THE EVOLUTION AND REVELATION OF LOVE

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Through science's revelations, we learn how love becomes manifest in our universe and how to extend our love beyond humanity to all earthly organisms as well as to the cosmos beyond. This essay investigates this proposition in three sections. First, love is a product of evolution, as disclosed by sociobiology's exploration of relationships of kinship and pair bonding. Second, because we are a symbol-wielding species, love in human beings can spread beyond its roots in kinship to embrace all humankind. Third, science has forced us to locate God either nowhere or everywhere. In revealing the remarkable autonomy, unity, and creativity of the universe, science points toward a God who is love at work everywhere. God's love is first manifest explicitly in the universe when love evolves.

The Evolution of Love

The sub-discipline of biology known as sociobiology arose in the 1960s in response to behavior observed in animals for millennia: animals in some species help one another. Especially remarkable in their cooperation are members of some wasp, bee, and ant species, all having sterile castes. When cooperation reaches beyond the care of dependent offspring, and especially when it flowers in the social insects, it poses a problem for Darwin's theory of evolution by natural selection, as Darwin himself

admitted in *On the Origin of Species* (1859, 1964). Darwin's original theory emphasized competition, not cooperation, and it depended on characteristics being inherited, so it seemed unable to account for the evolution of sterile castes.

Darwin reasoned, correctly, that cooperation among animals had something to do with family relationships, but he could not work out the details because he knew nothing about genetic inheritance, which science incorporated only forty years later. By the 1960s biologists knew a great deal about genetics, including the fact that the social insects with their sterile castes had very odd genetic relationships. In almost all sexually reproducing species, siblings are related by .50, but in the social insects, sisters are related to their sisters by .75, but to their brothers by only .25. W. D. Hamilton (1964) showed that, in the social insects, cooperative relationships follow genetic relationships: sisters cooperate to raise sisters; brothers laze around until time to mate with a queen. Hamilton also generalized his findings, theorizing that animals most closely related cooperate the most. His hypothesis turned out to be one of the most fruitful ever made for the study of animal social behavior. As biologists tested it, they found it held for every species studied. It explained pair bonding, cooperation within families, rivalry within families, infanticide by males that took over a harem as male lions do, and the formation of coalitions among highly social primates such as chimpanzees. Those animals that sacrificed to raise dependent offspring and cooperated to help their kin passed copies of their helping genes on to the next generation through all their kin. Those that refused help passed few copies of their selfish genes to the next generation, so helping genes proliferated among kin while selfish genes decreased. Biologists also

discovered that diverse species have various ways to discern their close kin—by smell, by chemical traces, by growing up together, and so on.

Although biologists could study animal behavior because they could observe it, and genetics because they could experiment on it, and the way an animal detected kinship because they could also experiment on it, they had to speculate about the proximate systems bringing animals to cooperate. For simple animals, rudimentary stimulus-response devices might evoke cooperation, but for more complex animals whose behavior is flexible, such crude mechanisms would not work. Because we are complex, highly flexible animals, because love engages us in the task of raising dependent offspring, and because we also love and aid our more distant kin, it seemed reasonable to conclude that an analogous emotion helped other complex animals raise their offspring and cooperate with their kin. Thus, sociobiology demonstrated how love evolved: those animals that loved their kin helped them and, so, passed copies of their loving genes to the next generation through their kin, and loving genes proliferated in the population. Those that did not love and, so, did not help, did not pass their selfish genes to the next generation, so their selfish genes decreased in the population.

Devices that have one function when first evolved, but later add another or switch functions, are common in evolution. Although love first evolved as a device to get kin to help kin, it later developed another function, pair-bonding. Most dependent offspring survive to maturity with only the help of the mother. In this case, the parents mate, and the father departs. Sexual lust between the pair is adequate to promote such matings. However, some offspring are so dependent they require two parents to raise them successfully. If the father mates and deserts, his offspring die, and his genes for desertion

die with them. If he stays and helps, his offspring live, and his cooperative genes appear in the next generation. But, what would bind him, what prompt the requisite pair bonding? Again, in complex animals exhibiting flexible behavior, love would.

Human offspring are, of course, exceptionally dependent, and their dependency lasts for years. Their dependency has meant the evolution in us of deep, lasting love for our children and our mates. Both types of love are the products of evolution, and both are based on kinship, for the ultimate basis of pair bonding is the parents' kinship to their mutual offspring. Contrary to much misinterpretation, neither type of love is selfish. When I save my child from drowning, I am not saving myself; when I share food with my spouse, I am not feeding myself. Nor, contrary to the title of a popular book, are genes in general selfish. Rather, they cooperate to produce a functioning organism in ways so complex biologists have not begun to understand them.

Thus, love evolved—love of kin and love of mates. These loves are limited. More ample love also has a natural basis.

Love beyond Kinship

Love beyond kinship has four natural sources, but it increasingly occurs only in the human species. I have already mentioned the first source, pair bonding. Although pair bonding evolved because the mates have a common genetic interest in their mutual offspring, the bond itself is not between kin, but between mates. Indeed, because of inbreeding depression, evolution ensured it transpired largely between animals that were not close relatives. The love promoting pair bonding transcends kinship.

Second, emotions evolved because they allow animals more flexibility than stimulus-response mechanisms do. The emotion of love is flexible. Particularly in

human beings, who have friends and coworkers, love's flexibility enables it to drift beyond kin to embrace social relationships.

Third, all normal adult human beings possess a theory of mind. Theory of mind develops as soon as children know something of the workings of their own minds, think analogically, and realize other human beings resemble themselves. From theory of mind flows empathy accompanied by thoughts like, "If that happened to me, I'd feel terribly rejected. She probably feels rejected, too. I'd want to be comforted. She may, too. I'll comfort her." In other words, empathy uses self-understanding to understand others, and it uses self-love to love others.

Finally, human beings are symbol-wielders. One thing we do with our symbols is to turn people who are not kin into symbolic kin. Thus, we call the man who married our daughter our son-in-law; we call our club a sorority, from the Latin for sister; we make the Latin explicit in English when we introduce a member of our sorority as our sorority sister. To promote universal love, we declare we are all sisters and brothers. Finally, we anthropomorphize God as a parent. In the following section, I say a little about what happened historically to this transcendent parental figure.

God as Immanent

Normally, the Bible portrays God as transcendent. It locates God in heaven. Moses ascends a mountain to get closer to heaven to reach God so he can receive the Ten Commandments (Exod. 19—20). Elijah ascends to heaven in a whirlwind to be with God (2 Kings 2:11). Jesus also ascends to heaven to join God (Luke 24:50-51; Acts 1:9-11). Stephen sees Jesus in heaven (Acts 7:55-56), and Paul recounts his own experience of meeting Jesus there (2 Cor. 12:1-4). The Bible places God above the Earth, transcendent.

However, Jesus emphasizes another biblical tradition. He tells of God's kingdom here and now, spread out before us all (Luke 17:21; Thom. 113:4), but hidden, like yeast in dough (Matt.13:33) or a treasure buried in a field (Matt.13:44). He says God knows when even one sparrow falls and counts the hairs on human heads (Matt.10:29-30). At his baptism, in his healings, and in prayer, Jesus has profound experiences of God's presence, here and now. Jesus knows an immanent God.

Before the scientific revolution, people saw God's hand everywhere. They thought God had directly created the very Earth upon which humanity trod—and not long ago, a mere six thousand years. They believed God had created every species of animal and plant. They supposed God moved the stars in their courses and caused the sun to rise. Moreover, they assumed God focused divine concern on human beings, who resided at the center of the world God created.

The scientific revolution changed all this. Earth migrated from the center of the created world to an arm in one galaxy among billions. The age of our universe went from six thousand years to 13.7 billion, with Earth coalescing from a cloud of dust and gas about 4.5 billion years ago. Species evolved from one another, and every species could trace its ancestry back some 3.8 billion years to a common ancestor—some kind of microbe. Humanity was just one among myriad species, and a latecomer at that. Gravity formed the stars and moved them, and the stars created almost all the elements in the periodic table. The stars appeared to move around the Earth because Earth rotated on its axis, not because Earth was at the center of the universe.

One result of the scientific revolution was the development of Deism, the belief that God created our universe and then left it to run by itself, according to the mechanistic

laws science uncovered. Such a God was transcendent and took no interest in humanity. Deism's God resembled Aristotle's unmoved mover rather than the Judeo-Christian creator who participated in the world. Mechanistic science had apparently wrecked the western religious tradition.

At least one theologian in the late nineteenth century, however, took a different view. Aubrey Moore believed science had done the western concept of God a favor, for after the scientific revolution, God had to be either nowhere or everywhere, and Moore opted for everywhere, even as Jesus had. The choice now lay between atheism/Deism and mysticism—mysticism defined as God present everywhere, available to human consciousness, and active in this world.

However, as long as the metaphor of our universe as mechanism held, it was difficult to explain how God could work in the world, for the universe science described worked like a clock, with inert matter moving according to fixed laws. Either God acted through the natural laws God had established at the beginning, in which case God was the God of Deism, or God broke the laws. The last choice did not seem reasonable because God had made the laws. To believe God broke them suggested God was untrustworthy, contrary to biblical tradition and God's supposed benevolence.

However, the mechanistic metaphor the scientific revolution bequeathed us began to disintegrate in 1900, and by 1930 it had collapsed, although not many people noticed except a few physicists. It collapsed at the level of matter with the development of quantum mechanics. In quantum mechanics, matter became indescribable, a dualistic particle-wave that is incredibly active, so active physicists cannot trap it. Moreover,

experiments at the quantum level disclosed the unity of our universe, tied together mysteriously in all its parts, each part affecting all the others.

With the development of relativity, the mechanistic metaphor lost its absolutes of space and time. Now, only the speed of light was absolute and objects grew more massive with speed while time slowed down. At the speed of light, time stopped, so nothing could move faster than light.

Science's mechanistic metaphor eroded further when Edwin Hubble discovered the expansion of our universe. Everything moved; nothing stayed the same as it had in the old, created-and-finished world. By the end of the 1950s, astrophysicists knew the details of why the stars shine and how the heavy elements came to be. The comprehensive answer to both was nuclear fusion. The light elements, hydrogen and helium, formed in the big bang. The furnaces of the big bang and the stars created the elements necessary for life.

The universe science describes is remarkably creative, much more creative than the one Genesis 1 depicts God fashioning, and more unified, too. Penultimately, the Hubble expansion and the second law of thermodynamics drive our universe's creativity, helped by the nature of matter at the micro-level, gravity on a cosmic scale, and natural selection on Earth and wherever else living things reside.

At each of these levels, chance plays a considerable role, leaving room for an immanent God to act within the creativity of our universe, but hidden, just as Jesus taught, working like yeast in dough. And because our universe is unified, knit mysteriously at the micro-level, bound by gravity and nuclear fusion at the cosmic level, and related through common inheritance at the organic level, God can easily be

everywhere, operating through all things. God need not intervene in the world as an external, transcendent force, as the Bible claims, handing the law to Moses or flinging hail from heaven on beleaguered Amorites (Josh. 10:6-11). Rather, modern science allows us to envision God as immanent, creating everywhere, continuously and actively, although hidden, never contravening natural laws. Science also leaves room for God to work in the human psyche, in relationship, in a manner similar to human-to-human relationships. If the words spoken by our neighbors, our friends, or our lovers can affect our emotions, beliefs, and behaviors then certainly God may equally affect us through the divine word whispered within.

Science, I am suggesting, points us toward a God who is more creative and more liberating than the biblical God—more creative because our universe is more creative than the Bible imagines, and more liberating because science's universe is autonomous, run by its own laws without God's intervention, and more liberating, too, because God does not appear to people, overwhelming them with splendor and holiness, forcing them to prophesy or capture laws in stone. Rather, God stays hidden and works quietly, as Elijah experiences when he hears divinity in silence after failing to find it in wind, earthquake, and fire (1 Kings 19:11-13), or as Jesus depicts God's kingdom, a hidden treasure that, nonetheless, a persistent seeker will find (Matt. 7:7-8).

Characteristically, love creates and liberates. The God science points us toward creates and liberates. Therefore, science reveals a God of love. But although God's creativity and liberation are explicitly manifest at the beginning of our universe and for some ten or twelve billion years thereafter, God's love is not. Love is patient (1 Cor. 13:4). It remains hidden. Its manifestation awaits the evolution of complex creatures,

and then it only peeks through in a few caring actions directed toward dependent offspring and close kin.

With the evolution of creatures that produce offspring so dependent they require two parents to raise them to maturity, love bifurcates. It remains manifest toward kin, yet reaches beyond kin, as it bonds sexual pairs of the same species to one another.

When *Homo sapiens* evolves, love extends itself again, revealing itself yet more fully. Humanity's ability to wield symbols makes love a topic of conversation and exhibits love in art, music, and literature. Moreover, people symbolize non-kin as kin, which allows love rooted in kinship to flow beyond kinship. In addition, we human beings empathize readily with those like us, about whom we can think analogically, and our empathy expands our love even to strangers and outsiders. Because we tend to anthropomorphize, most of us also empathize to some extent with other animals.

The discoveries of science during the last century should enable us to enlarge our empathy and feelings of relatedness again. Science tells us the living apes are our close relatives, that we share DNA complexes with many animals, and share DNA itself with all living things. They are our relatives, whether chimpanzees, birds, earthworms, yeast, or bacteria. Furthermore, we are all in one web of life, interdependent, just as close kin are.

But science leads us beyond life itself, for it discloses our kinship with our universe. We are not merely a few decades old, but 13.7 billion years, for the big bang created the hydrogen, and the stars fused the heavy elements, our bodies require. We are intimately connected to the universe we inhabit. We are stardust, as are the air we

breathe and the sea we navigate. And, of course, our universe is mysteriously unified at the quantum level, too.

A God of love, I think, created the universe we inhabit, but divine love remained hidden. It began to be manifest only as life evolved, but its scope was still limited. With the evolution of creatures who had symbolic language, it expanded. The great prophets of the major religions revealed God as love and compassion, the God whose compassion saves, and, in Christianity, the God whose love forgives. However, the prophets mostly taught us to love our neighbors, to love humanity. Now science has showed us that the famous question asked of Jesus, "Who is my neighbor?" (Luke 10:29) has an answer that reaches beyond the barriers of ethnic and religious exclusion Jesus broke. Science teaches that all living things are our kin and our neighbors, and our origins stretch back to the beginning of the universe and arch across the stars. We must understand Jesus' command to love our neighbor—the commandment all the major religions reveal—to encompass all creation today. Such is the evolution of love and its revelation in our time.

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