APPENDICES

1. BRIEF TIMELINE OF COLONIZATION OF TURASET

The collapse of civilization on Earth in the late twenty-first and early twenty-second centuries resulted from two things: a rapidly warming climate and an exponential rise in computer learning and sentience. In parallel, advances in molecular biology (most notably gene-splicing technology, i.e. CRISPR), enabled radically new bio-engineering strategies not only of crop plants and livestock but also humans.

Within this milieu, ships from numerous space agencies fled Earth. Their cargoes included genetically modified (as well as unmodified) seed and embryo banks. While diverse and extensive in scope, these banks did not include everything Earth had to offer. Disease vectors (e.g. *Aedes*) and parasites (e.g. *Giardia*) were not included for obvious reasons.

Of the fleeing ships, six arrived at Turaset some decades later. As a planet in the 'Goldilocks' zone of a distant star system, Turaset first appeared to be an ideal, if tiny, new home with a breathable atmosphere and no initial evidence of intelligent life. The day-length (27 hours) and orbit (420 days) were Earth-like, and water covered eighty-eight percent of the planet's surface.

The touch-down site was named 'Good Air' (later, 'Gaderr'). Although the ships were not designed to re-launch to space, they could manage travel between land masses and this was intended once the colony took hold—in an estimated five to ten years' time. It was thought that this

would be sufficient time for the colonists to develop Turasetian-based agriculture and begin having children.

Several months after landing, the rotation of Turaset's two stars aligned with the planet in the celestial semi-annual arrangement later known as Conjunction, and the colonists grew sick from a previously-unrecognized form of cosmic radiation. The first Conjunction killed seventy percent of the colony and was called the Great Death (later, the First Great Death). Crops and livestock were similarly devastated.

The mission at Gaderr shifted to feeding and housing survivors and finding a means to survive this radiation. This state of affairs lasted for close to a century, with the prior goal of dispersing to other sites on the planet's surface discarded. Turaset's brightly-colored native fauna was immune to the radiation, and the scientists looked for a biological solution—pigmentation genes—that might be forced into humankind to allow compatibility of Earth's children with Turaset's natural cycles. Roughly fifteen generations passed before the pigment genes were adequately expressed, such that conjunction was no longer seen as a threat to survival.

Approximately five hundred years after landing, the colony's population, at last, began to grow at a decent rate. With Earth plants similarly adapted to Turaset, Gaderr had achieved an Earth-analog status and dispersal to secondary colonization sites began.

Approximately a millennium after landing, multiple outposts across Turaset (including all four major land masses) were self-sustaining. This was a turning point in history, and trade began.

The Second Great Death, biological rather than radiological, occurred within this era. One theory says the transport of goods trafficked disease organisms. A second theory suggests that silent DNA, introduced at

Gaderr with the pigmentation genes, had somehow become activated. Possibly the combination of these factors precipitated the pandemic, but sixty-five percent of the human population died, and several staple crops and animal species (e.g. soybean, dromedary) were lost completely.

The remnants of recorded history from Earth were scoured for techniques to fight plague, an effort that led some Turasetians to argue that the Second Great Death would never have occurred had their world hewn to a more technologically-advanced practices. They claimed an agrarian lifestyle, which had been adopted by the colonists because of Earth's own history, lay at the root of the Second Death. They said technology was necessary going forward.

In particular, one woman (Betha O'Mardon B'GerFra) became a vocal critic of the rustic path. It was clear, she insisted, that agrarian living was fraught with risk, and that trade by its nature not only trafficked organisms but also promoted homogenous thinking. She insisted that the development of diverse societal approaches would benefit humanity in the long run. The loss of 'idea diversity,' she said, was to everyone's detriment. Bertha began a movement toward isolationism. The concurrent cessation of trade, intended to help end the ongoing pandemic, led to some settlements perishing while others began to grow.

Regional traditions took hold, and distinct cultures formed. Some settlements, especially those populated and influenced by Betha B'GerFra's adherents, eventually re-developed more advanced technologies. Over time, fossil fuels were discovered on Turaset and these technologically-inclined settlements embraced them.

Eventually, trade was established once more and intermixing of cultures and ideas began again.

Approximately three thousand years after humanity left Earth, the global population on Turaset surpassed one million. Cities dotted the coast of Nasoir (the largest continent in the western hemisphere) and Deasoir (the largest continent in the eastern hemisphere).

The events of *Aerovoyant* occur at roughly this point.

2. SELECT CULTURAL PRACTICES ON NASOIR

2a. Surname conventions.

Following the First Great Death, rapid reproduction was mandated. As part of the effort to prevent inbreeding, surnames derived from a child's parents' and grandparents' given names. A child of Mary and John, for example, who were themselves the children of Frances and Michael or Yvonne and Francis, would have the following surname: *of JohnMary by FrancesMichael and YvonneFrancis* (abbreviated to o'MarJoh b'FraMicYvFran). While bulky, this convention did limit interbreeding. Over time the convention simplified.

On Nasoir:

1. Couples take a unique surname at marriage derived from the given name of the partner in higher business standing. If this partner is a woman, the prefix 'Van' (coastal) or 'Von' (inland) is added. If the partner is a man, the prefix 'di' (coastal) or 'de' (inland) is used. Thus, the surname conveys a general geographical location of the family and relative business standing of the respective partners; e. g. **Ardelle and Ephraim Vonard** live in the inland region and Ardelle has a higher business standing than Ephraim. **Lesteri and Marja di Lest** live on the coast and Lesteri has a higher business standing than Marja.

Children are given this surname until their own marriages. For example, in the event that Odile Vonard takes a business and marries, her surname could change from Vonard to Vonod.

2. In cases of divorce or death, surnames can be (and often are) changed to remove implications inherent in the above. Typically, the prefix 'Na' or 'Pe' is appended to a chosen word, and children take the new surname of the parent with whom they remain; e.g. As a child, **Alphonse Najiwe's** last name was di Marc. His mother, following divorce, changed her last name to Najiwe in order to convey 'by (na) stone (jiwe),' or 'by hardness,' which is how she envisioned surviving.

2b. Courting and marriage.

Practices vary by region.

1. **In cities, high populations and formal education promote socialization between peers**. Attachments naturally form. Self-matching is typical.

2. **In agrarian regions, interactions between peers are less common.** Consistent with a role in managing an often-isolated family stead, parents seek suitable matches for their children. A match can be initiated in either direction.

3. **Foothill practices lie between these extremes**. Parental matching occurs, especially to facilitate the family business. If the son of a weaver will take the family business, a sensible match by foothill village standards is with the daughter of a dressmaker. However, it's not unusual for youth to self-assort into matches of their own choosing. Parents may be consulted.

Courtship traditions exist in villages. If a person initiates courting, and the recipient is disinterested, the courted individual will insist they're strangers whether true or not. If the courted individual is interested, they will give their name whether the two have previously met or not.

2c. Business.

1. **Manufacturing drives city economies**. In Nasoir's cities, industry (energy, pharmaceutical, etc) employs a majority of residents. Family-run businesses are only a small percentage of the economy. It's common for city youth to try a number of jobs before choosing career paths, which may or may not follow their parents'.

2. **Family businesses drive the economy of the foothills and belt.** Apprenticeship to the family business is common in rural areas. Even more than formal schooling, children learn to take over their parents' livelihoods.

A net-positive birth rate in the countryside leads to surplus labor. Among those who don't take the family business, some claim land in the agricultural belt. They work their holding through mining, farming, logging, ranching, or, in some cases, construction and artistry. Others find work in the cities.

3. **Pay Gap**: The pay gap on Nasoir is opposite to what had existed on Earth. Nasoirian women earn roughly double as men for equal work. Some believe this gap traces to the colonization and to a loose interpretation of one of the founding precepts. Whether or not, the pay gap became accepted. Women are viewed as more valuable for the following reasons:

a. Their life span averages six years longer.

b. Similarly, retention of mental executive functions averages eight years longer for women.

c. On the whole, women are more risk-averse and suffer fewer injuries in their adolescence and young adulthood. This translates into fewer job-related accidents and ongoing liabilities from past accidents. Women provide a work force with lower extraneous costs.

d. Women tend toward relational interactions; men tend toward hierarchical interactions. Relational interactions are seen as more beneficial to business.

e. Hiring a mother usually enables two jobs—one for the woman and one for whomever she hires to care for her children. Thus, a fraction of pay goes toward childcare. (The allowance can be made for men under analogous circumstances.)

Certain careers, such as term-limited political posts, are more likely to approach pay equity. Livelihoods requiring physical strength are biased toward men, but income from these jobs depends on product to market. The idea of a pay gap doesn't apply.

3. PARTIAL LIST OF MODIFIED TRAITS

During the CRISPR frenzy of Earth's twenty-first century, myriad genetic modifications were introduced into the human genome. These modifications included duplication and specialization of tissues, introduction of genes from other organisms, and computer-based prediction and *de novo* synthesis of genes with novel function not previously extant in the biosphere.

Once on Turaset, colonists engineered additional traits. However, ship-board DNA technology was eventually lost and this practice ended.

Over the centuries, the local frequency of any particular trait began to vary, a result of genetic drift and selection. During *Aerovoyant* and its sequels, differences in allelic frequencies are most pronounced between continents. Below, an approximate global frequency is provided for each trait. Some traits, such as resistance to radiation, are universal; the allelic frequency is 100%.

The origin of each trait (Turaset or Earth) is indicated.

Aerovoyancy (rare; Earth origin): Duplication of ocular and visual cortex tissues to allow perception of atmospheric chemistry. In essence, this modification amounts to a biological encoding of a technological tool. More broadly, conversion of technology to genetically-encoded biological function was part of an Earth-based trend to send technology to space in biological form.

Audiovoyancy (common; Earth origin): Duplication and specialization of aural tissues to allow perception of sound above and below the normal

human range. Selective communication is possible between vocalizers and audiovoyants. Individuals possessing both of these modifications can communicate in a way that mimics 'telepathy.'

Barometrics (extinct; Earth origin): Barometrics tolerate rapid shifts in pressure with no ill effect. Based on marine animals that transit vertical depth routinely and easily, the ability was reverse-engineered into humans and augmented. It was thought that barometrics would be particularly well-suited to extra-vehicular activities in space, e.g. hull repair.

Chronovoyancy (rare; Earth origin): Individuals capable of marking time to a remarkable degree of accuracy and precision. The ability stems from changes to cell cycle proteins. Pairs of chronovoyants can separate from one another and synchronize their behaviors over minutes, days, months, and years.

Docility (universal; Turaset origin): Genes linked to aggression were pruned out of the genome in an effort to limit human-on-human death in the early generations. In other words, Turasetians are gentler than their Earth ancestors.

Dowsers (somewhat common; Turaset origin): Specialization of nerves in the hands toward the detection of moisture. Dowsers detect groundwater through handling soil.

Elysians (rare; Earth origin): The ability to host foreign plastids in dermal tissue; specifically, the ability to ingest an algal meal and sustain chloroplasts in the skin. In so doing, Elysians can photosynthesize sugar from suns-light. This provides an evolutionary advantage during food shortages.

Geovoyancy ('Time binding.' Rare; Earth origin): Earth history was encoded onto the Y chromosome, and a new organ able to interpret the coding was developed in the amygdala. Geovoyants serve as historians on colonized worlds.

Gravimerics (extinct; Earth origin): Individuals capable of detecting gravitational anomalies by sight. This ability was rumored to play a crucial role in helping spaceships find new homes. The physical basis of the ability is unknown.

Healer suite of genes (uncommon; Earth origin): Enhancement of the parasympathetic nervous system, with some duplications in the hands and feet, such that touching a patient allows a healer to assess their physiological state. Healers can measure pulse, body temperature, blood pressure, immune system activity, and so on, through touch.

Insensates (rare; Earth origin): Extreme down-regulation of nervous system function related to pain tolerance. Insensates are naturally tolerant to pain.

Isotopics (rare; Turaset origin): Like aerovoyants, isotopics perceive particles down to the molecular level, and some of the same tissue duplication lies at the basis of this ability. However, this trait is specialized toward the detection of elemental isotopes.

Luminescents (unknown; Earth origin): Bioluminescence was one of the earliest test applications of CRISPR, and that manipulation quickly found its way onto the black market. The desire among some parents to give their children the ability to glow can be thought of as loosely grouping with vanity surgeries, body painting, and so on. The ability made

its way to Turaset, but the gene frequency is unknown, as bioluminescence requires a dietary component to activate.

Magnetotactics (unknown frequency; Earth origin): Enhancement of the organ in the human forebrain that detects magnetic fields. Magnetotactics have a well-developed sense of direction.

Peacekeeper suite of genes (somewhat common; Turaset origin): This group of genes includes sequences coding for super-strength (augmentation and overexpression of myostatin) and adherence to order. So-called 'peacekeeping' individuals self-select toward law—usually seeking jobs in the marshalry.

Piezoelectrics (rare; Turaset origin): Piezoelectrics have a third long bone running parallel to the radius and ulna in each forearm. This third bone, the piezus, is specialized to absorb and store piezoelectric energy (generated from mechanical stress). The stored energy can be discharged and used in various ways.

Pigmentation (universal; Turaset origin): Pigments identified in Turaset's native fauna were reverse-engineered into the human genome to protect the colonists during Conjunction. Within three generations of landing on Turaset, everyone carried some new form of pigmentation, but these colors varied in their relative efficacy. Over subsequent centuries, evolutionary pressure selected the 'most fit' versions of these pigments.

Skeletonics (common; Earth origin): Enhancement of the LRP5 allele promoting dense bones.

Super-sleepers (uncommon; Earth origin): Individuals with alterations in the hDEC2 gene, who maintain normal functioning over several weeks

at a time in the complete absence of sleep. Supersleepers were valuable crew members in space, but the gene frequency on Turaset drifted downward over time.

Super-sprinters (somewhat common; Earth origin): Enhancement of the ACTN3 genes. Super sprinters can sustain a three-minute mile for five or more miles.

Telomerics (rare; Earth origin): Individuals whose chromosomal telomeres are protected from degradation. The natural lifespan of telomerics measures into millennia, but these individuals can see psychological decline after a few centuries, and some telomerics take their lives before they've reached their own natural middle age.

Vocalizers (unknown frequency; Earth origin): Duplication and specialization of vocal tissues to allow speech above and below the normal range of human hearing. Using this skill, they can selectively communicate with audiovoyants.

4. POLITICAL STRUCTURE

Nasoir is ruled by a representational democracy at three levels: City (city councils), provincial (provincial assemblies) and continental (continental congress.) At the time of *Aerovoyant*, three provinces had been designated on Nasoir.

4a. City councils.

Each of Nasoir's six coastal cities are ruled by a twenty-five-seat council.

The five most recently-elected councilors hold probationary seats. These councilors vote on proposed legislation and can draft preliminary bills in concert with at least one non-probationary councilor. Probationary councilors cannot call for votes or oppose points of order when council is in session.

Ten junior councilors hold additional powers—the authority to draft bills on an individual basis and to oppose points of order.

Ten senior councilors serve as committee heads, call votes in general session, and serve on the Provincial Assembly.

City councils write law, oversee local taxation, and manage the budgeting for established and proposed projects, institutions, and policies. Councils steer city goals. A council term is five years, with elections held annually on a rolling basis.

4b. Provincial assemblies.

Each of Nasoir's provinces is overseen by a twenty-seat assembly.

All senior city councilors automatically serve on their respective provincial assembly. Assembly members ensure that the city councils are operating in an equitable way. For example, if one city plans a geographical expansion, the assembly judges if this poses a negative impact to the province as a whole. Environmental concerns are a common focus of discussion for assemblies, as is any joint venture between cities that might benefit both simultaneously. Assembly members communicate the outcomes of their deliberations to their respective city councils.

The primary role of the assembly is oversight of interprovincial commerce and the associated collection of tariffs. Funds obtained through tariffs are used to maintain provincial waterways and roadways.

Assemblies elect ten of their twenty members to serve on the continental congress.

4c. The continental congress.

Ten assembly members from each province serve on the thirty-seat congress.

Congress sets a continental tax rate (limited to provincial lands) and manages trade between provinces and the non-provincial agricultural belt. Congress also settles trade disputes between provinces.

One congressmember is elected by the full body to serve as prime chancellor. Principal responsibilities of the chancellery include ordering the congressional agenda, commanding the marshalry, and naming new provinces. The chancellor relinquishes congressional voting rights but retains assembly and council voting rights.

5. GLOSSARY

Autore: The singular deified embodiment of the scientists responsible for humanity's survival following the First Great Death. Also, a city-based swear word similar to 'God.' Autorism is a belief structure (a quasi-religion) based on science and technology.

Autoremalde: Loosely, goddamned. Its most common usage is in connection with any negative consequence arising from science and technology.

Bel: One of the two stellar masses (stars) around which Turaset orbits.

Bristlepod: A shrub-like plant on Nasoir's southern isles. Ripe pods are harvested and pressed for nectar.

By the code: A swear phrase referring to the power of science. In practice, 'by the code' is a throw-away phrase similar to 'by all that's holy.'

Byantun: A tree-like organism indigenous to Turaset with features resembling both plants and animals. In some ways, byantun trees are reminiscent of Earth sponges, except larger and land-based. Byantuns are sessile and grow in varied forms. They have a 'root' system, and their 'branches' (or 'limbs') are pad-like and motile. Byantuns are colored and harvest energy from the suns. That energy is stored in their 'roots,' as light, to attract sub-surface prey (worms, grubs, and so on) which is absorbed by the 'roots.'. In this manner, byantun trees are predators. Byantun pigments were analyzed and reverse-engineered into the human genetic code during the First Great Death.

Camsin: A hot beverage prepared with leaves of *Camellia siniensis*. Tea.

Conjunction: The alignment of Bel, Letra, and Turaset into a straight line. During conjunction, Bel'letra appears as a single stellar mass and radiation bathes Turaset.

Copperwood tree: The name of this Turasetian plant suggests the wood is valuable, but in actuality the soft, fibrous bark is the cash crop. The fiber can be worked and spun, is naturally a pale shade of red, and can be bleached with acid, after which it takes dye.

Deadly hells: Swear-phrase in the foothills and belt.

Distavoc: A Turasetian word for telephone. When humanity fled Earth, countless measures were taken to avoid communications surveillance by sentient AI. One such measure was to substitute a range of etymological roots into common words, leading to new constructions including 'distavoc.'

Fierno: (1) The radiation that bathes Turaset during conjunction. During these bursts, ocean life descends to the benthos, land forms become more vibrantly pigmented, and soils form a leathery crust. (2) (metaphorical / archaic) The fires of purification; the heat that burns the chaff to release the worthy. (3) A city-based swear word.

Holy heavens: Foothill phrase denoting disbelief.

Lele: A stringed instrument similar to the Earth ukulele.

Letra: One of the two stellar masses (stars) around which Turaset orbits.

Martire: Martyr.

Miere: A city-based swear word meaning excrement.

Moarab: Tusked, multi-appendaged (up to fourteen-legged) beast, with a lizard-like head and skin, roughly the size of a small bear. Moarab are indigenous to the forests of Nasoir and are dangerous. Moarab can eat virtually any plant or carcass or debris they find and store what they eat as layers of a fat-like substance. They're occasionally hunted and their meat smoked.

Museo: Museum.

Meldeto / maldeto / maldeta (spelling varies by city): A city-based curse associated with Autorism and derived from the word 'malediction.' Similar in intent to the Earth word "damnation." In essence, the word implies the degree of suffering that would be associated with damnation. To be in maldeto pain is to be in pain beyond comprehension.

Nanquit: An animal indigenous to the Singing Sea along the coast of Nasoir. They are comprised of a central mass with four radiating arms and measure eight inches from tentacle tip to tip. They move by spinning through the water (or through the air when fog is sufficiently dense). Nanquits are chemo-attracted to iron and capture small prey with their tentacles, usually fish or mice. They sometimes mistakenly wrap around iron railings. Baby nanquits are called nanquittens.

Okeafolk: The intelligent life deep in the oceans of Turaset. Okeafolk are tentacled and beautiful, and their songs enrapture men and women alike. Sea maidens. The okeafolk were encountered after humanity began sailing Turaset's oceans.

Quiverfish: These animals resemble small eels and have six paddle-like appendages along their ventral line. They vibrate as they move.

Orange quiverfish pigments were reverse-engineered into the human code during the First Great Death.

Raptorfowl: Beaked animals native to Turaset. Raptorfowl have webbed limbs and can coast for a mile or more following a single leap. Their flight is described as 'bounding.'

Rebla: Standard unit of currency. One rebla feeds an average Nasoirian for approximately one week.

Sandsap: A tree native to Turaset found above eight thousand feet of altitude. The tree retains water but the high solute concentration in the sap gives it a sandy texture.

Scat: A swear word used in the belt. Excrement.

Spiceberry: Native shrub of Nasoir. Spiceberries are not true berries but small fluid-filled sacs localized to plant meristems. Spiceberries are sweet and cause nausea when eaten in large doses.

Spinebark: A low-lying sessile organism, like a carnivorous plant, that camouflages with the surrounding soil. Small animals that run across spine bark fall paralyzed and are consumed.

Tar: Stringed instrument similar to the old Earth guitar.