Testing Major Evolutionary Hypotheses about Religion with a Random Sample

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Theories of religion that are supported with selected examples can be criticized for selection bias. This paper evaluates major evolutionary hypotheses about religion with a random sample of 35 religions drawn from a 16-volume encyclopedia of world religions. The results are supportive of the group-level adaptation hypothesis developed in *Darwin's Cathedral: Evolution, Religion, and the Nature of Society* (Wilson 2002). Most religions in the sample have what Durkheim called secular utility. Their otherworldly elements can be largely understood as proximate mechanisms that motivate adaptive behaviors. Jainism, the religion in the sample that initially appeared most challenging to the group-level adaptation hypothesis, is highly supportive upon close examination. The results of the survey are preliminary and should be built upon by a multidisciplinary community as part of a field of evolutionary religious studies.

KEY WORDS: Adaptation; Evolution; Evolutionary religious studies; Group Selection; Religion

Evolutionary biologists typically employ a number of major hypotheses for the study of all traits. Perhaps the most important question is whether a given trait has evolved by natural selection and adapts the organism to its environment. If so, then more specific hypotheses are needed to identify the particular selective forces. For example, a social behavior can evolve by either within-group selection (increasing the fitness of the individual relative to others in its same group) or by between-group selection (increasing the fitness of the group relative to other groups in the total population). If the trait is not a product of natural selection, then another set of specific hypotheses is needed to explain its existence. Perhaps it is an ances-

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tral trait that does not vary within the lineage. Perhaps it was adaptive in past environments but failed to keep pace with environmental change. Perhaps it is a costly by-product of another trait that is a product of natural selection, and so on.

These hypotheses are not mutually exclusive. Evolution is a multifactorial process, and traits usually reflect a variety of selection pressures and constraints on natural selection. Nevertheless, the different hypotheses are still needed to determine the combination of factors that operate in any particular case. To pick a paradigmatic example, morphological, behavioral, and life history traits in guppies (*Poecilia reticulata*) are influenced by a variety of selection pressures, notably predation and female mate choice (Endler 1995). Predators are both larger and more numerous in the downstream portions of rivers than the upstream portions, resulting in a corresponding gradient of traits in guppies. Downstream guppies that are transplanted into upstream tributaries that lack predators quickly evolve the suite of traits characteristic of guppies in predator-free environments. One trait that does not change is live birth, which is shared by all members of the family to which guppies belong and does not vary within the lineage. Decades of research guided by evolutionary theory has led to a comprehensive understanding of guppies, even though the story is complex and includes numerous selection pressures and constraints on natural selection.

This way of forming and testing evolutionary hypotheses, which is familiar for the study of nonhuman species such as guppies, is increasingly being used to study the human phenomenon of religion (e.g., Bulbulia 2004; Hinde 1999; Irons 2001; Sosis and Alcorta 2003; Wilson 2002). Not only can it be used to guide current research, but it can also be used to reorganize past research that was conducted without evolutionary theory in mind. Table 1 presents a classification of major hypotheses about religion, past and present, from an evolutionary perspective. It begins with the basic distinction between adaptive and nonadaptive hypotheses, with more specific hypotheses under each heading. Starting with adaptation hypotheses, one possibility is that religions are designed to function for the benefit of the religious group. This hypothesis has a long history in the social sciences, including Durkheim's *Elementary Forms of Religious Life* (originally published in 1912). In modern evolutionary terms, it needs to be understood in terms of genetic and cultural group selection. A second possibility is that religions are designed to function for the benefit of some of its members (presumably the leaders) at the expense of other members (Cronk 1994). For example, the Protestant reformation was in part a reaction to abusive practices within the Catholic Church that were clearly benefiting the elites at the expense of the laity. In modern evolutionary terms, this hypothesis needs to be understood in terms of genetic and cultural within-group selection. A third possibility is that the cultural traits associated with religion can evolve to be like parasites, infecting minds without benefiting either individuals or groups. This is suggested by the modern concept of memes (Aunger 2002; Blackmore 1999; Dawkins 1976) but can also be found in earlier theories of religion that were not explicitly framed in terms of evolution (e.g., Durkheim 1995:49).

Table 1. Major Evolutionary Hypotheses about Religion

Religion as an Adaptation	Religion as Nonadaptive
• Group-level adaptation (benefits groups, compared to other groups)	• Adaptive in small groups of related individuals but not in modern social environments.
• Individual-level adaptation (benefits individuals, compared to other individuals within the same group)	• By-product of traits that are adaptive in nonreligious contexts.
• Cultural parasite (benefits cultural traits without regard to the welfare of human individuals or groups)	

Turning to non-adaptation hypotheses, the traits associated with religion might have been adaptive in past environments, when social groups were small and composed largely of genetic relatives, but not in the large groups of unrelated individuals that characterize modern religious groups (Alexander 1987). Alternatively, the traits associated with religion might be a costly by-product of traits that are beneficial in nonreligious contexts. Two versions of the by-product hypothesis deserve special mention because they are prominent in the current study of religion. Sociologists such as Rodney Stark and William Bainbridge interpret religion as a by-product of economic thought (Stark 1999; Stark and Bainbridge 1985,1987). The basic idea is that people use cost-benefit reasoning to obtain many benefits in nonreligious contexts. Some benefits cannot be obtained, such as rain during a drought or everlasting life, but that does not prevent people from wanting and trying to achieve them, so they invent supernatural agents with whom to bargain for that which they cannot have. Stated in evolutionary terms, religion is a functionless by-product of mental processes that are highly adaptive in nonreligious contexts.

More recently, evolutionary biologists such as Boyer (2001), Atran (2002), Atran and Noyenzayan (2004), and Guthrie (1995) have proposed a by-product theory of religion that differs from Stark and Bainbridge primarily in reliance upon evolutionary psychology rather than economics for the basic conception of the human mind. Instead of being general cost-benefit reasoners, humans are thought to employ numerous cognitive modules that evolved to solve specific adaptive problems in ancestral environments. These modules are adaptations, at least when they were expressed in nonreligious contexts in the past, but their expression in religious contexts, past and present, has no function. This modern evolutionary theory of religion differs from the modern economic theory in the basic conception of the human mind, but they are similar in regarding religion as a functionless by-product of traits that are functional in nonreligious contexts.

Two important insights can be derived from this classification of hypotheses about religion, even before we attempt to test them. First, all of them are plausible and might be true to some degree. Second, they make very different predictions that should be possible to test empirically. A religion designed for the good of the group

must be structured differently than a religion designed as a tool for within-group advantage, which in turn must be structured differently than religion as a cultural parasite good for nothing but itself, which in turn must be structured differently than a religion for which the word "design" is inappropriate, at least within a religious context. These various conceptions of religion are so different that it would be surprising if they could not be empirically discriminated from each other. In short, evolutionary theory can be used to achieve the same comprehensive understanding of religion that we have achieved for guppies (and the rest of life), even though the emerging story will be complex and will include numerous selection pressures and constraints on selection.

Darwin's Cathedral: Evolution, Religion, and the Nature of Society (Wilson 2002) presents my own attempt to explain the subject of religion from an evolutionary perspective. My central thesis is that religions are largely (although by no means entirely) group-level adaptations. In their explicit behavioral prescriptions, theological beliefs, and social practices, most religions are impressively designed to provide a set of instructions for how to behave, to promote cooperation among group members, and to prevent passive freeloading and active exploitation within the group. The features of religion that appear most irrational and which have always made religion such a puzzle to explain from a scientific perspective can be largely understood as part of the "social physiology" (to use a term employed by social insect biologists) that enables the religious group to function adaptively.

Before continuing, it is important to explain why I stress a single hypothesis (group-level adaptation) even though I also appreciate the multifactorial nature of evolution (as also emphasized by Hinde 1999). One reason is historical. Not only was group selection rejected by many evolutionary biologists during the middle of the twentieth century, but the related tradition of functionalism was rejected by many social scientists during the same period. Serious intellectual work is required to return the basic concept of groups as adaptive units to scientific respectability (comprising chapters 1 and 2 of *Darwin's Cathedral*), even before we can apply it to the subject of religion. Another reason is based on the distinction between religion as idealized and as actually practiced. People often behave selfishly in the name of religion, as in the case of the Catholic practices that led to the Protestant reformation. However, these practices are often regarded as a "corruption" of religion rather than part of the "true" religion that is more "purely" associated with the welfare of the group. The meaning of terms such as "ideals," "corruption," "true," and "pure" requires an analysis of cultural evolution from an evolutionary perspective, which provides part of the broad theoretical background for the study of religion along with the basic concept of groups as adaptive units. Ideals are phenomena in their own right that influence actual behavior, even if they are not completely successful. Theoretically, religious ideals could reflect any of the major hypotheses outlined in Table 1. The fact that they reflect the group-level adaptation hypothesis even more than actual behavior is worth noting.

When it comes to testing the major hypotheses outlined above, it is important to

recognize the importance of descriptive in addition to quantitative information. Darwin established his theory of evolution very successfully on the basis of descriptive information about plants and animals gathered by the naturalists of his day, most of whom thought they were studying God's handiwork. Traditional religious scholarship provides a comparable body of information about religious groups in relation to their environments that can be used to test evolutionary hypotheses about religion. Quantitative methods *refine* but do not *define* scientific inquiry. Thus, although I review the modern social scientific literature on religion in *Darwin's Cathedral,* I also draw heavily upon detailed descriptive accounts of particular religious systems in relation to their environments.

These accounts provide compelling evidence for the group-level benefits of religion, but they are also vulnerable to the criticism of selection bias. Couldn't someone else handpick examples that illustrate the nonadaptive nature of religion, such as the celibate Shakers or the suicidal Jonestown cult? Random sampling provides an effective solution to this problem. If the major hypotheses are evaluated for a sample of religions chosen without respect to the hypotheses, then (barring freak sampling accidents) the results for the sample will be representative of the population from which the sample was drawn.

In Chapter 4 of *Darwin's Cathedral* I initiated such a survey by selecting 25 religious systems at random from the 16-volume *Encyclopedia of Religion* (Eliade 1987). In this paper I provide a preliminary analysis of the survey, which has been expanded to include 35 religious systems. It is not the last word but rather the first step of a task that is best continued by a community of religious scholars who are qualified to evaluate in detail the "natural history" of the religions that are comprised in the sample. Even in its preliminary stage, however, it provides important insights about the nature of religion from an evolutionary perspective.

METHODS

The religions to be included in the sample were chosen by writing a computer program that selected volume numbers and page numbers within each volume at random. An entry located by this procedure was then evaluated by criteria listed below to see if it qualified for inclusion in the sample. If not, I paged forward until I encountered the first entry that met the criteria.

An entry qualified if it could be associated with a single religious system, defined as a recognizable group of people with beliefs and practices that can be distinguished from other beliefs and practices. All systems were assumed to be religious because they were included in an encyclopedia of religion. In other words, I based my definition of religion on the inclusion criteria of the encyclopedia rather than imposing my own definition. This is crucial to avoid my own selection bias, although the selection bias of the editors might well deserve scrutiny. A particular entry that met the criteria might be the name of a person who founded a new religious movement (e.g., Eisai, founder of the Rinzai school of Zen Buddhism in

Japan during the twelfth century), a God (e.g., Mithra, an Iranian Deity and God of a Roman mystery religion), or the name of the movement itself (e.g., the Cao Dai cult that originated in Vietnam during the twentieth century). Minor religious movements within a larger religious tradition were included, since the larger traditions themselves started out as minor movements. Entries on general subjects such as "myth" or "polytheism" were excluded because they did not refer to a single religious system. Somewhat arbitrarily, I excluded religions associated with tribal groups that have no known starting date, even though I include them in *Darwin's Cathedral* and regard them as supportive of my main thesis.

This sampling procedure is not completely unbiased. Judgment calls were sometimes required to decide if an entry met the criteria, as described in more detail below. The procedure favors long entries over short entries. The major religious traditions might not be equally represented because some (e.g., Protestant) divide into separate movements more than others (e.g., Catholic). The entire encyclopedia might be biased in its inclusion criteria, contributors, and information available for different religions around the world and throughout history. State-level societies are probably over-represented. Nevertheless, the important point is that the religions were not chosen with the major evolutionary hypotheses in mind. The bias of choosing religions known to support a given favored hypothesis has been successfully avoided.

One potential bias deserves special mention. Religions that succeed in the sense of persisting and becoming large are more likely to be included in the encyclopedia than religions that remain small and quickly fail. This bias, if it exists, would reflect cultural evolution in action. The statement "most religions have secular utility" would not be false because it is based on a biased sample, but true because the encyclopedia reflects the winnowing process of cultural evolution. Correcting the "bias" would provide a more complete cultural "fossil record" that includes the ephemeral "losers" in addition to the persistent "winners," enabling the process of cultural evolution to be studied in even greater detail. As we shall see, the sample does include some religious "losers" in addition to "winners," which are highly instructive.

The encyclopedia was used to select the random sample and provided a small amount of information about each religion, but the main work of the survey involved gathering as much information as possible about each religion and evaluating it with respect to the major evolutionary hypotheses. This was accomplished with the help of 35 undergraduate students who enrolled in a 4-credit class entitled "Evolution and Religion." In addition to reading *Darwin's Cathedral* and discussing the general subject, each student was assigned a single religion to research over the course of the semester (which is why the size of the sample was expanded to 35), culminating in a bibliography and narrative answers to 32 questions addressing key issues (available upon request). A first draft of the answers was read in time to provide feedback for each student to correct shortcomings in the final draft. This

procedure insured that the students addressed the most important evolutionary issues and facilitated comparison among the religions.

This material provided the basis for my own analysis. I did not rely exclusively on the student analyses but rather used them as a guide to my own reading of the primary literature. As I have already stressed, the use of students to gather information and the descriptive nature of my analysis are only the first steps of an enterprise that ultimately should include the scholars who are the real "natural historians" for the religions in the sample.

DESCRIPTIVE ANALYSIS

Table 2 lists the encyclopedia entries that were included in the survey and a brief description of the religions that they represent. The major traditions of Buddhism, Taoism, Judaism, Christianity, and Islam are represented, although not Hinduism or Confucianism. Jainism and Zoroastrianism are among the oldest religions that are still being practiced today, albeit among a small minority of the world's population. Also included are a cult with African roots (M'Bona) a cult based upon an ancestor (Cinggis Khan), and two modern movements that are composites of the major religious traditions and other influences (Cao Dai and the Theosophical Society). The religions span the globe and range in time from the twenty-fifth century BCE to the present.

Most of the entries refer to religious movements, large or small, that clearly meet the inclusion criteria, but a few proved to be somewhat inappropriate in retrospect. The entry "cult of saints" refers to many cults within the Catholic religion rather than to a single cult, which makes it difficult to evaluate. Saint Catherine of Siena played an important conciliatory role in the Catholic Church during the fourteenth century, helping to prevent schism rather than promoting it. Ziya Gokalp was a political rather than a religious leader who was influential in the separation of church and state for the nation of Turkey. Agudat Yisra'el is not a religious movement in its own right but a political arm of a preexisting religious movement (Orthodox Judaism). Even though these entries marginally qualify for inclusion in the survey, they are instructive in ways that will be described in more detail below. It is important to keep in mind that none of the entries could have been included in the sample without first being included in the encyclopedia of religion. Thus, they are relevant to the subject of religion writ large (as defined by the editors of the encyclopedia) even when they don't constitute a specific religious system as defined by the inclusion criteria of the survey.

The religious systems identified by the entries differed greatly in the amount of available information. Even when information was available, authors differed in the degree to which they related theology to social and ecological context. Despite these problems, a number of preliminary conclusions can be drawn that are relevant to the major evolutionary hypotheses.

Table 2. 35 Religions Chosen at Random from the 16-Volume Encyclopedia of Religion (Eliade 1987)

Vol	Page	Entry	Description (dates CE unless specified otherwise)
1	149	Agudat Yisra'el	Orthodox Judaism, twentieth century
1	161	Airyana Vaejah	Zoroastrianism, Persia, tenth century BCE
1	211	Allen, R.	African methodist Episcopal Church, nineteenth century
1	492	Atisa	Tibetan Buddhism, tenth century
3	72	Cao Dai	Composite of traditions, Vietnam, twentieth century
3	120	Catherine of Siena	Catholic church, Italy, fourteenth century
3	230	Chen-Jen	Chinese Taoism, third century
3	328	Chinggis Kahn	Ancestor Cult, Mongolia, thirteenth century
3	333	Chinul	Korean Buddhism, thirteenth century
4	172	Cult of Saints	Catholic Church, general
4	200	Dalai Lama	Tibetan Buddhism, general
4	236	Dan Fodio, Usuman	Nigerian Islamic revivalist movement, eighteenth century
4	326	Dge-Lugs-Pa	Tibetan Buddhism, fifteenth century
5	72	Eisai	Rinzai school of Japanese Zen Buddhism, twelfth century
5	156	Eshmun	Phoenician healer god, fifteenth century BCE
6	66	Gokalp, Z.	Turkish nationalism, twentieth century
7	119	Iman and Islam	Islam, general
7	215	Indus valley religion	Western India, twenty-fifth century BCE
8	104	Jodoshu	Pure land sect of Japanese Buddhism, twelfth century
8	423	Lahori, Muhammad Ali	Lahori branch of the Ahmadiyah movement, Islamic, twentieth century

The Secular Utility of Religions

According to the by-product hypothesis, human psychological and social processes are clearly adaptive in nonreligious contexts but are triggered inappropriately in religious contexts. We pray to God for everlasting life, not to convey us to work in the morning. We see faces in the clouds because our minds are wired for social interactions. Going to work and engaging in social interactions have clear practical benefits, whereas praying for everlasting life and seeing faces in the clouds do not. Regardless of whether this hypothesis is framed in terms of rational choice theory or evolutionary psychology, the expectation is that religions by themselves do not produce practical benefits.

The random sample does not support this expectation, even with the limited information available (see also Reynolds and Tanner 1995). The majority of reli-

Table 2. (*continued*)

Vol	Page	Entry	Description (dates CE unless specified otherwise)
9	128	Mahavira	Jainism (India), sixth century BCE
9	188	Maranke, J.	Apostolic Church of John Maranke (Africa), twentieth century
9	287	Maurice, F. D.	Christian Socialism (England), twentieth century
9	291	Mawdudi, Sayyid Abu Al-a'la	Indian Islamic revivalist movement, twentieth century
9	303	M'Bona	African territorial cult, nineteenth century
9	579	Mithra/Mithraism	Iranian deity and God of Roman mystery religion, ca. fourth century BCE
10	290	Nagarjuna	Indian Buddhism, second century
10	297	Nahman of Bratslav	Bratslav sect of Hasidic Judaism, Ukraine, eighteenth century
10	360	Neo-orthodoxy	Protestant revivalist movement, Europe and America, twentieth century
11	226	Pelagianism	Christian doctrine opposed by Augustine, fourth century
11	324	Pietism	Protestant reformation movement, Europe, seventeenth century
12	335	Rennyo	Pure land true sect of Japanese Buddhism, fifteenth century
14	38	Spurgeon, C. H.	English Baptist Church, nineteenth century
14	464	Theosophical Society	Composite of traditions, America, nineteenth century
15	539	Young, B.	Mormonism, America, nineteenth century

gions in the sample are centered on practical concerns, especially the definition of social groups and the regulation of social interactions within and between groups. The impetus for a new religious movement is usually a situation in which a constituency is not being well served by current social organizations (religious or secular) and is better served in practical terms by the new movement. This dynamic describes the origin of Christianity and Islam and more recent religious movements within all of the major religious traditions, including the following examples from the random sample:

- Within Judaism, Agudat Yisra'el was formed in the early twentieth century to "unite under one organizational roof representatives of Orthodox communities from Germany, from Russia, Poland and Lithuania, and from Hungary" (Eliade 1987:150). Its primary goal was preserve and advance an orthodox form of Judaism, compared to more secularized forms. Agudat Yisra'el is described as the political arm of Orthodox Judaism because so many of its objectives are utilitarian, such as the economic support of distressed communities.

- Within Islam, Sayyid Abu Al-a'la Mawdudi founded an Islamic revivalist movement in the early twentieth century whose purpose was to protect Muslim interests from Hindus, secular nationalism, and Western culture. This movement was explicitly intended to define and promote the survival of a minority group threatened by competing social organizations.
- Within Christianity, Mormonism arose as one of many new movements in America during the early nineteenth century but was special in its ability to create encapsulated cooperative groups, which were persecuted for their success before undertaking their spectacularly coordinated westward migration. Mormonism continues to grow at a rate that rivals early Christianity and Islam.
- Among Eastern religions, Jainism constitutes a small fraction of the Indian population but one that has persisted for several thousand years. This impressive longevity is based on practical benefits, not some mysterious connection to traits that have functioned in a nonreligious context for such a long period, as I will describe in more detail below.

Clearly, these religious systems are about more than seeing faces in clouds and praying for unattainable goals, such as everlasting life. They are about goals that can be achieved but only through the coordinated action of groups. The practical benefits of religion might seem so obvious that they don't need to be pointed out, but then why have so many by-product theories of religion been proposed over the decades, from "animism" and "naturism" in the nineteenth century to the economic and evolutionary by-product theories of today? Somehow these theorists have managed to interpret the practical benefits of religion as "incidental," in contrast to something more "fundamental" about religion that cannot be explained functionally. This rendering can accommodate occasional practical benefits associated with religion, but not the results of this survey based on a random sample. According to my assessment, *most* of the religions in the sample are thoroughly rooted in the practical welfare of groups. In addition, the beauty of random sampling is that results for the sample apply to the entire encyclopedia from which the sample was drawn. If my assessment is correct, then the nature of religion cannot be understood without acknowledging its "secular utility," as Durkheim put it.

The practical purpose of most religious groups explains why Ziya Gokalp, a political leader who helped to separate church and state for the nation of Turkey, was included in an encyclopedia of religion. According to Heyd (1950:56):

> To Gokalp, Allah (Islamic God) was no longer the personal God. Instead to him "God was society." The sanctity of human personality is explained by its being the bearer of the "collective consciousness," the soul of society taking the place of the religious conception of the divine spirit.

Despite the use of nationalistic rather than religious imagery, it is obvious that church and state were *in the same business* of organizing the lives of a group of people. A similar process took place for the separation of church and state in American history (Cousins 1958). Framers of the constitution such as Benjamin Franklin

and Thomas Jefferson realized that religions are good at organizing social life among their own members but became part of the problem with respect to the larger scale of social organization that they were trying to achieve. The separation of church and state was a remarkable piece of social engineering and the imagery of God was freely combined with the imagery of nationalism to bless the new enterprise. To summarize, religion is intimately involved with the practical commerce of life, which requires an adaptationist explanation.

The Proximate/Ultimate Distinction and the Otherworldly Aspects of Religion

If religions are so practical, then why are they also so otherworldly? Why do they flaunt the kind of practical reasoning associated with science and rational thought? Why the belief in Gods that cannot be empirically verified, costly and time-consuming rituals, and the rest? These are the elements of religion that drive theorists toward nonfunctional explanations (the right side of Table 1). However, evolutionary theory offers a robust alternative in the distinction between ultimate and proximate causation.

All adaptive traits require two complementary explanations: the environmental forces that favor the trait in terms of survival and reproduction (ultimate causation) and the mechanisms that cause the trait to exist in actual organisms (proximate causation). Most flowers bloom in spring because those that bloomed earlier were nipped by frost and those that bloomed later had insufficient time to grow their fruits (ultimate causation). The same flowers bloom in spring because they possess physiological mechanisms that are sensitive to day length (proximate causation). Both explanations are required to explain an adaptive trait fully, and one explanation can never substitute for the other.

Continuing this example, notice that day length by itself has no effect on survival and reproduction. It is merely a signal that reliably causes the flower to bloom at the best time with respect to other environmental forces. In general, a proximate explanation need bear no relationship whatsoever to the corresponding ultimate explanation, other than to reliably produce the trait that survives and reproduces better than other traits.

Returning to religion, a given belief or practice might exist because it enhances survival and reproduction—for example, by causing the group to function well relative to other groups—but this is only the ultimate explanation. A complementary proximate explanation is needed that need bear no relationship to the ultimate explanation, other than to reliably cause the trait to occur. Perhaps a religious believer helps others because she wants to help others, or perhaps because she wants to serve a perfect God who commands her to help others. As far as proximate causation is concerned, the particular psychological motivation makes no difference as long as the helping behavior is reliably produced.

The proximate/ultimate distinction has profound implications for the study of religions by providing a way to reconcile their functional and otherworldly aspects.

When trying to explain a given feature of a religion, the primary question is not "Is it rational?" or "Can it be empirically verified?" but "What does it cause people to do?" This is the *only* relevant gold standard as far as proximate mechanisms are concerned. If the feature motivates adaptive behaviors, then it is fully consistent with a functional explanation (the left side of Table 1) no matter how bizarre (to nonbelievers) in other respects. If it fails to motivate adaptive behaviors, then a nonfunctional explanation (the right side of Table 1) is warranted.

In *Darwin's Cathedral,* I attempt this kind of analysis for a few selected religions, especially Calvinism as it originated in the City of Geneva in the sixteenth century. I show that theological beliefs (such as original sin, predestination, and the nature of faith and forgiveness) and social practices (such as rules governing decision making, discipline, and excommunication) combine with explicit behavioral prescriptions to form an impressive self-reinforcing system for organizing collective behavior. The system is necessarily complex because adaptive behavior is necessarily context-sensitive. For example, adaptive forgiveness behavior cannot possibly be embodied in a rule as simple as "Turn the other cheek." Different rules of forgiveness are required for different situations and categories of people, which must somehow be specified by the religious system. These rules can appear contradictory and hypocritical (e.g., How can Christians be intolerant of various behaviors while preaching "Turn the other cheek"?) until their context-specificity is appreciated. Comparative and longitudinal studies of religion are especially helpful for revealing the adaptive nature of these proximate mechanisms. For example, early Christian communities appear to have altered their sacred stories in response to the demands of their particular social environments (Pagels 1995, 2003). In this fashion, the otherworldly side of religion can be largely explained in terms of proximate causation, rather than as forms of maladaptive behavior. I include the word "largely" because I do not claim that each and every nuance of religion is adaptive. Evolution is a messy and multifactorial process for religion in addition to the rest of life. My point is that the otherworldly side of religion does not by itself necessitate a rush to nonfunctional explanations (the right side of Table 1). The proximate/ultimate distinction provides a very robust alternative explanation, and empirical research is required to settle the issue for any particular feature of particular religions.

Readers can judge for themselves how well I have succeeded for my selected examples in *Darwin's Cathedral,* but in any case they are vulnerable to the criticism of selection bias. The random sample avoids selection bias but has other limitations, such as limited information for some of the religions and my own limited ability to evaluate the enormous amount of information for all 35 religions. Nevertheless, some preliminary observations will help set the stage for more detailed future analysis by others in addition to myself.

The otherworldly side of religion is richly represented in the random sample. Joseph Smith's encounter with heavenly messengers that marked the beginning of Mormonism is well known. Comparable examples include an encounter with the Supreme Being through a Ouidja board for the Cao Dai religion in Vietnam and an

ancient secret brotherhood of adepts for the Theosophical Society. Numerous religious leaders in the sample attracted a following by their exceptional piety and indifference to worldly values. St. Catherine of Sienna had a vision of Christ at age six and took a vow of virginity against her family's wishes. Nahman of Bratslav locked himself in his parent's attic for long periods of time in an attempt to gain nearness to God. His disapproval of secular desires went so far that he didn't even want a following, which only enhanced his reputation as an enlightened spiritual leader. The ascetics of Eastern religions give up all worldly belongings and at times even fast themselves to death. At a less extreme level, numerous religious movements in the sample were envisioned as a move away from worldly secular values to more pure religious values based upon God and his commandments or the achievement of enlightenment. Finally, numerous religious movements attracted followers on the basis of miraculous claims such as bringing rain and faith healing that (based on current scientific knowledge) have no basis in fact. In short, the random sample amply confirms that religious belief includes but also goes far beyond a direct motivation to help others. The question is, do these seemingly nonutilitarian beliefs reliably cause the members of religious groups to help each other and otherwise function as adaptive units?

By my assessment, the answer to this question is primarily "yes" for the religions included in the random sample and therefore the entire encyclopedia. Saint Catherine treated love of God and love of neighbor as "inseparable commandments" (Hilkert 2001). Similarly, the encyclopedia defines the word Islam as follows:

> A noun derived from the verb aslama ("to submit or surrender [to God]"), designates the act by which an individual recognizes his or her relationship to the divine and, at the same time, the community of all of those who respond in submission. It describes, therefore, both the singular vertical relationship between the human being and God and the collective, horizontal relationship of all who join together in common faith and practice (Eliade 1987 [vol. 7]:119).

The success of Mormonism in secular terms is as famous as its otherworldly beliefs. The Caodai religion similarly functions as an organizer of secular life for its believers. The spread of relics associated with Saints evidently played a major role in the Christianization of the West (Eliade 1987 [vol. 4]:172). Wills (2001) provides a detailed account of how the City of Venice had it own religion based upon Saint Mark that very successfully organized secular life, frequently in opposition to the Catholic Church in Rome. Although Buddhism is often portrayed as an individualistic quest for enlightenment, most versions of Buddhism in the sample were closely involved with the organization of society through the patronage of kings and other secular rulers. In the African M'Bona Cult, a shrine is constructed in a way that it deteriorates over time. Members of the cult must periodically rebuild the shrine, but only after resolving their secular disputes. When offered the opportunity to build the shrine out of more durable materials, they refused (Schoffeleers 1992:75).

Pelagianism provides an excellent example of competition among alternative religious belief systems. Pelagius was a Christian monk who disagreed with St. Augustine on fundamental religious doctrines. Whereas Augustine believed that humanity was sinful by nature and must rely on God's grace for salvation by converting to Christianity, Pelagius believed that the souls of all men were created by God and that even pagans could enter heaven by their moral actions. Both doctrines motivated other-oriented behaviors, but they were not compatible with each other and Pelagianism was condemned in 431 by the Council of Ephesus.

In a contest such as this, one contender is going to win even if they are evenly matched. Alternatively, they can coexist by fissioning into separate religions that fill different socioecological "niches." Although Pelagianism ceased to exist in its original form, its elements have resurfaced throughout Christian history, for example in the Quaker doctrine of an inner light that stands in contrast to the doctrine of original sin (Ingle 1994). Religious scholar Elaine Pagels (1995, 2003) has written extensively on competition among alternative versions of Christianity, leading to the accumulation of forms that are exceptionally good at creating and maintaining strong communities. She does not frame her argument in terms of evolution, but it strongly supports the proximate/ultimate distinction as a way to reconcile the otherworldly and practical dimensions of religion.

In this section I have tried to establish two major points. First, the proximate/ultimate distinction theoretically enables the otherworldly and practical dimensions of religion to be reconciled with each other. The key question is: *What do the otherworldly elements of religion cause people to do?* Second, I have made an empirical claim based on the survey that the otherworldly and practical dimensions of religion are indeed tightly yoked to each other. If I am correct, then the major hypotheses on the right side of Table 1 are not required to explain the otherworldly side of religion. However, there is a third major point that I have not addressed: Why can't the proximate mechanisms be more straightforward? Why don't we just help our neighbor rather than believing in a perfect God who commands us to help our neighbor? This is a fundamental question but it requires a comparison of religious systems vs. nonreligious systems, where the proximate mechanisms *are* more straightforward. It is therefore beyond the scope of this survey but has been discussed by myself and others elsewhere (e.g., Wilson 2002: chap. 7; Alcorta and Sosis 2005 [this issue]).

Group-level Benefits, Individual Benefits, or Cultural Parasites?

So far I have tried to establish that most religions in the random sample are rooted in practical concerns (the left side of Table 1) and that their otherworldly aspects can be understood largely in terms of the proximate/ultimate distinction. Now it is time to discuss the three adaptationist hypotheses in more detail.

As I have already stressed, religion is inherently group- and other-oriented, as practiced and especially as idealized. The benefits produced by religion are obvi-

ously enjoyed by members of the group, and are "selfish" in that sense, but they are usually not selfish in the sense of causing some members to profit at the expense of other members of the same group. Instead, the benefits of religion tend to be public goods whose production requires time, energy, and risk on the part of individuals. When we focus on the fitness *differences* required for natural selection to act, we find the same problem for religion as for public goods in general. Producing them decreases fitness relative to those within the same group who enjoy the benefits without the costs, a negative fitness difference. The positive fitness differences that favor public good production are primarily between groups. Very simply, groups that "get their act together" outperform other groups, and this advantage outweighs the disadvantages of being a public good provider within groups. Most elements of religion are designed to favor the production of public goods and to limit the disadvantages of public good production within groups. When they fail, the self-serving behaviors performed by religious believers tend to be regarded as a corruption of religion rather than an aspect of the "true" religion. That is why between-group selection needs to occupy a central role in the study of religion, as I argue in *Darwin's Cathedral.*

This argument is strongly supported by the random sample. Most religions in the sample are as dedicated to the production of public goods as the selected examples in *Darwin's Cathedral.* In addition to those that have already been cited, Richard Allen founded the African Methodist Episcopal Church to address the needs of African Americans that were not being met by white-dominated churches. John Maranke founded the Christian Apostolic Church in Africa for the same reason. Frederick Maurice helped to establish Christian socialism as a religious version of the socialist movement in England. These examples might seem mundane when considered individually, but they gain significance as part of a random sample by establishing the group- and other-oriented nature of religious systems in general.

No social system, religious or secular, completely solves the problems of passive freeloading and active exploitation within groups, especially by the leaders. In *Darwin's Cathedral* I discuss two major ways that religions fall apart. The first is by becoming victims of their own success. Once a religion generates wealth by collective action, its members no longer need each other and leave or try to weaken the constraints on their behavior. John Wesley, the founder of the Methodist Church, was perfectly aware of this problem when he stated, "I do not see how it is possible, in the nature of things, for any revival of religion to continue for long. For religion must necessarily produce both industry and frugality. And these cannot but produce riches. But as riches increase, so will pride, anger, and love of the world in all its branches" (1976 [vol. 9]:529).

A second way that religions fall apart is by becoming exploitative, such that some members benefit more than others. When this happens, three outcomes are possible: The exploited members can work for reform, they can be forced or deceived to remain exploited, or they can branch off to form their own church. These possibilities illustrate that religions are *not* pure products of between-group selec-

tion. They always reflect a balance between levels of selection in which the disruptive effects of within-group advantage are present and in danger of escaping social control. The religious obsession with "sinfulness," "worldliness," "attachment," and "self-will" reflects this ever-present danger.

These conflicts are amply represented in the random sample. A substantial proportion of religions in the sample are based not on a new constituency (as for the African and African-American churches) or a new social need (such as Christian Socialism) but on the need to "purify" an existing church that has become "corrupted" by worldly values. For example, Usuman Dan Fodio founded an Islamic movement in Nigeria that, according to the student reviewing the material, was "distinguished by their refutation of those who had knowledge but failed to put it into practice; those who presented an appearance of compliance with the outward religious duties, but had not eliminated such characteristics as vanity, hypocrisy, ambition, desire for political office and high rank; those who presumed that they had the exclusive right to guide the common people and yet entered into unholy alliance with the sultans, thus encouraging the sultan's oppression of the people; those who engaged in jihad but only to obtain fame and wealth; and those scholars who used false methods, such as music, to lure people into spiritual practice." With the exception of music, this list clearly focuses on behaviors that are self-serving without contributing to the welfare of the group. The new, "purified" religion was rigidly structured to avoid these problems and to turn the community of believers into an encapsulated group. Great attention was paid to matters of dress, prayer, and ritual which appear to have no functional basis when taken out of context, but which make sense in terms of the proximate/ultimate distinction discussed in the previous section.

Even the famous Taoist indifference to worldly affairs makes sense as a way to prevent political corruption. Chen-Jen is a term used in the Chuang-tzu for a person who "does not refuse all contact with human society and politics, but if he should happen to 'get involved' he will not allow himself to 'feel involved'." During this period of Chinese history, "the feudal system of the Chou dynasty was in its final agony, and interstate relationships were characterized by ruse and violence." According to chapter 21 of the Chuang-tzu, Sun Shu-ao, an exemplar of Chen-Jen, had "thrice been named prime minister without considering it glorious and thrice been dismissed without looking distressed. 'Why should I be better than anyone else? When [the nomination] came, I could not refuse it; when it left, I could not keep it. Neither getting it or losing it had anything to do with me'" (all quotes from Eliade 1987 [vol. 3]:230–231). In a world full of vested interests, who better to choose for a leader than someone who has demonstrated a lack of vested interests (Irons 2001; Sosis 2004)?

In *Darwin's Cathedral* I stress that the *product* of natural selection is adaptation but the *process* of natural selection includes many failures for each success. Religious systems reflect a degree of intentional thought but in many respects they are unplanned social experiments, only a few of which succeed. A good cultural fossil

record of religions should include the failures in addition to the successes. Several religions in the random sample can be regarded as failures in the sense that they did not achieve a large following or succeed at their stated goal, such as the example of Pelagianism that I have already described. Frederick Maurice's effort to establish a form of Christian Socialism was well-meaning—no one could doubt its communitarian purpose—but never amounted to much and became a footnote to religious history. The Theosophical Society was based on a blend of science and occultism that made sense in the nineteenth century but attracts only a tiny number of followers today. Nevertheless, in its own way it provided "a new sense of purpose, mission, and service to others" (Campbell 1993:8). Thus, even the failures illustrate the fundamentally other- and group-oriented nature of religion.

Since natural selection is always based on fitness differences, group-level adaptations can evolve only by some groups contributing more to the gene-pool or culture-pool than other groups. Between-group competition can take the form of direct conflict but it can also take more benign forms, such as differences in economic efficiency. Darwin was careful to point out that natural selection at the individual level does not always take the form of nature red in tooth and claw. A drought-tolerant plant out-competes a drought-susceptible plant in the desert, even though they do not directly interact with each other. The same point needs to be made for natural selection at the group level. It is encouraging that *most* of the religions in the random sample and therefore the encyclopedia did *not* spread by violent intergroup conflict. Instead, competition among groups took place primarily through differences in recruitment, retention, and birth and death processes based on the ability of the group to function as an adaptive unit. It is undeniable that group selection sometimes takes the form of violent conflict, but the relatively small number of cases in the random sample adds a new perspective and makes it an open question whether religion per se increases or decreases the potential for violent conflict, compared with nonreligious human social organizations.

Our species is unique in its reliance on cumulative, socially transmitted information. The psychological and cultural processes responsible for the origin and spread of new traits are evolutionary in a broad sense but they differ from genetic evolution in many of their details. Even for purely genetic evolution, different traits are favored when the genes are autosomal (inherited through both parents), cytoplasmic (inherited only through the mother), or on the y-chromosome (inherited only through the father). Cultural evolution includes an even broader range of possibilities, in which a given trait can be transmitted via both parents, one parent, nonparent adults (teachers), peers, and so on. Each transmission mode is expected to favor a different set of traits, just as for purely genetic transmission modes. For these and other reasons, cultural evolution is not expected to produce exactly the same outcome as genetic evolution (Richerson and Boyd 2004).

Dawkins (1976) coined the term "meme" as a cultural analog of "gene." As he and others have developed the concept, memes can be regarded as autonomous life forms that have evolved exclusively to perpetuate themselves with no more interest

in the benefit of their human hosts than a tapeworm or the AIDS virus has. Religion is sometimes cited in support of this conception (e.g., Blackmore 1999), usually with the assumption that religion is so mystifying that it cannot be explained from any other perspective and that people would be better off without it, just as if we could eradicate the common cold.

The random sample provides virtually no support for the cultural parasite hypothesis. As I have already described, most of the religions in the sample are designed to promote the welfare of their members, and their otherworldly nature can be straightforwardly explained with the proximate/ultimate distinction. In addition, the basic concept of memes as independent agents can be faulted on theoretical grounds (Richerson and Boyd 2004).

A more sensible conception of cultural evolution is provided by Richerson and Boyd (2004). Not only have the parameters of cultural evolution evolved by genetic evolution to promote biological fitness on balance, but they have evolved to increase the efficacy of between-group selection relative compared to within-group selection. It is thanks to cultural processes that human groups are able to function as well as they do. Potential examples discussed in the theoretical literature include social transmission rules that increase variation among groups, low-cost mechanisms for detecting and punishing norm violations (such as gossip), and so on.

This conception of cultural evolution is far more theoretically plausible and consistent with the random sample than the parasitic concept. A good religion is awesome in the degree to which it organizes behavior and replicates itself through time. The mechanisms that enable all of this nongenetic information to be encoded, expressed under the right conditions, and faithfully transmitted must be very sophisticated indeed. Theoretical models of cultural evolution have not yet grasped this degree of sophistication and can benefit as much from the study of religion as the study of religion can benefit from the theoretical models.

Jainism: A Challenge and Its Resolution

Of all the religions in the random sample, the one that initially posed the greatest challenge to the group-level adaptation hypothesis was Jainism. As old as Buddhism, Jainism is famous for its ascetic values. Jain renouncers wear masks to filter the air that they breath, carry a broom to sweep the path in front of them, and have dozens of food restrictions to avoid killing any tiny creature. They are homeless and in some sects travel completely naked. Some even accomplish the ultimate ascetic act of fasting themselves to death. How can such beliefs and practices possibly contribute to the secular utility of either individuals or groups? Remarkably, they do. The following account is based on a detailed ethnography of a modern Jain community whose title says it all: *Riches and Renunciation: Religion, Economy and Society among the Jains* (Laidlaw 1995).

The ascetic renouncers constitute a tiny fraction of the Jain religion, whose lay members include some of the wealthiest merchants of India.

> As is generally the case among the Jains, these families are on the whole active and dedicated followers of the religion. This is especially so during periods when there are renouncers living among them, but even at other times the social mores of the community and the everyday lives of its members are shaped in profound ways by Jain religious values. The daily rites in local temples are well attended and local public events are almost all religious. Like the renouncers, members of Jain families engage in ascetic exercises and in periodic fasting.
>
> But this does not mean that lay Jain communities come to resemble renouncer orders. Nothing in the latter's strict regime would prepare one for the celebration and enthusiasm which attend Jain religious ceremonies, for the colour and opulence of their collective life, for their wealth, for their frank and cheerful pride in that wealth, or for the manifold ways it is linked with asceticism. Like most Jain communities, the Khartar Gacch and Tapa Gacch Jains of Jaipur are generally affluent, and their collective religious life is presided over by members of the most successful business families—in this case, for the most part, wealthy merchants who dominate the city's emerald-trading market, which is one of the largest in the world. It would be going too far to say that it is always the richest lay Jains who have the reputation for being the most religious; but it would only be going too far. In any case it is clear that the Jain religion provides for these families a medium in which to celebrate their worldly success, and to express and affirm the continuity of both family and local community. Yet the doctrine of the religion, as expressed by local teachers and by Jain renouncers themselves, is a soteriology—a project and a set of prescriptions for how to bring one's life to an end (1995:4).

Jainism has been religion of merchants throughout its history. The parallels with Judaism, another merchant religion, are remarkable. Jains lived in diaspora communities thoughout India and surrounding regions to organize trade, developed a sophisticated system of banking and merchant capitalism, formed alliances with nobility, engaged in debt-farming, and were persecuted by resentful lower classes. This economic niche requires a large degree of cooperation and is correspondingly vulnerable to exploitation. Laidlaw describes the modern Jaipur gem trade this way:

> The Jaipur emerald market is firmly oriented to international trade and connected, partly through diaspora Jain communities abroad, to markets overseas. . . . Speculative trading of stones within the market is very extensive, and there is an elaborate and active brokerage system. Emeralds are traded not only so that exporters can meet deadlines for large consignments of cut stones, but also in anticipation of the price fluctuations within the market which result from such highly time-dependent demands. The liquidity of the market depends on a system of informal banking, in which all the major gem firms participate, and which uses a version of the *hundi,* a type of promissory note used in India at least since Mughal times. Unsecured cash advances, which might have to be arranged at very short notice, are to be repaid after a fixed period of time, and this might in some cases be a matter of hours. The price at which a business can obtain money depends directly on its reputation for wealth, honesty, and prudent business practice and it depends beyond that on the public perception of its creditworthiness . . . (1995:353–354).

This reputation is based in part on status within the Jain religious community. The same beliefs that prescribe one code of conduct for the renouncers prescribes

another code for the lay members that is ascetic in its own way but fully consistent with secular values. Fasting in young women demonstrates mastery over their appetites and increases their marriage prospects. Men compete for the privilege of supporting community activities. The more extreme these demonstrations of religious devotion, the more they are publicized and raise the status of the family. The connection between religion and business is so close that family shrines include account books and tools of the gem trade along with religious artifacts.

The renouncers not only set a personal example and provide guidance through sermons, but they actually enforce religious observance through their food-gathering activities. The principle of nonaction dictates that the renouncers cannot prepare their own food or cause anyone else to prepare it for them. They must drop unexpectedly into many households and take only small amounts of food that will not be missed. In addition, they must be certain that the food is sufficiently pure, which goes beyond the details of preparation to the purity of the preparer.

> The purity of food depends perhaps most of all on that of the person who cooks it. . . . A loose or impious woman puts her family in moral peril, in part through the food she feeds them. Therefore it is particularly to the moral and religious standards of the women in the household that the renouncers look. Do they fast on the auspicious days of each month? Do they attend sermons? Does the household in general, and the women in particular, follow restrictions on what they will eat, and when, that at least come close to those they follow themselves? (Laidlaw 1995:304)

These matters are so important that the renouncers must inspect the entire household before they can accept a tiny amount of the food that the family has prepared for itself. Laidlaw describes a typical visit, which demonstrates the respect and even fear commanded by the renouncers.

> If renouncers are spotted approaching the house, a family will launch into a flurry of preparation, but their manner becomes instantly formal and elaborately graceful as soon as the renouncers actually appear. They perform *vandan,* and then invite them in as they would any honoured guests, "Come Maharaj Sahab, Come." And the renouncers are as curt and perfunctory as their hosts are ingratiating. Typically, they march straight through to the kitchen without acknowledging the family's bows and greetings. . . . The women answer renouncers' sometimes sharp and repeated questions about whether a dish is acceptable for them. . . . During the whole proceedings, the renouncers keep up a constant refrain, "Enough! Finish! No, we won't take that! No more of that! Enough!" The householders counter with assurances of the purity and quality of the food. . . . On leaving the house, renouncers say the words *dharma labh* as a blessing; but on most occasions when I have been present they had already turned away from their hosts and were on their way into the street by the time they called this out behind them (1995:309–313).

It is a mark of honor for a household to be included in the daily rounds of the renouncers and a mark of shame to be avoided. Men are expected to be more lax than women in their observance of these rules, in part because of the demands of

their businesses, but they have their own field of competition in the many opportunities that are provided to become financial patrons, including initiation ceremonies for new renouncers, which resemble lavish weddings. These events are so public that it would be impossible for a wealthy member of the Jain community to maintain his reputation without sharing his wealth with the community.

The high moral standards demanded for conduct within the Jain community are not always extended toward outsiders. Debt-farming "hovers between paternalism and naked exploitation" (1995:106). Questionable business practices outside the Jain community are tolerated (1995:342). Despite their obsessive efforts to avoid killing even tiny unseen creatures, Jains do not fit the Western conception of pacifists. Jain mythology includes a renouncer who converts a king to Jainism and persuades him to disinfect the arrows of his army to avoid killing invisible air-beings. No mention is made of using the arrows to kill people (1995:155). When Laidlaw asked a lay Jain about war, he received the following answer:

> No, Jain religion does not say that you should be a coward. Jains are heroes. Religion first teaches you about duty. So if it is part of your duty to go to the front in war, you should do that. It is different for renouncers, but laymen should do that duty (1995:155).

Any adaptive religion must be sufficiently flexible to prescribe different behaviors for different contexts. Jainism possesses this flexibility as well as the religions discussed in *Darwin's Cathedral.*

Even if Jainism is adaptive for the laity, isn't it clearly maladaptive for the renouncers in biological terms? It is important to think holistically when answering this question. All cultures include a fraction of individuals who do not reproduce, sometimes by choice but especially by virtue of circumstances. This is the raw material that cultural evolution has to work with for religions that include a nonreproductive caste. We can predict that the decision to become a renouncer (which is a lifelong commitment) is made primarily by people who do not have other attractive options, and that is exactly what we find. According to Laidlaw, "while non-Jain recruits are welcome as renouncers . . . access to the property, power, and prestige of lay Jain communities is not so readily extended" (1995:115). One Jain woman "was actively encouraged to seek initiation, so that her husband, as a 'widower' would be free to remarry; and the woman was happy to express her flight from 'this world of suffering' as a triumphant escape from an unhappy marriage" (1995:241). More generally,

> [In] Jainism men are much more heavily discouraged than women from entering an order. Dowry among Jains is high, and subject to a constant inflationary pull from richer sections of the community. I know of cases where young women from impoverished Jain families chose renunciation in a situation in which finding a respectable husband was proving very difficult. By contrast, the loss of a son is a financial, organizational, and emotional calamity for the typical Jain family (1995:241).

Another circumstance is age. Older men and women alike often devote more time to their religion when they can relinquish the duties of job and family to their grown children. Their commitment can rival that of the renouncers, but rather than becoming renouncers themselves they tend to adopt leadership roles in the lay religious community. To summarize, reproductive division of labor is not difficult to explain from an evolutionary perspective. It has evolved numerous times in the biological world, and cultures provide plenty of scope for individuals to contribute to the welfare of their society without themselves reproducing.

I have described Jainism in detail for a number of reasons. First, it perfectly illustrates the secular utility of religion that I have also stressed for the random sample as a whole. Second, it shows how the proximate/ultimate distinction can reconcile even the strangest religious beliefs and practices (to outsiders) with the functional side of religion. I cannot improve on Laidlaw's own wording:

> How then, is it possible to live by impossible ideals? The advantage for addressing this question to Jainism is that the problem is so very graphic there. The demands of Jain asceticism have a pretty good claim to be the most uncompromising of any enduring historical tradition: the most aggressively impractical set of injunctions which any large number of diverse families and communities has ever tried to live by. They have done so, albeit in a turbulent history of change, schism, and occasionally recriminatory "reform," for well over two millennia. This directs our attention to the fact that yawning gaps between hope and reality are not necessarily dysfunctions of social organization, or deviations from religious systems. The fact that lay Jains make up what is—in thoroughly worldly material terms—one of the most conspicuously successful communities in India, only makes more striking and visible a question which must also arise in the case of renouncers themselves (1995:7).

Third, this example shows how much progress can be made on the basis of careful descriptive studies of religious systems in relation to their environments. Jainism appears obviously dysfunctional based on a little information but becomes obviously functional based on more information. What exactly accomplished this transformation of the obvious? The most relevant facts are that the renouncers constitute a tiny fraction of the Jain religion, that lay Jains are impressively wealthy, that they occupy a particular economic niche, that the religion prescribes different (and more functional) behaviors for the laity than for the renouncers, that mechanisms of enforcement exist, and so on. Most of these facts are so basic that they are beyond dispute, once they are uncovered and put together, even if there is plenty of room for disagreement at a finer scale of analysis. This is the kind of "natural history" information that enabled Darwin to build such a strong case for his theory of evolution, and it can be used to build an equally strong case for an evolutionary theory of religion. Thanks to Laidlaw's detailed analysis of Jainism, the religion in the random sample that seemed to pose the greatest challenge to the group-level adaptation hypothesis now provides solid support.

The analogy between current religious scholarship and natural history informa-

tion during Darwin's time can be taken a step further. In both cases, the information was gathered by individuals who did not have evolution in mind. Laidlaw is a cultural anthropologist who describes his own perspective this way:

> This book begins from the observation that people may hold values which are in irreducible conflict, and that logical consistency in what we casually identify as a culture, is not something which is necessarily there to be found. It takes work to create, reproduce, and maintain it, and it is always partial. In so far as people manage, in particular cultural traditions and particular local communities, to create lives which are ethically and intellectually coherent, they are not just inheriting a ready-made, complete and integrated package, but sustaining and reproducing the achievement of culture. Jainism can be made to look like the ordered execution of a single doctrinal program, and as is the case perhaps in all cultural traditions, some of its greatest minds have always wished to make it so; but looking at Jainism as an enduring form of life, one is struck by a different achievement. It seems to provide its followers with ideas, institutions, relationships, and practices—a set of ways of going on—which together make conflicting values compossible, and impossible ideals compelling. This is a considerable achievement, and one that calls for elucidation (1995:21).

Laidlaw never uses the e-word, but his metaphorical use of phrases such as "enduring life form" and his practical focus on "a set of ways of going on" converges upon the evolutionary perspective. There is every reason to use the formal theoretical and empirical tools of evolutionary biology to guide future research on religion.

Summary of the Preliminary Analysis

The initial incentive for this survey was to address the problem of selection bias in *Darwin's Cathedral.* Is the *average* religion as adaptive at the group level as the ones that I chose for detailed analysis? Random sampling potentially provides a definitive answer to this question. It might sound naïve to talk about averages for a subject like religion. Aren't they too diverse for such a simple categorization? Religions are indeed diverse, in the same sense that organisms are diverse, but both can still be evaluated in terms of the major hypotheses listed in Table 1. Despite the preliminary stage of analysis, a number of conclusions can be drawn:

- Most religions in the sample have what Durkheim called secular utility.
- The practical benefits are inherently group- and other-oriented.
- In some cases the practical side of religion is so overt that it becomes indistinguishable from politics.
- In other cases the practical side is obscured by the otherworldly side of religion, but these can be largely reconciled through the proximate/ultimate distinction.
- Evolution is a multifactorial process with many constraints on natural selection, so all of the major hypotheses have some degree of validity. However, portrayals of religion as primarily nonfunctional or individually selfish (in the sense of benefiting some members relative to others within the same group) can be rejected on the basis of the survey.

- Religions are not autonomous cultural life forms that parasitize human individuals and groups, often to their detriment.
- Instead, religions demonstrate that the parameters of cultural evolution have themselves evolved to enhance between-group selection and restrict within-group selection.
- Between-group selection can take the form of direct conflict, but it usually takes other forms.

These conclusions are tentative, based on limited information and my own limited ability to evaluate the information. Ideally, every religion in the sample would be analyzed in relation to its environment with the same thoroughness as Laidlaw's analysis of Jainism. I invite others to join this effort. A thoroughly analyzed random sample can provide a reality check for all theories of religion from any theoretical perspective in addition to my own analysis from an evolutionary perspective.

In addition to a survey based on a random sample to guard against selection bias, other surveys are needed to ask more focused questions from an evolutionary perspective. For example, it would be fascinating to compare the religions of cultures that occupy the same economic niche, such as the merchant cultures of Jains in India and Jews in Europe. Numerous merchant cultures have existed around the world and throughout history, providing the basis for a study of convergent cultural evolution (Landa 1999; Wilson 2001). As another example, people from Christian cultures often assume that belief in a glorious afterlife is a feature of all religions and even one of its main functions—to allay the fear of death. Not only is a glorious afterlife absent from many non-Christian religions, but it is even muted in Judaism, the religious tradition from which Christianity was derived. One implication of the proximate/ultimate distinction is that *any* set of beliefs and practices that motivate adaptive behavior can serve as the proximate mechanism for a human social organization. A comparative study is needed to determine why belief in a glorious afterlife is featured in some religions more than others, and why it became more prominent in Christianity than in Judaism. At a finer grain of analysis, different branches of Christianity and Judaism almost certainly vary in their reliance upon belief in a glorious afterlife, which can be measured and related to historical, social, and environmental factors.

TOWARD A FIELD OF EVOLUTIONARY RELIGIOUS STUDIES

One theme of *Darwin's Cathedral* and this article is that religions and other human social organizations can be studied with the same theoretical and empirical tools that evolutionary biologists use to study the rest of life. As I mentioned earlier for the paradigmatic case of guppies, this enterprise is complicated but manageable. It is complicated because evolution is inherently a complicated process with multiple selection pressures and constraints on selection that vary from species to species, trait to trait, and place to place—even over a scale of a few meters in the case of guppies. It is manageable because the pressures and constraints that operate in any

particular case can be determined with enough hard work, and a very satisfying "big picture" can emerge for the system as a whole. This kind of enterprise requires a community of people who share the same set of theoretical and empirical tools that allow them to address a common set of issues. I will end this article by discussing how such a community can form around the subject of religion.

Ideally such a community would include people from evolutionary biology, traditional religious studies, and social scientists who are already using their own theoretical perspectives and empirical methods to study religion. The basic evolutionary principles and empirical methods are not difficult to learn. In general, the burgeoning study of human-related subjects from an evolutionary perspective is being conducted largely by people who received their formal training in other fields and picked up their evolutionary biology along the way. However, a number of major pitfalls need to be avoided.

The first is a belief that adaptationist hypotheses are hopelessly difficult to test and are destined to remain speculative "just-so stories." This belief is a pillar of skeptical arguments about evolution, as if evolution can be rejected for its difficulty rather than its falsehood. In any case, the belief is highly misleading. Functional hypotheses are as amenable to the scientific method as nonfunctional hypotheses, and in any case they cannot substitute for each other since the proximate/ultimate distinction requires both mechanistic and functional explanations for everything that evolves by natural selection. Productive evolutionary scientists do not wring their hands about the difficulty of testing hypotheses but roll up their sleeves and get to work.

The second pitfall involves thinking about individuals and groups. Holistic conceptions of groups as being like organisms were widespread in both biology and the social sciences until the middle of the twentieth century, when individualism became the dominant intellectual tradition. Only now are evolutionary biologists achieving a middle ground that admits the possibility of adaptations at multiple levels of the biological hierarchy and provides the tools for determining the facts of the matter on a case-by-case basis. It is easy to portray a group-level adaptation as individually advantageous because groups of individuals who pull together do, after all, succeed as individuals. Identifying the appropriate level of selection requires locating the fitness *differences* that drive evolutionary change. There are no fitness differences in a win-win situation, so cooperation can increase in frequency in a large population only if groups that engage in win-win interactions out-compete groups that don't, even for a no-cost public good. To the extent that public good provision (including social control, which is a second-order public good) requires time, energy, and risk on the part of individuals, fitness differences arise within groups that weigh against cooperation, requiring even greater fitness differences among groups for cooperation to increase in frequency in the larger population. Comparing fitness differences within and among groups is as easy as riding a bicycle, once one gets the hang of it, but errors still abound in the past and present literature. A good example from the current study of religion is the idea of costly

commitment, in which religions promote group cohesion by requiring members to engage in behavior that is too costly to fake (Irons 2001; Sosis 2004). This is indeed an important and adaptive feature of religion, which is well represented in the random sample, but is it adaptive at the group or individual level? Often it is portrayed as an individual-level adaptation because it is successful in general. However, breaking costly commitment into its component traits and comparing fitness differences within and among groups reveals that group-level selection is required for its evolution (Bowles and Gintis 2003). It is essential for the field of evolutionary religious studies to reach a consensus on how to identify levels of selection based on fitness differences within and among groups.

There is already a sizeable community of social scientists who study religion from an economic perspective. Economic and evolutionary theory are similar and inter-translatable in some respects but not others, creating another set of pitfalls for social scientists who wish to enter the field of evolutionary religious studies, as I discuss at length in *Darwin's Cathedral.* Once these pitfalls are avoided, a very impressive body of literature and empirical methods can be applied to the evolutionary study of religion. A number of economists who are at the forefront of the study of human genetic and cultural evolution from a multilevel perspective should be consulted by those who are currently studying religion from an economic perspective (see Hammerstein 2003 and Henrich 2004 for useful introductions).

Ironically, the fewest pitfalls might exist for scholars who conduct detailed historical and present-day studies of religion without having any particular theoretical perspective in mind. The functional nature of religion speaks for itself as soon as particular religious systems are studied in relation to their environments. That is why the selected examples in *Darwin's Cathedral* and the random sample of religions discussed in this paper are so interpretable from an evolutionary perspective. As the natural historians of religion, these scholars can provide the foundation of empirical knowledge for asking a new set of questions organized by contemporary evolutionary theory.

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