

Hawkes, Kristin and Paine, Richard R. (eds.). *The Evolution of Life Histories*. Santa Fe: School of American Research Press, 2006. 505 pages. ISBN 1930618727. (School of American Research Advanced Seminar Series) Price: \$34.95.

To a cultural anthropologist, a life history allows one to appreciate the major events that an individual has experienced across his or her lifecycle. In contrast, to an evolutionary biologist, a life history is a species' evolved trajectory of growth, development, reproduction, and senescence. Life history traits are fundamental species descriptors and include characteristics like growth rate, age and body size at maturity, litter size, birth spacing, mortality rate, and lifespan. Many features of the human life history are unusual. Humans grow slowly and delay reproduction until the second or third decade, greatly stretching the period of pre-adult dependency. Despite intensive investment of time and resources in offspring, human females manage to space their births closer and achieve higher fertility than other great apes. Human females are also unusual for shutting down reproduction at the menopause, often several decades prior to the end of life. Explaining how and why this unusual human life history strategy evolved is a source of perennial debate among biological anthropologists.

This edited volume is the output of a 2002 School of American Research seminar devoted to this question. A few chapters review material that is covered elsewhere, while many are unique to this volume. All bear directly or indirectly on how the human life history strategy evolved, and a number of the chapters foreground one model of human life history evolution in particular: the grandmother hypothesis (GMH). The GMH holds that, after the menopause, human females contribute to reproduction indirectly by provisioning their daughters and grandoffspring, thereby boosting the fitness of their close kin. As the key proponent of this model, Hawkes argues that the consequent evolutionary pressure for longevity in females has been the driver of the evolution of the human life history, and that many other unusual human life history traits—such as our extended childhood—have merely come along for the ride.

In addition to co-authoring the introduction (with co-editor Richard Paine), Hawkes is an author of the first 3 full chapters, which provide empirical, historical and theoretical background to the study of life history evolution. "The derived features of human life history" (with SL Robson and CP van Schaik) reviews how the human life history diverges from the mammalian or primate template, emphasizing early cessation of reproduction in females and provisioning as a driver of higher fertility. In "Life history theory and human evolution", Hawkes reviews the history of the field, with coverage of seminal early contributions by the likes of Gould's (1977) *Ontogeny and Phylogeny*. In the third background chapter, "Slow life histories and human evolution", Hawkes outlines Charnov's invariant approach to mammalian life histories, and reviews evidence that these "assembly rules" not only apply to humans, but beg deeper questions about what drives, and what follows, in life history evolution. In a later chapter, Blurton-Jones reviews ethnographic evidence for life history variation in hunter gatherers, and concludes that Charnov's model applies to humans.

In the following chapter van Schaik and colleagues take a different approach, as they argue for the importance of the brain as both a driver and outcome of the slow life history that characterizes primates and humans. They note, for instance, the correlations between brain size and other life history and behavioral traits. They also consider the nutritional

drain of growing a large brain, which might have favored a slower pace of somatic growth in humans and non-human primates.

Bogin's chapter summarizes his thinking on the evolution of childhood as a unique human life history stage. His chapter, and Sellen's on primate lactation and human complementary feeding, emphasize the reproductive benefits to the mother of weaning early: shifting from breast milk to provisioned foods distributes the nutritional burden of offspring across relatives and siblings, allowing shorter interbirth interval and higher fertility.

In their chapter, Konigsberg and Herrmann do not discuss data of direct relevance to the evolution of human life histories. Instead they use prehistoric skeletal sequences to walk the reader through the problems of reconstructing demographic characteristics from these samples, with discussions of Bayesian inference and the Rostock approach to paleodemography. In the following chapter, Paine and Boldsen model the life history impact of epidemic mortality during the late Mesolithic in western Europe, and question whether life expectancies might have been higher prior to their impact.

Skinner and Wood round out the coverage with a helpful synthesis of the paleontological evidence for hominin life history variation. Like many other authors, they do not take a stand on any given model, but note that it occurred in mosaic fashion with different innovations emerging independently during the past several million years. They approach these questions simultaneously from the perspective of "lumping" and "splitting" phylogenetic models, which are described in helpful detail in appendices.

On whole, these are well-written reviews, and the volume is nicely edited and produced. The volume's limitation is that it fails to fully capture the major points of tension within the field. Reading this volume alone, one would not appreciate the lack of consensus, or the challenges to the GMH that have been proposed. Compared to the tuber-based Hadza which inspired recent versions of the GMH, male provisioning is important in foraging populations that rely heavily upon hunting. Although rich, the original Hadza data demonstrating grandmother provisioning came from 8 women, not all of whom were technically grandmothers. Much of the subsequent human evidence for fitness benefits of grandmaternal provisioning has come from sedentary agricultural populations. In addition, some biologists do not see a need to "explain" cessation of reproductive maturity in human females, but instead point to evidence for constraints on the upper age of viable follicles.

These and other perspectives continue to inspire debate within the field. Here, coverage of such competing viewpoints is fairly light. As a conclusion to Chapter 4, Hawkes rightly notes that the major models of human life history evolution all "...recognize human longevity as an evolved trait—with help *from* elders, not *to* them—the source of the distinctive age structure of human populations." [p. 126, italics in original]. Whether it was specifically provisioning by *grandmothers* that drove the evolution of this strategy is not settled, and I'm guessing the advocates of competing models could muster data to challenge some of the arguments presented here.

Despite its failure to fully live up to its title, this is certainly an excellent introduction to one prominent model of human life history evolution. Hawkes' overview of the history of the field, and of Charnov's revered but challenging work on mammalian life histories and life history invariants, are a great service. The contributions by the remaining authors nicely complement this coverage, even if the chapters do not always speak to the

predictions of the GMH or alternatives, or in other cases—such as Bogin’s emphasis on provisioning by kin more generally and van Schaik and colleagues’ focus on the brain—propose explanations that are not entirely consistent with it. As the most comprehensive articulation yet of the GMH, this volume is certain to make a contribution to the field and its debates. If balanced by coverage of competing models, it would also serve as an excellent teaching resource for graduate and advanced undergraduate students.

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