

Gaia Beware:

Infertility in SF due to Bioterrorism, Pollution and Accidental Iatrogenic Events.

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SF has widely depicted eschatological scenarios of all types since we seem to willingly 'accept the lure of annihilation, only to discover that it is a temporary condition, a gateway to renewal and rebirth', an omnipresent theme in legend, myth and ritual.¹

Of these scenarios, infertility in particular is a crucial issue that afflicts many individuals, and epidemiologists estimate that the number of European couples who struggle to have children will double within a decade. One in three couples is likely to suffer infertility in ten years' time, compared with one in seven today, and this is thought to be due to the rising age at first attempt at pregnancy when fertility naturally declines, an increase in sexually transmitted diseases which damage the reproductive organs, a huge increase in obesity which is known to adversely affect fertility, and a declining level of male sperm count and overall sperm quality.²

This paper will limit itself to the intersection of infertility in SF with bioterrorism, pollution, and accidental iatrogenic events, all potentialities that may affect our fragile biosphere. These depictions are common in the genre, and perhaps this is because 'catastrophism evidently makes for more compelling fictional narratives than gradualism'.³

Real-life parallels will be highlighted, where and when appropriate and available, by the author, who is a medical doctor. Errors that go beyond the pale of poetic licence will also be pointed out, since 'error-free science fiction is an ideal [...] impossible of achievement [...] not that [...] the author can be excused for not trying; unreachability is, after all, what ideals are for'.⁴ A wide variety of narrative forms are included, in a comprehensive attempt to include all such narratives, and these include not only novels, short stories and films, but also computer games and comic books.

Infertility as a Result of Bioterrorism

Warfare on a mass scale between various groups of humans, or between aliens, or sentient machines, or any of these combinations has repeatedly been described in SF. However, warfare may also be waged by small groups of individuals on the rest in acts of terrorism.

Terrorism is now common in SF, a metaphor perhaps, for the current 'War on Terror'. Interestingly, SF has responded in a variety of ways to terrorism, including a satirical work edited by Farah Mendlesohn that knowingly tests the UK Terrorism Act of 2006 through the deliberate assembly of an anthology of works that break the restraints of this law.⁵

Bioterrorism is the intentional release of naturally-occurring or human-modified toxins or biological agents. In Greek mythology, the Telchines (who were either malicious daimones or malicious men) had the evil eye and were proverbial for their malice. Indeed, they sprinkled the island of Rhodes with water from the Styx in order to render it infertile.⁶

Certain properties of biological agents may make them ideal terrorist weapon, such as ease of procurement, simplicity of production in large quantities at minimal expense, ease of dissemination with unsophisticated technology, and the potential to overwhelm medical systems with large numbers of casualties. The dissemination of a biological agent can be silent and the incubation period allows a perpetrator to flee before the first symptoms of disease. General countermeasures to combat biological warfare and bioterrorism are inherently problematic and include intelligence gathering, physical protection, and detection systems. Medical countermeasures include laboratory diagnostics, vaccines, and medications for prophylaxis and treatment.⁷

For example, the devastating effects of such attacks were readily demonstrated by the Aum Shinrikyo sect attack in the Japanese subway system in 1995. This particular religious cult is obsessed with the apocalypse and in an attempt to hasten doomsday, released sarin nerve gas into the Tokyo subway system, killing twelve people and hospitalising 5,000 others. Sarin is a highly toxic and volatile nerve agent developed by Nazi scientists in the 1930s, and is some 500 times more toxic than cyanide gas. The attack was timed to hit the peak of the Monday morning rush hour in one of the busiest commuter systems in the world. This was the most serious terrorist attack in Japan's modern history, causing massive disruption and widespread fear in a relatively crime free society, and demonstrated just how easy it is for

a discontented minority with limited means to engage in chemical warfare. Sarin is difficult to produce but can be created using publicly available chemicals, and so the sect recruited science university graduates.⁸ Sarin also causes long term pathological effects including fatigue, asthenia, shoulder stiffness, blurred vision, neurophysiological and behavioural alterations.⁹ Ironically, the current war on terror has actually created fertility problems, such as the toxins used during the Gulf War which may have decreased fertility in its male veterans.¹⁰

In bioterrorism in SF, brave (or psychotic) individuals are depicted as taking matters into their own hands for a variety of reasons. A common one is that governments and states make no attempt to curb rampant population growth that overcomes finite natural resources with irreversible ecological damage and pollution, leading to massive multispecies extinction and loss of biodiversity. In the same way that natural viruses have been synthesised *de novo, in vitro*, such as the recreation of the polio virus from commercially available materials, SF also describes manmade viruses specifically tailored to curb humanity's overfecundity.¹¹

In Blake Sterling's short story *A Desperate Calculus* (1995) a small group of scientists create a modified 'superflu' that ravages the globe, a virus that interacts with the female hormonal system inducing all of a woman's ova to mature and be released simultaneously.¹² The author is effectively assuming a process of extreme ovarian hyperstimulation, analogous to, but far more severe than, the technique of controlled ovarian hyperstimulation that is currently used in assisted reproductive techniques. In this process, part of infertility treatment, several ova are induced to mature by a combination of drugs and hormones before being harvested for use.¹³ However, this story posits a most extreme and hitherto unseen form of ovarian hyperstimulation, a condition that only affects 1-2% of women in infertility treatments, mainly those who produce a large number of ova, which then result in grossly elevated hormone levels. This initiates a fluid leak from the bloodstream into the rest of the body, especially the abdominal cavity, leading to abdominal swelling, dehydration, shock and increased blood viscosity with the risk of thrombosis including stroke. Death is possible.¹⁴ In this story, intercourse would also have risked multiple pregnancies.¹⁵

The narrative leaves humanity with a modicum of fertility, as in fifteen percent of women the virus does not destroy all ova. Yet another complication of this epidemic would have been premature menopause in eight-five percent of the surviving female population, as these would have no ova left with which to have menstrual cycles. Complications of premature menopause include osteoporosis (weakening of the bones with the predisposition to fractures), ischaemic heart disease with angina and myocardial infarction, hot flushes, vaginal mucosal atrophy with painful intercourse and weakening of the muscles that support the genitourinary tract, possibly leading to incontinence or urinary tract infection, thus leading to the premature demise of millions of women.¹⁶ The virus unfortunately kills weak and elderly individuals, as does the true influenza virus. The scientists who engineered the virus are said to have been inoculated against the disease, but are still vectors,

carrying the disease all the over the globe thanks to air travel.¹⁷

In contrast, a story that does not ignore the importance of the female menopause is Thomas Disch's *Things Lost* (1972) wherein immortal women have a supply of ova frozen so as to stave off the menopause, a self-contradiction in that ova are depleted regularly, and a finite supply, however large initially, will eventually become depleted given a sufficient – and potentially infinite – amount of time.¹⁸

Wolbachia parasites engineered to infected humans are released to create widespread global sterility in Ejner Fulsang's *A Destiny of Fools* (2000). Wolbachia are one of the world's common and successful parasitic (gram-negative) bacteria, and live inside cells (endosymbionts), specifically, in testes and ovaries. These bacteria are rampant in the invertebrate world, affecting up to seventy percent of all insect species, and many species of nematodes (parasitic worms). The effect of bacterial infection may include (depending on the species infected) the death of infected males, the feminization of males to females or male conversion to infertile pseudo-females, the stimulation of parthenogenesis (reproduction without sexual contact with a male of the species) and cytoplasmic incompatibility resulting in the inability of Wolbachia-infected males to successfully reproduce with uninfected females or females infected with a different Wolbachia strain. Some researchers suspect that Wolbachia may even be important in speciation (the formation of new species) in affected species.¹⁹

Similarly, in Blanche D'Alpuget's *White Eye* (1994), a manufactured virus sterilises humans without destroying their sex drive. This virus is engineered from another virus that causes a painful death, and almost predictably, the original killer virus escapes.²⁰ In a more comic vein, the German film *Killer Condom* (1996) features condoms that are actually genetically mutated creatures, a conspiracy on the part of a religious group that attempts to rid the world of homosexuals by having these creatures attack and kill by biting off penises.²¹

Comic book SF has also dealt with infertility in the mad scientist trope, and since comics typically excel in goshwow heroes and stories, it comes as no surprise that *The Avengers* (Marvel Comic heroes) thwart the evil plans of the 'Yellow Claw' who planned to eliminate humanity as we know it by rendering all of humanity sterile through the release of a gas, while keeping a fertile set of women within his gas-proof base. The Yellow Claw planned to repopulate humanity by fathering children from women chosen for their superior genetic traits.²² Similarly, in AH Johnson's *The Thunderer* (1930), a scientist threatens environmental catastrophe if he is not given a work force, money, power and the total control over marriages, along with the right to sterilise any as he sees fit in his attempt to create a perfected humanity.²³ More altruistically, in John Taine's *Seeds of Life* (1931), a scientist who has become highly evolved and intelligent as a result of accidental exposure to radiation, decides to sterilise humanity in order to prevent useless suffering.²⁴

In a more egalitarian vein, a deranged scientist in *The Brains of Rats* (1986) develops a virus that can transform all unborn babies into males or females.²⁵ More recently, Margaret Atwood's *Oryx and Crake* (2003) simultaneously

indulges several themes by positing a scientist who uses his trusted position in a biotechnology corporation to genetically engineer 'Crakers', a physically beautiful and perfectly proportioned but dull, peaceful and herbivorous version of humanity, who only have sexual intercourse during limited breeding seasons and who die suddenly in their thirties. Since they are not products of natural selection, they have no inbuilt subconscious drives that encourage evil. Simultaneously, the same ingenious scientist creates a Viagra-like pill (BlyssPluss) which heightens sexual pleasure, increases libido, provides a general sense of energy and well-being, prolongs youth, and is supposed to prevent users from contracting sexually transmitted diseases. However, BlyssPluss unknowingly also sterilises both males and females with a single use, while simultaneously infecting users with an AIDS-like virus called 'JUVE', that is quicker in action and more lethally painful than AIDS. Crakers are naturally created immune.²⁶

Marc Platt's *Doctor Who: Cat's Cradle, Time's Crucible* (1992) explains the absence of children on the Time Lords' home planet through a curse that managed to kill all unborn children and rendered the entire planet sterile.²⁷ And Sanders's *The Sterile World* (1932) depicts a terrestrial colony on Venus based on altruism and fostering of the arts and sciences, where a throwback with the old human tendencies of egotism and selfishness turns a lethal ray on Earth, sterilising all animal life, including humanity.²⁸

Infertility Due to Pollution

Atwood's *The Handmaid's Tale* (1986) envisages a future wherein chemical pollution and nuclear accidents widely contaminate the environment and drastically reduce fertility.²⁹ The protagonist is a 'Handmaid', a slave in a fundamentalist society where women have no right to have property, occupations or literacy, and their sole function is to provide a child for a military officer and his sterile wife, a woman-as-breeder theme that will be re-mentioned. She is a valuable commodity in that she had had a child in the past, thus proving her fertility, a trope that was also used by Aline Boucher Kaplan in *Khyren* (1991).³⁰

Severely reduced human and animal fertility and a greatly increased risk of malformation is inherently unavoidable in a highly polluted future Earth in John Varley's *Millennium* (1985). 'Snatch teams' return to the past in order to remove fertile people who are about to die in accidents (typically airplane accidents) and whose disappearances will not be noticed (and so will not affect the timeline), and who are then used to colonise extrasolar planets.³¹ Realistic breathing but brainless mannequins that approximate the appearance of each and every snatched passenger are herded onto the planes as substitutes. This would naturally not work with current DNA technology being able to identify each and every biological fragment in a plane crash.

In similar vein, FM Busby's *Islands of Tomorrow* (1994) depicts humans also travelling back in time and abducting humans into the future for breeding purposes, and one of the women has a contraceptive implant and hence, initially, fails to become pregnant.³² And in Anne McCaffrey's *The Ship Who Sang* (1969), toxic environmental conditions lead to a high birth incidence of children with

severe physical handicaps and intact brains.³³

This trope is repeated in Nancy Kress's *Maximum Light* (1999), set in the 2030s where environmental synthetic chemicals disrupt the endocrine system and cause sperm counts, and therefore birth rates, of all species to plummet. Humanity consists primarily of people over the age of fifty, children are considered precious resources and the search for a solution to this infertility is given top priority. Children are generally found to suffer from slower and more limited brain development than previous generations. The protagonists eventually uncover a conspiracy to create hybrid human/animal 'substitutes' for couples desperate for a child.³⁴

Declining fertility due to falling sperm counts, coupled with the rapid onset of a new ice age in the year 2050, with societal decline into anarchy and chaos is portrayed in Maggie Gee's *The Ice People* (1998). Mass emigration from the former rich north to the more congenial south is unwelcome and the fabric of society changes into a pattern such that women flock around the rare children while men congregate together.³⁵

Robert Silverberg's *The Wind and the Rain* (1973) depicts a most extreme scenario, with human archaeologists excavating and restoring Earth, a planet that had been devastated by pollution, and where the few remaining human survivors on the planet have had to exist in special suits to prevent death from toxic pollution, with understandable reluctance to shed said suits in order to copulate.³⁶

The environment may be habitable but may not permit reproduction due to some form of chemical contamination that is not man made, and this is envisaged in the film *Unknown World* (1951),³⁷ loosely based on Jules Verne's *A Journey to the Centre of the Earth* (1864).³⁸ In the film, scientists drill deep into the Earth's crust uncovering a large underground space that renders their experimental rabbits, and by extrapolation, other animal life, sterile.

Accidental Iatrogenic Infertility

Widespread infertility may also be a completely accidental and involuntary iatrogenic event in SF, a flawed cure as depicted by Llewellyn-Thomas in his three books *The Douglas Convolution* (1979),³⁹ *The Bright Companion* (1980)⁴⁰ and *Prelude to Chaos* (1983)⁴¹. This trilogy is set in a 22nd century Earth suffering from widespread female infertility brought on by the use of a contraceptive agent. Similarly, in Tung Lee's *The Wind Obeys Lama Toru* (1967), fertility and sterility drugs act and counteract, driving human population levels up and down in a chaotic fashion.⁴² Likewise, in HF Parkinson's *They Shall Not Die* (1939), a drug is available that prevents all disease but sterilises all those who take it.⁴³ Radiation too has been implicated in this trope, and Piper's satirical *Operation RSVF* (1951) refers to the State irradiation of rats in order to render them sterile, followed by the same treatment to human criminals and the mentally defective, only for scientists to find that this results in a venereally contagious sterility.⁴⁴

Conclusion

Our anxieties are unalloyed by technological advances that may have far-reaching consequences, particularly when well known scientists also sound a warning clarion

call to this effect. Sir Martin Rees, the former Astronomer Royal, estimates mankind's odds of surviving the end of the 21st century as even. He lists as mankind's biggest threats the possibilities of nuclear or biological terrorism using engineered viruses, rogue machines including nanotechnological devices, and genetic engineering that could alter humanity out of all recognition. Natural events also threaten the entire Earth's biosphere and these include impacts by large asteroids or comets and super-massive volcanic eruptions. Rees argues that the risk has never been greater, not even during the peak of the Cold War. He advocates a renewal of the space programme with the intention of establishing self-sufficient extraterrestrial colonies of humans or intelligent machines who would be humanity's designated descendants, such that an Earth-destroying catastrophe would not terminate mankind.⁴⁵

Virtually all of the narratives included in this reading echo this. They are closed, quasi-eschatological scenarios, in that humanity somehow survives, having been taught a lesson, providing a 'narrative "escape" (the conventional Hollywood happy ending), by suggesting the possibility of communal rebirth'.⁴⁶ They also vividly illustrate one of SF's prime aspirations, that an SF author may

make my life a little more exciting for the next couple of days. He might even get me wired up to learn more about [...] science, [...] to reveal some truth to me—an insight that would make me think "By gosh, you're right, that's the way things are" or "I never thought about it *that* way before".⁴⁷

These narratives also adhere to '[t]he SF dictum that stories ought to be postulated on scientific concepts extrapolated from the existing data',⁴⁸ a convention that 'has not always been an easy standard for the genre's writers to maintain'.⁴⁹

Moreover, since all of these existential risks involve human meddling in Earth's fragile biosphere, with consequences that are likely to impinge on humanity in more ways than simply infertility, SF's admonition is that it behoves us to care for our entire ecosystem lest we destroy our own race. 'Some of these new threats are already upon us; others are still conjectural',⁵⁰ which is where SF's unbridled imagination may be helpful, by *gedanken experiments* that might help us plan how to avert or deal with possible catastrophes or even eschatological scenarios.

[Endnotes]

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