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Sexual Reproduction Is Not a Cosmic Accident

SUSAN WALDSTEIN

At first glance, sexual reproduction does not make much sense to Darwinism. Asexual reproduction or cloning is much more efficient than sexual reproduction, since the entire genome is transmitted to the next generation without alteration. In asexual reproduction like budding in yeast or some forms of parthenogenesis (where the unfertilized egg develops into an embryo) as in some insects, reptiles, and amphibians, the offspring are genetically equivalent to the parent organism. If the genes are truly the unit of selection and organisms are merely their "survival machines,"[1] as Richard Dawkins argues in *The Selfish Gene*, then their interest is best served by asexual propagation or parthenogenesis. No time or energy is lost in finding and competing for a mate and every individual can transmit all of its genes rather than half to every one of its offspring. Furthermore, the reproductive rate of the species is dramatically increased since every individual can produce offspring instead of only half of the individuals of the species.

When considering the greater efficiency of asexual reproduction compared to sexual reproduction, the puzzled Darwinist authors of a standard college textbook write, "Despite these disadvantages, most eukaryotic organisms reproduce sexually. It would seem that the production of genetic diversity is an evolutionary advantage that overwhelms 'the cost of sex.'"[2] The argument is not very compelling: Since nothing happens in living beings that is not the result of random mutations and natural selection, sexual reproduction must be more advantageous than it first appears.

Darwinians suggest that the principal advantage to sex is the generation of genetic variation, which provides the material for natural selection to act on. Sex generates variation in several ways. Of course, there is a new mix of genes when half the male and half the female chromosomes are united in the zygote. However, there is a prior mixing in the production of eggs and sperm of the parent organisms. In the first step of meiosis (the cell division that results in four haploid cells, having only one set of chromosomes), the homologous chromosomes from the father and mother are distributed randomly. In the second step, the chromosomes can be divided in parts and recombined in new ways so that not all of a male or female chromosome ends up together. Each of the eggs or sperm produced in meiosis has a unique mix of genes from the male and female parents. No new genes are produced in these ways, but new combinations of genes are produced. This can produce new phenotypes (physical characteristics in the organism), which might be advantageous.

Some forms of parthenogenesis in diploid organisms, which have two sets of chromosomes, also provide genetic mixing. There is no influx of new genetic material from a male; however, in certain forms of automixis, the germ cell also undergoes meiosis and the progeny are only half clones of the mother. The chromosome number may be restored to diploid in a number of ways. The unfertilized egg may develop into an embryo by doubling its chromosomes and initiating mitosis. Alternatively, the egg can fuse with another of the four haploid products formed in meiosis. In both cases, the sister

chromosomes are randomly mixed in the first step of meiosis as in sexual reproduction. In the second step of meiosis, the same recombination of chromosomes can occur as in sexual reproduction.

There is even an advantage to parthenogenesis in preserving novel genes. If a major chromosomal change occurs in meiosis, such as the fusing of two chromosomes into one or the doubling of a chromosome, it can be passed on without the problem of finding a mate with a similar anomaly. If the organism with the genetic anomaly lives and succeeds in reproducing, it may pass on the anomaly to many offspring. Sexual reproduction thus provides more opportunity for variation within a species, but less opportunity for generating a new species than half-cloning parthenogenesis. This form of parthenogenesis does not carry the advantage of transmitting the complete genome, but it still carries the advantage of not needing to spend energy to find a mate as well as the advantage of a greater reproductive rate per individual. If parthenogenesis is so much more efficient than sexual reproduction and can still provide a mechanism for genetic variation, it remains a mystery why sexual reproduction developed and spread so diffusely.

Nevertheless, there seems to be a clear trend toward sexual reproduction. Plants and animals have developed sexual reproduction in most phyla. Doris Bachtrog and colleagues point out that bisexual reproduction developed independently in various phyla of plants as well as in insects, reptiles, birds and mammals. A sign of this is the different sex chromosome systems in various groups of organisms. Besides the familiar XX female/ XY male system used by humans and most other mammals, there is the opposite ZW female/ ZZ male system in birds, snakes and butterflies as well as several other systems.[3] Sexual reproduction is clearly evolutionarily convergent (developing independently) rather than homologous (inherited from the same ancestor). It developed multiple times in multiple articulations.

In heterosexual organisms, there is a division into male and female with different reproductive organs and activities. Both male and female contribute a part of themselves in generation. Their gametes unite to form what becomes the body of their offspring. In many genera of animals male and female unite in the sexual act to form one body temporarily. One of the more expressive unions is that of dragonflies who fly united together in a closed circle. In dimorphic organisms, male and female animals also look quite different. Male birds may have bright-colored feathers and characteristic tails like the peacock or crests like the cardinal as well as mating rituals of dances or song. Male mammals may have antlers, tusks or manes. Much time and energy is expended in growing secondary sexual characteristics as well as in mating behaviors. Sex is altogether a puzzling phenomenon.

Perhaps there is a more profound way to understand the development of sexual reproduction if we step out of the Darwinian straitjacket. Natural selection (survival and reproduction of the fittest individuals or genes) may not be the only cause of evolution. There may be goals toward which evolution is directed. Fossils show several clear trends in evolution.[4] Organisms have grown larger. They have become warm-blooded. They have developed more and better sense organs with bigger and more complex brains where all the information from the senses is brought together and appreciated. Sensitive organisms have evolved in a world that is sensible. The last organism to evolve is not only sensitive but also rational; humans can not only sense but also enjoy the beauty of what they see and hear. They can comprehend nature's order.

Simon Conway Morris sums up the many examples of convergent evolution at the end of his monumental work, *Life's Solution*:

> Neither is progress a question of the sheer number of species, nor the supposed number of body plans. What we do see through geological time is the emergence of more complex worlds…Yet, when within the animals we see the emergence of larger and more complex brains, sophisticated

> vocalizations, echolocation, electrical perception, advanced social systems including eusociality, viviparity, warm-bloodedness, and agriculture—all of which are convergent—then to me that sounds like progress.[5]

Trends seem to imply purpose and an intelligence directing the trends. This is especially true when the trends are leading towards "the emergence of more complex worlds."[6] It is difficult to accept that a mindless random process could produce a mindful being that has purposes and searches for meaning. It seems fitting that the cosmos produce an organism through which it can become conscious and know itself. The conclusion that there is an intelligence directing the process of evolution is inevitable if it is admitted that there are trends leading to higher beings with richer ways of life, i.e., progress. But if evolution is a teleological process directed and powered by the Creator, why should bisexual reproduction be a goal?

The Book of Genesis indicates that the Cosmos was brought to completion by the creation of humans. After the creation of man and woman, God gave them the earth to fill and every living thing to be in their care. God gave them plants to be their food and the sun and moon to be their light. He gave them the Earth to be their home. Only after the creation of mankind did God see that everything was "very good" (Gen 1:26–31). Man completes the universe because he is rational and free. Without him there would be no one who could look at the world and see traces of the Creator. He alone can receive his life and the whole cosmos as a gift and thank the Giver. In praying, humans complete the cosmos by giving it a voice so that it becomes capable of praising God. "Praise him, sun and moon, praise him, all you shining stars!" (Ps 148:3).

Humans are not only in the image of God because of their reason and will but also because they are male and female. "So God created man in his own image, in the image of God he created him; male and female he created them. And God blessed them, and God said to them, 'Be fruitful and multiply…'" (Gen 1:27–28).

God, who is Truth and Love, creates humans out of love and for love. John Paul II provides a profound theological interpretation of human sexuality in his *Theology of the Body.* God creates man and woman as a gift to enter into a communion of covenantal love with him. To be male and female is to be made for communion with another. The sexual organs are physical signs of being made to be a gift. The marriage union reflects the mystery of God, who is Love. "The sacrament, as a visible sign, is constituted with man, inasmuch as he is a body and through his 'visible' masculinity and femininity. The body, in fact, and only the body, is capable of making visible what is invisible: the spiritual and the divine."[7] God creates the visible cosmos to make present in a new way, in a visible way, his love.

Sexuality does not have the same significance of gift and communion in lower animals and plants because they are not persons. Sexuality in beasts is driven by appetite and instinct. However, there is an attenuated aspect of gift in all sexuality. The male must give his seed to the female to produce offspring. The female must receive the male's seed and give herself as a receptacle or womb for their mutual production of progeny. Both male and female give something of themselves, a gamete, to the offspring. They give the specific life that they received as a gift to their offspring. They feed and protect the offspring in higher species. They may even give their life to protect their young. There is a dim foreshadowing of the gift-of-self that is present in human sexuality, as there is a dim foreshadowing of rationality in animal instinct and estimative power.

God reveals himself in the Old Testament as the God of creation and the Covenant. He creates a cosmos out of gratuitous love and calls forth rational creatures that can receive the cosmos as a gift. From these, he chooses a people for himself and binds himself to them in a covenant. The most adequate sign

of God's covenantal love is the faithful spousal love of a bridegroom for his bride. God tells the people of Israel about his spousal love for them through the prophets. "I will allure her, and bring her into the wilderness, and speak tenderly to her… I will espouse you in faithfulness; and you shall know the Lord" (Hos 14□15,19□20). God, the Giver, is reflected in male and female, shaped to be gifts to each other. God who binds himself with faithful covenantal love to his people is made visible in the marriage act, which consummates the covenant.

Christ revealed another dimension of God. He is love and gift-of-self within because he is a Trinity. God is a communion of persons: Father, Son, and Holy Spirit. The Father gives his divine nature to the Son. "The Father loves the Son and has given all things into his hand" (Jn 3:35). The Father and Son give the divine nature to the Holy Spirit.

St. Thomas speaks about two kinds of unity in the Trinity in the *Lectura Romana* when he comments on the passage "that they may be one; even as we are one" (Jn 17:11). The first is essential unity: Father, Son and Holy Spirit are one God. The second is affective unity: "the harmony of love."[8] Man and woman can imitate the Trinity in this "harmony of love." This is the communion of love that is physically expressed in the marriage union. Other human friendships imitate the Trinity in an affective unity, but only the marriage union imitates it in a second respect also, in reproductive fruitfulness. Because of the fruitfulness of the marriage union, humans are a more perfect divine image than angels in this respect, according to St. Thomas. "There is man from man as there is God from God."[9] However, he warns that this does not belong to the "divine image in man, unless we presuppose the first likeness, which is in the intellectual nature; otherwise even brute animals would be to God's image."[10] Male and female, wherever they are found in the biological kingdoms, are a trace of the Trinity; only in humans, because they are persons, are they a divine image and their union a sacrament of divine love. This leads to many moral consequences.

Ethical Consequences

Faithfulness, fruitfulness, and sacrificial love for spouse and children are the fitting response to living a sacrament of Trinitarian love. But if reductive Darwinism is correct, then lust, fornication, polygamy, adultery and rape are all adaptive because they enable a man to pass on his genes more successfully. As Richard Dawkins says in *The Selfish Gene,* "Individuals of either sex 'want' to maximize their total reproductive output during their lives. … Males are in general likely to be biased towards promiscuity and lack of paternal care."[11] Human genes are no exception to the selfish impulse to reproduce at all cost.

Sociobiologists write articles explaining how various forms of sexual behavior have evolved through natural selection.[12] They have no principles that could allow them to judge one behavior *better* than another. They believe humans are not essentially different from other animals and animals have no natures for which certain behaviors could be good or bad. They can only suggest that a certain behavior is better adapted than another behavior in a certain society at a certain time in order to transmit the most genes.

If, however, the cosmos was created to make God's glory visible in physical bodies, then the cosmos is sacramental, "charged with the grandeur of God."[13] Everything has meaning and points beyond itself to the transcendent. Male and female are cosmic signs. The Greeks and Romans saw the Sky Father as masculine and Mother Earth, of course, as feminine. Likewise Nordic, Germanic, Indian, Chinese and Native American myths have a Father Sky God and a Mother Earth Goddess. "In the act of love," C.S. Lewis tells us, "we are not merely ourselves. We are representatives. It is here no impoverishment but an enrichment to be aware that forces older and less personal than we work through us. In us all the

masculinity and femininity in the world…are momentarily focused."[14] We might borrow from John of Damascus, who calls man a "microcosm."[15] Together man and woman are a microcosm because they sum up the meaning of the cosmos in their bodies.

Man and woman are sacramental in their complementarity. Their lifelong gift-of-self in marriage mirrors the Creator, who is the Giver of Life and the Lord of the Covenant. Most profoundly, their lifelong union makes visible the communion of persons in the Trinity. Faithfulness, total gift-of-self, and fruitfulness in a lifelong marriage between a man and a woman mirror the Trinity in a way that other friendships cannot. Parent and child, friends at school, or colleagues at work cannot reflect the Trinity in the same bodily manner as a husband and wife who become the common origin of personal life. The division of the sexes did not develop by chance. No, "God created man in his own image, in the image of God he created him; male and female he created them" (Gen 1:27).

[1] Richard Dawkins, *The Selfish Gene*, 2nd ed. (Oxford: Oxford University Press, 1989), 35. "Individuals are not stable things, they are fleeting…. The genes are not destroyed by crossing-over, they merely change partners and march on. … They are the replicators and we are their survival machines. When we have served our purpose we are cast aside. But genes are denizens of geological time: genes are forever."

[2] David Sadava, David M. Hillis, H. Craig Heller, and May R. Berenbaum, *Life: The Science of Biology*, 9th ed. (Gordonsville, VA: W.H. Freeman, 2011), 902.

[3] Doris Bachtrog , Judith E. Mank, Catherine L. Peichel, Mark Kirkpatrick, Sarah P. Otto, Tia-Lynn Ashman, Matthew W. Hahn, Jun Kitano, Itay Mayrose, Ray Ming, Nicolas Perrin, Laura Ross, Nicole Valenzuela, Jana C. Vamosi, "Sex Determination: Why So Many Ways of Doing It?" *PLoS Biol* 12(7): e1001899. doi:10.1371/journal.pbio.1001899

[4] Simon Conway Morris, *Life's Solution: Inevitable Humans in a Lonely Universe*, printing (Cambridge: Cambridge University Press, 2009), 304□07.

[5] Ibid., 307.

[6] Ibid.

[7] John Paul II, *Man and Woman He Created Them: A Theology of the Body* (Boston: Pauline Books and Media, 2006), 19:4.

[8] Thomas Aquinas, *Lectura romana in primum sententiarum Petri Lombardi*, d. 10, q. 3 ad 3. "consonantia amoris."

[9] Thomas Aquinas, *Summa theologiae* I, q. 93, a.3.

[10] Ibid.

[11] Dawkins, *Selfish Gene*, 161.

[12] E.O. Wilson, *Sociobiology: The New Synthesis*, 25th anniversary ed. (Harvard: Harvard University Press, 2000). Wilson led the way in explaining every human behavior and ethical law as an evolutionary adaptation.

[13] Gerard Manley Hopkins, *God's Grandeur*.

[14] C.S. Lewis, *The Four Loves* (New York: Harcourt Brace Jovanovich, 1960), 145.

[15] John of Damascus, *De fide orthodoxa*, II, 12.

Susan Waldstein teaches theology at Ave Maria University. Her area of special interest is the interface of theology and biology in such topics as evolution and hierarchy in nature.