

## GENE FLOW UNDER WATER

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## Never Apologize, Always Explain

**A Devil's Chaplain: Reflections on Hope, Lies, Science, and Love.** Richard Dawkins. Houghton Mifflin, Boston, 2003. 263 pp. \$24.00 (ISBN 0618335404 cloth).

Richard Dawkins is one of those responsible for the current ferment of ideas that makes contemporary evolutionary theory such an exciting field. Building on the work of George Williams, he has argued that the history of life is the struggle between lineages of genetic replicators. Organisms, constructed by teams of allied replicators, are but one weapon in the struggle between replicator lineages, for the selectively salient effects of genes are often felt beyond the boundaries of the organisms in which they ride. Thus genes and gene alliances have extended phenotypes. He has argued that while genes are the predominant replicator in our biological world, they are not the only ones. Ideas too are replicated, some more frequently than others. Since thought is relevant to action, the differential success of meme lineages has effects on their bearers—mostly, but not only, humans. Moreover, Dawkins holds that this conception of life's evolution is true not just of our living world. Some aspects of it will characterize any evolutionary process capable of producing complex life-forms.

*A Devil's Chaplain* is a selection from Dawkins's (fairly) recent essays, and some of these themes internal to evolutionary biology are reflected in this collection. Thus there is a fine essay on the history and current status of sexual selection ("Light Will Be Thrown"). In particular, for those interested in memes, this collection is a rich resource. "Chinese Junk and Chinese Whispers" takes up the serious challenge of the fidelity, or lack thereof, of memetic replication, and

"Viruses of the Mind" systematically explores the problem of identifying (if not curing) virulent memes. But there is also a fine essay that takes up the themes of universal Darwinism, arguing that the inheritance of acquired characteristics cannot be the fundamental inheritance mode for any organism with an interactive, recipe-style embryology ("Darwin Triumphant"). The crucial problem is that for interactive developmental systems, there is no simple mapping from traits back to elements of the developmental program. Hence there is no route through which the acquisition of a trait can trigger discrete change in the program that would then generate the trait endogenously in the next generation.

But Dawkins has had an increasingly important second role as one of the public faces of evolutionary biology and of science more generally. Indeed, he is Stephen Jay Gould's only serious rival as this public face, for like Gould he writes theoretically innovative evolutionary biology for the nonspecialist, not just more or less accessible versions of the prevailing wisdom of the insiders. That public role dominates this book and makes it the splendid collection that it is. *A Devil's Chaplain* is at times intensely personal ("A Lament for Douglas"), at times exulting ("I Speak of Africa and Golden Joys"), at times seriously angry ("A Time to Stand Up"). But throughout it is a sustained, clear-minded, forthright, reasoned defense of science and scientific rationality. In particular, it is a defense of the scientific mode of thought rather than current scientific opinion. Even so, Dawkins thinks that much of current science is real knowledge, not just as-yet-unrefuted conjecture. Apsley Cherry-Garrand explains the journey of *The Worst Journey in the World* (New York: Carroll and Graf, 1997) by saying, "We travelled for Science...in order that the world may build ...on what it knows instead of on what it

thinks." Sadly, Dawkins is one of the few practicing scientists these days to have the confidence to draw this unqualified distinction between mere opinion and knowledge. He could, I suspect, even be tempted into capitalizing "science," and this collection explains why.

The specific topics of these essays vary as much as their tone, but four themes recur, and what Dawkins says on these seems to me to be both true and important. I begin with one that is personally embarrassing, since it is connected to my disciplinary home. The explosion of obscurantist and antiscientific relativism, mostly derived from French and German sources, is one of the most depressing recent developments in academic life, especially for those of us based in the humanities. Dawkins takes on these ideas variously throughout *A Devil's Chaplain* but most systematically in "Postmodernism Disrobed." Here Dawkins's gift for argument is hardly needed. A sample of extracts from postmodern texts is proof enough that something has gone horribly wrong for those not incurably cognophobic. I will not resist the temptation to quote one relatively short and almost intelligible example myself: "Perhaps history itself has to be regarded as a chaotic formation, in which acceleration puts an end to linearity and the turbulence created by acceleration deflects history definitively from its end" (p. 50). These writings would have some amusement value, except that institutions which ought to be, and which are funded to be, citadels of clarity and reason are protecting and spreading this darkness. In calling a charlatan a charlatan, Dawkins is surely on the right side.

His vigorous responses to postmodern and social constructivist views of science and truth are complemented by his essays on scientific reasoning and why, if we can trust anything, we can trust it. The best of these is "Snake Oil," an essay on the

scandal of alternative medicine: a multi-billion dollar rip-off of the ignorant, the gullible, and the desperate. He exposes the sheer bizarreness of many alternative therapies; for example, homoeopathic dilutions are so extreme that their “remedies” typically have not a single molecule of their supposedly active ingredient. More important, he explains the methodological power of double-blind, random controlled trials and why these are not a biased procedure. They can be adapted to, for example, homoeopathic treatment regimes. If homoeopathic regimes work, double-blind tests can demonstrate their curative powers. The central point is that there are alternatives to orthodox medicine, and some of these might even work. But there is no alternative to orthodox methods for testing medicines. Anecdotes about recovery are not enough, for the placebo effect is known to be important, and most of us recover from most ailments anyway.

It is important, though, that Dawkins is sensitive to the limits of science, too, endorsing a robust and traditional distinction between fact and value. That is the theme of the title essay: Science is the realm of facts, not values. Selection is inevitably brutal and destructive, which gives us all the more reason to subvert it when we think we should. But though science is the realm of fact, religion is certainly not the realm of values. Stephen Jay Gould deplorably feeble-d out on the relationship between science and religion, ceding matters of ethics to religion in return for excluding religion from claims about fact. Gould’s assessment was perverse. First, religions have historically made (and continue to make) many claims about fact, completely without evidential support. Second, many religions make simply barbaric ethical claims. Indeed, I suspect the only religions that are morally innocuous—Unitarianism, Anglicanism, and other denatured creatures of the secularizing world—are innocuous precisely because no one really believes in them doctrinally any more. They are evolving from religions to welfare organizations, with music and moral exhortation thrown in. Here Dawkins could not contrast with Gould more clearly: Dawkins despises

religion, an attitude that comes through in his genuinely angry “Time to Stand Up”; it is slightly concealed in the other essays that touch on the subject.

I am sure that some of Dawkins’s anger is fueled by a sense of the secular damage religion causes, a damage made so much more obvious by the contemporary revival of fundamentalism. But much of it, I conjecture, is fueled by a frustration I share. We live in a genuinely wonderful, mysterious, awe-inspiring universe—a world rich and strange. Religions turn their back on the genuinely wonderful in favor of a sham. They prefer the virtual to the real; religion is the PlayStation of the people. So a final theme in this collection worth making explicit is Dawkins’s delight in the natural world, both in its idiosyncratic details and in the systematic mechanisms that make it. This comes through in many places: in the essays on Africa, in the obituary for Hamilton, in the reviews of Peter

Medawar’s work and of a couple of Gould’s early collections.

I have my disagreements with Dawkins on some of the debates internal to evolutionary theory. Thus, when he writes “It is possible that by the end of the twenty-first century, doctors will be able accurately to predict the manner and time of death of everybody, from the day they are conceived” (p. 33), my bet is that he much understates the role of environment and accident on mortality. But I wholly agree with his account of the nature and importance of science. The methods of science are our only reliable, well-calibrated means of understanding the world in which we live, and in these essays Dawkins explains with his usual verve and clarity why that is so.

It is therefore somewhat sobering to realize that these essays will probably have little impact. They will probably not be read by those who need them the most. But they are also written in too

confident and forthright a tone for these relativist times. Dawkins's method is "never apologize, always explain," and so he defends science, truth, knowledge, atheism, and his other core views up front: openly, confidently, and without reservation, having confronted and rebutted the idea that this perspective is parochially, question-beggingly "Western." And given the weight of argument, so he should. Nonetheless, I would bet money that if I made, say, "Snake Oil" compulsory reading for 100-level philosophy students (and in the modern world, this would be a relatively friendly audience), this unapologetic confidence would get many backs up. Dawkins has the power and the passion, but is not of the temper of his times. I have no advice to give on this issue—the last thing I want to see is mealy-mouthed, dishonest evasions from his pen. But though these essays are vivid, clear, and compelling, their fate, I fear, is to be read mostly by those who already agree with their message.

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### LIFE HISTORIES AND SOCIAL STRATEGIES: FROM DEVELOPMENT TO EVOLUTION

**Primate Life Histories and Socioecology.** Peter M. Kappeler and Michael E. Pereira, eds. University of Chicago Press, Chicago, IL, 2003. 395 pp., illus. \$30.00 (ISBN 022642634 paper).

**L**ife-history analysis involves a host of variables that shape the distribution of reproductive effort across the life span, as well as the length of the life span itself, whereas socioecology includes the study of the different

behaviors responsible for social organization in relation to ecological systems. *Primate Life Histories and Socioecology*, a multiauthored volume edited by Peter M. Kappeler (Department of Behavior and Ecology, German Primate Center, Göttingen) and Michael E. Pereira (research associate at the Lincoln Park Zoo in Chicago), brings these fields together in an effort to evaluate the influences of diverse life-history parameters on the variety of behaviors underlying social systems, and vice versa.

Thus, the book addresses relationships among such variables as the rate of pubertal development, weaning age, inter-birth intervals, growth rates, and parental care and life span, as well as variables associated with social behavior, such as group size, infant care strategies, brain size, and various ecological variables. If the book can be said to have a problem, it may already be apparent: It can sometimes bombard a reader with so many different interrelated issues and data that it leaves the head spinning! A reader may sometimes lose sight of the big picture and the overriding themes. Fortunately, the focus of the individual chapters is interesting, and when one does step back, the common themes are intriguing. Consequently, this edited volume is both rewarding and fun, and is well worth the effort that goes into reading it.

The book starts by highlighting how the study of life histories has progressed over the years from a focus on models of relationships between ecology and overall fast ( $r$ ) versus slow ( $K$ ) reproductive strategies to the examination of complex patterns of relationships among the various components of life history that make a species live in the fast lane or in the slow one. Selection has operated on particular components in relation to one another and has done this differently across species and taxonomic groups, such that they have moved along the  $r$ – $K$  continuum via adjustments of different suites of life-history traits. The first part of the book highlights these interrelationships among traits, how they evolve and develop relative to one another, how they are linked and unlinked, and how

these linkages differ across taxonomic groups.

One example of the kinds of relationships identified here is an association between large group size, low body mass at birth, and high body mass at weaning among the different orders of primates (chapter 3, by Phyllis C. Lee and Kappeler). Links between social group size and several life-history parameters are carefully evaluated in chapter 5. The analysis leads the author, Charles H. Janson, to reject the commonly held view that the size of a social group reflects a compromise between predator benefits and foraging costs. This is because large primates have fewer predators than small ones do, and there is actually a positive relationship between group size and body size, which clearly runs counter to the predictions of the model. Janson suggests that, instead, larger primates gain greater benefits from a reduction in predation risk than do smaller ones because the impact of predation is felt across the life span, which is longer for large primates than for small ones. This is a nice example of how consideration of life-history traits can lead to a better understanding of sociality.

The second portion of the book focuses on how changes in developmental patterns appear to have led to changes in basic life-history parameters and sociality. The authors point out that "divergent modes of development result from dissociation of phenotypic elements" (p. 146), which can lead in turn to new suites of adaptive behaviors. Pereira and Steven R. Leigh (chapter 7) point out some of the ways that structures of primate societies have been influenced by slow rates of both developmental and reproductive processes, and they suggest that the resulting challenges to the immature primate "may constitute the single most important factor ultimately structuring primate societies" (p. 149). They also show how growth schedules of particular features of an animal's morphology can become dissociated in ways that reflect the social system. For example, the canine teeth of female mangabeys develop far more rapidly than do those of the larger baboons, which leads to considerably more effective weapons in the

females of the smaller species. This presumably serves the female mangabeys well, as they must independently compete to achieve their social status in the group, whereas the baboons can rely on help from their maternal kin.

Developmental issues related to human life histories and their influence on the evolution of our brains are discussed in a fascinating chapter by Kristen Hawkes, J. F. O'Connell, and Nicholas G. Blurton Jones (chapter 9). These authors use data from the fossil record as well as living primates to argue that the co-evolution of several life-history traits represents a major adaptive shift that set us on an evolutionary trajectory quite different from those of other primates. The traits in question, typically dissociated in other primates, are high fertility, altricial offspring, early weaning relative to independence, late maturity, and extreme longevity. The authors suggest that the key adaptation that enabled these features to be linked is "grandmothering," the disposition of females to help care for their grandchildren. The model represents one of many examples of the tantalizing speculations offered by many of the authors.

The chapter on grandmothering leads into the third and last part of the book, which focuses on the evolution of primate brains in relation to life histories. Chapters 10 and 11 examine the issues systematically and arrive at somewhat different conclusions. In chapter 10, Robert O. Deaner, Robert A. Barton, and Carel P. van Schaik evaluate which of the correlations between life-history parameters and brain size reflect direct functional linkages rather than processes that simultaneously affect both variables. Their analysis leads to the conclusion that in primates, but not in some other orders of mammals, brain size is linked most tightly to life span. One explanation for this relationship that the authors favor is the "delayed benefits hypothesis," which suggests that the learning supported by large brains can provide greater benefits to long-lived than to short-lived primates. The next chapter, by Caroline Ross, highlights associations between primate brain size, juvenile growth rates, and the length of the juvenile period.

Life span does not emerge as an important variable in this analysis. The reasons for the differing conclusions from chapters 10 and 11 are not clear.

In the final chapter on brain size, Robin I. M. Dunbar refines the analysis in several ways. He focuses on the neocortex, demonstrates its relationship to group size within both simians and hominids, and shows that for a given group size the neocortex is larger in hominids than in simians. The latter finding presents a challenge to hypotheses suggesting that "the evolution of brain size within the primate order was driven by the cognitive demands of living in complexly organized social systems" (p. 298). Dunbar suggests that the paradox may be resolved by considering advanced social functions, such as those that depend on a "theory of mind," that may be supported by hominid, but not simian,

brains. The chapter ends with the speculation that these may have been associated with the dispersed distribution of members of a social group in conjunction with highly territorial behavior among hominids. Interestingly, these patterns are also characteristics of the social system of spotted hyenas, whose brain-to-body-weight ratios are relatively high compared with those of many other carnivores.

As I hope the above descriptions convey, the many chapters in the book are fascinating with respect to the issues raised, the data presented, and the speculative interpretations of those data. The book brings together many lines of work to highlight how they all touch on the ways that life-history traits and primate social behavior are linked. It presents a solid argument for why further examination of such relationships is critical if



we are to truly understand the evolution of primate brains and the social behavior that emerges from them.

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## GENE FLOW UNDER WATER

### **Population Genetics: Principles and Applications for Fisheries Scientists.**

Eric Hallerman, ed. American Fisheries Society, Bethesda, MD, 2003. 458 pp., illus. \$69.00 (ISBN 1888569271 cloth).

*Population Genetics: Principles and Applications for Fisheries Scientists* fills a large gap in content resources needed by beginning fisheries scientists: It is the first text on the application of population genetics to fisheries science aimed at an undergraduate audience. Eric Hallerman edited the volume of 18 chapters, which were written by 14 well-respected fisheries geneticists.

Over the past 30 years, fisheries scientists have been applying population genetics to matters such as hybrid identification, mixed-stock fisheries analysis, and description of population structure. These and other applications of population genetics to fisheries have been widely documented in numerous journal articles and book chapters. Ironically, however, despite the large amount of information available on fisheries genetics, there have been few undergraduate courses and (until now) no undergraduate textbooks on the subject. This shortage of educational resources means that many professionals lack practical knowledge of a field that has become highly influential within conservation and management of fisheries resources.

In 1987, Nils Ryman and Fred Utter edited *Population Genetics and Fisheries Management* (University of Washington Press), which is aimed at a graduate-level audience. That book is considered a clas-

sic among fisheries geneticists, but it is too technical for most undergraduates. In the book under review, Hallerman, associate professor in fisheries and wildlife science at Virginia Polytechnic Institute and State University, explains that the text was developed as a teaching resource to facilitate the exposure of more fisheries students to this vitally important topic. I believe that Hallerman and the other authors have been successful in creating a text that is understandable and informative to the undergraduate student who has completed an introductory genetics course.

Hallerman has arranged the text into four sections: a brief refresher in classical and molecular genetics, measurement of genetic variation, population genetic processes, and practical applications of population genetics. The book also contains a useful glossary. The chapters on measurement of genetic variation are well written and comprehensive, and they contain many useful figures and boxes demonstrating a variety of genetic techniques. Unfortunately, the chapter on nuclear DNA focuses on outdated techniques (e.g., RAPD, or random amplification of polymorphic DNA) and provides little coverage of current and emerging techniques in this area (e.g., fluorescent DNA sequencing and fragment analysis, SNP [single nucleotide polymorphism] analysis, and microarrays).

With the exception of the chapter on migration, the section on population genetic processes is generally written at an introductory level and does not have the comprehensive breadth of the other sections. The brevity of this section may be useful for teaching undergraduates the basic principles of population genetics theory without getting lost in the details, but I know from experience that adding problem and answer sets could enhance students' understanding. Unlike the other sections, this one competes with numerous other texts that students can consult for additional details.

The main strength of the book is the excellent section on the practical applications of population genetics. Topics covered in these chapters include genetic stock identification and risk assessment,

genetic guidelines for hatchery supplementation programs, genetic impacts of fish introductions, genetic marking, forensics, and population viability analysis. The chapters contain a number of lucid case studies from the fisheries genetics literature that demonstrate the application of population genetics to fisheries management. Some notable topics are missing, however, including hybridization and introgression, population assignment, and pedigree reconstruction and kinship analysis. I would like to see chapters on these topics in a future edition.

*Population Genetics: Principles and Applications for Fisheries Scientists* achieves Hallerman's goal of placing population genetics into the fisheries curriculum in a form that undergraduate students can relate to and apply throughout their careers. This book will serve as the standard text for introductory fisheries genetics courses. Best of all, it provides a new cohort of fisheries scientists a solid foundation for applying the principles of population genetics to the management and conservation of fish and fisheries throughout the world.

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## NEW TITLES

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**Biotechnology Research in an Age of Terrorism.** Committee on Research Standards and Practices to Prevent the Destructive Application of Biotechnology. National Academies

Press, Washington, DC, 2004. 147 pp. \$35.00 (ISBN 0309089778 paper).

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