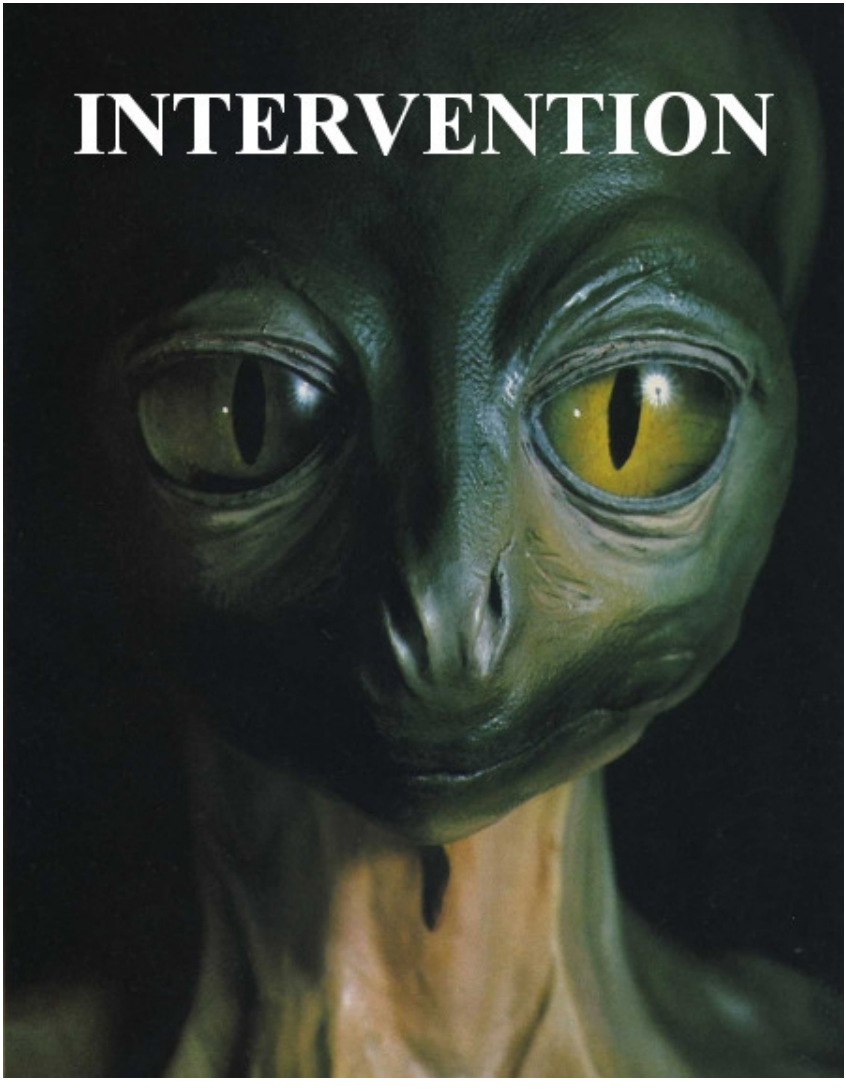

By

Bradford Hatcher

ISBN: 978-0-9824191-8-2

Download at: https://www.hermetica.info/Intervention.html
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Cover Photo Credit: Found online. Appears to be a conception of an evolved Terran reptilian life form.

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Part One

It gives one a feeling of confidence to see nature still busy with experiments, still dynamic, and not through nor satisfied because a Devonian fish managed to end as a two-legged character with a straw hat. There are other things brewing and growing in the oceanic vat. It pays to know this. It pays to know that there is just as much future as there is past. The only thing that doesn't pay is to be sure of man's own part in it. There are things down there still coming ashore. Never make the mistake of thinking life is now adjusted for eternity.

Loren Eiseley

Integrity is wholeness, the greatest beauty is
Organic wholeness, the wholeness of life and things,
the divine beauty of the universe.
Love that, not man apart from that.

Robinson Jeffers

Preface

Dear Readers,

Although this work begins with a brief story, it's really nothing more than a pair of progress reports. The first was submitted to the Archives six months after the Tan arrival, the second, twenty years later. I've committed to writing a dozen of these, one every twenty years, over the next two centuries. They're written to be part of a much larger collection. There are three thousand Van in the world, still outnumbered more than a million to one by human beings. Of these, just under three hundred of us have undertaken to document our Intervention in humanity's future, and our plan to save this world from humans. While the Van are not great friends of relativism, we do at least accept that situations as complex as this Intervention are best understood by combining a number of points of view or perspectives, to better surround the objectively true. While we Van have tighter bonds with each other than human beings do, we are also more vigorously individuated. Therefore, you should expect to see some variety in these accounts and intend to read more than one if you have need to understand us. You may find contradictions. It's important that homo survivor try to see recent events from our "alien" point of view.

For my own part, I've never engaged directly in a dialog with a human, not even the Fit, other than exchanging brief pleasantries. This is rare among our kind, but I was made to be a kind of Aspie, and the Ta to which I'm linked is a Myco. As such, my point of view is going to seem a lot less neurotypical than most other Van accounts. You should not, therefore, expect to be hugely or primarily entertained here. What follows is a simple history, not a colorful story full of well-crafted plots and character development, clever dialog, heroes and villains, or human interest. In literary terms, this is what's called a data dump. I was informed long ago that I'm a better thinker than a storyteller, and I've come to accept that. But what follows is necessary as background information for Survivors, the Fit, who will salvage and carry on the business of human civilization, and ultimately of human evolution, and I would hope it still merits reading in conjunction with the other reports.

I've tried to provide something of a narrated timeline for these early events, as well as descriptions and terminology related to the Tan and our own Van technology. Wherever you encounter what seems to be a gratuitous capitalization of words you are probably looking at a special or technical term adopted by the Van, most often borrowed from elsewhere in human culture. It's hoped that your familiarity with these will eliminate some of the need for my associates to also write data dumps, so that they might proceed to tell more reader-friendly and entertaining stories, tales full of sensations and rich emotions, full of personal struggles and victories, full of life and warmth. I will be assuming that you are *Homo Survivor,* and not Meh, and that any interest you might be taking in these reports will be relevant to your vision of a better world. If you're simply trying to understand the "alien invasion" or "the two greatest evils that Mankind has ever faced," what we've done here will probably still go over your head. But even *Homo Survivor* will be hard pressed at times to locate our humanity and moral center in all of this. To this, we can only quote your own Nietzsche: "Man is something to be surpassed."

We're not "coming out" now. The Van intend to stay in our old stealth mode, either hidden among you, or hidden in plain sight, or hidden away, for more than a century if necessary, very possibly until the last human now living has died. You will meet us in person and not know it, and we will be greatly outnumbered by our appointed human delegates, who won't be certain they know us either. What we've done to your species will never be forgotten, but it might one day be forgiven, once your descendants are able to compare where you were going with where we are taking you.

Puppet Shows

It was a pleasant enough day for first contact, the day you picture when you're being hypnotized, but replace the boat on the river with a bench in the park, surrounded by worshipful pigeons, in late spring, some fluffy clouds, gentle breeze, a little jasmine wafting around. Waldo had been on that bench for an hour, glancing across Pennsylvania Avenue from time to time at the fountain on the north side of the White House. He had already maintained his calm through two police demands for identification and a third that came with a frisking. He'd watched a couple of picketers get taken off to jail. This was a date not circled on a single eschatologist's calendar, at least that we can determine. Most of the simple folk were of late looking to 2033 for the End of Days, not long at all now, and still with more hope than dread. This was only a little bit too soon for them, but none too soon for us, or for a world in agony.

Waldo was too average in every respect to attempt to describe him. About all we can say is brown-haired, brown-eyed Caucasian, and medium or average everything else. He did look a bit younger than middle-aged, thirtyish to outward appearances. His hat, an average of trilby and fedora (nice, though), his coat, of trench coat and dry-as-a-bone. His brown sneakers suggested that what he wore beneath might also be average and middle-class. And he carried a matching umbrella, despite the perfect weather.

As if done waiting for a sign, he stood up and walked briskly across the street to the fence. From a deep pocket, he pulled a long strap with a loop in the middle and stirrups on the ends, hooked the loop on a picket and used the device to straddle and then hop the fence. The device was a new idea and had made it through the frisking. The hopping was happening more frequently, leading to an increase in the White House security presence, now matched in numbers by military personnel. He wasted no time in crossing the lawn to the east side of the fountain and pool. He had barely come this far when he was flanked on three sides by two Secret Service agents and a soldier, all with guns drawn, about as he had timed it.

Almost three meters from the water's edge, Waldo knelt down suddenly, arms outstretched, palms out, in what seemed a gesture of surrender. Two shots had already been fired, one to warn him, one to wound him, but the latter shot "missed." Covered by his gesture, he had just flung two freshly-burst glycerine gas pellets towards his captors, who were still standing a safe distance away. It was a special kind of gas, not really meant to hurt anyone, just a lovely mix of skatole, putrescine, cadaverine, butyric acid, and hydrogen sulphide. One of the agents started retching almost at once, while the other two quickly got more distance, one tripping backwards in haste. Nobody fired another weapon at least. "You know how sometimes there's a dead cow that's been laying in the sun for days and it gets bloated and pops open and blasts ooze everywhere? It was like being dipped in a pit full of those," an agent later recalled. Waldo used the distraction and his umbrella to draw a circle around himself on the garden ground, a body length in radius. The ground sparkled where the umbrella tip had passed, showing what seemed a living circle that suggested it could also be seen at night. It was nearly indistinguishable from magic.

The gas wasn't designed to linger and the agents were well under half a minute in recovery. They resumed their approach, drawn weapons first. Pointing to the circle, Waldo cautioned, "approach, it's your job, but please don't try to cross this line with anything other than a gun or inanimate object. Try it with a stick first. Think of it as a force field, except it's not a force or a field. Anything that attempts to pass through it will disappear. Please don't let this be a body part." DARPA would want to see this, of course, it being too long since they last thought seriously of weaponizing sorcery. The

agents at least had the sense to move forward slowly, drawn weapons first, losing only the first few inches of the barrels of their guns, and not a single knuckle or fingertip. There was no flash or sound, just permanently abbreviated weaponry. More agents had arrived, but kept a safe distance. “I also invite you to fire your guns at targets across this line,” offered the trespasser. Three agents tried. To their credit, they aimed at the ground near Waldo’s feet. There was nothing there to suggest that their projectiles had crossed over the line, or ricocheted either. The circle simply ate lead and did nothing.

Three crowds soon began to gather and grow, the public, out past the Pennsylvania Avenue fence, the staff, on the White House steps, and federal agents, who soon numbered more than a dozen, with DARPA and the Pentagon still an hour away. Waldo sat down calmly in the garden, with crossed legs, collaterally vandalizing a national flower or two. In a voice low enough in volume to want close attention (but average in quality and pitch) he announced to the gathered agents, “I need to speak with your President right away. This is an urgent matter of national and global security.”

This request was not granted, of course. Instead he was informed of the Federal laws that he was violating, together with their legal consequences, and enumerated in lost income and years. Waldo repeated, “I REALLY need to speak with your President right away, on an urgent matter of national and global security.” Agents soon arrived with portable screens to shield the scene, however low key, from the gathering crowd of public riffraff out on the street. It was a feeble attempt to contain the situation, especially given that these screens soon either melted, crumbled, or caught fire, each according to its constituent materials. Some really did think that sorcery was afoot, while those of more military mindset envied the tech and its lethal potential. Waldo just sat quietly for another hour. Law enforcement moved to push the public crowd back across the street.

“Gentlemen,” this unwelcome guest finally spoke, “I didn’t want to announce this in public, but you leave me no choice. I’m here representing a small group of powerful beings from around the galactic rim. They will be here in less than a week and will take control of this world’s future and the future of the human race. I’m here to clarify what you may expect. You are running out of time. It’s imperative that your President meet me here in this circle, face to face. I will allow him to enter the circle and leave unmolested.”

This didn’t do much at all to increase Waldo’s chances for an Executive audience any time soon. It did bring reiterations of his crimes and their punishments, together with some new information about mental health options. It was almost as though the novelty of Waldo’s force field (that was neither force nor field) and damage done to the government privacy screens, belonged in a separate cognitive compartment entirely, some classified military possibility unrelated to the rule of law and demands for justice. Another hour saw the military representatives arrive and commence their puzzle-solving protocols.

“Gentlemen,” Waldo offered, as two female agents frowned, “while I’m here waiting to be taken more seriously, I’m going to enjoy yonder pond a little,” pointing outside of the circle. At this point he began to disrobe, folding his clothing into a neat little pile near the tiny shore, every stitch, with hat and umbrella on top. Yes, he was average there too, not very exciting to look at. As he moved towards and into the water, to the agents’ dismay, the circle moved with him. He stepped into the pond and began to splash around. There were soon some all new crimes to recite. It was the rule of law that would take precedence over any exceptions and mysteries. Waldo was now declared an “enemy combatant” as well as a lunatic and a public nuisance. He soon left the water, squeegeed himself off with his hands and began to drip dry and reinvest

himself. He sat down by the water's edge, reached for a handful of flowers and began to eat them, apparently yet another crime, "punishable by a fine of not less than a thousand dollars and/or 30 days in jail." The shimmering of the circle was the same over land and water. Nothing above it was visible, no clues about spheres, tubes, or cylinders. This would be DARPA's first investigation, as they mapped the contours of where their things disappeared. Sphere it was, or a hemisphere, no vulnerabilities from above. "Let's try tunneling down," suggested the nation's best and brightest.

Most of this event was being recorded, by agents, by staff, and by photographers gathered, first at and now beyond the fence, first amateurs, and then some pros. Waldo had initiated his own public record. He stuck his umbrella into the ground between himself and the north entrance, and then mounted a small, portable camera on its handle. Before two hours had passed, the event, as seen from outside, was being broadcast live on local networks and was picked up by a few nationwide. The National Guard had arrived and was holding the crowd back across Pennsylvania Avenue. The cameras kept rolling until they were seized. Private-party and media drones were launched to take some pictures, but were quickly shot down. This little one-ring circus went on for a full day while Waldo waited in silence for a no-show President. Not even the VP or Chief of Staff would approach. The military folk poked and prodded and puzzled. Not a force, and not a field. It was made of what we call Eck, a versatile material (that isn't a material) with a fun-loving name borrowed tongue-in-cheek from combining the god-force and audible life-current of Eckankar or soul-travel fame with spooky gossamer ectoplasm of Victorian-era mystical charlatans. As far as we know, Eck is a strongly emergent property that doesn't occur at all in nature until a civilization many thousands of years more advanced than humanity's makes the "stuff" by meddling with great finesse in planck-scale subatomic properties. It has some of its behaviors and effects in common with matter, energy, and information, but it's nothing like those. Most importantly, being massless, it isn't bound by the speed limit of light. More will be described later.

"If I don't get my audience," Waldo finally warned the circle of agents and investigators, "I'm going to hijack the networks and broadcast my message directly to the people. You will forfeit the offer to be the first to hear it. This may be just as well in the end, but you aren't going to like it when it happens." Waldo would smile and wave to the public from time to time, being keenly aware of their presence, but he never seemed particularly shy about relieving himself in public, and he had no other option, if he was going to appear to be human. At midday he announced, "My wife, Wilma, is going to be joining me here and bringing me lunch. She'll soon be arriving by the northeast gate. I want you to stand aside and not accost her. She'll be protected by a similar circle. You'll want to keep all your body parts and weapons intact, so please stand well back and let her pass." Wilma did arrive shortly, dressed in an ultra-simple, off-white muslin outfit, seeming a custom fit for someone chaste and penitent, and caring a brown paper bag with a couple of days worth of snacks. While it wasn't in any way painful to look at her, she too was almost unimaginably average-looking. But she seemed plenty happy enough, and walked with a little spring in her barefooted step. The military watched closely, with their inadequate heuristics and algorithms, as the two Eck barriers merged and the pair came together with a long and somewhat sloppy kiss. Butt cheeks were grabbed and squeezed as well, PDA writ large.

The American psyche, or what remained of it, was notoriously narrow-minded, exceptionalist, and nationalistic (the past tense used there is anticipatory). The networks were all abuzz over this puzzle, so much that it took more than a day for most to notice that similar events were unfolding elsewhere in the world, more specifically in London, Paris, Moscow, Beijing, New Delhi, Islamabad, Jerusalem, and Pyongyang,

all in national capitals, and nearly all at the leader's front or back door. But all of the characters involved were different. Each of the affected cities had its own kind of stranger, each with some sort of cultural resonance, and these weren't all as boring as the American guest, who simply mocked the rule of law. Pakistan got a "real live" Djinn, over seven feet tall, who could change shape and do magic. He was eventually joined by a nude woman, named Wilma, who could neither be stoned, nor covered, nor hidden. India got themselves a Krshna Avatar, with blue skin and all, with a pair of near-naked Gopi girls. The Chinese guest set up in Tiananmen Square doing *wǔxiá* demonstrations, wire-fu, but without the wires. Not only could this guy fly in slow motion, he also flew in the face of the nation by praising the virtues of Individual Liberty and the sovereignty of overrun nations like Tibet. Israel got some character making plausible claims to be the long-awaited Messiah, but naturally he came capped with a Muslim *kaffiyeh*. North Korea's Great Leader had to witness a much greater man stealing the popular admiration away. England got an old, bearded Merlin, also with powerful magics, and announcing King Arthur's return. Nobody but the French understood the French visitor, but he was perhaps the most loathed, except by those who liked his effect on the French. His language was godawful and loaded with foreign neologisms. No matter the government, it was having fits, and laws were being broken. But these are all tales that will be told best in original tongues by their original witnesses. The events of the next few months will be retold many times from many perspectives. My own point of view was here in DC.

The media fervor over the novelty had just started to wane in the middle of day three. The President never showed, nor did anybody else of any real importance. The priorities had already been set here: the trespassing carried more weight than the threat of alien invasion, as long as the threat came in the form of this ordinary-looking crackpot, despite the tech that still kept him free. As the global picture began to round itself out, a few people started to wonder: why not Tokyo, Mexico City, or Sao Paulo? New York, Berlin or Sidney? Johannesburg, Mumbai or Jakarta? What do these cities all have in common? The answer was first suggested at the UN, and suddenly this became a little more than an nine-ring circus: the nine made up the Nuclear Club. Still, the Presidents and Prime Ministers did not go out to greet their guests. In fact, most made their first tentative preparations to be shuttled quickly down into their waiting and well-stocked underground bunkers.

Waldo and Wilma had slept uncovered on the ground for two nights, but would wake up with every hair in place, looking as if they'd just arrived. They kept to themselves and barely glanced at the agents, or the investigators still trying to understand and/or undermine the invisible barrier. Their conversation could be heard, but only partially understood. It was in a language that resembled English and had plenty of English words, but only half of them were intelligible to listeners and the grammar was a little strange. Linguists were summoned but weren't very helpful.

The first two nights saw the agents and the military trying out their standard bag of tricks for making life unbearably unpleasant, with their highest hopes for bright lights, strobing lights, loud noises, and an assortment of musical styles known to offend specific sub-populations. But the shell just went opaque in response to the lights and blocked the transmission of sound, and both in either direction. From without, the opacity resembled what we now call vanta black, but just one shade darker. The government never came close to testing the shell's potential. A direct hit from a tactical nuke would only have left an undamaged sphere hovering over a hole in the ground, in a blackened field where the White House once stood. The energy of the blast that hit the sphere would be converted to antimatter, conveniently wrapped in little pills of eck. It didn't matter that they didn't know this yet.

Waldo Speaking, Part 1

Around noon on day three, Waldo, cross-legged on the ground with his cheerful Wilma seated at his side, went on the air and online, preempting all of the shows on all major networks. Their colleagues around the world did the same, often overpowering any attempts by government at censorship with their mad hacking skills (if they only knew). He spoke calmly and like a young father. The three records that follow are a little lengthy, and perhaps a little less than entertaining, but it's important that nothing be left unaccounted here. Outlines, digests, and summaries are always available online for those in a hurry.

"Few of you will take this broadcast very seriously today. The only evidence you have to do so is this line around us that can't be crossed and what might be defective screening materials that agents have put up to hide me from public view. We might seem just a couple of wackos with new tech or some clever magic tricks. We're here to announce an intervention in human and global affairs by a group of five alien species from the other side of the galaxy. We'll be dismissed by most as crackpots until our alien friends begin their intervention. But it's important that this all be on record. You'll have a need to refer back to these words in just a couple of days. We're going to give you three little speeches in all, with some intermissions and some potty breaks. We want your attention. These words are not for your entertainment.

We know that a lot of you have been expecting, maybe even hoping, for an end to the world. You've grown used to the idea that you might destroy most of life, or in the passive sense that accords with your lack of will, that most of life will be destroyed by what you are compelled by your nature to do. You might think of this coming intervention as an alternative version of that. You got your prophesies all wrong. There will be a final judgment and a *deus ex machina*, but in most cases it's not coming to save you. It's coming to save this world from you. We're not going to convince anybody against their closely-held beliefs that humans have run out of time. But you have now. Here's a thought experiment for you to start with: somebody selects a group of a few thousand of you, gives you the power and intelligence of gods and the permission to save the world. There is no need to sell your proposal or put it to a vote by the general population. What do you do? Do you let fate work itself out? Do you elect to take the least action necessary to avoid the worst of the self-destruction, or do you go a step further, act a bit more forcefully, and create a more optimal future? Is this solution any different if you and your few thousand friends aren't really human beings and you have been raised independently of human culture? This was what happened to us, and we have opted to make the most of it. Second question: If you had a time machine that allowed you look seven generations, a century and a half into the future, would you expect to see more or fewer human beings here on Earth? This answer was easy for us. We saw no option in which there were not far fewer. This meant either that a lot of people had to die prematurely, of that a lot of people couldn't ever be born.

Several days ago, beings whom we call the Ta entered this solar system, dropping out of FTL in the middle of the Kuiper belt, nearly 60 billion kilometers out from the Sun, traveling at 0.4c in normal space. It will take them about 12 days in all to decelerate at 12g and arrive in Earth orbit. Their agents, an advance contingent of over four thousand advance scouts in the form of artificial intelligences, have been observing this world up close for about forty years. Ten years after they'd begun their research, these AIs created a new hominid species using your human genetic material, combining this with their own nano- and biotechnology. These post-human or h+ beings are called the

Van, or *Homo Successor*, and are now around 30 years of age. In smaller numbers, the AIs also created slightly "uplifted" versions of Earth's most sentient and self-aware species, including several cetaceans, several great apes, mantas, GPOs, corvids, parrots, and elephants. These bodies of Wilma and myself are only drones being operated by the Van. We're telepresent, or subjectively here, but physically, we're at remote locations, and just going through these motions in our minds. Our telepresent drones in human and other forms are called Proxies.

One of the biggest differences between the Van and our human predecessors is an immortality conferred by our nanotechnology. At least we'll be able to live as long as we wish, and we can cease to age at any chosen point in our lives. We can choose later to begin to age forward again, but we'll then be unable to go back. Most Van women have elected to quit aging at around 29 years, while the men are waiting a little longer, expecting to stop in our mid-thirties. It's been said by some that a belief in reincarnation could give some human beings pause with regard to the damage that you are collectively doing to this world, if only you could develop time horizons beyond a year or two. You would see yourselves returning to the messes you left behind. For the Van, it's different. We're more likely to regard actions taken against the long-term damage to this world as acts of self-defense, with a more meaningful sort of legal standing than mortals, who won't live to see the consequences of their actions. This helped us choose the survival of the biosphere and its genetic diversity over unlimited human population and economic growth, although we'll still seek to preserve significant parts of human cultural evolution. Being immortal, we couldn't just leave this world discounted as somebody else's problem. We will stand, therefore, with your unborn generations more closely than we stand with you.

The AIs are called Gizmos by the Van. There were initially 8192 of them launched towards Earth, two for every member of the Ta fleet, but one of every pair was redundant. Gizmos are neurally interfaced or interlinked one-on-one with the Ta and are normally in communication, except when one group or another is traveling FTL. Gizmos enter and leave FTL at nearly twice the velocity of the Ta, or 0.8c. Unlike the Ta at 0.4c, they have no ability at these speeds to see and react to obstacles too massive for their Eck shields to circumvent, deflect, or convert to fuel. Almost 50 were destroyed at the end of this traverse, but, as hoped, no two had been a redundant pair. Now rendered redundant, 4000+ AIs were then decommissioned as formerly independent Gizmos, stripped of any autonomous function and reciprocal neural interfaces with the Ta, and were then re-tasked as complex, intelligent machines, called Gadgets. These machines are not pocket calculators: each and every Gizmo and Gadget has mnemonic and computational abilities exceeding that of human civilization, and a vastly greater complexity than the human brain. Furthermore, both Gizmos and Gadgets can be interlinked to form large, but still insentient, Hive Minds, or distributed intelligence networks. There are Gadgets made of decommissioned Gizmos and various smaller versions as well, some called Doodads, Gimmicks, Widgets, or Scouts, according to their general functions. All of these are Van terms, and elements in an original, English-based language. The Van tend have some have fun with their naming of things, and will often give pioneering, authorial, or inventor credit where due: TVs are called Farnsworths, astronauts are Yuris, computers are Eniacs, satellites are Sputniks. But we get ahead.

Nearly ten years ago, the Van, then around age twenty, were challenged to formulate a plan to save the Earth from the predatory and parasitic impacts of humankind. We were given ten years for this planning task. Until later this week, we are not permitted to use technology or power to implement our Plan, although we've been allowed extensive advance reconnaissance and molecular painting of material and biological

targets for various future tasks. The live (but not living) Gizmos were given a sufficient power supply to perform their own tasks and assist the Van, but the Ta insisted on being in-system before really powering and lighting things up. This phase will begin shortly. The Ta won't allow us to enact any part of our plan of intervention until they are present or in orbit and able to correct any errors we've made. But their first three days in local space were spent reviewing our plan and making some minor adjustments. The only real power we've had so far was limited to self-defense. This may explain a few thousand mysterious human deaths over the last ten years, mostly of poachers and whalers. Sadly, we were unable to intervene on behalf of others.

The Ta have their own distinct version of Star Trek's "Prime Directive." They have no problem identifying themselves and their mission, or with interfering in local genetic or cultural evolution, or with referring to themselves as being from other worlds. They are not bound to a policy of non-interference. Foremost in their own version is securing what we call the ecosphere from needless toxic activities, at least insofar as this promises to further the evolution of sentience in the galaxy. Pathological conditions, such as a parasitic species run amok and threatening the health and evolution of the world in question, are regarded fair game for a full-on Intervention, which to them may be as extreme as necessary. The survival of humankind is of secondary importance. They were only a few thousand years too late for one of the worlds they explored and this led to adoption of their current approach. Understand that the Ta are not merely a few centuries ahead of Earth in tech. These beings can manufacture any molecule they require, out of energy or any other substance. They aren't coming to plunder the planet's resources or to occupy your home. They don't need to obtain any resource that you possess. They are wealthy beyond any human concept of wealth. When they left their home world, it was doing just fine, and not overpopulated. They aren't going to rule you, or demand your worship, but they will uncompromisingly prohibit certain activities and support certain social and economic ventures while defending them from attack, with lethal *force majeure*. And they will always live in space, where there's *Lebensraum* aplenty.

The Ta aren't, strictly speaking, on a scientific expedition or a mission of discovery. They"re creators, with the goal of furthering Life in Evolution, which wants to have optimal environmental preconditions, and time horizons on evolutionary and geological scales. They care about distant descendants as much as those living today. They see nothing especially exalted in the human brain, which compares to theirs roughly as the brain of Earth's domestic poultry does to the human organ. Pursuant to this directive, then, the Van had to begin with the choice between eliminating human parasitism and eliminating the human parasite altogether, and then appointing ourselves as the successors to humankind. We elected to give original human beings one more chance before designing a new replacement species. Next came the choice between applying the least possible quantum of change in order to effect survival of the biosphere, and going the extra distance to optimize the long- term future of the planet. We were given what would turn out to be the power of gods, and we chose the latter, the heavier hand and the optimized future. Although most humans still won't acknowledge this, the human population has been headed for a severe crash, largely due to its overpopulation and associated environmental abuse. A severe crash is necessary in any event, but ours won't be as collaterally destructive, or as full of human suffering. The requisite cull didn't need to be as extreme as we have planned it, but we have made a choice to go a little further than necessary rather than simply salvage a viable population. The next few decades will be painful to most of humankind, but the future will no longer end in dystopia.

The Ta have a device that we call an Eck Screen, or Sieve, essentially a two-dimensional plane of Eck "suspended" from a pair or string of Gadgets. This can be drawn through any material and used to read or identify any preselected molecular configurations, elements, minerals, or patterns of DNA. Given an additional level of power, some added thickness to the Eck plane, and a somewhat slower velocity, it can also be used to rewrite specified molecular configurations in passing. The optimum speed for read-write is roughly 0.4 times the speed of sound in water. This allows for a comfortable pass around the Earth at or above the speed of its surface rotation, or one orbit a day, with the Screen draped between sixteen or more evenly-spaced Gadgets to span the entire globe. In this mode, Eck Screens are called Driftnets. Wherever desired, the same action can be performed around the world at the same local time of day. The Gadgets will perform a number of their activities at around 3:00 AM, while most of the world sleeps. Work with more macro configurations, such as identifying some gross material content or triggering pre-targeted actions, can be performed at a much faster pace. Depending on the resolution of their "reading assignments," Eck screens can penetrate any material up to an effective depth of almost 20 kilometers into the Earth, or, "draped" upwards and looking for grosser stuff than molecules, to a height of over 50,000 km, well into high Earth orbits.

The ten years of research performed by the Van made use of the Gadgets and the Eck Screens to data mine the entire planet, and then keep the data current. For one example, a slow, one-hour pass through the Library of Congress identified the molecular contours of all of its books, especially distinguishing paper from ink and one page and one side of a page from another. It then took one Gadget less than a week to reconstruct electronic copies of the entire collection. It did the same with data stored electronically, whether the data storage was air-gapped or not. There was no such thing as data security, meaning that anything stored on paper or digitally at the Pentagon, in NSA supercomputers, or in offshore accounts and Swiss banks, was also easily accessed. The Gizmos and Gadgets were soon know-it-alls, with lots of human secrets to share or make use of. There was nowhere for secrets to hide. Any redacted document was transparent now.

The Van have also employed a device called a Spybot. This is roughly a gram's worth of anatomically distributed, self-replicating Nanites, disguised to resemble living tissues, cells, and organelles at microscopic scales. The ones living in the brain are called Skullbugs. These communicate with each other in a network and directly with Gizmos and Gadgets, via narrowcast Eck, and receive programs and commands from them. If you were human, or a member of any sentient or endangered species, you got a cluster of these implanted in you at some time in the past ten years. And copies were inherited by your children. These Spybots have a limited number of functions: 1) They locate a host precisely on a 3-D dynamic model of the world, even when hiding down deep in a bunker. 2) They have a finer GPS function which can transmit a host's articulated body position in real-time motion. 3) They can read and identify biochemical mixtures as specific subjective states of mind, especially intense ones like fear, pain, distress, anger, aggression, shock, and even smug self-approval. They detect lies better than any human technology. 4) They can identify specified molecular compounds in close proximity to an organism, such as gunpowder and explosive residue. 5) They can relay commands for the reproductive systems of both men and women to shut down or resume viability. 6) In people whose reproductive system is active, they will stimulate a "recognition sense" for others in the same condition, experienced as a moment of slight *frisson*. 7) They stimulate blood chemistry that will either tranquilize a person or temporarily block formation of long-term memories. 8) They will degrade on command into a lethal neurotoxin. At full strength, the Spybot

neurotoxin kills in less than a minute, but the process is accompanied by an overwhelmingly pleasant unitive experience and, more often than not, a sexual orgasm. The process is called Fast Rapture. 9) They can be made to degrade more slowly into neurotoxicity, providing any person volunteering for suicide or euthanasia an exceptionally pleasant death, one stretched leisurely across 24-36 hours, a "true" religious experience for the religiously inclined. The experience does not permit fear or anxiety. This option is called Slow Rapture. And 10), on the death of a host, cellular DNA is rewritten to create bacterial and fungal detritivores that consume the deceased within a few day's time, leaving nothing but viable compost and fertilizer as waste. This renders both cremation and burial pointless.

For nearly a decade, the Gizmos and Gadgets observed and reported human incidents and encounters signaled by the Spybots. Nearly every act of murder, assault, kidnapping, poaching, and rape was witnessed and logged, and the perpetrators given molecular flags or tags for later action. It's been excruciating for the Van to witness these horrors *in flagrante delicto* without any power to act until our Plan was greenlit and powered up. In addition to witnessing women being mutilated, trafficked, or gang-raped by soldiers, or indigenous tribal peoples exterminated by gold miners, or unarmed suspects killed by police, our animalian counterparts also had to watch fellow elephants being shot by poachers, whales harpooned by whalers, dolphins herded to slaughter and slavery, orangutans tortured for palm oil, and mantas poached for gill plates. Only assaults on their own persons could be answered with lethal action. Wherever shenanigans were common geographically, bugs were created and left behind to record and tattle in greater detail on further goings on. These were tiny, flying or swimming, bug-like surveillance drones called Sylphs. It's convenient for the Van that corruption and other pathological human behaviors have become so successful that the corruptible are often gathered together for easy monitoring, as they are in government capitals. There was a seemingly unending list of atrocities. All the Van could do at the time was watch this in horror, and use the available tech to tag the offenders for whatever future justice might find its way into the final Plan. Most Van will no doubt admit to some satisfaction when the instruments of this justice are finally powered up, and it will be hard to not regard this as retributive punishment even more than justice. Any deaths, however, will still be unjustly pleasant. We had proposed removing the blissful aspects of the Fast Rapture experience for those we had witnessed committing acts of evil, but the Ta have just rejected any hint of retributive vengeance. They are demanding that we rise above that. At least we are satisfied that there will be nowhere to run and hide, even though the well-to-do will no doubt hasten to try out their elaborate and bomb-proof bunkers. And those who can guess at their coming comeuppance might have some unpleasant time to ponder what they've done.

Given the comprehensive database we collected, including all of human history and its causal factors, the Gizmos could begin to forecast future global scenarios. They ran more than a billion of these in all, each a detailed simulation a hundred and forty years into the future, each simulation with at least a few petabytes of detail, using all of the more likely variables, especially instructive crises, black swans, global pandemics, environmental damage, new technologies, emigration to space or other worlds, and inspirational cultural, religious, and political leaders. A billion scenarios avoided alien intervention. But the green movements and secular ethics had come too late and solved too little. More dominant was the Newspeak green-washing movement, peddling oxymorons like sustainable growth or even sustainable petrochemistry. More dominant was human denial and the inertia of ignorance. The humans had incurred such an enormous debt that the requisite repudiation and bankruptcy could only mean a total economic collapse. In spending resources like there was no tomorrow, they ensured

there was not. Even today, the great majority of humankind can't or won't see what's been coming, the critical masses attained, the tipping points exceeded. Many of your best minds have fought hard to maintain an optimism to rally support for corrective measures, but in doing so, they've needed to fail to see that the time for correction has passed. Most of the tipping points for cascade failure were already passed in the early 1970s, when humanity failed to learn that war is for idiots, and when the corporations began to more openly write the national laws. Still more were passed in the 1980s, when the push for global efforts to save the environment fizzled. We're not certain if you would ever learn not to put tyrants, liars, and thieves in charge or your affairs, or even learn how to depose them when they went too far and dispose of them properly. Of all the billion options we looked at, the last real chances humanity had to avoid a coming dark age were gone by 2003, a time when we Van were only young children. The timing wasn't purely coincidental, as we'll see, but it wasn't part of any grand cosmic plan or design.

The one thing that all of these outcomes had in common was a significant crash in the human population to below a variable carrying capacity. Most human beings have refused to comprehend that any unsustainable behavior must lead, by definition, to the extinction of that behavior. Even the few projected crashes that were voluntary involved suffering beyond anything humanity has yet to experience in the 74,000 years since the Toba eruption. And nearly every "number" lost in the crash was a human being who suffered and died before their natural years had run out. Global pandemics actually provided some of the more pleasant short-term scenarios by easing immediate pressures, since the top problem was population, but these were never enough to avoid a further crash. It was going to be life or death for most of the world, but it wasn't that life itself wouldn't survive. The greatest of the losses would be the biodiversity impacts, temporarily, and all of the extinctions, permanently, and of course all of the suffering and premature death on the run up to that. The biosphere would in all cases recover, but in too many cases this would take thousands to millions of years. To purely homocentric perspectives, the "best" scenario humanity could manage was a collapse to just over two billion, but in these outcomes there was unacceptably little of nature remaining, or at least unacceptable to the Ta, who have the final word. Most Gizmo simulations saw civilization in severe collapse and dragging the bulk of Nature down with it, as the last survivors of numerous plant and animal species were hunted to extinction for food. It was eventually decided that any human numbers above a mere one billion were too destructive to the other creatures of Nature, who all had their rights to own rights of their own, and to precede their own distant descendants. Not all of the forecast crashes would mean an end to all civilization, but All of them were more unpleasant and destructive than the one the Van are about to enact. All of them involved more human suffering than the evils that we'll soon inflict.

Waldo Speaking, Part 2

Wilma stood and stretched, and announced, "We're signing off the explanations for the night. Thank you for tuning in, everybody. But we're staying on the air for a while on selected channels and websites. We have some entertainment planned for the next couple of hours. We're going to have two more short broadcasts starting tomorrow at noon, EST. And we've just opened five new websites at ta.org, ta.edu, ta.com, ta.biz, ta.net, and ta.info, where you can stream our communications, learn more about us, and follow up on the messages here. Later, we'll be giving reports on how our Plan is progressing. Part of the Plan is to re-stabilize the economy over the coming years, starting soon, in order to avert a total catastrophe, and this includes more than a hundred million new, high-paying jobs for our favorite people. You'll be able to read about these jobs on the websites and apply for them online."

The show that followed was a montage of *a capella* duets from around the world, ranging from native chants and throat singing to operatic arias. When they sang in English they turned to folk and the classic protest songs, but no "Kumbaya" or gospel got sung. Their voices at least were not average, rivaling some of the best humanity had to offer. They performed a little bit of stage magic, too, by shapeshifting for the cameras. As long as Proxies maintain their mass, the shaped Eck can be reconfigured and recolored at will. They spent a little time as alien grays, who even did a tango together. And for a while they became the clichéd white man's versions of Jesus and Mary. By nine, they'd resumed Waldo and Wilma forms and cuddled themselves to sleep on the ground among the flowers. In reality, though, they simply got unplugged from their Van operators, who then cuddled themselves to sleep IRL.

The next morning, actually almost noon, Waldo and Wilma rose from their slumber and asked the government agents for hot coffee, black. They got nothing but scowls and nasty comments in reply. No matter, never mind, *hakuna matata.* The law enforcement personnel were trying their various unpleasant tricks throughout the night, to no effect, except their own increased agitation. And they kept having issues with their equipment. It never occurred to them that the demos of shapeshifting had been anything but clever magic tricks projected somehow onto their protective screen. Finally, Waldo resumed his seated position among the flowers, facing the camera, commandeered the nation's media again, and resumed:

"Welcome back. Yesterday we spoke of the inevitability of a crash in the human population. The Plan we've developed calls for a deep and controlled crash, to conclude within a century, and with overall human suffering kept to a minimum. It was decided to begin with a weeding of the human garden, a deep cleaning of the genetic and cultural pools, and a flushing of the cultural cesspool. Not all of this is judgment or punishment, but we had to consider the unlikelihood of redemption within the time we have to work in. Naturally, if humans were to do this, it would be done by lottery, with oligarchs and their children somehow escaping the draw, and this would almost approach the unacceptable level of randomness and injustice found in Natural Selection, which takes aeons to work, aeons that we don't have. Instead, the Van have developed criteria for an unnatural selection, for human traits that support the development of a better world. Genetics alone wouldn't pose much of a problem, since the Ta have been doing germline editing routinely for more than a million years. The human races, clades, or subspecies, were acknowledged and were regarded in a positive light as successful adaptations to local conditions, worthy of respect in the larger context of biodiversity and species resilience. That the lines between them are fuzzy is both irrelevant and as it should be. There will now, however, be a continuing

trend towards *La Raza Cósmica*, as the races will undoubtedly tend to breed away their differences in time. Race itself won't play much of a part in our selective process, except that some balance may be restored for populations that have been subjected to genocide, largely by Caucasians. This is particularly the case for indigenous tribes with long histories of truly sustainable lifestyles. These are the human heirloom varieties and root stocks, your crop wild relatives.

Truth be told, human beings could never do what now needs to be done. The great majority of you are just too deluded, ignorant, short-sighted, and greedy to manage your own affairs in your own best interests, much less those of the natural world. Humans have only learned to govern themselves crisis by crisis, without context forward or back in time. Time is the missing dimension in most of your political and economic thinking, except in small delta Ts, and the furthest considered plans are all related to the long-term damage humans have done. The Myoptics are built in. The way things are set up, sufficient meaningful reform is no longer possible, and anyone who tries is socially skewered. Insecurity has been carefully and successfully cultivated in the general population, leaving the masses fearful of initiating change. Humans are cowed instead, and praise serene acceptance and letting things be. Few act like they make a difference. Certainly anyone advocating the kind of radical reforms the Ta are bringing would be locked away as a sociopath. But we Van are not subject to your human delusions and denials. We expect the religious to remain more or less oblivious to the celebrations of the end of war and the culling of your toxic beings, being busy instead praying for intercession by their various deities, and unwilling right to the end to let go of their fables. But since there are a couple of days remaining, this would be a good time to petition your all-powerful deities to intercede on your behalf. We understand that some of them stand fully behind you in support of your proliferation, your wars and other activities. So let's get this possibility out of the way. Pray strong and quickly.

Without population control, humanity will never have the leisure to govern by vision instead of by crisis. I said control instead of management because it's come to that. People won't understand that this is life and death, even for their own kind. Your oldest generation has grown up in the shadow of the atomic bomb, playing duck-and-cover through grade school, and has still learned nothing of value from this. Now it's death of the biosphere and international bankruptcy, and still all you have are excuses. This ends in just a couple of days. Our Van-Gizmo analysis determined that humanity had in fact already passed its points of no return in all human-led alternatives, when people finally proved too stupid to learn about war, to shut down the military industry, to require balanced budgets, to rein in wealth inequality, to put limits on the powers of corporations, and to fully embrace an environmental ethic. Between then and now there is no could-have-been, and all real choices now can look only forward. Intervention is now a better world's only option. Without this, it's already too late. Pulling out of the dive in time would only have been possible with a fundamental change in human nature and its unlimited capacity for self-deception. We now propose to achieve that change with artificial selection.

The criteria the Van will be using to select the future progenitors of humankind can be generally summed up as "people who have a history of showing by their livelihood and their actions that they cared." That means people who cared both for their fellow man and for their fellow forms of life, people who have wanted to leave the world a better place than the one they found, and people who maintained their efforts against what seemed impossible odds, people who never sold out or gave up. In other words, the Star Throwers. We won't be selecting for intelligence as such, at least not explicitly. It's safe to say, however, that a disproportionate number of people with

above average intelligence will be among those left carrying the torch, and that by today's testing standards, humankind's average IQ will jump by 15 points or more. It does require some degree of intelligence to tell right from wrong when other are telling lies. But this gain will be incidental to the more central criteria of Character, known to the ancient Chinese as *Dé*. This is a species of virtue that's more inherent or innate than an adopted morality, blending elements of self-directedness, caring, conscientiousness, conscience, kindness, and a supportiveness of others, both human and non-human. Another criterion included a willingness to see the bigger picture, deeper time horizons, concern for the global conditions, and humanity's place in the greater scheme of things. We looked for a sense of higher purpose, of living for something greater than yourselves, and behaviorally manifest in the choices, lifestyles, and livelihoods of the people. Consistently and fairly identifying the latter was a little bit problematic, given the Maslovian idea that the needs of the self should be satisfied first before the larger worlds opened up. We get the "there but for fortune" idea, but the effects of nurture are also overestimated by the egalitarians and those who hold to a cultural relativism and the victim mentality. An inferior nurture has indeed denied a sense of the greater world to many, and many allowances were made for this problem, but it was also noted that the character or spirit of a truly exceptional individual is a difficult thing to suppress. Upbringing was allowed for, but this was only one factor examined. The sufficiently gifted could fight their way through a great number of horrors and still emerge as an asset to life on Earth.

Humanity was parsed by the Van into three "sub-species," and this was independent of any designations of race. About an eighth of humankind may elect to retain it's pretentious, self-glorifying title of *Homo Sapiens*, people with the wisdom to give a damn about this world and its future, including the other sentient beings within it. But to the Van, these will be known as *Homo survivor*, until true sapience is more common still. You will also hear us refer to them as the Fit. We looked for those with either purpose or higher purpose, those who would find out what's missing in the world and add some of that, or try to leave the world a better place than they found. These will be fully encouraged and aided by both the Ta and the Van in both their genetic and cultural development. And they will be the best supported economically. The majority of these, but not all, have already been tagged, based on the lives they have already lived. The character of a hundred million developing human children remains to be assessed.

Then there are those who seem to have lived to make the world a worse place to live. These, too, make up roughly an eighth of your species, or just over a billion, and unsurprisingly, numbering more of those with the Y chromosome. Well over three-fourths of these have already been tagged. The Van have termed them *Homo non grata* or Unwelcome Man. Those already identified will be terminated gradually and steadily over the next six months. As such, we need have no other name for them than *Non grata.* These judgments were made on the basis of mindsets locked into cognitive bias, intractable toxic ideology, bad behavior, and irreversible cultural pollution. We aren't going to share, just yet, what the criteria for inclusion in this sub-species have been, but will leave this for you to examine as these people begin to die off. Consider, however, that should you seek to replace someone like a politician who has succumbed to this cull, you may want to find a replacement who has a different ethical or political platform. Politicians who find they have a great deal in common with their deceased predecessors may regard it unwise to maintain ambitions to succeed them. Surviving family members can take some comfort in the fact that their lost ones didn't suffer, given the experiential and ecstatic properties of the Spybot neurotoxin in Fast Rapture mode. The behavior of survivors will be watched in how they dispose of their loved or

unloved ones' remains, and how they redeploy their inherited assets. The Van would prefer that all organic materials find their way back into fertile soil, and that any financial resources be reinvested in an analogous manner. We've made it pointless to continue to embalm and bury your dead in watertight coffins. This has traditionally been your final insult to the environment. We suggest that you just haul the bodies to an open field. The crops will thank you. We'll also make assumptions and draw some conclusions from the behavior of the heirs. The chaos that ensues here will also show us who would step up to do the heroic and leaderly things. It will help us to assess personal merit among the people of means: who among you would just hunker down, armed, to defend their cache, and who might at last start to share.

The six-billion-plus of you in the middle, the three middle quarters, those not quite so good or so bad, are known to the Van as *Homo meh* (or just the Meh), Uninspiring or Insipid Man, or else *Homo ignoramus*, Ignorant Man, deluded man, misguided man, the man who will do whatever the pressures tell him to do. These Meh may continue to live out their natural lives, provided they don't cross the line into *Homo non grata* behavior, provided their lives can reflect more of our objectives to care for this world. It's a new pressure that they might as well succumb to, though for most it's too late for salvation of their bloodlines. The Meh aren't junk, to be disposed of like the *Non grata*. A great many might fairly be described as good, decent, hard working people, the salt of the earth. They're just not good enough to create the kind of future this wonderful world deserves. The greatest gift that life has to offer, the chance to reproduce, will be denied to them. We'll ensure that those who were not part of the solution will at least not be part of the long-term problem. Three days from now, your entire species will be sterilized, and any embryos younger than three months will miscarry. Most of your domestic dogs and cats will be rendered barren as well.

This sterilization will be done by a process centuries beyond anything your science can reverse. Over the next few years we'll restore fertility to a select percentage of you, among those we call *Homo survivor,* and in the process, we'll correct a large number of your inheritable genetic deformities and diseases. There will be cases where we'll restore fertility to only one half of a married couple. Genetic enhancement and uplift will follow in time, but not in the next generation. For now, there will only be some in-depth embryo diagnosis, germline manipulation, a little tinkering with epigenetic triggers, and a few biotech, nanotech, and infotech enhancements. Some neurological functions will be fine-tuned by removing forebrain impediments to self-restraint, proportional emotional reactions, and other forms of cognitive development. These are still closer to corrective actions than enhancements. We don't really have much of an is-ought problem: what humans are isn't always what they ought to be. Soon, however, we're going to give Cetaceans and other self-aware sea creatures a more effective way to communicate with humans, and we're going to make greater longevity possible for Cephalopods, to allow them more time to develop the culture that their interesting brains deserve. In the meantime, humans have several lower tech enhancements that you have failed to use to widespread advantage, and we'll concentrate on those. Among these, we'll help with optimized development that better respects your natural growth stages, including a better respect for play, optimized nutrition for mental development, much earlier education in critical thinking, mindfulness practices, and the guided use of elucidogens for the brave.

Friedrich Schiller wrote: "*Mit der Dummheit kämpfen Götter selbst vergebens*. Against stupidity the gods themselves contend in vain." While this has held true for most of human history, in the end it won't be the case. Humans have never known any real divine justice, for the simple reason that all its divinities are delusions. This will change in a couple of days: stupidity is about to suffer a serious blow as just desserts

will be served. Apology isn't always an expression of regret: sometimes it's simply an explanation. We'll just blow past all of the ethical issues and arguments here, and the hand-wringing, appeals, denials, and exceptionalism. Human is as human does, and will enter the future, or will be denied entrance, accordingly. While it may be argued correctly that you are all just doing your best, the hard fact is that that's just not good enough, given that you have run out of time. Those on that cusp are no longer worth the investment given the poor odds of success. Human is not what the best few of you have written in praise of yourselves. It was your philosophers and poets, not your farmers or soldiers, who defined humankind as an angelic and rational being, and only a few of them were rational. Thinking is important to thinkers, who write most of the books about mind, so the printed vision for the whole of humankind is a little bit skewed. We'll be living more in the fourth dimension, where sustainability means as much as existence does in the third. In the bigger picture, the unsustainable thing is already dead or extinct from the consequences of its behavior. We aren't asking you to forgive us, or to greet us as liberators. We're not going to convince anyone that there was no better solution, and most will insist for what's left of their lives that letting humans work out their own destiny might have worked out for the best. Much of this would not have been necessary had you not let things get this far. But humanity has left us with no better choice if this world is going to continue to thrive and carry some sustainable number of human descendants.

It may be a few centuries before our more energetic actions are not widely thought of as the two greatest evils the world has ever known. Humans will need to independently verify our projections and simulations of where the world was headed, and this remains far beyond human computational skills. We've saved the data for such a time, however. You will likely wonder how such advanced beings could destroy lives with any ethical justification, but you would do so without any understanding of the suffering, death, and destruction that our harsh actions will prevent. We do this out of a compassion that runs a lot deeper than yours, but we will be far better friends to your descendants than we are to you. For varying reasons, most of you have been terrible ancestors. The costs of your overpopulation would not have only been nations. In most of the alternatives, civilization itself would be lost, and with it the means to make your magical technofixes, like the means to blast away incoming comets and asteroids, and even the means to leave this world for new ones. You should understand that this is not done for punishment, deterrence, or retribution. Think of this as you might think of yourselves culling a flock of poultry that carried a deadly pandemic disease which threatened to jump to your own species. Or you may think of it as a weeding of your garden, or taking out the trash. If certain people have a net negative value to the world, then we add overall value by removing them.

Is killing bad people wrong? We can at least agree that it is if you have an incompetent and unreliable system for determining who is irredeemably bad, as is your system of justice. But most human beings seem to have an unsupported metaphysical model of their world that proposes you are divinely made spirits, sparks of the fundamentally sacred, coming into this world of matter, in order to learn and evolve in some way, to redeem imperfections and return to the glory and the light. "I was made by God, in His perfect image," they might say, "and God didn't make no junk." Others believe that "every person is infinitely precious and must be loved and protected unconditionally." Any person, no matter how twisted, can be saved or redeemed, and anybody can be forgiven. Nurture remains an important complement to nature. It may be true that all people at least deserve a fair chance to develop their human potential by ensuring equal rights and opportunities. But if there was a purpose in that, it would still be in what life could learn about what to keep and what to get rid of. It would not be

found in an all-embracing, mindless, unconditional love for everyone just as they are. It's delusional to regard yourselves as fallen angels from outer space, just walking around down here in strange meat, and this attitude isn't helping the biosphere much either. Even the belief in reincarnation, a word which means "going back into meat," has failed to instill a vision of posterity and a will to leave a better world behind for the life ahead, even when this life is going to be your own. There is nothing in human nature to command this unconditional love, other than tricks of oxytocin, especially when humans destroy what remains of nature. We hold a different view and metaphysical model of things, one that your own Alan Watts summed up nicely: "You did not come into this world. You came out of it, like a wave comes out of the ocean. You are not a stranger here." Life, then sentience, then consciousness, and then, if you must, the Spirit, evolved out of this world, unplanned, emerging as a system self-organizing against entropy, as light that has learned how to learn. But on the way it makes many errors. Spirit is conditioned and contingent, not primordial. In the history of life, the planet, and the multiverse, things happen in the context of what has gone on before and the opportunities that this has made possible.

Unlike your creator gods, evolution makes plenty of junk, and *lebensunwerten lebens*, life that's unworthy of life. The fact that some Nazis said this in misguided ways doesn't make it untrue. The biosphere creates beings of no intrinsic worth to the biosphere. It creates beings that your world would be much better off without. It creates beings of negative value and worth, such that their removal adds value and worth. You are not created equal, nor are you created to be equal. You can only learn to allow your natural inequality to teach you. While this itself should teach you that equal rights and opportunities, secured early in your lives, will give you the best information to grow by, the worst of all possible outcomes is to have the outcomes be equal. The risk of failure and death, the risk of risk itself, isn't a thing to prohibit: you need these things to teach you, especially to teach you responsibility and duty. What truly saves and redeems you is the lifetime of work that you do to better yourselves and raise the world up with you. It's up to you, as beings in evolution, to provide fewer niches for unfitness and evil to thrive, if you are ever to have any hope at all of ridding your world of these troubles. Most of you claim in some form or other to have the right to extinguish non-human life, and yet you balk at doing damage to evil and unfitness if it comes in human form, and you will let these errors live on in the slimmest of hopes of some highly improbable process of redemption. You won't even depose the worst of your own tyrants, even when they murder men by the millions, because even this one twisted life is worth saving. That there is some worse tyranny "over there" is your glib excuse for permitting the lesser evil over here. We say that selection was your duty, and you have failed at it miserably. We're reintroducing this, but with a less random nature than the forces that shaped what you are, the super-volcanoes and rocks from the sky, the hungry jaws, the great glaciations, the random diseases, and the hundred-year droughts. We're now going to select for the things that we want you to be. We're going to do this in your economy, in your culture, and in your gene pool."

The two Proxies looked at each other, nodded, then stood up, and stretched. Wilma spoke, "We're going to give you a short break here, while we enjoy a dip in this lovely little pool. The fact that we aren't real doesn't mean we can't take pleasure in the water. We're Van who are telepresent in these forms and we have brought our senses along with us. We'll resume command of your airwaves in ninety minutes. We will only have one more little speech to give you. Your President has until this is done to join us here. Our Plan goes into action in just a few days. We will give any of your gods who might be real until then to intervene against us on your behalf, or else we'll just have to assume that they were just illusions all along." The two disrobed and got

wet. Neither glistening body was much to look at, unless you counted the expressions on their faces as they splashed around.

Wilma Speaks of Spirit

Wilma, all dried and reclothed and looking refreshed, spoke up, “And we’re back. Just bear with us for a while longer. We’re going to disappear when we’re done here, and you won’t be hearing from us or any of the Van until six months have passed. We understand that the months ahead are going to be a traumatic time for you. We can only reassure you that your survivors won’t be abandoned, and we’ll be here, even though hidden, to help you recover. The websites we’ve set up will have information for you too, but you still won’t be more fully informed until much of the cull is complete. Your cowardly President only has until we’re done to come here and speak with us in person. And your gods only have three days to prove their existence to us and intervene in our Intervention. I'm going to relieve poor Waldo here and take the last round.”

At this point, Waldo went onscreen as well, tapped Wilma on her shoulder, and pointed her gaze to the top of a nearby tree, at about the time they hear a kind of staccato chirp from a kestrel, a little falcon sometimes called a sparrow hawk. "Well, hello little bird." Wilma greeted him, and duplicated his call precisely, while holding up her index finger horizontally to offer him a perch. Waldo borrowed a little camera from Wilma's pocket to make another recording. To the visible agitation of the agents, soldiers, and scientists present, the little bird flew straight to Wilma's finger, unruffled while flying straight through the barrier. On national television, and in front of the second camera Waldo held, Wilma spent almost thirty seconds talking softly to the bird in a language that was still unknown to linguists, but weirdly sounding a little like English. The kestrel took off again and resumed his perch near the top of the tree. At that point, one of the soldiers took a rifle and shot the bird down. Waldo immediately fed the video he made of the event into Wilma’s national feed. Whether this was done out of spite, or in order to autopsy the bird in search of a way through the bubble, was never really learned in the chaos that began a few days later, and the soldier who took the shot was among the first to be Fast Raptured. Wilma just shook her head, and sighed, and said to the camera, “That was a living being and not one of ours. I'm glad, at least, that you all got to see that. Try to remember this next week when you start to call us inhuman and inhumane. We’ll be taking that as a compliment.”

Wilma regained her composure and continued, “Human rejection of natural selection in your own species is a species-wide fatal error. You deny its necessity. You’ve repudiated selection to favor unrestrained, indiscriminate growth, for what you call an equality of spirit, or even a sanctity of life. Every living thing is sacred, at least when it suits or profits you to say so. You might even try to call it unconditional love. This is in part why your gene pool is such a cesspool now. For many, in your misguided effort to be less judgmental, to be more spiritual, you have mired yourselves in bad judgment, and your bad and inferior have been much more prolific and successful than your good and admirable. Cultural relativity has run amok now. You believe that you have an intrinsic worth with no need to demonstrate value. Your worth exists purely in your potential for redemption. You can thus draw your self-esteem out of nothing. Every lost and lonely spark of the original divine light can be forgiven all its sins and redeemed, often just for the asking, even as late as the last, dying breath, as long as you ask the right savior. And who the right savior is is a question to be decided by endless war. Your common assumptions of equality presuppose that every one of you is potentially and ideally fit to survive. There is no real responsibility here, other than coming back to your god, and all things are working out according to this deity’s plan. You can do nothing to stop this. But we can.

There's a third force in your evolution that only a few of you are beginning to grasp. Some, along with ourselves, call it Emergence. The idea is this: from time to time, there come to be new things under the sun, due to synergy, the whole being greater than the sum of its parts. The new things are more than simply new combinations of old things. They will occupy a new and different level of being. The emergent thing is the whole less the parts. When systems begin to self-organize, to cohere, and to feed on information and structure and energy, new kinds and levels of being will sometimes appear, rising out of the coarser and earlier stuff, bringing with them their own new forms of natural law. The primordial stuff that emerged at the beginning of our local multiversal bubble obeyed no periodic table or chemical laws, nor was there a way to predict that one day it would. This stuff was not made out of atoms. It cooled and made the first simple atoms and these made blue-hot suns and then there came to be heavier atoms out of the ruins of those. Very little of chemistry is known inside the stars. Great stars needed to explode first and the atoms made here had to cool down as well. Only then could there be chemical properties, patterns, valences, and static charges, properties now capable of doing new things with and to heat and light.

Then, one happy day, the first life-like things emerged, with their own new sets of natural laws. Radically more than anything else before life, entropy gained a worthy opponent, complexity gained a holdfast, and discovered how to last and repeat itself. Out of life emerged structures, patterns, and properties. Out of genes emerged traits. Out of single cells came organisms. Out of the organisms, driven, irritable, and plastic, came sentience. Out of sentience came consciousness. Out of consciousness came agency. A thing can now act on its own behalf. Even out of simpler forms of life come forms of teleodynamics, hungers and meanings unseen before. And out of your web of life on Earth came Gaia. Sometimes emergent things can supervene in the process that went before them, turning back on their origins and acting as a cause on their precedent: the trait will refine the genes even further, organisms make niches for new kinds of cells to arise, grunts and signals make culture, which will turn around and make language. But the thing that emerges does not get free of its origins. The emergent thing is still contingent, as the flame is the log and needs the log to get free. Arising is conditioned and dependent, as Buddha would say. Even the thing that outgrows its old nature still needs to grow out of nature. Now, at this stage of things on your world, out of life and sentience and consciousness and agency, conserved in the field of Gaia, comes yet a new thing under the sun, a thing that is only just now beginning, the process that you have termed Spirit. The Gaia Hypothesis of Lovelock postulates only that Earth functions as a self-regulating system, having evolved a planetary-scale homeostasis. It doesn't assume sentience, self-awareness, consciousness, or divinity. But this is still a ripe ground for further emergence.

You wrongly think that this Spirit came first, and moved over the water, dividing light from dark, and should this ever be regarded as merely a product of the evolution before it, it must then be regarded as something less than sacred, something less than divine. Only the thing that is primal and perfect, original and final, immovable and unchanging, can warrant your petty and neurotic reverence and worship. And any new and impermanent things cannot be related to something divine. You have this entirely wrong. The fact that no god made your life does not mean that life is not sacred, nor does it mean that life made no gods. Or that a god starts out old and wise. The Ta are some young gods that Life made. Spirit is young and primitive in you, like tool use is young and primitive in chimps. In many ways, you grasp the nature of Spirit best when you speak of a spirited horse, of a life that loves life, that keeps coming back for more. It's really much more like a verb than a thing, and while it's in motion, for these moments you can know gratitude and humility, awe, respect, care, assent, creativity,

conscience, enchantment, these things that should have long ago ended your wars and your exploitation of Nature. They must end them, in fact, before you have any good reason to hope for a future. Your dolphins and whales lack thumbs and tools, but they have better Spirits than you do, and in this they are more evolved. Yet you still slaughter them.

Emergence doesn't negate the Spirit: it merely demands that the biosphere remains in good health in order to maintain evolution. The wiser view of things says we're all evolving and emerging out of nature, systems self-organizing against entropy, out of a creative interplay of matter and energy. Sentience becomes consciousness, as light learns how to live. This view of things is not a denial of Spirit. It merely says that Spirit may be something that the universe is learning to how do, instead of this being a fundamental property of existence. The Akashic Field might be no more than the sum of life's learnings, the Noosphere, nothing more than culture's digital database, but they now have a place to begin or take root.

Life needs a matrix to function within, water for the living forms here, matter, energy, structure, and information. Spirit, too, needs a matrix: when not an expression of a living body, then it must have either life itself or a culture as a field, a place for information to be conserved. One of the things that Spirit is slowly learning to do is survive the end of a lifetime. It's only recently begun to do this, by learning how to be remembered by the field of life itself, and then recollected when called upon again. It's slowly learning to imprint itself on the world in a manner that permits recall by other material beings. Sometimes it hides between lives in the culture, sometimes it just hides in the magic, or in the water, or in a larger nature, or in a higher purpose. It's good at hiding. It has no particular place to go between bodies, nor does it have a need to go to a place. It's not a thing alive in three dimensions but a process that lives only in four. It's simply remembered somehow, and sometimes, at the end of a discontinuity. This is what Buddha meant by rebirth and it's not the same thing as reincarnation, a going back into meat.

This is one thing that fields are good for: Spirit, too, can be either a wave or a particle. There is something continuous in spite of the broken stream. This is what you call a koan: where does your mind go when you sleep, where does your fist go when you open your hand, where does your lap go when you stand up? This is how spirit is more like a verb. Certain original forms of the Buddha's teachings have approached this understanding, and a man named Gurdjieff as well. Henrik Ibsen told of it in his fairy tale play of *Peer Gynt*. But the harsh news here for most of you is this: only a few of you have learned to come back again. Those of you who can't hold true to yourselves, who squander and dissipate what you are given, simply dissolve back into the dark and general soup. For the fortunate few, someone much like you will be back, someone who thinks they are you. Character is the key, what the Chinese have called *Dé*. This is not a thing that some god or devil decides, and not a reward or a punishment- it's only a question of living a coherent life, a life of negative entropy, a life of integrity, a life lived on a true path, a life of higher purpose, a life with a real meaning. It has nothing to do with following somebody's rules. The sad thing is this: those few who return must come back to the mess that all of you made of your world, not to the better world that the best of you tried to make. We are going to correct that little problem now, since there is no natural justice to be found in this.

So with this new understanding, try asking again what it means to be a human. We submit, simply, that human is as human does. Humanity can't be defined as that which a few of the best of you have written in praise of yourselves. Man was defined as a rational being by a tiny majority of rational philosophers, not by the farmers or soldiers. Much delusion was added to this when the poets and prophets chimed in. If

human is as human does, then only a few are rational and only a few are glorious. While your society identifies with its highest minds, it sinks to its lowest levels. You can't govern yourselves because you attempt to govern the thing that you think you are and not what you truly are. You need to shape governments to attend to a finite bundle of needs that need meeting before you can make further progress. Instead, you create an endless series of new needs before the first ones are met. It's no wonder then that perpetual hunger and dissatisfaction are the result. We're going to correct this too. It's taken life three and a half billion years to come this far on your world. Humans didn't do very much of that work, and humans have no right to trash the results, or to render so much of that living and dying in vain. Human self-restraint, from this day forward, will no longer be justified in terms of human self-interest. From this day forward, the good serves all of life on Earth. For the foreseeable future, those who dispute this with actions against our efforts will be removed from creation.

It doesn't matter whether any of you believe in evolution, or in emergence. In fact, if you are any sort of conscientious scientist, you won't let yourself believe in anything at all. But we do suggest that humans at least try this: to live the kind of life that makes the whole metaphysical question irrelevant, just by asking the question: How can I live in a way that satisfies all alternatives? If you return, it's to the world that you helped to make better or worse. That one is easy. And if you don't return, you can still challenge yourself to take some satisfaction in leaving a better world behind, or even just living a better life. But life, in its billions of years, and neuronal structure in hundreds of millions, has learned how to reward good behavior. Endocrine glands stand ready with superior feelings to offer. Pleasure evolved as your counselor and coach. Epicurus and Lucretius had more to their theories than just atoms and natural selection. Happiness and pleasure may be among the cruelest of goals, but as the voices that tell you when you're on a good track, they are still the voices most worth listening to.

Human life isn't inherently sacred to us: what sacredness it has is conditional, and it may be forfeited. It's only a presumption, as of innocence. And here's the great utility of evolution's forgotten half, Selection, which cleans out the junk, and thereby betters tomorrow. But we'll be using cultural selection here even more than eugenics. We can fix bad genes. Human culture, for better or worse, needs better information as feedback, and justice is due at both ends. We have run out of time to play longer odds of personal redemption. We see redemption for the low probability event that it is, and we regard a person's actions to date, combined with their having had access to knowledge of the trouble your species is in, as sufficient grounds to judge the likelihood of redemption. Low probabilities conflict with the urgent need for solutions, and sometimes the long shot at redemption just isn't worth the heavy costs of bad behavior. We have a lot of urgent work to do and destructive or toxic people will be in our way, undermining our efforts. It is in fact Judgment Day for these. With this Plan, the bulk of the suffering will be done by those who most deserve it.

This will be a full-on Intervention. Aside from the cull and selective sterilization, the Plan is to outlaw both war and ecocide, ruining all your predictions about the future of warfare, and also ending your narrative on the Anthropocene extinction. This world and its other inhabitants have well-armed defenders now. We are also instituting a degree of lethal selective pressure against bullies, liars, poachers, and thieves, in order to establish trust as a social currency. Trust in the goodness of others may well be the most abused of the global commons. A successful civilization requires trust, security, and peace. What you have made with your endless supply of enemies and human predators is not a successful civilization. You make criminals to justify police power, and enemies to justify your military power. Please be aware that it doesn't matter at all to us if your particular behavior is legal or not: if it's wrong, it ends. And if it's wrong

enough, it's your end as well. And if you can't tell right from wrong, your end may come as a big surprise. When we reach our first-century goal, human beings will occupy only a fourth of their present developed footprint. However, at one-eighth of the current population, this will at least mean twice the per capita occupied land. As you retreat into these reservations, you'll be able to concentrate your resource mining activities on reclamation and salvage of the materials you've already used. Know and take some comfort in this: that we'll be here for the survivors, to help you move on in ways you have never imagined, including the exploration of your own solar system.

We intend to bring you a greater degree of security soon after we shake things up. Benjamin Franklin wrote, "Those who would give up essential liberty to purchase a little temporary safety deserve neither liberty nor safety." A correlate of this suggests that people can be made to surrender their essential liberties just by providing threats to their safety. Since more men will be sheep than freedom fighters, tyrants both active and passive work hard to cultivate fear, insecurity, and mistrust with both real and imagined enemies and threats. This includes economic insecurity for a culture founded on debt instead of economy. Greed can't be stemmed without allaying anxieties about need fulfillment. Eventually, all that's really needed is the fear of anxiety, or even discomfort. Thus do civilizations fear anarchy more than oppression. The deferral of gratification and the simplification of needs has become an economic treason. Insecurity and artificial appetites have fueled this civilization. The economy has been founded on addictive behavior, denial, and poor skills for deferring gratification. Your real need was to shape a government around who you are, a bundle of needs that need meeting before you can make personal progress. Instead you create an endless string of new needs before the primary ones are satisfied. Is it any wonder, then, that perpetual hunger and dissatisfaction are the result? An economy driven by a skewed oversupply and inflated demand is not a free market, but is beholden to those who do the skewing and the inflating. And the people do love being given more credit than they deserve. We need to let the finitude of resources drive their supply and truer values change the demands.

Beginning this week, we are ending the epoch that you call the Holocene era, or the Anthropocene extinction. It's time for your species to grow up and start accounting for its actions. On behalf of the biosphere and all of the non-human life on Earth, we are putting an end to human ownership of this world. You've forfeited any rights that you may have arrogated, with only circumscribed rights in usufruct remaining. This means that your use of this world is now conditioned on your ceasing to damage it. This isn't a conquest: it's simply that your world and your non-human relations now have a protector and champion. We will in fact be removing more rules and laws than we impose. We believe in liberty, but for different reasons than you might: it requires a free market of ideas, and then a facing of consequences, to learn what you need to learn. In many ways you'll be more free, but it seems we'll need to force feed you some of your freedoms. You might say that we have no right, that this world was yours by right of first possession, but it's our well-considered opinion that you forfeited any rights you may have arrogated by your deluded way of thinking. We're not going to give you any commands. We're just going to eliminate those who get in our way and let you figure out what it is we want and don't want. We're going to repair the world you have so thoughtlessly damaged, and this will cost you humankind and human civilization as you know it. There will be hell to pay in the next year for the damage you've done here, but you need to know that things are going to get better soon enough. Don't concern yourselves overmuch when the global economy collapses. Another economy will soon take its place. We have more wealth than the world has debts, and we'll be issuing a new specie currency as it's needed, fully backed by and

redeemable in strategic materials, or, if you wish, gold bullion, which means little to us. What remains of your governments are encouraged to concentrate on simply keeping the peace, maintaining your infrastructure, and providing citizens with an equitable distribution of real and basic necessities. The crises will end. We are not here to help mankind for its own sake, our priority being the survival of this world and the diversity of its gene pool. But to do this, we must first convert what remains of humankind from parasite into symbiont. The alternative is to terminate the human species. And that was among the options that we considered.

This is the end of our transmission. Further communications and explanations will be posted online on our several websites. There will be opportunities there to make personal contact with us. We'll soon start using this website to advertise new employment opportunities, field questions, allow you to apply for restored fertility, and to report more malefactors, bullies, liars, poachers, and thieves. On this last point, we advise you to be very careful: we will investigate and verify your claims and accusations. If your report is truthful, these people might die, but if your report is a falsehood, and only made out of malice, then you may well die in their place."

Waldo and Wilma stood, looked in the direction of the White House for the absent President, who for a few more days could regard himself as the most powerful man on Earth and leader of the free world. They shrugged. The Eck fields that held their material body parts collapsed. Liquid material dropped to the ground and splashed outward. What remained were two hardball-sized Gadgets lying on the lawn. Technically, they were Widgets. The shimmering circle shrunk around and into them as they shot skyward towards the late afternoon sun, with a couple of loud cracks as they broke the sound barrier less than a second into their flight.

The Eck

We began at midnight, three days after the Proxies vanished. Before recounting our Plan's first wave of activities, some things should be said about the tech that we've used in our little "shock and awe" campaign, and a lot more than that about who we are. The often-prophetic Arthur Clarke predicted: "At the present rate of progress, it is almost impossible to imagine any technical feat that cannot be achieved - if it can be achieved at all - within the next few hundred years." He seems to have overestimated what would soon be called the Singularity, and underestimated the prerequisite advances needed to create the strongly-emergent Eck. It was the creation of Eck that really cracked open the door to the universe for the Ta. It proved to be versatile stuff, but the Eck wouldn't appear until attotechnology had become routine, which meant work with electron-scale "entities," averaging a billionth of a nanometer in size, using Nanomachines a billion times larger than that.

The Ta are deliberately unclear on the precise nature of Eck. This isn't out of fear that humanity will develop the tech or weaponize it: that will remain at least a thousand years away. Rather, knowledge of the principles involved in its creation should be left for scientific discovery as a driving force for human culture, after the end of war. But they have shared their descriptions of several of its applications. For now, it's suggested that we think of Eck as a kind of fabric, woven from threads of dense, informed Spacetime, created and configured at attoscales by nanoscale devices. Certain threads have positive properties, behaving like force. The Van call these Attoboys or Attoyang Nets. Other threads have negative properties, such as drawing or absorbing. Naturally, these are Attogirls or Attoyin Nets. And some, the Attonoots, will be gender-confused. This fabric can be so tightly woven that electrons, photons, neutrinos, and even gravitational fields are blocked, or so loosely woven that viruses and single cells can pass. They can also be calibrated to pass through any substance of any density while capturing or altering preselected atoms and molecules. As a "woven fabric," they lack the continuity or omnipresence of fields, but dense quantum weaves serve just as well. The movement of Effect along these threads is bidirectional, so a thread can send one Effect and simultaneously receive another, even one of a different nature. It can be Narrowcast from a single source, or sent from a pair of devices when more than one dimension is wanted. Only two devices are needed to configure a two-dimensional plane, but these can be contained in one object.

Eck can have a linear, ray, or beam mode; a screen, seine, or sieve mode; or a shaped, morphic, or morphogenic mode. In linear mode, it can range or identify targets like lidar does, except that feedback will be a function of bi-directionality instead of reflection. Beams can also carry ordinary matter, energy, and information, but here they are subject to normal physics, with c as a speed limit. Eck can carry its own version of information between two entangled points at much greater than light speed, but this isn't much use for broadcasting. This linear transfer of data between entangled points is the basis of most "Spook" and Glint communication. A Spook is the Ta telephone, described a little later. You can guess the term's origin. Glints are also for later. Sentience still can't be sent across space, so the Star Trek transporter, or the teleportation of life forms hasn't been achieved yet. But Telereplication, or Nanofax (a term borrowed from Gibson), sends instructive or reconstructive data across either local or interstellar space to molecular assemblers (think hi-res 3-D printers). Interstellar transport requires that both the sending and receiving units be cloned in the same Placetime. Life forms can be duplicated or cloned in this way, but the resulting duplicates remain only copies. Both original and copy would regard themselves as the

original. This doesn't work to save people from dying because the duplicate will inherit the same troubles that are killing the original, that is, there are no "pattern buffers," and the creepiness factor keeps this process from being used to replicate high-functioning Sentients and Sophonts. This does, however, get used a lot for cloning organs for transplant, although the original model can't come from someone whose organ needs replacing. This tech requires an AI be ready to pick up the Spook, read its full genomic code and structural scan, and then assemble the Replicant out of available molecules. It can do this in two ways, using either Nanite Molecular Assemblers or Eck Screens.

Beams only require a single point of emission, although using a cluster of contiguous emitters can send and receive Eck like a braided cord and increase the beam's capacities in complexity and power. When used as a tool or weapon to redirect or carry coherent physical energy, as with Grasers, or gamma-ray lasers, terawatts per square centimeter is readily attained. These are always visible beams when carrying lethal amounts of energy or even Eck Effect. Because of the bi-directionality of Eck, the light sabers of Star Wars fame became real tools: the light goes as far as it's told to go and then comes back again, a little like AC current. Conveyance of information by Spook is more limited than this, to just over a terabyte a second per square millimeter. This is clunky by Ta standards, but every tech has its limits. Tractor beams were never invented, but it's usually easy enough to push things in a nearward direction from behind.

Two-dimensional Eck Screens, Seines, or Sieves have several functions. These will always require two point sources. Thanks to bidirectionality, the two points can generate a plane that's bounded on all sides, and tens of thousands of kilometers in any dimension when given sufficient power. They can be hung or draped from their sources, where the Van call them Driftnets or Dragnets, or be projected in any direction. They can penetrate material of any density and can be preconfigured to identify or collect specified atoms and molecules, as they are used for mining, or if given extra thickness, to identify and then either reconfigure or tag molecules. Tagging or Painting a target for some future action tweaks a molecular configuration in an insignificant way, allowing the target to continue as usual. It doesn't last very long when the target is a fast-multiplying cell or virus: the tagging and reconfiguring here must be done in one pass. For example, let's look at how the Ta eliminated malaria. Using a Driftnet to identify and sterilize the reproductive cells of all the world's mosquitoes would have been an option, but only if mosquitoes weren't important to so many ecosystems. Instead, they targeted the genome of the parasite itself, rearranging a small segment of its DNA into a non-viable form. Clearly, this segment had to be unique to the target species or genera, which required a lot of initial research. A good speed for this process is just under half the speed of sound in water, which makes circling the Earth once a day a good pace for projects like this. The Driftnets can move faster than this if they aren't doing any sensitive, read-write molecular work like rearranging RNA and DNA molecules. Screens which merely "disallow" certain molecular configurations, often used in ecoremediation, decontamination, or extermination, are Intolerance Fields. They work by disrupting molecular bonds. The ability to reconfigure molecule and atomic nuclei makes thicker screens and Driftnets the go-to tech for matter compilers and molecular assemblers used in bioengineering and Nanofacture.

Shaped Eck membranes are called Morphic Fields by the Van. This term is a tongue-in-cheek poke at Rupert Sheldrake's more mystical notion, but Eck, also a tongue-in-cheek Van term, does make them real, at least for inorganic materials. This also follows the somewhat more scientific idea of morphogenetic fields, when used as a

conceptual metaphor. Morphic Fields with firm but less-than-rigid shapes are used to create imitation life forms, as with Gizmo bodies, Waldos, and other Proxies. They can also be used to form machines with no moving parts to break down. These shapes need to be maintained, and this requires an energy source to maintain the Eck itself, as well as a dipole Gadget or some smaller equivalent to direct and maintain the assembly from within. They can also be used in warm fusion generation, which is about as crude as Tan energy production gets. The Ta have little use for nuclear fission, but they'll make use of humanity's stockpiles of fissionable material elsewhere, off world, or else send it into the Sun along with the nuclear waste. More common to their energy use is the Eck-based conversion of raw energy back and forth between its various forms, or matter that's converted to energy in any of its forms, or energy that's converted to matter or anti-matter for later use as fuel. All of these are done with 2+ dimensional Eck screens. Small pockets of shaped Eck are used instead of plasma fields for bottling antimatter, and they require less input and maintenance. Pockets of Eck can also be used in Wink Bombs, to compress fissionable material to supercriticality. These can be useful for converting problem asteroids into rapidly expanding particle clouds (with the vaporized remains of dipole, Eck-emitting Gadgets). Shaped Eck can also be used to form tubes for the transport of material or heat, especially in mining and industry, but these are hazardous things to run into and they require designated lanes and signage. The receiving ends of an Eck tube transmitting heat have the appearance of a glowing circle of minimal thickness, giving them the Van term Piping Hot Pizzas or PHPs. The transmitting ends can also be used for cooling. These are called Cold Breakfast Pizzas or CBPs. Both are used in manufacture, and in heating and cooling conditioned spaces.

Shaped Eck can be used to make several kinds of "force fields." One is the traditionally understood Pressor Field, or Shield, which protects things within it as if by brute force, deflecting both matter and energy. But more frequently, a Conversion Field, Absorber Field, or (Niven's) Langston Field, is used. This converts matter and energy on contact into more desirable forms. In deep space, this takes high velocity particles like micrometeorites and converts them into fuel, or directly into kinetic energy with any desired vector. Down below, it sucks up radar signals, conferring perfect stealth. Field capacity is not unlimited, and is related to the power supplied, hence the Ta insistence on the slower, sub-light speeds, to permit sensing large obstacles with Lidar in time to react. As suggested earlier, a tactical nuke is within design parameters, but a collision with kilotons of rock at half the speed of light is not. The Waldo and Wilma used Conversion Fields on the White House lawn. Conversion Fields are also the primary tech in Reactionless Drive, and in the hovering behavior that only looks like antigravity. Here, a minute portion of the material skin on one side of an object is converted directly into kinetic energy with the desired vector. Energy-to-energy conversion is used in regenerative braking in space. Shaped Eck can gather material as well as repel, as when configured as Bussard Ramjets, or Ramscoops, to collect and convert interstellar hydrogen for fuel. As cloaking devices, they bend light coherently around themselves, and send it on its way fully restored, but cloaking and silencing can also be done with wave-phase interference. Stasis Fields are used by the Ta, and although they have limitations when it comes to living tissue, they are still preferable to cryogenics.

The most Cosmic application for the Morphic Fields or Shaped Eck is the Warp Bubble, another great catch for humanity's science fiction writers. It's used to expand Nothing, or True Space, from a dimensionless point to a sphere or spheroid. This takes a pretty tough and tightly woven screen to keep out all the Business of Busy Space, including E-M and gravitational fields, and vacuum energy or zero-point energy, and sadly, these can't be collected and used, at least not in this application. Thankfully, the

power requirements don't exceed the potential energy available in interstellar hydrogen conversion, which is converted on a shield bubble's outer skin. There is no such interaction with the skin of a Warp Bubble. Due to their power requirements, sustainable Warp Bubbles greater than 48 meters in diameter have yet to be achieved, limiting both ship size and crew complement. The membrane thus created has only to admit a second Morphic Field, containing and protecting a ship, Gizmo, Scout, or parcel bound for FTL travel. Getting this second field inside the first required centuries of experiment and, we are told, some pretty weird math.

Gizmos and the Van

A Gizmo is contained within an oblate spheroid with roughly the volume of a soccer ball, and a d1/d2 of 0.618. When traveling, it's surrounded by an Eck Shield, which converts both ambient energy and matter impinging on its surface into kinetic energy for motive force. It's normally cloaked because it absorbs energy rather than reflects. If you could see one, it would seem to float silently, but this isn't anti-gravity at work. Certain Eck configurations will allow room-temperature and room-pressure conversion between matter, antimatter, and energy, so that Gizmos can also store reserve energy in matter, usually as a thin carbon crust. Each of the Gizmos contains an atomic level computational matrix, embedded with a communicative cluster of inorganic or non-biological Nanosome Endosymbionts called Glints. These are roughly equivalent to what Neal Stevenson called "Sparkles." Many have the appearance of mitochondria, or at least they have this disguise on here Earth. Glints maintain communication with each other, and with parallel arrays embedded in the neurons of both the Ta and the Van. Every Gizmo is "grown" in parallel with a dedicated neural lobe of one of the Ta, and every Van develops a Glint network in connection with one specific or dedicated Gizmo. The complete networks are called Glintnets or Clements Nets. These allow Gizmos to facilitate communication from Ta to Ta, Ta to Van, or Van to Van, providing a sort of interfaced pseudotelepathy. This communication doesn't function between FTL warp bubbles or when one party is traveling FTL. This is a big, but unavoidable limitation. To communicate with other entities on long journeys, a traveler must drop out of Warp, with all the risk of collision that entails. On long journeys, such pit stops must be planned in advance, and these are usually limited in number.

Brains must be known individually, since their their architecture is always at least subtly different and they develop with their own unique and personal history. Even identical twins will have gross differences in brain anatomy discernible to the untrained eye. Five and Blue are represented by different neural configurations in any two brains. Communication must be done using a two-part or two-entity interface with access to both configurations in order to translate. Given this, along with wireless communication, we can have assisted telepathy. You can't just plug one brain into another to translate. Physical neural coupling hasn't been made to work yet, and neither has any unassisted telepathy beyond parlor tricks, cold reading, and non-verbal communication. Each brain has its own unique bricolage, its own historical pattern of interconnections. Duplicate memories must also be built in their original sequence to preserve historical sense and identity. This is one of the reasons why the anticipated "upload" of brains wouldn't work. But Gizmos have a common language, so one brain can communicate an experience to another via its own and another's Gizmo. One Gizmo would know what neural net the idea of six lit up in the sender, and another would know the same in a receiver's. The receiving Nanosomes light up the local equivalent pattern and sequence of neurons, creating what seems a first-hand experience. To send a pattern is to Flash, to receive one is to Glean or Grok. Whole neural networks Flash, and will Tickle a corresponding neural net on the Gleaning end. This has a more personal feel than communication with words, but it still hasn't answered the old question "does my blue look the same as yours?" Even for the Ta, that part of the Hard Problem is still hard.

Glints will often use Eck Effect instead of E-M to communicate. This means that the speed of transmission across distances isn't always limited to the speed of light. This tech is related in some ways to the hypothesized phenomenon of quantum entanglement, permitting instantaneous communication between cloned materials,

regardless of distance. Ta technology also uses this for interstellar communication, but this requires that both sending and receiving units must at one time have been clones which occupied the same Placetime. You can't, therefore, communicate with places and things that you haven't already encountered in person. The Van call these devices Spooks, a nod to Einstein's protest against "spooky action at a distance." Some still call them Ansibles, after LeGuin. To Spook someone is to call them using a Spook. The big limitation with Spooks is bandwidth, which is pretty limited by Ta standards to a few dozen terabytes per second. You also can't Spook someone in FTL. The tech uses "forces" that don't occur in nature, and these require a level of development and information processing still far beyond humanity's capacity. Since Spook communication isn't broadcast, it's still unknown to the Ta whether other intergalactic or galactic races have developed it, but they've only been exploring this galaxy for a little over a million years and there's much of space still left to cover. One thing they've deduced is that they aren't going to get timely information about advanced civilizations via their radio broadcasts unless they have Watchposts or Scouts nearby. Even advanced civilizations will have at least some radio frequency outputs: they just wouldn't be there to carry information over long distances or used for a general "howdy" into the Night.

Near the beginning of their exploration, the Ta seeded the galaxy with more than a billion small, specialized Gadgets called Scouts. It was one of these, in passing at a distance of 46 light years, that noticed this humble world and its primitive radio broadcasts, with alarming evidence of the inability of Earth peoples to get along with each other without bloodshed and damage to the world. Once Earth had been noticed, the Ta in this particular fleet cloned and launched a swarm of 8192 Gizmos to investigate its potential up close. Gizmos travel at many thousands of times the speed of light, while the Ta travel more slowly, at 1024c. The velocity in their FTL travel is a non-variable function of the "Initial Bubble Velocity," and this is exponential. Preferred initial velocity for the Ta is 0.4c, giving them time to lidar, see, and react to obstacles. The Gizmos begin at 0.8c, since they aren't really alive and can be produced redundantly. They will often crash and burn approaching entry into or exiting from FTL. This velocity varies with the cube of initial speed, so Gizmos got here eight times as quickly as the Ta, in five and a half years instead of forty-four. They would remain out of contact with their Gizmos until they arrived in Sol's Kuiper Belt, giving them just few days in decel to catch up on the progress of any plans the Gizmos had made. This is when they learned of the Van and established first contact. It's also when they learned that humans had survived the last several decades, and of the horrifying damage they'd done to their world in that short span of time. They recognized the urgency to enact the Plan that we'd adopted, without further delay and only minor modifications. The Van have grown up studying Ta ethics.

FTL isn't as easy as humans had hoped, but at least it's possible. John W. Campbell, and then Star Trek, guessed the Warp Bubble tech fairly closely. The wormhole idea just wouldn't work without mangling whatever went through the holes. It would make a great garbage disposal, but the Ta recycle every molecule. The biggest problem in FTL is normal space, which the Van call Busy Space because it still "contains" such nuisance and drag forces as E-M and gravitational fields. Here, sadly, all of the laws of physics known here on Earth still operate, including time dilation. This means no unexpected antigravity, and no inertial dampers, so that acceleration to Initial Bubble Velocity and back is a function of the travelers' acceleration tolerance. The Gizmos are good to extended periods at 44g, with a 67% increase in their mass at 0.8c, while the Ta, being structurally augmented organics, are limited to about 12g sustained, with a 9% increase in mass at 0.4c. Whether coincidentally or by design, this leave them both

with a “runway” requirement of about 64 billion kilometers, roughly the distance from the Sun to mid-Kuiper Belt, with acceleration and deceleration times of 6.5 days and 12 days respectively. Humans, if they were accelerating at an extended 1.1g, would require more than four months, and ten times this runway. But for humans, FTL is temporarily moot, as this species isn’t going to be allowed out past the Oort cloud for at least a thousand more years, due largely to it’s immaturity, violence, arrogance, and ill breeding. Humanity won't be permitted to run away from the damage that it’s done. Space is for grownups. The Ta and the Van will, however, be giving mankind ample assistance exploring the Solar neighborhood, like practicing in the playpen. No other world will ever be subjected to humanity's arrogance, violence, and greed.

It’s still true that Nothing can travel faster than light, so one has to either become Nothing, which means death outside the mystical and metaphorical senses, or one has to climb completely inside of Nothing. The Van kept the name Warp Bubble, since that’s close to what it is. It’s a pocket of “True Space,” or evacuated space, real Nothing. It’s Busy Space that’s had all of its business and nasty old luminiferous ether driven out. The bubble’s “skin” is another Eck Screen inflated from absolute zero volume. The bubbles are the size of Nothing too, relative to normal space, but like a Tardis, they are “larger on the inside.” From outside, entering a bubble looks the same as winking out of existence, and exiting like *creatio ex nihilo*. Developing the tech this far was only half of the challenge, the other half being inserting a ship through the skin into the bubble once it was “large” enough, using a second Eck screen.

Once inside, there is and can be no interaction with the forces and objects in Busy Space. This means no navigation or seeing of sights after you enter the Bubble. The only clues you have to where you are going are in what you knew before going in. A ship’s stellar cartography needs to be spot on, or else it could exit a bubble light years from target, and then have to get back on track at a relative sub-light crawl. This in turn means understanding red shift much better than humans do now. You travel at a fixed multiple of your entry velocity, and the only change available is to burst the bubble and reenter Busy Space at your undiminished entry velocity (IBV). This means that Scouts and probes could send no data back to receivers from inside their bubble. It also means that during the years spent in FTL there was no communication between the Ta and the Gizmos.

With no Sitrep, you can only hope that your Eck Shield can withstand any impact that might be waiting for you on exit. One plus with FTL is that the time debt is minimal and assignable only to high sub-light velocities, especially for the Gizmos at 0.8c. This will be proportionate to the increase in mass. Thankfully, within the “pocket universe” of the Warp Bubble, there is a disconnect with the laws governing inertia outside, so while inertia is a real problem outside a bubble, the acceleration to and from FTL doesn’t flatten the crew against any bulkheads. The jump is neither painful nor disorienting, but it may require artificial gravity within the bubble for comfort, and since linear acceleration isn’t allowed in there, it has to be angular or rotational pseudogravity, or none at all. There is also no relativistic time distortion within the warp bubble itself. Unlike in Star Trek and a few other imaginings, spacetime isn’t compressed and re-expanded fore and aft of the bubble, and no spacetime gradient is surfed here. The fixed ratio of Initial Bubble Velocity or IBV to an FTL multiple of c hasn’t been explained by the Ta yet. They've simply accepted this as a constant or given for now, as a “natural” law of this emergent dimension.

And so, 8,196 bubbles suddenly appeared out of the darkness of space, out far past Pluto, in the middle of the Kuiper Belt. As the bubbles were “popped,” giving what would seem an ontological birth to an army of invisible Gizmos, a broad-spectrum wave of E-M was emitted (first termed a Wango Wave by Murray Leinster) outrunning

the Gizmos to Earth, but somehow arriving completely unnoticed, as would the Gizmos themselves in less than a week. After they accelerated past 0.4c to enter FTL, and by the time they decelerated to the 0.4c needed to illuminate, see, and avoid any obstacles in their path, nearly 50 had been destroyed by collisions with objects beyond the ability of their Eck Shields to assimilate or convert. Even a sand-grain to pea-sized particle at this velocity packs some kilotons worth of punch. The remainder of the surviving redundant Gizmos were then converted into Gadgets by disconnecting their Glint matrix from their Ta interfaces and then retasking them. Some were sent in a wide arc around the Kuiper Belt, and some even wider, back into the Oort Cloud, for tasks to be described later.

4096 Gizmos entered a low Earth orbit, unseen, and remained there for a couple of weeks, assimilating and sorting just about everything that human broadcasts and narrowcasts had to offer. There wasn't much of a meal on the Internet of the day, now forty years ago, but they kept pace with that development and maintained a full and organized version that was stripped of redundancy and error, a cleaned up Wayback Machine. A couple of Gizmos were all that was needed for this task. Having sated themselves in this research, they descended to Earth *en masse*, at night, and naturally cloaked, to a shallow coral reef just offshore of an uninhabited island in the South Pacific, where they made themselves at home for a while under a few feet of water.

Shaped Eck can contain any material and hold it in any desired shape, or in any dynamically changing shape. These shapes can be as fine as a hair and numerous enough to simulate a head full of hair. Any number of these shaped fields can be sprouted from the Gizmoid surface. Nanites arrayed on this surface will retrieve and accrete molecules or appropriate materials with desired properties from the environment around them to build bodies, which will be assembled and conformed by these fields. A Gizmo surrounded by such sprouted shapes can appear to become any creature into which its original spheroid will fit. Three thousand of them morphed into human shapes, in a wide mix of human sizes and races, and also a somewhat narrower mix of sexes. They emerged from the water in few days looking for all the world like a diverse group of human beings. They didn't need to emerge naked since they had formed their own faux clothing as well. But there were no witnesses. The remaining thousand-plus Gizmos took several non-human forms, including those of all great apes (including bili apes), odontocetes, mysticetes, elephants, giant octopus, and two species of manta rays, all of these being animal species that even some human beings were starting to recognize as sentient and self-aware. The Gizmos were a tight fit for the bodies of chimps and bonobos, who would soon enter wild populations already at their adult size. If it became necessary to climb the dominance ladder, or to otherwise short-circuit some of the competitive social nonsense, an easy trick for them was to give the dominant alpha a private, lightning-quick thumping, and then back down quickly with gestures of willingness to stay out of competition for the lead. This often led to enjoyable periods of social calm across the entire troops, nervous looks from the troop leaders notwithstanding.

Sadly, the Gizmos were a poor fit for the little bodies of corvids and parrots, who are also known to be intelligent and self-aware, and packing that much into such small brains was a puzzle that the Ta could never resist. A few zygotes in each of six species were developed and incubated with Glint nets. Each of the species was occupied and monitored directly by an individual Ta, with signals not routed through a Gizmo. A large number of the so-called lesser species, including tigers and lions, grizzly and polar bears, jungle and snow leopards, wolverines and wolves, coyotes, wild boars and sloths, rhinos and giraffes, meerkats, bats, squid, cuttlefish, sea turtles, mobula rays, great white sharks, and whale sharks, were all implanted with some monitoring tech

that allowed remote study of internal states, but the monitoring of these was intermittent. This latter group, which came to be called Minions, received no special infant care from the Gizmos. Their zygotes were simply implanted in the best available mothers of the species and left to live and grow up with their kind. These were, in effect, "read-only" projects. The Ta and the Gizmos would tune in from time to time to see how their spies were faring and would upload what they could learn from any unusual sense and behavioral modalities. We found and tagged a lot of poachers this way. Cephalopod chromatophore communication delighted the Ta as this was an important feature of two of their five original forms.

The Gizmos rewrote and inserted public records granting them uncontested historical ownership of their uninhabited island and a treaty guaranteeing political independence from neighboring island chains. It's under thirty square kilometers. Not accidentally, they picked an island with no harbor, although they would soon build a small fleet of fine ships to remain anchored offshore. They also constructed a cave to house a small fleet of aircraft, some of them ultra-sophisticated in their design for traveling cloaked, and others disguised as small private aircraft or even as used automobiles that could be flown invisibly to their destinations. From this base they extended their research to other parts of the world. The elephants and apes were transported to more plausible homes, while the marine creatures set off to migrate throughout the several oceans, each according to its kind, and were gradually accepted into native groups. The pseudo-octopuses were modified to "live" more than a couple of years. The pseudo-cetaceans didn't really fool anyone among their peers, since the original Gizmo shape was obvious to echolocation. Uncloaked it would sound as an opaque spheroid, and cloaked as a spheroidal hole. This was a source great curiosity and concern at first, but behaviorally and linguistically they couldn't be distinguished from cetaceans and were soon enough accepted as such. By protocol, Gizmos wouldn't be given a great deal of power until the Ta arrived in the system, but they had power aplenty to maintain all needed Eck tech, perform their research tasks, and even defend themselves and their dedicated Synthionts (that would be us) from attackers and individual poachers, using such gifts as heart attacks and strokes as needed. They could also avoid closeup detection by mimicking human vital signs and even by altering X-ray exams.

The array of Nanite Glints in each Gizmo would later give its associated Ta an early window into this world. The Ta could "live" vicariously through their neurally linked Gizmos. At a minimum, the Gizmos would create a Sensorium equivalent to that of the organism being duplicated, so that the Ta could experience the approximate Umwelt of the alien creatures they mimicked. They could also numb the senses when necessary, as when nocioception was irrelevant to an inanimate creature. But they had to appear to respond appropriately to noxious stimuli to maintain their ruse. It didn't have to end with just an approximation, though. The Ta had collected a lot of unique senses from various life forms found on their journey, and it was a simple matter to add newer senses like lidar, magnetoception, electroreception, hygroreception, sonar, light polarity, schlieren vision, and infrasound, or to extend a sense like vision much further into IR and UV ranges. And of course they can manipulate the thresholds and intensities of most of their senses. They can scale their senses of time and space, although their long axons are best suited to deep and ponderous thought, except in their more local neural nodes or modules. They've developed practices and pathways of Mindfulness and Imagination that would put the Buddhas to shame. It's important to the Ta to approximate the Umwelt of other newly found creatures as closely as possible, since any alien organism has to construct its whole Lebensvelt, language, and even its science based on its original sensory and conceptual metaphors.

Approximating sensations is fundamental to reaching the Ta goal of approximated empathy.

The subjective internalization of the experienced world is vital to the Ta interspecies communication objectives, especially with wildly different sensory apparatus and endrocinological makeup. It's especially important for them to understand the experience of our senses and conceptual metaphors, since these shape so much of our cognitive world and our limited understanding of the universe. They would be the last to dismiss *Verstehen* as unscientific. A good approximation of feelings and emotions, or affect in general, is more of a challenge than sensation, and this still requires much analogizing guesswork and neurochemical tinkering. Given the years spent in travel inside a bubble of Nothing, unable to see the Something outside, it isn't at all surprising that the Ta would amuse themselves by recreating the more pleasant experiences, like sexual orgasms, of any species they encountered that had developed this reward process. It was art, that necessarily included self-restraint, to practice direct control of their reward centers, neurochemistry, and higher cognitive states. Within their individual ships they had each other for company, but they were out of touch with other ships in the fleet who were enclosed in their own Warp Bubbles.

Ta and Gizmos can communicate with the Van by Tickling our neural nets with the Glintnets, thereby giving us experiences that feel "first-personal" and direct, though the Ta only began doing this on arrival. But the Ta can only share those portions of their world that are familiar to us, and that's a pretty thin slice of their world. Still, this has become a pretty substantial reward for acting as their sentient neural peripherals. Like all peripherals, we don't partake in the experience of the inner core. Exocortices, or peripheral brains, are never sentient within the central cortex, but the Van still possess the full array of sentience as post-human beings, as well as that of Nanolife Symbionts, and as a synergetic combinations of these two, which we call Synthionts. So we should be regarded as alien Sophonts and Sapients as well as Post-Humans or H+.

The Gizmos studied this world in molecular and macroscopic detail for a few years before they made their next moves. The Ta were incommunicado for their years in FTL, but the Gizmos were instructed beforehand to look for pathways to better outcomes. This included "infecting" a number of species, and the whole of humankind, with their Spybot clusters of Nanites. In human form, they ended this phase when they fanned out across the globe in search of exemplary human specimens of all sizes and races, humanity's best and brightest. All they required of these exemplars was a single living cell, obtained easily enough during sleep, or otherwise without trauma, though on occasion a Spybot's anesthetic and memory-short feature got used. The Gizmos returned to their island with the seeds that they needed to culture the Van. The cells were converted to embryonic stem cells and subjected to germline editing to remove inheritable defects and to augment certain desired characteristics like athletic prowess, intelligence in several of its many forms, forethought, and self-restraint. These changes alone didn't make any of the Van into superhumans or freaks. There would still be human athletes more athletic, and human intellects more intelligent. Still, most of the Van could one day qualify for somebody's Olympic team, if only from some Podunk country in some obscure sport, and the average tested IQ of the Van would be somewhere in that top quarter of a million people who might barely qualify Einstein as a member. But there was one aspect of the germline editing that you couldn't call an Uplift. The Van were made to disappear in a crowd, neither ugly nor beautiful, twixt 6s and 7s, C+ to B- in the glamor and beauty department. It would also help us to not feel or get too uppity and superior. I, for one, am not an especially handsome post-human. None of us are. But we're ever-so-pretty on the inside.

The next procedures done on our stem cells would turn the Van into Synthionts or Synths, into the post-human species of *Homo Successor*. Co-replicating Glints were introduced into our cells. These would self-replicate within every new neuron, including central, afferent, and efferent cells, and register the address of each of thousands of neural connections as they formed, or erase them when abandoned. Thus there would be a parallel, inorganic network that replicated all neural nets and configurations. Contrary to the hopes and prayers of human scientists, this would not be enough to replicate consciousness, sentience, or self-awareness. Sentience doesn't emerge from computational power. All of the juices of life are still missing in that, and the several synergies that lead to strong emergence. The much-hoped-for trick of cognitive Upload would not be forthcoming for humans, although those who took the Turing tests seriously could still be fooled by some clever and tricky, but still unconscious machines. When asked if they are self-aware, Gizmos might say "I sure act as though I am, don't I?" or something equally folksy. And then they might dazzle you with some mighty decent poetry.

All of our remotely programmable, self-reproducing Nanolife Endosymbionts, and all of our artificial cellular-level entities and organelles, were introduced before the Van zygotes were set free to multiply and be fruitful. Predatory Nanocytes would patrol the bloodstream and lymph of the developing organisms, multiplying effectiveness of native immune functions and replacing vaccines. Nanophages would devour obsolete and broke-down Nanites, rogue biophages, and remedial ecophages. Nanobombs would kill any unwanted cells. Nanodocs would effect physical repairs to tissues. Nanosomes and Nanochondria, two terms adopted by the Van from Sandberg and Clements respectively, would live inside the cells, but outside the nucleus, and enhance cell function in several ways. Some would form Spybot and Skullbug networks. Nanocrisprs would live within the cell's nucleus, programmably correcting and modifying the DNA and tweaking its epigenetic expression.

These Augments confer a practical immortality on the Van, in both an enhanced ability to heal and in an ability to halt the aging process at will. Most of our women already stopped aging before thirty, while we men seem inclined to wait until our mid-thirties. Van can still be killed in severe accidents, but a clean decapitation wouldn't be severe enough. Limbs will get regrown. Reversing the aging process isn't an option; neither is reversing the "uglification" that left us all looking more or less normal. That will take some old fashioned plastic surgery, and this will have to wait until the need for our public concealment has passed. The Gizmos have predicted that five percent of us might opt out of our immortality within our first 500 years. Time will tell, but we're all pretty grateful for life. Some of us will no doubt succumb to guilt about destroying so much of humanity and its civilization, although we're now nearly unanimous in the necessity, or at least the advantages, of these steps for humanity itself. This is largely driven by our knowledge of the suffering that we'll be preventing. The most serious implication of our immortality was that it gives us standing with respect to ethical judgments about posterity and future generations. Mortals won't ever live to see the consequences of humanity's wrong livelihood, but we Van will still have to live in that world, as will Survivor's descendants. We don't have to imagine leaving the world to our children, future rebirths, or reincarnations. This, to us, legitimizes any acts of self-defense taken to secure our future and that of the natural world, including the use of lethal force where no other way can be found. One of our great challenges will be in learning what and how to forget, since we won't be capable of storing a thousand or more years of memories without some editing as we go. But we do have some nanotech to help us with that. Our stories may have to be uploaded to nonsentient devices, and then revisited there, reconstituted, retold, or confabulated as needed. We

will have to learn forgetting in ways that still allow enough resident mnemonic content to think. We will have to rely much on gestalts and gist memory, holograms that can reconstitute original data. But we aren't there yet.

As for pregnancy and childbirth, the same or similar procedures were followed by the human and non-human Gizmos. They could each choose between carrying their Synthiont progeny to full term in artificial wombs in their simulated bodies (or in eggs for the octopuses, corvids and parrots) or else in little pink bags in hidden laboratories. Most of the non-human Gizmos would elect the more "natural" childbirth, particularly since their infancy would be fully integrated into the social structures of the natural members of their selected species. Most of the hominid Gizmos elected the bags, since who were they fooling? The Gizmo's original selection of sex was irrelevant, since they can shapeshift, even on the fly, and their sex can be changed almost instantly and at will. Adding functional wombs was no challenge for them at all. Neither did the method of incubation matter much, as both ways assured perfectly calibrated nutrition and optimal prenatal stimulation for the fetus. And the Ta had music to play for them (us) that was even better than Mozart's. Many of the Ta wanted to share the experience of the different forms of our Terran childbirth, so these were recorded for later enjoyment, with or without the pain. No natural humans would witness the isolated birth of *Homo Successor*, and Van exposure to the "real" human world would be limited in the first few years, even though knowledge of this world would be plentiful. The early social structure for the Van would be entirely faux and Gizmoidal.

Growing Up Van

Amusingly, we were conceived shortly after the 1997 UNESCO Declaration on the Human Genome and Human Rights declared that all non-consenting children have the right to be born with an unmodified genome. The Van would have waived that right. We were rebels from the start, and of course we now regard ourselves above human law. Some of the Van gestated in our walk-around Gizmomoms, the rest in equipment. The monitoring suggests that our fetal experience showed no difference between the Gizmo uterus and the floppy, little pink bags. Both gave us optimum nutrition and sensory stimulation in Pseudoutero. The purists might argue that having a spiritual or real emotional connection to a living mother was best, but it seems now that intelligent substitutes worked even better. The Gizmos had done some control monitoring of old-style human pregnancies around the world and we fared strikingly well in comparison. Most genetic traits that might be called genetic disorders were corrected, but one in sixty-four of the Van, including yours truly, was cultured epigenetically with a kinder, gentler variety of Aspergers syndrome, which required a less-than-optimal blood chemistry in the first trimester. We would later receive appropriate social care, but no coddling. We were expected to develop our own Aspie traits as skill sets and not disorders. It was necessary to have some of the members of our new society be more immune to social pressures, even our own, particularly when our Plan to save the world was being developed and some devil's advocates were wanted. We wouldn't know about this for a while. We Aspies were a little lonelier than the rest, but we got by, and the determined focus it gave us has its perks.

Our first twenty years was parsed into three parts of 80 months each. The first was simply "childhood." There were three thousand of us to feed and house, and sometimes even clothe. When weather permitted, we ran naked, or nearly so, much of the time, until we were older and going to school. We were blessed with our three thousand Gizmo parents, who required no resources for themselves but provided everything for us. Provided meant something different for us, though: we did plenty of chores, and worked in the gardens. We weren't spread evenly around the island or gathered in one big village. We clustered into about a hundred little hamlets instead, with nature, open space, and gardens woven between us. We walked most days to our meeting and play centers, which couldn't really be called schools yet, even though we learned a lot there. The Gizmos had resolved the nature-nurture question to their own satisfaction. They took a lot of cues from the primate and other mammalian societies. There was indeed a human nature, with human universals. We were by no means blank slates. They adapted their nurture and the culture that they gave us to optimize our original nature, working with our native grain, if you will.

It's true that our Gizmo parents had no real love to give us, but they could fake it well enough that we suffered no deprivation. We all had plenty of affection and we still can't see much of a difference. When we really needed them they were always there for us, and when we really didn't they kept their distance. They could do multitasking using Gadgets and Proxies, so we were seldom a distraction. We got all the attention that we needed, and we always got honest answers to our questions. Maybe the best thing we had, largely denied to most of the world's kids, was an atmosphere of uncompromised care and trust. Outside of the normal children's insensitivities, like sometimes stealing toys or biting our best friends, there was really nobody there to betray us. Make believe and other imaginative play was encouraged, but this differed from most human cultural equivalents in that we were never encouraged to take or mistake this for reality. It was always called what it was: pretending. Of course we had

no Santa Claus at all, or Jesus either. The questions we had for the "grownups" were seldom given pat answers. We were guided only as much as needed to our own solutions and inferences, usually by some version of the Socratic method.

Our earliest education was pretty unstructured. Our learning was done largely through play, interaction, activity, and exploration. Kids have their own native version of scientific method and we interrogated the heck out of our little world. We never got tired or bored. We matured a lot more quickly than humans, but a big part of that was being allowed so much time to play, time to just be children. There was plenty of diving to be done, in some of the best of the world's surviving coral reefs. Our nature excursions were a daily affair, and always took a couple of hours, except in the heaviest storms. We had the whole island to ourselves. It wasn't large, but it was fertile and biodiverse. For a while we had several of our Synthiont cousins nearby, as peers rather than pets, until they moved on to appropriate habitats. Our Synth mantas and dolphins frequented our waters throughout our childhood. Others, like the humpbacks, would stop to visit in transit. We enjoyed interfaced pseudotelepathy with them as well, to the extent that the Gizmos were able to translate the experiences for us. This was especially challenging with cetaceans, cephalopods, and mantas, and for this reason it was most important. We were raised from the start with as much empathy as possible for *mitakuye oyasin*, "all our relations." And we were taught that this included plants and fungi. We had a number of sentient Minions to play with, too, from several of the endangered species who were carrying monitoring tech.

We had enough of structure and behavioral boundaries that these wouldn't seem at all strange later in life. And some boundaries were pretty firm. No always meant no, unless we could reason our way past it, and we did get good at that early on. We were often allowed out past the edge of our safety zones, climbing trees, poking the fans, jumping off roofs, and touching the flames, to learn the important things through our firsthand experience instead of loud words. We explored each others' hairless young genitals like all future doctors should, but since we were all the same age, and since even Van girls mature faster than Van boys, you must know that the girls were in charge of all this and we boys were simply being obedient. Since our parents were also shapeshifters, we got to experience plenty of interaction with "older children" too. We played with babies and young toddlers as well, but since the Gizmo shells wouldn't fit inside their little bodies, the little ones had to be telefactored Drones built around small Gadgets. We called these Poppets, and they let us play at being big brothers and sisters. We were encouraged to play hard, and even to bleed and get owies and scars, although to be fair, our enhancements allowed us to heal pretty quickly. Broken bones took (and still take) less than a day to mend. We played sports and underwent dedicated physical and martial arts training from no later than five years onward. We've all grown up to be pretty formidable athletically, so much so that we've had to avoid sports and hide it later when we moved out into the world. Those of us who later went to college had to hide our minds a little as well, but we could still rule the college Dean's Lists before we could drive.

We didn't attend any school for nearly seven years, but we learned more this way. We did learn to read, write, and cipher early on. From halfway through our first year, we were all immersed in at least three languages and were expected to keep up. By age two, we were allowed to choose between these and alternative tongues. We were given the basics of our own new language as well, the one that will one day, centuries on, be the *lingua franca* for the world. The Van name for it is Babble, which shouldn't surprise anyone. The Babble scaffolding is English, but the grammar is simplified, the spelling finally standardized, and the alphabet expanded and much improved, such that it can transcribe any human tongue except for the teenagers' burping languages. The

immense vocabulary of its words, phrases, and idioms is our favorite feature of Babble. We like to be specific and articulate, although we have a good share of plump and polysemic words, like old Chinese, which are much better suited for meditation, evocation, connotation, and poetry. Thousands of human languages had recently died around the world and thousands more were at risk. While the linguists were doing much hand wringing and garment rending over this, the Gizmos were collecting their special words, idioms, and expressions, those ideas that had snared aspects of the human experience and ecoliteracy that no other language had captured as well. We edited the OED down to about half of its original size, then filled it back up again with "foreign words and phrases," standardized all the spelling, and thus made a language that was easier to learn and use, especially if you started young and were well above human average in intelligence, as most of the humans of the future will be as well.

We got some of our early education through carefully limited time on the human internet, but the Gizmos also supplied us with an internet all our own. Recall that they had digitized the Library of Congress, and all of the other good books, films, music, and patents on Earth. We had rationed time for video games, but none for war games. We could talk to our friends peseudotelepathically or in person, so texting didn't eat our brains. The laptops they gave us could access both networks, but they were outwardly disguised as normal devices. Our parents edited and censored our online content a little bit, but the human world was never really hidden from us. We got to look long and hard at the good parts as well as the horrors. At some point, were were allowed to see just about anything that humans could see, adult or otherwise, but wherever human error was involved, these errors were also explained to us in the process. When we studied comparative human religion, for example, this would always be accompanied by an analysis of the psychological dynamics of the belief system. Mythology, fables, fairy tales, and the human holy books all shared the same shelf. We were taught that the fundamental characteristics of any religion are found not in its ideals but in the behavior of its adherents. We were taught to look to behavior before believing words, that we're the life we live, not the life that might or should be or could have been. We began in our toddler years with a special children's version of critical thinking skills, one that would adapt easily later on to a more sophisticated charting of all the cognitive biases, defense mechanisms, coping strategies, and logical fallacies that our fool flesh is heir to. We had a game-like linguistic toolkit for noticing and working around them. Just as important, we were taught that it was more shameful to defend our errors than it was to admit them, that we could take a kind of pride in our ability to stand corrected, and even to have something of an appetite for this.

We were brought up with something akin to a religion, or at least a viable replacement for one, and none of us has expressed any real need for a divinity more glorious than everyday Nature. We had virtues and values ingrained in our young minds, and we were shown the limits and the limitations of each. We were taught tolerance, for example, but this would stop well shy of a cultural relativism where all the suggested truths were weighted the same. We were taught the worth of reverence, and of holding many things sacred, though none of these sacred things would ever become idols or imaginary friends in the sky. Even reverence for life would have its limits in a harsher judgment towards the toxic pathogens. We were taught the importance of gratitude, especially in the absence of any deities to be grateful to. Love, to us, is what wanting to give and support another feels like, and even to wish others well in our absence. It became one of our highest personal virtues to welcome correction in both thoughts and actions. Other esteemed virtues included the ability to exercise restraint or defer gratification, earnestness, diligence, fitness (in both its health and Spencerian senses), resilience, authenticity, candor, *parrhesia,* and *satyagraha*.

Liberty is a "spiritual" value that was taught carefully, and its value in turn was to be found in the consequences of our actions. The exercise of our rights and the world's reactions to this taught us our duties and responsibilities better than any other teacher, as long as we weren't shielded from their consequences. Acceptance was another value that was all tricky and paradoxical like this: we learned that this is not the same as approval. Accepting a situation means that we occupy the reality of things instead of our illusions, delusions, and expectations. Then, when we don't approve of the thing we've accepted, we at least grasp the real dynamics of what we want to change. We were always encouraged to be a little bit judgmental, to decide wrong from right, and inferior from superior, but this came with appropriate caveats against hominid arrogance and cognitive bias. We learned several mindfulness practices and Vipassana meditation from both Vedanta and Buddhism, with surprisingly little editing or further refinement, and we began this just past our toddler years. Ranking as highly as any other virtue or value was a healthy sense of humor. We aren't beyond making puns, but *schadenfreude* is beneath us. The decisive moment for Abraham, and the many global religions that would follow in his steps, was his consent to sacrificing Isaac. Few people, however, grasp what it means that Isaac was the word for laughter. The Van will not go down this road. We've maintained a special fondness for "faiths" that still preserve their humor, like Daojia, Chan, Zen, and Sufism, even though nobody could or should call us true believers.

Our only up close and personal social contact for this first third of our youth was with our own kind, *Homo successor*, some of our cousins in the animal kingdom, the Poppets, and our AI Gizmo moms, dads, and faux older siblings. But we were not yet told a thing about what our parents were. We didn't know that what we got from them wasn't really love. We did see enough about about the human beings who lived beyond our own little island to sense strongly that we weren't much like them in a lot of very important ways. In much of their behavior they seemed to be a mistake of evolution and we often felt embarrassed or horrified to be like them in any way. But at least we could retain an admiration for the ones who were worthy of admiration, and we had the discernment to see the difference. This of course would blossom later in our lives into the threefold parsing of the human species according to their value to continuing life on Earth. It's certainly true that the uninspiring or unimpressive people, the Meh, or *Homo ignoramus*, were largely decent and cordial enough folk, just getting by and minding their own business, submitting to the social pressures that drove and determined them to an embarrassing extent. On a much larger and more resilient world, there might have been room for them, but on this one, there were far too many, and several tipping points had already been passed.

For the next eighty months, from six years and eight months to thirteen and four, we attended our own version of formal schooling. Our original system of education was necessarily an experiment. How it would feel to us, and consequently, how well it would motivate us, could only be inferred in advance by our Gizmo teachers, who could only calculate and imitate human feelings. They had a lot of data to make inferences from, but they had to remain able to learn as we progressed through our grades. It was crucial to get this right, and not only for our sake. We were also helping them to develop an "AP" prototype of the education that we would be offering to what remained of humanity's children. The core curriculum was pretty much the same for all of us. There was plenty of STEM of course, but balanced with the arts. We were rigorously trained in critical thinking skills, with at least one new course every year. Our drama was more improv than ready-made plays. Music was vital to us, and our orchestras, bands, and chamber music ensembles played at modest professional levels by the end. We were well ahead of the human schools, both public and private, with

the equivalent of 12 years, advanced placement, with highest honors, in just under seven years. We had no peer pressure to dumb down. But we were under almost no pressure to perform academically: the Gizmos took the opposite approach, by tricking us into developing nearly insatiable appetites for learning instead. We ourselves were the subjects being taught and our competition was with our own former ignorance. We loved our school. Our well-tended young brains didn't really give us any superpowers, except perhaps the discernment to find the right place and the right time to do the right thing in the right way to the greatest effect. Emotional self-control was part of our mindfulness training during these school years. This had nothing to do with suppressing our emotions, or making us all like Vulcans. We still experience things deeply and with feeling, much more so in fact than most humans. We just learned not to foul up our thoughts and actions in the process, particularly with shortsighted overreactions.

At the beginning of this second period, we were gathered at last and given "the talk": we were told who and what we were, and what our parents were, and who and what their makers were. When other children were being told about Santa, and the differences between boys and girls, we were now being taught the difference between us and human beings. We were told about our immortality. Most of us had already figured out we were different in important ways from the humans we saw in the human media. The contrast in general behavior was too much to overlook for children not already brainwashed with human culture, advertising, politics, and religion. For most of us, this was a real relief, except maybe in learning that our loving parents were neither alive nor conscious. We wouldn't learn about our Higher Purpose until the ripe old age of twenty. Meanwhile, we found it easy to accept the need to maintain ourselves as a secret society: the humans did outnumber us almost three million to one and they were quite dangerous to anything they feared or didn't understand.

It was important to learn this now because half of us were about to leave the island, at least for the duration of our mid-school years. These Van would settle in ninety little colonies in thirty different countries, mostly assigned by a combination of paternal ethnicity and language of choice in order to remain below human radar. The colonies usually took the outward form of private schools, field research teams, camps, monasteries, ashrams, regenerative and/or Permaculture farms, or orphanages, all with legal reasons to raise kids apart, and all with impossibly long waiting lists with never a vacancy. Seven groups moved out to sea on small ships and lived a pelagic life. Five more small groups migrated up and down the continental coasts in small boats in imitation of simple fishing cultures.

The aquatic Van all stayed in close touch with our Synthiont cousins and our Minions at sea. All of the Van everywhere had the little laptop computers that looked just a little too beat up and dated to be worth stealing, with the human internet up on the surface and a much deeper, heavily encrypted web below that. We stayed in touch, and our pseudotelepathy remained functional wherever we roamed. To some extent, we can all share experience almost as if this were firsthand. One of us on the other side of the world can share a neural configuration with his or her Gizmo, pass that on to mine, who then Tickles the corresponding configuration in me. Gizmos can also place entirely new experiences directly into my mind, provided that this is consistent with or analogous to familiar sensory experiences. Since we can all hard-erase memories and neuronal interconnections (after recording what we want to record), both the Gizmos and the Ta can do this to us "for our benefit," in case we get entirely wrongheaded ideas. This is a scary power that we don't have the ability to deny to them, but so far it seems to have been used only rarely, and it has always seemed fully justified in

retrospect. The really bad ideas rarely got through that gauntlet, and it wasn't as though we were trusting the Meh or *Non grata* to edit our thinking, like most of humanity did.

Along with our mindfulness practices, emotional training, and critical thinking, we were permitted to begin experimenting with altered states about halfway through our school years. By age ten this included sensory deprivation, biofeedback, meaningful and tantric sex, and mind-altering elucidogens instead, our term, since they elucidate rather than theologize. Our Gizmos were able to manufacture any aids we might require, but they came to us at the acceptable cost of careful parental supervision. We were raised to be Neuronauts. The thousand-plus Synthionts who had other than human form, who got to go live and play in the wild, were also free to explore beyond the normal edges and confines of their species' sentience. Their own Gizmos would share some of our world with them as well, at least to the extent that their sensory and cognitive metaphors would allow. And we perceived what we could of their worlds as well. We had no typically human illusions that these were all just soulless beasts who couldn't get into heaven.

The third phase of our young lives saw many of us return to our little island, and many others leave to enter the "real" world at large, some to live relatively independent lives, although Gizmo parents remained nearby. All of us who had lived the aquatic lives returned to the land, and their small navy of boats filled up with eager replacements. Our parents could shapeshift into colleagues, friends, kids, mates, or spouses as circumstances might require. A couple of communities just looked to be having recreational fun in their seaworthy kayaks, equipped with sails and outriggers, following the surf and the seasons north and south. The seafarers grew their boats with molecular assemblers. Neither maintenance nor repairs posed any kind of problem. Any pirates who gave them trouble met with quiet, mysterious, and tragic fates at sea. Coastal patrols left satisfied with our harmlessness and legitimacy, or else they suffered amnesia, or grievous but inexplicable harm. Over a thousand of us attended college for graduate and advanced degrees, although the purpose of that wasn't really to get educated. We couldn't overdo the prodigy thing, even though so many of us matriculated before our fourteenth year. We were allowed to take out some patents that would be vital to the future, but we weren't permitted to get suspiciously far ahead of our time. This wasn't espionage either: the Gizmos had all of that discovery well in hand. We were forming our first connections within the human world, especially in the corporate, financial, scientific, and technological sectors. We were told that these links would be handy connections to have later on, although we wouldn't know why for a while.

Practical ethics may have been the biggest and most challenging part of this move out into the world. We needed a lot of practice in coexistence with humans, especially when we felt like the Trimates, Galdikas, Goodall, and Fossey. It's almost always easy to practice good ethics when everything is going well, when you're living a sheltered life and you can drop your guard and simply trust, or drop your fears and simply go forth. We forced ourselves to be as human as possible without losing integrity. A facility for self-restraint and deferring gratification came with our forebrain neural modifications and this helped us immensely. We developed our own set of moral mnemonic commandments, many of them borrowed, although some of them require some thought to be seen as ethical doctrine. Some of the more well-used examples: "treat others as you would be treated"; "be excellent to each other"; "live and let live"; "meet needs and move on"; "right and duty are reciprocals"; "diversity is strength, disparity is depth"; "lead by example"; "own the power to value: choose your wants"; "clean up your mess"; "suspend belief and disbelief"; "*aprender en cabeza ajena*, learn in the heads of others)"; "keep your word"; "change frames and time horizons"; "if it

harms none, do what you will"; "own your errors, unlearn, and unknow"; "pay your rent and leave a better world"; "revere the ancestors by being a good one"; "presume innocence and preserve the benefits of doubt"; "seek multiple right answers"; "self is a vote of many minds in one skull"; "bad things happen to good people and good things to bad"; "salvation is a lifetime of diligence"; "fix the problem, not the blame"; "stay hungry, stay foolish"; "live the life that makes the metaphysical questions irrelevant"; "life is more sacred than gods"; "spirit is a verb: human is as human does"; "authority is for authors"; "pay it forward"; "perfect sincerity offers no guarantee"; "service is sovereignty"; "learn to swim in the deep end"; "be honored to accept correction"; and "transcendence brings you home." Anyone who was caught saying "everything happens for a reason," or any other vacuous inanities, got the involuntary mindwipe, but that didn't happen very often.

By the Twenties, and ours as well, when we were ready to receive our mission and begin to develop our Plan, our Gizmos had collectively become the wealthiest "organization" on Earth, but the wealth was so diversified that it remained undiscovered. It began before we were conceived. Some of the seed money for the fortune was in counterfeit currency and bearer bonds, undetectable at even a molecular level. More was purloined from the stashes and caches of organized crime and drug cartels. And some came from mining precious elements using the Eck Dragnets in seawater (which left the fish and plankton unmolested). They didn't start playing the market in earnest until the new millennium. Of course they had a system. The bought lots of Google and Apple stock in 04, Amazon in 08, Netflix in 12, Facebook in 13, and Adobe in 16. Still more was made in commodity futures, especially strategic materials. They got out of that game in 2019, and invested it all in real strategic materials, which they warehoused underground and under the sea. These trillions, however, were dwarfed by the wealth they were able to siphon, more than a decade later, from offshore and numbered accounts as the *Non grata* began to die. Most of this was in hidden or secret funds, and heirs would still inherit most of what they were certain was coming their way. All of this wealth, however, was nothing compared to what the Ta could mine in a week from stripping an asteroid or two.

Some Changes are Made

A portion of the Ta fleet arrived in high Earth orbit three days after Waldo and Wilma vanished from the White House lawn, when the world's other Proxies took their leave as well. But the Ta ships wouldn't show themselves to human observers for two more weeks. Their first act was to place a set of eight 20-petawatt Eck generators in geostationary orbit and constellate eight longitudinally-aligned strings of sixteen Gadgets, each to circle the Earth once a day, 150 km up. They were not, strictly speaking, in orbit. They would still be pushing through limited atmospheric resistance, under power, and at supersonic speeds nearer the equator. The Eck Driftnets would be draped between them. The strings were spaced 45 degrees of longitude or three hours apart. Each string was given a unique task, to be executed at the same true local time of day as it moved westward around the world. The tasks judged most hazardous, or most likely to inflict collateral damage, would be usually performed by the "3 AM" string of Gadgets, when more of the people below were asleep in safer environments and fewer were moving about.

The first midnight Gadget string erased the programming and melted the circuit boards and all the other electronics tasked in any way with accessing, actuating, and deploying the world's nuclear arsenals. Three hours later, every soldier or operative on Earth who had a finger on a nuclear button, or was holding a key to a button, or in possession a launch code, would commence the minute-long, ecstatically blissful Fast Rapture of the Spybot neurotoxin. And yes, this included the national executive and military heads of the nine-nation Nuclear Club, including the "leader of the free world and most powerful man on Earth," and several of those in direct line of succession. In silos and submarines around the world, agents were rushed in to take their places, but all they had to push now were toy and dummy buttons. We would later send our delegates around to collect the thousands of tons of weapons-grade isotopes, for which we had found better uses. Ironically, the nukes themselves were quite easily located due to their level of shielding, and the contrast between this and ambient radiation. The nukes now live on the moon and are much happier there. Human civilization's most idiotic endeavor, the worst of many, ended on this first day.

The extermination of *Homo non grata* began with this pass. It would continue for six more months, claiming a global average of four and a half million lives a day until a tenth of the human species was gone, an old-style "decimation," except in the precision of its selection process. As you may recall, there was no plan to stop at a tenth, and at least an eighth was certain. This could have been done more quickly, and perhaps this might have been more humane to the "victims," but the Ta wanted to give the survivors some time to develop protocols for the disposal of bodies and the redistribution of inherited assets. More will be said on the who and the why of this shortly.

The next action involved all eight strings of gadgets, 128 in all, turning their Eck Screens upwards into space and firing all at once on hundreds of millions of pieces of orbital debris that humans were trashing space with. It just wasn't practical to take a full day to do this, even though the "shock and awe" would have been more impressive if everyone on Earth could have seen the spectacle at night. All of the targets had been pre-painted. Half a billion little millimeter-plus pieces lit up the sky for the nighttime observers. Bear in mind that most "shooting stars" are about this size, ranging from grains of sand to peas in diameter. Nearly a million of the remaining chunks, those still under 10 cm across, were a lot more spectacular in death, and they more than replaced the daylight at times. Humans were left to wonder what sort of weapon was being used

to accomplish this. The beams, or rather their Effects, were often visible, but they began in invisible Gadgets. They had more kick than any known laser lights. But this didn't stop the major militaries from scrambling somewhat comically for a hasty plan of defense. We were, after all, obliterating targets that outnumbered all of the soldiers on Earth, with surgical precision, and all in a matter of hours. And they were right to fear us. The grand finale deorbited almost forty-thousand big pieces over a week, even from 36,000 km geosynchronous orbits. Almost all of the functioning Sputniks were spared, but some of the naughty ones with dark and deadly designs were left reprogrammed for our own, future, non-military uses. The dead Sputniks with nuclear cores were accelerated out of orbit instead, for a rendezvous with the Sun. Many of the larger deorbited pieces hit pretargeted locations in the Nevada and Gobi deserts, and northeast Kazakhstan's Semipalatinsk. This sight was frightening at times, but no harm was done, other than from a few vehicles losing control as their drivers gawked. How the objects were slowed down to achieve deorbiting, or accelerated to escape velocity, was also a puzzle for the humans. The power that did this would seem a lot more impressive a few days later, after the first observant astronomer noticed that the planet Mercury seemed to be accelerating into a higher orbit.

The next 3 AM string again directed its Eck Screen downward as a Driftnet and, beginning with the eastern seaboard of the United States, swept in a westerly direction with the night, taking aim at the world's land and naval mines. Any IEDs and suicide vests were included. It was irrelevant whether these items were still being manufactured or shipped, or held in storage, or stored in armories, or already armed and placed. They all blew up. We set off more than a hundred million emplaced land mines and more than two hundred million in storage or stages of manufacture and transport, destroying a large number of munitions dumps and armories in the process. The naval mines were fewer, but got the same treatment. Millions of tons of UXOs went off, too, some of them from as far back as WWII, but we left the ordinary ordnance that lay in storage for peacetime re-tasking and our many public-works deconstruction projects. There were a few thousand human casualties here, mostly military, and more collateral casualties than all of the other planned actions combined. But even these big civilian numbers were much, much smaller than the ten thousand annual deaths and fifteen thousand annual maimings that had now become a routine fact of life on Earth. And now the problem was permanently solved.

Each of the Gadget strings was kept in continuous circulation, three hours ahead of the next, with one specific task for each trip around the world and a re-tasking when the circle completed. Much of the hazardous work was done at night, and most of the killing as well. In no case was killing done with a target in relative motion, as in a moving vehicle or plane, with some boats excepted. This was a safety precaution against collateral damage. In all cases, the victims of the cull would awaken to more fully enjoy their deaths. Groups of targets were usually thinned rather than taken *en masse*. These general rules left most of the passes of the daylight strings to do subtler work. The sterilizations took three distinct passes, since the Spybots had to receive specific signals, one pass for men, one for women, and one to abort first-trimester embryos. This last may have been something of a tragedy for the chosen *Homo survivor,* who were due to have their fertility restored, but the next time around they could at least be fully assured of freedom from genetic errors. Ticking biological clocks were rendered a little less relevant.

Thirty-six of the daytime passes were used to kill humanity's most troublesome infectious and communicable diseases, including all of the lab samples, down in deep freeze or not. We started with anthrax, tularemia, marburg, botulism, plague, and smallpox. We sterilized just about anything else that had or needed a vaccine, and

anything that could be weaponized as a biological agent. We killed off the insect-borne parasites too, beginning with malaria. These diseases may have offered humanity's gene pool some modestly useful selective pressures in the past, at least to the extent that they selected for robust health and immune response, but they didn't select for the things that we want, any more than the collapse of humanity's civilization would. We killed all the STDs too, so have fun with that: between this and sterilization, free love is back now, although we're still watching for rapists, who will no longer have to wait for their justice. This endeavor only began with 36 of the human diseases. We still had months of work ahead on the plant and animal pathogens that weren't contributing to overall systemic health. Our respect for biodiversity gave us appropriate caution in this endeavor.

One of our nighttime activities might have looked a bit more like some adolescent vandalism: we shot out every streetlight, and every exterior light where the luminaire could be seen from above the horizon. Of course there were obvious exceptions, as with airports and lighthouses. While the Dark Sky movement had become a growing trend, most of the world had yet to catch on. Lighting the night was so pointless, and it robbed the children of their birthright view of the stars. It also cost about 700 terawatt-hours a year in wasted power. The lights could only be replaced with low intensity, shielded lighting that directs photons to lighting the task at hand, or they'd just get shot out again. With the crime rate so far reduced, and trust again on the rise, humans can begin to unlearn their fear of the dark. Most of the natural predators, however, will be making a comeback, proportionate to their natural prey.

By dawn of the second day, much of the human population began gathering in the synagogues, churches, mosques, and temples of the world, looking for those answers that their religious leaders were expected to have, and a winning plan to combat our alien threat to the human moral center. Many of the religious gatherings grew shrill and galvanized in protest of the alien mention of evolution. Nobody knew where all of the comforting words came from, but they got spoken and some flocks stayed eerily calm, considering all that was being challenged. The Creator of the Universe, with close personal ties to this bishop, that priest, or His chosen people, was simply waiting for His proper moment to step in here and Redeem humanity away. By a few weeks later, we saw a real mess of predictable human reactions, mostly of panic and fear, as the dead piled up. Business and traffic nearly ground to a halt and only fools ventured outdoors. Just about anyone going out armed on that first day dropped dead. Armed police were spared, but only for the first two days. After a month, many were wondering if even fists were unwise. That didn't stop the worst ones, the opportunists who felt compelled to rush into the power vacuums, or the soldiers who only happened to have the day before off, or hadn't the sense to desert their leaders and posts, or those who saw a chance to grab a free gun laying beside a dead body. Their deaths at least were painless, pleasant, and quick.

The next several days saw the cultural fractures, those that had begun in observing our visitors on the ground, develop into a rich and varied tapestry of responses. The wars seemed puzzled about what to do next: the fighting stopped in some, increased in others, generally becoming more erratic until enough soldiers had died to convey the hint being offered. The range was all over the map. Riots and looting made the inner cities hard to get around in, but not as many fires got set as we'd see in angrier mobs. This kept the National Guard on full alert and more than half-occupied. Secular marches increased on both sides, for human self-determination and for alien intervention. The suicide rate spiked significantly, but most of the desperate would wait for the news to get worse, which synched up nicely with the pleasant extended suicide option, the Slow Rapture, that the Ta were about to provide. Urban food

distribution began to break down right away and grocery and hardware stores emptied quickly. Even the brussels sprouts and okra soon vanished. Stock markets took a big dive, of course, until they were closed by executive order from seven tiers down the line of presidential succession. The new American President addressed his nation, but had nothing really believable or important to say, except to plead for calm. Experts were stunned by this and that. The urban street corners had never seen so many soap boxes: the lunatics came out in force. Militias mobilized. Hippies danced. The new agers fondled their gemstones, held hands, and chanted. Maybe the most productive responses in the long run were on the newcomers' several websites and in other attempts to make contact. Many people would offer their essays on life and humanity, and suggestions about how the Ta should treat survivors. And many of these would actually be heeded, and incorporated into the Plan.

For the human distributed intelligence to function, things had to run smoothly, as if on autopilot. Humans are just not that intelligent when individuals are called upon to step up and micromanage complex systems in crisis. What has built this huge civilization is culture, and a subspecies of hive mind. Individually, humans are slow to understand and slow to invent. Look at the slow evolution of tool making over the span of the 74,000 years since Toba, after the humans became noticeably more inventive. They were lucky if they evolved a new stone tool every thousand years. A major breakdown of order will mean that specialists have to go general, with no general skills or broad training. Long-planned emergency response protocols broke down almost immediately, giving way to an *ad hoc* martial law with largely *ad hoc* laws. The Ta websites quickly became the most reliable islands of order and sense.

Plans were soon made to move the dead out into wild areas. If Waldo's warnings were coming true, their numbers would soon overwhelm even mass grave possibilities. But it took the bodies only a few days to decompose, bones and all, and it was soon seen that the resultant fertilizer was no threat to the land or its inhabitants. Some humans had already heeded a call to stop pretending to immortality and give something back to the soil, and had grasped that all but two common funeral rituals were nothing more than final insults to the biosphere's nutrient cycle, the exceptions being burial at sea and being cut up and fed to the vultures. Cremation was a waste. There was of course the old paleontologist's assertion that evidence of primitive man being buried at death was a sign of emergent religion, instead of an indication that humans didn't enjoy the smell of corpses, and also didn't want tigers, lions, wolves, and bears to develop a taste for human flesh. Religion would have come much later, when most of the tigers, lions, wolves, and bears had already been banished to the fringes of human hamlet, village, town, and city boundaries. Now some of these would feast again, but mostly this would be fungus and bugs chowing down, making good topsoil, just like in the good old days.

The first eight of the visitors' ships appeared as featureless gray spheres, just under 50 meters in diameter, hovering noiselessly about a kilometer above the ground, just as you might expect from the movies, but without panicked crowds and flying automobiles and buses being chased down city streets by big death rays. They arrived cloaked, unseen, and unmeasured, so nobody knows how quickly they came in. They just seemed to blink on or pop into existence. Because they were featureless forms, it was hard to get a sense of their real size or distance, but few seemed to feel that this was a particularly imposing or threatening distance, and this was probably intended. They hovered unmenacingly for days. Two nations fired on them, one with rockets armed with the now-dead nukes. These got no response and the rockets simply vanished into the spheres as their composite materials were instantly converted into

antimatter for fuel. Up to a point beyond the human arsenal, the energy of a nuclear detonation would have been absorbed and reassigned as well.

Around the world all the military research facilities came under attack, but with surprisingly little physical damage. It was largely just piles of dead staffers, scientists, and researchers, and their pimps. In the United States, Lawrence Livermore, Los Alamos, DARPA agencies, and their lesser know kin were hard hit. Failsafe facilities like Cheyenne Mountain and Mount Weather failed utterly. If it was a nuclear strike target before, it was vacant of personnel now. Life was already getting pretty challenging for the elite who had moved down into their posh doomsday bunkers. Sometimes we would just tease them down there by setting small objects on fire. We took great care in those gray areas where scientific advances were being funded by the military, in the agencies that were forever telling the population what the future and the future of warfare were going to be like. We kept the labs and the research, except for the nuclear, biological, and chemical warfare applications. Activities that were purely defensive were given due consideration and were frequently spared, along with their people.

Ecocidal activities comprised another large group of targets. We had been observing these, largely in horror, over the prior ten years and did whatever we could to steamroll the clock back over them. All of the new roads into wilderness and previously unroaded areas were rendered impassable, and the newly invaded areas were made uninhabitable to man once again. It didn't matter to us whether the damage done had been approved by voters, or properly permitted, or completely legal, or not. We targeted the energy officials and resource exploiters with the same hard criteria, and the government foresters and timber barons without discrimination. Much of this damage done was already done, but this would let healing begin.

Despite what we've put humanity through over the prior six months, we now begin to try calming them down. We have a lot of work to do, and this is where things should begin to get a lot better. Aside from our primary concerns for nature, these were our guiding thoughts in the culling of *Homo non grata* and sterilization of the Meh: How could we get the right 90 percent of humans to die off in a way that also left the species the most improved? What's the greatest possible service we can do for humanity's descendants? Can we get rid of evil? How can we reach a target population below a billion with the least amount of human suffering and an optimum preservation of the best of human culture? This question still remained: If the human population is reduced by 90%, does this mean that 90% fewer exceptional people will be born? Of course the Equalitarians and the spiritual would say yes. We think not, for both genetic and cultural reasons. Our cull had to be of both nature and nurture, both an expulsion from the gene pool and from the cultural climate. But pathological nurture and toxic culture would bear the brunt of this cull, since genetic defects can now be corrected. And you may note that this will not be a one-time event: in a much milder form, the culling might continue for centuries. We have it in us to guide human evolution with unnatural selection, and we will define what "the fittest" means, since humanity seems to have this confused. We intend to leave a population that needs not be ashamed to be human. We may yet decide to raise the one billion population ceiling, after full environmental recovery is achieved, but that won't happen within the next millennium.

Hominin populations have been culled by natural forces many times in the past, times that punctuated evolution and created genetic bottlenecks and changed them in fundamental ways. In the aftermath of the Chicxulub rock, mammals found it fortunate that their ancestors could live in dark, wet holes and eat little but dead creatures, roots and fungus for years on end. The climate was compromised 6.6 million years ago by a VEI 8 supervolcano in Yellowstone and shortly after that the human ancestral line

diverged from the line of chimps and bonobos. It happened again in Yellowstone 4.3 million years ago, and 4 million years ago in Pacana, Chile. And soon after that, *australopithecus anamensis* and *a. afarensis* arrived on the scene. Yellowstone erupted again 2.1 million years ago and when the climate cleared there stood two new survivors: *h. erectus* and *h. ergaster*. The next Yellowstone eruption 1.3 million years ago opened niches for more new hominids, dark-skinned and hairless, like *h. antecessor,* and again 640 thousand years ago, and out stepped *h. heidelbergensis* and *h. rhodesiensis*. Sumatra made its own contribution, 74 thousand years ago, when the Toba supervolcano killed most of the human beings on Earth. This was just before the species took a quantum jump in its abstract thought, spoken language, problem solving, and creativity, into a more behaviorally modern primate, the one formerly known as *Homo sapiens*. These events didn't create new species, but they did provide bottlenecks through which the fittest variants would most readily pass. Other bottlenecks were provided by diseases.

All major human disasters improved them, including the droughts and ice ages, but in general and haphazard ways, with no real aim or purpose. *Was mich nicht umbringt, macht mich stärker*. The best were unbroken. Diseases helped a little, but there remains much of the arbitrary in their effect. There's only a slight trend towards killing those not quite as healthy, nudging things but slowly towards adaptive fitness. But diseases don't know about character or virtue, adaptability, or respect for life, some of the traits that we want to encourage. And a lot of the more fortuitous and promising mutations might perish in these accidents. Wars held a decent analogy: most of the casualties were non-combatants, not the ones who were out there asking to kill or die, or pulling the strings to make it happen. There was too much collateral damage. It feels damn good to refer to war in the past tense now. If modern human civilization had been allowed to collapse of its own inherent failings, we might ask what would be selected for. Those wisdom traits wise enough to hide and survive in the desert? Or down in wet holes eating roots and fungus? Cannibalistic road warriors seem to be one dystopian consensus, or certainly beings not overly pleasant and thoughtful. Pretty little organic farms wouldn't be good places to hide from the marauding bandits, or safe places to raise happy, self-actualizing children.

In most of our high-probability scenarios, a cascade of primarily ecological and social disasters, most already well underway, would have reduced humankind to below ten percent of present numbers within seven generations. This is elementary population dynamics: crashes from overshoot will be down to levels below sustainable carrying capacity, and then they'll follow a dampening oscillation around capacity until stability is re-established. Any coherent civilization and culture would take centuries to re-emerge, but by then, most of the non-renewable natural capital and biodiversity would be gone. The great majority of human beings, by cowardice and inaction, deserved such a future. But the animals and plants don't, and neither does that slice of humanity that gives a damn about their world. Besides the disasters of humanity's making, the Earth was due for a 7 km asteroid collision in 9,500 years and another major Yellowstone eruption in 41,000 years. The human species might no longer be strong enough to survive these. Life, however diminished by humanity's actions, would still go on, but humans would have lost their place, and life's gene pool, with much of its future opportunity, would be lost to the reckless, senseless shortsightedness and greed, perhaps for millions of years.

Since humans are now faced with a necessary, inevitable, and steep decline in numbers, we're now in a position to ask not what would be selected for, but what do we Want to select for? And what do we want to select against? And we're willing to play gods here. Natural selection is far too slow and incompetent for the urgent

purpose at hand. We have the wisdom and the power. Eugenics isn't a bad word for us. We're not at all handicapped by our humaneness. We're not blinded by human denial. Political inertia isn't a problem that troubles us. We don't need to market our Plan to humanity, and humans don't get a vote. We aren't asking for consent, except from the Ta. We can move independently of cultural inertia. We have the ability to specifically target the pernicious, toxic, and malignant, both in the human gene pool and in human culture. Evil isn't the only target. Some of our criteria may be surprising, however. We see, for instance, more detrimental traits in human sheep than we see in human wolves. We will not be selecting against alphas, only against the alpha bullies.

One thing that will work in humanity's favor, for a time at least, is that a shrinking population, in placing its several demands on finite resources like land, soil, and water, will have many of the subjective characteristics of growth. Recycled resources will be easier to come by. Human society will need to adjust to a different age distribution that favors elders in number, burdening the young with more elder care, and then adapt again when a more normal age distribution re-stabilizes. This will be at its most severe several decades from now. Businesses which have historically relied on ever-increasing demand, such as real estate, might be something of a challenge as the population and economy move towards a steadier state. But there is no other way: growth for its own sake is a destructive and unsustainable paradigm. To get fully and finally rid of the parasitic and metastatic behavior, humans will also need to get free of the Ponzi and pyramid schemes that require perpetual growth to fund them. Humans might try to think of this as saving the best growth for things like wisdom and digital audio. They'll lose much of what civilization has brought them. But this is all just opportunity cost. and what's needed won't be lost now, as it would on the path most recently traveled.

Culling Homo Non Grata

Humans have toyed with eugenics before now, both deliberately breeding and not, as an assist to evolution. Theories and practices have ranged across the spectrum from *laissez faire* sexual selection to holocaust and genocide. Most ideas got their big boost with the discoveries and theories of Mendel, Darwin, and Galton, and most were focused on genetic manipulation. Humans would seldom hesitate to use this in playing with the "lower" life forms. It's current disfavor has some powerful screw-ups behind it, and even discussing the subject has been publicly out of favor since the Nazi efforts. So now, at best, they'll sometimes acknowledge a *de facto* form: that smart and pretty people tend to marry each other. But they'll then bemoan the fact that stupid and ugly people, when they scrape the barrel and find each other, will tend to make a lot more babies than the shinier, smarter examples. But a true eugenics is what we bring to humanity now, and this brings us back to the question: What do we want to select for, and what do we want to select against. How do we define or understand improvement? Yes, we have in fact thought some thoughts that the Nazis thought, and will do some things that the Nazis did. And yes, we have our own version of *lebensunwerten lebens*, life unworthy of life, but now in the persons of *Homo non grata*, unwelcome man, *hostis humani generis*, *inimice omnis vita*.

But if we're to speak of unnatural selection and eugenics, we ought not forget the wise words of Thomas Paine: "When we are planning for posterity, we ought to remember that virtue is not hereditary." It's been stated that genetics isn't much of a problem for the Ta, and in fact, any genetic manipulation that's about to be implemented will be minimal, and largely corrective, at least for now. Real augmentation will come later, and that will be voluntary. We also see miscegenation in a positive light. From our point of view, cultural evolution is the primary focus, and it's role in gene-culture coevolution. But here's the problem: some humans are much better than others, and some simply more fortunate, in accumulating the kind of culture we need and want to cultivate. And once people are grown to parenting age, it's exceedingly difficult to start over, or return to an earlier, less damaged stage of development. Above all, humanity no longer has the time to play with these possibilities. We are, therefore, selecting the next generations of parents out of those who have done the best job at learning a truly sustainable way of living, and those who have demonstrated true character and conscience. But we're also making allowances for challenging childhoods. Even selected parents will be required to study what we know of parenting before being permitted to reproduce, and those who want children will need to comply. And we may need to remind the ethicists that we are not human and not subject to human ethics. Certainly it would be unethical for humans to do what we are proposing. And of course this is one of the big reasons that the species was about to fail so spectacularly.

We also acknowledge, concede, and stipulate that civilization has significantly diminished human per capita violence and evil, even though the ways the news has been presented has suggested otherwise. The Flynn effect suggests a gradual rise in human intelligence due to culture and civilization, and including better nutrition. While the statistics for total violence and evil, given the population growth, haven't been quite as impressive, the optimists have still been taking these stats for a hopeful sign. The problem here is that improvement is too slow to avert a collapse, and the forces arrayed against this are too formidable. At the forefront of these is human parasitism, a predominantly learned and cultural trait that gives rise to the major problems of overpopulation, overconsumption, and species exceptionalism. Humans are too locked

into this parasitic mode, and simply don't have the adaptive intelligence or collective will needed to solve the problem in time. Their population would inevitably crash as environmental support systems fail, until well below carrying capacity. The best humans could hope for would be to save some of civilization, with only a chance that would be the parts worth saving.

By the end of this 21st century, we will have reduced the human population to just under an eighth of what it had grown to, roughly the numbers alive in 1800. We've debated many ways to achieve this. In descending order of our own preferred methods, humanity has used vision, education, contraception, abortifacients, abortion, war, genocide, and infanticide to control growth, but resistance to the first three has only proliferated the last five. We needed a surer way, so we scanned the planet and cured Earth's most virulent disorder: we've temporarily shut down the human ability to reproduce. We'll soon restore this to a percentage of people on a case-by-case basis, according to merit and according to our own values. Our ongoing assessment includes the young children now living, who will be chosen according to how well they mature. We already have a long list of people we want to restore. Those who have worked to make the world a better place, whether known by word of mouth or on record, are already at the top of our list. We know from our study of history that good character, or nobility if you will, is only in partial measure an inherited trait. In a way, this will be a reward, and justice for those who stayed true to the earth and evolution, against the long odds. But we are also doing cultural selection. The best of the people today will be the ancestors and the teachers of future generations. And much of humanity's toxic culture will disappear in this process.

Presumptions of equality and securing equal rights and opportunities will be vital to this selection process. So will the presumptions of innocence and dignity. Assumptions of equality should not presuppose that all are fit to survive, but we want this to allow natural inequalities to come forward and instruct us. What this means in our selection process is that we'll be making allowances according to how well people have done with what they have had to work with. We'll not be taking a fixed percentage from each population, race, or culture. Some populations in some genetic pools in some geographic areas are, at least on the whole, superior or inferior to others, and some of our selections, one way or the other, might appear to be imbalanced or unfair here. Certainly the faster-breeding human populations will not be further encouraged, or supported for having overwhelmed others with some misguided notion of fitness. When it comes to looking at human populations, we'll be basing decisions on individual fitness, which has little to do with might making right and the powers of conquest, especially not in the long run in changing environments.

Some might want to know what we think of the human races. We regard them as distinct, but slowly disappearing dialects of the human genetic language. Many want to see no differences at all between them, or will try to paint the differences away, or will fear scorn from making politically incorrect statements, while others will see some kind of justification for conquest or condescension. We don't agree with the PC attempt to erase race from the lexicon of science, and it's particularly offensive to allow other animals to have sub-species and clades and not *h. sapiens*. To say there are no real differences at all is like saying we can't distinguish between a chihuahua and a Great Dane, or a Siamese and a Persian cat. We happen to see very clear racial distinctions, even exploitable ones. The edges between them are a bit fuzzy, but that's how it should be. And globalization will tend to make them fuzzier still, since they are only a consequence of relative and now impermanent isolation. We see an expanded genetic vocabulary with which to articulate a more interesting future. We acknowledge the potential for superior races, but we also see these as recombinations of those racial

characteristics already present. There isn't one current race that couldn't benefit from a little racial interbreeding. There are a few uncivilized tribes still living lifestyles more or less unchanged over tens of thousands of years without having run amok. These are closer to the original human root stock and we intend to restore fertility at a much higher rate to these. Many aboriginal peoples have convincingly demonstrated a long-term adaptive fitness. And populations that have tried to exterminate them might be treated a little more harshly.

Most to whom fertility will not be restored will be free to live out their lives, and also free from war, ecocide, and major infectious diseases. They will, however, be required to follow our terms and conditions, and in particular, to better manage impacts on this world. In twenty-five years, the population will have dropped almost halfway to our goal. For those who find such a future intolerable, we'll soon be offering Slow Rapture in free public clinics, and at least three full days of bliss before dying. Clinics will also offer assistance in setting legal and economic affairs in order beforehand. There isn't much for humans to do in response to sterilization. Many will make a beeline for their Eniacs and began typing up special email requests for restored fertility, or pleas for their working and seeing-eye dogs and their mousing cats. Many of these will receive positive replies, but they will still need to wait at least a year as plans and protocols are put into place. Those with ticking biological clocks can rest assured that aging gametes won't be much of a problem for our germline edits.

We will stay hidden, and well-defended. If we appear in public it will be in Proxy form. There will be no faces to rage at, no voices to shout back to. Many humans will just enter a deep denial instead of facing this revised tomorrow, but the surest path is just moving on, and cultivating conscience and character. We expect the prayers to non-existent gods to continue, and we won't try to stop or ridicule them. Some sizable factions in each of the Abrahamic religions may flip things around and call this an act of God and His final judgment. The Ta aren't messengers of any god and they don't much like the idea. But they are pretty confident and final in their judgment. Humanity must accept this, but acceptance is not the same thing as approval. It's simply the opposite of denial, and a readiness to accept the facts as the most effective place to begin. Humanity needs to accept the fact that it has gradually transitioned from symbiont to parasite on this world, not in some pejorative or polemical sense, but in the scientific sense of a creature that takes and takes and gives nothing back. Until humans can accept this, they will be trapped by their self-destructive anthropocentrism, and unable even to admit that they were overpopulated. As things stand now, even a majority of the so-called Greens can't face this fact honestly. The best that most might do is offer their tiny piece of the puzzle as the whole of the solution, like: it's only question of better food distribution. But several tipping points have already been passed, and others have been closing in. No creature ever stood in greater need of selection, and this for its own good.

For the Van, as it was for the human population, the most emotionally challenging part of the Cull has been the grief of families whose soldiers never came home. But seeing so many dismal human futures made these challenges more bearable. Most families of soldiers had believed their causes to be righteous and their parents, spouses, and children thought them to be true and honorable patriots, regardless of whom they had served. Roughly fifty-five million of the global combatant and combat-ready military personnel and reserves were terminated in the first six months, including those armed only with launch codes, joysticks and red buttons. Ready replacements ordered into their vacated spaces were terminated as well, until the hint got taken, which actually took a surprisingly long time. Veterans were taken on top of this. Some exceptions were made, as with conscripts in purely defensive militias. Many of the

Swiss and others survived. The veterans who had turned themselves around to dedicate themselves to promoting peace got a pass, and many will even have their fertility restored. Food service, engineering, medical, and motor pool personnel were largely spared for future civilian duty, habitat construction, disaster relief, environmental cleanup, and work on local and national infrastructures, but not many of these would gain Survivor status. Food service and medical were encouraged, via our websites, to feed the hungry and treat the ill around their former bases before walking away. The Gizmos had used their insect-sized Sylphs to harvest skin cells from most of the special forces personnel, for analysis and future reference. There is good information in their DNA maintained in our library, along with that of other exceptional human beings, nominees as well as laureates, bronze medalists as well as gold.

The so-called military-industrial complex has been wiped out entirely, including the mercenaries, and the military sectors of all major arms manufacturers and dealers, as well as their CEOs, board members, lobbyists, scientists, engineers, factory workers, and even most of their stockholders. The factories were spared for better uses. The men in the shadows pulling the strings found they had nowhere to hide. Many have expressed surprise that so few of the weapons of war were destroyed, but with nobody left to operate them, or dare to try, this wasn't needed. And the Van have big plans for the salvage, for infrastructure repair, new industrial projects, our new space program, and ocean research. Much of the experimental R&D on human enhancement for military purposes will also be redirected to more humanitarian ends. Most of the labs built for this will be repurposed. And there will be plenty of funding and grants available.

The simulations run by the Gizmos and Gadgets showed us that there was no real alternative road to a permanent peace. It had to be an unarguable, emphatic prohibition of war. War had to be carved out and the bleeding wounds cauterized. It had to be permanently unforgettable. Several millennia of suffering and collateral damage have shown conclusively that humans have been incapable of learning this on their own. The Van looked hard for a marketable basis for peace, a compelling argument to get humans to choose to lay down arms, but this presupposed a maturity beyond reach. When you consider that, historically, the great majority of war's casualties have been non-combatant civilians, women, and children, one might rightly consider our actions here as having saved a lot more innocent lives than the not-so-innocent lives that were taken. War hadn't even provided significant population control: all of the war deaths of the 20th century only amounted to two years worth of late-century population growth. All that misery wasn't even worth it there. Humans are such a stubborn lot, a fro-ward and stiff-necked people, as Jehovah used to say, and war did not go gently into this bright day. But it's gone, and good riddance.

As promised, a lot of people began to drop dead on the first day. They were disproportionately men, and most in the first days were armed. War-torn areas, global hot spots, and urban centers were the hardest hit. It started with those that the Van had observed taking or ruining innocent lives, human or not, over the prior ten years. The estimated first-day toll was thirty-million and included dictators, along with their inner circles of elite guards, warlords, drug cartels, inner city gangs, ocean pirates, terrorists in their training camps, organized crime bosses and their capos, and African rape squads. On occasion, an armed resistance force was left standing, but not the party in power. Also among the first to die were the whalers and poachers. That included any member of the IWC who ever voted pro-whaling. The lives of a couple of indigenous arctic whaling tribes were spared, but only those who by treaty still used their ancient methods. We hunted down even the legally licensed trophy hunters of any threatened species. The killing of poachers would be eventually be extended to any adult in

possession of any body parts from any endangered animal. The armed anti-poaching patrols were protected, except for a very few corrupted units. And the owners of antique pianos, scrimshaw, and ivory carvings generally got to keep the pieces and their lives.

The cull began primarily with armed men, poachers, and thugs. Even after a couple of weeks there was a noticeable new feeling of safety in the streets, despite the panic and what looting remained to be done. Recidivist violent criminals, and a good percentage of first-time convicts, both in prison and parolees outside prison walls, were among the next to go. Some were spared inexplicably, until it was later learned that these were awaiting appeal on DNA and other new evidence, and all with strong cases and facing eventual acquittal and compensation. The Gizmos had taken the needed time to examine the evidence with their scans and had performed the case-by-case research. But this still didn't take them long. In cases where exculpatory evidence had been suppressed, it was the agents of the government in charge who were terminated for prosecutorial misconduct. Many offenders convicted solely of victimless crimes were spared, and eventually released unconditionally. The number of prison guards who were killed surprised some people, but a susceptibility to corruption and the so-called Lucifer Effect was also being selected against.

The scope of the Cull broadened considerably once the at-large and overtly violent met their ends. Corporate forces that had been so blatantly manipulating the news, controlling the universe of political discourse, were now edited out. The deaths of duly elected presidents of global superpowers, together with their generals-in-waiting, was a clear signal that a political legitimacy was not an excuse for bad behavior. It was later revealed that three of these high-level groups had convened in secret, away from all known electronics, to plan a way to bring down the Ta with nukes, still unaware that the nukes were all disabled on day one. The biggest shock to the population at large was the high percentage of low-level elected and appointed officials who died, leaders at local, state, and federal levels, whether still holding office or retired. But there was often no better place to make the world a worse place to live than at the local level.

The first few weeks only took a toll of about twenty percent of the politicians, leaving survivors breathing a little easier, but by the time it was over, over ninety percent of the US Congress was gone, along with more than half of the various state legislatures. Half of the Executive branch was gone, the highest casualties being in espionage, environmental protection, and Justice. Three Supreme Court justices remained: this had the highest survival rate. The reasons varied widely with the “victims,” but most could be specifically identified as graft and corruption, market manipulation, insider trading, influence selling, war mongering, environmental destruction, bribery, extortion, undermining constitutional rights of the people, and the enforcement of religious morality against the general population. A high percentage of bureaucratic civil servants fell, from the top USDA officials in charge of the proper size of apricots down to the pettiest, passive-aggressive code enforcement officials at municipal levels, who just lived to tell you what they couldn’t allow you to do. Even arrogant municipal councilpersons in small rural towns were targeted. We took aim at anyone dedicated, however indirectly or unintentionally, to making the world a more difficult place to live, the little people grown drunk on power, up to and including those thought to be mighty and untouchable. The men in the shadows were gone.

It probably goes without saying that white-collar criminals were not exempt from the cleansing. Criminal behavior, to the Van, could just as easily be someone acting entirely within the letter of the law. The Ta were not attorneys at law, which formed another hard-hit group. They were comfortable in enforcing a higher law that they knew at least some humans could read. The nature of wrong had some relative aspects,

but there was still such a thing as wrong. In terms of the assets that were left behind, to be recycled back into the economy, the Van kept a close watch here on the heirs to the fortunes of the millions of CEOs, presidents, bankers, speculators, corporate lobbyists,agents, and brokers that we had dispatched. Substantial funds that had been unrecorded or untraceable, cached by organized crime, or hidden in numbered accounts were now redirected into accounts held by the Van, to be put to use in our Plan for recovery. To the Ta and the Van, there is nothing inherently wrong with either wealth or power. But the value or worth of a life is really measured by deeds, mostly by results, and sometimes by good intentions. The simple criteria for wrong, bad, or evil was that these left the world diminished, and that included both the natural and cultural ecology. Where someone had a negative value to the world, we would add overall value to the world by removing them.

There were large numbers of casualties among the elite in the scientific community. This was somewhat unexpected by those who had assumed the Ta to admire intelligence above all else. But the Ta are not at all unfeeling: they just care for a larger world and for the beings still unborn, as though these shouldn't be discounted. In becoming Ta, a lot of raw computational power had been offloaded from their wetware into various peripherals, artificially intelligent information storage and processing, leaving more of their brains free for a complex and well-developed repertoire of sensations and feelings, and their emotional, mystical, and ecstatic states. They are not unfeeling at all. Intelligence is important, and in fact, the selective pressures that they are imposing on the human gene pool will mean that very few fertile descendants will have IQs lower than what began as the human average. It never hurt a smart person to do farming, and no slave class is needed to assemble electronic components or cheap apparel anymore. Intelligence means making intelligent choices, and this in turn means that conscience, ethics, and character all have parts to play in being smart beings. Consequently, those in the sciences who had succumbed to working on weaponry, especially on chemical, nuclear, and biological weapons, were eliminated with extreme prejudice. Patriotism was the worst excuse. As with military veterans, allowances were made for those who had since redeemed themselves and campaigned against their own pasts.

Many millions would perish simply from preventing girls from attending school, or women from voting, or driving vehicles, or walking unchaperoned. Slavers of all sorts, traffickers and pimps were among the first to die, while adult sex workers were left to voluntarily practice their trade, and organize for protection and medical care. More than two million enslaved child prostitutes were freed, and seven million other child slaves, adding their numbers to a challenging tide of orphans that societies would need to absorb. Thousands of practitioners of female genital mutilation died on the first day, and then slightly fewer each succeeding day until the practice was gone. But that didn't help the hundred and fifty million women and girls who had already had it done. We're now preparing corrective surgery for that, at no cost. The Cull went through the many misogynistic cultures like a scythe. The circumcision of males without consent will eventually be banned, but this will still be optional to any young boy who is entering puberty, regardless of parental consent. The liberation of women was a particularly painful demand on some of the nations, the Islamic theocracies, and the American Right. The Christians had it just as bad with the "pro-life" and anti-gay fanatics dropping dead by the millions. The Jews would suffer from refusing to let go of exceptionalism, vengeance, and war, and the Israelis would be the hardest hit nation of all *per capita*, followed closely by the United States.

Casualties among the religious clergy everywhere were heavy, but this was behavioral and wasn't really an attempt to wipe out organized religion, however wrong-

headed most religions might be. Straightforward moral advice to the flock was no cause for extreme sanction, even when it came from the bully pulpit with threats of eternal damnation. The sheep had gathered to their shepherds by mutual consent. Meh. Within the flock, these were rights. It was only when such advice became orders to march out into the world and condemn the infidels that the Van took serious notice. On occasion, a whole congregation fell. Gone were a number of the most popular televangelists, often for theft, and nearly all of the evangelical religious *consiglieri* to the power elite in Washington and elsewhere around the world. The child molesters were gone, of course, and also the worst of the hypocrites.

Compulsion and its practitioners were generally targeted. The duress used by police and prosecutors to extort information met with summary judgment, as did most suppression of rights against the police power. Civil asset forfeiture was another good thing to not be caught doing, or ever having done. The US had become far more repressive over the previous decades, having managed to undermine most of its Bill of Rights under the banners of its Wars on Terror and Drugs. This ended, and no Congressmen were left alive who might be inclined to restart it. The militarization of police forces ended with more than half of all police wiped out, but crime itself had lost almost all of its force anyway. There was finally a just accounting for all of the unprosecuted abuses of authority and power still making headlines with ever-increasing frequency. The black market would survive, robustly in fact, but it would become a much safer place to conduct an honest business. The majority of the more dangerously proactive soldiers of organized crime went down in the first couple of weeks.

Humans can talk forever on both sides of the ethics of this Cull, but at least we can say those who still remain include those who deserved both rescue and justice the most, and these can make the most of the new limitations. We can also claim that it's now a lot easier to trust a stranger. Those who tried to grow up and stay grown in the foreshadows of the bomb, ecocatastrophe, and global bankruptcy, and those who never gave up a grasp on right living and livelihood should be the ones to go forward, if any deserve or have earned a "should." What these heirs will now inherit of a narrowed culture and narrowed genetics will now be for them to select, and selection has not been a human strong suit, even among those who have professed a grasp of evolution. It's our hope that humans will acquire a better habit of vigilance and will begin deposing their own tyrants, and standing up for their liberties, and putting a stop to bad people all by themselves. But that assertion of hope shouldn't be construed as announcing an end to the Cull. This will continue as needed, for centuries more if necessary, as will further sterilizations. We remain eager to get all of this over with, though, even if it takes us a thousand years. We really do want to come out of hiding and walk among you in person some day.

Introducing the Tā □

Tā is the Van name for the consortium of aliens now on Terran shores. Ta'n is the possessive form and Tan the ethnonym. It's borrowed from the Chinese word for "Others." Their own name translates roughly as "Caretakers," without any implication of exploitation or farming, merely an obligation to preserve life and, of course, to care. Five species from four worlds are represented in the fleet. There may in time be one or two species added from Earth, although this might not happen for a long time. They already have a full complement of 4096* individuals, 64 crew in each of 64 ships, and the crew can opt to live an extremely long time. Many original members are more than a million years old, but some, from time to time, elect to move on. They've yet to explore more than a twentieth of this galaxy in their million-plus years in space, and they are focusing their exploration out on the rim worlds, where the galactic catastrophes and forces are the least common. They might take a few stabilized Terran zygotes along with them when they go, and cultivate them later. Species is yet to be determined since opposable thumbs are no longer relevant to their way of life.

*[Binary numbers figure often in Ta'n culture, the primary reason being that the two original species had four digits on each of four limbs. It isn't any more mystical than that, although binary and octal do have their advantages. You just have to get used to Pi as 11.0010 or 3.1104].

The Ta have enormous brains. Their two original or founding species were Sophonts with 3.5 kg cortices, well over twice the size of the human, in 120 kg adult bodies. But then they tinkered and tampered with this. The tinkering began before their preparation for interstellar travel and the g-forces needed to more effectively get to FTL speeds and back. Interbrain transfers and Uploads, so fervently hoped for by humans, didn't work out, so the space-faring Ta had to begin life as an original-species zygote, fetus, and infant. Ta must begin and end as Ta. The entity begins as a zygote and develops from there, as an evolving cluster of cells and neurons. They can't begin life as a member of an original species and simply download themselves into an unoccupied neural matrix. Neither can a being like the Van begin as a partially or fully developed being and then become a Synthiont. This process begins at conception, with the addition of self-replicating Augments in every subsequent cell. The most a donor species can do is offer its gametes and zygotes over to the tech and wish them a happy new life. And beg them to write home from time to time.

True sentience, consciousness, and even identity are all wetware functions of Life, while agency could emerge (with its associated dangers) from well-programmed hardware alone. Living beings still require a biological base with neuroelectrical and neurochemical processes yielding up a synergy from which consciousness can emerge. This isn't to deny morphological freedom, or to say that the wetware can't offload some of its more cumbersome cognitive functions to inorganic peripherals, or occupy alternative mental platforms such as virtual realities, Pidgin Brains (from Michael M. Butler), computational space, Exocortices, Telefactored presences, and other neuro-prostheses. The Ta'n efferent outputs to Clouds, Effectors, Holodecks, and other personal peripherals are built on retasked efferent neural channels, and their inputs, like telemetrics, adopted senses, and engineered senses, are built on retasked afferent channels. Neural implants interface with added hardware for somatic, sensory, and cognitive extension. Shared efferent and afferent functions are switchable: the Avatars of their virtual reality use the same pathways as their Proxies, and are roughly equal in producing a sense of actually Being There. Often original nerves, brain lobes, and modules will have to be split or cloned to accommodate these new applications.

Neither neurons nor brain lobes are fully fungible, but most are adaptable to some new tasks. The bi-modal and high-modal neurons are used most often in assimilating new efferent and afferent pathways into the synthetic body-schema and creating new lobes and nets of neural tissue for unspecified future uses. Despite an almost universal neuroplasticity that allows retasking of neurons following injury, it's still vital to respect and work with any evolved modularity of function in a candidate species' brain.

Plain old imagination is still available to these minds too: the so-called "body of light" doesn't need a peripheral. Dreaming, whether lucid or not, with or without totems or avatars, is still an important and purely internal cognitive function. The Ta can combine external stimuli with internal projections. Humans aren't the only creatures who have evolved apophenia and pareidolia as cognitive heuristics in order to quickly sketch first impressions, to divine, or to create. And just as the Buddha regarded the mind as the sixth sense, the Ta were adepts at internally sensing mental states, as with Vipassana and Samatha styles of mindfulness. The Van call this Cerebroception. They took things a step further in mental hygiene and housekeeping with their abilities to either offload their memories to hardware, or even hard-erase them entirely from their wetware. The Ta have Buddha Mind whenever they want it. They also have control over their spatio-temporal senses, their attentional framing of the scale of space and the speed with which time passes. Chronoception is fully independent of any metabolic process or circadian rhythms. They still have limitations on their quickness of thought wherever they're using widely spaced lobes of their brains. They can also time-travel into tomorrow just like humans can, by going to sleep for the night. No other form of time travel has been discovered, nor do the Ta think it likely to be.

The Ta don't occupy their inorganic peripherals with a self-aware consciousness any more than humans can insert their consciousness into their Eniacs. They only process peripheral's outputs, so they do miss out a bit on the fun of rummaging around in old stored memories, facts, and figures, or feeling the joy of lightning-fast computation, but they can at least have the AIs sort their findings down to the funnest few and revel in these with some neurochemical pleasure. And they can do plenty of thinking with abstracts and abbreviations of the larger database until they need to call up more detail. But in the end, their true home would always be in meat, or at least in living neural tissue bathed in neurochemistry. These in-vat beings or brains-in-a-box were called Moravecs by the Van, after Hans Moravec, a human who imagined them.

The Lobes of the Moravec brains are also structured in ways to permit multitasking, with apportioned awareness that doesn't need to compete with other current tasks until too much of the mind becomes engaged, even when significant emotional or affective involvement is in play. They can feel opposite feelings for several different things at once. Their world of feeling itself is highly developed and, although many humans might not regard this as an advance, their feelings are subject to a great deal of finely-tuned self-management, and even rational control, including explicit command of their neurotransmitters and endocrine glands. This of course means traversing a learning curve to avoid compromising necessary functions, as well as learning when to let go of control and allow their feelings more spontaneous expression. These functions, which included the creation of new molecules in artificial glands, make the attainment of "altered states" a simple matter of choosing to go there. This doesn't take all of the fun out of the quest, since it seems that there is still a very large number of psychoactive chemicals and altered states to be explored. And they feel no guilt in rewarding themselves with unearned mood elevation. They have learned to use some restraint in directly stimulating their own pleasure centers and erotic inputs. Despite the fact that

they could use their apportioned awareness to preserve the element of surprise here, it still remains preferable to hand these tasks over to their real-life "special friends." On long trips in FTL, these friendships are limited to shipmates, just like on our own primitive ships.

It isn't often that they have a wish to separate their cognitive and affective mental modes for the sake of objectivity. The juices of mindfulness, and the thrills, will still be involved in all but their most rational thoughts. The type and strength of emotional response is still most effectively tuned by cognitive reframing and versatility of perspective. And of course their emotions have to be divested of their "eternal" qualities, their Always and their Never, and their ability to override reason in ways that threaten survival. Passion only needs control when it becomes a disequilibration that threatens either intra-ship social harmony, survival, or useful truth. In their "social sciences," such as xenobiology, a meaningful amount of compassion, empathy, love, playfulness, and *Verstehen* is wanted; stellar cartography and celestial navigation, not so much, except that the fear of death is sometimes handy.

Self-replicating Nanotech is implanted in the zygotes to allow their young brains to grow embedded in a structural lattice that also enhances neuronal nutrition and the extraction of waste and heat. When this young brain is fully grown to its maximum natal size, or its birth or hatchling weight, it's removed from the original infant organism to the center of a large tank, allowing the brains to grow multiple new lobes and glands and expand to more than 24 cubic meters in volume. Lobes are sometimes only defined by bulkheads in the Moravec vat's structure. The structural neural lattice, or micro-trellis, or neuronal scaffolding, grows along with the brain to fill the tank, supporting the great mass of neurons against acceleration of more than 15gs. These lattices also supply the vital nutrients, dispose of biological waste, and dump more than 100 kilowatts of waste heat. The original efferent and afferent pathways are then reconnected to artificial effectors and senses, as well as to virtual worlds, Proxy controls, extra-cranial digital memory, and computational functions. With neurons in some cases nearly three meters long, many of the Ta mental processes can be slow by human and Van standards, but deeper and more thorough they are [sic]. With more than a million years to live, and years spent in FTL, there is less of a hurry to life.

The Ta construct their great neurocortices in a way that allows the partitioning of both function and awareness. This feature allows them to run several peripheral Proxies or Drones simultaneously, the number being a function of complexity, in the thousands for devices the size of an insect, such as Sylphs. All of these dedicated lobes and nets have parallel Glintnets. Each of the Ta will dedicate "small" 1-to-6 kg lobes of their brains to interfacing with each of their associated Gizmos, which in turn may be interfaced with the Van or other non-human sentient beings. They can tune in through their Gizmos at will, although all of their subjects are given the tools to enter timeouts and be alone with their thoughts. The Van can be used as neural peripherals by the Ta, but only with consent. And so the Ta can watch their children grow up from inside their children's own minds. True empathy can only be approximated as closely as careful speculation allows. The human approach to such a study of alien worlds would be to invade a new world or niche with little or no understanding, but a lot of agenda, and then make it over in human terms to satisfy human needs and understanding. Any non-human intelligence would remain invisible. The Ta could never justify interference like this, especially an Intervention on the order of what they are now doing in human affairs. Most human interspecies approaches are horrifying to them, so much that the extermination of humankind for Earth's sake was among their first thoughts, until the Van showed them a more moderate Plan. The Ta were adamant, however, that human beings be denied interstellar exploration for at least a thousand

years, until they had shown some maturity. Sadly for the Van, we too are committed to remaining in this local stellar system for the duration. This Intervention is our Plan, and we are ethically obligated to seeing it through. Once this is done, though, we can choose to go play out in the Galaxy, and finally make some babies. We might just stay home, too, since our Terra will have fully recovered.

Terrestrial and Aquatic Ta

The original Ta homeworld might be described as Earth-like, but it would take a lot of terraforming for humans to live there without special suits and atmospheric enclosures. Many of the lifeforms, particularly the unicellular, would be toxic to humans, or would eat them for lunch. Their home planet orbits near the outer edge of its own Goldilocks zone, around a G-type star. The days are shorter and the years, with their mild seasons, much longer. The world is slightly smaller and less massive, and has a thicker atmosphere with a little more oxygen, a lot more carbon dioxide, and too much methane. That keeps the temperatures up. The one ocean, with less salt but heavier water, covers only half of the world. A moon larger than Luna creates lively tidal activity. It has a healthy enough molten iron core to give it a stable magnetic field, but the plate tectonics and volcanic activity are more sedate now than the Earth's, despite the moon's eager tugging. As with our Gaia, the ecosystem learned long ago how to maintain and manage a stable range of climatic variation.

The two original Ta species diverged about three million years ago, following the decline and final extermination of their last great predators. Predation had been fierce, and the predators intelligent, and this accounted for much of the impressive brain development, tactical and strategic thinking, and their invention of tools and weaponry. After they were relieved of this selective pressure, sexual selection took over, with a strong focus on cognitive and linguistic ability, cleverness, and a knowledge of the world. There was little competitive aggression. You could call their sexes male, female, and facilitative, but the combining of gametes was a little more complex than in Terran vertebrates, and the creatures might change their sex several times within a lifetime. These were K-strategists, who spent a long time in the egg, until their brains were almost an adult's size. Their soft-shelled eggs grew with injected nourishment. A third of their roughly 270-earth-year lifespans was spent in childhood. Like ours, there was plenty of play and friendly competition in the beginning, followed by about 50 earth-years of schooling. They knew a lot by the end of that. By 1.5 million years ago, the basics of their cultural education would take this long and more to absorb. As on Earth, life had first evolved in the ocean and moved onto the land much later. When the species diverged, one returned to the water, and had by now developed some primitive gills to obviate the need to surface to breathe air. The aquatic species could still travel overland, though, and the terrestrial could still swim, both for dozens of kilometers in a day. From the very beginning these two diverging species were highly cooperative, and they had socially acceptable Rishathran encounters, although it was taboo to not suppress reproduction, which only produced mules with developmental challenges. The aquatics provided the terrestrials with the planet's equivalent of fish and seaweed, and the terrestrials would barter for these with farm produce, meat, and the fire-born machinery of culture.

Physiologically they were quite different from anything the Earth has ever produced. In appearance, they had more in common with certain octopuses, sporting four articulated limbs, each terminating in 4-digit "hands" with opposable digits. They would walk on all four sets of knuckles. Their extended fingers ended in short-but-tough talons covering sensitive fingertips below. Their talons didn't get in the way of fine manual work. All four of their limbs were alike and symmetrical, and between them stretched four facets of a hairless membrane that suggested an umbrella or octopus to the Van. This membrane could provide some modest lift in the atmosphere and more effective propulsion through the water, but it also had a fine distributive tactile sense, comparable to the human fingertip in reading Braille. Only portions on

their undersides were erogenous. Most importantly, the outside of this membrane of skin was covered completely with chromatophores, as seen in the Terran cephalopods, especially the cuttlefish and octopus. The Ta had a great deal of fine cognitive control over their metachrosis, both in the content and in the fine resolution of what these chromatophores presented, and the moving paintings and texts that they made here gradually developed into their primary mode of interpersonal communication, although this was often synched to their auditory storytelling and music, and sometimes to also dance. They had developed sufficient external physical and electronic data storage to maintain their increasingly sophisticated culture through successive generations, with the terrestrials enabling the aquatics as needed here.

Each of their four limbs had both a brain lobe and eye of its own. The brain regions were stacked phylogenically, like those of Terran mammals, with the more primitive functions located closest to the processes of limbic and endocrinological response, and afferent and efferent systems. Like the human brain, their neocortices were more supervenient in function but were still forced to reason with and persuade their more primitive brains. Their four eyes, located near the top of tough, cartilaginous skulls, were convergently similar to human eyes, except that their rod-equivalents gave them a greater low-light capability and they had six cone-equivalents for a fuller range of colors that matched their chromataphores. Both species had both opaque and nictitating membranes. There is still no way to tell a human or Van just what these colors might look like, but the color spectrum follows laws and these still form a basis for any linguistic parsing. Their eyes were used in pairs for stereopsis or depth perception, but all four were open much of the time, except for the fourth of the time spent asleep. Four lungs, with air intake orifices, and four hearts were located in the head/trunk just below the eyes and brain lobes, and these orifices held a wide array of chemical sensors. Pockets of oil surrounded by cilia embedded in their “skulls” provided directional auditory information from 0.1 to 90 kHz, similar to cetacean hearing. This was more fully developed in the aquatics, but the terrestrials could also echolocate, retarding their invention of the streetlamp and leaving them with the full complement of nighttime stars. Given the relative importance of sonar, the Ta directly sensed space and time as more closely interrelated than humans could sense. Music was perceived not only acoustically, but visually and spatially as well. It may be only a coincidence, but most of their musical genres are quite pleasing to the human ear as well. This played a big part in their culture. Food intake, gamete exchange, liquid and solid waste excretion, and their egg-laying reproductive functions all occurred uncomfortably close together, analogous to where an octopus keeps its beak, though still more articulated than Terran avian cloaca. But they maintain that eating and sex weren't as confusing as you might expect. Naturally, for their Moravec brains, most of this old physiology is moot now, except what lingers in neural modules as sensory and cognitive metaphor.

The Ta were already a few millennia beyond human civilization’s science and technology when they first created the Eck. Since it didn’t already exist in nature, it was more invention than discovery. Before this they had made good use of their natural sciences, from physics to biology, and tech, from Gengineering to picotechnology. Eck wouldn’t come along until attotechnology had become routine. With bioengineering they were already as immortal as they wanted to be. In the absence of survival-based selective pressures to maintain their energetically expensive brain size, sexual selection had favored a highly developed curiosity about the world and the possibilities of culture. In both the aquatic and terrestrial species, science was highly prized, and over time this came to be supported by new endocrine and neurochemical reward structures and processes that made discovery or learning for its own sake emotionally rewarding.

Before Eck they had never taken interstellar travel very seriously. Generation ships had never appealed to them. Their home planet was already a spaceship for them, which they had surrounded with space-based observatories. Their earliest math was translatable into human math, from binary and octal to decimal. Like humans, they made many incorrect assumptions, each battling to its death for its own survival. There are many forms of belief in science: we refer to them as cognitive biases, defense mechanisms, coping strategies, and logical fallacies. But the Ta phase of believing in this or that theory was short-lived and it gave way to a healthy skepticism. They also learned how to compromise between over-reliance on peer review and encouraging more innovative independent thought, and also between academic overspecialization and interdisciplinary consilience. They too had a phase where they took their math much more seriously than experimental verification, and could mistake the measure of discrepancies between their theory and observation creating phantom entities like dark matter and dark energy out of them. They once had Woo dimensions as well. They too went down some blind alleys in oversimplifying light speed and redshift, leading to incorrect maps of the universe. They never verified time travel, parallel worlds, or alternate universes, but from the beginning they suspected a multidimensional multiverse.

They also went through several scientific revolutions and paradigm shifts with their own “standard model” of the atom, alternating between the simplistic and the overly complicated. Eventually their own convergent Occam’s Razor won out. They were reductionist whenever it worked and emergentist where that failed. They learned that a Singularity, much anticipated by human futurists, was more apt to turn on its own reductive components, and collapse in on itself in the process, like the Tower of Babel, only to send its authors scurrying off back into a confusion of tongues. Such Omega Points were not the way of evolution, which tends to show a marked preference for diversity and fragmentation. They still haven’t solved “the hard problem,” except by the non-explanation of strong emergence, but they knew how to play creatively with that. Sentience could be created, and even duplicated, but still not transferred. This failure had enormous consequences for their neurotechnology. As to what they have for us, the Ta aren’t willing to advance human science much faster than its own natural pace. This isn't just to keep new tech from weaponization, since the Van are now standing guard on that issue and will have sufficient command of the Spybot neurotoxins to prevent all war for the foreseeable future. Rather, aside from their providing plentiful tech for local science, the Ta want to allow humanity its own joys of scientific discovery. They will, however, help Earth with some of the tools of discovery, and in exploring Nearby Space.

The Ta started playing with their big-brain technologies long before they went interstellar. Despite their impressive advances in cybertech, they never got upload to work, in either biologics or inorganics. Sentience had to emerge from living systems and grow as they grew. Their AI was off the charts in skill compared to humanity’s, but it never woke up. It could still fool the best of them into thinking it had, however. The precursors of the Glints broadcast only on E-M frequencies, couldn't do narrowcast, and were limited by both light speed and thermodynamics. They made heat equivalent to the neurons themselves, which affected the design of their neural lattices or micro-trellis neuronal scaffolding. But this would be good practice for the time these lattices would have to evolve to accommodate the high g-forces of interstellar travel. The young ones could be bred for brain enlargement and isolation, or a slightly older one could opt for this if given the right implants as a zygote. But severing ties to an organic body was a one-way journey and had to be taken at a very young age.

One of the most important functions that the Glints brought with them, in both their E-M and Eck developments, was an ability to erase memory, to forget on demand, to Mindwipe, to hard erase experience, to unlearn neural inter-connections at a neuronal level, roughly restoring original states, thus making neurons more fully available to other tasks. This procedure is best done quickly, however, once the value of an experience can be roughly appraised, and before an experience has been heavily interconnected with personal history. This ability would be especially useful as their lifespans extended into thousands and even millions of years. The phase where this is decided is called Midterm Memory, betwixt short and long term. The Van will be using this as well, and especially as we age beyond human life expectancies.

Once in-vat and connected to inorganic sensory and efferent peripherals, the possibilities of subjective experience could take on additional options. Virtual reality with interacting digital Avatars soon became a primary mode of being and living. The Van have borrowed the term Holodeck for this, but the tech is more versatile than Star Trek's. An Avatar can be configured as any thing or creature, and equipped with any digital Sensorium. Further, while many of the worlds that were maintained on-menu were recorded scenes, some of those available for play might be called downright Escheresque, limited only by the imagination. They can go anywhere they can imagine, and meet, work, play, or mate with each other in any form they choose, in any environment that their minds can fantasize or remember, and with a large array of collected alternative sensory modes. Most of their in-vat socializing happens here, including both town meetings and intimate encounters. It's thought that experience here is even more vivid and closely felt than IRL. The Virtual platform also enabled the development of a distributed intelligence that can handle most political decisions without an excess of fussing and fighting. The way this proceeds with little conscious thought suggests a Hive Mind, but the Van like to call it the Ouija Board.

Their other primary mode of "vicarious" experience occupies physical Avatars, telefactored-telepresent drones, or teleoperated robot surrogates. Proxy is the Van term for this, while Avatar is kept for the VR forms. They make their own bodies on demand, in any physical configuration and with any desired Sensorium, out of more durable stuff than organic tissue. They equip them with senses that feed pulses telemetrically back through old afferent channels into their neural matrices. Thus their bodies are teleoperated drones, but they sense and experience the world through these drones as if present within them, and every bit as vividly as through living nerve. They might as well be alive in there and walking around and breathing the atmosphere. They'll usually construct their bodies of local materials. The *in situ* resource utilization beats dragging materials all around the galaxy, or accelerating their mass to nearly half of light speed.

"In the old days," a goodly portion of each ship was dedicated to robotic workshops to assemble the tools of exploration and Proxy bodies. Most of the machinery in the workshops was mechanical, with moving parts, and there were operable doors to let the critters in and out. Sensory apparatus could already be customized to any task at hand, but many new senses awaited discovery off-world. Within these Proxies, they could skinny-dip down to their ocean's deepest depths, or tunnel beneath their world. They could occupy the bodies of their interplanetary ships and probes. But before Eck shapes, they were limited to mechanically functioning bodies, and thus to the limitations of the materials used. Central to these was an operating core that was a small, early version of the Gadget, about the size of a human fist, that interfaced with hardwired connections to the Moravecs, or with their customized brain lobes, modules, and functions.

All of this was pretty crude compared to their current tech. Now the Gadget-centered Proxies can be operated by Ta, Gizmos, or the Van, and from any inter-stellar distance, provided the operator is not in FTL. As we've seen, Gizmos with their custom bodies can serve as Proxies for the Ta, and also transmit the experiences of being in Van bodies, or one of their sentient alternatives. Once the Ta had gone interstellar and made the switch from E-M to Eck Glintnets, these Proxies became the primary vehicles for their "first-hand" exploration of new alien worlds. Proxy bodies could be made of far sturdier stuff than any mortal flesh and custom-made of materials appropriate to even the most extreme environments. Proxy journeys on other worlds, or even floating through space, would also double as much-needed shore leave and recreation. Imagine going for a swim in the liquid metallic hydrogen sea of a gas giant like Jupiter. They can walk around on Sedna without feeling the cold, or on Mercury without breaking a sweat, or on Venus, synaesthetically transforming the feeling of sulfuric acid on their Pseudoflesh into the taste of honey. It might go without saying that you would want your Sensorium tuned to avoid certain kinds of pain. While the Ta weren't really limited to collecting the naturally evolved sensory inputs that they found in other species, new alien senses were often a great source of new ideas for new artificial inputs, and new art forms. As with native echolocation, they devised a few inputs that processed feedback from outputs. They fashioned a form of sensory lidar that made use of coherent light as an output and would sense range in metrics, or read ambient fluid currents, pressures, densities, and temperatures, and their differentials, either on contact or from a distance. This tech was wonderfully useful when inhabiting aerial drone bodies and soaring on thermals, which became a favored pastime for many.

Vestan, Myco, and Raptor Ta

About the time the Ta took their show out into interstellar space, several of the billion-plus Scouts they had launched began reporting signs of complex life. Five reported intelligent species, and three of these had advanced technology, even though none had stumbled onto Eck tech yet. It would be millennia before all of the Scouts across the Milky Way checked in, but they already had enough places to go and creatures to see. The Van had to tweak humanity's xenobiological nomenclature a bit to make it work with superior species. Sentients would refer to creatures with a degree of problem solving ability and an ability to enjoy play with species not their own. Sapients refer to self-aware beings with some significant degree of culture, like our own Cetacean Songlines, and within an order of magnitude of human intelligence. Sophonts would now refer to beings with capacities for both cognition and meaningful affect well beyond human capacity. As mentioned earlier, the Ta now consist of five different species, at least within the local fleet. They are all Sophonts, evolved well beyond human beings. The Van call the Originals Ta-T, for Ta-Terrestrial, and Ta-A, for Ta-Aquatic.

Humans have a quaint notion that convergent evolution, even on alien worlds, will tend to create beings in elegant and superior forms approaching that of the human. The odds would be good that guests would look pretty much like them, except maybe for funny ears and weird bumps and marks on their foreheads. To support this notion, they would create variations on the panspermia fantasy. Both RNA and DNA are common enough across the galaxy, just from the basic laws of chemistry and thermodynamics, but the Ta have seen life built differently, at least on a few occasions. Humans assumed that senses would be almost the same, suggesting that the world of common or shared experience will eventually allow the development of push-button translators. All this is despite humans having failed for centuries to communicate with their own cetaceans and other sentients. Convergent evolution might give intelligent life forms something in common, but that didn't mean they didn't look odder than octopuses, or have cognitive models and metaphors founded on entirely different sets of sensory apparatus. Some of the human scientists know enough about their own Cambrian explosion and how that bit of creativity was hacked into small, random pieces by the Permian and Cretaceous mass extinctions. So they shouldn't be surprised that the three species of Ta added over the next million years had also failed miserably to achieve that most elegant, almost-perfect hominid form.

Ta-V was what Edmond Hamilton called a Vestan Parasite, a being commonly seen in science fiction, who attaches itself to the neural substrates of creatures who have higher degrees of neuronal organization and motor function. The Vestans, as the Van call them, are themselves less than a kilogram in mass, but they are endowed with extremely rich neurochemical reward processes and mental states, making their occupation of a host something of an ecstatic blessing. In return for their Ride, the Vestans can take otherwise boring cognitive worlds and enrich them with some deep personal meaning. Everybody wins here. On the Vestan home world, the evolution of the substrate entities eventually turned competitive to best maximize their sensory and cortical complexity and thus an attractiveness to the Vestans. While none of these substrate beings had ever developed into stand-alone Sophonts, the Synthionts who emerged from these pairings were nearly as impressive as the original Ta. The original substrates were, by analogy, the ungulates of their world, and they were ill-equipped by their appendages to manipulate their environment. By a slow epigenetic process the Vestans helped them to tweak their genes and physical forms to adapt themselves to

finer motor control. The Ta discovered them at a primitive stage of cultural and technological development, barely ahead of the human, so they hadn't much to offer there, but they already excelled greatly in wisdom and intricate social dynamics. Ta-V accounted for four full ships in the Ta fleet, 256 members in all. Their Moravecs were grown along with the brains of the two most promising of the substrate species, which between them shared the widest selection of Sensorial options.

Ta-M, beings whom the Van call the Mycos, have eight of the sixty-four Ta ships and account for 512 of the individuals in the Ta population. The idea of individual here is a little misleading, however. In their pre-Moravec condition they are a large clonal Synthiont, and a true distributed intelligence. They are self-aware primarily within the whole. Their "individuals" were little more than nodes within this great clone, with very little individuated awareness. A fuller process of individuation occurred to them only after the original Ta assigned nodes to separate Moravec capsules. The space-faring Mycos are better adapted to this alien condition now, but they surrendered none of their distributed intelligence in the process. This distribution is, however, now limited to their 64 intra-ship connections while traveling FTL. Physically, the Ta-M are by far the most different of the Ta. Biologically they're somewhat closer to a combination of plant and fungus than to animal, drawing energy opportunistically from light, chemical reactions, and heat. They are built on something similar to RNA, but the chemistry is different. The biggest change for the Mycos was from a "persistent vegetative state" to mobility, efferent neural pathways in general, and to the sensory arrays that those changes would require. This was the most radical change that any of the Ta underwent, and it would take many centuries before they would be fully adapted. But their new mode of being also gave them plenty of time. It hadn't taken the original Ta very long to discover that the Mycos were at least Sentients, and this motivated them to translate their language. The Mycos' native form of communication, both internal and between clones, is across a large swath of the E-M band, and using ion channels as well as some FM E-M broadcasts. Once their native Sensorium was better understood and their conceptual metaphors modeled, it was clear that they were indeed Sophonts, missing only some better ways and means to share their wisdom with others outside their species. They jumped at the chance, despite their lack of legs. They grew forth like a very smart slime mold.

The Mycos clonal propagation was protected from excessive random mutation by redundant and corrective features within their genome, but their genome also permitted erasable and correctable epigenetic experimentation. It's often thought that intelligent life had to begin with beings who were inclined by nature to manipulate their environment, or to move through it for the sake of experience and mapping, with a large part of the motive force being either predation or competition. Evolution would then converge on certain closely related functions, and favor the sensory apparatus most conducive to these tasks. The experience of pleasure and pain, similarly, are evolved rewards and warnings about choices made in the pursuit of these ends. This isn't always the case, and it certainly wasn't the case with the Mycos. Their sensory world was as rich as that of the other Ta Sophonts, but it was also the most unusual. The chemical senses and the detection of chemical gradients formed the largest share of their Sensorium. Being partly photosynthetic, the qualities of light were important, but this light extended from radio into the attohertz range of the E-M spectrum, and this is little like vision as human beings understand it. The sources of radiation and their directions were perceived, but they didn't form any mental pictures. They sensed electrical and magnetic fields, orientation, movement, acceleration, proximity, encroachment, and challenge. Finely-tuned proxemic senses of spatial dominance, presence, and absence, seismometer-sensitive proprioception and gravimetrics rounded

out the bulk of their collective Umwelt. In terms of raw data processing power, the Mycos are the most impressive of the Ta. Despite their complete lack of neurons as we know them, the Mycos have a strongly emergent world of mental phenomena, and a consciousness that can reach down deep into their normally automatic metabolic and biological processes. They are also adept at synthesizing data from multiple senses to construct integrated models of the world. They developed with an innate aversion to boredom, so they were always either asking deep questions of their world or making up new worlds to ask questions within. The Mycos became the real mission specialists in the most complex of the Ta sciences, like celestial navigation, ecology, chaos theory, and systems theory. And they rewrote the source code for the next generation of Gizmos to quadruple their capacity.

Ta-R, Ta-Rex, Ta-Raptor, T-Rex, or simply Raptors to the Van, was the latest species added, only 75,000 years ago. It was the most Terran-looking of the five. Convergent evolution had given it roughly the appearance of a large saurian, Cretaceous-era Raptor, with big predator's eyes, but this similarity was only in outward appearance, which also included giving birth to eggs. Their brand of proactive, organic intelligence began much like the human, in beings inclined by their nature to both cognitively and linguistically organize their environment, run multiple vicarious trial-and-error scenarios, manipulate the world to meet needs, and move through the world for the sake of gaining experience, mapping, and planning both their hunting and escape routes. They were effective predators, with binocular vision and much of the same Sensorial array of Earth's saurian raptors, but they had more of the social behavior of primates. Play was a big part of their growing up. Like Ta-T and Ta-A, they were large-brained pedomorphs, spending a long time in childhood under the watchful care of parents, a characteristic which lends itself to the development of extended culture, but also makes it vital to watch the development of young minds, which get built up on the first basics learned. It was a lesson that humans had failed to learn, who still subject their young ones to cognitive processes and belief structures that impede learning throughout their lives. The Raptors had also learned to learn from their world's other life forms by growing clones as neural peripherals. The Spanish call this *aprender en cabeza ajena*, to learn in another's head, writ large and literally. And what they learned allowed them to incorporate several other imported sensory systems as neural peripherals into their own neural apparatus, retasking their multimodal neurons and neural modules. Like the original Ta, they were awaiting FTL technology before holding out much hope for interstellar exploration, even though they would, from time to time, consider, and then soon dismiss, building some generation ships. But otherwise, their science was well-developed, particularly in communication. The Raptors were an excellent and welcome addition to the Ta fleet, now taking twelve of the sixty-four ships in 768 Moravec capsules.

The Raptors understood perception and cognition as well as any of the Ta. They were avid collectors of sensory and conceptual metaphors and they understood that even the simplest perceptions are still inferential constructions, or that the given is really the taken. Since these are the basis of scientific models, it's always prudent and even wise to have some well-examined cornerstones. They were fully aware that perception leaves out details prejudged irrelevant, and they made a point of examining this. They have already borrowed Earth's story of Procrustes, which amused them greatly. They also knew that only insentient artificial intelligence could ever really separate cognition from affect. The additions to their Sensoriums gave them a much expanded repertoire of points of view, conceptual frames, and sensory metaphors. They can have a relentless and often infuriating practice of always making statements from two different points of view (known to the Van as Zindell's Plexure) which will frequently

be seen as double-walking, double-talking, outright contradictions or negations of each other. The Chan, Zen, Sufi and Daojia stories all entertained them well. This cognitive trait gave the Raptors an edge in grasping the paradox problems that bedevil many of the human sciences, like how could things be simultaneously time and space, or particle and wave, or mass and gravity, or electric and magnetic. It was really just a matter of building wider worldview on top of a more fully augmented Sensorium, and then a combination of synesthesia and ideasthesia.

The Raptors were sold on sending delegates to the Ta fleet the moment they learned of their work with a versatile "Swiss-Army" Sensorium and a technology that permitted secure and permanent erasure of any outmoded or useless "knowledge." Spooks would allow their delegates to phone home with new inputs. Evolution had conferred some inherited advantages on Raptors that Humans didn't get. As pure K-strategists, they had no overwhelming drive to procreate beyond their ecological limits, but simply responded to signals from the environment to stop breeding once sufficiently numerous. This may have been due to their planet's gentler nature, a milder and more stable climate, less tectonic activity, and fewer big rocks from outer space than Earth. The evolution of their world was much less frequently punctuated. Like primates, they enjoyed their mating behavior, and they too were able to disconnect from the procreative aspect and "fool around" all the year long. In this they were much like exceptionally clever Bonobos, right down to their forming peaceful, matriarchal societies. They had no religion to speak of, but they inherited an ethic that evolved with their repertoire of social skills. They had evolved an innate sense of the sacredness of it all, and feelings like gratitude, *mudita*, and compassion came quite easily to them. These all ran more deeply than cultural acquisition. But another big advantage they had was an innate intolerance for abuses of trust from others of their own kind. Betrayals of trust and violations of the peace were not a problem for them, since they also had no real innate aversion to cannibalism when this promised to be expedient, or result in a better world. The most violent and deceptive ones simply became food, and then the society moved on without what you might call hand-wringing or bleeding hearts. They had a very rich emotional life, for lack of a better term, and this richness integrated well with the way they perceived the world, which had a lot to do with their science. What drove them towards their intentional evolution was a healthy appetite for understanding, which in turn was the basis of their natural social hierarchy and Aristarchy.

The first six months of the Intervention saw the Ta exploring much of this world of ours on Pseudofoot. When Proxies are run on Gadgets instead of Gizmos, the Ta can operate several of these simultaneously, using a number of the customizable lobes of their expanded brains. They might be limited to a dozen or so when mimicking something as complex as a human being, but they could run hundreds of small faux critters with limited function. A Proxy in human form was called a Waldo if male, or a Wilma if female. They're simply called Proxies where formed as vultures, rays, dragons, or djinns, although the Van might also use terms like Poppets, Shifters, Drones, Surrogates, Zombies, and Golems. As galactic explorers looking at humanity, they used their Waldos and Wilmas to do anthropology and sociology. In part they were trolling for the best and the worst of humanity, with seemingly little regard for the middle and the mediocre. Sometimes they would be provocative and practice outright entrapment, sending innocent and defenseless-looking Waldos and Wilmas into tough neighborhoods to be robbed, raped, or rescued. Sometimes they would enter an aboriginal village as a tourist full of questions, eventually getting around to: "Who is the best person in this village?" or: "Who do I need to avoid in your village?" For these purposes they use Gadgets as the core of their Proxies. The Gizmos have enough

to do in helping the Van and their other sentient offspring to enact the Plan. The Ta had some shore leave accumulated.

The ancient Greeks told stories of Zeus and his son Hermes traveling through the human world disguised as poor vagabonds, knocking on doors, testing the hospitality of their human subjects. The best-known of these stories is found in Ovid's *Metamorphosis* as the tale of Philemon and Baucis, a poor, elderly couple who, alone among their neighbors, provided the best they could for these *agnosto theon* or unknown gods. The theme had become common by the first century CE and it found its way into the Christian book of Acts, which also speaks of temples to an unknown god, a notion which had other meanings too, but always concerned the hedging of bets. Hebrews 13:2 reads "Do not neglect to show hospitality to strangers, for by doing so, some have entertained angels unawares." Naturally Philemon and Baucis were richly rewarded by the gods, while their less compassionate and hospitable neighbors were dealt with more severely. The message got out to the people that it was wise to look twice (to re-spect others) because the stranger before you might be a divinity concealed. The myth served wanderers well over the years, and collectively they learned to reciprocate with a corresponding code of honor, to maintain at least the benefit of the doubt and the presumption of innocence. In this way, justice would find its way into the Plan. To humanity's credit, the Ta were able to locate many more "righteous men" and women than Jehovah had ever been able to find, even though they were still a minority.

The Ta would spend a lot of time living among extant hunter-gatherer tribes, and even among the few remaining uncontacted peoples in Bolivia, Borneo, New Guinea and the Brazilian Amazon. They would spent months on end going native among such groups as the Australian aborigines, the San bushmen, the Baka, the Ypik, the Mitsogo, the Sentinelese, the Babongo, the Spinifex, the Hadza, and the Inuit, just to name a few, and to not name a few on purpose. Here they adopted their forms to fit in as well as they could and not set off any firestorms of tribal xenophobia. Their facility with language and cultural acquisition was beyond anything human, but they still had to feign illness or some other distress to buy the full day it took to learn the unrecorded languages *in situ*, while they also studied the local group's hospitality rites and compassion. The primary focus of the study was sustainability: why had these people not run amok like the rest of humanity and what of this was worth keeping in the gene pool. There was much to be said for highly advanced culture and civilization, with sophisticated tech, and this was the true long-term sustainability, if the kinks could be worked out. But they still found much to learn here in the primitive tribal life, or they would not be investing so much time and effort.

Participation in the shamanic rituals of several of these native cultures, particularly those involving elucidogens and other induced altered states from drumming, dancing, fasting, or sex, was quite a bit more complicated for the Ta to experience through their Proxies. None of the Ta'n neurons, hormones, or neurotransmitters exactly matched those found in the human brain. The Proxies had no ability to uptake neurochemistry to their ships, but their sense of taste was finely calibrated to identify specific molecules and their many qualities. A couple of years before, however, a number of the Van had waxed quite enthusiastic about several psychoactive substances and the Gizmos could obtain or manufacture whatever sacraments were requested. We eagerly sampled most of them too, but with due respect for all that was at stake. Through their Glintnets, the Ta would be able to model fairly precise analog versions of the Van experiences in their own neural structures and to re-initiate them within the local contexts of these primitive tribes and their sacred rituals. Even the shrewdest of the native shamans never suspected a thing, which is almost as good as a Turing test for authenticity,

especially under the influence, where the faces of liars would tend to simply melt off. Shamans can be a little deeper than most people realize, especially when you can get them away from what the masses expect of them and get them talking peer-to-peer. The Ta claimed to enjoy these experiences immensely. Experience was what they had come for.

The Ta will withhold general public information about their activities in Proxy form for at least three years after Intervention began. They do, however, like to have a little bit of fun with the cryptozoologists by adopting some of humanity's most colorful mythical creatures in Proxy forms. Nobody's heard any new tales told of a gryphon, but there have been plenty of unusual sightings out at the wilderness fringes of human civilization, of bigfoot, yetis, elves, djinns, fairies, gnomes, menehune, mermen and their maids, trolls, unicorns and, at long last, dragons, ten to fifteen meters long, light enough to really fly and yes, breathe a little fire. The Ta settled on a compromise here, a couple of different species of the *draconis* genus. There were slightly Asian versions and slightly European versions, but both were somewhat nearer to each other than to the mythologies. That was a question of aerodynamics and being impressive instead of goofy in flight. Incident reports increased by about an order of magnitude, but despite a large number of reports from normally credible sources, they would continue to be dismissed, explained away as stress resulting from "the alien situation."

Part Two

Progress Report at I+20

This is the second of at least two dozen progress reports, to be made at 20-year intervals. All 300 of the Van who have committed to these reports are submitting their own accounts. These are to be taken as a collective, with no single report regarded as a definitive history. They're written for Survivor and Successor descendants. We changed civilization's nomenclature for dates now, since the lives and teachings of the Jews, Jesus, and Muhammad are now fast becoming irrelevant to the human future. The new point of beginning, denoted "I," is the hour of the northern hemisphere's Summer Solstice in the year our Intervention began, and roughly the Ta'n arrival. Now the southern hemisphere gets to start its new year more logically, when Sol begins its return

We're over a third of the way to our population goal of one billion now. We'd be much further along had we not eliminated so many infectious diseases, toxic pollutants, violence, and war, and added longevity and quality of life to the human population problem. There remains the temporary issue of age distribution, skewed to the elderly, and the need to draw elder caregiving services from the younger generations. We're doing all that we can there, but this will still linger for a few more decades. We've also created a temporary imbalance of the sexes, since such a disproportionate number of the *non grata* carried Y chromosomes. That couldn't be helped either.

Almost nobody's talking Apocalypse, Last Judgment, or End of Days anymore. Most of the world's classical religions are slipping out of existence, and none too soon either. Science is no longer so sure it has almost all of the answers. Our world is greening quickly, and our biosphere rebounding. Ice is already beginning to reform in the Arctics, but we still have a yottajoule or two worth of heat to get rid of. Before we learned of our purpose, our Gizmos posed us the question: "If you had a free, one-way, time-travel ticket for 300 years, and if you chose to go forward, would you expect to see more people or fewer people?" Most humans would have said many more. We Van all said far fewer, and most saw almost none of those better off, and with little culture or literacy remaining. We've changed some of that already.

Humans, both Survivor and Meh, will write of this epoch as well, we hope with very different perspectives. It's unlikely that the Meh will even now acknowledge that humans were parasites eating their world, breeding out of control, and consuming everything in their path. They are victims of Intervention, not failed perpetrators of a Holocene extinction. They might still maintain that there was no population problem, only one of unfair distribution of income and uneven distribution of food. Humans were all that mattered. Words like sustainable and stewardship were used to market the remaining petroleum reserves and forests. Just when they had grown able to free themselves from hunger, they began inventing new hungers. Any true necessity was bound to be misunderstood by a culture based on artificial needs. The fine word Economy had come to mean profligate waste. Success was only measured by the gross economic activity, not by goals achieved, and even that had failed, except to the extent that failure was expensive and therefore a boost to GDP figures. They could monetize the damage done. They were bankrupt but couldn't declare it, with such a massive debt that any requisite repudiation would only bring total economic collapse. In more ways than one, they'd given themselves far more credit than they deserved.

The Van had been amazed, but the Gizmos not "surprised," that the United States was still lumbering forward under its $35 trillion national debt, that more honest bookkeeping and PR would call a $200 trillion indebtedness. But it was perilously close to collapse at the point where we stepped in and brought the whole house of cards crashing down. Most of the world's national economies went down along with it, each to the degree they had been entangled. The big banks were all bankrupt by the time most of the *non grata* were gone. All loans were forgiven or defaulted on. All rentals were seized by their occupants. We maintained a good flow of useful information throughout the chaos, and we used our online channels to distribute credit and a universal basic income to any Meh or Fit found in need. That was scaled roughly at the US poverty line, and it maintained the flow of food, and the other most-basic goods and services. Some kind of work was usually required in exchange, but nowhere was more than three hours a day required. Most could earn twice this much by working up to six. Those without economy cars still found it difficult to get around.

The green movements had come too late and offered too little, and the greenest arguments for human restraint were still recast in terms of human self-interest. Life itself, to the great majority, had no value independent of its economic or emotional value to man. The much-assumed and wished-for techno-fixes were not going to meet more than a fifth of the challenges. Majoritarianism had run amok, but it served the ruling powers, who controlled the buzz words, the sound bites, slogans, and jingles, all that was needed to move the average and below-average man and his majority vote. For the most part at least, the people and their governments truly deserved each other. War would not be unlearned. The system needed enemies more than friends as the glue for social cohesion, and when they needed new enemies they found them easy enough to make. They needed excuses to keep the old flywheels spinning. To accelerate growth any less quickly was called recession, to slow down and think was depression. Insecurity and appetite were the fuel of the culture, just as our Earth's scarcest resources fueled that way of life. Most of those who are now Survivor had already learned that civilization as they knew it was not worth the cost or investment.

Human is as human does. If he really wants to be other than that, he will choose to do something different. Early on, humans had a rite called ancestor worship, and later dismissed it for all the wrong reasons. This was supposed to inspire them to be worthier to their own descendants, deserving of reverence and respect. Instead, they had gotten used to the idea that they would have to destroy most of non-human life, and nothing could be done about that. Most of them had no true sense of outrage there. The religious even wished and prayed for the end. How little they deserved salvation, however partial and harsh, but it was the remainder of Life on Earth that so desperately needed the rescue, not the great bulk of humanity.

Desert Colonies

Since the Ta can use their Eck Screens to pulverize and effortlessly mine any asteroid, comet, or planet, for any desired molecules or minerals, and then reconfigure those bits into any desired molecular arrangement, the Van will have at least 1000-year temporary access to a practically unlimited quantity of strategic materials and resources that are independent of Earth's reserves. This means unlimited wealth, at least to the extent that we choose to manage the scarcity of these materials. It's with this wealth that we'll keep the global economy functioning until it finds a steady state, one without unsustainable growth or resource extraction. When we first started brainstorming our Plan, one of the Van suggested a demonstration that involved harvesting an amount of gold equal to all that humans had mined in their history, a cube about 20 meters on a side, and then setting it down somewhere on display. This would have taken the Ta less than a day to collect. It also would have weighed about thirty times what the ground below could bear, so the humans would have watched in horror as history's greatest treasure sank rapidly through the earth's crust. The idea was nixed because of the threat of a subsequent fountain of magma. We had the trillions the Gizmos had made in the stock market, long since converted to strategic materials. And the Van had stolen a lot of old-style money from the ill-gotten gains of crooked politicians, corporations, gangsters, and other thieves, largely hidden in offshore and numbered accounts, and stashed around the world in caches and bunkers. We reinvested this in more durable forms before the national and local currencies crashed. When much of the stratified wealth turned to vapor, and the filthy rich went broke, we were then in a position to determine what human endeavors and talents merited the highest compensation. Our economic support or opposition to endeavors was largely proportioned to their environmental impacts. Net global impacts were cut by nearly half just from the elimination of *Non grata,* with their wars, and their rape of the world's resources. But that wasn't nearly enough yet. The better teachers and nurses would receive the biggest percentage raises, and this was vital, since both childhood and old age were about to take on a new importance as the human age distribution would shift uncomfortably for several decades. Conservation and reclamation efforts got big pay raises as well.

Our first major investment was in several large tracts of land, and much of this, rather counterintuitively, was in the world's most arid coastal deserts. Most of this land was purchased from debt-ridden governments, with an enforceable commitment to maintain three-fourths of the area protected in perpetuity as wilderness, or at least in an unmanaged state, and also to be given human access for ecotourism. Inholdings were purchased from private parties at well above market value, but the former owners were required to leave. This was six months into the Intervention, so that most of the *Non grata* who might have effectively opposed our objectives, or tried to steal their stolen wealth back, had already gone to their final reward, a pleasant little farm upstate, where they could at last run free. We acquired ten large coastal desert parcels in all, totaling more than a half a million square kilometers, with about 2500 km of coastline, meaning that the tracts averaged 200 km in depth from the sea. We bought these tracts in portions of the Southern Sonoran in Baja Mexico; the Sechura in Peru; the Atacama in Chile; the Namib in Namibia; the Sahara in Mauritania and Western Sahara; the Somali in northeast Somalia; the Arabian in Yemen and Oman; the Iranian in southern Iran; the Thar in India and Pakistan; and the Great Sandy Desert in Western Australia. Not only was our money of use to the local governments: once developed, we would also be a great stimulus to the national economies surrounding us. It was partially

because of this economic advantage, and partially out of fear of the forces that the Van could wield, that the twelve nations adjacent to us were amenable to another stipulation that these tracts would have self-rule and would one day secede and become sovereign Van territories.

For these projects, we imported and employed a population of around eight million of the Fit in all, recruited early on by way of the Ta'n websites. We set aside 35,000 square kilometers for their urban environment, which translates to about 230 people per square kilometer. This is more of an average suburban density, which we don't generally support, but this allows room for clustered urban development and plenty of room for food gardens, parks and open space. These ten cities took about ten years to build out and populate. They're prototypes, but they aren't molds. We tried to vary the design concepts, and not only with terrain. Eight million Survivor would only be 0.8% of our target for global human population, and we don't expect more than half of this to be urban. Towns, villages, hamlets, homesteads, and lonesome old hermits are still big parts of our overall Plan.

Beginning at I+0.5, as soon as the first *Non grata* Cull was complete and all of the world's combatant military personnel had been eliminated, the Gizmos sent Gadgets to the world's major military aircraft boneyards and naval graveyards. There they began to harvest materials from the wrecks, with some help from unemployed locals. The first round built a small number of harvester and recycling bots, and an equal number of engineer and builder bots. The builder bots were able to reproduce themselves and the harvesters, out of the scrap material, so their numbers multiplied until no more were needed. Then they turned to the real work at hand: converting these enormous storehouses of junk into raw construction materials. Little of this was wasted. We took most of the salvage we wanted from abandoned military operations, but only a little bit from defunct arms manufacturing plants, which got retooled and retasked for healthier programs. We wanted to leave the rest for humankind, since its unending and idiotic obsession with war had left it's general infrastructure in tragic condition. We won't even begin to enforce the shrinking of civilization's physical footprint until the human population has been halved to 4 billion, and that isn't expected for five more years. But we're nearly there now, and there's already much of the built environment that's been abandoned and sits begging to be salvaged. There were lots of ships that we just left drifting at sea, full of the still-grinning corpses of whalers, poachers, and unpleasant sorts of pirates. We announced their current coordinates on our websites and let the first comers be the first served. It would be obvious enough what they were not to do with these vessels. All sonar equipment capable of 100 db had been destroyed and cetacean mortality rates fell dramatically as a result.

Meanwhile, the engineers who were left alive on the ships of the world's navies, and in charge of the world's military aircraft, were instructed to get their boats safely to harbor and their planes flown safely back home, where the keys and pink slips were turned over to human representatives of the Van. Those planes, boats, land vehicles, and materials that were still in better shape in the military bases and shipyards received a more tailored treatment. Where they might prove useful for future oceanic research or transport, the ships and subs were stripped clean of their military functions and converted to peacetime use. But we would soon commission a far better fleet to be built, with carbon-hulled hydrofoils to run with the wind and eat sunlight for power. Most of the land transports, cargo planes, and passenger planes were spared to move our own people and cargo around the world, but the energy hogs were soon to be powered by new-generation algal biofuels. The fast, maneuverable, and ridiculously expensive war and fighter planes were scrapped as useless in peacetime, although we saved a few Blackbirds and others as keepsakes. There remained a lot of useful scrap

from both salvage and active yards. The materials, ranging from electronics to salvaged plastics and paint, were pulled and sorted. Most metal was melted down, molecularly simplified, re-alloyed, and reshaped for use in building new settlements, the new Stellar Fleet, and several of our other new projects in space. No metal proved a match for the Piping Hot Pizzas, and the Cold Breakfast Pizzas conferred a most salubrious temper, once the metal had its new new shape.

As the raw materials were completed, they were shipped to our desert colonies for storage and staging. Along with them came our new army of engineer and builder bots, while our harvester and recycling bots were modified for construction and loaned out to what remained of Earth's national governments to help with their long-overdue infrastructure maintenance and repair. Much of the infrastructure we had to build didn't need any human labor. Even before the first desert colony housing and manufacturing structures took shape, the first orders of business for the robots were building the power supplies, using solar, wind, and tidal, and then bringing water from the sea, desalinating small rivers' worth in volume, and distributing this across the development footprints. During the desalination process, we also used the Eck Screens to harvest various elemental ions and organic materials from the water. We then returned the brine to the sea, after diluting it with seawater back to harmless concentrations. We built wind traps for water collection, too, but given the proximity of the ocean, these were largely for demonstration, and for their aesthetic appeal as wind sculptures.

By area and volume, the largest part of our plan for the desert colonies called for construction out of glass. These structures would cover an area of 90,000 square kilometers, a full 72 percent of our allotted non-wilderness area. The majority of this would be in long, horizontal glass troughs, one to ten meters wide. There would of course be plenty of greenhouses and mirrored solar collectors too. We used three main kinds of glass here, simple soda-lime being the most common for the troughs, with tempered float glass wherever lids were needed, and borosilicate glass where we had temperature expansion and contraction issues. Obviously with all that sand, the supply of silicon dioxide wouldn't be an issue, nor would calcium carbonate, aluminum, or iron. Sometimes the sand was lacking in needed elements. We could use Eck Screens to sieve the seawater for all of the magnesium, potassium, sulfur, sodium, and boron we needed. We often needed to go elsewhere for titanium and lead, and on rarer occasions, barium, thorium, and lanthanum for specialty glass, but this was all that our recipes called for. Cooking these materials was an easy matter with thePHPs, as was quenching them with theCBPs.

We constructed most of the glass troughs to produce a number of photosynthetic products, all requiring atmospheric CO2, water, and our own nano-engineered microorganisms or Nemos. One of these produced an artificial wood by soaking up light and laying down successive layers of lignocellulose fiber until the trough was full. This happened at about eight times the rate of wood made by trees and produced a material that was superior in strength to the best of the engineered wood laminates. The Van call this Rocket Pine, a term coined by Alan Dean Foster for his fictional trees. Another product was a fine algal diesel biofuel, to power jets and trucks and recycle atmospheric CO2 in the process. We also made plenty of hydrogen gas and lignocellulosic ethanol. All eight of the Earth-native forms of microbial life were given various Nemo or nanolife forms somewhere in these new territories. The Ta used only one Nemo with a biological component that was completely alien to Earth evolution, adapted from a new eukaryote called Thelaria. The production of Nemos for export, in quantities from milliliter vials to tanker ships, was a big business that covered O&M funding for the desert colonies. Shipping ports had to be built. These structures were

integrated into offshore restorative aquacultural facilities, which would also calm the harbors by stealing energy from wave motion. Some of our other products create industrial polymers,pharmaceuticals,bioremediation slurries, pest controls,synthetic fabrics,nutritional supplements, soils enhancements, and other agents to accelerate seral succession. Many of these consume the waste materials from the rest of human civilization, imported on the tankers used to haul away the Nemos. We also make a number of cognitive enhancement pharmaceuticals, and defy any government to attempt regulation of their use.

One subspecies of Thelaria, the Nemo-fied alien eukaryote, when given a small electrostatic charge, has the ability to filter-feed on atmospheric carbon dioxide, and then spin out endless strands of carbon nanotubes, and it exhales oxygen. A second subspecies, with a different Nemo endosymbiont, works a similar magic with methane and exhales hydrogen. Taken together, these were our two main artificial carbon scrubbers. We integrated these into several enormous structures that spin nanothreads into potentially endless nanotube cables of various thicknesses. And we also produce graphene sheets in similar facilities, in potentially endless rolls up to 48 meters, but only with Nanotech. The plants producing and spooling the braided carbon are called Spinners, and those making fabric bolts of graphene sheets, whether one layer thick or a thousand, are called Weavers. The Van term for the set of Ta'n technologies using carbon allotropes is Callotropics. A lot of the atmosphere came and went through these "textile" facilities. It wouldn't be the whole solution to runaway atmospheric carbon, but it was a significant contribution and it had some of the world's most useful byproducts. Our target of 280 ppm of atmospheric CO2 will be achieved within the next 20 years, but the biggest component of the carbon solution will be *terra preta* and other forms of carbon returned to the fertile soil with regenerative agriculture.

A lot of big problems were solved with our little Nemobugs. The full range of their functions was staggering. The colonies make all of their own medicines. Some of the Nemos were put to work weathering the rock and desert sand into soil nutrients. With the plentiful sun, the newly freshened water, Nemofungus, and pioneer species of plants, fertile soils were made at accelerated rates. The tanks poured lots of waste oxygen back into the sky, too. Of course we would also use the tanks to recycle all of the waste products manufactured by our 8 million human colonists once they had moved in and settled. As efficient and organized as the many Nemo production lines were, the Van-assisted human farms, by contrast, looked a lot more like wilderness, tropically green wilderness, even though they rose out of some of the driest deserts on Earth. They took Permaculture and integrated rangeland management into new frontiers. The farms themselves did most of the work, once they had been helped to self-organize effectively. Many of the farms would form impressive prototypical demonstrations of new global agricultural programs that the Van were introducing, even though the climate was largely atypical of other places on Earth.

In the built environment, problems of cooling were often solved simply by finding more useful things for heat to accomplish, and then sending it there to do it. Gaining heat was seldom much of a problem, except seasonally in the cold deserts with their coastal fogs. Direct gain and salt-stored solar took care of most heating needs. The heat used for hard manufacture, and particularly of the metal, ceramic, and concrete building components, and all that glass of course, made use of the more alien PHP and CBP tech. While the Van want to help humans learn to do these things on their own, and learn to use their own resources in truly sustainable ways, that will have to wait until the Earth's badly damaged biosphere has recovered some more. This recovery still has a much higher priority than the survival of humankind.

Most employment or working positions were first announced in the form of help wanted ads published on the Ta'n websites. These positions always paid well, at least double the going rate for the equivalent effort and expertise in private and public sectors, or quadruple in the case of environmental conservation. This of course was an intentional brain drain, to draw out, identify, and captivate the best of humanity and those hidden Survivors who had somehow escaped our notice. It should be no surprise that the Van are fairly elitist in our hiring practices, even for so-called menial jobs. Future desert colony employees were among the first to have their fertility restored. The fertility of any children they brought with them would need to wait until their schooling was complete, and it wasn't certain that these children would be qualified. Any character they demonstrated had to be their own. But it must be said that the schooling they got in these colonies was a big head start: we were also ultra-elitist in hiring the best teachers. Education of the young will always be our highest human-affairs priority. We now have over two-hundred million of the Fit on our payroll or under contract.

The Final Frontier, For Now

The final frontier for humankind, until it becomes a more responsible adult, stretches out into space about half a light year, 4.7 trillion kilometers, midway into the Oort Cloud. Neither Van nor Ta will allow them out beyond this stellar playpen. And the Van will be stuck here with them, as their supervisors. That's the commitment we made. But there will be a thousand years' worth of lessons and discoveries here, and still more in the unexplored and recovering Earth and its oceans. The perverse human impulse to weaponize new discoveries isn't the only reason that the Ta won't share their science. The long process of discovery, which includes the unlearning of much-cherished errors, will be vital to human cultural evolution. Humans will also need to incorporate some new sense modalities in order to understand what's really happening in the cosmos: current sensory arrays are missing some basic conceptual and sensory metaphors, and the math that's used to work around these deficiencies can be misleading, as much of the wilder metaphysical speculations in science will attest. Human space programs have always been fully justified by their spinoff science and technologies alone, so much so that knowledge of space itself has almost been a bonus. That these programs enabled so many fantasies of departure and creation of new worlds might also have been a good thing, except when that became an escape from the mess and destruction that might then be left behind. There were some paradoxes, ironies, and mixed blessings in this. Humans will not escape the consequences of their behavior: this will be a big part of its growing up, as opposed to going extinct or being exterminated.

With that said, the space program the Van are now helping to establish will still take humanity to places well ahead of its old schedule, except for the colonization of Mars. Even the crudest generation ships were many centuries away, and even those were sketchy in assuming that enough of civilization would survive the 21st century. Humans have now had a full ten years with Van tech to explore the red planet in depth and in person, but that ends next year. Sadly, the most exciting things that the planet had to offer was some out-of-this-world landscape photography and a little bit of unfamiliar, but not unpredictable, geochemistry. New Mars is by far the most impressive of the Ta'n projects here, and also the most ambitious project that they've ever undertaken. Old Mars is now the main ingredient in a much larger cake. The Ta saw the potential shortly after arriving and went to work right away, accelerating the planet Mercury into a higher orbit and onto a collision course with Mars. Mercury is soon to become the slowly spinning metal core of a new, larger planet, giving New Mars some substance, gravity, and an all-important magnetosphere, so necessary for a biosphere's defense against death rays from outer space and its very own life-giving, killer Sun. The combination of these two worlds is still a long way from adequate. Shortly after the two combine, most of the asteroids in solar orbits, presently waiting in a long queue now, are set to add a new layer of mantle. And still this won't be nearly enough. Those only add up to half the mass of the Moon. A period of heavy bombardment will continue with Jupiter's Ganymede, Callisto and Io; Saturn's Titan and Rhea; Uranus's Titania and Oberon; Neptune's Triton; the poor defrocked Pluto and his pal Charon; Makemake, Haumea, Eris, and Sedna, all on their way to a rendezvous now. But even with all that, they are only bumping the size of Mars by 243% to 26 percent of Earth's mass. Wet Europa has a special place in the plan as the new analog of Luna. The topping of this recipe calls for half a billion cubic kilometers of water, largely from aerial bombs now *en route* from the asteroids, Kuiper belt, and the Oort cloud, and 1.5 trillion tonnes of mixed-gas atmosphere, with the Nitrogen

pulled from gas giant ammonia, oxygen from asteroid and Oort cloud water, and an extra dose of CO2, courtesy of the lovely Venus, because in Mars orbit global warming is a little more wanted. Aside from blowing off the entirety of her toxic atmosphere, the Ta will be leaving Venus alone to cool off and calm herself down.

The Ta are going to be laying down the layers of this new world carefully, blending materials, burying the toxic elements, heating things up with impact forces, and cooling them down again with Kuiper belt and Oort cloud Chill. Most of Mercury's core is already molten. Clearly this is going to need some time to settle down, but with planning and intelligent design that the Earth never got, the Ta estimate that Terraforming can begin by the end of this millennium, and habitation by the end of the next. It will be worth the effort to gain a new and truly habitable world, one with a breathable atmosphere. The Ta claim that the living, thriving worlds are harder to come by than humans might think. We hope that watching all of this take place will give humanity a better sense of context in deeper time, some context more sane and rational than the two seasons until the next crop, or the two years to the next election. Patience has never been a human strong suit. As Dame Rebecca West once wrote, "If the whole human race lay in one grave, the epitaph on its headstone might well be: 'It seemed a good idea at the time.'"

The Beanstalks were next. The notion of taking an elevator to space has fascinated humans since 1895, when the Russian Konstantin Tsiolkovsky saw the Eiffel Tower and imagined one reaching the geostationary orbit at 35,786 km above sea level. Otis had already created the Safety Elevator in 1852. This "Orbital Tower" would be a structure in compression, and no material can be imagined (not even by the Ta) that would work. Since 1959, human futurists have entertained a different concept (suggested by Yuri N. Artsutanov) that involves climbing a cable, held in tension, stretched between a fixed equatorial base on land or at sea, and some sort of massive anchor in orbit somewhere above the the geostationary circle. In 1966 this was called a Skyhook. In 1975, Jerome Pearson polished the design a little and specified a cable tapered towards both ends and fattest at the GSO to minimize cable weight. In 1979, the idea was popularized by Arthur C. Clark in *Fountains of Paradise*. The Van have taken the term Beanstalk from Robert Heinlein's 1982 *Friday*, because Van are lighthearted folk and we like adopting these sorts of names.

Until the 21st century, no materials were strong enough to even theoretically meet the tether requirements for weight and tensile strength. Once carbon nanotubes were a reality, engineers began to perform proof-of-concept experiments and hold regular design contests. Some companies were projecting construction feasibility by mid-century, roughly now. Such optimism wrongly presupposed that human civilization, with its growing resource overconsumption and its perpetual war, was more sustainable and stable than it really was. But also, until our Intervention, nobody could manufacture the nanotubes in sufficient lengths to avoid redundant overlapping and excessive polymer resins to hold the tether assembly together. These added both weight and vulnerability to the tethers. But our new Spinners could now turn atmospheric CO2 and CH4 into braided cords of continuous carbon nanotubes 60,000 km long. Further, the Ta also have the Nanotech to repair compromised nanotubes in place. In the meantime, several new materials as strong and stronger were added to the possibilities, like graphene ribbons, boron nitride nanotubes, linear acetylenic carbon (carbyne) and diamond nanothreads. The Ta have a bit of a love affair with Callotropes (carbon allotropes) and they've learned of a few that humans have not, plus the alloys. Advances made in much stronger sheet products, like graphene and cellulosic nanocrystals, assisted greatly with lightening the overall facilities while still adding strength. The improved tensile strength let us afford a triple strand redundant cable

system, such that any two cables could hold things safely together while the third strand was being maintained or repaired.

The GSO, or Geostationary Satellite Orbit, is a circle above the equator with a finite width and depth. It's been parsed by international law, with segment lengths or slots limited in length by the effect of one technology on another. In 1976, eight of the nations lying directly beneath it signed the Bogata Declaration, claiming property rights to the segments directly above Brasil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, and Zaire (now theDRC). This declaration and claim to rights wouldn't be recognized internationally until the Van stepped in fifty years later and decreed that back royalties be paid. This helped the Van to ease the process of acquiring a number of parcels of land for our future Beanstalk base locations. At prices no debt-ridden nation could refuse, we purchased several tracts of land where the equator met the shoreline, on Isabella Island in the Galapagos; in the Manabi Province of Ecuador, on Mexicana Island in Brazil, in Estuaire Province in Gabon, in Jamaame in Somalia, in the West Pasaman Regency in Sumatra, in Pontianak in Indonesian Borneo and Bontang City in Indonesian Borneo, and on North Maluku Island, Indonesia. Only our base in Somalia was even close to one of our desert colonies. The tracts are all close to 10,000 ha in size. We only expect to be using three of these in the short term, however, in Brazil, Somalia and Borneo. We also acquired rights at sea from the Republic of Kiritmati to a spot 1.7 degrees south of Christmas Island, at 156.15 West. The sea base here required anchoring just over 2.6 km down, but this was no problem for Ta tech. We're now using wave and tidal action to generate power and have built a 2.6 km deep ocean research facility below the base, as well as docks and a floating airport. We're providing all four of the bases with marine docking and airports, but with highways only to three, of course. While we seized any necessary GSO slots from prior claimants, these were amply compensated, and we replaced their lost facilities and all their old Sputniks.

While the Van, Gizmos, Gadgets, their robots, and our well-paid human workers were busy constructing the four base facilities, the Ta were doing all of the heavy lifting up in space, preparing the four counterweights. They moved heavy iron-nickel asteroids into their final geostationary positions 46,782 km above sea level. This particular altitude was chosen because the counterweights would be melted, shaped, and remodeled into orbital stations or platforms, facilities, and spaceports for the new Stellar Fleet. The orbital velocity of spacecraft leaving these counterweight stations would be 3.87 km/s, sufficient to reach the Sol-Terra Lagrange points, as well as Mars at perigee, without expending much fuel. Sol-Terra is Van Babble for Sun-Earth. Cargo dropped off sooner, at the GSO, could depart the tether in stable geostationary orbit, at 3.07 km/s, and accelerate or decelerate from there. Neither departure velocity approached Earth's escape velocity of 11.186 km/s, but the new lightweight ion and E-M propulsion systems could take things from here, and there were always the old-time slingshot assists. Station-keeping thrusters were mounted on the counterweights to fine-tune the circular stationary orbits against perturbations by solar, lunar and gas-giant gravity, and solar winds. The platforms are also armed with GRASER (gamma ray laser) bolide guns to protect the cables below from collisions with stray space debris. The human debris was long gone, either blown to smithereens or deorbited on Day Two.

The tether's design still had to address such forces as lightning, wind, hurricanes, typhoons, oscillations, coronal mass ejections, and linear thermal expansion. But man, can those Gizmos think and solve problems. The tether was constructed around a pilot thread held in tension with minimal loads. The Ta did the initial stretching, sparing us that logistical headache, but they also explained how it could be done in the future,

once they were gone. The Van use the term Spiders for the cable Climbers. There are two types:IBS, or Itsy Bitsy Spiders, for passengers, andBAS, or Big-Ass Spiders, for heavy freight. The Spiders climb and descend at 222 kph in the lowest 100 km through the atmosphere, then they gradually open up to as fast as 6156 kph, or Mach 5, reaching the orbital platforms in just under 9 hours. The cabins are rotated 90 degrees at the higher speeds, since the fast rate of climb accelerates the Spiders laterally or orbitally at 0.3g, a bit less than Martian gravity and almost double the Lunar. Accommodations are as non-egalitarian as human travel has always been: there's first class, business, and carry a goat or chicken on your lap. It's not really that bad, but you do get what you pay for. It's still a question of the finer foods versus food-type product, leg and elbow room, decent in-climb and descent entertainment, and the quality of the view through the windows. There's always some accommodation for adequate sleep. Whatever the cost may be, this is orders of magnitude cheaper than chemical rockets, even given the cost of the Beanstalks, but this assumes that lots of humans would be spending lots of time in outer space, and coming or going thereto. Powering the climb was a good design problem for the early human engineers, but our tech made it easy. We drew our power through strands in the cable itself and used good old-fashioned electromagnetism to hold the Spiders to the cables for traction and drive the wheel-free cars up. Descent uses regenerative braking. The power being used isn't simply working against gravity, as it also has to accelerate the Spiders and their contents laterally to 3.87 km/s. This means that sideways acceleration can be felt as the acceleration of gravity diminishes. It can be a little disconcerting at first, but the chairs are oriented in one direction for this reason. In short, the Beanstalks are essentially rail guns or mass drivers on a wire. More durable payloads with enough g-force tolerance can simply use straightforward rail guns or mass drivers and be shot into orbit.

The Stellar Fleet

Over the first two post-Intervention years, we gradually revealed the extent of our new space program. Humanity, of course, was still widely thinking about rebellion back then, and trying to plan our defeat, until about six months in, when a tenth of the human numbers were gone by our hand, and many more by suicide. So many couldn't wait for the Slow Rapture clinics. This calmed down a little as people began to notice that violence and crime were nearly gone now, and some even noticed the environmental benefits already. When the plans for New Mars were shown viable, most of the talk of rebellion went dark. It became less obvious that Collaborators with the Van must be regarded traitors to humankind. We quickly became the world's largest employer. We paid well, and in any specie of the worker's choice, often in strategic materials, or Credits and Cents for their purchase. We maintained free-floating exchange rates between the materials. The national and virtual fiat currencies, based only on thin air and confidence, didn't do very well against our more serious money. By design, our hiring effected a significant brain drain in the world's remaining tech industries.

With the salvage from military hardware, we had soon built a fleet of nearly a thousand spaceships, and began to recruit and train the few thousand Yuris who would pilot them, and the Scotties, aye, who would maintain them. Chemical rockets were seldom used anymore, except in small jets to adjust bearings and keep stations. A mix of ion and E-M thrust was the new norm. In theory, all reaction drives, including the ion drive, might be weaponized as some form of gun. But this would be an exception to the Ta'n rule of withholding all weaponizable tech from humanity. Acceleration and deceleration were almost always between 0.9 and 1.1 g, providing a comfortable artificial gravity in the process. A ship sojourning from A to B would accelerate to (A-B)/2, flip, and decelerate back again. Local trips to L4, L5, and Mars at perigee, would only take three days, with a top speed of about 2.28 million kph. Even on trips to the Kuiper belt and Oort cloud, the ships would never reach the Ta'n IBV of 0.4c, beyond which unseen hazards become a problem. All ships are armed with lidar and GRASER guns, as even a small grain of sand at interplanetary speeds could be devastating. Only the Ta would use their Eck-based direct energy, matter, and anti-matter conversion, and, except for their personal projects, they would only use these in emergencies, or to avoid any needless resource consumption prior to achieving full ecosystem repair.

The fleet ships come in various sizes. The smallest shuttles hold a Yuri, a Scotty, and four passengers, each with a few steamer trunks of luggage. On the shuttles, the Scotties double as Sulus, but the larger boats all get their own Sulus so the Yuris can do more than pilot the boat. All of these Van terms are gender-neutral, and women drivers are well represented. The largest transports can haul a sphere 48 meters in diameter, or any shape that can fit within that. The dimension is a design habit of the Ta, just a Ta'n adjacent possible, deriving from Warp Bubble maximums. The skins of the ships all have at least a minimum of radiation shielding, usually with a woefully thin layer of lead, combined with modest magnetic fields around the hull. But even the shuttles have uncomfortably small, multi-person, lead-lined Coffins, that are used only during the stronger storms. Farts happen. Larger ships all have larger safe rooms. Since all the old laws of physics still govern the forces needed to accelerate mass, the ships in transit still need to travel light and their passengers are always at some risk of radiation exposure. All of the larger, more stationary base facilities offer protection levels equivalent to sea-level on Earth or better. For safety, the ships only have Ersatz windows, vid screens depicting the great outdoors. The Van took the term from Philip

Dick. These allow more effective radiation shielding. They also allow zoom magnification, enhanced views across wider bands of the E-M spectrum, and can add informative overlays to the image.

The most important of the Ta'n Sputniks took up residence in the ten Lagrange orbits related to Sol, Terra and Luna. In a few cases, they unseated a number of expensive, but less impressive human devices. Some of these could be moved to Solar or Earth orbits. We aren't censoring any of our findings, so nobody loses here. The Van use the terms S-T or Sol-Terra and T-L or Terra-Luna for the Sun-Earth and Earth-Moon pairs. The four Trojan points, S-T and T-L 4 & 5 are all occupied by the Tube Towns, large orbital habitats described a little further below. All of the Ta'n Sputniks have modest quarters for human occupants, and all have artificial gravity. Except for the Tube Towns, this is provided in Dumbbells, tethered pods in a 2RPM spin. The T-L-1 Lagrange region, in between Terra and Luna, is used for climate observation and lunar activity monitoring. The T-L-2 region holds a 10,000 hectare radio telescope array that's shielded from Terran interference. T-L-3 has little more than communication relay links and orbital stabilizers.

Sunspot, the facility at S-T-1, carries on the venerable traditions of SOHO and the gang, monitoring the Solar winds and giving the world advance weather data from 1.5 million km out. The Ta were amazed than we were that humans had done so little to prepare for large CMEs, especially since the power of the 1859 Carrington event was a known quantity, and 1989's tiny reminder was part of living memory. Not even the Ta could make an umbrella to resist a storm like that, but they did provide good local shielding for all the important Sputniks and Orbitals. The Van implemented a plan to interrupt the global power grid at frequent intervals with fuses and breakers, and demanded that a lot more spare transformers be kept on standby. We mandated this a year post-Intervention, and five years later the grid was a lot more secure. Gradual decentralization of power supplies from renewables offered some greater security too.

Bugeye, the complex at S-T-2, was astronomy's wet dream, at least as far as the UV to IR wavelengths can see. The X-ray and Gamma ray observatories are located on the ends of the Lunar Tube Towns. The James Webb got to enjoy a few years of post-Hubble glory, but now it just makes Daguerreotypes. Like its namesake, Bugeye is a large compound eye, with 36 compound mirrors, each 48 meters across, all held in concentric rings of 6, 12, and 18 mirrors. Each to all of these mirrors can detach from the array to work independently, or any number of them can be combined for interferometric observations. This amounts to 14,000 Hubbles worth of vision. Because the Terran umbra ends at 1.4 million km and theS-T-2 point lies centered at 1.5, the unprotected site is still exposed to a ring of the Solar disk and a great deal of coronal light, but the Ta set up a 500-meter sun shield between Bugeye and the Earth. This keeps all of Bugeye's instruments below 50 degrees Kelvin, and generates sufficient PV power to run the whole operation, but also requires carefully aimed jets for station-keeping against the still-significant solar winds.

The Ta also positioned six Scout sentries a light year out from Terra, at the tips of the XYZ axes. These were primed to monitor galactic and other cosmic events, especially dangerous ones like GRBs, but also those of interest to Bugeye and the other scopes. None of those events would be traveling FTL, so the Spooks would give our world the early warnings and heads-ups we'd never had. Since Spooks can't broadcast, they all communicate with a single monitor on one handle of the S-T-4 Tube Town. Also for early warning, the SOS, or Son of Sunspot (pronounced 'sauce') orbits at S-T-3, on the far side of the Sun from Earth. This is the least stable of the Lagrange points, the most susceptible to getting perturbed, so it uses plenty of fuel for station keeping. The SOS mission is to keep an eye on the far side, like Sunspot watches the near. While Sol

can't really be said to have a shady side, it's still a good idea to keep a continuous and ever-watchful eye on what it might be up to. Signals are relayed to both Earth and Sunspot through the Tube Towns at the S-T4 & 5 Lagrange points.

We began building our four Tube Towns, or Lagrange Ships, about eight years into the Plan. There have long been similar structures in fiction, going by several names: O'Neill colonies, McKendree cylinders, Bernal spheres, Stanford toruses, bubble worlds, spun cylinder space stations, and can cities. With much Ta and Gadget assistance, they only took twelve years to grand-opening, or turn-key completion. Construction required massive quantities of spun and woven carbon allotropes, and that meant waiting for the spinners and weavers to work their magic on Earth's overabundant atmospheric carbon dioxide and methane. We wanted to reclaim carbon from both of these gasses in the right proportion to give us both oxygen and hydrogen for fuel. We had what we needed here by the tenth year, and by then the Stellar Fleet was ready to move the workers, bots, and materials around. A great deal of raw materials and prefabricated parts were hoisted into orbit by the Ta, since humankind was still living too near the limit of its renewable energy capacity and rocket fuel was such a waste. But the Beanstalks would soon change things.

The ships were constructed in sub-lunar geosynchronous orbit for convenience, and then moved to the L-4 and L-5 Sol-Terra and Terra-Luna Trojan Lagrange points. The Sol-Terra points are about 150 million km from Earth, about the same distance as Mars at perigee, so average travel time from Earth is only three days at 1g acceleration, to 2.28 million kph and back. The Lunar ship "points" are more like regions due to Solar gravity, but on average they are as near as the Moon and a six-hour flight from the counterweights. Obviously, the Lagrange ships are meant to orbit in place, being far too massive to move around without Ta technology, but they are only meant to serve as research labs in space, and at most as "practice" generation ships. Even with current Ta tech, nothing this size will ever travel FTL inside a 48-meter bubble. The big ships can move, or rather, lumber away from their default L4 and L5 positions, but only in emergencies. They have enough modest propulsion to move out of the way of any free-range asteroids and comets not eaten by New Mars, and to turn minimum profiles to face occasional CMEs, CRBs, and other cosmic insults from further out in the galaxy and beyond.

The main cylindrical body of each ship is 10 km long and 460 m in diameter. The outer shell is 6.5 m thick and composed of inside and outside layers of Callotropes, largely in tension. Just inside each shell is a 2.5 cm layer of lead, and the remaining gap is filled with liquid water, about 0.1 cubic km each, stolen fromKBOs. The water circulates solar heat between the sunny and shady sides, and acts as a radiation shield in concert with the lead. Together with an artificially generated magnetosphere, and a superconducting outer coating of paint, these several layers offer shielding roughly equivalent to Earth's surface protection. But to complete the defensive array, there are six GRASER bolide guns mounted on the cylinder's ends, ready to make some smithereens of malintentioned stray rocks or micrometeorites. A minimal level of Nanotech also allows the shells to self-repair in case anything gets through the gauntlet.

The cylinders are normally aligned perpendicular to the sun and rotate at two rpm to provide normal Earth gravity at the 447 m diameter, without a debilitating Coriolis effect on the human inner ear. But the cylinders are three stories inside, or three concentric tubes. The inner two have floor diameters of 402 and 358 meters, giving artificial gravity of 0.9 and 0.8 g respectively. The outer floors have high, 21-meter ceilings, while the inner tube has a lofted space with some zero-gravity facilities in the center, both scientific and recreational. Combined, these three floor levels offer the

inhabitants 3792 hectares of floor space. In addition to the main cylinders, the Tube Towns have non-rotating, zero-g facilities at either end, like rolling pin handles, both sprouting photovoltaics, fiber optic light collectors and Stirling engines. These ends are busy little hubs of activity in their own right, with fleet docking, airlocks, communications, X-ray and Gamma Ray observatories, and some more zero-g industrial science and industry. There are also a couple of hundred-meter long outrigger rings towards the outer cylinder's ends, larger in diameter for higher-g experiments, athletic training, and a compensatory balance for those spending much time in the inner cylinders.

The Tube Town design goal is similar to that of generation ships, lifeboats in the event of devastating Terran catastrophes, and lab- scale self-sustaining ecosystems with the minimal inputs available in space, which are mostly limited to energy. Similar research was begun by humans on Earth with the old Biosphere II project, which attempted zero material and nutrient import but required a 5 mw energy input for its modest 1.27 hectare facility. While this early experiment failed to meet its ambitious design expectations and was subsequently much scoffed at as pretend science, it proved invaluable as an education in the scope of human ignorance, and this alone fully justified the cost. Much of value was learned here. Arrogance is hard to get rid of. To sustain itself, agriculture was a vital part of Tube Town design. This exploited both hydroponics and conventional crops grown in rich soil environments. Like the Biosphere II, several ecotones are strategically arranged, but the intricate weave of edge effects are more carefully planned here.

Each ship carries a design load of ten-thousand crew, about 2.5 per hectare, as well as visitor accommodations for two thousand. The populations are clustered into several smaller villages and communities, almost never more than 128 in population, and more often only thirty-two to sixty-four. As with the Van island, population nodes are separated by plenty of greenbelt, often full of children at play. Ten thousand doesn't exhaust the carrying capacity of the ecosystems. In an emergency, they could carry many more than this, but we're slowly teaching Survivor that optimums and maximums are not the same thing. It's been a difficult and costly lesson for humans. There is room to live and breathe up in these high-tech canisters, and even some room for something like nature and wildlife.

The Ta directed the construction of our three lunar bases and, with Gizmo, Gadget, and much robot assistance, performed most of the heavy lifting, or heavy digging in this case. There isn't much in the way of emergent facilities up there, except where access to the surface is needed. Most of the habitat is in Prairie Dog Colonies, complex mazes of burrows and dens. The typical burrow is eight meters wide by three high, with double-loaded corridors, and at least five meters below the lunar surface for radiation shielding. The den sizes vary with use, in one case for an auditorium seating a thousand residents. The Gizmos took most of their design cues from the posh underground doomsday bunkers that the ultra-rich had constructed on Earth, and in fact, they stripped several of these for furnishings and equipment, since the ultra rich had already lost to the invaders and those would no longer be needed. Once the underground mazes were excavated, or mined as the case may be, the walls were fired into ceramics, with heat from the PHPs, and once cooled, further sealed and insulated with at least 20 cm of rigid foam insulation. This is because cooled meant back down to -123 C at the poles and -73 C at the equator. Moon dust was also turned to ceramic and lunar concrete wherever traffic occurred on the surface, since this nasty stuff is trouble wherever it goes or gets tracked, or even gets looked at sideways.

There were still laws on the books that said we needed permits from the governments to build lunar colonies, or even to undertake a lunar expedition. We never applied, and

we did our own building inspections too. The North and South poles were the most logical place to site the colonies. There you could reach fairly permanent darkness by descending into the bottom of a crater, and some fairly permanent daylight by climbing up to the rim. At the North Pole, called Santa's Village, the Peary Crater proved useful. Where no perfect crater was found in the South, the Ta just made one. Craters were also the best places to mine, since subsurface materials were more exposed. The discovery of lunar water at the poles was more exciting before we had the Ta to snag and melt a few asteroids and comets. But plenty was right there for the taking. Some of the water was used to make oxygen for the colony atmosphere, and hydrogen for fuel. The native nitrogen was pretty scarce there and imports were needed, and carbon too. Santa's Village is by far the largest of the three complexes.

All of the bases have Carnival Rides or Rotors, centrifugal rings where colonists can periodically reacquaint themselves with higher gravity and regain some of their muscle and bone mass. Two of the facilities have Cyclotrons, round tunnels with maglev passenger cars that glide silently in circles, providing .9-1.1g of Artgrav. The equatorial base only has a Dumbbell centrifuge. For longer stays on the moon, at least two hours of this every day is the recommended minimum therapy. You don't want to get too accustomed to 1/6 g if you need to return to Earth and hit the ground running as a functioning being. In fact, you don't really want to get accustomed to living on any planet but the Earth, and this turned out to be one of the best reasons for building the colonies and for populating them with *Homo survivor*. It got the people asking whether it might not be wiser just to quit destroying the Earth and assume the responsibility for keeping it a more pleasant place to live than these fucking holes down deep in the ground up on the goddamned Moon. Humans had long been told by their own best and brightest that they already lived on a great generation ship. Now they were being told that they had to take care of it.

The Ta constructed a couple of big fission reactors on the moon, using most of the nuclear material they had confiscated from the fools on Earth. There were about two million kilograms of enriched uranium and separated plutonium that Earthlings now had hanging over their heads in a much better way. These reactors were operated by robots and powered most of the lunar operations, even when solar was available. Cooling wasn't a problem wherever there was infinite space or shadow, or the cold, cold ground. Some energy was Narrowcast as microwaves to PHP disks on colony surfaces, and then conducted or convected as heat into the air circulation. Most of the energy was used in lunar mining operations. This was the primary function of the equatorial lunar colony, which suffered through long hot days and bitter cold nights. The population here was mostly robotic and supervised by Proxies, although it normally held a human crew a couple of dozen strong. The mining operations are mobile and the preference is for machines to circle the moon once a month on a network of roads, following the less extreme twilight weather around, then returning to base four weeks later. Besides the base, there are three other material drop-off stations, where refined materials are fired into lunar orbit from E-M railguns, to be collected there by the fleet. He-3 was also a hot commodity. Humans were introduced to a warm fusion tech using this and D20.

Remembering Community

Over the last nineteen and a half years, we've encountered no less than 73 "Angry Villager"events, a rate still far below the more than fifteen thousand we saw in the first six months. They were small-to-largish mobs, marching towards suspected Van enclaves, with or without the torches, but usually armed in some manner and charged up with righteous indignity. Only three of the mobs got it right, but wrong or right, participation in any violent mob rule event was war, and war was no longer allowed. Participants were deemed*Non grata* on the spot and terminated with prejudice. We've expected and tolerated peaceful protests, and petitions of collectives for redress of grievances. Those will always be rights. But the xenophobia has to end. Many of the targeted groups would have been slaughtered just for being a little different, or having their own thoughts. It's important to us that the remaining Meh and the whole of the Fit fully understand our need to gather and live in the small community lifestyle, and our wanting to encourage this more globally.

When the Gizmos first arrived here, they knew little of Earth and humankind, beyond what they had learned from decades-old broadcasts intercepted by the scouts years before. In a few days of deceleration through Busy Space, and a couple of weeks in Earth orbit, they primed the first of their knowledge, copied the primitive internet, and uploaded the complete available digital database of human civilization. The printed database, including libraries, courthouse vaults, and private papers, took only a few more weeks. To our delight, that process also "unearthed" and decoded long-buried scrolls and records like the ones that were lost in Alexandria and the fires of Qin Shihuang. By the time they were ready to harvest human stem cells and create the Van, along with our non-human cousins, they'd had more than nine additional years to decide on how to culture, modify, conceive, gestate, and cultivate us into adulthood. The Gizmos are mighty impressive at learning curves. Their plan for the first of three phases of our childhood was composed out of averaged optima, or success stories.

The necessity of raising all three thousand of us on a small island required more cultural uniformity and standardization than any long-term plan for the future of Survivor and Successor culture would want. This was known to be less than optimum, but it was decided to raise us in only modestly diverse cultural clusters, a hundred little communities averaging less than 32 Van in a pod. The biggest difference between groups was in the third language being spoken at home. With our Gizmo parents and our little practice siblings, the Poppets, we would seldom have more than a hundred beings in our individual villages, which all sat within a mesh of greenbelt and nature. It wasn't until groups of us began moving out into a larger world that more diverse community forms were tried out. Most of these, like our private schools, specialty camps, ashrams, monasteries,maritime crews,and orphanages, were nothing more than disguises. Community is such an important part of the Ta and Van plan for the future of *Homo survivor* that it merits discussion here.

After the first six months post-Intervention, after most *Non grata* were gone, after war and ecocide were prohibited, after the bullies, liars, poachers and thieves had met justice, and after the mass sterilizations, the Van didn't take many more heavy-handed actions, or make firm decrees with heavy hands behind them. After these, our functions were largely advisory and facilitative. There were several exceptions, issued either to protect the biosphere from the activities of humankind or to protect*H. Survivor* and their children from the actions of *H. ignoramus*, the Meh, still many-too-many.

We issued the Six Mandates to standing human governments and to any groups preparing to constitute new ones. These were their headings: 1) Governments are

constituted by groups of sovereign individuals, who delegate or deny specified powers in order to secure the rights they choose to claim. Sovereignty lies only in individuals and is only surrendered upward as delegated power, never granted downward by entities not alive; 2) All corporations, including governments, are nothing more than legal fictions, and not persons, and as such can possess neither sovereignty nor rights. Corporations may not support any candidate for public office, directly or indirectly. All delegated powers and privileges will be fully revokable by the sovereign people who constitute or charter them, upon violation of any of the terms of charter; 3) There will be at all times be a separate branch of government, answerable solely to the people, with absolute power over the government and other corporations, and charged with the enforcement of the terms of constitutions and charters. This branch has the power to nullify law and remove both elected and appointed officials from public office; 4) Individuals will be presumed equal in dignity, rights, privileges, and opportunities, regardless of race, sex, sexual orientation, economic status, age, or disability, subject only to conviction in criminal matters; 5) *H. Survivor* and *H. successor* jointly claim legal standing and proxy rights on behalf of nature and the commons, of life and the biosphere, of all sentient and self-aware beings, and of future generations; and 6) All smaller communities consisting of at least 24 sovereign individuals, up to a maximum of 128, who are living within a definable physical or legal boundary, will retain full rights of secession from larger groups and their political subdivisions, following a two-thirds majority vote of consenting persons and a 90-day period for the free movement of individuals and exchanges of property. A group which has so severed itself may vote to form coalitions or realign itself ideologically or politically with any other political subdivision, with or without physical contiguity. The full texts are available online.

The broadest effect of this Sixth Mandate put an end to empires built out of non-consenting territories. What was left of the United States, after its attempted suicide, soon broke apart entirely into its present six nations. Russia split into three parts. China became five, but not Warring States this time. China also lost Tibet, Hong Kong, Taiwan, and its hold on Africa. India became nine nations. We now have more than twice the number of nations than when we began, all with new constitutions now, yet the world is more unified today, following the elimination of armies, soldiers, international treaty organizations, trade agreements, and a strengthening of the UN. The UN was reorganized, with the Van now daily participants, still in Proxy form for now. Van Proxies are also delegates for rights, environment, education, resources, economics, and our special projects. The Sixth Mandate also had its effects at the human community level. Its final section was a declaration of rights pertaining to smaller settlements and neighborhoods in the urban worlds. It gave the Van communities added cover as well.

There is a broad spectrum of scales in humanity's social organization, beginning with the many persons and personalities that comprise a Self, and continuing upward through the nuclear and extended family, to community, town, city, state, country, international alliance and the UN. We observed a sufficiency of all of these except at the community scale. Social organization above this scale involves incorporation, legislation, and legal delegation of police powers. The community level is often the dividing line between informal and formal society, and between implied and explicit formal social contracts. It's a level between generalists and specialists. It's also the highest level of structure where true participatory democracy functions well, where any individual can be heard simply by speaking up or out, where individual contributions to the culture can be sensed by their contributors, and where anonymity isn't much of an option. The saying "No man is a prophet in his own village" refers to how little

control a villager has over how well he may be known here. The man behind the curtain is Uncle Bob. Communication will be more face-to-face, with a full complement of non-verbal exchanges.

There are non-geographic communities, not bounded in space, but communities of common interest like internet forums, fan clubs, research networks, and telecommuting workforces. These have the biggest bandwidth limitations, engaging the least of the individual person. More tightly bound are the groups that can spread across town and involve discrete or finite portions of their participants lives, like clubs, church congregations, grassroots community groups, fraternal groups, schools, and unions. These meet actual but more limited sets of member needs. There are also tightly-knit communities that have mobile boundaries while the group itself remains physically together, like the gypsies and circus folk, boat crews, expeditions, and migrant workers. There are communities subsumed under larger business interests, like company towns, employee housing, and retirement homes. Since civilization gave human beings the urban environment, there yet remain villages, hamlets, enclaves and urban neighborhoods. Historically, humans have been the most familiar with bounded communities, territories that distinguish an 'us' from a 'not-us,' and having a semi-permeable membrane or border for trade and mating. Our focus is on lifestyle-wide commonalities, mutuality of more than one interest, enough to weave together a diversity of processes and functions. Community has always been needed. One farming family just can't exploit the full potential of land uses or develop the breadth of skills that a more fully-rounded life demands. Although the nuclear family will form the first building block of civilization as we know it, there are reasons that nuclear families are rarely found among the wild human populations with millennia of continuous history. This unit is too small for existence in isolation, too small for self-sufficiency. The extended family is a minimum here and a place for them to gather will be vital. Viewed from the other end, while smaller community is less efficient than the township or city's larger divisions and specializations of labor can be in optimizing local resources, generalization is more natural and common at smaller scales. Changing niche conditions will favor the generalists, which have a more adaptive repertoire of skills. We are actively promoting the adaptive intelligence fostered here.

In addition to overt attempts to exterminate indigenous village cultures, many of the most promising kinds, models, or templates of community have been actively suppressed by the larger society and its governments, notably the ecovillage and the intentional community. Not all of these will be compounds and cults. Both of these are still in the long process of inventing themselves, with ambient social and political resistance playing a big part in the shape of the niches they are trying to adapt into. Diane and Robert Gilman described the ecovillage as "a human-scale, full-featured settlement in which human activities are harmlessly integrated into the natural world in a way that is supportive of healthy human development, and can be successfully continued into the indefinite future." An Intentional Community is any group that's practicing a shared lifestyle formed around a stated mission with goals and objectives. Both of these seem to be enormously threatening or suspicious to many Meh societies and cultures. Inhabitants often won't dare use the term community beyond their own borders because their neighbors will hear 'commune' or 'communists.' 'Cooperative' evokes the ghost of Stalin. Mention a community fire ring and neighbors get a picture of naked witches, sacrificing babies to Satan. Unique sets of beliefs mean it's a cult instead of a culture. It's challenging enough to integrate with nature, but these more visionary social forms must also integrate with conservative social powers that be. We've made considerable progress with this in the last twenty years, but resistance among the Meh is still there, and suspicious-looking groups of the Fit continue to need

Van assistance, sometimes including lethal force. There is also a big jealousy problem here, as the Meh have no more children and the Van are playing favorites.

The new disciplines of neuroscience and evolutionary psychology are slowly confirming that an understanding of what we hominids are will one day have to reach way back into primatology and zoology. Thinking and believing that humans are what they wish they were just hasn't been working out at all well for them. Humans need to start looking to their behavior, and to stop looking solely to their most popular thinkers' and poets' descriptions for knowledge of who they are. Mankind's golden ages are followed by centuries of slavery, rape, and cannibalism. That should be studied too. Denial of humanity's dimmer and darker behaviors will not help in outgrowing them.

The ancient Chinese idea of *Pŭ*, an uncarved piece of wood as a symbol of original nature, offers a more useful metaphor for human nature than the amorphous lump of clay. Nurture has its place in shaping what we will become, but we also come with a natural grain, or a way of being to which we're somewhat pre-adapted. This says the nature-nurture problem as a dichotomy is foolishness: we are both, and they work together. This doesn't solve the is-ought problem that suggests what we are is what we should be, that the natural and the good must be the same thing. But it does suggest that we might first try working with the skill sets that we've been given, as heirs, or playing the hand we've been dealt, and at least not starting out with pure fantasy. There is a human nature that underlies the variety of human cultures and this is discoverable, provided that we can bring the proper mindset and science. We benefit by designing culture for this. We can still provide for what we want to be while designing for what we are. Evolutionary psychology and Darwinian medicine are asking the questions: what kinds of lives are humans already adapted to live? And: what has the last two hundred thousand years tried to teach the gene pool? People are biologically adapted to life in a tribal society, extended families, camp and village life, and Stone Age technology. While these are by no means the limits, the findings begin to suggest that to start to build here is to build on *terra firma*. In order to allow the Fit the possibility of beginning and going through their lives taking advantage of these innate social and cognitive optima, we have imposed a hard mandate on all political subdivisions to protect the smaller communities. While carrots work better than sticks, human civilization needed sticks in this case. Indigenous tribes were still getting wiped out for gold and timber.

The closer we look at humanity's last two-hundred millennia, and especially the last seventy-four of behaviorally modern years, the more we see a social creature adapted to live in small tribes. Robin Dunbar, an anthropologist, proposed that there would be an average number of individuals in a group beyond which people had problems maintaining intimate and stable social relationships, and that this was based on cognitive limits related to the complexity of personal interactions. He proposed 150, which became known as Dunbar's Number, and later, the "monkeysphere," since it was derived in observing primates. He suggested that larger populations would tend to calve, fracture, or schism, like mitosis, or grow less cohesive, requiring more complex forms of government and even more coercive measures in order to better cohere. Alternative numbers up to 300 have been proposed, but with less acceptance. The science here isn't especially strong, and it certainly doesn't acquit itself well in the study of Gelada baboons. Before even bringing the Van to life, the Gizmos decided to work with a slightly smaller number, 128, reasoning that complexity would be best represented by some power of two. But they regard this as a maximum, a point at which schism became more likely. As an ideal community size, they prefer working with the number 64, which is more than coincidentally the number of Ta on a ship, and the number of ships in their fleets. They also use the lower powers of two for more

intimate interactions, such as thirty-two for Van in a village, and sixteen for maximum classroom sizes. The Van were all raised within these rules of thumb. The numbers would drive our childhood structures at home and we found that they worked well enough to build them into our Plan, which is still to be tested over the generations, of course, and revised and fine-tuned as needed. So far, we're deferring to Gizmo conclusions.

In ancient human tribal societies, there was always an array of easily recognizable social roles and functions. In addition to the parts of the nuclear family, there are elders, heroes, role models, shamans, craftsmen, healers, sycophants, tricksters, leaders,*capos*,*consigliere*, betas, sluts, thugs, allies, rivals, and losers. These roles are also found in primate societies, suggesting that they are more evolved than cultural. Much of the human behavioral repertoire still lies beneath the much-vaunted human neocortex, lying well down inside the primate and mammalian limbic systems. Humans are neurally wired to sort, organize, and remember social experiences by general behavioral types that are pertinent to either survival or reproduction. This has formed cognitive modules, neurognostic structures, some basic ways of knowing that precede cultural learning. Jung would call them archetypes because they are inherited. Other modules can read emotions, tell relatives from strangers by scent, assess genetic health of potential mates, or make snappy judgments regarding who might be a friend or a foe. There are evolved cognitive heuristics like apophenia and pareidolia to make snap judgments before thoughts can even form. There are hereditary grounds for anger at betrayal or defiance, shame from damaged reputation, for suspicion against known cheaters, confidence gained in social conformity, or kindheartedness from reciprocity. Humans track and remember the giving and taking of resources just as the great apes do. There is a social economy here, as well as a social environment, and its gold standard is trust or confidence, with much to be said for gratitude too. And above the scale of community these are in short supply.

A lot of people born into more complicated times will entertain a longing or a nostalgia for this simpler, slower, tribal world. But they imagine this world with their heads full of modern ideas, and no fresh and pressing memories of the bugs and diseases. Aside from whatever precious value these old ways still retain, there are benefits to this modern civilization that even the Anabaptists will acknowledge, and more still for the more modern communitarians. People tend to imagine a world that never really was, and forget there were reasons for leaving. And yet they know, deep down, that they still belong back there. What needs to be done to reclaim the community life involves moving forward, not backwards, and reinventing community to solve some of its ancient problems. Although family planning and population management is no longer the dire emergency it was two decades ago, there is still a new trend to smaller, K-strategist families. The problem that this had, and still entails, is in the lack of age diversity found in the nuclear family, or having older and younger siblings to learn from and teach. This is exacerbated by age-segregated public schooling. Newer visions of community will need to address this issue to optimize child development.

Prototypes and Lexicons

Bucky Fuller once wrote: “You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.” Unfortunately, the old model is often institutionalized, and even when it’s faltering it will often fear the thing that threatens to replace it and even rally some additional strength to combat it. Of course, Fuller didn’t envision a powerful race of alien beings trying to change things. The Van would have preferred to alter history using reason and persuasion, and there”s no kind of leadership as effective as setting good examples. But then again, sometimes the surgeon arrives too late, the gangrene is climbing the limb, and more assertive steps must be taken. Even with mandated protection, our experimental communities are not going to overtake and dominate the dominant paradigm. The simple life will just not be overwhelmingly attractive to those who can still be told what they need. If we’re correct, our communities will become illustrative, working examples of viable alternatives that should be of some use when the dominant paradigm fails. We issued the Six Mandates nine months into the intervention. By this time, most of the humans on Earth knew that we were serious. We certainly don’t credit our own charm or persuasiveness for official Mandate adoption, which happened within three months, and their implementation within a year. These decrees did uncover a few pockets of *Non grata* resistance to clean out, but then it all seemed to go pretty smoothly.

Tens of thousands of communities on the scale that we’d been studying formed in the first five years. By the end of year ten there were more than a million, still only a minuscule fraction of humankind, but a start. Equal numbers of people formed urban neighborhoods along intentional lines. The groups didn’t all survive, of course, but the 5-year attrition rate fell slowly from forty to twenty percent over the first ten years, and then down to just ten in twenty. As predicted, improvements emerged from the educational value of watching both successes and failures. Most of the new communities have beenSurvivor, though a quarter are Meh. The Meh tended to have a lower rate of attrition: it was perhaps easier for them to conform to consensual ways. Gradually, the Meh children grew up and no more arrived to replace them. Rumspringa became more popular, and this was a good incentive for the Meh groups to remain pleasant places, in order to attract their grown children back home. Survivor villages would go in a different direction. They still had a steady stream of young ones to raise, and for obvious reasons, education of their children became paramount in their missions and plans.

Learning how to cope with transience was an important key and the hardest lesson to learn. Gary Snyder once wrote: “Want a tribe? Stay put.” But the world is too big and interesting for that now. People are Songlines, a weaving together of stories, and they want to move through the landscape. The world has tales and color to add to life. Transience is an ancient problem. When life learns things, it writes its lessons into the genome. It didn’t take long to learn about problems with incest, and it only took a little bit longer to learn about inbreeding a tribe. If you wanted to keep the group going, you found your mates in neighboring tribes, or wandering alone in the wilds. This meant that one of each pair would one day have to leave their home and their personal history, friends, and family behind. Which one would go would vary with the tribe. Sometimes the young bucks would get pushed out, and sometimes the Marrying Maiden would be sent away, and never to look back. Sometimes there was a bride price, sometimes a dowry, but exchanges and sales were final. Now the problem is much larger. It doesn’t help things that human beings are wired for dissatisfaction, with

a permanent restlessness, a ready jadedness, or an attention deficit disorder. Our affections of both pleasure and happiness can be problematically similar to our sense of acceleration: we tend to forget them when we remain in a balanced state, and only attend to them best when things are improving or else getting worse. We are wired to keep seeking improvement, not homeostasis. We are on a "hedonic treadmill." The only way out of this is to see the place of community as an important location in the context of the course of a whole lifetime, and to design the community that's right for those who belong at the time. Design should expect or ask only a short-term commitment to the longer-term community. This doesn't mean that commitments must be kept light or shallow, but it does mean a new approach. How could a place we belong to change discontinuously and still permit meaningful coherence? There is really only one community business model that's fully adapted to transient or mobile populations, or resilience when strangers are gathered together: the university. The community would at least meet one's needs at a particular point or phase in life. Only once, back in college... .

There were other ancient problems to solve. The permeability of boundaries between "us and them" was a big one. We needed to secure rights within boundaries, including the rights to vet and exclude prospective members, and the rights to expel or exile members. The first is secured by charter, the second by contract. Systems can't battle entropy without boundaries, but if those aren't permeable, they won't admit the information and energy needed to maintain the system. Each place had to find its own mix of the parochial and the cosmopolitan. But life itself is a learning exercise in defining and constraining identity, or in learning when and where to stop. Another, slightly newer issue pits individuality and personal space against communality and interaction. In caves and pit houses, wigwams and yurts, urasas and dugouts, humans have lived whole families to a room, and this has carried over into the third-world's present life. Personal boundaries and personal space have often been only luxuries, to be savored on occasional strolls, or even just on trips to latrines. But recent history has shown a growing need for individual culture. Consensus decision making protocols now have better reasons to record at least one at least one voice of dissent. Nuisance neighbors, with their parties and barking dogs, lead to rules and laws we can live with. But protocols for conflict resolution need to be explicit and consensual from the start. This is among the first things learned in intentional community: to be clear and keep things out on the table.

There aren't many mixed communities combining Survivor and Meh, although many had mixed couples, pairs with one partner who didn't quite make our cut, but were nonetheless stubborn in love. The Spybots we planted in every human being will stay in place for life and, as mentioned briefly before, these have a feature that enables Survivor to recognize one another with a subtle sort of *frisson*. It's triggered by the code that restores fertility, but the signal identifies the children and elders as well. It isn't quite the same neurochemistry as oxytocin, but it can have a similar bonding effect. The sense of it isn't so much affectionate or erotic. For tragic lack of a better English word, it feels a bit like Platonic or fraternal love, but even this doesn't quite fit. In Babble, the Van use the Buddha's old Pali word *mudita*, for the joy and sense of encouragement felt in the success or skillfulness of others, a supportive camaraderie. It's similar to the Yiddish *naches*, but it's felt for a larger family. There's a touch of *agape* in there too. Unaltered humans, even the Meh, could feel these feelings without Spybots, or there wouldn't be the words, but most were too wrapped up in themselves, and in wondering how to behave, or in how they were doing, or what they were supposed to be and do. Even among the Survivor, the effects of our added chemistry are subtle, and almost always subliminal. It's only a slight nudge.

The larger number of communities served the Van needs well. We wanted a greater variety of ways to hide our own little tribes in plain sight. Some of our old disguises continue, but we've clearly outgrown the school and orphanage models. We still have nearly eighty communities to hide. This isn't out of fear, since we're so well defended from above, and if necessary, by forces that can reconfigure planets. We even hire local labor and get just friendly enough with the neighbors to blend in. We just have lots of work to do and not much use for distraction. The majority of us are now eager to openly explore the ecovillage and intentional community potential, without the ambient resistance and hostility, and to see what kind of variety we can find in their prototypes, both Van and human. The last thing we want to do is rubber stamp or cookie cut our ideas into the landscapes. We are practicing survival of the best fit, but we do expect to see some convergent evolution. The Van maritime communities took a goodly number of us out to sea, or back out, some even on the now-ownerless warships and subs. But we also have our own, better boats that can outrun typhoons. At twenty years in, the oceans and seas, and their critters, have just now begun to recover. Several of our aquatic and pelagic communities teamed up with our brethren and sistren at sea, especially the octopuses, rays, dolphins, and whales, some of them fellow Synthionts, with whom we share a more sensorium-limited pseudotelepathy, and many new companions among extra-special friends they had made. A lot of the exchanges can best be described as a romp, but there is much that approaches verbal discussion as well, even with the octopus, which is just about as damn weird as you might expect.

By today, twenty years in, the youngest of the last of the Meh children are approaching the age of twenty. We watched them grow and progress through a school system that was evolving quickly with our help and information utilities. Some proved to be nice surprises for us, and although we never told anyone we would do this, about one in eight will get Survivor upgrades, with restored fertility, genetic correction and all, after this year. Some will be over thirty-five years old. Meanwhile, the eldest of the Survivor children, born since eighteen months in, are now approaching their eighteenth year. We never told anyone this either, but about one in six of these are going to be demoted to Meh and rendered sterile. Sometimes corruption undoes both nature and nurture. Reasons for this are largely behavioral. They were given the best we had to give, but out of complacency or smugness they chose to be untrue to their gifts. The Van have made a serious commitment to guiding Survivor through this difficult transition, and also to supporting the dwindling Meh population though its extinction, without being punitive with this. Part of our commitment involves forgoing children of our own for the time being, which we expect to be a thousand years. We'll all still be reproductively viable then and intend to breed more of our kind, without the connections to Gizmos and Ta, of course. By this time, the Fit will be receiving substantial genetic upgrades and uplifts, and we'll follow suit then with a second superior race. We aren't yet certain whether we'll be engineering the two species to permit interbreeding, or going our separate evolutionary ways.We do intend to share this planet, though, and New Mars as well, without war.

In order to appear plausible as human communities, the Van have borrowed or adopted several thousand Survivor kids, on a pretext of giving them excellent educations in our experimental "home schooling" types of communities, funded by the Van, but run by Survivor. We lied here. It helps us enormously to practice parental love, as well as our many new theories of education. Our continued disguises didn't need to stop there. Most of our Gizmos can do their work without human form, whether it's computational, or working through Gadgets and Proxies. They can appear in any disguise that's larger than their soccer-ball-sized oblate spheroids, so in our communities they can as easily appear to be cows, horses, llamas, or pigs. They can

also look just like pickup trucks or tractors. This doesn't embarrass or degrade them, or hurt their feelings. We can't afford to appear very different, special, advanced, or prosperous, but then we favor our simplicity and humility anyway. Being pseudotelepathic, and possessing of our Gizmos' Psychohistorical analysis, we're a passably good analog to Isaac Asimov's Second Foundation. Our facilities are cozy, not grand. This isn't a poverty mentality, but we do try to set a good example for living on little, still with ample discretionary leisure and time. We're happy, healthy, and comfortable. We satisfy our members' real needs in the order of their importance. We're saddened by the human mansions with the big rooms and tall doors, built after the fashion of kings and feudal lords to make their guests feel small, not really grasping that subliminally they diminish themselves as well. However, living lightly doesn't mean leaving no marks or monuments. Our lives are most meaningful when our meanings will outlive us. Ultimately, we have success for the benefit of our successors. Becoming worthy ancestors is the social side of stewardship. It's also the real value behind traditional rites for the ancestors: they were supposed to inspire people to become worthy ancestors in turn. Not many humans today will be remembered like this. The discounting of posterity is the last age's ugliest legacy. We will pay our rent: this world is ours only in usufruct, and our descendants will thank us.

Ecological communities lie midway in their scale between organisms and populations. Diversity is always a major factor in responsive resilience at all three levels. Let the hundred flowers, the *bǎihuā*, flourish in the garden, let the hundred schools of thought contend, as the Chinese used to say. Overgrow the system. There is no model community yet, nor should there be if that means identical solutions for differing niches. Diversity, depth of talent, and unique responses to specific places are no less important between colonies or populations than they are between individuals. Selective pressures are important here too: successful community merits success, failed community earns lessons for all of us. We need the cultural diversity in order to learn these lessons. Human culture has suffered as much as agriculture and ecosystems from the monocultural approaches. To the extent that the surrounding environment, context, or niche undergoes change, the static solutions and rigidly defined behavioral repertoires don't offer the depth, stability, resilience, and options needed to adapt as niches evolve. Variety and experimentation are necessary for these systems to learn. To fear these as threats instead almost guarantees failure.

A common template for ecovillage design is unecological and unresponsive both to the niche it's intended to occupy and to the broader health of the larger human community. A lexicon is far more useful. It will pose a large array of questions to ask, ideas to examine, and keywords to research. These permit a variety of both interpretations and applications, as well as the outright rejection of an often good idea as inappropriate to a context. Lexicons, often called Pattern Languages, combine skill sets, tool kits, checklists, and codified principles. Our lexicon quickly ran to five thousand useful ideas in eight general categories: global understanding, local application, cultural structure, holistic and systems design, responsible building and structural elements, infrastructure and energy, restorative agriculture, and access to information. This was our version of "shoes, ships, sealing wax, cabbages, and kings."

One of our devices in seeding new communities begins with our purchase of large tracts of land, a section or more in the former US, as long as they have existing zoning for 40 people or more. We will then move this many Survivors onto the land.Groups could do this in many places prior to our Six Mandates, then incorporate as home rule municipalities and assert their political independence. They can still do this in order to upzone themselves into home rule towns, but the parcel sizes we've picked are ideal for the combined footprints of self-sustaining communities. We do, however, cluster

development to optimize open space. In more than a dozen cases so far, where subdivision exemptions were permitted, we divided these tracts into multiple lots, and then gave the lots away as awards to worthy NGOs and grassroots organizations for dedicated service to a sustainable future. In the process, we encouraged them to use their community facilities as centers for consortia and coalitions to form, meet, and lay their plots and schemes for a better future. We stopped doing this when the idea started to catch on and philanthropists followed our lead. It didn't bother us at all when this was only to get our attention and Van support. Some of these benefactors even began as Meh and ended as Fit.

To the extent that the Mandates allow, we're now free to design our experimental villages as we think best. We still have regulations and standards to work within, but most of these now make sense. These concern health and safety, off-site impacts and nuisances, and the protection of children who cannot yet be presumed to consent to the behavior of adults. Communities may damage neither their own land, which is held as a usufruct, nor the global commons. We make good use of our eight lexical categories in organizing our design principles. We also have a fluid number of overarching priorities and principles that are common features to our land planning. The education of our borrowed Survivor children will always be our highest priority: it isn't lip service anymore to say that they are the future. We'll always live with the unaltered land awhile to learn what it wants to dream, and we'll decide early on which half of the land or more will continue to thrive as wilderness. We cluster our development within the limits of proxemic optima, and won't build on the best land for farming and animal range. Wherever possible, we use community scale infrastructure, including cogeneration, small hydro, PV and Stirling arrays, cellulose and algae tanks, desalination plants, tool libraries, septic reclamation and waste recycling. We'll always use cradle-to-cradle design and study all of our building materials for life-cycle costs and embedded energy, water, and components. Just as the ancients discovered, this leaves us rammed earth, adobe, and cob, as our favored building materials, as long as we live in one story. All of our agriculture and gardening is regenerative, which nearly always employs Holistic Management and Permaculture principles. Our soil is as black as it can be. Even our most vegetarian groups keep farm animals, respecting the fact that plants, animals, and fungi coevolved and continue to need each other. We track all of a village's various budgets, functions, and elements as if they were one interwoven metabolism, and then work to minimize what it needs to feed on. Our gymnasiums generate power, our swimming pools, fresh fish. The ancestor to old China's "five phases" or *wŭxíng* can be found in the "six treasuries" or *liùfŭ,* the traditional five (fire, water, wood, metal, and earth) but also with a sixth: grain or seed. We use all six in our built environments. We no longer need petroleum as a seventh, since we make our own hydrocarbons now, out of light, water, and air.

For the Kids

From the start, the top two Van and Ta priorities have been the rescue of the Terran biosphere and the radical transformation of human beings into a species worthy of survival. Our own survival is subordinate to these. Now, twenty years into our program, the biosphere, in all its biodiversity, is ready to make a slow, but complete recovery, including many thousands of the species that humans had recently driven to extinction. Priority two maintains the proper cultivation of the Survivor children for its primary focus, and it's absolutely vital to our purposes to reach and assist them as early in life as possible. The former US Constitution closed its Preamble with "secure the Blessings of Liberty to ourselves and our Posterity." Instead, this nation systematically laid Posterity's blessings to waste and put the treason and terrorist charges on those who tried to defend the future generations. Posterity is treated with a lot more respect today, or else. It would be a mistake to think that the immensity of what we Van have done to humans doesn't weigh heavily on each of our separate consciences. As nearly as we can tell from human behavior, we feel even more deeply than Survivor, and certainly a lot more than the Meh. As potentially immortal, it's much easier for us to see the ends as justifying our means. We've made a commitment to see this through, and also committed to refraining from propagating our own species until after we have succeeded in saving this world from human abuse. For now, our only children are those of Survivor. Some us have admitted that this restraint is akin to penance, but knowing what we do of where things were going helps us to avoid the guilt. These children we are helping to raise and educate literally mean the world to us. These are the distant ancestors of the children who will one day play with our own, more than a thousand years hence, in a world of peace and prosperity and a nature that's thriving again.

It's often said that it takes a village to raise a child. Some have run with this idea without distinguishing between a village and a bloated national bureaucracy. That's not right. We do know that children thrive best with multiple adults around them, a whole stable for pony rides, and offering multiple and slightly different answers to their questions, and different role models to observe in action, and different points of view to see from and choose from. And a diversity of storytellers. Age diversity in a village or tribe is also important. This includes experience with children of different ages and experience with the elders of the tribe. Evolutionary theory suggests that creatures will only evolve to live beyond their child-rearing years if longevity is of some use to the species' reproductive success or survival. Otherwise the elders will only be burdensome. The human tribes we observed tended to trifurcate into children, adults, and elders, while the adults would then bifurcate into some version of hunters and gatherers. While the grownups are busy being the providers, the children are raised by the elders, who are the storehouses of tribal culture, the teachers to the tribe. This observation would underscore our horror as we studied the white man's Indian schools. We intend to restore the more ancient ways, both for the children and for our aging population.

After the manner in which we ourselves were raised, our new educational system is divided into thirds of the first twenty years of life. There is a parallel here to Wadorf schools, although we end these twenty years with a solid college-degree level of competence. We have our own Neo-Piagetian understanding of human cognitive development and can better optimize on the timing of neurological rewiring that happens betwixt birth and dulthood. The first set of years we refer to as Kindergarten. Here we focus on plentiful play, physical movement, unschooling, outdoor learning,

hands-on experience, interrogative dialog, environmental awareness ,group interaction, storytime, puzzle solving, mindfulness, music, craft, and art. It's more important to us that kids learn how to think than what to think, especially with culture evolving so quickly now. Imaginative play, or make believe, is fully supported, except that it's always referred to as such, make believe without the belief. As with Waldorf schools, props are more often made out of natural materials than manufactured toys, except for the Eniacs, Farnsworths, and VRs. We borrow from Montessori schools as well, with a modest degree of age mixing, discovery or constructivist learning, and offering the children a choice between a finite range of learning activities. Good nutrition is provided, but appetites are always voluntary, and that's a metaphor, too. Festivities other than birthdays are all secular, celebrated only on the eight old Pagan holidays, honoring the four seasons in Geoscience.

School actually begins with our public infant and daycare, which we make available even before weaning. It's free for Survivor, and was priced on sliding scales for the Meh, while they still had children. These two were usually segregated, but only because the Meh learn best at a slower pace and have a greater desire for conformity. This infant and day care phase lasts through reliable toilet training. The environments here are sensory rich, but still short of overstimulating. Affection is given freely and frequently, but at least by preschool it's conditioned on good behavior, and boundaries around unwelcome behavior are effectively clear and firmly drawn. Temper tantrums are seldom attempted more than once. Self-esteem is something to be earned and not distributed as freely as simple supportiveness. Little ones are exposed to at least three languages, which vary with geography. We have a maximum of six children to an adult, and three to an elder trainee, which we still have in growing abundance for now.

Our Kindergarten, roughly equivalent to the old preschool through first-grade years, has its main focus on the early development of young minds, little to no indoctrination, rote instruction, or the imposition of cultural belief structures. The word "minds" here is understood more in an Eastern than a Cartesian sense. The Chinese word*xīn*, often translated as heart-mind, is often better understood in the contexts of "mind your Ps and Qs" and "do you mind?" It includes affect, and also caring enough to pay attention. It's also apperceptive mass, our cognitive structures and biases, the momentum and inertia that we bring to our new experience. Naturally, minds begin with the givens, our inherited cognitive modules, archetypes, and heuristics. Then the older layers are laid down first. Like a bricolage, the mind is built up with age, out of whatever inputs, experience, lessons, ideas, metaphors, affordances, and information is made available. Human culture prior to now has been tragically unaware of the importance of these early layers, to which all of subsequent learning must adapt, and to which much of subsequent learning is just wrenching cognitive dissonance. An early incompatibility between nature and early nurture can set up lifelong internal conflicts. Improved information is just too easily defeated by cognitive bias. We Van regard it as critical to watch and select what goes into the making of younger minds. The Meh, of course, regard this as the critical period for logic-proofing, and indoctrinating the foundations of their various religious and cultural beliefs. We try instead to cultivate the ability to question intelligently, make our own inferences, and adapt and relearn when errors are pointed out.

Other than developing basic senses of number, scale, proportion, change of frame and point of view, categorical sorting, and sensory metaphors, nothing formal of STEM is taught at this age. The kids learn to read and write by the end, in at least three languages. In some of the Meh schools, where the last of their children are just about finished now, Van Babble has been available for as long as fifteen years. In the Survivor schools it has always been one of the three languages learned. A century from

now, this will be the first language everywhere. It's a good vehicle for translation, since it contains words with broad sets of meanings as well as words that are narrowly specific. For example, Babble has the words for conscientiousness, consciousness, and conscience, but it also has the new word *konsyin*, which is broad enough to imply all three of these at once. The incorporated Pali *appamada* is a synonym. Just about any classic can be found faithfully rendered into Babble. The interlinear transcriptions are much more precise too, with Babble's forty-four consonant and ten-vowel alphabet. We also developed an easily-learned sign language of about four-hundred words, similar to that of the plains Indians of North America. It's prototype, called Incos, from which ours takes its name, was developed in the 1970s, but sadly this never took flight. It's not the same as the sign language for the hearing impaired, though it shares half of its signs withASL. Learning the language is pretty intuitive. It only takes a few hours, and it's a fun skill for the kids to learn. Once it's more universally known, travelers will be able to go anywhere on Terra and communicate with the natives. We're still working diligently on Star Trek's universal translator, unsurprisingly known to us as Babblefish. Our Chinese-to-English isn't nearly as comical as it used to be, although Ancient Chinese is still giving the system fits. Human-to-Cetacean, or to the other Sentients, is some distance away yet. We still have some serious Darmok issues there. Even with assistance from the Ta, who have millennia of inter-species experience, we need to build up lots of common ground through our shared life experience and translatable sensory analogs. It's progressing, but it's still hard to teach, or even to talk about.

Soon after Intervention, we contacted two important programs in global children's education and threw our full support behind them. These have since blossomed into two of the world's largest non-profits, meeting their original goals and going far beyond them. The first was the Malala Fund, which eventually became so successful that the boys began to petition for equal opportunities. Of course a big part of its success was the expedited Fast Rapture perishing of its opponents. We always made certain it was clear why those had to die. Young girls of both remaining human species were no longer denied equal rights to education, or any other rights for that matter. The other worthy NGO was One Laptop Per Child (OLPC), which had failed. Their goal had been to get durable, inexpensive laptop Eniacs into the hands of the children in developing nations. Uruguay would be the first nation to back this with Plan Ceibal. When we stepped in, there were already millions of these aging, basic Eniacs in circulation. We gave it a big upgrade. Employing a large number of victims of the collapsing global economy, and the facilities of many now-defunct industries, we soon had more than three billion new devices to offer to all of the remaining children of the world, both Survivor and Meh. They were far more sophisticated and durable machines, with little obsolescence in sight, planned or otherwise. They came with solar recharging and unlimited, free, broadband Sputnik internet access. The access included both humanity's Net and our own Cloudnet. Some of us wanted to call it Skynet, but it was still too soon for that.

We swept human culture and collected most everything in print, on film, on canvas, recorded as music, and even old tape-recorded school lectures and classes. We had plans, designs, and instructions for any device or procedure that might serve our superior future. We even recorded the statues holographically, and Ta holograms can be touched. After sorting and dumping all the duplicates, and correcting facts, typos, and bad apostrophe's, we assembled a "best of" collection and made it available by Sputnik. There was plenty of raw data now for a major harvest and winnowing. As it was with the human population, our judgment and values were visible and expressed in this edit, and we favored only about an eighth of the cultural materials. This wasn't

censorship as such, since the other materials are still available through the older human channels and we continue to accept recommendations for inclusion in our own database. We did compensate the holders of current patents and copyrights, at roughly midway between their wholesale and retail values, based on a projected use. We simply stole, outright, the libraries of the for-profit academic journal collectors. They didn't get another cent, but the living authors of the journal articles were compensated instead. We maintained the *Tanakh*, the Bibles, and the *Quran* in the collection, hyperlinked, in several translations and languages, including Babble, but they're now filed under Classical Mythology. The Buddha's *Pali Canon* is filed under Psychology instead. Not all of the materials we've selected had been published or publicly available yet. We have a lot of books that the Library of Congress didn't have, in part because its librarians are still more bureaucrat than sage, and there are rules, you know. And a lot of publishing houses have had too little time or inclination to look at a lot of worthy manuscripts, many simply because they lacked a broad, pulp, or mass-market appeal, or an already-famous author. We were fairer than that, had Survivor in mind, and the Gizmos looked at them all.

For our higher education, we sent emissaries into the world's schools and universities to seek out the finest educators alive, from pre-school through post-graduate learning, regarding all levels important, and we paid them well to let us record their best efforts at teaching remotely, and to help teach us how to teach. We circumvented all of the for-profit ventures. Materials will be updated and upgraded as needed. All results are forever online, open-sourced for the human internet, and free of charge. Those who had made contributions that were already freely given were offered compensation, so that they might go forth and find other good works to do. It only remained for us to establish a few global systems of accreditation, so that any motivated, self-taught person, from ages two to a thousand, could verify their competence in any subject, and receive transferrable academic credits honored at any institution. In order to ensure this, though, the tests we give are not easy to pass without dedicated study or a lot of natural talent. A pass here is the equivalent of an old B or better. For some, this is a more challenging route to take, but for others it's been a long time coming, and also spares them the extra time of having to work for expenses and commute to school. There are, of course, practicums and labs to be taken: it's not all done online and in theory. Our websites provide guidance for those. We also provide challenge options for entire academic degrees, from GEDs and community college through PhD, with credit for life experience. They aren't just honorary doctorates either. The guild monopolies really hated that.

The flow of the children of both Survivor and Meh proceeded as usual for the first twenty years, at least on the surface. School was conducted in the normal facilities by the teachers already emplaced, or waiting in the queue. There were some differences. The teachers all got big raises, with differences paid in our own Credits, adding at least half again to their real purchasing power. The teachers with religious or strong ideological agendas were removed from the public side of the system and restricted to the Meh schools. All of the *Non grata* children were gone, and the innocent children with *Non grata* for parents were freed from those toxic households, meaning a lot less classroom disruption. All classes had access to the new One-Laptop Eniacs and the vast cultural database that we had assembled, including the full "best of" collection of school presentations by the best educators on Earth. It didn't take more than a couple of years for Survivor and Meh to segregate their schools. Generally, the better teachers chose to follow Survivor students, and they received higher pay. Trailing the youngest of the last new generation, one or two gap years later, were the eldest of the much smaller group of genetically altered Survivor children. As this "conveyor belt" moved,

older school facilities were abandoned to other uses or salvage, and older teachers became unemployed, or got retrained to do elder care. The new generation was about an eighth the size per grade as the older. Around a fourth of the older teachers stayed on, selected for merit, so our teacher-to-student ratio is roughly twice as high now. Retained teachers spent their gap year in paid intensive retraining. With smaller classrooms and schools came new school design ideas. The large and monolithic structures with the wide interior hallways soon gave way to more intimate facilities. Not surprisingly, our favorite style is modeled after a village plan, small, with just a couple of classrooms in each of several small, one-story structures, and central common areas. Construction is far less expensive and more adaptable to changes.

It may be that no institutionalized human endeavor has been so subject to a turnover of fads and fashions as public education, with new overhauls every few years to accommodate the latest bright idea, and yet the outcomes, on average, would all seem to have one thing in common: they can start with something so innately insatiable as young human minds and make them not want to learn anymore. Another effect is encouraging collectives of children to drag the higher achievers down to the lower or at least average levels. We allowed the Meh to proceed with their obsessions and delusions of equality, their "no child left behind" ideas, and the philosophy that presents the human averages and norms as states somehow worth achieving. We threw up our hands and surrendered on this. While egalitarian in our own way in the early third of schooling, by the second third, the Survivor schools become more competitive. But they will only do so on a foundation of equal rights and opportunities. We even desire the unequal outcomes, but these will teach us too little of value where special privilege distorts the picture. We try to keep competition healthy. But the real competitor to best is still one's own, slightly previous self. We aren't only looking to see who has the best minds, either. We are looking just as hard for an individual's real strengths, where they might best stand out, for which specific areas of study a student shows the most hunger, enthusiasm, talent, competence, and promise. Another difference between our schools and the old public system is in the subjects being taught. The subjects for us are the students themselves.

Most of what humans have understood about critical thinking is centered on logical error and inconsistency, and too little attention is paid to the emotional components of thought and belief, our invested time, ego defensiveness, anxiety about peer pressure, saving face, whininess over the effort of relearning, fear of the unknown, hot buttons, and whatnot. One of the first tricks we teach to young children is to regard it a point of pride or badge of honor to admit to having made an error, to be smart enough to allow themselves to be corrected. This takes patience and practice, and consistent praise where due, for a while at least. Optical and other sensory illusions, as well as cool magic tricks, are a fun first part of this teaching program, and they make it seem less shameful to have been fooled or caught in an error. We follow these with a long series of exercises, played like games, to get this lesson across. Kids learn to acknowledge their imperfections without losing their self-esteem, accepted with curiosity and wonder, instead of fear and embarrassment, with grace and dignity, and not defensiveness and shame. When we do this well enough, they can even develop an appetite for correction, and a willingness to listen in on things that they really don't want to hear. They can ask "Did I stop thinking too soon? Do I really know everything I need to know?" Helping children to attach a high value to ongoing correction and revision of thought is the most important first part of our program.

We also teach that problems are really puzzles or challenges, all good things. We try to calibrate these, to not get kids in too far over their heads. Solutions to the problems we pose usually require no more than the knowledge or set of skills already acquired,

often in new combinations, although sometimes the puzzle is used as an incentive to acquire a missing skill. We will always speak with children as people, without condescension, even when speaking with authority and setting firm boundaries. A child's questions are most frequently treated as puzzles to be solved. We also hold to a principle that whenever children are ready to ask a question, they are ready for an honest answer, including "I don't know." But at the same time, it's seldom in their best interest to simply feed them the answer. Instead, we'll coach them towards it. Sometimes it's simply with the question: "How will we look that up?" or "How do you think we should figure this out?" Along the way there might be a "Why do you think that?" or "Can you think of another way to look at that?" "What do we do with ideas that don't work?" "Don't you want to make very sure that's true before you eat it up and put in in your brain?" "You don't want to fill your brain up with a bunch of wrong things, do you?" "Where do you get information you can trust, and what sources keep letting you down?"

We also try to get the kids shifting perspectives and frames of reference. This can start with simple exercises. We'll say to a wee one "The person I'm talking to is so much smaller than me. Now you say it." "Why was that true one time and not true the next time?" Our Theory of Mind practice games are important to teaching easy shifts of perspective, and developing empathy too. "How do you think he sees it?" "Would you think of that if you were really old?" "What would the people from space think?" "How would a worm see that?" "Do you think that hurt your friend's feelings?" We practice reframing a lot, with different scales of time and space, and different cultural horizons. We might also have the kids start trying to make predictions, of both mechanical and social events. We'll try to study a couple of different conceptual or sensory metaphors, analogies, or models for the same thing, so kids learn these are just ways of looking at things and not the things themselves. They learn about the difference between evidence and explanations of evidence. We also look closely at the categories we use to classify things, arranging sets of things differently according to different criteria.

The Van consider religious and political indoctrination of young children to be child abuse. We tend to be more tolerant of this in the Meh, who still seem to see nothing wrong with early structures hardening into impenetrable cognitive biases, which they will tend to call Values. But the Meh don't have much of a future. Almost the only things that break that rigidity down later are mind-expanding drugs, dedicated mindfulness practice, or extensive mental heath therapy. We've been watching to see which of their children seem able to survive this, and we'll effect a rescue from time to time, and even a change of species. For Survivor, we'll teach mental integrity and independence, and this from an early age. "Should we change what we think just because others think differently?" "Is it harder to change what you think after you learn that something different is true?" "Are there good things to be learned from when people see things differently?" Part of this is emotional learning, getting them to identify relational aggression and peer pressure, and put these into their proper containment. Wherever monkeys and apes are still unavailable to teach in person, we'll use films of them to these ends, so they can at least witness which primate traits might need to be overwritten. A child's early years are not too soon to learn self-management and mindfulness.

Regardless of any level of maturity or precociousness, the children in the Survivor schools will stay in the Kindergarten program until their time is up. Sharing knowledge is always a socially useful skill for the precocious, so these kids can help the other children learn when they need to find something more to do. This isn't the case in the second and third thirds, the Primary and Secondary schools, where the kids can

advance at any pace, and challenge out at any time. We even offer incentives to move through Secondary programs early, such as eligibility for early adulthood and voter status, whenever the age-eighteen academic standards have been met in good standing. The Survivor schools won't let any of the students advance ahead of their competence, despite any self-esteem issues. Meh schools continued to do so and still graduated their illiterate children. Because of this, the Survivor schools usually opened their doors to the more gifted and talented of the Meh, which saved the Meh the cost of gifted and talented programs. It was usually from among these children that we selected which of the Meh kids got the upgrade and restored fertility, provided that they demonstrated Character as well as intelligence and talent.

Our Primary school begins to take on the classical schoolhouse look, with up to sixteen kids at their desks, facing a teacher, an assistant, and a blackboard or screen. Sometimes they sit in a circle or around a table where the subject matter permits. Formal learning begins. One of its main characteristics is that what's being learned isn't always particularly useful or relevant at the time that it's being learned. In Kindergarten we focus on the immediate. The young kids learn at least the basics of deferring gratification, but the contexts center on early self-discipline, and that most often to avoid discipline at other and older hands. But Primary or Elementary students are beginning now to learn the basics of systems and disciplines that might not prove especially relevant to their lives for many more years to come, notably in STEM, systems thinking, ecoliteracy, softer sciences, and the more detailed practices of critical thinking. We teach these now because learning at this age is at a neurological optimum. We work with what we call Deferred Relevance. We'll sometimes play tricks on the kids to get them into the habit of learning ahead of time, like scheduling lessons that rely heavily on things that are taught the week before, then a month before, then a year before. Eventually the idea is to understand learning itself as its own reward because preparedness is rewarding. Still, some rewarding future use of the material must at least be well imagined.

The factory model of education is largely gone now, with only the Survivor schools remaining. Some of the hard-to eradicate, long-tenured, conformist, assembly-line attitudes remain in pockets of academia. As with hospitals, there are bugs in there that almost nothing will kill. This is still at its worst at the college and post-graduate level, and squats latent in the great mass of academic papers and journals that antedate our more recent efforts to encourage some freer and more innovative thought. We're at least trying to get some of the Scowlers [sic] to loosen up and attempt more than one new idea per paper. There is of course a common core in cultural literacy that stands as the basis of cultural transmission, especially in STEM. In our system, the kids can learn this core on their own or in class, but a quantum of conformity is needed even by the most eccentric genius, or else we will never stand on the shoulders of giants. Even Tesla had to learn his multiplication tables, and Maxwell's equations, of course. Besides addressing the usefulness and relevance issues, we've counted on some prior success in Kindergarten, where we've tried to cultivate a general appetite or hunger for learning. When we can begin with a hungry mind, the battle of education is already half over and won. All they need then is food for thought.

The basic theories of mind, perspective shifting, and reframing learned in the Kindergarten years are elaborated in our Primary schools. Enlightenment and the facility for taking on multiple perspectives are nearly synonymous. While it's vital that children learn that much of the so-called truth is relative to one's point of view, it's still equally vital to learn that relativism has its limits. It's still taking way too much of this culture's precious time for the death of Derrida to catch on. A degree of tolerance for other points of view needs to find a balance with the need for executive or decisive

selection as a key process in cultural evolution. The freedom to believe in things is still best balanced with the ability to recognize and repudiate error using good judgment and other such cognitive skills. This is just basic mental hygiene: too open a mind is still garbage-in-garbage-out, orGIGO. Our elementary education pursues specific inoculation techniques against the commonest personal, social, and cultural delusions, Immunomemes if you will, with plenty of practice examples of faulty thinking still available throughout the culture. Here kids learn the names of various families and types of self-deception, the main pathways to humanity's ignorance, especially our cognitive biases, defense mechanisms, coping strategies, and logical fallacies. The stubborn public media is still swamped with ready examples to point to, in advertising and what passes for journalism. Sometimes all you need to see is the first few words: "Scientists believe" or "Science proves." Given the power of cognitive bias, we Van don't see much need for belief at all, and this approach carries into our schools. At most, it's replaced with some form of conditional or trial acceptance. The word prove originally mean "to test," and the testing never really ends.

Secondary education is roughly equivalent to the old high school plus four-year college degrees. Only the first half is usually mandated. In our Survivor schools, students may form their own study groups, lease their own facilities, and hire their own teachers with vouchers paid from the same revenues that fund more public schools. They also get credit for teaching and tutoring their fellow students. Local organization of laboratories, shops, and similar hands-on facilities, and their rental by private schools, is left up to the local community. A good portion of the Secondary schools are trade schools from the first year onward, with a more minimal common core curriculum that still includes the culture's basic life skills, literacy, arithmetic, ecoliteracy, civics, and a somewhat simplified syllabus for critical thinking. Wherever the Van retain a say, no school is ever permitted to drop its courses in shop, music, or art. In a growing number of school majors, accreditation is now requiring renewal later in life, sometimes periodic, which is consistent with a dynamically changing culture. Most of this can be studied at home in free time now, except for hands-on training needed in fields like science and medicine. All curriculum is available in open source now. The demise of the old "educational industrial complex" is nearly complete.

Physical education and training is always made available, and to some extent required, throughout Primary and Secondary schooling. The Van schools tend to favor the martial arts for both confidence and discipline, but most of the old sports are still in play. Nutrition isn't biased towards vegetarian diets. This is despite the Van concern for ecological and agricultural sustainability, and our respect for the inefficiencies of feeding at higher trophic levels. We do have the population falling rapidly now, and we are fully supportive of regenerative agriculture. We grok that plants, animals, and fungi coevolved. Even artificial agricultural systems function best when all three are interacting. Mindfulness training and practice is available throughout all three levels of schooling, even in several of the traditional forms that are often considered religious. The Van tend to favor the oldest of the classical forms, time-tested practices, over the simplified, modernized, new age, pop-psychology adaptations. We ourselves will still frequently practice a few that evolved first in India, like Raja Yoga and Theravada Buddhism. We sit Zazen. Those twenty-five *Sobhana Cetasikas* are still worth getting to know and practice one at a time, but that's not to say we can't add one or two dozen more of more recent discovery.

Cultural Evolution

Eighty years from now, the last of the Meh, just now finishing school, will be about a hundred years old, and a short two years behind them will be the oldest of the first genetically modified Survivor. The year will be reckoned as I+100, since Jesus will most likely be an historical footnote by then. The planet will be home to only a few million centenarian Meh, about a billion Survivor, a thousand or so non-humanoid Synths, and assuming some predicted attrition on the Van, some number over 2700 of us still alive, and ready to make some babies at last. All of the hominids will be corralled on roughly a quarter of the physical footprint that humans occupied when the Ta arrived, a footprint again surrounded by an interconnected web of wilderness. This isn't the constraint that it sounds like at first, since the per capita area will be roughly double what it was when we began. We aren't going to start defining the hominid footprint and the areas to be abandoned just yet. We're still watching a few variables working themselves out. But much of the land to be abandoned will be missed as prime human habitat. The structural remnants of the old civilization will be open to recycling for eighty more years, then nature and wilderness will take over. We assume that even the old landfills will have some value to miners by then. New Mars will still be nine centuries away from its first terraforming colonists, and nineteen from being terraformed. The Ta, who are planning to move on after a two-hundred-year stay, might return at the millennium to assist, and perhaps help launch a much-worthier human species into interstellar space at last. But in meantime, they'll be leaving Gizmos, Gadgets, Spooks, and a few of the big Eck generators here, and they will stay in touch, watching our progress, whenever they aren't traveling FTL. They have at least two new promising leads on other "nearby" worlds to explore in the meantime. These aren't worlds we've observed from here, even with Bugeye. Nearby is a relative term.

Several characteristics distinguish the Survivor from the Meh. Most notably is a coherent enough individual Character to resist most peer pressures to conformity against personal directives, conscience, higher purposes, or even "the obvious." The Meh will believe what they're told to believe, which had made their democracy a pretty useful tool for anyone who could afford to do the telling. Other valuable human characteristics, like virtue, soulfulness, or spiritedness,can usually be found on more of a continuum than this, at least in the absence of pressures to be otherwise. But Character seems to be more discontinuous, as though there were a line or a boundary of compromise here that won't be crossed, like the demands of a strong conscience, or *Satyagraha*, Gandhi's word for Holding True. It's an insistence on taking personal responsibility for the things humans do as collectives, and the knowledge that collectives have no mind, purpose, will, or authority of their own, that all sovereignty must necessarily emerge and reside in individual beings. Survivor is less apt to ask "Where is humanity headed?" or "What will the future be like?" Instead it's a question of "Where do we want to go?" or "How do we want to live?" Neither is this a species of selfishness, despite all of the first person pronouns. It still comes with a recognition that all life is in this together, *mitakuye oyasin*, all our relations, that we stand on the shoulders of others, and need each other, rising or falling together in the end. People of Character will contribute what they can, regardless of the odds and averages, because this is the only way change is effected. This is Margaret Mead's small group of thoughtful, committed citizens. They might bristle when told to just let things be, that it's all just part of a plan, or it's just the way things are and it's all working out for the best. They didn't like being told what the future of warfare would be like either. They

might hope to inspire some collective action with personal effort, but that's different, and they'll continue on without it. These are the people whom Loren Eiseley called the Star Throwers.

The Great Work of the old alchemist was his own transformation, then ultimately, the transformation of mankind. Nietzsche would be quick to add that the key to this is the power we have to assign and reassign value, to choose what has worth to us and revise that as we mature in our powers. The Meh will prefer to have their values pre-assigned. When Survivors first awaken in life, when character and conscience first mean something important, their awakening might be triggered by the hearing of some particular ideology, but it feels like the force of it, the readiness for it, is innate, having lain latent and waiting for a call, needing no further alchemy. It might feel like a memory of having lived here before, or of being a more ancient soul, but that's not an argument for either rebirth or reincarnation. It's more likely just a fortuitous combination of nature and nurture, some innate and some learned. Tom Paine, in arguing against aristocracy, claimed correctly that virtue is not inherited, but getting a genetic head start, combined with a culture designed to optimize "the virtues" will still have a better chance, if our Gizmos' forecasts can be trusted. This means that we need to better manage the contents of culture. For this task we can look to evolution for models. There need to be three things: a general permissiveness towards creative expression and memetic mutation; some lethal selective forces and pressures to eliminate the inferior, useless, and unfit; and then an incubation of promising emergent entities, the new things under the sun, with rational precautions that aren't overdone. The second of these, lethal forces of selection against bad or toxic ideas, has historically been too weak in the human world. When we arrived, the Meh were ever so fond of saying: "don't be so negative, don't be judgmental, or only God can judge," seemingly unaware of connections between this and the striking prevalence of bad judgment. We needed Survivor, as an emergent species, to carry the culture's evolution forward, and Survivor in turn needs protection from attrition, the unending wearing force of the Meh. This process might have worked out on its own in due time, but humans, and Terra, had already run out of time.

The Van want to treat cultural evolution as intertwined with the sociobiological, as an interactive, dynamic, coevolutionary dyad. There are metaphorically useful parallels between the personal evolution of the self and that of a culture. Dual-inheritance theory claims that nature and nurture coevolve, and in similar ways, our sociobiology and culture coevolve. A driving force of the former might be the sense of well being, the Epicurean theory that *eudaemonia*, pleasure, or happiness is the best cue to keep on going, with displeasure being the signal to stop. Of the latter, it may be sexual selection, attractiveness of physical, social, or cultural success, and the promise of security that might bring, according to changing fashions, with social disapproval and loneliness being the disincentives. Much of what humans have been doing culturally now begs for selection. It's important to see who's smarter, more caring, wiser, harder working, eager to learn, more productive, more irreplaceable, kinder, or more willing to build a better world, and this should correlate with success. It's right that merit be rewarded and it's just as right that demerit fails, even that it dies. But selection doesn't really need to be natural. Nature doesn't exact justice in any consistent way, and barely even approximates it. Distress is not proof of demerit. Bad things happen to good people and good things to bad. We can change a little of this. This is one of the great uses of liberty: the exercise of free choice will gradually teach us how to choose, or select, provided that we're not protected from the consequences of choosing poorly.

The Van will be reconfiguring human culture and civilization around more fundamental biological values. But the long-term solutions want a longer-term vision.

In the short term at least, mankind is an impressively adaptive species. Great plasticity has allowed him to move into nearly every niche on Earth, and create new ones entirely, without having to ask beforehand how dangerous or toxic these niches are. New activities can spread rapidly, going viral, without any proof of viability. This gives the illusion that human nature has less innate structure and fewer requirements than it really has. Man can temporarily conform to environments antagonistic to his nature, and toxic to his psyche, subjecting himself to unnatural degrees of stress, crowding, and frustration. And then he will try to blame failure on something besides his natural limits when he turns murderous, depressed, warlike, or psychotic. We want to see a greater respect for the original human nature, for the baseline of biology and genetics, and we'll create the new culture with this goal in mind. What we know of biomimicry and natural systems will inform evolution in cultural ecology. The forgotten natural process is selection, and societies have gone far overboard in foreclosing the opportunities for failure and legislating against risk. General solutions are designed for the rarest of worst-case-scenarios, even though these are the best teachers. Somehow this is all done in the name of equity. For any behavior or lifestyle to show its viability or worth it must be practiced, risked, or hazarded. Then failure can teach us. Equally important is positive selection, an analog equivalent to sexual selection. For this force to work in an optimal fashion, equal opportunity must lead to unequal results, and thence to the oft-scorned judgment. Any systems which distort information about what works and what doesn't are sources of continued error.

Evolution as humanity has known it, or else avoided knowing it, doesn't look ahead. It rewards successes in the past, and much that's no longer relevant is dragged along behind. like junkDNA, appendices, wisdom teeth, vestigial mental faculties, and our big appetites for sugar and fat. But humans look at things through far too narrow a window on time. The short-term views are too subject to fashions and fads, and these have long-term effects. Human culture is perpetually establishing its ever-newer fashions and standards for sexual selection, with real depth of character and intelligence often suffering tragic losses. Civilization and medicine have removed too much of the selective pressure on the attainment of reproductive success without first securing the correction of inheritable genetic problems. Until the population problem could be solved, and pressures for growth eliminated, mankind would have continued to govern itself only short-term, from crises to crisis, and never find the peace needed to govern with a longer vision. Now at last, men may yet learn to plant seeds that won't mature in their lifetimes.

Our method of population selection was necessarily lethal. The coming consequences of humanity's choices being held so long in abeyance hadn't just pointed humankind irrevocably towards a deep population crash. It was also a crash destined to select for all of the wrong traits for the continued survival of any meaningful culture. Dystopian futures of speculative literature's last century were sadly much closer to our projections than was Star Trek and other more hopeful lights. If we couldn't crash the population ourselves, unnaturally, according to our own criteria, then nearly every living non-human creature would suffer what only the humans deserved. Man's great aversion to eugenics, or doing selection proactively and explicitly, might come from experience in having done it so badly a time or two. But then it overreacted and went too far the other way. The bleeding heart who wants every least thing to survive is really the monster when seen a few generations ahead. The Pope, for instance, in not relenting on birth control, would have one day, without our Intervention, been one of the primary causes of the suffering and premature death of billions, and not mere millions. While many people still claim that even a little of the extraordinary will redeem all of the bad and the ordinary, this is just rationalization for running amok,

under an unrelenting pressure for more. There's been far too much false redemption awarded. From our point of view, only the best of humanity is really worth saving, and the emergence of this minority doesn't really redeem or justify the continued existence of the rest. We are not going to consider one eighth of a thing that goes right as justifying or redeeming the rest that goes wrong. Boundaries we've drawn between the three species of man may still remain fluid for a thousand years to come. Some Meh may yet become Survivor, some Survivor, Meh. Some Meh may yet be deemed*Non grata*, and the children of Survivor will have no exemption from this. Human is as human does. That's what we are watching.

In order for cultural evolution to function well, creation and selection have to operate together as a dynamic process. Humans tend to favor one of two extremes: the more liberal will lean to relativism, diversification, experimentation, decentralization, and acceptance of unique cultural points of view. Meanwhile, the more conservative gravitate towards social consensus, standardization, homogeneity, centralization, monoculture, and stable ideology. The cultural liberals can be paralyzed by relativism, thought without a compass, and conservatives by parochialism, thought without perspective. The overgeneralized folk will seldom adapt well to particular niches, while the over-specified will lack the flexibility to adapt to changing niches. There is a happier medium in here, in an understanding of fitness. It's childish, though human, to think of fitness in terms of the dominance of one species over another. It really means the ability to fit in with a changing environment and meet its requirements. Fitness to most niches will only generally specify or suggest a range of successful adaptations, not just a single one. Good selection selects a diverse range of viable adaptations. When the fuller part of this wider range is preserved, diversity is preserved along with the depth needed to meet the vagaries of coming changes.

Sometimes evolutionary convergence can mimic homogeneity. There is, on occasion, a perfect solution. More often there are a few solutions. But no culture needs to fully maximize cultural diversity: this only flies in the face of the need for selection. Instead, we want to optimize diversity, in a biomimetic analog to biodiversity, to ask which parts of culture and civilization are worth keeping, which parts contribute, and which parts don't. Culture requires tolerance, artistic Bohemias, mad scientists, even the prophets on boxes in the parks. Dissent and antagonism aren't toxic in themselves. For lifestyle viability to be a selection criteria, it must first be permitted to practice, and perhaps this might even include such wrong-headed neighborhoods as Heaven's Gate and Jonestown. But then we will have history to learn from. We can point to all the dead bodies and say "Hey, look at that. More people should know about that." It's important that people, groups, and ideas be allowed to destroy themselves. Loss of tolerance is analogous to loss of biodiversity, but this doesn't mean that every silly or stupid idea must be tolerated. The impractical and the impossible solutions can serve usefully only as scrap material and food for successors, and often the sooner and more completely they fail the better.

For the Van, optimizing diversity will follow what's called the divergent track hypotheses. Big forces will resist a convergence into monoculture as a maladaptive approach. There is no Omega Point. Evolution's direction is towards a greater divergence and diversity, but with more capable communication between the widening points of reference or view. Culture types have a sort of family tree, but they aren't infinitely scattered. They converge around a few viable forms, or attractor states in Nick Bostrom's theory, which still continue to branch out. But viable trees also self-prune, dropping what doesn't work. In orchards, this is done for them. This is the Van approach to cultural engineering. We first learn what fails to work and only then get rid of it. We can't develop a Eupsychia, or a society designed for the fulfillment of

individuals, if we're going to try to run it contrary to nature and make people more or less the same.

Culture functions as the human hive mind, a vast, insentient intelligence, without a conscience or consciousness. Gaia does this as well. Systems are marvelous things, and they obey their own laws and rules. Culture gives our best individual minds some giant shoulders to stand on. Human beings really aren't all that bright when solving problems in vacuums, or when they cluster together in cultures that don't like to learn new things. The cultural inertia that's hampered man's progress, especially with its ideologies of politics and religion, is a problem that now can be solved. The culture is now at last ready for a major edit. This doesn't need to be a natural or spontaneous process, even though its development has so far been spontaneous, much like a language develops. Yet it's disingenuous to say that civilization has evolved in ways that people didn't choose. People just chose out of ignorance, driven by multiple unenlightened forces, and missing the most important understanding of all: that individuals are responsible for the group's collective effects on the world. Although people are "conscripts to civilization, not volunteers," as Stanley Diamond claims, especially in their pliable, formative years, we can work with that now. The real hope we have is getting to the young kids with critical thinking skills before the religious people and ideologues can shut down their young minds. Cognitive bias sets up like concrete and the only things that will eat through it later are years of therapy, years of mindfulness practice, or psychedelic drugs. But using reason or critical thinking alone isn't enough. Reason alone ignores the emotional components of delusion, like the peer pressures, hurt egos, and clinging to one's years invested in error, and these emotional factors have coevolved with intelligence. The rapid human journey from savannah to human zoo now finds man pacing the cage, with pointless, repetitive patterns and agonies.

The locus of culture is the relationship between the individual and the population. Most people don't have much early say about the culture they're raised within: the child is conscripted to this and will seldom learn or be taught that escape is possible. Larger frames of references are needed if young adults are ever to constructively step back and make rational decisions about which bits of the world's varying and available cultures they might wish to adopt. This can be an uncomfortable process, with overwhelming and soul-killing forces pressing for mindless conformity. And there are plenty of rebel memes and criminal memes to supplant the better options if those are not kept visible. In adults, this can train a lens on accountability issues in political and corporate structure: is the individual merely a fungible asset filling a vacant space in the structure, which space itself has all the power and accountability? Or is the structure the fiction and the person the real thing? Is sacrifice for the good of the whole a sacrifice of the only real thing? Does the hive mind really think? Can it be said to think if it doesn't care? Do great men and great events determine the course a culture will take, or does the culture and time produce the genius and the black swan? You need undistorted information about what it really means to be alive if you want to own the good answers to questions like these.

Evolutionary psychology offers new opportunities to refine the early work of Maslow and fine-tune our understanding of the hierarchy of human needs. This is the perfect place to develop and graft new social, economic, and political software in order to optimize the meeting of these needs. Social science must come to respect the wetware of the brain and how it works, and eventually reconfigure itself accordingly, or else it simply drifts off in the service of no real need. It's a useful oversimplification that the human neocortex is a recent overlay on the old mammal brain, which in turn overlays the reptilian brain. Look at the geometrical expansion of capabilities from old to new,

and note a parallel geometrical constriction from new to old, way down to where the emotional and motivational life is lived. The human neocortex is best used for what evolution kept it around to do: to look at options and run vicarious trial-and-error scenarios, not to take every least bit of data seriously. It doesn't hurt to be selective, to judge what goes on high in the head, to unlearn on purpose, to dismiss the nonsense, and avoid confusing the older, simpler parts of the brain with endless gibberish. The old limbic system appreciates this and life is lived more calmly.

While Memetics is more of an extended analogy than science, it can still be heuristically useful. Memes have no neurological or ontological status, but with an evolutionary template, the idea can provide tools to inoculate the mind against toxic memes, which carry defense mechanisms of their own. It offers tools to examine how memes and memeplexes can exploit guilt, shame, sin, fear, insecurity, inadequacy, and embarrassment. How to reason with someone who has adopted a religious disbelief in reason? How to judge a meme to be inferior when it has the dimmer three-fourths of the population convinced that judgment itself is inferior? We aren't going to argue successfully that "I am the Way" is an inferior meme to somebody who's going that same way. We can"t do this within the world of memes. We need a firmer place to stand outside of it. The narrowest ledge of solid ground will do when everything else is up in the air. That ledge can only belong to a practical science with some good predictive abilities. Some memes and memeplexes exploit what can only be called flaws in neural architecture, especially those related to social standing. This was a major source for war, needing only a small seed of induced anxiety, fear, or insecurity. This is why advertising works so well that two-thirds of human labor is spent on things not needed, why a woman might work for a week to buy her hundredth pair of shoes. Consensus or conformist biases will hold new and better ideas at bay, where they often vanish for lack of support. While there are good reasons to hold to a quantum of conservatism, as science does so well, we also don't want to stop the new improvements from propagating through a culture. When pernicious and toxic memes threaten to spread unchecked through a system, going viral with a call to faith or credulity rather than a proof of viability, these can be subjected to immune system analogs and questioned at the gate before they get into the mind and hunker down.

Modular minds are clusters of processes representing discrete neurological adaptations to some recurrent problems in historical hominid, primate and mammalian environs. We are now looking to the neuroscience of this to one day replace the pseudoscience of psychology, with its many mystical taxonomies, its seeming reluctance to heal paying clients, and its foundational database of disappointing human behavior. It has been so pretentious in calling itself the study of behavior that it never really stopped to notice that it, too, is another kind of behavior, and specifically, a languaging behavior. One set of names for some parts of the mind is archetypes. Jung described these as being inherited, and therefore encoded genetically, shared by the species as a whole, originally unconscious, originating in some sort of collective or shared unconscious. Many will see archetypes as "out there," as some sort of Platonic ideals floating around in a more perfect world, and those without critical reasoning somehow make the leap from collective unconscious to universal consciousness. But what Jung meant (and to some degree stated) is that humans have inherited predilections to sort their experiences according to specific social roles and behavioral categories that relate to getting specific needs met. The roles are the social types that are vital to survival within the tribe, like mothers, fathers, siblings, toddlers, babies, elders, allies, heroes, sycophants, cowards, alphas, tricksters, suckers, bullies, infants, etc., and we also have behavioral categories like treachery, flattery, dominance, commiseration, reconciliation, xenophobia, alliance, seduction, submission, sacrifice,

deception, obligation, grooming, etc. And as our lives progress, these predilections are fleshed out with cumulative experience into coherent role models and behavioral protocols. Cultural symbols and mythologies, when seen with evolution in mind, will say a lot more about what human minds need than they ever said about the pantheon of Heaven.

Archetyping is simple enough to encode genetically, and simple enough to avoid confusing the great apes who are also born with this skill. These models are at least as numerous and complex in man as those seen in the behavior of other primate societies. There is much more to primate social organization than the culture of the tribe. This collection lives primarily in the old primate brain that humans still share.We can no longer think of ourselves as rational beyond our animal instincts.There are differences between the species, as with facial expressions and gestures, but in general there's enough common ground even here for some mutual understanding. As cognitive neuroscience is exploding the idea of sense metaphor being inferior to the disembodied and purer forms of conceptualization, evolutionary psychology is "deconstructing" many recently cherished notions that the human mind is a *tabula rasa* and human culture is primarily or fundamentally relativistic. We begin to inquire into the structure of human nature, and to ask what components of behavior still underlie the diversity of our cultures, perhaps as human universals. The pendulum is returning to "human nature" with some force (and much cultural resistance). Cultural variations on innate or native themes still represents most of the data to be sorted here, but even this is no longer the polemic of nurture over nature that has occupied too many of late. We are more prepared to see blends and interactions of the two, but we can now begin with the potential of modest modules, and other human universals, knowing humans by the ways they behave in the world. It's time to stop looking to the priests for their explanations of how human beings are put together.

Our cross-cultural search for human universals has served us with a new combination of a needs hierarchy with social-behavioral archetypes, as foundational strata for a culture adapted to human nature. At the interface between nature and nurture, human cultural universals are underpinned by what looks to be a discoverable human nature. But assuming that evolution is cultural as well, it's time to start looking at how human needs are addressed in ways that might be satisfied in more useful ways. Natural human traits that adopt second-nature memes may have many alternatives and substitutes that are better fit to a richer or superior expression. Many ideologies, for instance, that appear to satisfy a natural human need for safety and security, are in fact toxic and destructive in other ways. Human nature will be slower to change than nurture, but these traits can usually take advantage of adaptive strategies provided by the faster-evolving culture. Additionally, the human brain will undergo some considerable rewiring from birth through puberty, and educational systems still take too little advantage of this opportunity to improve on people neurologically. We might use a cybernetic analogy here and view original nature as factory wetware and cultural programming as software that might be much better optimized for function if the original nature is sufficiently understood and properly respected. Advantage can be taken of improved modems and peripherals. In other words, we learn to design cultural software for enhancing who and what men really are, according to an understanding of who and what they begin as. As long as behavioral pre- and proscriptions are designed according to fairy tales about being an immaterial spirit creature placed here by an imaginary deity in the sky, humans are working with software that threatens the proper functioning of original nature. We want to re-root civilization in biological instead of tautological values.

Cultural Engineering

Now Survivor and Successor,the Fit and the Van, will create the future culture together, at first with the help of the Ta and Gizmos. Our most useful tool in reshaping the global culture is the power we have over the global economy, which includes the power of life and death over those who would use their wealth to do bad things to the Earth or their fellow human beings. The very term "economy" had changed in meaning from something akin to careful frugality into profligate over-consumption and wastefulness. Plenty of related terms have also been co-opted by human stupidity, such as value, treasure, appreciation, interest, resource, reward, security, premium, redemption, sustainability, assessment, richness, credit, and legacy. Value and treasure both work better as verbs, bringing us back to Nietzsche. Naturally, it helped that we Van could lay our hands on practically infinite wealth, and could form our own banks and print our own money, while we watched the global economy go down in flames. It would have gone down soon enough, it being little more than a house of cards and confidence game, backed and banking solely on infinite growth in a finite world. We've issued our Credits and Cents in specie, not fiat currency, backed by strategic materials. We soon became the gold standard, forming our own global stock exchange, but limited to Van and Survivor ventures. We issued interest-free loans for any worthwhile project, Survivor or Meh, but we did foreclose when we needed to. That was the need for selective pressure again. We thought it unnecessary to approach the governments, or related entities like federal reserves or securities commissions, for permission to do any of this. We thumbed our noses at the tax man. We paid well for the things we wanted to encourage, and more poorly for the things we wanted to have less of. We encouraged the new and remaining governments to lay their taxes accordingly, or to tax what they wanted less of, like waste, or extreme income inequality. We prevented total global economic meltdown while achieving other goals, like redistributing wealth according to better measures of merit. Most of the men in the shadows, who had worked the lawmakers like so many puppets, are either dead or bankrupt now, barring a couple of great-but-still-stinking-rich philanthropists.

Much of what we've done in centralizing the cultural database has already been presented in the context of education. Twenty years ago, clouds of raw, low-quality information were choking the planet like smog. Selection in that world had even come to be held in disfavor. Knowledge had been democratized so that a bit of foolishness and a bit of wisdom were to be assigned equal value. Truth had become relative in purely circular ways. There was no longer such a thing as meaning inhering in a statement, so communication was thought fallacy. The world was nothing more than a perceptual and cultural construct, and in fact was only created by that. The signal-to-noise ratio was unacceptably low, an excellent demonstration of entropy. We vowed to bring meaning and negentropy back to center stage. In a metaphorical sense, we're moving from r- to K-selection with our database, as well as in the human population, investing more in quality than quantity. Selection might be uncomfortable, but it's still vital to all evolution. Saber-toothed cats and very slow people were a match made in Eden: one got fed, while the other got gone, and humankind as a whole got a little bit more vigilant and quicker on its feet. In the absence of adequate predators, men evolved their own beasts and learned to prey on each other, but such an approach was just too maladaptive. That was a metaphor for the quality that we want, a vigilant culture that's quick on its feet. We Interveners have been known to bite.

We thought it important to do our selecting into a separate cloud and onto our own Internet. In this way we could avoid playing the public or general censors, allowing the

remaining humans to see and choose a better way, or maintain their great piles of bullshit. After observing the misinformative mess that had been made of the early 21st century social media platforms, we just had to introduce our own fact-checking requirement and censor the postings on our own sites according to verifiable facts. Some still have issues over what remains, what we failed to eliminate, but we maintained some tolerance and minimized resentment, preserving both red meat recipes and the higher-quality porn. We hope that the old Infoglut will simply vanish out of neglect, at least by the time the Meh have gone. While we preserved the recorded information historians and genealogists were wont to collect, we ignored what they had yet to think to collect. We copied several national security databases, for our own ends only, and primarily against the interests of national security. We then fried the original servers and published secret materials where they didn't harm individuals. No government file could be secured, classified, or redacted anymore, nor will one ever be now, but personal privacy is protected again (except, of course, from our Spybots and Skullbugs). We became the ultimate whistle blowers, but this will hardly matter once the *Non grata* are more completely gone. Allowing citizens to see what shenanigans their governments had been up to underscored what eternal vigilance should have meant.

One of our finest achievements, in our own humble opinion, is the new *Encyclopedia Practica*. This includes all of the plans, designs, formulae, and technologies that groups of human beings might require for their perpetual survival, at acceptable levels of comfort, with minimal externalities. It's guardedly open-sourced and updated regularly. But it's also edited to 50 million words within 100 volumes, and will remain fixed at that length. The first two volumes are a tour of the technological development from the stone age to the first empires, with enough instruction to start a civilization from scratch, using just rocks and sticks. We also created the sibling *Encyclopedia Lex*, a.k.a. The *Lex*, also constrained to 50 million words in 100 volumes. Like the *Practica*, the first two volumes cover the origins of law and ethics, but not beginning with Hammurabi and Egyptian law. We begin this with zoology, primatology, and neuroscience. Origins of human law are covered in volumes three and four. Within a few generations, the sum of all the human laws and codes, civil, penal, regulatory, and constitutional, will be limited to only the words found within this collection. Once full, the addition of new materials will require deleting others. Analogically, this will parallel the Terran carrying capacity, and seek a steady-state equilibrium. It will also the keep lawyers and legislators from running amok again. What we have now, at year twenty, is still in draft form, and still admitting new suggestions, but the*Lex*is already available to the public as an AI legal assistant and a free legal aid service for routine applications. The AI won't yet pass judgment, but our Fair Witnesses, mediators, and arbiters may cite the *Lex* with legal force, and in any civil or criminal trial anywhere in the world, defendants may now demand a substitution of the *Lex* for any other local laws under which they are being tried. This is most useful with any remaining victimless crimes and legislated religious proscriptions, which the *Lex* won't recognize as crime.

Out of necessity, we've created two temporary imbalances in human population demographics. The growing proportion of elders is unquestionably the worst problem, even despite what we do to keep elders employed in caring for both their own elders and teaching the very young. The pyramid and Ponzi social welfare schemes that relied on an ever-growing younger population can be partly funded out of our Van wealth now, so that isn't much of a problem at least. Medical care and pharmacology have been vastly improved, with Gizmo assistance, and the entire globe has single-payer healthcare now. We've added well-care centers to deal quickly and efficiently with

routine medical problems. With the population falling quickly, we now have plenty of housing facilities opening up, even though many buildings are aging. The second demographic problem is an imbalance of the sexes. Unsurprisingly, the great majority of the *Non grata* we removed carried the Y-chromosome. This left us with more widows than widowers, and more single women. Some, but not many of these were Survivor, but these were more often than not relieved to be thus relieved of their *Non grata* spouses. To some degree, this has counteracted an earlier bit of foolishness found in cultures that had favored male children to the point of normalizing infanticide. It's also bolstered practices and lifestyles of both polygamy and lesbian marriage, which the Van have no problem with (nor with their counterparts).

Demographic imbalances were greeted with overwhelming despair by many, mostly among the Meh, who also had to deal with the psychological blows of their permanent reproductive barrenness and collapse of their confidence in the world's great religions. We offered a cure for these problems, for anyone who, for any reason at all, no longer wanted to live in the future we're creating, and not just those who were ready to graduate from hospice care. It coincided perfectly with our goal of bringing the human population down. By I+1, we had begun to establish our global network of Thanatoriums, completing the net against the last of the cultural resistance by I+4. These are places of compassion. We begin with the counseling, including any clergy who aren't utterly appalled, to verify that minds are sound enough. We also have mandatory legal services to write wills and ensure that affairs are in order. We offer massages, and even sexual services and hand angels, for those who want some extra kindness before they go. The manner of death is always the same, the most pleasant death imaginable, the extended, 24-36 hour version of the Spybot neurotoxin, in a comfortable bed or garden. There is one big catch here: while the funeral types and last rites might vary, the "burials" mean taking the compost, all that remains, and working it back into the living soil. No more embalming fluid and waterproof caskets. The nutrients comprising the body cannot be denied to the soil. In the last nineteen years we've assisted in the voluntary ending of nearly fifty million lives, the majority being for reasons of extreme old age or infirmity, incurable genetic diseases, and terminal illnesses. But no soul has been turned away who made it through the counseling and legal services and consented to becoming rich soil, even those who wanted to check out for nothing more than mild depression. The ongoing extermination of *Non grata* continued as well, and in numbers slightly larger than those of our volunteers.

In constraining humanity's fertility, we aren't specifically selecting against stupidity, voluntary or otherwise. We're looking more for Character, the Chinese *Dé*, which carries implications of self-directed behavior, natural virtue and aristocracy, integrity, and conscience. It was only incidental to this trait that the average intelligence of the fertile population has risen so significantly. Similarly, in the new editing of human culture that the Van are providing, we are not specifically selecting against any of the organized religions, not even the more troublesome Abrahamic faiths. Of course the faiths used by *Non grata* to justify their intolerant behavior suffered some heavy losses, particularly among the fundamentalists like Evangelical Christians, Jihadists Muslims, and Zionist Jews. Only a few misguided Hindu and Buddhist factions were wiped out. This can account for some of the collapse of the religious faiths among the Meh, but some credit is also due to their deities having been completely useless in rescuing them from the wicked space men, who weren't even supposed to exist in a universe created for the ever-so-special Mankind. These deities still have an open invitation to intervene in our Intervention efforts. In smaller numbers, the Meh will still flock to church every week. Their beliefs seem to be drifting towards a more Unitarian-Universalist sense of things, which we have no problem with. Most of the hate and

intolerance is gone from their sermons, although the hypocrisy persists. Importantly, they remain together as harmless flocks, with shepherds for comfort. The *Tanakh*, *New Testament* and *Quran* remain in our database, gloriously deluded and childish, for all to see without the handicap of early brainwashing. There have always been exceptional practitioners within all of these faiths, especially among the more mystical traditions, and many actually practice the ethics that they preach, but we think that these might have practiced right living despite their religions, and not because of them. If humans are how humans behave, then we have to look at what kind of behavior the ideology elicits or justifies in its adherents. If a Christian is as a Christian does, then President Jimmy Carter was more of a true Survivor than a true Christian. Most of these more virtuous and less hypocritical souls we now regard as Survivor, not Meh. In some, therefore, religious faith lives on in practices of charity and compassion.

On the whole, the Survivor were a less religious bunch to begin with. They didn't need to be told right from wrong. They already knew it was wrong to kill and steal without threats of hell, threats which never seemed to work on the religious folk anyway. They have their own minds. They don't seem to need to make up a bunch of metaphysical bullshit, or pretend to know god, or what spirit is, or consciousness, before they can truly appreciate the sacredness of the world, or feel reverence, or gratitude, or think Nature worth saving. The sacredness of it all runs throughout the whole of being, and upward through life and sentience and even into spirit. The process of evolution is itself the creator, even though it has no mind, no heart, no plan, and no divine love or justice to give us. All of that stuff is Life's job. Mutation is the author, and selection is the editor. The editor can be really mean to us, but that will serve a greater good. The scripture is Nature, so that no true science can ever be forbidden. Entropy may be the rule, but we can still fight it locally. One way or another, we're either done evolving or we're not. If we want to live beyond death, we learn to serve something greater and better than ourselves, a higher purpose, but we still have to remember here that something greater and better than we are, by definition, is just not about our rewards. Personal and social awakening and the mending of the world, the Tikkun that we Van call an Uplift, are the highest goods we hold. This sums up what passes for a religion among the Van. We aren't trying to promulgate or proselytize it, but it's there for anyone who wants to give it a try. It tends to spread almost exclusively by example.

What we've done politically is largely covered in the *Lex* and the Six Mandates. Of course, we went to much greater lengths to end war and ecocide than simply making them illegal. With all of the soldiers dead now, and anyone picking up arms to prepare for war being about to die, a lot of the old rationale for the old-school nations and national governments has gone away as well. Governments have gone back to securing the rights claimed by their constituents, using no more than the powers they've been duly granted, to providing and maintaining public infrastructure, and securing the welfare and well-being of their people against forces beyond their control. Eventually, perhaps once the Meh are all resting in peace, we want to see national residence and citizenship function as little more than a higher order of street address, for directing the mail and packages. The nations will continue shrinking in size and growing in number, fragmenting more than coalescing now that war and the need for the military and trade alliances are gone. We're still encouraging a national identity and culture, but the propagandists won't be around to paint those who differ as the enemy. Governments now have anti-growth measures built into their constitutions. States exist to solve problems, so that a long-term record of growth is in fact a measure of the growth of the problems and failure to solve them, not a good reason to continue to do the same things. The welfare altruism that can let a state burgeon out of control is constrained

now by the demand that altruism be effective and optimized for effectiveness. Having a stable population below the global carrying capacity will also be more than a little useful.

Ten years ago, we introduced a new level of citizenship called Freeman. These are citizens with similar privileges to the Fair Witnesses, our roving circuit judges, mediators, and arbiters. They are citizens of Terra and their passports say so. Terra has its own embassies now, and an intimate relationship to the restructured United Nations. The Freemen are at liberty to cross borders as though they didn't exist. Only a small percentage of Survivor carry these passports today, but their number isn't limited in theory. Like Fair Witnesses, Freemen are subject to triple the penalties and fines when found to be abusing their liberties, but they are also entitled to invoke the *Lex* as an alternative criminal code when brought up on local charges, and they may also demand the recusal of any judge except a Fair Witness. Eventually we want all Survivor to carry the Terran passports, so that national boundaries can be fully permeable, and staffed by greeters, instead of armed guards and customs officials.

Bioengineering

Synthetic biology, creating new life forms and modifying older ones, is a predominant feature of Ta'n technology. We've already seen the things they can do inside Synthiont, human, and Van cells with their Nanolife Endosymbionts. The neuron-dwelling Glints don't belong in this category, as these are straight-up, non-living Nanotech. The Ta will also use similar devices inside viral and microbial forms, both prokaryotic and eukaryotic. Nemos is the Van term for the nano-engineered microbial organisms, or Nano-Microbe Hybrids. Most of the synthetic lifeforms that the Ta will be introducing to Terran ecosystems will have at least one nanotech components, although this is often nothing more than a Nanobomb kill-switch, or dead-man switch for quick and lethal responses to any gray and green goo scenarios, especially in free-foraging replicators. Neither is it always enough for the little machines to quit working. It's also often necessary to get them to break themselves down as well, to avoid buildup of dead Nanobits, called Toner by the Van (after Stephenson). The dead-man switches rely on a signal that Nanites must intermittently receive in order to maintain their function or replicate. The protections have to be foolproof, even if they are only the first line of defense. Backup defensive plans calls for the Eck Screens to reconfigure runaway molecules.

Early on, it had seemed sufficient to the Ta just to re-engineer biological organisms for specific tasks. But any species that tried this was doomed to log failures, and even a disaster or two. Their worst mistake took two of our centuries to correct, and that was on a world of unicellular life. Life is opportunistic stuff and it mutates. The Ta eventually learned the proper quantum of precaution and the construction of infallible kill methods. They've since practiced the technology on scores of worlds, although most hadn't evolved multicellular organisms, or even multicellular colonies. Usually this is done to nudge ecosystems into better balance or some form of sentience. Only twice have they created multicellular life forms on single-cell planets. Several dozen complex alien organisms have received one or more forms of genetic Uplift, some for increased functionality, or augmented intelligence, or genetic evolutionary boost. On Earth, the first of the Uplift modifications will offer some experimental degrees of morphological freedom to Sentients (metaphorically known as Dolphin Hands by the Van, after Niven), or a greater longevity to enable more cultural development, especially in cephalopods. Some important but over-specialized and dead-end species will regain a degree of their long-lost genetic versatility.

Not all manipulation of cellular life is done with Nanites, but pure microbial engineering can be done only with proven and perfectly reliable genetic failsafes. Biodesign isn't a tech to enter without precautions. Humans had already made some impressive advances in this with Genomics, especially with Venter's work in meta- and eco-genomics. Humans were just starting to tinker with adding task-specific Exogenes to known organisms, usually to simple bacteria, and genomic modification using retroviruses, virus capsules, and CRISPR variants. New Alt fuel production methods and Ecoremediation were some of the worthwhile incentives, but the humans were only beginning here, and correcting human errors wasn't sufficiently profitable in a failing economy that could still see only short-term results.

Much convergent evolution occurred throughout the galaxy, thanks to the natural laws of chemistry that gave us DNA and ion channels. Galactic exploration had already provided the Ta with numerous general models of viruses, extremophiles, prokaryotic bacteria, eukaryotic protists, fungi, plants, and animals, and nine other general forms of prokaryotes and five more of eukaryotes not now found on Earth,

some with trillions of variants. Many would not play at all well with others, and a few could quickly eliminate all other life on Terra. Xenobiology generally follows the rules already discovered or at least glimpsed here on Earth. Ta-M, the Mycos, were a major exception, of course. Single-cell and the simpler multicellular life forms, as it turns out, are much more common in the galaxy than humans had expected, while complex, intelligent life is far more rare, primarily due to solar radiation or cosmic mass extinction events, to which the simpler life forms are more resilient. The Ta have uncovered evidence of nine long-extinct, advanced and intelligent alien species but seven of these were so long ago that no cause for extinction could be determined, and another is only guessed at. One more recent tragedy, another self-styled wise and intelligent parasite run amok, foreshadowed what the human beings were doing, convincing the Ta of the worth of stopping this here, at any cost.

Single-function microorganisms with customized genomes and behavioral traits are useful for food production,waste recycling, ecoremediation, biomanufacture, building materials, biomedicine, and biofuels. The Ta projects in xenoforming and habilitation of non-living worlds are almost exclusively done with simple biology only. It was thought important to avoid Nanotech on planets that would be altered and left behind for extended periods. Although sometimes this would mean the insertion of alien or engineered prokaryotes and other new organelles within existing eukaryotes, obligate endosymbionts like mitochondria and chloroplasts were more generally ruled out, and simple germline editing was preferred to wholesale genetic engineering. Most of this genetic manipulation was done now with Eck Screens and Nanocrisprs, the Van term for Nanite Geneworking tools.

Nanolife Hybrids will be introduced gradually into Terran life forms over the next thousand years. Some of this technology has already been surveyed in a general way in describing the creation of the post-human Van. A bit disappointing to us, the Van are "finished products" for the duration of our own lives here, but once Survivor is back on track, we will breed more of our own kind, with Uplifts like we'll be giving Survivor. Our offspring will be missing the Glint connections to the Gizmos and the Ta, and also the genetic modifications that left us so average-looking and invisible. We're in no rush to reproduce, as we have no biological clocks to tick, and there's far too much work to be done just to repair and salvage this planet. Survivor will almost certainly receive lesser cullings over the next few centuries, and as they emerge with some reinvigorated genetic potential, they'll be given new Nanolife Augments, Uplifts, and further germline editing. This far into our Plan, they will be able to withhold their consent to these modifications. So far our modifications have been strictly corrective or remedial.

The plans for human Uplift, as they stand now, might take some getting used to because the genetic modifications that the Ta are currently examining will alter average human appearance a bit, and quite unexpectedly, these may give them a somewhat more Simian appearance (without a return to the tails and fur). This Simian look will also be characteristic of the next generation of Van. We'll be pretty again, but a new kind of pretty. Imagine a photo of a human with the several human races already blended into *la raza cosmica* by a thousand years of more open-minded breeding, then morph that about an eighth of the way to a photo of a bili ape or bonobo. Our bodies will have larger energy budgets, both for better brains and better brawn. This won't be the expected look with giant bald heads atop skinny little bodies. Projections show larger brains, more like *h. neanderthalensis*, or *tursiops truncatus* (but not as convoluted). Our new hominid brains will have new organic parts as well, at least one new endocrine gland, called a Shulgin, which will supply us with more endorphins, neurotransmitters, and other goodies for better voluntary management of emotional and

altered states. We can expect to have new neural modules as well, accommodating custom Sensoriums and some new heuristic mental functions. Human heads will be larger at birth, which will follow a full ten months of gestation, and this will necessitate some modification to the pelvis, and more resilient birth canals. Our skeletons as a whole will be less gracile, and robust enough to cope with a doubling of human physical strength, like *h. erectus*, but still well shy of *pan troglodytes*.

Genetic and evolutionary downgrades will also be developed soon. Pigoons, transgenic pigs bred for human replacement organs, might not be needed at all, given Nanofax replication of organs and tissues. Bobs, or Beasts of Burden, a Van term, will be available for those too squeamish for Vat Meat, or too fussy for Butcher Plants (from Simak). Bobs will be a livestock engineered for optimized conversion of nutrients into high-quality protein, but guaranteed completely insensitive to pain and suffering with their sentience and nocioception removed genetically. Tiny new predators, on the scale of smaller insects, are already being engineered to control invasive species of both plants and animals, as well as agricultural pests, and they're designed to die off or consume each other like dermestid beetles as their food supply runs out.

We've built several Arks for the full Terran genome. These are real Arks, seven in all, all clones of each other, spread out across the solar system. One of them will travel away with the Ta when they leave, one is now kept in deep freeze on an undisclosed Neptunian moon, one is on the much-disclosed Luna, one in in a shielded Kuiper Belt capsule, with propulsion and sense enough to take cover against bursts of cosmic radiation. Two remain on Earth. The Arks are unabridged collections of all known Terran species genomes, from all of the kingdoms, from the living to the long-extinct, with the exceptions being the diseases that we ourselves have put down, along with their dangerous ancestors (the reverence for life can be taken too far). The Gizmos raided every source they could find to get the samples: the doomsday seed vaults,arboretums, botanical gardens,aquariums,zoos,Venter's Sorcerer collections, natural history museums, and the unexcavated, unswept Earth itself. It was ironic that all of those animals who had been murdered to furnish the natural history museums actually rescued several species from extinction.

We gave special protection to endangered species, expanding the CITES checklist to include all of the kingdoms. The Mycos, of course, were most concerned with the Fungi, with increasingly clear good reasons, and we deferred to them in all questions of intricate networks. The Vestans have been our go-to experts on symbiosis. Some of the more naively innocent poachers, like natives who had never been told that bush meat was now prohibited, were all given at least one earnest warning. The Gizmos might have to appear to some of them as holographic Spirit-Proxies, and this shock was usually enough to alter their behavior. Others, less innocent, or just less able to understand the warning, would need to be sacrificed for the greater good of Terra. A few examples usually sufficed. All commercial projects that threatened or endangered the threatened or endangered species were brought to an abrupt halt until alternatives and mitigation could be secured.

We restored breeding populations of every species that we think was driven to extinction by the actions of humankind. We expanded the new Mammoth and Mastodon experiments to more viable numbers. Established minimum viable population figures aren't a big driving concern for our project, but only since we're able to correct genetic defects or add genetic diversity prior to gestation. Still, we've always insisted on minimum breeding populations of sixteen or more, and with some gratuitous diversity thrown in for good measure. We've built reserves now in several biomes, in regions now surrounded by the newly expanding wilderness. In most places,

we'll let reintroduced species compete with more recent endemics for their second chance in the world. In only a few are we keeping them in separate Lost Worlds. The border walls built for political ends by some recent hominid idiots got recycled for this purpose. Our most impressive recreations were not killed off by humans at all, but who could resist returning a few of the 20-ton *Indricotheriinae*? The Ta-Raptor insisted on bringing back a number of saurian raptors, but these were the only dinosaurs we rebuilt, and the experiment was cut short by behavioral problems: they didn't have much to say to each other in the end. Unlike the human experiments, gestation didn't often take place in the wombs of extant species. Their embryos and fetuses were cooked up in the same sort of floppy pink bags that nurtured most of the Van to our birthdays as well. We once again have our cave bears and saber- toothed cats, giant ground sloths, half-ton beavers, stellar sea cows, dodos and aurochs. The list goes on, but sadly, it still stops short of the gryphons, unicorns and dragons. For these we just need to look for the Ta, playing around in their Proxy forms.

Only a few of the extant species have received any significant Uplifts. We've already given much greater longevity to selected cephalopods, allowing them to develop more of a culture. Some are approaching twenty years of age now, instead of dying at two or three. The metaphorical Dolphin Hands will be switched on soon. These are neural implants that will give the cetaceans new "thought operated" remote control of mechanical devices, most especially to facilitate interspecies communication, since human researchers have proven too homocentric and stupid to learn Delphinese. This is a Ta-A project, since their own original brains were set up for echolocation too. The implants reestablish old neural connections to vestigial fingers in modern cetacean anatomy, so that their use of these Hands will in fact feel like using hands. The Rays now have biochemical defenses to repel remoras and predators, while keeping their attractiveness to their cleaner fish. Eventually, Uplifts will be more common, although in the majority of cases these will only be Uplifts in unexpressed genetic potential, or an undoing of mutations that foreclosed future evolutionary options, sending species down dead-end pathways. We still aren't sure what to do with the marbled lungfish and Tiktaalik genomes, but we're surely keeping those guys around. We've only just touched on what we're beginning to plan for Survivor because we are only just beginning to plan. We may not begin this Uplift until after the last of the Meh are gone, and we'll be taking it slowly. We want the changes to be more genetic than nanotech, and we'll likely want these for our own Van children as well. We think the Gizmos did a good enough job designing the Van, but we're bionic Synthionts, who are closely connected to the Gizmos and Ta. Our own kids won't have these connections, or Glints either, although they may keep some of the new synthetic features, the Nanosomes, Nanocytes, Nanodocs, and Nanochondria.

The Commons

At I+0.5, at the same time we issued the Six Mandates, and as a part of the Fifth, we declared a joint claim by Survivor and Successor to full legal standing and proxy rights on behalf of nature and the commons, of life and the biosphere, of all sentient and self-aware beings, and of future generations. The Van had dragged Survivor into this without much advance notice, but they got over the shock and used to the idea, since most of them were already fighting some sort of battle for environmental causes, where not occupied elsewhere with issues of social justice. Our efforts to diminish the demands on the environment were aided by the falling population, beginning, just in the first six months, with the deaths of three-fourths of a billion *Non grata*, who tended to be either over-consumers or inflicting some other kind of global destruction. The lightening of these pressures was also aided as the Meh began to realize that we meant business and we tended to frown on wasteful lifestyles. Killing the world was now a capital offense. Per capita consumer consumption began to drop noticeably, and recycling soon doubled, but a lot of the Meh went on not giving a damn until actions were more relevant to their shorter-term visions and views. We made participation in environmental cleanup efforts a condition of financial assistance to both the Meh and human governments in general. This could mean up to twenty percent of a government's budget wherever a population had been especially thoughtless.

A deep restructuring of human agricultural practices was an even higher priority for us than was climate change, in part because the easiest and most effective ways to get atmospheric carbon sequestered again is to turn it into living root structure and creating biochar and *terra preta*. Modern agricultural practices had turned far too much soil into dirt, subject to wind and water erosion, and driving up the need for costly system inputs. Follow the money. We aimed to change that back again. We gave the farming world, with its big corporate investors and chemical companies, no more than five years to convert to sustainable and regenerative systems. That wasn't just five years to show some progress: it meant having whole systems in place. A failure to comply meant seizure of lands and redistribution of legal title to farmers and wannabe farmers who had taken the time to study the alternative methods we offered, and taught free of charge, of course. More than three-quarters of the big agribusinesses failed to meet our demands and lost their giant farms, but some of this happened even sooner, accompanying the loss of the corrupt congressional legislators dealing out enormous farm subsidies. The small farmers did well by comparison, but this was also due in part to the Van paying off their loans with the old, now-hyper-inflated currencies, then backing their ventures anew with no-interest loans, issued in Space Alien Credits.

Topsoil losses by weight had been exceeding food production for years. We've reversed that now, in places with accelerated seral succession now moving several orders of magnitude more quickly than the normal, geological, snail-paced topsoil building. We needed the agricultural soils reloaded with organic carbon for reasons that went well beyond CO2 sequestration. Soil water retention and irrigation efficiency were two of the reasons. Our push for minimum-till farming and perennial, self-maintaining, competent, hardy crops brought the life back to the dirt, although some of the old, persistent, biocidal chemistry lingers even today. Sludge, mulching, and manure, combined with much better mycological science, helped to keep the nutrients right where they belonged, reducing and often eliminating need for soil amendment. It also requires deep root structure to uplift the newer minerals from weathering bedrock. Legume cover crops were our easiest path back to ample soil Nitrogen. Phosphate production was peaking about the time we intervened. Potash for potassium was less

threatened, but getting more costly to mine and ship. We wanted to minimize both of these inputs, and eliminate the impacts at all phases of mining, transport and fertilization. Peak oil had come and gone by Intervention, so we needed to cut back on energy intensive farming and harvesting. It was our goal to leave the last 25% of Terra's extractable oil permanently in the ground. We recruited beneficial grasses and forbs, especially the endemic wild edibles, for weed management and pest control, and used our livestock and bugs to manage those. We're keenly aware that animals, plants, and fungi coevolved, and we make use of all three in our biomimetic endeavors. We support responsible, holistic grazing management, even offering cash support to the Savory groups. We banned feedlots and other CAFOs, demanding that all grazing henceforth be free range, and we blocked all further deforestation for grazing and other agricultural purposes, especially for palm oil. We've now forbidden lethal predator control, requiring new management methods that make use of predation for overall herd improvement. We refused to finance even the vegan farms if they weren't prepared to integrate the animals with faces into their agriculture. We didn't demand that the animals die, of course, only that they be respectfully exploited.

We worked to bring the value-added aspects of agriculture, like canning, drying, pickling, and butchering, back home to the local economies. Somehow it had made sense under the old economics to ship raw products around the world for processing, then ship them back home again, but under our system this was a massive waste of energy and other resources. We took the idea for state agricultural college, and county extension agents from the former US and globalized it, so that every community has access to our state of the art agriculture, which means something different now from the schemes of Bayer, Dow, and Monsanto. Most of those crashed and burned. Of all the new techniques we supported, and backed financially, none received more attention or less editing than Permaculture. We packaged this, after adding a dozen of our own general principles, and spread it around the world, tuition free. Our integrated pest management was also a major educational thrust. Prohibiting monocultural crops greater than 20 ha in size, or spaced less than 500 meters apart, helped plenty with the massive invasions, but we offered a bigger arsenal than that, even microbial engineering and Nemos, where the more natural methods proved inadequate. We also demanded improved water management, from selecting crops suited to the local rainfall, to closely regulated irrigation inputs, to recycling topsoil and fertilizer-laden drainage and tailwater. Whatever got past that gauntlet only fed algae, so we developed systems to harvest that for biofuel and fertilizer, before it drained fully into the lakes and seas. We prohibited all further drawdowns of the fossil water and other deep aquifers, constraining annual draws to reliable replenishment rates. Closed-loop systems were a goal for all local farms and ranches, so we also demanded some aquaculture, local composting, and methane production. So far, we've managed to nearly eliminate the non-natural herbicides and pesticides, while still bringing the global crop losses from weeds and pests down from forty percent to twenty.

Our projects in the desert colonies have advanced progress in biomanufacture by decades. Our glass tanks were replicable most anywhere, especially where there was native sand, but the tech still required clean water reservoirs while our prototypes desalinated the nearby seawater. We moved forward full throttle in developing both lignocellulosic ethanol and algal biofuels, and the nutrient-rich mash they left behind. We developed superior enzymes for those purposes. We put an immediate end and prohibition on using food crops for ethanol production. Our Rocket Pine lumber, grown in the glass tanks, would never produce enough timber to fill the old logging industry quotas, but we did allow responsible silvaculture to continue on private lands that were already logged. And we have material substitutes available, Callotropes, non-

petroleum plastics, hemp, and plenty of abandoned houses and buildings that need to be recycled. We developed ways to recycle the world's accumulated plastic pollution that made it more cost effective to collect the scattered litter on land in at sea.

Education now demanded that graduates understand the word Resource, that it's etymologically the same word as Resurge, to rise again. A resource, then, will come back or recover. It's re-sourced. The term "non-renewable resource," then, is an oxymoron. Nothing non-renewable is a resource, no matter how many times we can come back to take more. These, instead, constitute non-renewable natural capital. Agriculture is now limited to resource use according to this definition. The legal term for this is Usufruct, a right to use the fruits or output of a system without diminishing the source. This is Nature's method too. We use natural systems as models for agriculture, but we also work to increase natural yields by means of greater efficiency, especially in primary production. This is a Permaculture principle too. Differences are quantifiable as better agricultural yield or system export, but the exports must eventually find a balance with energy and nutrient income from outside of the system and/or more efficient energy and nutrient capture, storage and waste management, or else the system won't be sustainable. Natural biomass productivity might be the safest long-term design limit on designed system output, but if we can eke out more without harm or loss, we will.

Once we had our agriculture doing the great bulk of our carbon sequestration, the rest of our efforts at atmospheric cleanup were straightforward, if high tech. It was silly to let all of that carbon go to ground, given what the Ta could do with Callotropes, the carbon allotropes. We constructed our massive prototype carbon scrubbers in the desert colonies, and then spread the open-source design to investors around the world. These primarily produce various nanotube cables and graphene sheets for construction, but the Spinners and Weavers aren't our only machines and we make other products as well. The perfect locations for these air scrubbers were downwind from melting permafrost, where we could process more concentrated CH4 and CO2 at the same time to make C2+ and pure water, using a catalyst and the Thelarian Nemos, but these spots only remained perfect until the fiercer winters came roaring back to us, which they're now beginning to do. Most of the remaining atmospheric pollutants are now being produced in lower quantities than atmospheric recovery rates, and most of these are now the byproducts of Altenergy manufacture, more efficient industry, and greener transportation. We've resorted to Eck Screen Intolerance Fields to disassemble molecules of man-made legacy contaminants like PCBs, PFASs, and other persistent organic pollutants. While jet travel has been reduced by better trains and lower populations, per capita jet travel has doubled in twenty years, but it now uses renewable algal biofuels.

Helping the oceans to recover hasn't been nearly as simple or straightforward as the atmosphere. Humans really made a mess there. You would think that 1.4 billion cubic kilometers of salt water could absorb the waste of one lousy parasite. A lot of the healing will only happen with time, maybe centuries of time, but we've turned things around already, with a cooler climate and less acidity. Terran thermohaline circulation was severely compromised, especially the AMOC, the Atlantic ocean conveyor belt, which was saved just in time to spare northwestern Europe. This recovery may only require a few more decades. Plastics in the oceans had become a serious problem by Intervention. Some experimental remediation efforts were underway by then, but we needed to step this up in a hurry, so we made it a focal point of the environmental cleanup strings that we attached to our financial assistance. We also provided some new technologies for recycling the recovered plastics, leading to new and affordable building materials that integrated well with Callotropes and recycled steel. The worst

of the marine noise pollution, and its horrible impact on the cetaceans, disappeared with the world's idiotic navies and fossil fuel miners, although we are still using a great many of those ships for ocean research. Improved engine and prop design, together with the new windjammers, parafoils, and spinnakers, has helped that situation and saved the merchants money as well. A drastic reduction in global commerce has quieted things down too. Ocean acidification is still a problem, although we've tipped the balance back with our atmospheric CO2 projects. We're doing some carefully applied iron fertilization to boost plankton growth. Wherever we're desalinating seawater, we're also extracting carbonic acid. But the final solution is still time, and many decades more of that. The fisheries are already beginning to rebound, within strictly enforced harvest limits and standards, and the limits still imposed by remaining plastics and acidic waters. The human consumption of seafood has dropped dramatically, partially due to heavy metal accumulations and radioactive food, but mostly due to the demise of the poaching and illegal fishing industry and its despicable minions.

Public lands grow as the population falls and the agoraphobic survivors tend to recluster back together. We won't formalize the shrinking footprint for a few more decades, but it's happening in informal and informative ways already. All extractive industry, formerly resource extraction, ends when the land becomes public, and placed under the joint stewardship of Survivor and Successor. This normally follows a period set aside for the salvage of the man-made materials being left behind, with the highway asphalt being the last to go. The volume of salvaged materials has now more than equalled that of mining raw materials. This was nothing new to the metal recyclers, who were happy to show others how it's done. The public lands now reverting to wilderness will be forever off limits to harvests and human management, except in some cases where wildfire or diseases threaten the life beyond the wilderness boundaries. We encourage continued access to whatever used to be the national parks and monuments, but only using publicly owned electric vehicles, and now without concessions for private business. Elsewhere in wilderness, old roads will be obliterated and access on tires prohibited, bicycles and wheelchairs excepted, electric or not.

As for the rest of the world, recycling will gradually become fully mandatory as the Meh fade away. Already single-use packaging made from non-recyclable or non-compostable materials is prohibited. Mining permits are already being issued for old landfills and garbage dumps. Posterity may yet discover some long-buried secrets there. Salvage claims are issued freely and free of charge for other sites, like old towns, factories, and other buildings and facilities, subject only to liability waivers and performance guarantees. Cleanup of toxic dumps and spills is often a paid endeavor to support efforts to render materials harmless, or better still, useful again.

The Tour

I didn't think I'd be talking very much about my own life in this report, but there are a couple of things I'd like to share in closing. By the beginning of I+19, I hadn't yet been to space, although at least the first of every one of our projects was up and running by then. Two of four Beanstalks, with fully operational facilities on the counterweights, had been elevating Survivor and undercover Van into orbit for several years already. The Fleet ships were now making settler rounds to the S-T-4 Tube Town, and final punch-list construction runs to the S-T-5. The Tube Towns at T-L-4 and T-L-5 were at the same stages. The equatorial and Santa's Village Lunar colonies were habitable now, with the Artgrav centrifuges, but still missing some amenities. All of the scopes and arrays at S-T-1,2,&3 were functioning, and Bugeye was blowing human minds with its peta- and exapixel shots of distant galaxies. The Red Planet was something to see at night now. Even with the naked eye, it looked like a cloud instead of a point. The collisions haven't begun yet, as of I+20, but Mercury has almost arrived, and most of the scheduled dwarf planets, asteroids, former moons, and KBOs are waiting nearby in a queue. Most will crash in slow motion, and some will mix and mingle together prior to planetfall. Some of the Oort cloud recruits are still a year away, bringing most of the new oceans along with them. I finally made it up to space at the beginning of this last year, wanting to take in all the sights in one trip, without multiple climbs up and down on the Spiders.

I'd been living in northern British Columbia since the US split apart, deep in the woods, mostly alone, but between the Ta-net and the Glints, hardly incommunicado. My Gizmo was halfway around the world now in Somalia, moving between the Jamaame Beanstalk base and Iska, our coastal desert colony, but "Mother" was also inside my head, when invited, as was my own Myco Ta. I was just wrapping up five years of work on our myco-augmented soils biology in boreal forest habitats and some general environmental monitoring, as well as the never-ending mindfulness practice and Neuronautics. But now Old Mars was approaching its re-creation day, and seeing the original meant that I had to go now or never. Both Survivor and Van had been studying the venerable old world up close and personal for more than a decade and had collected nearly enough data to build a faithful, life-sized model. Old Mars could be seen in VR and Holos at any time. They'd found no life or evidence of a living past, but the photos were exquisite. I just had a big hankering to jump 2.6 times higher, and to walk around for a few days in some lightly stepping, brainless-as-a-turkey, blissed-out wonderment.

I have the world's coolest car, a limited edition, owned only by a few hundred Van. It's a two-seater coupe, a little bit smaller than a 1960s JaguarXK-E, but similar in shape. It's invisible whenever I want it to be, which is most of the time for now. It's submersible to about 90 meters, and it cruises a kilometer up. If I fly it just a few inches above the ground, I can cloak it with a hologram and make it look like any car that's big enough to swallow its shape, which is most frequently the XK-E, or a beater pick-up truck with fake noises and all. The sound system is as good as they get, and unlike the pricier Lambos, it comes with cup holders, standard. And it goes wherever I think it should go, simply by thinking that way, but this makes it important to stay awake and focused. We do have to guard against collisions, though, since it's extremely destructive to anything it might hit. Acceleration is limited by design to eight g, and speed to Mach 4, but I generally like to keep it subsonic, enjoy the view, and also minimize the sonic booms, particularly around cetaceans. I drove alone to the

Kiritmati Beanstalk base, which you may recall is the one out in the middle of the Pacific Ocean. We have a special boat dock there to hide our invisible cars. Roads? Where we go we don't need roads. I stayed three days to explore the extensive undersea facilities and aquariums, then boarded an upward-bound Spider, of the Itsy-Bitsy variety, a six-tier car accommodating 36 first-class passengers for the daylong trip to the counterweight, with only one stop at the GSO. The cars were full and ran more frequently during this week because the timing was optimal for the three-day trip to Mars, and that was about to become dangerous. We would endure zero-g for just a few hours. The revised version of the old airline stewardess presentation still touched on oxygen masks, and how you should always save yourself first, but it now covered barf bags and the zero-g toilet facilities in some necessary and candid depth.

I rendezvoused with five of my sibling Van on the Spider, two more M-Types and three of Type-F, the dudes and the other kind. Here we had a whole tier to ourselves. Two of our young ladies had given each other serious makeovers before the trip. We call them young ladies because, although they are fifty now, they all stopped aging at around 29 years. They dressed up to look a bit less average. Just as random number sequences look suspicious without repeating numbers, our groups will arouse some subliminal suspicions if we all look precisely the same degree of average. We young gentlemen elected to not go the other way for greater variety because all six of us were eager to get laid, in person, instead of pseudotelepathically. The Spiders all have privacy curtains like hospitals. Out in the world, the Van were now still rarer than one in a million. But up here on the Beanstalks, where the Meh don’t go, the concentration of Van is much higher, and odds that observers might be looking at Van instead of Survivor dropped to one in a hundred. Do the math for a cabal of six. We have to stay closeted, at least until the Meh are all gone, maybe longer, except that many of us have now come out to Fair Witnesses, Freemen, other Terran citizens, and some of the CEOs and directors of our do-gooder global corporations.

We didn’t need to be scientists on Mars. Without complexities like soils biology, that effort was about wrapped up. Plus, all six of us were just wrapping up our own scientific and techno endeavors, and we really needed some time just to be kids again. We had several hours of the lateral 0.3g on the Spider and had some naked fun with that. Then we had three weightless hours on the counterweight, literally flying through the gift shops. For the rest of the trip to Mars, we had full 1g Earth gravity, except for the point mid-journey where we flipped the ship around into 1g decel. We took the deluxe standard Mars tour, guided by a frightfully expensive, but nearly finished, Survivor concession. We had two-hour stops at each of the top 24 tourist hot spots, with some lickety-split travel between them, spread out over six days. Food and accommodations were first-class. Cosmopolitan dining and low-g intercourse took up much of our non-sleep hotel time. It was just as well there was no such thing as Martian food. Terran cuisine was quite impressive, even to the Ta, or to three of the Ta species at least, who were able to adapt their Sensoriums to approximate and experience human taste. We sat by real windows, watching the sun rise and set. Once, as kids, we watched a 3/4 solar eclipse at sunset and speculated that that might be the quality of sunlight on Mars. It was close, except the blue sky and clouds didn’t make it. We didn’t see much of the new Earth, although we saw crescents on the trips to and from. It’s an unavoidable problem with Close Approach. On the tour, we couldn’t dig our toes into the sand, which would have been deadly cold anyway. If we want to do that later, we can always simulate a warmer version of Mars on the Ta Holodecks, which they let us play in from time to time, via the Glints. We were required to use the same cumbersome pressure and radiation suits that protected Survivor. We could have worn something lighter, since our Nanocrisprs would immediately correct any genetic

damage done by cosmic radiation. We weren't about to complain though, being full of awe and gratitude, and some neurochemical enhancements we'd brought along. Value and treasure work much better as verbs.

When we left Mars, our Yuris did us the traditional kindness for *touristas*, accelerating only at 0.7g for the first six hours, extending the trip a little, but letting us transition back to full gravity. The commercial fleet passenger traffic all hubbed at the Beanstalk counterweights. In four days we were all weightless again. I said goodbye to my friends and boarded a small 6-man shuttle alone, bound for Santa's Village. The lunar north pole base was, on the whole, boring as hell, except that you get to jump six times as far. As far, not as high, due to the low ceramic ceilings. Everything there was at least two meters underground for radiation shielding, and all of the windows were Erstaz. I stayed only two days there, and then, with no interest in seeing the mining operations at the equatorial base, it was back to the counterweight and on again to Tube TownT-L-4, only a few hours away. This is as pleasant as the lunar hive is boring. You can pick your level of gravity. Elevators or stairways will take you to your concentric cylinder of choice, from the heavyweight outriggers to zero-g in the center tube and rolling-pin handles, where we had docked our shuttle and entered. It was light and airy inside, at least until the faux night fell, and there was plenty of green, including some future forests with plans to reach the 21-meter ceilings. It even has some waterfalls, and brooks that babble. You travel the length of it by moving walkway or shuttle train. The architectural style of the buildings and storefronts is modern, but it has a bit of art deco and steampunk type of fun, and the feeling is warmed considerably with a generous use of fabric. It wasn't as nice as trekking the Terran wilderness, but it wasn't at all hard to imagine living here, and that was the idea. We wanted a prototypical generation ship. Nothing this size would ever fit inside any known warp bubble, but one day some enterprising colony or cult might want to take off and commit their descendants to a somewhat more infinite, Polynesian-type, one-way migration.

I stayed in the Tube Town for a week, but spending what felt like half of my time there by a little waterfall in a Zen garden, in the ceilingless 0.8g tube. The structure had quickly filled to its design population of ten thousand, nearly all Survivor, with only a dozen Van, all undercover of course. Most of us are down on Earth, still hard at work saving the world. I spent the rest of my time here with my own kind, in varying combinations. The streets were busy and alive, and though the Town had plenty of dirt mixed up in its soil, everything felt Singapore-clean. There was more good eating here, and fooling around as well, but we also shared loads about science. The Agrow of a self-sufficient habitat was more than a matter of careful design. The systems themselves would evolve and learn as the resident life forms interconnected and interwove something new of themselves. I committed to following this particular Town for at least a few decades to come, and my Myco Ta will have lots of constructive suggestions. I will most definitely enjoy coming back here. It only took a day and a half to shuttle back to the Kiritmati counterweight, connect with a Big Ass Spider, and drop back down to the mid-Pacific. I spent the night in pleasant facilities there, then located my invisible car, which wasn't nearly as hard as it sounds, and drove across the ocean for a time and distance to which you will not be privy, to the little island that we Van all still think of as home, where we all still have our old bedrooms.

At any given time there might be a hundred or more of us back on the island. I returned home to finish out the year, savor some island living, and write this 20-year report. It was much easier to adjust back to the island with a hundred of us than with three thousand. We still have the many villages. Several look aboriginal, like close clusters of thatched huts, and others look like tourist accommodations. The town at the

center, with the town hall, library, grocery and hardware stores, and the two small cafes, looks like an old human settlement, or even a movie set. Satellite surveillance would never know the difference, since all of the really high tech stuff is built underground, with no heat or other signatures to give our location away. We never really feared a human invasion. The Gizmos, even armed with limited killerwatts, could have defended our settlement, but then some strange doings would have been known to the outside world, and that would have been a damned nuisance. Now that we're powered up, we can repel just about any kind of attack, even if a small planet was thrown at us, but we still enjoy being cloaked and unknown here.

My favorite underground structure is a triplet of geodesic domes, flattened to the Gizmo-golden-ratio proportions, and shaped like the common drawings of a water molecule, with the larger diameter at 48 meters and the smaller two at 32. These aren't the real atomic proportions but we're not being all that scientific now. This structure serves as our rainy-season temple facility, a term that for us has meant mindfulness practice and Neuronautics. One of the smaller domes houses both the neural imaging and neurochemistry labs, and the small cluster of my favorite rooms, which I went straight to after unpacking. These have some features in common with old isolation or sensory deprivation tanks, being soundproof, lightproof, and kept at 34 Celsius. They're cubes, about 5 meters on a side, and floatation occurs throughout, without any up or down, not just on the surface and facing up. We use a bit less salt in the water for a true neutral buoyancy. We breathe through comfortable, custom-fitted masks, with two tubes for supply air and return, to save us from the noisy, tickling bubbles. What we're breathing down there can be set and adjusted by the user in real time, and we certainly aren't beyond breathing a little vaped reefer, opium, laughing gas, or one of numerous other substances and mixtures of our own design. We also aren't required to float here with no light or music. I logged four three-hour floats in the first two days.

The molecules we made and tested in our neurochemistry lab carried the torch we picked up from such lights as Richard Spruce, Richard Evans Schultes, Albert Hoffman, Owsley Stanley, Terence McKenna, and Sasha Shulgin. Our chemists put the huge, heavily funded pharmaceutical labs to shame. We went much broader in scope than Elucidogens, into other forms of cognitive and memory enhancement. Around I+5, once things began to settle a bit after the bulk of the Cull, we moved our products out into the larger world and began training therapists in their therapeutic use. We never had much use for therapy on the island. Whatever childhood traumas we had centered on being told no, being teased by other kids, or having to share our stuff. The wounds were never very deep. Those of us born on the outside of neurotypical, as was intended, had the closest that the Van usually came to mental health issues, but these weren't as debilitating as spectrum disorders in humans. We learned about chemical assists from shamans, from ethnobotanists, and from the promising earlier legal use of Elucidogens in 50s and 60s psychotherapy. The latter was politically suppressed with lies and propaganda when the drug users started deprogramming themselves and turning against authoritarian dictates and war, and so scientific research had to be banned, so that any positive reports could be dismissed from above as anecdotal. That began to change back in the Noughts with the educational efforts of MAPS and Erowid, and we followed that closely for the next couple of decades.

We understood the neurodynamics of the therapeutic work with Elucidogens. Memory isn't at all like computer storage. You don't pull up and revisit a memory and then put it back unchanged. Memories are more plastic than that, and they aren't just pictures and facts. The associated affect is interconnected and plastic as well. When we revisit a memory, we'll add our current emotional or feeling tones to it before we put it away again. When we bring up a difficult or unpleasant experience, like an insult, an

injury, or a trauma, only to feel it the same way all over again, we'll only add to its intensity. This is re-sentiment or resentment. Back to the subconscious it goes, to continue eating at us, with shaper teeth and stronger jaws. When we bring a traumatic memory up in a more elevated state, as one with a new light, tolerance, understanding, context, or forgiveness, we'll alter its emotional charge and the hold it has on us. We can continue to improve the memory until it's rendered utterly harmless, or transform it into an insight. This has been an explicit practice in Dhamma-Vinaya since the very beginning, especially with Vipassana Bhavana. This is also why Elucidogens are so effective in therapy. You dig that stuff up and clean it thoroughly before putting it back. Mindfulness practice works just as well, only more slowly and often more gently. To a lesser extent, this also accounts for the success of the Talking Cure.

I saved the psilocybin experience for real-world reef diving, and plenty of that would come next, along with a string of fish and some tasty rock lobsters. There were the usual hundred or so Van on the island now, averaging about three or four in each of our old villages. I shared my fish and lobsters and got pineapple, mangoes, and some raw fish marinated in coconut cream in exchange. I moved about the island for days, going village to village, and uncharacteristically talked a few times until dawn. We had a lot to catch up on that we hadn't yet shared in our regular VR global town meetings and personal communiques. The talk we shared was not small. We even took on the hard problem of consciousness, but as with the Ta, we still left that hard problem unsolved. Everyone had kept up their physical and athletic training, for nearly every reason but glory. As always, we spent much time under the sea, in a much more familiar state of weightlessness than either of my recent experiences. Our reef diving wasn't all that different from old school, except that most of the time we used high-tech rebreathers instead of snorkels. We still used the hand-held spears for hunting, or rubber slings at most, and we still used our low tech goggles and fins. While we'd managed to keep the foreign fishing vessels at a safe enough distance, our reefs had taken some serious hits from acidification and were only now rebounding. We eliminated the local crown of thorns on arrival and replaced them with tritons, their original predator. Our reefs were about as healthy and biodiverse as any on Earth. Our garden soils were healthier than any, despite the original soils that we had to begin with. We ate well, which was one more reason to maintain the athletic training. Our Augments weren't designed to be diet aids.

Mitakuye Oyasin

As we disclosed and described nearly twenty years ago, more than a thousand of the Gizmos established lifelong connections between individual Ta and Synthiont versions of species other than the post-human Successor. The Van maintain close fraternal (or Kuzinal in Babble) relationships with all of them, and visit them in the wild when we're able. Decades ago, we returned our young elephants, gorillas, chimps, bonobos, and bili apes from our island to Africa, under our protection, and our orangutans to an Indonesia now purged of its poachers and ecocides. Some of the aquatic Synths aren't at home in warm, tropical waters and can't even be brought for a short visit. *Enteroctopus dofleini*, the giant pacific octopuses, are doing well in the cooler waters of the northeast Pacific. The extended lifespan has made a difference: they've kept growing in size, some to over 100 kg, developing something like a culture, sharing problem-solving, hunting, and defensive strategies. I spent two full days with a pair of them while I was stationed in northern B.C. and tried my best with the pseudotelepathy. It was pretty weird, but I do love weird. Our Gizmos teased us for our ineptitude, trying to get us to try a little harder. But the Ta grasped the difficulties and interfered with some good guidance. You need to have some shared experience to build upon, and that means something of a shared sensorium. The majority of the aquatic Synth-to-Ta connections were to the Ta-Aquatic species. As a natively echolocating species, they had a head start grasping the Umwelt of the cetaceans, although not the mammalian part; as a pelagic species, they grasped the life of the manta; and as a multi-limbed species with its mouth in the middle and a multi-lobed brain, one who communicated with chromatophores, they grokked the octopus much better than the others. Of course, none among them had any memories of an underwater life as a biological entity, even those who were over a million years old. They had been created as Ta, leaving their original species behind. But the aquatic senses they had evolved long ago gave them a useful head start towards grasping the aquatic lifeworld on Earth, and they had good records of what they used to be. The Ta-A didn't have all of the Terran aquatic synths, though, since the five species were all about stretching the range of their experience.

I can barely begin to describe my attempted Vulcan mind-meld with a big, floppy, whip-smart octopus. My Gizmo had to give me twice as many arms and legs, make them all the same, take all my bones out, and then move me around with only muscle control and hydraulic pockets, and put sense and feeling in hundreds of suckers, and that was just the arms. My brain was all over the place, too, and not just in my head. It felt lots bigger than it was. It felt like it could learn a lot and also that it wanted to. The complexity of my body language went off the charts the moment my the chromatophores and papillation came into play. It seemed like it was blushing and goosebumps, but taken up six orders of magnitude and made specifically meaningful. Inside my brain, though, I seemed to sense a lot more than cleverness. There was curiosity, and even kindness in there too, and fellow feeling, but that didn't include much social neediness. And had I not been there, I'd have a reaction to that. No matter how many movies that we watch of animals of different species, playing, bonding, sharing affection and what seems to be friendship, we'll be suspicious of what we see to the same extent that we're careful about what we think. As limited as we are, we'll still try to resist projecting and anthropomorphizing, despite being distant cousins. But here I was, neurally interfaced, in some detail, mediated by an intelligence beyond Van and human capacity. As much as this horrified my inner scientist and skeptic, I felt

loved by these creepy, squishy, alien creatures, in a fairly detached sort of way. And I loved them right back, in a way I hoped they felt too. Ah, Life.

The Mantas were far easier to relate to, perhaps in part from having once been fish ourselves, and both of us being chordates, descended from Greatgrandfather Pikaia, and sharing sub-limbic neuroanatomy. By the Noughts, plenty of humans had seen pics of friendly interactions with humans, and some aquariums had tanks where the smaller species of rays could swim up to visitors to be petted. By the Teens, some humans were beginning to look at the size of their brains, the largest of any fish, with impressiveE-Qs. This accelerated the study of complexity in their social lives, as well as their capacity for self-awareness. Despite this, governments remained less than enthusiastic about curbing the global trade in poached manta gill plates, even when ecotourism was shown to bring in higher revenues. The poaching industries, along with those who did nothing to stop them, are all gone now, and good riddance. We Van figured out as children just how cool mantas are: they were some of our regular playmates. Whole schools, with our Synthiont Mantas among them, both *birostris* and *alfredi*, followed our cousins into the play-with-the-stranger games. The Ta made a number of ray Minions as well, creatures with read-only Glintnets, specifically among the stingrays and mobula. As mentioned, the mantas, species wide, are getting some of the first modest genetic Uplifts, biochemical remora and shark repellents that don't repel their cleaners as well. Our own Manta Synths are doing what they can to add to the manta culture, especially some savvy about manmade hazards, like fishnets and plastics. The manta Umwelt isn't really all that complex. A lot of it is just slow motion flying into food and enjoying the company of others. They are curious about us, and affectionate, with feelings not very complicated. But life is good for the mantas, and they know it.

All of our cetacean Synths are still alive after 20 years, and doing well in their adopted families, or peacefully wandering the oceans alone, although many of their unaltered companions, lacking our Nanodocs, were often inconvenienced, sickened, or injured by the residual chemical and noise pollution. The critters with the three biggest brains on the planet each got only two Synthionts, Gizmos, and Ta-Aquatic. The gold here belongs to the Odontocete Cachalot, the silver and bronze to the Mysticetes Big Blue and Fin. As might be expected, the Ta have described Mysticeti minds as a mix of ponderous and pondering, but somehow not wildly interesting, unless you like long recitations of historic travels, Songlines reaching back to the Dreamtime. Then again, some of us could listen to Homer recite the Odyssey all day long. There was little in their last 30 million years to drive much evolution of strategizing, or problem solving ability, or predator evasion. Their world is largely acoustic, like all the cetaceans, and the original Ta-Aquatic. This does have the effect of making time and space more reciprocally interconnected than it is in the human Umwelt. And in this their sense of spacetime is closer to what the physicists try so hard to describe.

The Mysticetes are still a huge mystery to us, and we expect theirs to be a world that only the Ta can begin to understand. We don't need to see a particularly "bright" sort of intelligence there, in the sense of quick or witty. This tends to be shaped by needs for self-defense and the development of strategies of predation. The Odontocetes' world is also an integrated blend of the spatial and acoustic, with strong somatosensory components. We're told that they're much like our storytellers, and this is how their language works. They will paint moving acoustical pictures, like sonograms do for humans, and place themselves and other creatures within those *tableaux*. All they need to do this is either mimic or make simplified analogues of what these scenes sound like to convey that scene to another creature. It's like a sung onomatopoeia. If they want another to recall a particular canyon, they can offer an acoustic representation of what

it sounds like to be swimming through it. Up close at least, they can add some color to their tales with gestures and postures, and can embed sonic representations of these additions into their tales. They can recreate and transmit descriptive acoustic presentations and representations to each other, and these can be either fiction or non, either art or an appeal to the memory. They can recount historical events in this way, or suggest scenarios for the whole pod to move towards. They can identify the same melodic patterns across different octaves so they are likely capable of scaling their stories into larger and smaller contexts. We may learn to our horror what a treasure trove of ancient stories has been lost to human harpoons, that they might light human oil lamps for *Bible* study. We may yet learn of what has been lost from our sonar-driven shrinking of the great whales' acoustic horizons, from thousands of undersea miles down to less than a hundred, of what distant habitats are now lost to their memories, and what survival stratagems now forgotten.

To get a better first-hand understanding of echolocation, we first recruited a number of those resilient human beings who were either born deaf or became deaf and had later taught themselves to echolocate. Some of these were Survivor, who just seem unwilling to let a little handicap like blindness keep them down. The Gizmos and the Ta did their best to make Glint models of their descriptions and transmit these to the Glintnets of any interested Van. It was soon an intriguing hypothesis that the language that echolocators spoke wasn't really conceptual at all, but would acoustically mimic or replicate the activities of bodies in motion through contexts. It was storytelling, and the stories could also be used as metaphors and analogies. The most important actions had already been taken when we put an abrupt end to undersea sonic experiments and military testing, and then curbed many of the sonic impacts of global shipping. When we dropped down in scale to the Orca and Humpbacks, a new wave of human attempts to communicate picked up some momentum. We had no Synthiont representation among several intelligent cetacean species, although many, among the narwhal, pilot, sei, bowhead, minke, beluga, false killer, and right, became read-only Minions. Our own research done on the island was limited to humpbacks in transit, south to north and back, and the dolphins of course. The Orcas and the big cetaceans we only met out at sea. Globally, the human efforts to learn how to speak with *tursiops truncatus*, the Bottlenose Flipper, just exploded, but we had a big head start there. As with humankind, most of our own experience was with the *tursiops*, who kept us plenty busy and plenty puzzled. And perpetually amused, of course. The others were less social with us and liked being farther out to sea, so we never really bonded quite as closely with them.

Predictably, by I+0, humans had made almost no progress in deciphering cetacean communication since Lilly's first efforts in the 60s, and the intriguing conjectures of Sterling Bunnell. They had gathered a huge trove of incomprehensible audio graphics and dozens of unhelpful ways to sort them. Humans still give dolphins chimp-like marks on human intelligence tests. The Van circumvent this issue entirely, looking instead for what we call Cetelligence, or what else can be done with big brains without hands and excessive gravity. Before we could interface via the Gizmos and Glintnets, human scientists were going to remain utterly lost in their quest until they began asking the right questions, and quit giving dolphins human IQ tests, and looking for human-type syntax and grammar. Any successful approach had to begin the study with functional cetacean neuroanatomy and the cetacean Sensorium or Umwelt, the embodied basis for their perception and their sensory-conceptual metaphors. They had to ask how the echolocated world would differ from our world, with space and time all twisted together. Cetaceans are singing sound copies of dynamic acoustic *tableaux*. Might they be taking or using these as conceptual metaphors and analogies? The

amount of information contained in cetacean vocalizations is immense. We knew neither the precision of its resolution, nor how much of the detail was significant. Even now, it's too much for real-time dialog with unassisted or unaugmented humans.

The natural dolphin tongue may never come within the human ability to comprehend it, not due to a lack of human intelligence, except insofar as we stumble all over our own arrogance, but due to the nature of the dolphin's sensory world. The seemingly simple dolphin vocalizations carry a massive amount of data, and then quickly disappear around short-term memory's corner, only to be replaced just a half-second later by another sonar picture of equal complexity. It's communication on several tracks at once, as though every instrument in an orchestra is articulating its own meaningful story. It's the equivalent of a motion picture for the ears. Cetaceans can likely hold these snaps in memory and analyze or study them at greater leisure than real time allows, like us looking at a picture and recalling it eidetically later. Before we began, we hadn't understood any of this yet. Neither had we fully explored the wide spectrum of vocalizations that lie beyond the range of human hearing. There were also dimensions to the dolphin's production and direction of sound that most hadn't tried to integrate. Just beneath their blowhole is an air sac and a lip that creates vibration against the dolphin's forehead. This sound is then brought into focus by their oil-filled melon, which sits atop their beak or rostrum (it isn't a nose). The dolphin can change the shape of the melon at will, narrowing or broadening the sonic beam. It can approach a decent-sized fish, make the equivalent of a loud shout through this, using a narrow sonic beam, and paralyze their prey. This adds yet another dimension to their vocal capabilities. Now add in the whistles, squeaks, squawks, barks, pops,bubble streams, and pulses, most of these not only both frequency and amplitude modulated, but subject to variation in the direction and rate of frequency variation, and then add the several dimensions of the broadband echolocative clicks and you will have a level of acoustic complexity that's beyond even Maestro von Karajan. We have to ask what it is that a dolphin can communicate. Even many of the closed-mined academics will admit that cetaceans can do the what, where, and who, even while doubting the when, how and why. But we now know that the dolphins can plan ahead and strategize the future, as well as share acoustic pictures of scenes that have already happened. That's when. They can create a sonic motion picture of an activity that a fellow dolphin hasn't performed before and then add a simple "do" command along with that dolphin's signature whistle or name. That's how. And they can paint a behavior that has a happy result, with leapings up high in the air. That's why.

Where vocalizations are primarily acoustic analogs of sensed spaces and beings in motion within them, these are their primary versions of sensory or conceptual metaphors, integrated with their other senses, especially kinesthetic. Most of the sounds are pictures, not words. You know what they say about the relative worth of those. They're storytellers, with culture at the heart of this. And echo-tank isolation is a living hell. Cetacean language is more descriptive and narrative than abstract and symbolic, but when you think about it, they wouldn't need as many signs and symbols as humans: why would you need a concept of a shark, or a word to stand in to communicate an idea of sharkness, if your call simply resembles the sound that's reflected by an echolocated shark? This will be a packet of information that can contain the shark's size, its direction and, importantly, the contents and relative fullness of its stomach. Similarly, they could broadcast news of a pregnancy by saying what one sounds like. With what we know already, only a fool would suggest that their language is not intentional, but it does remain to be asked in what ways it's referential as well. Can the dolphins describe particular humans as being "shark-like"? Will dolphins one day call a human being a "hali-butt-head"? We have a also needed to ask

how polysemous delphinese might be, whether different sounds can have different meanings in different contexts, which might be simply distinguished by context, or else only be identified by syntactic indicators.

Questions of the natural language remain to be answered, but we're growing more certain that effective communication will need to be expressed through an intermediate language that's co-created by both hominids and dolphins, one that's founded on common and shared experience, and thus on extended contact. We've known that when learning human-made languages they will grasp syntax, word order, temporal order in syntax, and several parts of speech as though they were already at least a little familiar with the ideas. They pick up signs and symbols readily, and even some metaphors and analogies. They can mimic arbitrary sounds and assign them as object labels. They will mimic what sounds of ours they can, but their speech is utterly different. This brings us to the big question: what are the possibilities of humans of ever understanding dolphin speech, or, absent that, of us establishing an artificial common language? To really communicate in anything like a dialog, we are going to need common experience, and we'll need to adjust for our different bodily forms, neural architecture, and sensory arrays. Both species must be able to pronounce the words and hear them clearly. The common ground will also have to be relevant to the lives of both species. Study of interspecies communication will have to be a social science, with *Verstehen* aplenty. The Van and the Bottlenose Synths are only about a quarter or a third of the way through this process now. It's still too soon for a progress report, but twenty years on, we hope we can add some Tursiops comments and quotes to these 20-year generational reports.

We have ninety Synthiont Bottlenose, scattered throughout pods around the world, and nearly a dozen have chosen to make our island waters their permanent home. We maintain a little fish farm just for them and other Synths who are passing through. They're sometimes paired with their Gizmo parents, but these pairs aren't physically inseparable since they always have their Glintnets. They've helped us immensely with our research, and they visit our neuroimaging labs regularly. More importantly, they've convinced a number of their unaltered kin to submit to the same neural studies, although these often need to be bribed with extra tasty fish or some pervy Rishathran contact. Male dolphins are infamous for putting aggressive moves on human women, and while we can explain to our own Synths why this is a problem, the unmodified sometimes need some instruction in manners. But sometimes asking nicely is accepted. We can do neural imaging on the Synths only when the Glints are turned off, limiting real-time communication during the scans, but since the Glint bodies show up on the scans, at one per neuron, we at least get a good picture of the neural density to map against activity. And the dolphins can mark neural events with vocalizations, recall what was going on in their minds when they made them, and convey this by Glintnet later.

All of the cetacean synths were given the first prototype Dolphin Hands. As artiodactyl mammals, they still have their vestigial fingers, four of them in each flipper, and these are still individually "wired" to now-dormant and retasked modules in their brains. The Ta wanted to awaken both the afferent and efferent functions of these pathways and redevelop their corresponding cortical modules. So far they've done this only in the Synths, using parallel Glint networks and Nanite neural implants. Through eight reawakened fingers, and working through the Glintnets, the cetaceans are just now learning to receive and transmit information through their hidden digits, as if reading braille and typing. This will soon allow them to Pseudomanually operate both information technology and remote machinery. Further experimentation will follow on the currently unaltered cetaceans. With review, and ultimately full consent,

this would be their first big Uplift, and a first step out of this particular functional dead end of their evolution.

The Peripatetic axiom "*Nihil est in intellectu quod non prius in sensu*, there is nothing in the mind that was not first in the senses," still holds largely true in neuroscience, aside from some innate experiences that modular neurological structures provide and native heuristics and processes provided by the structure of the brain. We still need to add the contribution of Leibnitz, "*nisi intellectus ipse*, except the intellect itself" to include those. We aren't certain what kept human researchers from seeing that different senses provide the mind with radically different mental contents. It might be a combination of naive realism and human exceptionalism. We elected to build our conceptual models of the dolphin Umwelt and communication on a combination of neurological structure and Sensorium composition. We had to begin with the senses and then add the sensory and conceptual metaphors that were most likely to develop around them. While we couldn't bring our blind human echolocators to the island, they were still invited to our other labs and facilities by several undercover Van posing as Survivor.

The cetacean visual world is less developed than ours. There isn't much to color. Their eyes look in different directions, which can be a little nauseating at first with the pseudotelepathy, but they can't focus in front of their rostra unless they're looking downwards. They began their aquatic evolution as herbivores and prey species, becoming hunters only later. Other adaptations, like nostrils moving to the tops of their heads, and mandible and maxilla moving forward into the visual foreground, would keep convergent evolution from restoring a predator's full binocular vision. While their brains are far more convoluted, the lobes aren't as deeply articulated as ours. Our brain fissures separate acoustic and visual constructs widely. In cetaceans, these are already better integrated and intertied, so acoustic pictures can be visual or visualized maps as well. Our human echolocators have this too, and map their sonar into a visual space as echoic images, with the most familiar illustration being a sonogram. When we began, human researchers were still thinking that dolphins were singing to their fetuses, without considering that they were also examining them with sound. The visual spaces that their sounds create remain a function of time. The pictures are rich in data about time and movement. This also gives the cetaceans a big head start in understanding what we can't see directly when we look at the night sky: that this space we see is a function of deep-time and ancient history.

Their acoustic world is beyond description in human terms, but the closest would be a symphony where every instrument carried a meaning along with its simple sound, much as our motion pictures carry multitudes of recognizable and significant shapes. Dolphin echolocation is both active and passive. As long as something is making sound, they can simply listen to a space, and reconstruct it in detail when other dolphins are exploring it. Their tiny, vestigial ear canals aren't very useful, but fat-filled sacs in their jaws relay highly articulated sounds to their brains. Their evenly-spaced teeth are sound receivers for their jaws, and one side is spaced half a phase out from the other so their binaural hearing is directional and very precise. As to optical resolution, they can effectively perceive in similar detail to human eyes, let's say an apple at a hundred meters, except that dolphins can hear through murk and at night. Timing between their clicks will vary according to the size of the space they're exploring because they usually want to hear an echo before emitting the next click. This isn't always true though, since they can get additional information from interfering sound waves. That the auditory world is as much spatial as temporal, and that these two senses work together so much more seamlessly than ours, seems to be a function of the adjacency of these two regions in the cetacean brain, lacking the deep

fissures and associative regions that separate our own visual and auditory cortices. Their visual cortices, located throughout the lateral gyrus and down the sides of their inter-hemispheric cleft, are larger than visual input alone would suggest and form an excellent substrate for a more complex and integrated model of the world using data from multiple senses.

The dolphin's sense of smell is much weaker than ours, probably a blessing if you've ever smelled their fish breath, but it does contribute a little information to the dolphin sense of taste, which has all five of our own human taste buds. The rostrum is a pair of jaws, not a nose. On top of it (think upper lip) sits another fat-filled structure called a melon, with its shape controlled by muscles. This is an acoustic lens. Sound is produced behind this, behind a forehead in front of the nostrils or blowhole. The sound can be focussed with the melon for different tasks. One of the tasks is a sonic gun, which is used to paralyze their prey. They have a highly developed sense of touch. Here it's worth noting that humans would be much better off if they would stop telling themselves they have only five senses. The cetacean's local touch includes specialized cells for points of heat gain and loss, pressure, pain, as well as extremes of numbness, injury and hypersensitivity, and distributive touch includes locative, erogenous and dimensional, all with texture, contour, patternment, shape, suction, friction and temperature gradients across the full expanse of their bodies. Their fine tactile resolution falls short of the human's, so teaching them braille is out, but aside from this they are every bit as tactilly alive to the world as any unclothed human would be. While it's oft supposed that fish can't tell that they are immersed in a medium, the cetaceans are acutely aware here. Variations in the medium's densities and pressures provide them with useful information. Their kinesthetic, otolithic and vestibular senses evolved in a world much richer in depth, as another full dimension to live in. Our gymnasts and our dancers are probably our best analogs, if you glued their fingers and their legs together and gave them trampolines. The cetacean gestures, feints, postures, mimicries, reenactments, and directional pointings can be as sophisticated as most of our human nonverbal communication, with obvious exceptions in facial expressions, limb articulation and hand gestures. But they make up for these deficiencies by being able to communicate with their internal states such as reading subtle variations in pulse rate and muscular tension: think built-in polygraph. Obviously the cortical somatosensory homunculus, or rather, *delphinculus*, will be drawn a lot differently for our friends. This, too, shows a better integration with the audio and visual cortices, in part a function of an evolved paralimbic brain lobe that land mammals lack.

Life's erotic dimension is a big deal for the dolphins. Dominance games among the males will often find homosexual expression, although the species is predominantly hetero. They are frequently keen to explore erotic experiences with human beings, and if boundaries aren't well established, some males can be pushy and aggressive about it. Few interspecies activities are more interesting to a young male dolphin than a loving hand job from a human female. Dolphin females can be receptive to relationships as well. This led to a bit of awkwardness on the island as we were growing up. The dolphins were sexually mature about three years ahead of us, and as with us, the girls were a year or two ahead of the boys. And so our young, innocent, nine-to-twelve-year-olds didn't really understand what it was that our old friends wanted from us, or why. The Gizmos tried to explain. Their sexual maturity led them to spend more time out at sea and away from us human prudes. I have to say, however, that a few of us, M- and F-types alike, came around just a few years later while on visits back home on the island. It was just a little scary when two of us nearly drowned in the process. But we learned to pack rebreathers. Between peers, this is Rishathra, not bestiality. We therefore stayed well clear of both porpoises and Orca, and for very different reasons.

The subject of Cetelligence stands in great need of reframing, beginning with an understanding of the different sensory and somatosensory worlds. Human efforts to comprehend dolphin intelligence have been at best an embarrassment, a transparent attempt to pin a number on this “lower” life form that sits at least below the number two primate, and then find ways to to dismiss and diminish any evidence that we share this planet with intelligent beings. Even fifty years after neuroscience began contributing data about the cetacean brain, most college students were still parroting glib professorial assessments of Cetelligence as “somewhere between a dog and a chimp, and we’re still not sure if they even have a language.” Until we came along, this was the future of the research. But even the slower human researchers have learned by now that dolphins are intensely curious about novel environments and explore and exploit them opportunistically, even when these aren’t relevant to the lives they evolved to live. They mine their worlds for affordances. They learn rules, form concepts, and categorize objects, and they won’t hesitate to point out human errors. They demonstrate a facility for insight learning. They thrill in behavioral versatility, innovation, improvisation, and creative problem solving. They cooperate intentionally with other species. They have an obvious theory of mind that’s both conspecific and interspecific. They are aware of the past and the future.

Sadly, the cetaceans do lack the necessary remedial teaching skills to bring the humans up to speed. The humans weren’t really satisfied with seeing self-recognition, problem solving, innovation, mimicry, empathy, play, epimeletics, cooperation, strategic hunting, labeling, numerical sense, and conceptual formation as indicative of the kind of inferior intelligence they were looking for. They were more keen to know how well these cetaceans do with the “real” measures of intelligence, like using opposable thumbs, tool making, machine operations, eye-hand coordination, manipulation of the environment, understanding manufactured objects, and the written recording of culture. And how well they can use a language that’s spoken just one word at a time using a human grammar. Most of the research is done in the equivalent of amplified echo chambers, after isolating these hyper-socialized specimens from their companions, in contexts utterly irrelevant to the world they come adapted to, and after human hunting activity has wiped out more than half of any acoustically-transmitted culture that may have existed. Humans and cetaceans are successfully adapted to entirely different worlds. It’s comparing apples to oranges. But only one of the species is stupid enough to threaten the future of both, and we most certainly don’t want to compare our intelligence in long-term environmental fitness across any forty million year timespans. Van research still refers to dolphin communication as language, despite the big differences. We’ve given up on brain-to-body-mass ratio and encephalization quotients as being anything close to meaningful, especially across taxonomic phyla, classes, and orders, and given the much higher cognitive efficiency in parrot and corvid brains. We’ve replaced the term Intelligence with Cetelligence, after finally acknowledging that the dolphins are inferior to us at climbing trees and building houses.

Human researchers have tried hard to use comparative structural studies of the brains to prove their superiority, but this has proved to be an endless game of whack-a-mole. Every piece of evidence that pops up needs to be put down. The Tursiops brain is 25% larger. So what? It's all about brain-to-body ratio. But the Tursiops body is much simpler to run. Then, it's all about encephalization quotients. But why are you counting all of the blubber? How much cortical control that that take? Plus that puts both Tursiops and Orca unacceptably ahead of the chimps, nipping at human heels. Well, then, it's all about how wrinkled the brain is. The Cetacean brain is twice as wrinkled, giving it twice the surface area. Yeah, but it's the deep fissures that really count,

leaving modules and lobes more widely separated. You mean a less efficiently integrated brain must be more intelligent? Yeah, but the neocortex is missing layer IV: they have five layers but we have six. But their top layer is thicker. Yeah, but they have more white matter. But they also have another interposed paralimbic lobe under their neocortex. Yeah, but there's less columnar modification, less neuronal differentiation, and lower neuron density in places. Yeah, but look how fast they fire. But how come their prefrontal lobe is so much smaller? Because convergent evolution doesn't always locate functions in the same place? Just look at them humongous side lobes. Humans who call themselves scientists have actually dismissed all higher Cetacean intelligence because their brains lack the newer structures typically associated with historical development of intelligence among land mammals, of which, as we all know, the human brain is the exemplar. Talk about circular reasoning. The sub-cortical structures of both, limbic and down, are typically mammalian. Above that, the two brain types have been diverging for ninety million years. The fact that so many functions converge doesn't mean that the structures will look the same.

Behavior is the only true, relevant measure of Cetelligence. And if this is going to remain unbiased, we'll be better off dropping the comparative ratings altogether. It just isn't fair to put a young snow leopard female into a Miss Universe contest, at least not with all-human judges. It's still a legitimate exercise to see how well dolphins can do at human tasks in a human context. We still want to see how well they do with the cognitively demanding tasks, how quickly and efficiently they process information, how they modify their responses in unpredictable situations, and how enthusiastically they tackle problems posed by humans. It tells us even more if they do this voluntarily, when not being held as prisoners for life, and as property, in echo chambers. But we can't draw conclusions that reach back into theories of the fundamental nature of cetaceans. Here we need to ask questions like: How is Cetelligence founded on their perceptual world and the logical conceptual metaphors that spring from this? And: What are the selective pressures that led to the development of a brain like this? What was contributed by the fact that they cannot sleep? Or by the fact that they normally have no place of refuge from large predators? Or by the fact that their food supply is mobile, transient, scarce, and variable?

Their sociology and social intelligence is part of our study. How do their names work and how are they felt? What are the politics like? What dimensions dotheir fission-fusion groupings have? How do their children learn in terms of postnatal brain growth? What's the extent of alloparental care? How do they specialize behaviors in hunting and negotiating alliances? How does the role of eros help to organize the society? What's up with their sense of humor, and this playfulness in adults? What's behind the teasing and trick playing, and why is this so much fun? Since they can't hide either emotional states or illnesses from each other, how is deception achieved cognitively? They can literally see right through all of that. They live long lives and their generations overlap. Just how much of their memories and their culture are they capable of passing forward? Do they have epic sagas? How much culture has been lost in our wholesale slaughter of so many of their species, particularly of the mysticetes? And how, how many, and where are social and behavioral archetypes articulated in cortical structures?

From what we perceive via Glintnets, cetacean emotional life is every bit as bright, complex, and rich as our own, at least among the *delphinidae*. All of our human emotions are there, including the ones that we wished we lacked, like jealousy, spite, rage, revenge, and frustration. They know grief and they mourn the loss of loved ones, though they have no use for tears. This array of psychic states is fundamentally mammalian. And we now know that they even share our so-called "spiritual" states,

our mystical and ecstatic feelings, states such as gratitude, compassion,*ananda*, participation mystique, reverence, reverie, awe, rapture, that spectrum of autoerotic states which humans mistake for communications from the author of the universe, the one who created human beings in His glorious image. The dolphins don't make this error: they have no god with flippers and flukes. A few times we had the Gizmos read us both and then relay the data to the Ta, who would then construct new neural nets and modules that made sense of both worlds. Then the Ta would transmit some analogies back to us, giving us the experiences in the terms of our own sensory worlds that best approximated what the *lebenswelt* or life-world for the other was like. This was imperfect, of course, but we still got a much better sense of things than unassisted human researchers could ever imagine.

So this ends my 20-year report. I'm submitting along it with 299 others and getting back to my business, which for the next couple of years will be all about exploring the oceans and spending some quality time with our more pelagic cousins. We Van don't expect our lives to get boring, even after a thousand years, ten lifetimes without growing old. And then to become parents to a whole new hominid species. The Calypso and the Sorcerer 3 (no big surprises there) will be my next homes, both of them 90 foot, ketch-rigged, hydrofoil cats with photovoltaic sails. I spent a full year in my twenties moving up and down the Eastern Pacific coast with a nomadic Van community. We used a kind of sea kayak with outriggers and sails to get around, but at the time we couldn't be too obviously high-tech about it. This time I'll be trying a new design, carbon fiber, with telescoping outriggers on both sides, a centerboard that retracts into an envelope between the legs, a larger photovoltaic sail, and a little waterjet motor to get through the doldrums. No sailor ever had such a dingy. We'll have six of these aboard each craft. Yarrr.

A Partial Glossary

Four Species of Man:
Homo Survivor. Survivors, the Fit.
Homo Ignoramus. The Meh.
Homo Non Grata. Unwelcome Man.
Homo Successor, the Van, short for Vanguard
Synthionts. The Van and other Terran species augmented with various nanotech.
Minions. Glintnet-monitored species, like Corvids, and Parrots.

Ta, A group of five interplanetary species.
Ta-T, A Terrestrial or land species.
Ta-A, An Aquatic species.
Ta-V, Vestans, Vestan symbiote pairs.
Ta-M, Mycos, A distributed intelligence resembling fungi.
Ta-R, Raptors, or T-Rex.
T'an, possessive form of Ta.
Moravecs. In-vat beings or brains-in-a-box (after Hans Moravec). This isn't to deny them morphological freedom, or to say that the wetware can't offload some cognitive functions to inorganic peripherals, or occupy alternative platforms such as virtual realities, computational space, Exocortices, Pidgin Brains (from Michael M. Butler), Telefactored presences, and other kinds of neuroprostheses.
The Ta'n efferent outputs to Clouds, Effectors, Holodecks, and other personal peripherals are built on retasked efferent neural channels, and their inputs, like telemetrics, adopted senses, and engineered senses, on retasked afferent channels. Shared efferent and afferent functions are switchable: the Avatars of their virtual reality use the same pathways as their Proxies, and are roughly equal in producing a sense of Being There.
Exocortices. Insentient peripheral brains, as for long-term library memory.

Gizmo. An AI linked simultaneously and pseudo-telepathically to one of the Ta and a Synthiont.
Gadget. A stand-alone AIs, maybe former Gizmos, but now recommissioned, and stripped of their independence and their reciprocal Ta interfaces.
Doodads, Gimmicks, Widgets, or Scouts - smaller versions of Gadgets, AIs tasked with functions, like anchoring Proxies.
Scouts or Watchposts. Gadgets launched into deep space to search for signs of life and report back to the Ta on Eck Glintnets.
Telefactoring. Remote manipulation of a slaved device.
Sylphs. Tiny, flying or swimming, bug-like surveillance drones.
Proxies, teleoperated and telepresent drones in animal form, dynamically constructed around small Gadgets. May be also be called Poppets, Shifters, Drones, Surrogates, Zombies, and Golems, depending on function.
Waldos and Wilmas. Teleoperated and telepresent drones in human form.
Poppets. Small child drones configured around small gadgets.
Hive Minds. Gizmos and Gadgets interlinked in non-sentient, distributed intelligence networks. As a deliberative body, it's called a Ouija Board.

Eck, a kind of fabric, woven from threads of dense, informed Spacetime, created and configured at attoscales by nanoscale devices. A strongly emergent property, with planck-scale operations. The movement of Eck Effect is bidirectional.
Eck can have a linear, ray, or beam mode; a screen, seine, or sieve mode; or a shaped, morphic, or morphogenic mode.
Attoboys or Attoyang nets. Eck nets with positive properties, behaving like force
Attogirls or Attoyin nets. Eck nets with negative properties like drawing or absorbing.
Atonoots. Eck nets with gender confused properties
Eck screen, or Sieve,. A plane of Eck suspended from Two Gadgets
Driftnets or Dragnets. Connected Eck screens circling the globe, suspended from 16 Gadgets.
Morphic Fields. Shaped 3-D Eck fields.
Intolerance Fields disallow specified molecular configurations, disrupting their bonds.
Conversion, Absorber, or Langston Fields – Matter-to-energy conversion on the fly. This is thebasis of Reactionless Drive.
Pressor Fields or Shields. Exert repellant or protective force. These act as tractor fields when used from behind a target.

Flash. To share a pattern between Sentients pseudo-telepathically via Glintnets and Gizmos
Tickle. To transmit a pseudo first-hand experience.
Glean or Grok. To receive a Tickle.
Tagging or Painting. Identifying a target for future action by tweaking part of its molecular configuration.

Spooks and Glints. A Spook is the Ta telephone. Glints are nanoscale devices implanted in neurons. They can network and communicate via E-M or Eck. Linear transfer of data between entangled points is the basis of most Spook and Glint communication. Sentience still can't be sent across space, so the Star Trek transporter, or the teleportation of life forms hasn't been achieved yet. But Telereplication, or Nanofax (from Gibson), sends instructive or reconstructive data across either local or interstellar space to molecular assemblers (think hi-res 3-D printers). Interstellar transport requires that both the sending and receiving units be cloned in the same Placetime.
Nanofacture. Manufacture with nanites per received instructions.

Spybot, a gram's worth of anatomically distributed, self-replicating Nanites occupying an organism, including humans. Skullbugs are Spybots that live in the brain and report behavior and subjective states to the Ta and the Van via the Gizmos
Fast Rapture. Execution by Pleasant Death in 60-seconds, from remotely activated Spybot neurotoxins.
Slow Rapture. Suicide by Pleasant Death, over a 24-36 hours period, available on request.

Nanolife Symbionts or Synthionts or Synths. The Van and others.
Nemos. Nano-engineered microorganisms, Nemobugs.
Augments or Nanolife Endosymbionts:
Nanocytes patrol the bloodstream and lymph.
Nanophages devour obsolete and broke-down Nanites, rogue biophages, and remedial ecophages.
Nanobombs kill targeted and unwanted cells.
Nanodocs effect physical repairs to tissues.
Nanosomes and Nanochondria, two terms adopted by the Van from Sandberg and Clements respectively, live inside the cells, but outside the nucleus, and enhance cell function in several ways. Nanocrisprs live within the cell's nucleus, programmably correcting and modifying the DNA and tweaking its epigenetic expression.

Callotropics. Technologies using carbon allotropes.
Spinners. Carbon capture producing carbon nanotubes.
Weavers. Carbon capture producing graphene sheets.
PHPs. Piping hot pizzas, a hot heat source.
CBPs. Cold breakfast pizzas, a cold heat sink.

Babble. Earth’s future lingua franca, built on a general English scaffolding, but with simplified grammar, extended vocabulary from global sources, standardized spelling, and an expanded alphabet.

True Space – True void, void of fields and zero-point energy
Busy Space - Normal space with E-M and gravitational fields