conclusions

Cattell gave little consideration to the distal antecedents underpinning variation in personality and intelligence. In other words, he expended little in the way of time or thought on questions of ultimate causation. In spite of this, the frameworks that he developed for understanding the structure and proximate origins of individual differences within the spheres of intelligence and personality readily map on to a life history evolutionary framework. With respect to Cattell's intelligence research, the investment model, when recast in terms of life history theory, yields insights into the evolutionary factors influencing the Flynn effect,[12] which appears to plausibly result from the increasing allocation of cognitive differentiation effort into the cultivation of ever more specialized abilities and skills, which, in turn, extends from life history slowing in both phylogenetic and ontogenetic time. Following from predictions of the CD-IE model, genetic correlations between *g* and indicators of life history speed are small to zero in magnitude (Loehlin et al. 2015; Woodley of Menie and Madison 2015). Likewise following from predictions of the CD-IE model, trade-offs have been empirically validated, via studies of both student and national samples (Woodley et al. 2013). Further still, and more broadly, the trade-offs between specialized vs. generalized *behavioral* investments have also been demonstrated and have consequently been chained to environmental stability and predictability (Figueredo et al. 2013, 2015).

With respect to Cattell's personality research, his identification of higher-order factors among personality traits is consistent with theoretical predictions that life history variation should undergird covariation among such traits. This is so, up to and including the level of the superordinate GFP, which has been identified among Cattell's 16 personality factors, and has been found to correlate with other GFPs extracted from related personality inventories, indicating a fundamental homology among these various approaches to predicting and structuring personality variation. Indeed, several authors have found a GFP among Cattell's personality factors (Booth 2011; Loehlin 2012; Loehlin and Horn 2012).[13] Even while there is no evidence of his having heard of life history theory, Cattell's influence on the development of life history theoretic models of personality and cognition can therefore rightfully be considered substantive.

Notes

1. The lexical model uses language to search for personality. Instead of unrestrained theory, the lexical model looks to factor analytic surveys of adjectives that have been applied to human individual differences in order to specify personality traits.
2. The *Five-Factor Model* refers to factor analytic techniques producing five factors from a pool of adjectives, factors which are descriptive of human personality along the following dimensions: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism.
3. Syntality refers to the personality trait, not of a person, but of a group.
4. Under the banner of *Beyondism*, Cattell gave thought as to how to create ecologically sustainable regimes of eugenic selection.
5. Edward Thorndike and William McDougall were among his later preceptors (Ryckman 2000). From McDougall, he gained a biological bent that worked its way into his personality framework.
6. Ipsatization refers to the process of subtracting an individual's mean rating across items from an item.

7. A student of his, Richard Gorsuch, would go on to become one of the foremost experts in factor analysis, advancing and refining many of Cattell's innovations (such as coarse-grained factor analysis) in the process (Gorsuch 1983).
8. The distinction between *gc* and *gf* originally made by Cattell and Horn has become a cornerstone of modern structural psychometrics. John Carroll (1993) demonstrated that these were the two most stable Stratum II factors that could be extracted from among a large array of batteries (Carroll's model also accommodated six additional Stratum II factors, along with numerous Stratum I factors, subordinate to these in his hierarchical model of *g*). Indeed, the model proposed by Carroll (1993) is termed the Cattell–Horn–Carroll (CHC) model. While certainly useful, not all of the original precepts of this model have remained intact. Cattell believed *gf* to be more heritable and cross-culturally stable than *gc* (Cattell 1980), which has been challenged recently with the identification of a *Heritability Paradox*—the apparent incongruity between the observation that it is the *least* culture-fair tests that are the most heritable (such as vocabulary) (Kan et al. 2013). This is further compounded with the *Mental Retardation Paradox*—the observation that the most culture fair and *gf* loaded ability measures (such as the Ravens) are also the most sensitive to the Flynn effect (the secular increase of on average 3 IQ points per decade), which means that nineteenth-century populations would have had IQs of between 50 and 70 compared with modern ones on these tests—yet clearly did not exhibit signs of mass intellectual disability (Flynn 2007). The first paradox can be solved by simply thinking about the effect of *g* on the environment in terms of *active gene environment correlations*. Individuals with high *g* seek out and expose themselves to environments (such as education) which facilitate their acquisition of knowledge. Thus, knowledge functions as part of an individual's extended phenotype, serving as a highly *ecologically valid* indicator of their underlying *g*. The second paradox can be solved via the observation that so-called culture-fair tests often rely on the detection of simple rules which are meant to generalize across populations, but can in fact be learned, either actively, via exposure to tests, or passively, via exposure to other media in which rule detection and following feature. The rule dependence of an IQ test positively correlates with its sensitivity to the Flynn effect (Armstrong and Woodley 2014). Furthermore, being "pre-equipped" with the expectation that rules need to be found and used in solving IQ tests alters the parameters that these tests measure over time—causing them to drift away from being strong measures of *g* (this being the failure of measurement invariance that is typical when the performance of cohorts from different time periods is compared on the same test; Fox

and Mitchum 2013; Wicherts et al. 2004). Very highly heritable and also *g* loaded *gc* measures, such as vocabulary knowledge, show the opposite pattern to the Flynn effect over time—performance (measured in terms of the *typical* utilization frequencies of high difficulty vocabulary across written texts sampled in Google Ngram Viewer) has been declining over time, since the 1850s (Woodley of Menie et al. 2015, 2017b). This pattern is consistent with the expectation that dysgenics (i.e., selection favoring the fitness of highly individually [as opposed to group] selected, and low *g* individuals) is causing *g* to decline over time, whereas the Flynn effect is restricted to specialized skills and narrow abilities, which can be improved via exposure to enriched environments and exhibit *discrete* heritabilities that are far lower than that of *g* (Carroll 1993). Hence, dysgenic declines in *g co-occur* with respect to gains in specialized skills and abilities, meaning that far from being intellectually disabled, Victorian populations likely had somewhat higher means of *g* than modern populations, but would have lacked any familiarity with rule-based tests, thus would have performed poorly on these relative to moderns (e.g., despite having on average richer vocabularies and faster reaction times).

9. The application of the investment model to understanding factors influencing the growth of abilities yields *proximate* explanations for these phenomena; that is, explanations that pertain to the action of factors acting on phenotypes arising from the environment in ontogenetic (developmental) time, such as education. The idea that humans invest effort into the acquisition of somatic capital (i.e., specialized knowledge and skills) has significant implications for life history models of human intelligence, which, however, historically have been unable to account for the extremely small magnitude observed bivariate correlation between *g* and behavioral life history inventories, such as the ALHB and Mini-K (the values of *Rho* range from .023 to .06 in meta-analyses; Figueredo et al. 2014; Woodley 2011), despite much stronger individual differences level positive correlations having initially been predicted on the basis that factors such as brain volume, which should capture somatic effort allocation, are positively associated with *g* (Rushton 1985, 2004).
10. Cattell's five global factors are as follows: Introversion/Extraversion; Low Anxiety/High Anxiety; Receptivity/Tough-Mindedness; Accommodation/Independence; and Lack of Restraint/Self-Control.
11. Factor *G* in the 16PF model.
12. In addition, this solved the paradox of a lack of a substantial main effect of *K* on *g* at the individual differences level (which was contrary to what had been predicted), via the development of the CD-IE model.
13. This has been found to correlate modestly with GFPs extracted from other personality batteries (MMPI $r = .49$; OutQ $r = .31$; Loehlin and Horn 2012, p. 660).

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CHAPTER 18

Edward John Mostyn Bowlby: Reframing Parental Investment and Offspring Attachment

1 Attachment and Loss

Edward John Mostyn Bowlby turned personal loss to scholarly account. The fourth of six children born at the opening of the twentieth century into an upper-class family with legitimate pretensions to gentility, Bowlby received parental attention in vanishing doses. Bowlby's mother devoted but one hour each day to her children, while his father, a baronet and member of the medical staff to King Edward VII, absented himself from family life six days each week. Rather than signifying dysfunction, or even preoccupation, reserve betrayed anxieties over the characterological effects of parental indulgence; a fear typical of affluent British families of the era. A nanny then assumed rearing responsibilities. She was attentive and doting, and thus, at her departure from the household when he was four, Bowlby experienced a deep sense of loss. The incumbent nanny was cold and sarcastic; nothing like the one he missed. This relationship, for whatever it was worth, ended shortly after it was begun when Bowlby was sent to boarding school. Uprooted from hearth and home, Bowlby later reflected, "I wouldn't send a dog away to boarding school at age seven" (Schwartz 1999; p. 225). Excepting prominently dysfunctional home environments, Bowlby came to believe that early separation from caregivers was not conducive to *healthy* development (i.e., development leading to personal well-being and to societal advantage) (Bowlby 1951, 1988). He thus carried throughout adulthood, apprehensions about child-rearing experienced firsthand. Instead of indulging in private

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acrimony, Bowlby went on to prescribe dedicated and warm parenting from his position as a social scientist; a prescription that he was privileged to see progressively garner social acceptance toward the end of his life.

Bowlby studied psychology at *Trinity College*, Cambridge, and medicine at London's *University College Hospital*. Thereafter, Bowlby received psychoanalytic training at the *British Psychoanalytic Institute*, where he met Melanie Klein, whose views held sway within British psychoanalytic circles, most especially in London's *Tavistock Clinic*. It was at the Tavistock Clinic where Bowlby insisted, against Kleinian orthodoxy, that actual, as opposed to fantastical, childhood events ought to be valued in understanding child psychology. For this apostasy, Bowlby was unconscionably underappreciated.[1] Additionally, Anna Freud and her acolytes charged Bowlby with oversimplifying and misinterpreting Freudian theory. Such fissures became fault lines when Bowlby compounded his heretical leanings by turning to the study of animal behavior. In so doing, Bowlby brought his views on child-rearing together with elements of ethology and comparative psychology. Thereafter, censorious salvos hailed from a different quarter. Following his first major publication on attachment, Bowlby was constantly criticized by feminists who perceived his recommendations for continuous, intimate caregiving as a ruse to convince women to vacate the postwar job market.[2] Without giving over his ideas to compromise, Bowlby maintained his equanimity throughout, not allowing intellectual disagreement to grow into interpersonal discord.

Bowlby's last effort before passing away in 1991 was spent on a biography of Charles Darwin (1992), an affirmation of the evolutionary thought so indispensable to a proper understanding of psychological development. His prior works, however, directly pursued the theme of attachment, rather than focusing on the mechanism of evolution. During the 1950s, Bowlby served as a mental health consultant for the *World Health Organization*. While there, he produced an impactful report, insisting that constant and loving parental care was foundational to a young child's *healthy* development. Translated into 14 languages, this report subsequently gave rise to an expanded popularization, published in 1953 as the best-selling book, *Child Care and the Growth of Love*. Bowlby examined attachment from a clinical perspective, as in his 1988 book titled, *A Secure Base: Parent–Child Attachment and Healthy Human Development*. Yet, Bowlby's magnum opus was a lifelong labor; this was his *Attachment and Loss* trilogy (1973, 1980, 1982), completed at the twilight of his career (Byng-Hall 1991), consolidating several decades of collaborative research on emotional and social development in childhood. Drawing on evolutionary theory, applied research, and clinical experience, Bowlby demonstrated the reach of childhood attachment into adult functioning.

2 Evolutionary Roots of Human Attachment and Development

It is worth remembering, four decades ago, publications in developmental psychology showed negligible interest in evolutionary principles and cross-species examinations. Notwithstanding the want of precedent, John Bowlby, along with Robert Hinde (1959) and Harry Harlow (1953), suggested that human relationships, such as those between mothers and infants, followed similar patterns to that of non-human primates. More broadly, the 1950s witnessed a renewed interest in *fixed action patterns*, *instincts*, and related biological explanations of behavior (Tinbergen 1951; Lorenz and Tinbergen 1957; Lewis et al. 2002; Griffiths 2004; Brigandt 2005). Mutual influence between Bowlby and contemporary ethologists, such as *Nikolaas Tinbergen* and *Konrad Lorenz* (Van der Horst et al. 2007), facilitated theoretical productions and empirical examinations of invariant behavioral scripts that were more or less unresponsive to environmental input. Even while sensitive to intra-individual and cross-cultural variation, Bowlby insisted on the universality of certain behaviors, some of which had analogues in non-human species. His position is captured in the first volume of the *Attachment Trilogy*, wherein *instinctive behavior* is manifest as predictive patterns across species:

> For it must be emphasized that in all higher species, and not in man alone, instinctive behaviour is not stereotyped movement but an idiosyncratic performance by a particular individual in a particular environment-yet a performance that nonetheless follows some recognizable pattern and that in a majority of cases leads to some predictable result of benefit to the individual or the species. (Bowlby 1982, p. 39)

Behavioral variation in instinctual expression across species was attributed to differences in complexity, not kind (Bowlby 1982). Simple behaviors, or *prototypes*, acted as basal structures from which more complex features emerged. Adaptation, then, was defined as change in *structure*.

From thence, a structural adaptation could undergo modifications that allowed it to maintain its function within a particular organism, or express a modified function within a particular environment. In expected Darwinian fashion, all such structures, together with their maintenance and modifications, enhanced survival and reproduction (Bowlby 1982). Adumbrating the heritable action patterns described in the *Extended Phenotype* (Dawkins 2016), Bowlby also recognized organism-driven *environmental modifications.*

As we have seen, Bowlby's renowned studies of attachment were nested within an ethological and evolutionary framework,[3] with its *instinctive* processes,[4] and *sensitive periods.*[5] Still, even though biology provided the intellectual architecture for his life's work, anthropology informed its precise content. Aware that some cultures were not organized around nuclear families, yet determined to study the most elemental structure of societal organization, Bowlby found inspiration in Robin Lane Fox's *Kinship and Marriage: An Anthropological Perspective* (1967). Assisted by this anthropological perspective, Bowlby proposed the *mother-offspring dyad* (MOD) as the fundamental unit upon which more complex social structures were built. By adopting a bottom-up perspective to human sociality, and focusing on the MOD, Bowlby could track mammalian attachment structures as they functionally varied through phylogenetic webs. So situated within a comparative matrix, Bowlby contrasted attachment as it developed across five primate species: Rhesus monkeys, chacma baboons, chimpanzees, mountain gorillas, and humans. Amidst general cross-species commonalities, variation extended to timing, proximity seeking, and affiliative behavior within the larger social group.[6] From observing differential manifestations of attachment across the primate order, Bowlby thereafter cataloged fundamental cross-species commonalities, including: (1) offspring recognition of the immediate caregiver; (2) proximity seeking; (3) progressive increases in autotomy and exploration; and (4) development of additional bonds with other relatives and allies (Bowlby 1982). Based on these phylogenetic consistencies, Bowlby proposed that attachment developed in four phases, beginning without infant preference, proceeding to preference for the primary caregiver, succeeding to more generalized proximity seeking, and finally, to differentiation (Bowlby 1982).[7] From years of close study, Bowlby was also able to make competent inferential claims as to function. Separation from the primary attachment object, Bowlby explained, induces distress, anxiety, and fear; emotions which elicit proximity seeking. Proximity seeking, together with its actuating emotional state, is an adaptive response to predation, interspecific aggression and starvation within the *environment of evolutionary adaptedness* (EEA). However, insecurely attached infants evidence apprehension concerning caregiver responsiveness and accessibility. Relative to this insecurity, younglings evince angry or otherwise emotionally charged remonstrations at separation, and sometimes also upon reunion.[8]

3 Philosophically Reframing Attachment

From the foregoing review, Bowlby's *descriptive* ends are clear. He attempted to analyze attachment as it unfolded within the mother–infant dyad, and within kin-networks at large. Equally prominent are Bowlby's *prescriptive* ends, which extend from his childhood experiences, and which culminated in recommendations concerning child-rearing practices (Bowlby 1988). We highlight this *descriptive-prescriptive* distinction for its bearing on the process of reconciling Bowlby's researches with life history theory. As will become clear, Bowlby drew attention to, and expertly described, a pivotal event in child development. Yet, subsequent clinical prescriptions, while they may not be problematic in and of themselves, betray Bowlby's misinterpretation of insecure attachment variants. Bowlby may well have mistaken differential adaptation for unmitigated dysfunction. His background in ethology and evolution was sufficiently rigorous to orient Bowlby toward attachment, and subsequently to properly explain it in primatological context. Nevertheless, neither Bowlby's training, nor anyone's training at that time, enabled attachment, specifically insecure attachment, to be fully understood. Life history theory is necessary. To demonstrate as much, we first review the important work of Belsky et al. Thereafter, we cite Ellis et al. and Figueredo et al. in building toward a summary statement of our current thinking on attachment.

Belsky et al. (1991) proposed a developmental model influenced by a life history framework. The authors classified development as unfolding along two pathways. *Type I*, the first path, entails a family context remarkable for high marital discord, copious stress, and inadequate access to resources, which is associated with harsh, rejecting, insensitive, and inconsistent child-rearing practices. As development unfolds, Type I tactics *evoke* anxious and depressive traits in females, aggression and non-compliance in males, and insecure attachment, mistrustful internal working models, and an opportunistic interpersonal orientation in both sexes. More originally, Type I behavioral, cognitive, and emotional traits were thought to be correlated with early somatic and sexual maturation. From precocious pubescence follows early sexual debut, preference for short-term sexual relationships, and limited parental care of resultant offspring. Alternatively, Type II pathways are characterized by spousal harmony and adequate access to resources. Such environmental stability bolsters sensitive, supportive, and responsive child-rearing tactics which *evoke* secure attachment, a trusting internal working model, and an interpersonal style based on reciprocity. The opposite effects on adult sexuality and parenting are evident: Type II pathways relate to delayed somatic and sexual maturity, deferred sexual debut, preference for long-term sexual relationships, and high parental investment.

Belsky et al.'s description elaborates upon the adult implications of childhood attachment, but its originality lies outside the realm of description. From any traditional perspective informed by Bowlby's work, Type I pathways signal developmental dysfunction; but for Belsky and colleagues (1991), this path is an *adaptive* outcome of living in harsh, unpredictable, and unstable environments. Alternatively, secure attachments are equally adaptive to generous, predictable, and stable environments. In both pathways, parental care mediates the effect of ecological variables upon offspring development. Thus, offspring use parental treatment as a heuristic marker concerning the stability and safety of the broader environment (Belsky et al. 1991). Such reorientation comes only in exchanging the standard of *subjective well-being* for that of *adaptive stratagem*. Hence, by maturing early, Type I individuals successfully compensate for the instability and inherent lethality experienced in the prevailing ecology.[9]

Nearly two decades later, Ellis et al. (2009), modifying Belsky et al. (1991), articulated two contrasting developmental pathways culminating in *reproductive strategies*, respectively, suited to their contrasting *reproductive ecologies*. Bowlby assumed secure attachments were the default norm within the EEA, but Ellis et al. question this assumption. They argue that Bowlby was insensitive to environmental variance, failing to recognize the confluence between ecological instability and insecure attachments. As Ellis et al. explain, high environmental unpredictability, when associated with broader variance in adult morbidity-mortality, favors a fast life history strategy; whereas high unpredictability, when associated with broader variance in juvenile morbidity-mortality, promotes bet-hedging strategies. When facing long-term environmental fluctuations, selection will promote *conservative* bet-hedging strategists, with generalist offspring capable of flexibly adapting to a broad spectrum of environmental contingencies; whereas, when facing short-term environmental fluctuations, selection will promote *diversified* bet-hedging strategists, with diversified offspring capable of occupying a range of variegated niches. Without descending into consequent complexities, such circumstances result in adaptive reproductive strategies, each having implications for parental behavior and offspring attachment.

Thus, attachment is rendered ecologically sensitive. However, we have yet to broach the following question: *How are insecure attachments mechanistically associated with unstable environments, and vice versa?* Some models, like that of Belsky et al. (1991), are developmental. Infants and children imprint upon their environments, as heuristically experienced through the medium of parental care. This is a developmental model of attachment wherein environmental characteristics developmentally shunt children toward secure or insecure attachments, from which we might expect *sLH*-selected or *fLH*-selected behavior to, respectively, follow. While such calibration seems to take place, its latitude is hereditarily constrained, as will be demonstrated in the following section. Suffice it to say at present, that it is therefore not plausible to conceive of this process simply as a cascade of ontogenetic consequences. Instead, heritability estimates suggest partial genetic dispositions that constrain developmental latitude. Conceptual complications ensue. This is not just a matter of apportioning variance to nature or to nurture, as it would be if the attachment-relevant parenting milieu were imposed from without. Instead, however, it is imposed on children from within by genetically related parents. Therefore, we cannot precipitously separate either attachment, or its associated parental behavior, from genetic contributions. After all, *genetically sensitive designs* suggest that humans "actively shape the environmental features to which they are exposed" (Figueredo et al. 2018; Plomin et al. 2016).

With these complexities reviewed, we turn to our *summary statement:* Even as secure attachment is strongly *correlated* with positive affect, subjective well-being, long-term alliance formation, as well as mental and physical health, Bowlby misinterpreted its significance, thinking it an invariant marker of *healthy* or *normative* parent-infant bonding. In turn, Bowlby misinterpreted insecure attachment as unmitigated dysfunction. Secure attachment, like high intelligence, is indeed reflexively seen as an unqualified good. Such a traditional developmental viewpoint affords no evolutionarily informed cost-benefit analysis; no consideration of time-relevant investments, no comparisons made among alternative attachment styles using the standard of reproductive fitness; and, above all else, no reference to ecological variation. Yet, recall the concluding paragraph in Chapter 9 wherein Quinlan (2007) is heavily cited. Quinlan reminds us that parental ministrations evolve when, and if, they mitigate offspring mortality. Parental behaviors, and here we can include attachment-relevant parenting, can and will evolve when they foster offspring survival and subsequent reproduction. To the extent that parental efficacy is attenuated, so, too, will be parental effort.

Hence, *attachment is an outgrowth of ecology*. As with intelligence, evolved heritability for attachment-relevant parenting imparts a range rather than a value. That range can be pressed toward its upper or lower boundaries during ontogenetic development as offspring actually experience attachment-relevant parenting. And so, there is certainly an etiological role for development. Yet, the attachment-relevant parenting is itself partially an outgrowth of heritable parenting practices extending from a parent's life history strategy, and so is not an aspect of the environment to be dissociated from underlying genetics and treated as a randomized variable. Heritability extends from individual and lineal evolution, which is itself largely ecologically determined. Specifically, there is the physical and community ecology operating through the evolutionary history of persons of particular populations. The physical and community ecology of a geographic region informs the selective regime to which a population is adapted, and thus that population's mean life history speed, which, if *fLH*-selected, will emphasize mating effort over parental effort. Within such ecologies, selection will favor parents who allocate resources to producing larger, genetically diversified broods of generalists. Highly extrinsic ecologies will then evoke mate choice centering, for example, on dominance and parasite resistance as gleaned through symmetry; rather than, for example, the laboring and loyalty extending from conscientiousness. Additionally, parental investments are rationed, possibly with respect to birth weight and gestation time, and more certainly with respect to attention, enculturation, nutrition, and supervision. Paternal care will be especially attenuated, and polygynous systems will preponderate. So while insecure attachment might not be specifically adaptive, the eliciting rearing behaviors displayed by parents, like the resulting mating behaviors displayed by the child at maturity, are adaptive within unpredictable and stochastic environments imposing highly extrinsic mortality regimes. Before leaving off, we recall that there is life history variation within, as well as between, populations. And so, though proportions will differ, insecure attachment is to be found in any and all human populations. Thus, even amidst a broadly *sLH*-selecting regime, either in reaction to an *fLH*-selecting mortality regime prevailing within a micro-niche, or as a minority strategy garnering returns by its scarcity as per the dictates of *negative frequency dependent balancing selection*, some proportion of the population will express insecure attachments as one of many *fLH*-selected traits.

4 An Evidentiary Triumvirate

Data gaps combine with space restrictions to prohibit a thoroughgoing apologia. Still, we review and reference three points made within our summary statement. Specifically, we first address the genetics of attachment, then its correlative parental and sexual behavior. Collectively, the heritability of attachment and its associations to parenting and mating suggest its strategic significance as one of many ecologically evolvable life history traits.

Attachment generates moderate heritability estimates in controlled analyses (Finkel and Matheny 2000; Crawford et al. 2007; Brussoni et al. 2000). Further still, some such studies apportion little variance to the shared environment. As attachment is decidedly heritable, so are its predicted consequences. Militating against unqualified environmental explanations, Rowe (2000) reported heritabilities of .44 for menarchal age, and .40 for pubertal timing, with a negligible effect of shared environment. Similarly, Kirk et al. (2001) reported heritabilities of .50 for menarchal age, .23 for age at first reproduction, and .45 for age at menopause. Following a review of theory and evidence, Rodgers et al. (2001) attributed heritable differentials in human fertility to genetically mediated behavioral precursors. Lastly, Figueredo et al. (2006) found significant heritabilities reported for many behavioral precursors of differential fertility, such as, "sexual behavior, marriage and divorce, fertility desires, fertility ideals and expectations, age of first explicit attempt to get pregnant, completed family size, and parenting behavior." These moderate heritability estimates contraindicate categorical ontogenetic explanations of insecure attachment status wherein the early environment, inclusive of the attachment relationship, acts as a heuristic calibrator, imprinting itself upon the child during development. Ontogenetic models of attachment, variously advanced by Bowlby and Belsky et al., would predict little to no heritability for attachment; either in its upstream parenting behaviors, or in its downstream mating behaviors. On the other hand, such moderate heritability estimates broadly validate our summary statement. Within a life history paradigm, ontogenetic explanations are not unequivocally controverted, but only considerably qualified. Genetic dispositions partially drive parental and mating behaviors within generations, as well as concomitant effects on attachment formation between generations. Individual life histories arise from evolved dispositions that are thereafter modified by developmental processes.

As mentioned in previous chapters of this book, parental effort is one of the key bioenergetic dimensions of life history. Hence, individuals exhibiting a slow life history are willing to allocate resources to their offspring, rather than to copulating with multiple mates. Evidence supporting these predictions has been found across cultures. For example, in US college samples, a single life history factor loaded positively onto multiple indicators of social and relational stability, including parental investment (Figueredo et al. 2001). Similarly, in Northern Mexico, parental investment was one of the components of a single life history factor accounting for 92% of the variance in the model (Tal et al. 2006). More recent studies found a significant effect of environmental unpredictability upon life history and adult attachment. For instance, in a sample of pregnant females, family conflict and related early stressors influenced adult attachment. These patterns remained significant after controlling for the effects of ethnicity, education, and income.

Del Giudice (2009, 2011) advanced a theory parsing between varieties of insecure attachment as they differently operate in males and females. Avoidant attachment, observed predominantly in men, potentiates aggressive competitiveness within the context of short-term mating tactics. Alternatively, anxious attachment, observed predominately in women, potentiates apprehensive vigilance whereby women seek to reassure themselves of relational stability. Such theoretical interpretations have considerable empirical support. Consider that sex differences in indicators of short-term versus long-term mating tactics have been tied statistically to sex differences in attachment styles, and to life history strategy at large, in a study of negative post-coital emotions conducted in the USA, Canada, Brazil, and Norway (Fernandes et al. 2016). Therein, men exhibiting excessive post-coital avoidance were statistically more likely to evince an avoidant insecure attachment and, more broadly, a faster life history. Conversely, women exhibiting excessive post-coital desire for bonding were statistically more likely to evince an anxious insecure attachment and, more broadly, a slower life history. Early stress, as Chisholm et al. (2005) suggest, predicts age at menarche and first birth, expected lifespan, in addition to attachment status. Still further, within a college sample, Figueredo et al. (2001) found a positive association between secure adult romantic attachment and slow life history strategies. Outside of the evolutionary literature, attachment is known to predict sexual behavior and pair bonding. Whereas secure attachment predicts "interdependence, commitment, trust and satisfaction" (Simpson 1990), insecure attachment predicts early first intercourse, infidelity, more lifetime sexual partners (Bogaert and Sadava 2002), aggression, and coercive sexual behavior (Smallbone and Dadds 2000).

Notes

1. In fact, it was said that Bowlby would appear at the clinic every day, and offer to see anyone, to give them full attention when desired. "Perhaps this could suffice as a description of a secure attachment figure?" as put by Byng-Hall (1991; p. 14).
2. He dutifully addressed their concerns, but eventually turned away from this effort, as feminist authors seemed to cite each other's views on Bowlby more frequently than citing his own words.
3. We add here an interesting digression on Bowlby's considered thoughts on cultural and evolutionary change. Bowlby believed that trait-environment associations require, in parallel, an adequate understanding of the milieu in which that system operates and evolved (Bowlby 1982). Consequently, Bowlby considered differences between contemporary ecologies inhabited by extant human societies, and humanity's ancestral ecology, contemporaneously described as the *environment of evolutionary adaptedness* (EEA). In considering such comparisons, and the contrasts they suggested, Bowlby inferred inevitable mismatch, for he thought that environmental change was outpacing evolutionary change. And so, according to Bowlby, contemporary human behaviors should be examined only after considering that such behaviors might be evolved within and only congruent with the EEA.
4. Even though during development younglings are thought to be exposed to a variety of stimuli, for Bowlby, behaviors were elicited by just a few environmental effects (i.e., restriction of stimuli effectiveness). Furthermore, even though during early developmental stages some

systems may be activated by an array of environmental inputs, in later phases the same structures may be affected by a limited set.

5. Sensitive periods then are the level on which an individual has a higher proclivity to be influenced by a set of stimuli during a stage of its development. Under this lens, Bowlby viewed the study of human *instinctive* behavior, as the interplay between ultimate causation (i.e., the selection of behaviors in the EEA) and proximate causes (i.e., traits expressed depending on the stimuli present during sensitive developmental stages).
6. We here provide a sample of specific examples of attachment behavior within non-human primates as found in Bowlby's work. First, consider that one-year-old rhesus monkeys and chacma baboons restrict their interactions to a few adults, but that this period is extended in chimpanzees and mountain gorillas, with infants of these latter two species mostly interacting with their mothers for the first three years (Bowlby 1982). Other factors, such as the broader social system, may also act as sources of interspecific variation in attachment patterns. Whereas in chacmas and mountain gorillas, infants and juveniles seek the proximity of adult males (in the case of the former usually a friend or consort of the mother, while in the second with the dominant silverback), this behavior is delayed in chimpanzees, with individuals exhibiting affiliative behaviors with males after reaching adolescence. Also, we find that *clinging behavior* is attenuated among humans, as compared with non-human primates.
7. Presently, we provide further detail on the four stages mentioned above: In the first phase, due to sensory-motor immaturity, infants are restricted in their ability to discriminate their main caregiver from among other group members, as suggested by unselective smiling. The second phase establishes the ability to discriminate. During the second phase, discriminatory abilities are augmenting and preference for the principal caregiver (e.g., the mother) increases. In the third phase, the infant seeks the caregiver's proximity, avoiding the interaction with non-familiar individuals. Finally, the fourth phase brings differentiation; the caregiver is considered to exist independently of the offspring, with the infant recognizing its caregiver as an individual with goals, independent of those of the offspring (Bowlby 1982).
8. According to Bowlby, two hypotheses address the anger-anxiety link observed in insecurely attached individuals. The first suggests hostile individuals experience more separations, which would lead to an increasing anxiety. Alternatively, for the second hypothesis, separation anxiety acts as a catalyst of aggression (Bowlby 1973). For Bowlby, the clinical evidence supports the latter proposal. This association is interpreted to be mediated by the individual's frustration due to the absence, inability or unwillingness to respond on the part of the attachment figure. After the crystallization of

an insecure attachment, ambivalent individuals reflect a hypersensitivity at the time of experiencing future separations, manifesting anger when confronted with the attachment figure's absence.

9. In addition to considering the effects of environmental unpredictability, Chisholm et al. (1993) suggested mortality rates provided cues of the degree of lethality of the environment.

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CHAPTER 19

Urie Bronfenbrenner: Toward an Evolutionary Ecological Systems Theory

1 Applied Policy and Public Service

Born 1917 in Moscow, Bronfenbrenner immigrated to the USA at the age of six. When Bronfenbrenner was a child, his father, an astute observer, often oriented his son's attention to ways in which living organisms interfaced with their surroundings (Gilstrap and Zierten 2005). His father, by training a neuropathologist, expressed frustration at the treatment of the developmentally disabled population with which he worked. Young Bronfenbrenner witnessed such treatment and felt his father's frustration. Juvenile courts consigned seemingly healthy children to this institution, thereafter administering intelligence tests as part of the discharge process: If scores on these tests indicated mental deficiency, patients became wards, apt to stay in residence for the remainder of their lives. In Bronfenbrenner's eyes, these mental incapacities were probably attributable to the poor conditions to which they were subjected. Without falling prey to a confirmation bias, we can safely look back to Bronfenbrenner's early days, to find suggestive parallels with his later career.

Never forgetting these early experiences or his father's influence, Bronfenbrenner pursued a bachelor's degree from Cornell, graduating with a double major in psychology and music in 1938 (Bronfenbrenner Center for Translational Research 2017). Thereafter, Bronfenbrenner obtained an M.A. degree at Harvard and a Ph.D. from the University of Michigan in 1942, where he commenced graduate work in developmental psychology. Bronfenbrenner briefly served as a psychologist in the

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Air Corps and the *Office of Strategic Services*, before spending two years as an assistant professor of psychology at the University of Michigan. Eventually, Bronfenbrenner accepted a faculty position at Cornell where he remained throughout his subsequent career.

Not excepting Price, Bronfenbrenner stands out among other authors featured in this book for relentlessly, consciously, and dependably applying research findings to social policy. Bronfenbrenner was influenced by Soviet psychologists Luria, Leontiev, and Vygotsky, as well as his initial mentor, Dearborn, regarding the kind of research that leads, and in their view should always aim to lead, to social transformation (Rosa and Tudge 2013). Imbibing their tutelage, Bronfenbrenner's career can hardly be described solely as that of an instructor or researcher, as he went to great lengths to influence society as directly as possible. In this vein, in the pages of his 1970 book titled, *Two Worlds of Childhood: U.S. and U.S.S.R*, Bronfenbrenner asked:

> How can we judge the worth of a society? Many indices could be used for this purpose, among them the Gross National Product, the birth rate, crime statistics, and mental health data. In this book, we propose yet another criterion: the concern of one generation for the next. (1970; p. 216)

He testified before Congress on a proposed antipoverty bill in 1964, arguing that initiatives to prevent poverty should be directed in particular toward young children. Soon after, in 1965, he co-developed *Head Start*, a federal child development program for children of low-income families. His research also advanced the philosophy and objectives of Cornell University's *Life Course Institute*—renamed the *Bronfenbrenner Life Course Institute* in 1993 (Lang 2005). Bronfenbrenner's publications have had, and continue to have, international influence upon practice and research within the field of child and youth care (Derksen 2010). Bronfenbrenner spent many of his later years concerned with the breakdown of desirable familial and social values and virtues, such as honesty, integrity, and compassion, especially as they occurred alongside what he saw as augmenting apathy, delinquency, and rebellion (Bronfenbrenner 2005).[1]

Bronfenbrenner authored, coauthored, and edited more than 300 articles and chapters, in addition to 14 books. Some of his most notable publications include *Influences on Human Development* (1972), *Two Worlds of Childhood: U.S. and U.S.S.R.* (1970), *The Ecology of Human Development: Experiments by Nature and Design* (1979), and *Making Human Beings Human* (2005).

While approaches and topics range from cross-cultural comparisons of childhood development to commentaries on societal change, a vision of developmental ecology, with its many layers of influence and levels of reciprocal interaction, weaves and wends throughout. This was the tenet of what Bronfenbrenner came to call an *Ecological Approach to Human Development* (1974), an *Ecological Model of Human Development* (1976), and, ultimately, *Ecological Systems Theory* (1989). This theory, at its core, involved the realization that no interpersonal relationship exists in a social vacuum; rather all are embedded in the larger social structures of community, society, religion, economics, and politics. Bronfenbrenner's Ecological Systems Theory was modified across many papers and book chapters in the 1980s and 1990s; modifications that more conspicuously emphasized the biological being at the system's center and articulated developmental mechanics unfolding across the system's circles (Rosa and Tudge 2013; Tudge et al. 2009). These revisions contributed to what came to be called the *Process-Person-Context-Time Model* (e.g., Bronfenbrenner and Morris 1998), or, alternatively, the *Bioecological Theory of Human Development* (e.g., Bronfenbrenner 2001).

2 Toward a Bioecological Model of Human Development

Researchers have often said that, before Bronfenbrenner, child psychologists studied the child, sociologists the family, administrators the organization, anthropologists the society, economists the economy, and political scientists the broader governmental structure (Lang 2005).[2] In a feat of macroscopic consilience, Bronfenbrenner (1979) proposed a hierarchy of concentric circles surrounding the developing organism, each representing social systems of successively greater complexity. These social systems are theorized to be in a state of constant causal interaction with each other, as well as with the individual organism. Early in development, the family system alternatively buffers and filters the effects of larger social systems, which nonetheless act indirectly upon the child. More directly with time and maturity, the organism will come in contact sequentially with each successive layer of the social system. Thus, a human child typically interacts first with its mother and father, then with the rest of its immediate family, then with its extended kin, then with genetically unrelated friends and acquaintances, then with the community at large, and so on. The four major hierarchically nested levels of social organization proposed by Bronfenbrenner were as follows:

1. The *Microsystem*, which includes the social structures closest to child (family, school, neighborhood, childcare environments).
2. The *Mesosystem*, which includes the connections between the microsystem structures (between child's teacher and parents, between child's church and neighborhood, etc.).
3. The *Exosystem*, which includes the larger social system interacting with microsystem (parent workplace schedules, community-based family resources, etc.).
4. The *Macrosystem*, which includes the outermost layer in the child's environment (cultural values, customs, laws, etc.).

Much like other psychological researchers who dedicated themselves to a specific field and scientific endeavor throughout their careers, Bronfenbrenner updated his work considerably across the decades. The initial model incrementally accreted complexity, even while maintaining many of its integral components. In "re-assessing, revising, and extending—as well as regretting and even renouncing—some of the conceptions [previously] set forth" (Bronfenbrenner 1989; p. 187), Bronfenbrenner's reorganizations and revisions, in their extremity, were reminiscent of Freud's theoretical vacillations and reversals, which in fact negated and replaced early Freudian doctrine (Gay 1989).[3]

The main expansions of the Ecological Systems Theory, sufficient to warrant renaming it *Bioecological Systems Theory* (Bronfenbrenner 1986), came of elements which had gradually been introduced in unpublished lectures, colloquium presentations, and symposia. As outlined in Bronfenbrenner and Ceci (1994), Bioecological Systems Theory contains two-related evolutionarily relevant alterations:

1. There is a shift of focus from the role of context and environment in shaping the individual, to a more thoroughgoing consideration of interrelating developmental forces:
   a. The individual, embedded within these interrelating circles, is affected by environmental forces, as is recognized within Ecological Systems Theory. However, within Bioecological Systems Theory, the individual is also an active instrument, exerting some measure of agency as to the choosing and shaping of the environmental conditions under the influence of which he will develop and live;

   b. Reviews of the literature identify that these aspects of the Bioecological model are frequently ignored, in favor of Bronfenbrenner's earlier, more simplistic model;
2. Recognizing and valuing advances in behavioral genetics, gene–environment interactions are acknowledged as one of the forces in the system:
   a. In this expanded view, different circles not only interact with one another, but there is also interaction between the individual's genes and the contexts to which the individual is exposed;
   b. A child can thus, for example, actively seek or actively shape the environment, evoke certain reactions from the environment, or react to it in a specific way, at least partly based on his genes.

Bronfenbrenner's early writings were clearly ecological as multiple spheres of influence interact to shape human development in context; however, as discussed, they fail to appreciate humans as active agents in shaping the environmental conditions to which they are exposed. However, as Ecological Systems Theory became Bioecological Systems Theory, this weakness was ameliorated. In consequence, Bioecological Systems Theory is able to incorporate, for example, a process such as *niche construction* (Odling-Smee et al. 2003). Following the above-described revisions, *proximal processes*, meaning those interactive processes that directly influence developmental outcomes (Bronfenbrenner and Ceci 1993), are more acutely acknowledged to derive from complex, reciprocal transactions of which the individual is intrinsically and irrevocably an active part, rather than a passive subject.

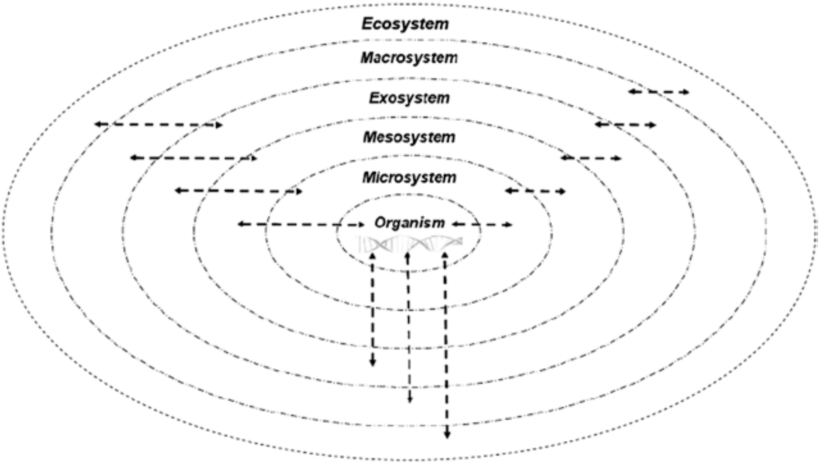
Bronfenbrenner believed his model generalized beyond any particular culture of interest. Partially validating these pretensions to universality, Bronfenbrenner (1972) did in fact engage in some cross-cultural scientific efforts, as when he compared American and Soviet childhoods. Though the landscape of Bronfenbrenner's publications is interspersed with additional cross-cultural comparisons, these remain limited (Weisner 2008). An important step in examining the generalizability of a theory, in establishing its application across human societies and its ability to act as a meta-theoretical guide to psychological research, is to test whether it has cross-cultural replicability. While Bronfenbrenner's theories have permitted the derivation of many lower-level hypotheses across psychological subfields, it is perhaps in the study of multilevel social organization of human groups that the broad idea of multiple concentric circles of mutual influence can be better tested. Irrespective of wide ranging societal complexity, ranging from hunter-gatherer bands to modern, globalized civilizations, human individuals relate among themselves across various levels; levels that can be hierarchically organized (Grueter et al. 2012), from the self, to small kin groups, and through to many more complex levels to ethno-cultural structure, only ending with the supranational organizations recently developed in modern societies. While they serve different functions and involve different activities, levels clearly interact to shape individual behavior in concert.[4]

3 An Evolutionary-Ecological Critique of Bronfenbrenner's Bioecological Model

Given that this is purportedly a model of ecological systems, one cannot help but wonder just where, within this conceptualization, the actual *Ecosystem* resides. As understood in biology and ecology, an *Ecosystem* can be described as a geographically delimited system of interrelations among living things, inclusive of the living and nonliving components of their environment, as well as their interrelations with one another. More precisely, the *Biology Online Dictionary*[5] defines an *ecosystem* as follows:

1. A system that includes all living organisms (biotic factors) in an area as well as its physical environment (abiotic factors) functioning together as a unit;
2. An ecosystem is made up of plants, animals, microorganisms, soil, rocks, minerals, water sources, and the local atmosphere interacting with one another.

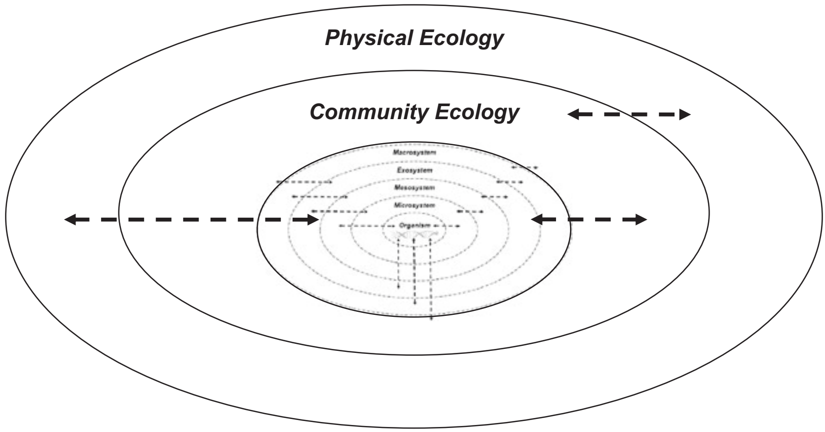
The *Ecosystem*, as classically defined, thus encompasses the *entire* Bronfenbrenner model! This hierarchical relation may be depicted as follows:



This implies that ecosystems themselves have a hierarchically nested internal structure, within which three levels may be discerned:

1. The *Physical Ecology*, which comprises the *abiotic*, or nonliving environmental features, inclusive of temperature, humidity, precipitation, etc.
2. The *Community Ecology*, which comprises the *biotic*, or living environmental organisms, inclusive of predators, prey, symbionts, and ecologically disconnected species.
3. The *Social Ecology*, which comprises the conspecific environment, inclusive of mates, offspring, kin, kith, allies, enemies, social superiors, social subordinates, social peers, etc.

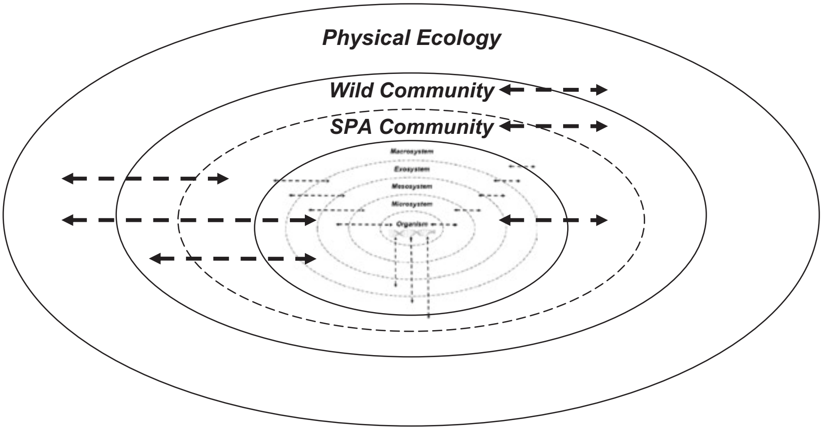
From this, we further discern that *social* ecology is what entirely encompasses the Bronfenbrenner model. This more detailed set of hierarchical relations may be depicted as follows:



It is further evident that the community ecology itself also has a hierarchically nested internal structure, within which two levels may be discerned:

1. The *Symbiotic Portmanteau Assemblage* (SPA) *Community*, which includes the assemblage of human and nonhuman species in close symbiotic (mutualistic, commensalistic, etc.) association with human societies (pets, domesticated animals, and cultivated plants).
2. The *Wild Community*, which includes all the nonhuman species that are not symbiotically associated with human/nonhuman species assemblage (predators, prey, etc.).

The *Symbiotic Portmanteau Assemblage* (SPA) is a product of *niche construction* created by coevolutionary processes among human and nonhuman species, and immediately surrounds the specifically human social ecology. This even more fine-grained set of hierarchical relations may be depicted as follows:



Furthermore, according to this newly expanded *Evolutionary Ecological Systems Theory* (Figueredo et al. 2017), a more biologically accurate series of concentric circles representing the human social ecology might better resemble the following:

1. *Self*
2. *Biological Parents and Siblings*
3. *Sexual/Romantic Partners/Mates*
4. *Genetic Offspring*
5. *Extended Consanguineous/Genetic Kin*
6. *Extended Conjugal/Affinal Kin*
7. *Friendship/Alliance Kith Networks*
8. *Village/Community-Level Organizations*
9. *Clan/Tribal-Level Organizations*
10. *Ethno-cultural/National-Level Organizations*
11. *Supranational/Imperial-Level Organizations*

To add further dimensionality to this representation, we find it useful to think of these concentric circles as being merely the view from above afforded of a set of *concentric cylinders*, each inserted vertically into the next one below. A side view of this geometrical construct would thus produce the following evolutionary-ecological Bronfenbrenner-inspired *ziggurat*.

The all-seeing eye of Horus at the top is a gratuitous addition, but we just couldn't help ourselves! Also missing from Bronfenbrenner's original Bioecological Systems Theory of development was an account of the *evolutionary* significance of the place of the organism amidst the multiple transactions with several social levels in which it is embedded. Our more biologically grounded recasting of the Bronfenbrenner model now permits us to discern two different levels of Bronfenbrenner's *Chronosystem*:

1. The *Developmental Chronosystem*, which is the original construct envisioned by Bronfenbrenner, includes environmental events and life transitions experienced during organismic development, and may also subsume relevant sociohistorical circumstances.
2. The *Evolutionary Chronosystem*, which now adds the evolutionary-ecological interactions over deep time.

Interactive influences (*causal transactions*) in the *evolutionary chronosystem* include the generation of "mutually shaping" selective pressures. Although these extensions of the Bioecological model of human development are novel, and any errors are surely our own, we nonetheless believe that Bronfenbrenner (1994) himself provided a warrant for such an expansion in a final section entitled *Genetic Inheritance in Ecological Perspective*:

> Certainly thus far it has by no means been demonstrated that this latest extension of the ecological paradigm has any validity. Nor is the validation of hypotheses the principal goal that ecological models are designed

> to achieve. Indeed, their purpose may be better served if the hypotheses that they generate are found wanting, for the primary scientific aim of the ecological approach is not to claim answers, but to provide a theoretical framework that, through its application, will lead to further progress in discovering the processes and conditions that shape the course of human development. (Bronfenbrenner 1994; p. 41)

From this more broadly ecological perspective, we might also observe that genes exert causal influences outside the organism, as in the construction of species-typical beaver dams and termite mounds (Dawkins 2016). Emergent *group phenotypes* of social systems are thus aggregate expressions of the genomes of its multiple component organisms, as well as of their non-social environments, in "mutually shaping" causal transactions with one another.

The causal influence of a single organism's genome on the emergent group-phenotypic properties of a socioecological system will thus partially reflect its *genetic similarity* with other group members, as might be indicated by the mean coefficient of relatedness within the group. Socioecological microenvironments (e.g., *family systems*) are thus influenced by localized *swarms* of genes of differing degrees of genetic diversity. Micro-niche construction is performed by means of this collective gene action through "mutually shaping" gene-environment interactions. Thus, the closer each concentric Bronfenbrenner layer is to the developing organism, the greater the spatial density of the swarm of genes that are similar to those of the developing organism, and the higher the consequent magnitudes of the gene-environment correlations produced by the projection of the extended phenotype of the given genome of the developing organism. The Bronfenbrenner Circles are thus successive layers of epigenetic transaction.

It follows that the relative *Kin Density* surrounding any given organism within a demic subpopulation partially determines the power and influence of that individual organism's genome over the local social ecology (Figueredo et al. 2001). These Kin Densities are expected to be greater at the socioecological systems closer to the developing organism, as conditioned by patterns of assortative mating, assortative sociality, parochial or kin-selected altruism, parental/nepotistic care/allocare and offspring dispersal/philopatry influence.

This new vision of Bioecological systems implies that it is really not the individual organism's *genome*, but the *gene-swarm* of which it is a part, that exerts this aggregate influence upon the emergent group-phenotypic properties of localized socioecological microenvironments. The gene-swarm can be thought of as interacting with the local microenvironment, just as a population does within an ecosystem. Kin Densities determine the diversity of allelic variants within the gene-swarm, and thus, the *homogeneity* of the aggregate genetic influence. The homogeneities of gene-swarms therefore influence the relative strength of gene-environment correlations within localized social ecologies. Homogeneous gene-swarms produce more concerted and univocal gene-environment interactions, exerting greater aggregate influence upon emergent extended phenotypes of socioecological systems. Divergent emergent group phenotypes so generated provide the raw material required for group (*interdemic*) selection, within evolutionary models of multilevel selection.

4 Application to Life History Theory

This all brings us full circle (pun intended) to the question of life history theory, and how it might apply to our evolutionary-ecological reconceptualization of Bronfenbrenner's model of human development. To begin with, slower life history humans have been shown to have generally higher levels of aggregate *covitality* (Figueredo et al. 2004, 2007; Figueredo and Rushton 2009), which encompasses most aspects of both physical and mental health. The slower life history child therefore starts life with biological advantages for long-term survival.

Building upon our expanded version of the Bronfenbrenner model, which we call *Evolutionary Ecological Systems Theory*, it is easy to envision how variations in the life history strategies of the conspecifics encountered by the developing organism within each of the concentric circles (or cylinders) would have major implications. Taking the proposed importance of kin densities as our starting point, slower life history humans have been empirically shown to be systematically higher in assortative mating, assortative sociality, parochial or kin-selected altruism, and parental/nepotistic care/allocare (e.g., Figueredo and Wolf 2009; Wolf and Figueredo 2011; Cabeza de Baca et al. 2012, 2014; Sotomayor-Peterson et al. 2012). All of these biasing factors would predict that slower life history humans would have higher local kin densities surrounding them, and consequently higher gene-environment correlations or *extended phenotypes*. A slow life history child is therefore less at the mercy of random variations in the developmental environment, or the *hostile forces of nature*, as Darwin (1859) called them. The slow life history child's gene-swarm is simply denser and more influential, thus buffering it from the slings and arrows of outrageous fortune.

The genome of the fast life history child, on the other hand, lacks this degree of control over its most immediate microsystems. Its paternity confidence is eroded, its average degree of relatedness with its siblings is lessened, its family structure is weakened, its extended kin are probably more estranged, and its residence patterns are less stable over time. The concentric circles/cylinders surrounding the developing fast life history child are therefore more diffuse and chaotic (Figueredo et al. 2012), with attenuated causal linkages among them providing little scaffolding for what Bronfenbrenner (2005) characterized as *healthy* human development.

The fast life history child is thus more susceptible to environmental variation, and more closely conforming to the environmentally-determinist models of conventional developmental psychology. Developing in such unstable, unpredictable, and uncontrollable environments (Ellis et al. 2009), faster life history children are thus likelier to develop higher levels of insecure attachment to kith and kin, higher levels of opportunistic and exploitative interpersonal styles, lower levels of kin-selected altruism, lower levels of parental and nepotistic effort, higher levels of social defection, higher levels of social antagonism, higher levels of social aggression, and higher levels of selfish general orientations toward social partners (Figueredo et al. 2006, 2013; Figueredo and Jacobs 2010). Add to these differences in their microsystems, the fact that the larger-scale social structure within which the developing child is situated is likely to be different. Recent studies in social biogeography (e.g., Figueredo et al. 2017) have demonstrated that faster life history human populations generally evolve lower levels of social equality, within-group peace, between-group peace, sexual equality, strategic differentiation, macroeconomic diversification, human capital, brain volume, and aggregate cognitive abilities. The effects of both individual- and group-level life history strategies therefore profoundly shape the emergent phenotypic properties of socioecological systems at every concentric level of the Bronfenbrenner hierarchy.

Notes

1. Bronfenbrenner's personal character is also revealed to be intriguingly in line with his own developmental theory, especially with evolutionary accounts of *kin selection*. This is indicated by the fact that, even though he cared about and defended the importance of investing in and nurturing *all* children, he put that principle into practice especially intensely with *his own* family. Toward the end of a 1970 White House conference on American children at which he spoke, Bronfenbrenner was invited by President Nixon's assistant to extend his stay by one day. It was explained that further consultation with Bronfenbrenner would improve government policy. When Bronfenbrenner responded he had a family birthday party to attend, the aide inquired if he was putting his own children ahead of the American children. Bronfenbrenner himself was proud to tell the end of this story: "I said yes" (Woo 2005).
2. Since his first formulations of ecological systems theory, Bronfenbrenner established bridges connecting these magisteria; thereby permitting integration within an overarching theory capable of guiding research and practice. There are interesting parallelisms and analogues to Bronfenbrenner's contributions evident in the work of contemporary authors (Lourau 1970; Deleuze and Guattari 1972); nevertheless, these are rarely recognized because American psychological science is more or less disconnected from French philosophical movements analyzing human sociocultural behavior.
3. Prominent modifications to his seminal 1979 theory centered on the role of the social and historical context during development, the role of the active person, and the impossibility of understanding developmental processes in isolation. This is not frequently recognized and incorporated into modern developmental works based on Bronfenbrenner's ideas, as reviews have indicated that few publications reference concepts and views espoused by Bronfenbrenner later in his career (Darling 2007; Tudge et al. 2009).
4. Moreover, even though many animal species exhibit complex social interactions, multilevel organization is not widespread, even among other primates (Grueter et al. 2012). Instead, multilevel organization may only have appeared in our evolutionary history, past the point at which humans and other apes shared a common ancestor.
5. www.biology-online.org/dictionary/Ecosystem.

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PART VI

Section Metacommentary

Cattell was a pioneer in exploring the latent hierarchical structures of human individual differences in both intelligence and personality. As such, he set the stage for much of the later thinking on the relations between life history strategies and cognitive abilities. His hierarchical models of personality structure anticipated the modern *general factor of personality* (GFP), which has been characterized theoretically and meta-analytically as a construct representing *social effectiveness* (van der Linden et al. 2016) and is one among three major indicators of the highest order factor of life history strategy: Super-*K* (Figueredo et al. 2004, 2007; Figueredo and Rushton 2009).

In addition, Cattell introduced the idea of *investment theory* to intelligence research (not to be confused with the *parental* investment theory of Trivers, 1972), applying it to the relation between fluid and crystallized intelligence. When generalized to other specialized mental abilities, this reasoning served as the basis for the evolutionary optimal resource-allocation theory underlying *CD-IE* effects (Woodley et al. 2013), which was later itself generalized to *SD-IE* effects (Figueredo et al. 2013). These latter theories view the multiplicity of mental and physical abilities as an evolutionary problem in resource allocation during human development to be solved by the adaptive regulatory mechanisms of life history strategy that are dedicated to that function.

Our interpretation of Bowlby's work, as filtered through the lens of contemporary models of the adaptive calibration of behavioral development by evolved regulatory mechanisms (*e.g.*, Del Giudice et al. 2011), also focuses on the developmental *investment* of limited bioenergetic and material resources then available to the organism. Although Bowlby prescriptively considered *secure* attachment to be the normative target of optimal (*healthy*) behavioral development, later life history theorists began assessing the costs as well as the benefits of various attachment statuses relative to social ecologies (Belsky et al. 1991; Ellis et al. 2009). It became clear that when the family environment was chaotic and unstable, and parental investment was generally low due to the fast life histories of other family members, trying to invest in more *secure* parent–child attachment might, via any rationalized evolutionary calculus, represent a misallocation of resources. Furthermore, the carryover of an *avoidant* attachment style into adulthood with respect to potential sexual partners, which was previously viewed as purely pathological, might instead be more adaptive in future socioecological niches where short-term mating strategies predominate as the prevailing mating system.

The same reasoning applies to the intergenerational transmission of low parental effort, to the extent that it might be experientially learned behavior. Experimental work on rhesus macaques, maternally and socially deprived as infants, revealed that females so deprived grew up to be incompetent and negligent as mothers, and in fact required brutal mechanical (*rape rack*) coercion to sexually conceive any offspring to begin with (*e.g.*, Harlow and Zimmermann 1958). These extreme experimental conditions produced clearly pathological and reproductively maladaptive symptoms. However, one cannot but wonder whether these experiments inadvertently tapped into an evolved *Darwinian Algorithm* for the adaptive calibration of future parental effort based on early experience. Less extreme deprivation of maternal warmth might normally serve as a developmental cue to ecologically appropriate parental strategies to adopt upon reaching adulthood, as that might be the optimal behavior in environments favoring faster life histories. In view of the relatively high heritabilities of life history strategy described in Part V of this volume, we must infer that a substantial gene–environment correlation would necessarily exist under more natural conditions between the genetically influenced life history predispositions of both mother and infant, on the one hand, and the rearing environment naturally provided by the mother to the infant, on the other, as a consequence of these heritable predispositions. Social modeling of low parental effort would thus be consistent with the genetic predispositions of the infant and would be likely to serve it well in the future as a feature of its adult reproductive strategy, especially if coupled with more prolific fertility.

Such developmental gene–environment correlations also emerge as important considerations in our evolutionary extensions and expansions of Bronfenbrenner's *Bioecological Systems Theory.* We proposed a reframed *Evolutionary Ecological Systems Theory* sensitive to a developing organism's social environment, which, after all, consists of socioecological microniches constructed by one's close genetic relatives, and furthermore that the effects of *family environments* might largely reflect endogenous gene–gene interactions within the swarms of genes shared by oneself and one's family members, as opposed to truly exogenous influences. Only as the outward-radiating Bronfenbrenner circles of social interaction become wider with behavioral development, and begin to encompass more distantly related individuals as kin density decreases, do the genes of unrelated individuals begin to exert any substantial influence upon the developing phenotype of the focal organism. Even then, those later influences are not purely endogenous, as the wider social niche is now constructed by the mutual interactions of the gene swarms of others with one's own kin-generated gene swarm. We quote Bronfenbrenner as anticipating this kind of amendment and modification to his theory, and it appears that he was quite welcoming of such future developments, although himself unable to take that next step.

We finally consider the expected differences between the patterns of gene–environment interaction during development of slow and fast life history strategists, which were concepts seemingly unfamiliar to Bronfenbrenner. As we expect the kin densities to be systematically higher for slow life history strategists, especially toward the middle of Bronfenbrenner's array of concentric circles, we expect that the influence of the focal organism's genotype in the constructed socioecological microniche will be correspondingly stronger. Once again, a positive feedback loop will be generated, where slower life history genes will shape *sLH*-selecting environments through the interactive niche construction of extended phenotypes. They will therefore wind up inhabiting an environment to which they are better adapted and biologically prepared, due to their heritable tendencies. Genetically influenced slow life history strategy is thus once again self-reinforcing on the scale of developmental, as well as evolutionary, time, with internal order imposing external order. Presumably, fast life history strategies are similarly self-reinforcing throughout development, although perhaps with weaker genetic influences shaping the interaction due to the correspondingly reduced kin densities, as chaos also begets chaos.

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Epilogue

We have reviewed the basic principles of life history evolution and, from the outset, become acquainted with its basic tenets, which were introduced and thereafter reinforced:

- Seven fundamental *biodemographic* variable sets, which are subsumed within its theoretical framework, can be used as reliable and valid indicators of this construct
- These and other variables were found to cohere as a convergent multivariate complex that varied along a continuum
- There exists substantial life history variation across species, wherein some organisms rush through life, investing more in quantity of offspring and speed of intergenerational turnover, whereas other organisms mature, mate, and age slowly, investing more in bodily maintenance and quality of offspring
- Each species can be assigned both a life history mean and a range of variation along which individuals are found dispersed
- As with other species, within the human species there exists substantial interindividual variation across the fundamental seven biodemographic indicators
- More fully even as compared to other primate species, humans have corollary life history differences deserving to be separately designated *psychological* life history traits
- Human social complexity, also augmented relative to any other animal species, then is described as *sociological* life history variation

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We then assigned ourselves readings in geography, demography, history, anthropology, sociology, and psychology, collectively comprising six disciplines, eighteen authors, and, as it turns out, well more than eighty-two volumes published between 1734 and 2015. Plundering, interpreting, recalling, conducting, and applying more than thirty years of life history research, we then wrote the foregoing eighteen core chapters, which, aided by section meta-commentaries, expose life history evolution's lineaments and contours, powers and limitations, range and depth, promise and purpose. Thus, positioned on that perch, the following nuance emerged:

- Physical and community ecological features, as they vary in time and location, create diverse selective regimes, which, in turn, produce divergence among population life history means
- As active agents, humans seek and modify the environment, and thus, the selective regimes under which they and their life history speeds coevolve
- Both the prevailing physical and community ecology, together with anthropogenic modifications, determine the carrying capacity of the environment and, thus, its potential population density
- All else being equal, population density slows life history
- Added to population density is mortality regime, which, in being relatively more extrinsic or intrinsic, speeds or slows life histories
- Populations isolated by distance, separated in time, and exposed to different selective regimes, even as they develop highly consequential between-group life history variance, still retain more within-group life history variance
- Within-group life history variance comes of adaptive diversification, whereby intra-group competition fosters intra-group diversity, allowing various social microniches to be exploited
- Within-group life history variance is studied inside the social sciences as individual variation in personality, attachment, social class, mating behaviors, parenting styles, criminality, deviance, time-orientation, *et cetera*

Ever-present in our thought, implicit in our writings, but not, perhaps, patent, is one remaining life history lesson, which, if not learned, would otherwise distort our understanding of all that has gone before. Whether individually or societally expressed, slow and fast life histories *do not*, respectively, relate to good and bad, superior and inferior, advanced and regressed. Slow and fast differences are adaptations to variations among local ecological selective pressures, and each evolved life history strategy must be viewed as exquisitely tuned to its environment of evolutionary origin. It is true that certain populations have undergone unprecedented slowing, especially over the last ten thousand years, but these values are subject to change as environments change. Population mean life histories are only as stable as the physical, community, and anthropogenic ecological regimes by which they are calibrated. It is easy enough to see what a *sLH*-selected individual might understand to be the liabilities of *fLH*-selected persons and the societies that they create in aggregate, just as it is easy enough to see what one may understand to be the assets of *sLH*-selected persons and societies. However, this perspective often stems from judging the adaptive values of *fLH*-selected traits within *sLH*-selecting environments, instead of within their proper ecological context. Notwithstanding, any adaptive value along the life history speed spectrum brings with it costs and benefits. It just so happens that the benefits of fast life history behaviors and societies are not obvious, absent evolution. Conversely, the costs of slow life history behaviors and societies are not obvious, again, absent evolution.

When Price and Malthus, respectively, advocate enlightened values and population control, just as when Bowlby and Bronfenbrenner, respectively, promote secure attachment and stable systems, they are acting as partisans, defending the prerequisites, and advancing the values, of slow life history persons and systems (Hertler 2016). The social sciences are awash in these value judgments, and that is what they are, value judgments often extending from persons and subpopulations with particularly slow life histories. Nevertheless, they are not seen as such. These value judgments creep into the social sciences precisely to the extent that they are not grounded in evolutionary thought. As was said previously, “this is not to condemn the value judgment, but only to deny to it the imprimatur of evolution” (Hertler 2017; p. 37).

Do not mistake us. This is not a paean to scientific neutrality or a sop to imagined critics. The *fLH*-selected are generalists, capitalizing on available resources immediately at hand, thwarting extrinsic threats with quick reactions, countering risk with genetic diversity, a variety of mates, and increased brood size. They are not excessively dependent on cooperative systems of reciprocal exchange, or any other variety of ecological stability. The *sLH*-selected are specialists, depending on ecological and social stability, and its associated returns to long-deferred investments in the form of reciprocal altruism, reputation building, enculturated young, education and training, savings, planning, and investments. When *sLH*-selected regimes stably prevail, civilizations, perforce, evolve slower life histories. In doing so, they proliferate, diversify, and specialize, which brings wealth, order, and justice, among other social features generally viewed as positive goods within the social sciences. As in social insect colonies with their diversified castes, slow life history societies with their diversified vocations are enormously productive precisely because they capitalize on the division of labor. They accomplish, as parts in a larger whole, that which would be impossible individually.

Slow life history strategists police, judge, convict, educate, donate, create armed forces, form insurance companies, and, in innumerable other ways, anthropogenically exaggerate the natural ecological stability of which they are commonly endowed. Notwithstanding these myriad methods of niche construction, vulnerabilities remain. Perturbations to any aspect of ecology, physical, community, or anthropogenic, undermine *sLH*-selected strategies and send shocks through *sLH*-selected societal systems. Perturbations of sufficient duration and magnitude, such as that experienced by post-colonial Amerindians, can change the prevailing winds of selection, rapidly favoring more adaptable fast life history strategists, along with simpler fast life history societies. Barring such dramatic reversals of prevailing ecologies, climate change such as that befalling the Classic Lowland Maya during the Medieval Warm Period, or centuries of internal decay as described by Toynbee, can accomplish the same more slowly. When the intricacies and interdependencies of slow life history societies are destroyed, specialized slow life history strategists rapidly lose fitness. Like a honeypot ant with no liquid to store, or a door-blocking ant with no door to block, the *sLH*-selected strategist showing somatic, cognitive, educational, and vocational specializations may find the trade he plied to such good effect, suddenly stripped of value, for all the generalized abilities sacrificed to its cultivation. Thus, life histories are not absolutely adaptive or maladaptive, but one or the other only relative to prevailing selective regimes, just as a test is only valid or not relative to the construct it attempts to measure.

A difficult thing for some to admit is that the decline and collapse of our beloved civilizations can be biologically interpreted as a change in the selective regime in favor of fast life history psychosocial systems and in disfavor of the slow life history psychosocial systems, even when ensconced and sheltered within their carefully constructed niches. But sometimes even the massive and seemingly impregnable walls of Constantinople can be battered down. This eventuality is neither a lapse in evolution nor its absence. This is just one of the many reversals in direction and magnitude to which selective pressure has always been subject. We may personally regret the outcomes of natural selection all we like, but our lamentations do not move its unseen and inexorable hand.

An epilogue was in order, and its customary retrospective view was dutifully assumed. Yet, in truth, we understand this volume in point of prospect. Yes, it served some consolidating function, but at the same time, more important than compiling primary research, it envisions the future potential of that research as it interfaces with, and binds together, social scientific data. We have adopted an expansive application of life history theory, one that may not be recognizable to early biological researchers. Admittedly, we proffered the grand vision of an overarching science of social biogeography, spanning both geography and history and rooted in biology, as intellectually reconstructed through the lens of life history theory. However expansive, this species of life history theory is not meant to nullify or negate social scientific work, but instead structures and expands such work. Life history evolution holds promise as an organizing matrix within which variables can be connected, causally sequenced, and ultimately explained. Above all else, to the unity of purpose long-evident within the social sciences, life history evolution adds unity of perspective, finding a concatenation and leaving a confederation.

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