Religion—An evolutionary adaptation

Peter J. Lachmann

Department of Veterinary Medicine, University of Cambridge, Cambridge, United Kingdom

When Charles Darwin published The Origin of Species in 1859 and The Descent of Man in 1871, he was concerned that evolution by natural selection would be seen—as it was then and still is—as standing opposed to religion. However, the proposition to be defended here is that he was mistaken about this point and that religion itself can be seen as an evolutionary adaptation that has arisen to meet a peculiarly human need—to maintain those important aspects of human behavior, where variation is found among different human groups, sufficiently constant over a sufficiently large number of individuals and over a sufficiently large span of time that natural selection can act upon them.

WHY HUMANS NEED RELIGION, WHEREAS BEES DO NOT

The basis of the argument presented here arose from considerations published nearly 30 years ago, comparing honeybees with humans with regard to the control of behavior that distinguishes different populations of each (1). I must emphasize that it is “between group” variation that is being considered and not behavioral differences “between species”—between humans and monkeys on the one hand and between bees and ants on the other. Inter-species differences are certainly genetically determined. Nor is it the “within group” behavioral variation that is prominent among humans and probably occurs also in bees. In 1983, group selection was out of favor with evolutionary biologists, and the views put forward in the paper were probably regarded as heretical and certainly ignored.

Sociobiologists, notably, E. O. Wilson (2), rejected group selection, and Wilson invented the term “culturgene” as a cultural homologue of a gene and proposed that these culturgenes and normal genes interacted in evolution. This idea can only be true in a limited sense, as the rate of cultural evolution is so much faster than that of genetic evolution. However, Wilson has changed his mind more recently about rejecting group selection, and in a 2007 article, together with D. S. Wilson (3), they come to the conclusion that “selfishness beats altruism within groups and altruistic groups beat selfish groups” and conclude that multi-level and group selection have come back in from the cold. It is not, however, clear that all sociobiologists have yet accepted this change of view.

D. S. Wilson had already come to the conclusion that the rejection of group selection was “evolutionary theory’s wrong turn” and in his 2002 book Darwin’s Cathedral (4), puts forward views about the function of religion that are compatible with those I put forward in 1983 (1) and will expand here. However, although the conclusions about the functions of religion are quite similar, the arguments reflect the complementary but distinct approaches of a social scientist and a biologist.

To compare bees and humans is not as idiosyncratic as it may seem. Both live in communities where cooperation among individuals who perform different tasks is essential for survival, and there are few other species where this is the case, particularly where there are not anatomically distinct “castes”, as are found in ants. Honeybees have long fascinated evolutionary biologists as a result of their social organization and altruism, as well as their curious sex determination. Female bees (the queen and the workers) develop from fertilized eggs and are diploid, while males (drones) develop from unfertilized eggs and are therefore parthenogenetic and haploid. Each colony contains a single fertile queen. She deposits an egg alone into a wide (drone) cell or with a sperm—from her spermatheca, where sperm are stored after mating—into a narrow (worker) cell. Only when the queen goes to lay into a worker cell does she need to bend her abdomen, and this allows a sperm to drop. The egg is only then fertilized. Nearly all females develop into sterile workers. When required to replace a failing queen or in preparation for swarming, the workers build a longer worker cell and feed the larva therein with royal jelly. This then develops into a fertile virgin queen. It used to be believed that the virgin queen, on her mating flight, mates only once with the fastest flying drone, exemplifying sexual selection. However, filming mating flights shows that queen bees behave more like the Whore of Babylon and mate with every drone in the neighborhood. The sperm in her spermatheca, therefore, do derive from many drones, and the workers in a colony do not all share the same father. They are not therefore 75% genetically identical, the explanation advanced by William Hamilton and popularized by Richard Dawkins in “The Selfish Gene” (5) to account for bee altruism on the basis of “kin selection”. This term was coined by John Maynard Smith (1920–2004) (6) and was adopted widely as an explanation for altruism. Maynard Smith

1 Correspondence: Department of Veterinary Medicine, University of Cambridge, Madingley Road, Cambridge, CB3 0ES, UK. E-mail: pjl1000@cam.ac.uk
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defined kin selection as “the evolution of characteristics which favour the survival of close relatives of the affected individual, by processes which do not require any discontinuities in the population breeding structure.” Although there may well be something to this explanation in general, bee altruism, as discussed by Dawkins—“the kamikaze bee”—is itself a misconception. It is only when bees sting an elastic-skinned mammal (particularly humans with no fur and thin skin) that they are unable to retract their arrow-shaped sting and in trying to do so, pull out their hind gut and subsequently die. When bees defend their hives by stinging other insects, which is much more important to their survival, the stinger punches a hole in their chitinous exoskeletons and can then be withdrawn safely.

THE “RE-QUEENING EXPERIMENT”

It is the worker bees that build the cells, feed the brood, and then cap the cells (nurse bees); guard the hive against intruders and remove dead bees and debris (guard bees); and gather nectar, pollen, and propolis (foraging bees). A bee goes through these three phases of activity as it grows older. Colonies vary in behavior between neat and untidy nurse bees; aggressive and docile guard bees; and industrious and lazy foragers—beekeepers preferring the former in each case. Colonies also differ in their propensity to swarming.

The re-queening experiment, regularly undertaken by beekeepers, shows these variations in behavior to be entirely genetic rather than learned. If a colony shows undesirable behavior, the queen is replaced by a newly mated queen from a well-behaved stock. She then lays eggs and sperm, giving rise within 3 weeks to new workers. These workers do not learn from the workers that they grow up among but behave entirely according to their genetic background. Therefore, bees, in regard to such behavioral variation, do not have free will and as I will argue, do not need religion.

CULTURAL EVOLUTION (7)

In humans, on the other hand, such between-group behavioral changes have evolved culturally. This can be shown by the analogy of the re-queening experiment already described for bees. When young children are taken from a primitive environment and educated in a socially advanced environment, they do not retain the behavioral characteristics of their birth group but acquire those of the group into which they have been adopted. A well-known example is provided by Carleton Gajdusek, who brought 56 primarily male children from Papua New Guinea to live in the United States and provided them with the opportunity to receive high school and college educations (8). These children grew up as American college graduates rather than New Guinea highlanders. There are many other examples of similar experiments. It is therefore clear that the human species has abandoned genetic control of these between-group variations in behavior in favor of control by cultural evolution.

HOW NATURAL SELECTION WORKS FOR CULTURAL EVOLUTION—THE ROLE OF RELIGIONS

In bees, genotype gives rise to phenotypes, which allows selection to occur on the basis of reproductive success. To allow culturally determined variation in behavior to undergo selection, the cultural variants need to be maintained over sufficiently large numbers of individuals and for a sufficiently long period of time for selection to be able to act upon them.

In man, these culturally determined patterns of behavior appear to have been expressed almost invariably in the form of religious prescriptions, and it is the generation of these cultural variants and their enforcement that have given religions a vital evolutionary function. It should be emphasized again that what is being discussed here are culturally determined patterns of behavior that distinguish groups of humans. These are not differences in behavior between humans and other animal species, which are clearly determined...
genetically, nor are they within-group variation in behavior. Within any defined group, there will be a range of behavior depending on a variety of factors. Some, such as intelligence, have a substantial genetic component, and others may reflect the educational level, social status, and other lifestyle factors.

This view of religion meshes well with the definition given by Samuel Johnson in his dictionary of 1806. He defines religion as “Virtue, as founded upon reverence of God, and expectation of future rewards and punishments”.

There are many other definitions of religion, but Johnson does encapsulate eloquently the view that the central element of religion is its virtue, which describes its prescriptive element—the fiats and the caveats. All those religions about which there is enough information have such a prescriptive element. Although the differences among the prescriptions are of great importance, they also show considerable similarities. Religious prescriptions deal inter alia with diet and health, reproductive behavior, interpersonal relationships (honesty and truthfulness), attitudes toward work and death, and suicide. It is difficult to find good accounts of the prescriptions, as opposed to the rituals, of religions that no longer exist. Tables 1 and 2 do give some analysis of prescriptions relating to diet and to reproduction and morals, which have been gathered from a variety of sources. It may be worth noticing that, among the major surviving religions, Christianity has no prescription about washing! This may have assisted the devastating spread of plague in Europe in the Middle Ages.

The prescriptions that proved to be of selective value did so almost certainly for reasons unconnected entirely with those for which they were adopted in the first place. An interesting example is the prohibition of cannibalism, which is shared by virtually all religions (and secular cultures). It is plausible that this is because prescriptions that allowed cannibalism failed to survive, as their adherents died from Kuru or from some related spongiform encephalopathy spread by cannibalism, as nearly happened to the Fore tribe in New Guinea in the last century.

Similarly, the reasons for adopting male circumcision will not have included protection against sexually transmitted disease. It is, however, likely that the practice has survived, as it does indeed give some protection against various infections, including the human papilloma viruses (that cause cancer of the penis in men and cancer of the cervix in women) and against HIV.

VIRTUE AND THE ETHICAL PARADIGM OF AN ENDANGERED SPECIES

The virtue and the ethical paradigms that the virtue enshrines can be seen in all major extant religions to show a vital concern with increasing population. This is the ethical paradigm of an endangered species and was probably entirely appropriate to the human situation at the time that the major extant religions came into being and not inappropriate until the industrial revolution and the introduction of the smallpox vaccination approximately 200 years ago. The primary obligation of the male was to feed and defend his mate and his children; the primary obligation of the female was to breed and raise her children. The equivalent of these obligations was recognized in the Norse mythology whose Valhalla was reserved for men who die in battle and women who die in childbirth.

This ethical paradigm is clearly no longer at all applicable to the human situation in the 21st century. Mankind is no longer an endangered but an endangering species—and a revised ethical paradigm to take account of this new status may now be essential if human life on earth is to be sustainable.

THE SUPERSTRUCTURE OF RELIGION

Johnson held that the virtue of a religion was “founded upon reverence of God, and expectation of future rewards and punishments”. These facets of religions—the rewards, punishments, hereafter, and God(s)—vary far more among different religions than do the prescriptions. This alone would make an evolutionary biologist believe that the prescription or virtue is likely to be more important than the superstructure for securing the survival of a particular religion.
<table>
<thead>
<tr>
<th></th>
<th>Contraception</th>
<th>Sexual hygiene</th>
<th>Celibacy</th>
<th>Travel</th>
<th>Personal hygiene</th>
<th>Worship</th>
<th>Moral prescription</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buddhists</td>
<td>Generally permissive</td>
<td></td>
<td>Variable for monks</td>
<td></td>
<td>Prescribed</td>
<td>Personal devotion; occasionally at temple</td>
<td>Sila, To refrain from taking life; to refrain from theft; to refrain from sexual (incl. sexual) misconduct; to refrain from lying; to refrain from intoxicants</td>
</tr>
<tr>
<td>Christians</td>
<td>RC, Natural method only; Protestants, generally permissive</td>
<td></td>
<td>Yes for monks, nuns, RC priests</td>
<td></td>
<td>Congregational and personal devotion</td>
<td>The Ten Commandments; variation on many details among denominations</td>
<td></td>
</tr>
<tr>
<td>Hindus</td>
<td>Permissive</td>
<td>Prescribed</td>
<td>No</td>
<td>Brahmins were forbidden to cross sea</td>
<td>Prescribed</td>
<td>Temple worship, personal devotion, group pilgrimage</td>
<td>Dharma, Mercy (refusal of violence); renunciation/sense control (refusal of intoxicants); truthfulness (refusal of gambling and speculations); purity (refusal of sex forbidden in scriptures)</td>
</tr>
<tr>
<td>Jains</td>
<td>Permissive</td>
<td></td>
<td>Yes for monks and nuns</td>
<td></td>
<td>Prescribed</td>
<td>Temple worship, personal devotion, group pilgrimage</td>
<td>Nonviolence (Ahimsa); truth (Satya); nonstealing (Asteya); nonpossession (Aparigraha)</td>
</tr>
<tr>
<td>Jews</td>
<td>Generally permissive</td>
<td>Prescribed (male circumcision)</td>
<td>No</td>
<td>Rituals prescribed for Orthodox</td>
<td>Prescribed</td>
<td>Congregational and personal devotion</td>
<td>Do not do unto others that which is repugnant to you (Hillel); much variation between Orthodox and Reform groups</td>
</tr>
<tr>
<td>Muslims</td>
<td>Generally permissive</td>
<td>Prescribed (male circumcision)</td>
<td>No</td>
<td></td>
<td>Prescribed</td>
<td>Congregational and personal devotion; Hajj</td>
<td>Sharia, Wide-ranging prescription; variation among different groups</td>
</tr>
<tr>
<td>Zoroastrians</td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td>Prescribed</td>
<td>Congregational and personal devotion</td>
<td>Good thoughts, good words, good deeds (Humata, Hukhta, Hvarshta); asceticism frowned upon</td>
</tr>
</tbody>
</table>
Many, but by no means all, religions have a God or Gods whose attributes vary widely but generally include power and wisdom superior to those of humans. Many, but again not all religions, believe in an afterlife, where rewards are enjoyed or punishments suffered. Some other religions that do not believe in an afterlife believe in reincarnation. This may include the Pythagorean expectation of being reincarnated as a high-status human if one has led a virtuous life and as a lower-status animal if one has behaved badly.

It is self-evident that a superstructure does not need to be accurate for a religion to be effective. For example, Apollo’s horses do not pull the sun across the sky each day, but Apollo’s injunction “nothing in excess” retains its moral force. Similarly, the power of the injunction to “love thy neighbor” and to “render unto Caesar the things which are Caesar’s” is unaffected by skepticism about the virgin birth or the Trinity or the resurrection of the body.

On the other hand, the superstructure does need to be effective. If it is accepted that the function of religious superstructure is to enforce one prescription as opposed to another, then one can understand why successful religions cannot be fully tolerant of their competitors. The brutality, hatred, persecution, and wars that have resulted from competition among religions throughout history can be seen as a lamentable consequence. This is an archetypal and pre-Darwinian example of “social Darwinism” (7). It is not clear whether this propensity to inter-communal strife is a long-standing cultural adaptation in humans or whether it is a genetic trait that evolved during hominid evolution. Either way, it is nothing for the human species to be proud of.

HOW DO RELIGIOUS INNOVATIONS ARISE?

It is entirely obvious that innovations do not arise by prophets meditating what is advantageous for the long-term survival of their followers. Just as in genetic evolution, the changes on which selection acts are not purposive and have no goals. One view would be that these innovations are analogous to the origins postulated by Karl Popper (9) for scientific theories—that they are random, aesthetic, or inspirational speculations.

One can see some examples where religious prescriptions, in particular, environments, have failed dramatically. A particularly good example—“Norse Greenland’s End”—is described in some detail by Jared Diamond in his book Collapse (10), where the Christian Viking population starved to death when the climate became colder, as the restrictions placed on them by their religion prevented them from adopting the way of life of the Inuit who lived in the same environment and survived.

GOD—“TO BE OR NOT TO BE”: THAT IS NOT THE QUESTION (11)

Regarding this view of religion, it can be seen that the existence of God(s), which dominates so much argument about religion and forms the main ground of dissent between believers and atheists, is not the central question. God(s) are an epiphenomenon of religion, not its essential core. It is more important for a successful religion that its God(s) are obeyed than that they exist.

There are Gods that certainly did not exist. The spirits of natural features such as rivers and rocks, worshipped in animistic and Shamanistic religions, are one example; fire is another, and very few people now believe in the existence of the Gods of Olympus or of Valhalla. Nevertheless, these religions were successful over long periods of time. On the other hand, there are Gods that certainly did exist. These include Oriental and Roman emperors, and indeed, the Emperor of Japan was worshipped as a God into the 20th century. The existence of the God of Abraham forms the main basis of contention between modern atheists on the one hand and believers in Judaism, Christianity, and Islam on the other.

There are other religions that do not have Gods at all. The original form of Buddhism (12) is not merely without a God (atheistic), it is actually antiatheistic, because of its emphasis on eradicating desire to achieve nirvana. Buddha regarded belief in God as a form of desire. He was emphatic that he was a mortal man and not a God and that he should not be worshipped. As Buddhism spread out of India to other Far Eastern countries, the original elegant philosophy of Buddhism became corrupted by stories of previous lives of the Buddha, a hierarchy of bodhisattvas and supernatural beings and syncretism incorporating Gods and heavens from various other religions.

Confucianism (13) is another religion that manages entirely without a God and certainly fits the functional definition of religion that is used here.

SECOLAR RELIGIONS AND “DEMAGODS”

Confucianism is not the only religion that manages without a supernatural god. There are a number of “secular religions” that fulfill the essential functions of religions and have replaced orthodox religion, particularly in the 20th century, on quite a large scale. In these secular religions, a human leader, who may not be considered divine in the classical sense but is nevertheless deferred to in a way that is appropriate only to a God, takes the place of God. These secular religions enforce their prescriptions by demagoguery combined with physical coercion. For this reason, I have suggested the name “demagods” for these human objects of worship in secular religions.

Nazism is the canonical example of such a secular religion. Its prescriptive superstructure based on bio-
logical racism was put forward as being scientific and Darwinian. The grievous error this involves—assuming that evolutionary competition needs to imply conflict between competing groups—is discussed in detail in (7). Hitler clearly subscribed to the view that success for his racist theories required the eradication of the unfit, be they Jews, gypsies, or the mentally defective. Probably had Nazism extended much beyond Europe, Hitler would also have tried to eradicate what he considered to be other inferior races. The success of Nazism in a civilized European country remains a matter of deep concern and emphasizes that a prescriptive system does not need to be ethical in any use of that term to acquire large numbers of devotees.

The other major secular religion of the 20th century was Communism. There is little doubt that Marx himself was regarded as inspired, if not actually divine, by his more enthusiastic acolytes and that the Soviet dictators, notably Stalin, were treated as demigods. Stalin used extreme physical coercion to enforce a policy that was regarded, again falsely, as Darwinian but based in this case, on class rather than race. Stalin held the view that the eradication of the middle and upper classes would lead to a proletarian heaven on earth. Class-based genocide was an appalling policy, and no proletarian paradise came into being. Other Communist dictators, notably Pol Pot in Cambodia, can be regarded as in the same league.

RELIGIOUS PRESCRIPTION IN A SECULAR WORLD

Although religious belief is still nominally widespread, there is little doubt that the literal beliefs in the creation accounts of various religions, be it the Genesis account or the churning of milk in the Hindu account, are no longer widely believed. It is, however, entirely consistent for those who do not believe the literal accounts of holy books or in the existence of the God of Abraham to accept the religious prescriptions that they have been taught and to participate in occasional religious ceremonies such as memorial services for their colleagues. To put it in another way, skeptics have no reason to reject religious prescriptions evolved by natural selection just because they cannot accept the religious superstructure.

Much behavioral prescription has been ceded to secular law, which goes back to the code of Hammurabi approximately 5000 years ago if not earlier. Nevertheless, questions of conscience are still not left entirely to secular regulation. These are the very matters with which religious prescriptions are largely concerned—diet and health, reproductive behavior, interpersonal relationships (honesty and truthfulness), attitudes toward work and death, and suicide. Although the law enforces limits to what is allowed, substantial latitude is left to individual choice. Considerable controversy endures about where the line between legal compulsion and, individual choice should be drawn in regard, for example, to sexual practices, reproductive technologies, abortion, and end-of-life decisions. In the United Kingdom parliament, such questions are generally left to a free vote rather than to party regulation. Individual choice in these cases is certainly deeply influenced for believers by the prescriptions of their religion.

THE FUTURE

Evolutionary speculations do not lend themselves to prophecy. Evolution does not look ahead; it reacts to the selective pressures that are acting now. However, we are engaged currently in a major international soul-searching about energy consumption and climate change. Few now deny that man-made energy consumption is raising levels of CO₂ and other greenhouse gases and is likely to raise the temperature. However, much religious belief resists accepting that the essential underlying cause is population increase; and that any effective solution must aim not merely to stop population growth but also to achieve sustainable population levels for the various regions of the world. This conclusion is at variance with the ethical paradigms that underlie all modern religions.

There have been political moves at changing this paradigm—two examples include women’s liberation and gay rights. These are both ideas that are not new, but in the past, when there was real selective pressure to increase population, those that supported the right of women not to bear children and the rights of both sexes to have relationships mainly or exclusively with members of the same sex would probably not have produced enough progeny to survive. Now that this is no longer a problem, both movements have acquired considerable legitimacy in much of the world.

However, such changes need to go much further, and the virtually unfettered right to breed needs to be constrained in one way or another. How this is to be achieved is difficult to say. Such evidence, as is available at present, would suggest that improving living and educational standards, particularly for women, may be an effective strategy (14).

CONCLUSIONS

If one accepts the view of religion put forward here, there are a number of significant implications:

1. A degree of free will must exist. Individuals and/or groups must be able to choose among religions for selection to occur. It is clear that for many people in the world, particularly in the past, this freedom was relatively limited, but it did exist, and new religious sects did arise and were selected.

2. Genetic determinism of inter-group behavioral differences is therefore rejected.

3. A religion needs to defend its prescription and therefore, cannot be totally tolerant of the prescription of other religions. This does not mean that religions
succeed only by trying to eradicate their opponents. There are highly successful religions, such as Buddhism in its original form and Jainism, which reject conflict entirely. It is, however, a sad fact that religious warfare has been extremely widespread throughout recorded history.

The human species has reached a critical stage in its evolutionary history. Humans have gone forth and multiplied to the extent that their numbers can now be seen as a major problem for their long-term survival. It is easy enough to say that our behavioral prescription needs to be adapted to this new situation but not at all easy to see how this is going to be achieved—something Omar Khayyam already knew 900 years ago:

Ah Love! could you and I with Fate conspire
To Grasp this sorry Scheme of Things entire,
Would not we shatter it to bits—and then
Remould it nearer to the heart’s desire! (15)

REFERENCES


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