

WHEN
EMPIRES
FALL





When Empires Fall

A NEW ERA

I had a dream. A dream of a wood, old beyond imagining, rich with life, thick with deep, heavy fertility, laden with the smells of eternity. The trees were tall; the trees were strong. And they beckoned, though they did not need to move. Their proud straightness alone was a magnetic force. Their silence was a pregnant moment waiting for a voice. And I was drawn toward them.

How many other travellers had heard this call? How many had become lost in this wood or found a home here? But the silence pressed in tight, and the wood closed around me. And where I had expected to hear the distant conversing of birds and the careless accompaniment of splashing water, there was only the sighing of a dry wind. The sighing of a dry wind through brambles, thick, black and wicked, clinging closely to the bases of trees, sinking thorns deep into aged bark. And what had been the rich, sticky-sweet smell of life swelling deep in the earth became the cloying scent of decay, of death bursting through the soil in repellent, fungous growths.

The wood cringed about me, as if each creature in every nest and burrow and cocoon were recoiling from the smell that I had caught. And although the motion subsided quickly, the vision remained with me, like bright flashes in darkness. The wood was steeped with life, saturated with creatures, each cowed, as was I, by the unexpected intimation of doom.

But the trees were tall and proud. The brambles, though twining vine-like through the limbs, were nothing to the ancient strength of the trees.

A soft groan touched my ears, the sound of weight shifting, settling. It came from a tree, like many of the others around me, heavy with sigils and signs, carved deep with coats of arms and patents of rectitude. With a dull pop, it sagged against its neighbor, a younger tree, uncarved and unmarked, but no less tall or broad. The young tree bowed, trying to roll with the weight of its older neighbor, but the groan of its bending ascended to the shriek of living wood splintering. The two trees crashed to the forest floor, leaving the final shriek hanging in the air. While the young tree crashed and splintered bitterly and violently, leaving a quivering stump and savage echoes, the older tree landed with a dull thud, and disintegrated to reveal an interior seething with insects and pungent with dead ichor. Where it had entered the ground, the trunk had pulled free, leaving a shallow, musty wound, where all its roots had long since dissolved into the gray leprous soil that remained.

And suddenly I saw how many of these dead but still erect trees there were, each sagging against the living ones beside them, hanging like a sword above the healthy trees of the forest. These standing dead were holding the living hostage against their pride, their will to outlast their lives. It was then that the silence found a voice, and it was singing a song of death.

How could no one have seen that the wood had been dying for so long? How many young trees could shrug their way through the dead weight entangling them?

A shadow passed near me, a force shrouded in blackness, which left a bright flickering behind as it fled. A flickering of fire. Before I could move, the fire leaped to the fallen tree, consuming the crumbling, dry wood, destroying the insects with pops that merged into a steady sizzle.

The wood came alive again, with creatures mindlessly fleeing the blaze, but not quickly enough, for the fire leaped ahead of them, tree to tree, bramble to bush, cutting them off, mercilessly devouring them. Leaves ignited on branches in the searing air, and trunks exploded as the sap inside them flashed to steam. Somehow, above the infernal roar, arose another sound, a shrill keening, the combined cries from the throats of a million million incinerated creatures, and the creaking of a million million falling trees.

After a time, which was forever, or might only have been an instant, the fire was over. Smoke and steam concealed everything, and the sounds were of fading hissing and crackling, and the exhausted groan of great weights shifting one last time to their last resting places. A wind stirred, but not a dry wind—a fresh wind, which stripped the smoke from the smoldering wreckage and carried away the sounds of ruin.

The trees that remained stood battered and blistered, but untangled in the sunlight. The brambles were seared away, and the standing dead were ashes. The creatures that returned were the strong and vigorous, and the song they took up was the song beyond the song of death: It was a song of defiance, of renewal. The voice had found the song of life.

Some things can only be cleansed with fire.

I had a dream. A dream of fire.

THE FALL OF EMPIRE

By 1130, the Imperium was dead. Perhaps it had been dead for a long while, wanting only one dramatic event to prove it. The Rebellion filled the bill. And the Rebellion exposed something that perhaps nothing else could have

exposed: The Imperial social contract was dead. That contract was the contract of empire. Eleven thousand worlds collected into one group need a set of values that they all share in order to remain together. And because it is time-consuming and inefficient (not to mention impossible)

to expect every single inhabitant of 11,000 worlds to comprehend and internalize those values, the values were abstracted out of the general population and placed in the care of the nobility. The nobility, whose job it was to represent their worlds to a level of nobility above them, who would represent their subsectors to a level of nobility above them, and so on all the way up to the emperor, the most powerful being in the known galaxy.

The essence of the Imperium could be distilled into a deceptively simple ancient Solomani phrase, "*Noblesse oblige*," literally from the French, "Nobility obligates." Obligates the noble to repay the fortune of privileged birth by using that privilege to obtain the talents of stewardship. Obligates the noble to use those talents of stewardship to take care of the land, to take care of the people. To understand that everything comes with a price, that even privilege must be paid for. Must be paid to the people beneath, whose willingness to serve legitimates the noble. Must be paid to the higher nobility above, whose recognition of service legitimates the noble.

"My lord," "my liege" is not kowtowing; it is social contract. But the Rebellion revealed the unpleasant reality that, by 1100 at least, the Imperium had entered the era of *Noblesse n'oblige plus*, "Nobility no longer obligates." The often repeated notion that societies have life cycles—that they are young and vigorous, then mature, wise and productive, and then over-aged, spent and decadent—applied to the Imperium, although few saw it.

When enough nobles no longer took the long view, and began thinking in terms of short-term or local gain, the Imperium was in trouble.

When enough nobles forgot that their positions were not guaranteed by invisible forces, but lasted only so long as the Imperium as a whole was vital and healthy, the Imperium was doomed.

When Dulinor shot Strephon, then fled to Ilelish, never imagining to take the reigns of Imperial power, but only intending to flee to his home ground and prepare for war, *noblesse n'oblige plus*.

When other Imperial nobility formed their own factions to back their own claims to the throne, instead of maintaining the empire as a whole against internal forces of destruction, *noblesse n'oblige plus*.

When the admirals of the Imperial Navy, nobles all, and entrusted with power enough to snuff out billions of lives, committed their fleets to battle against other Imperial fleets, they turned their backs on the proud service that gave meaning to their careers. They, better than any other humans, knew the appalling power of the Imperial fleets, knew the annihilation that would result if fleet were pitted against fleet. Only the Imperium, the navy, and humanity would lose. But the admirals did not stand together and refuse to do battle against humanity itself. *Noblesse n'oblige plus*.

When lesser nobles girded for war, sent their best and brightest to swell the factional battle fleets, not thinking that lesser nobles in other factions would do the same, and therefore every lesser noble in the Imperium was sending

the best they had to certain and senseless deaths, *noblesse n'oblige plus*.

Why should these lesser nobles have been expected to think so far ahead? Because that was their jobs. The wealth and leisure of noble birth not only allowed, but *demand*ed, by the tradition passed down by generations along with the titles, that the nobility be smart, temperate and foresighted. For they were the keepers of the social contract. The Imperial Moot was the symbolic recognition of that fact.

ARTIFICIAL INTELLIGENCE

It was ironic, and yet instructive, that the most promising source of true independent artificial intelligence was unknown to the majority of humanity. Ironic because of the vast influence that it would have, but instructive because of the anthropomorphic myopia that it highlighted.

If asked about viable artificial intelligence, most anyone would have pointed to various experimental robots such as those revealed by the Rhylanor Institute of Technology, or the organic computer cores that pulsed at the center of most TL13+ computers.

Hardly anyone would have mentioned the tiny semiconductor chips native to a harsh world in the Solomani Rim.

While the sophistication of personality simulation programming was impressive, and the facility with which organic brain tissue could control the function of starships was useful, these paled beside the potential of the tiny etched bits of silicon that could reproduce themselves and grow their own circuitry.

To be fair, the chips of Cymbeline were not widely reported, but among those who were aware, they were dismissed as a curiosity, thought of as cute objects somewhere in between clever pets, fascinating toys and precocious children.

After all, what threat could they be?

Anthropomorphic robots, on the other hand, looked like us. Now that was a threat. They could secretly live among us and usurp our positions. And organic computer cores were like our human brains in direct control of machinery.

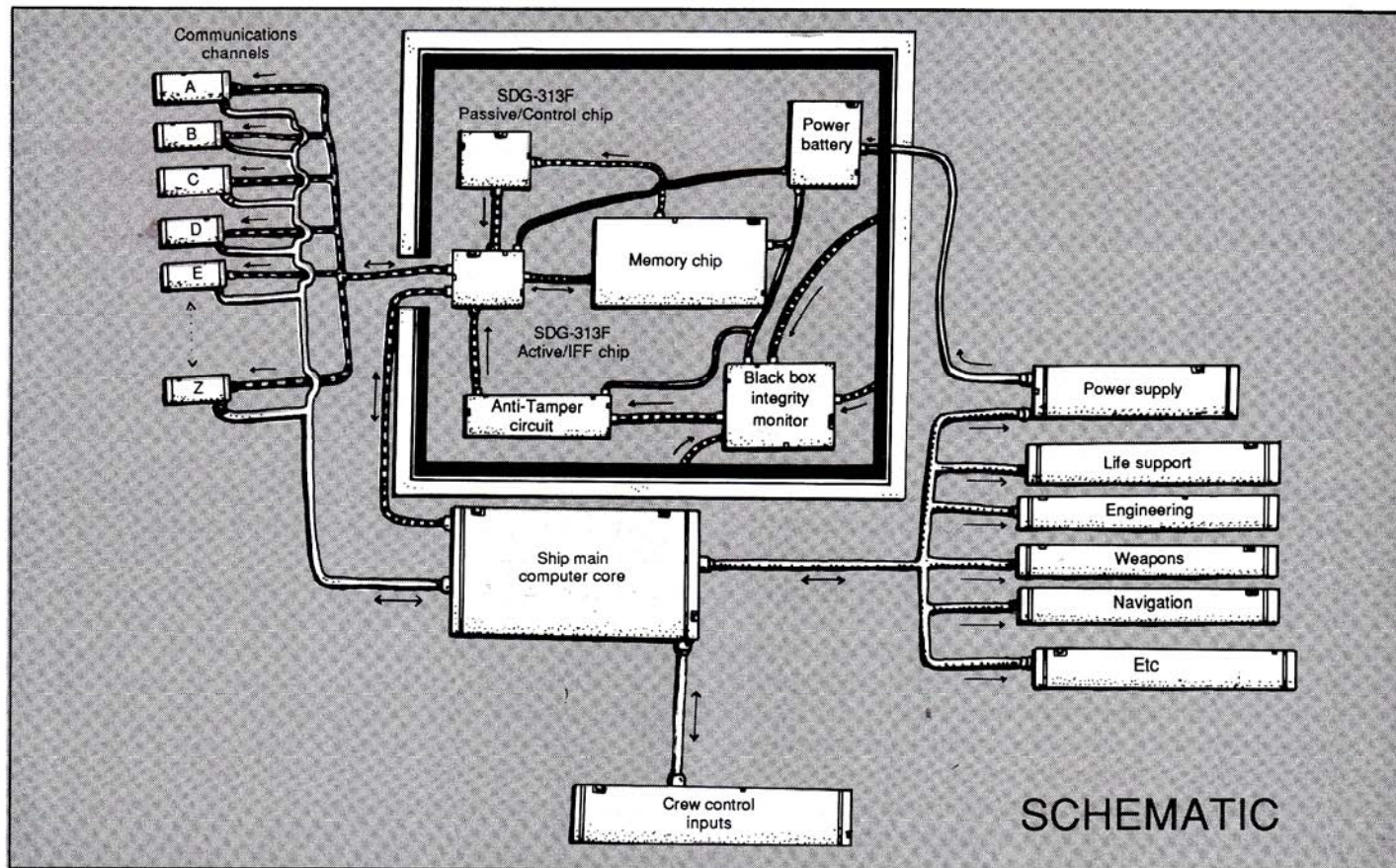
What was at work was simple racism, specism or morphism.

Humans were the masters of the universe, or among the broad minded, humans and things that look an awful lot like us with arms and legs, and if you stretch it, funny star-handed tentacles. But a little chunk of glassy stuff was just a *thing*, not a being that could usurp our position.

Ah, where would dramatists be without hubris? And what a tragic fall it would be.

From the introduction

Wham! An Irreverent Look at the Virus,
the Collapse and the New Era,
Dr. Eneri Kuniholm,
Mora, Deneb, 1198



Functioning, as many thought, as a rubber stamp to confirm new emperors or Imperial decrees, this role was in fact a symbolic recognition that the empire only lived, only functioned, only succeeded, so long as the lesser nobility affirmed the greater Imperium and its policies as a whole. The Moot's single greatest power was to dissolve the Imperium. The Imperial nobility, the repository of the Imperial social contract, could call into question the legitimacy of human society as a whole, and hopefully remind all concerned of what was at stake. Instead, they stood aside, inert, impotent, and permitted the Imperium to die by their inaction. If ever a body of persons deserved the contempt of all humanity, it was the Imperial Moot. For a decade they did nothing, while more human lives were extinguished than by any other single event in history.

When they thought that they could maintain their positions by siding with their factional or domain leaders, they forgot their jobs. Why did they forget the Civil Wars of 604-622 when the Moot and the Imperial bureaucracy, by carrying on with their jobs and refusing to allow themselves to be split, prevented the howling forces of chaos to take the life of the Imperium? Why did the Moot not stand as one and forbid lesser nobles to drain away the lifeblood of the Imperium by fighting each other? What if they gave a war and nobody came? Because *noblesse n'oblige plus*.

The Imperial nobility started the job. The Virus only finished it.

ARTIFICIAL VS. INORGANIC INTELLIGENCE

What would occasionally flare up as the subject of bitter debate was, in the final analysis, a moot point. Generating

rather more heat than light at conferences dedicated to robotic intelligence, attempts to distinguish between artificial (manufactured) intelligence and inorganic (non-biological) intelligence were irrelevant to the general public, who used the terms interchangeably.

The terms were less than helpful, at any rate. If a computer with a synaptic, vat-grown organic core attained intelligence, it would surely be artificial, but would it be organic or inorganic? If silicon chips could develop intelligence independently, they would surely be inorganic, but since such a chip could be readily manufactured once its function was investigated, could it not also be described as artificial?

Much of this etymological hair-splitting finally collapsed, exhausted, at the rationalization that science was to blame. Since the biological sciences obviously lagged behind electronic sciences, meaningful comparisons between the manufacture of organic and inorganic life were impossible.

In the end, it was a distinction without a difference.

The real acid test of intelligence proved to be that intelligence, whatever its adjective, defines its own parameters.

STARSHIP TRANSPONDERS

The least appreciated daily miracle of Imperial society was the starship transponder. Its simple purpose, to prove the identity of a given starship to ground facilities and to other starships, was confounded by the sheer magnitude of the task. At 920 parsecs from the Solomani Rim to the Zhodani border, the one-way passage of a packet of information across Imperial territory would take three years at maximum theoretical speeds of jump-6 with no turnaround

time required for successive jumps. But because cosmography does not conveniently place worlds at six-parsec intervals, jump-6 ships are rare, and turnaround time adds up—practice dictates that the period is considerably longer.

Given these distances, it is clearly impossible for a central authority to keep track of all the changes in status of starship ownership and registry, much less issue and confirm those changes, in a timely fashion. But localized administration permits too much variation in procedure, which over the span of an Imperium, would only create more confusion. Either way, the system is ripe for fraud, abuse and intrigue. And because the stakes in a ship's identity and allegiance are high, often life and death (it is no accident that military vessels refer to transponder systems as IFF, for Identification, Friend or Foe), such shortcomings cannot be permitted. Eleven thousand worlds cannot function as an efficient economy if each starship encounter is treated as the arrival of Greeks bearing gifts.

Distance dictates that identity registration must be localized, but cohesion dictates that registration must be noncounterfeitable. The solution was elegant and successful for quite a long time. It also proved to be the manifestation of the Imperium's Achilles' heel.

Imperial science was aware of the possibility of inorganic microchip intelligence before its discovery on Cymbeline in 1067. The fact that the existence of the intelligent chips remained a secret until Dr. Arnold Rushorin's heavily expurgated paper was allowed to be published in 1114 is a measure of the importance that the Imperial government placed on these creatures. Even before they were discovered, they were chosen to be the ultimate solution to the Imperium's IFF problem. However, the creation of such circuits, though theoretically predicted, proved impossible until living examples were found that could be studied and, most importantly, allowed to reproduce.

The Cymbeline chips reproduced by impressing their circuitry patterns onto existing silicon chips, using conductive materials present in the environment. In many cases, the chips would impress their circuitry over existing chips, converting an existing circuit to a new pattern. It was the chips' ability to reproduce that allowed the program to gain momentum. Now the researchers could actually guide the evolution of new circuitry patterns by offering different chip "blanks."

In 1086, the researchers achieved their goal—the creation of a strain of chip, the SDG-313F series, with a low, constant rate of self-mutation over time that would reproduce offspring identical to the current form. This would allow the creation of a pool of identical chips, all of which would change at the same gradual rate. This pool could be expanded at any time by retaining a breeding population which could create new chips, each at the same state of development as all their siblings. These chips were also bred not to have full independent intelligence, but rather to respond in a sophisticated fashion in only a few prescribed areas. These areas were the ability to communicate with each other, to exchange and update information and, most importantly, to recognize other sibling chips as authentic,

ACHILLES' HEEL

We can talk all year about the vulnerability of certain Imperial systems to offensive data system exploitation, and we won't solve a thing. We're vulnerable to computer viruses today, and this law will allow us to be vulnerable to them tomorrow.

So what? That's the name of this game. The Imperium wouldn't exist without that kind of vulnerability. We can't legislate it away. We will always be vulnerable. There is no iron-clad defense against anything. The history of warfare is measure and countermeasure, then counter-countermeasure and counter-counter-countermeasure, on and on forever. Technology will not stop. Weapons will be devised against our current defenses, but we will work to anticipate and prevent them, and each new generation of threat that will develop.

Would you have us go back to writing with pointed sticks on wax tablets? That might be invulnerable to a computer virus. And if not, we could throw away the wax tablets and write in the dirt with our toes.

Two neighboring walled cities can either fight each other until only one survives to grow, or can grow by placing a larger wall around the both of them and becoming a state. Two walled states can enlarge the walls and create a nation. Two nations can expand their horizons to defend the society of a continent. Two continents unite to form a hemisphere, hemispheres to a world, worlds to a subsector, to a sector, to an Imperium.

Each level of consolidation increases your strength by an order of magnitude, but it comes at the price of trust. You always have to trust someone. If you extend that wall around a sister city, you can both be rich, but if they decide to stab you, you're *dead*, because you gave up the ability to defend yourself against those people when you jointly agreed to stand back to back and move your defenses outward. Any great society proceeds from the acceptance of its members' joint vulnerability to each other.

And look at what we've achieved. This Imperium is the most powerful organization known to history. We're invulnerable to everyone but ourselves, because only we have the inside access to the undefended vital organs.

Our awesome power lasts only so long as we continue to justify our faith in each other. At some level, we must all trust each other.

The other choice is to give up being a powerful Imperium and become a collection of squabbling sectors, or subsectors or individual worlds. We'll be able to more surely control our own security, but look at all we'll lose. If we can't trust each other, technology *can't* save us.

*Marquis Pyotre haut-Bastien,
addressing the Moot, 103-1086, during testimony
for the 12th Standard Data Systems Law of 1088*

unaltered, untampered members of their specific strain. By additionally limiting the chips to only receiving new information from other authenticated sibling chips, the information loop could be sealed to exclude counterfeit data.

The new SDG-313F transponder system consisted of the traditional sealed, tamper-proof "black box," inside of which were two SDG-313F chips. One of these was the active IFF circuit, while the other had no active role, but was the control chip against which the active chip could compare itself. Connected to the IFF chip was its larger memory chip. By using the same electrochemical processes that the chips used to reproduce, the IFF chip would create and update data storage circuits on this chip. When each transponder was built, the chips inside were educated by trainer chips of the SDG-313F strain. This initial training consisted of contextual data, which included the date, the world on which they were created and selected items of history passed on from the trainer chips' individual memory. This created a common frame of reference within which all of the chips could orient themselves. Once installed, the SDG chips would be given detailed registry information for their ship. Any change in a ship's registry, configuration or status was reported to the SDG chip, which would record this information. New information of this type did not replace or overlay the previous registry. Rather, the SDG chip kept a current running history of itself and of the ship it represented, and it was this complete history that was broadcast to other transponders during the authentication process.

Most people are not aware that transponder systems are constantly broadcasting and receiving information while they are in normal space. They assume that a transponder only broadcasts a discrete identity "squawk" when interrogated by another transponder system. While this is true, it is only a small part of what goes on. The identity squawk is for the benefit of the ship's crew, as it gives them the details and particulars of the broadcasting vessel, but it is not here that the authenticity of the other ship is established. This takes place during the conversation between the transponders themselves. The transponders have direct access to a ship or port's communications channels, and they are, therefore, "frequency agile," able to use whatever comm system or frequency is needed and not otherwise in use.

In conversing, the chips interactively exchange information from their dedicated memory chips, and from their own ship's main computer core and databanks, to which the transponders have unimpeded access. It is by these conversations that the chips convince each other of their authenticity. This is not controlled by any arbitrary codes or passwords that could be discovered and misused or counterfeited. The chips simply judge whether they *believe* the other chip to be authentic, based on the information presented and the way each chip demonstrates its thought processes. As all authentic chips are also slowly mutating at the same constant rate, they also show incremental change in their thought processes over time. The recognition of this change in a previously encountered chip is crucial to establishing that it has not been merely copied and counterfeited. By testing these indicators against the

parallel SDG control circuit and its own data in the ship's computer and its own memory chip, the chip assesses a new contact as authentic or flawed. This judgment is then passed on the squawk that was received by the crew, telling them whether to believe it or not, and allowing them to act accordingly. This entire procedure is independent of crew oversight. The large volume and high rate of data exchange is more than could be controlled by a human, and keeping the crew out of the loop is necessary to minimize transponder fraud from the outset.

A squawk judged as flawed must be investigated further. It is not on its own a sign of hostile intent—it may be a sign of a deliberate act of deception or some sort of malfunction. Similarly, an authenticated squawk may be that of an enemy vessel, but the identity received is correct.

In a very real sense, the SDG chips are a population of "honest brokers," outside of governmental or interpersonal allegiance. They are responsible only to perform their jobs, and they make no allowance for the consequences of their actions. For example, the transponder of a stolen starship will not attempt to conceal the fact that it is a stolen vessel, should the data at its disposal confirm that fact. However, the ship's crew must often assess the significance of an authentic identity squawk. For example, the questions, "Are we at war with that world?" or, "Was a ship by that name reported stolen?" are outside the purview of the SDG-313F transponder circuitry.

The true nature of the SDG circuit is completely unknown to the public. By presenting the new transponder as a self-contained black box which functions unobtrusively and without need for human interaction, Imperial authorities have forestalled popular curiosity about its details. And when dealing with the curious, the eminently reasonable response that prevention of fraud and counterfeit require transponder contents to remain secret is readily accepted. To thwart tampering, each black box contains a tiny antitamper circuit. If the box's integrity monitor detects any breach in the container, a surge of power from the antitamper circuit melts the SDG circuits to slag.

Prototype SDG transponders were in final testing in 1086, and with the passage of the enabling laws in 1088, the new transponders, popularly known as the "Deyo Circuits," became mandatory equipment on all spacecraft operating within the Imperial boundaries. These were installed as standard equipment on new construction vessels, and over the course of a 12-year phase-in period, were retrofitted to all existing vessels as part of routine annual maintenance and re-licensing procedures. SDG-313F transponders were also installed at all starports and other locations with at least orbital communications facilities, to permit interaction with the spacecraft transponders. The SDG circuits were also exported vigorously, for any of the alien powers that wished to trade with the huge Imperial markets also had to be integrated into the system. Many governments, particularly the Aslan, Vargr, Zhodani, Darrians, Sword Worlds and Solomani, adopted the system for themselves rather than carrying two separate IFF systems. By 1116, the Deyo Circuit was ubiquitous within the Imperium and along its

DEYO CIRCUIT

Interviewer: Where did the Deyo Circuit get its name? Omicron's rosters show no Dr. Deyo.

Jarrah: [Laughs] Now that's a good story. You may be aware of this—the actual series numbers on the transponders that are being installed under the new regulations are in the SDG sequence. It's right there on the casing of every transponder box: SDG-313F-152467, whatever. SDG is the name of the new standard transponder model, but that's actually the name of the circuit itself, the SDG circuit. That, I believe, is from Strain D, Group 313F—I don't recall the distinctions between all of them. The breeding guys would be able to tell you that; I just tested the chips they sent up to me.

Anyway, that's the way we kept track of the different circuit lines we were breeding. SDG-313F was the pure-strain constant mutation rate chip that carries the collective memory in all of the transponders that are going into the ships now. We had literally thousands of strains and breeds of those things. Remember, these guys can mutate and evolve at a *phenomenal* rate because they breed like crazy; you don't have to wait for sexual maturity or anything. Zap! It's born; it's a circuit; it's wide awake; it's happy to see you; it's ready to go; and by the way, it asks, can I have a look at that little flake of silicon over there? The trick was to *hold down* the mutation rate, because we needed a chip that had a constant, predictable rate of mutation over time. That took us close to 20 years, but we finally got one, like I said, the SDG-313F.

So anyway, this story is to my mind proof that these chips are truly intelligent, just like you and I—they just don't have a big data storage system they can haul around, which is what's been holding them back. I had one hooked up to a big data library, actually using it to run diagnostics on the SDG series, because it could get in and appraise the circuits better than we could, and there was a period of down-time, and I guess it got bored and decided to look through the library. It must have hit a Bach entry, because a minute later the chip tells me [through the voder attached to the chip interface circuitry] that it thinks the SDG series designator stands for, "Soli Deo Gloria [to God alone goes the glory]."

[Laughs] Who would have thought that these chips were thinking about religion? But it makes sense, really—like any other intelligence, they're wondering why they're here, what's the story, why *are* things? And it comes across some connection that seems to make things fit, and it wonders if it has an answer. Other people have told me about similar experiences, particularly early on, when we carried the first chips away and told them that we had created them via the old Terran MILSPEC chip. The chips for a while must have thought we were their gods or something. That sounded really human to me.

Now there are a lot of people here who firmly feel that these guys aren't intelligent—it's just "simulated intelligence," whatever that is. I mean, what's *simulated* intelligence, anyway? People talk about how the human brain works like a just slightly busted computer, making tenuous connections, little short circuits which is where you get worldview and opinions out of events, and they'll be different for different people. But our brains are always looking for these little missing pieces, fitting bits here and there, trying to make a pattern, to bring order out of chaos, and that's what I see these chips doing all the time. If you talk like a drunk, stagger like a drunk, and fall down like a drunk, do I say, "Oh look, a simulated drunk"? No, I just don't let you drive my g-pod. But I got a big kick out of the Soli Deo remark, and I told a lot of people, and we started calling them the Deo circuits around here. It just got written down somewhere "Deyo," and it went from there.

There's a postscript to the story, too. I thought it was so interesting that the one chip came up with that idea, I ran it past a few other chips when we had them on the diagnostic circuit. One day I ask this one chip, like all the others, "What does 'Deo' mean to you?" I still haven't figured out the reference for this yet, but it came back with, "Daylight come and me wan' go home."

They're sophisticated and unpredictable. If unpredictability isn't a hallmark of intelligence, what is? The thing to keep in mind is that the SDG circuits were bred to be subintelligent, without some of the connections for real oversight and self-modification, but they're almost there. The structure is there. It would just require some specific improvements, and, wham, intelligence. Just add water.

From the Imperial Research Station Omicron oral history tapes, Volume XXVII, Cycle B, Dr. Jamys Jarrah, 211-1106, assigned to Provisions of the 50-Year Rule, Code 16, Case 4, Imperial Security Act of 893

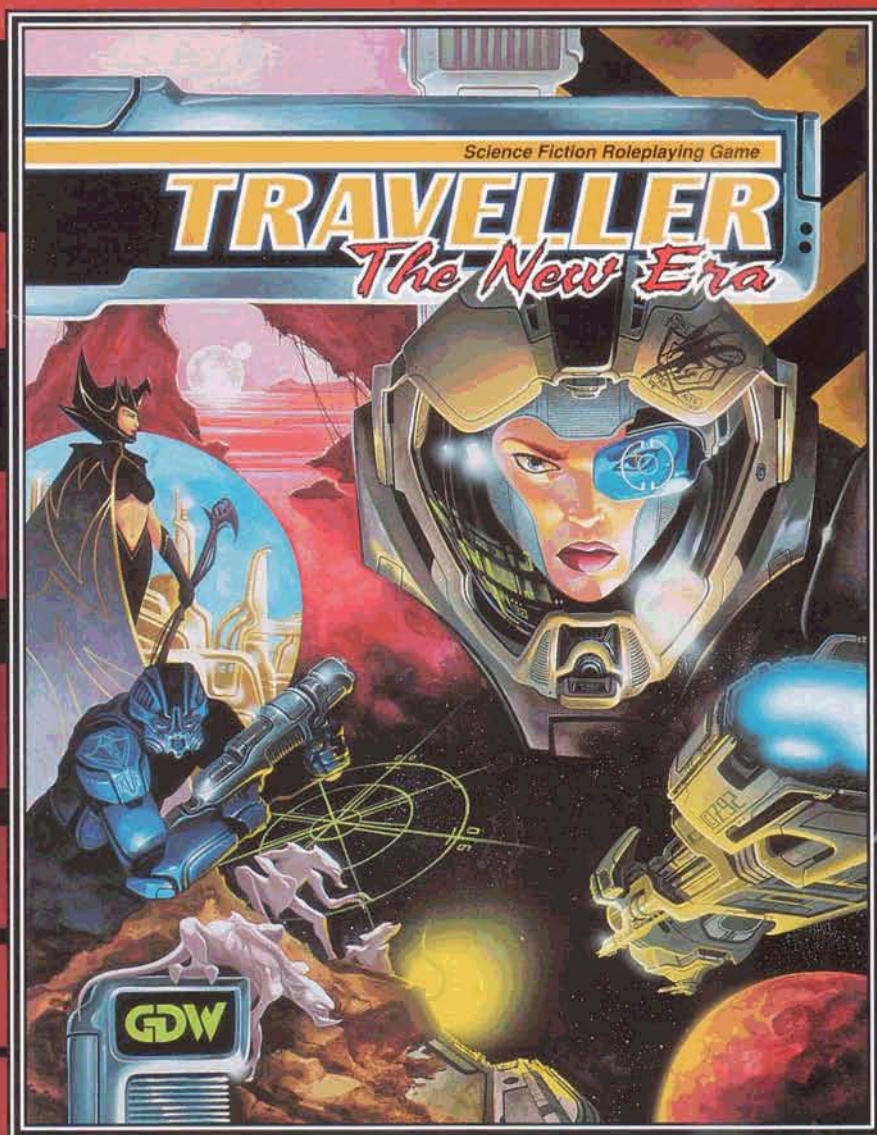
frontiers, and was well-represented even at the core of K'kree and Hiver space.

However, Admiral Herzoch Stearns, chief of Combined Imperial Intelligence from 1097 to 1108, ordered the exploitation of a newly discovered "wild strain" of Cymbeline chip. These symbiotic parasites were, in some cases, able to change the circuitry of their prey at a distance by convincing the prey circuit via broadcast messages to modify its own

circuitry to the parasite's wishes. This research was intended to give the Imperium an ultimate fail-safe to use against invaders or insurrections. Had Stearns been up on his Plato, however, he would have known that any truly effective tool is distinguished by its capacity for opposites. Ω

To be continued in future issues of Challenge, culminating with the February 1993 release of Traveller: The New Era.

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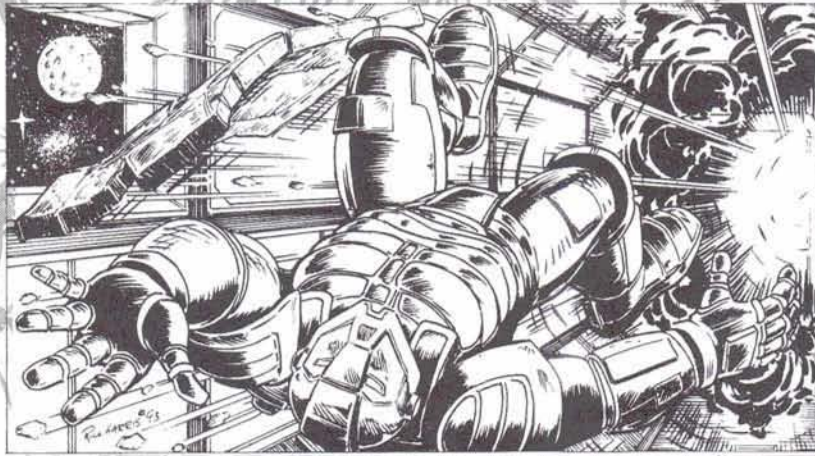
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When **EMPIRES** **FALL II**





Perhaps the Collapse could ultimately be blamed on Solomani Security. Or Imperial Army Intelligence. Or Joachim Sanhex and Baldwin Wei. But what would be the point? The facts are these: In early 1110, Dr. Arnold Rushorin left his position at the Free University of Aquitaine to defect to the Imperium. IAI Forces under Colonel Sanhex attempted to assist him; Baldwin Wei and SolSec attempted to thwart him.

In the end, it was the keepers of secrets, intelligence and security apparatchiks, that took a simple scientific fact and turned it into a weapon. Had Rushorin been allowed to freely publish his data outside of the politically charged context of the Imperial-Solomani conflict, things might have turned out differently. The public would have known about the chips, and there might have been public debate about their proper use. But in the event, that was not a choice. The paper that Rushorin was finally allowed to publish in 1114 was heavily edited by Imperial Army Intelligence, and contained deliberate inaccuracies. By the time the public became aware that Cymbeline was home to sentient silicon-based life, it was too late; the Final War was in full swing, and the Cymbeline chips were already being transformed into the final weapon of that war.

An Aborted Warning

In 1128, a number of research personnel working on TL 16-17 artificially intelligent computer systems at Imperial Research Station Omicron (0922/Core) discovered the existence of a terrifyingly dangerous research program. Although the program was nowhere near complete, and would in fact take another three to five years before it could be used, the mere existence of such a project was enough to make these half-dozen scientists rethink their involvement.

After a number of furtive and urgent meetings, they decided that they would try to carry warning of this project to the heads of the other factions, one to Margaret's faction, one to Ilelish, one to Deneb, one to Gushemege, one to Vland, and one to Daibei. They planned their departures to coincide with a conference they could all arrange to attend without attracting undue attention to themselves.

Unfortunately, one of their number was a plant loyal to Lucan, one of many assigned undercover to Imperial Research Stations to ensure their reliability. This plant arranged for them all to be followed and murdered, but the emissary to Ilelish, Jean Milakhad, was able to turn the tables on his assassin and escape. However, he did not know that he had been betrayed from within, and continued his mission as planned, although now aboard a patrol cruiser, commandeered with the help of his Imperial Navy reserve status. But as the plant knew of the scientist's ultimate destination, he was able to position naval units to intercept the craft, and even

insert an assassin at the destination, should the patrol cruiser get through.

On 121-1129, Milakhad's badly damaged patrol cruiser pulled into the highport at Khirar (2208 Ilelish), urgently requesting protection and media attention "for humaniti's sake." A number of tri-D film crews were waiting when the vessel pulled in, and Milakhad announced that he had information on dangerous military research being conducted on behalf of Lucan's forces that would have the direst results for the Imperium. Before he could get any further, he was gunned down by one of the assembled observers. The assassin took advantage of the confusion to relieve the body of the prepared statement, but before he could escape, was cut off by Federation of Ilelish troops. A brief firefight ensued, which was interrupted by the explosion of the patrol cruiser, assumed to have been the work of a confederate of the assassin. The assassin was killed along with over 200 Ilelish troops, bystanders, and members of the press, but was able to destroy the statement during the distraction afforded by the explosion. Although the scientist was clearly dead, an emergency medical team rapidly bundled him into a mobile shock-trauma low berth and removed him from the scene. Reports of the cryptic statement and foreboding events made their way onto TNS and other news services, but no details were forthcoming.

As a result of "tomb-tapping" (the psionic probing of the residual brainwaves in a dying brain) tests conducted on Milakhad, Dulinor learned that the man was bringing warning of one of Lucan's superweapons, a virus that was being perfected at a research station in Core sector.

This information came at a very opportune time for Dulinor, as his new Coronation Fleet had completed working-up exercises and had been declared battle-ready by its officers. The Coronation Fleet was the crowning achievement of Dulinor's new staff, led by Tredek Jurisor, and was the product of carefully husbanded shipbuilding resources in the undamaged spinward portions of Dulinor's Federation. The fleet was built and manned under the tightest security, as no faction was supposed to be able to field such a force any longer. With this one fleet, Dulinor believed he could make a final, triumphant thrust at Capital, take the throne, and bring the war to a conclusion. If he could capture the secret of Lucan's dangerous superweapon on the way there, his power would be that much more secure.

Final Offensive

While Dulinor and the Coronation Fleet prepared for their departure to Core, Dulinor sent the fleet's reconnaissance units out ahead to pinpoint the location of Omicron. Confident of his success, Dulinor prepared a prerecorded message of himself on a replica of the Iridium Throne. This message was timed to be broad-



cast on all Illeish Federation worlds at the anticipated time that Dulinor and the fleet would capture Capital. (A similar measure had worked quite well to solidify Illeish opinion following the assassination.)

Lucan, for his part, had been informed that Milakhad had escaped, and that the security of Omicron might be compromised. Rather than moving the facility, Lucan increased its defenses, placing a small fleet in the system and several tripwire flotillas along likely avenues of approach. The arrival of Dulinor's advance guard of recon ships gave Lucan's navy warning to beef up these forces even more, for Lucan correctly believed that Dulinor would be coming at the head of his fleet.

However, Lucan's forces were no match for Dulinor's. Lucan, having fought vigorous campaigns against four separate factions, and now having difficulties on his trailing, K'kree frontier, could assemble nothing to match the Coronation Fleet. Dulinor and Jurisor's dream of creating the final, irresistible force seemed to have succeeded.

Dulinor, swinging through Massilia to come at Lucan from an unanticipated direction, swept aside Lucan's screening forces in several short engagements. Although each battle was a clear victory for Dulinor, each trimmed his fleet back by a few more irreplaceable vessels, and the warning given by these screening forces gave Lucan time to assemble his reserves at Omicron where, on 78-1130, they met the Coronation Fleet.

The battle was the largest of the Civil War since 1122 and the slaughters in Gushemege and Zarushagar. Lucan had not evacuated or moved the research station, for he no longer had an officer corps that would bring controversial decisions before him. He had successfully purged the navy of this kind of honesty and courage by executing officers accused of "defeatism." What remained were officers who correctly divined what Lucan wanted to hear, and who kept one eye constantly over their shoulder and one hand on their necks. Nonetheless, Lucan's fleet at Omicron was larger than Dulinor anticipated, and was able to prevent Dulinor from capturing the research station intact for a leisurely examination of its contents.

On the second day of the chaotic battle, 79-1130, the virus was released. One of Dulinor's strike teams was able to seize control of the research station's data center. In their hurry to get the goods and get out, they infected their data retrieval systems with the virus, believing that they were only collecting raw research data. However, the team had run out of time. To ensure that the data would get to Dulinor's fleet even though they were now unable to escape, they began spewing high-speed data transmissions which were picked up by several of Dulinor's ships as well as Lucan's. The virus was also able to spread and embed itself into the research station's control systems, and continued to infect other of Lucan's forces in the following weeks.

THE DUCK TEST

The age-old duck test declares, "If it walks like a duck and quacks like a duck, it's a duck." Unfortunately there is nothing resembling such a straightforward test for sentience.

The main reason for this is the emotional priority given to pre-existence. There is a clear popular prejudice that something artificially created or manufactured cannot be sentient; that it is somehow instead merely a simulation or mimicry of sentience. On the other hand, a pre-existing organism that is discovered to have sophisticated mental processes is much more likely to be perceived as legitimately sentient.

What this demonstrates is a deep-seated psychological or spiritual belief that life or intelligence can only be created by something greater than we are, something which is infinite or eternal. Just as we finite creatures are an order of magnitude less substantial than the infinite (shadows of the eternal forms, as Plato would have it), our creations must again be an order of magnitude lower than we are, and the notion that we can raise this lesser order of energy up to our level is something that we emotionally resist. Whether this belief is true or not is arguable; that it is unconsciously subscribed to by a substantial portion of humans is not. Thus we find in Imperial society the persistent rejection of increasingly sophisticated robots and computers as anything other than machines.

A powerful adjunct to this belief is the "threshold" issue. If we accept the premise that we can manufacture sentient life, then we should be able to define the threshold at which a mere thing becomes a *being*, something with *a priori* value. Then it follows that if we can simply add the ingredient that takes something across the line into beinghood, we can take it back out and pull it back across into thinghood. Once we know what that thing is, we can identify the people that were born without it, or the point at which a person loses it and becomes merely disposable. We don't really want to know what that thing is; after all, we have a vested interest in maintaining our anointed status as beings.


Had the Cymbeline chips been created in a megacorporate lab, Imperial opinion would have marvelled at the sophistication of their features, but would eventually have slapped them with labels like "emotion simulation programming," or "sophisticated synaptic replication," and consigned them to the ghetto of things, rather than beings.

The fact that the chips were discovered *in situ* with their potentials already developed allowed their sentience to get a much more sympathetic hearing from prejudiced, insecure humans.

Even when it was realized that they had gotten quite a head start from human technology, the fact that the threshold was crossed without human intervention made their status as sentients easy to accept into our belief structure. Because none of us was watching at that magic moment, the supernal spark of real sentience could have touched them and—*hoc est corpus*—inducted them into the association of beinghood.

Thus, we see that the definition of sentience is not the clear-headed, coolly rational issue that we might like to ascribe to urbane, interstellar sophisticates such as ourselves. Rather, it is more an issue of faith—faith in something we can't define, and which leaves us with more in common with our shivering, fearful ancestors than we would like to believe.

From
What's the Matter with You People?
A Historian Looks at History
Dr. Eleri Kuniholm
Mora, Deneb, 1235



Dulinor's fleet, now virus carriers, regrouped and refueled in the outer system and prepared to continue attacking toward Capital. During this time, intelligence specialists labored to collate and analyze the superweapons data they believed they had recovered, not realizing that what they had was the superweapon itself. In fact, the virus was even then working to conceal its presence, erasing the portions of data that described the development and function of a computer virus. The intel specialists, finding that they had received mostly garbage and gibberish, were left to conclude that somehow the data beamed to them had been encoded, or perhaps improperly transmitted. Because the research station had not been secured, and because Dulinor had a tight timetable for his arrival at Capital, precautions urged by some officers to prevent data contamination were not heeded. Dulinor, deep in enemy territory, and meeting stiffer-than-anticipated resistance, had to strike fast, while he still could.

Because the virus code had been directly fed into the fleet's central processing systems and did not have to sneak in via peripheral systems as it would usually do, it developed extremely rapidly. The fact that something was wrong became clear to Dulinor when his fleet attempted to jump out of the Omicron system. Only three quarters of his remaining force arrived at Keplo (1322 Core); the other quarter mis-jumped. Dulinor attempted to carry on toward Capital, but as ships in his force began malfunctioning deep in Lucan's territory, his nerve failed him for a second time, and he turned the remainder of his fleet for home.

Lucan's forces were able to fight the virus with a little more success. At least they had some idea of what they were dealing with, but only very little. It took the research station personnel over a week to reconstruct what had happened, and the best that anyone could do was compile a list of all the ships and systems that had probably been infected, along with orders that these all be destroyed. By this time, however, many of the ships had jumped out-system, pursuing Dulinor's fleet or carrying news to Capital.

Dulinor made it as far as Gakhu (2607 Ilesh) with the tiny remainder of the Coronation Fleet. Here his flagship, *Clarion*, began to malfunction, and eventually was crash-landed on the surface of the planet. Dulinor's experts, by now aware that they had caught a virus, believed that they had eradicated the cause of the malfunctions. But they had not. As Dulinor's technicians thought they repaired and vaccinated each system, the viruses within each ship—by now fully intelligent—were only allowing the technicians to believe they were succeeding. Meanwhile the AIs cleverly covered their tracks as they picked their way from system to system, infecting diagnostic equipment so that it would give back misleading results. Imperial systems, especially starships, were designed to be too efficient, with too

much labor-saving computer control. Lucan's scientists had deliberately programmed the virus to instinctively navigate through the intricacies of the standard Imperial Data Packages; the virus knew these computers better than their own operators, and were able to defeat them at every turn. Crews who were trained to run their ships through computer interfaces were no match for an enemy that turned those computer interfaces against them. There was no contest. Aboard *Clarion*, a determined technician had finally, painstakingly managed to discover the nexus from which the AI controlled the ship. But as he attempted to cut power to the offending areas, the AI seized control of the drives, trying to kill the crew before they could report what they had discovered. As the ship plunged through the atmosphere, the crew blew the central computer with a demolition charge and used manual controls to slow the ship's rate of descent and conduct a crash-landing.

On 243-1130, Dulinor was attempting to rally an angry crowd of farmers on the surface of Gakhu. The nearby computer control center had come under control of one of Dulinor's infected ships, which was testing its ability to control the automated farming machinery. Although Dulinor noticed the oncoming slave unit combine, he believed it was an attempt by the farmers to intimidate him, and refused to get out of its way.

As the weeks turned into months, lights started going out all across the Imperium.

The Virus

When Chief of Combined Intelligence Admiral Herzoch Stearns ordered the development of an offensive virus based on the Cymbeline chips, he planned to utilize the talents of "wild strain" chips which could command prey chips to cut new circuitry without having to come into physical contact with them. This would potentially allow Imperial forces to selectively disable ships equipped with the new SDG series transponders without having to commit overtly hostile acts, and with very limited collateral damage. Because Imperial dissidents and criminals, and non-Imperial races licensed to trade within Imperial boundaries all must have the SDG suite, this would be an extremely flexible capability. However, although this ability was successfully demonstrated on several occasions, it was never perfected, and never became a major path of viral infection.

But this failure did not stop the program. Initial research uncovered so many other promising avenues to develop that the wild strain vector became unnecessary, and funding continued at substantial levels.

Since each transponder suite included latent artificial intelligence in the form of two "lobotomized" Cymbeline chips, the trick was to find out how to trigger the chips into waking up and cooperating with the virus user, or at least into commencing independent and hostile action against their host operating systems.



As it turned out, this was relatively easy. The hard part was controlling them once they were unleashed. Lucan was aware of the program, and had great expectations of its service to him. However, each time he demanded its completion, the answer was the same. "It is not ready for military use, as it will not discriminate between friendly and enemy systems after as few as one or two generations. We can release it, but we cannot control it." In reality, it was even less controllable than that. It would not discriminate between friendly and enemy systems even in the primary generation.

Modus Operandi

The two main strengths of the virus, its heritage from the Cymbeline chips, were 1) its intelligence, and 2) its ability to cut new circuitry, i.e., embed itself in hardware, not just software.

Upon entering a new system, the first thing the virus would do is build itself a "hidey-hole"—a small cul-de-sac in the circuitry where it cut its code into the computer's own circuitry. Here the virus was safe from such precautions as powering down and memory reformatting. It would then attack the security and input-output systems. As with all security programs of any type, they can only be designed to counter known or anticipated threats. In the realm of measure, countermeasure, counter-countermeasure, counter-counter-countermeasure, there is always a small window of opportunity for the latest system.

This initial activity was visible to an observer who knows exactly what to look for. The small intense amounts of power required by the virus to cut new circuitry could be seen as power spikes at these early stages. Unfortunately, no one but Lucan's weapons scientists would have known the significance of these signs, even had they seen them.

Once in and embedded in some peripheral electronic hardware, the virus could watch how the operating system worked and learn how to subvert it. This stage was extraordinarily short early in the virus' history, as it had already been trained/designed to take over every standard Imperial computer configuration (called IDP for the standard Imperial Data Package which covered parameters of everything from graphite pencils and radial tires to starship software). Taking over Dulinor's and Lucan's starships at Research Station Omicron, after all, was what these things had been born for.

However, unfamiliar systems would require a bit of study. Hiver, K'kree, and Aslan computer architectures were unfamiliar to the first virus that infiltrated such a system, but as it was intelligent, it did not require one distinct data format in order to flourish. It merely sat inside its hole and watched the computer function, and would eventually figure out how to impose its code over the operating code. And once this virus had mastered its new home, all of the offspring that it sent out already

knew how to defeat these systems as well. With this kind of specialization came an increase in the mutation rate, but more on that later.

The one characteristic that would limit or prevent virus infection was limited computing capacity, either in terms of space or speed of calculations. A virus that attempted to infect an independent (non-networked) desktop-style microcomputer could not develop intelligence, as there was not enough raw material to achieve intelligence with. By the same token, an old slow computer would result in an infestation by a slow, stupid virus that would have a very hard time reproducing itself. Such viruses were like genies trapped in bottles, helpless for the moment, but dangerous if they could get out into an environment that allowed them to develop their full capabilities.

However, an already conscious virus that knew of such systems could still make use of them. Even a small hand computer has enough space in it for a virus to implant an "egg" which might lay dormant for years, but then spring to life when it is connected or transfers data to a larger system. Travellers in *The New Era* would do well to be careful of a pallet of computer terminals labeled, "Never been used, ready to plug into your mainframe."

Propagation and Vectors of Infection

The virus had an incubation period of perhaps 30 to 45 days, but it must be remembered that this period was the time usually taken for the virus to actually show itself and take over the system it inhabited, not the time it required to become operational. The time to become operational was quite variable, from very short as was the case when its full code was transmitted in one piece directly into a powerful computer system (as with Dulinor's and Lucan's fleets at Research Station Omicron on 079-1130), to very long, as when attempting to break into a small or slow computer, one with extensive security systems which it must outwit, or into an unfamiliar alien system operating at unaccustomed power levels. Thus, through the latter portions of the incubation period, the virus would merely be playing along with its operators, voluntarily operating correctly in order to gain time to reproduce. All through this incubation period, as well as afterward (in cases where the virus didn't merely suicide all at once), it would be attempting to reproduce by infecting every other electronic system available to it. Like any living creature, the virus only wanted to be fruitful and multiply. In certain cases, the virus would continue to remain incognito within the system for long beyond its usual gestation period, if it felt that this would help it gain greater reproductive success. This was the case with the viruses that inhabited Dulinor's ships that made it back to Illeish. Aware that the Archduke was taking them home with him, they went along for the ride, hoping to gain

DOWN IN FRONT, CLEON

Whenever the topic of the virus comes up, one question that is invariably asked is, "Why weren't the chips protected as Imperial citizens? After all, Cleon, I said, 'Any sentient life form within the Imperial borders, regardless of its origin, is a protected being, and thus a citizen of the Third Imperium.' So as Imperial citizens, they should have been protected from the use to which they were put."

First of all, just because somebody, even an emperor, says something, doesn't mean it's true. Sometimes it just isn't up to him. And Cleon, for all that we may remember him as the first emperor, was not an emperor in the way that Paulo or Strophon were. Cleon was in charge of the Sylean Empire, which would not become the Third Imperium as we know it until the end of the Pacification Campaigns. A great deal of fighting and nodding and winking and local accommodating took place between Cleon's reign and the creation of an empire that had a relatively uniform self-image.

Second of all, Cleon didn't really mean it. One of the first things he did after making that remark was to point out how robots could be excluded from the formula because, although they might be sentient, they were not life forms, and hence their status as sentients was expendable. What Cleon *meant* was, "Whomever and whatever the emperor wants to define as a citizen is a citizen, and this can change without notice." This is the kind of power-preserving cynicism that was embedded in the Third Imperium from its very beginnings, and which ultimately brought its downfall. It can be argued that the reason it lasted as long as it did was because for centuries its base cynicism was understood by only a relative few. But once word got out, it was open season on social cohesion, and there was nothing anyone could do to stop it.

Perhaps the Cymbeline chips were entitled to citizenship, but they did not get it. Why?

First, their discovery was kept a tight secret by the Imperial Navy from 1067 until they could no longer keep a lid on Dr. Rushorin's paper in 1114. It is likely that intramural conflict between Imperial Naval and Army Intelligence allowed the report to get out at all. Had the chips been in the domain of just one service, Rushorin could probably have been muzzled. But until 1114, any discussion of the chips' eligibility for citizenship was easily quashed by invocation of the Imperial Defense Secrets Act. And that was that. Anything that did not exist could scarcely become a citizen.

Second, they were, unfortunately, robotic-type life forms and were subject to the same prejudices that Cleon and most other Imperial citizens shared. Had they received a fair hearing, they would have likely been consigned to the same limbo that robots have occupied for centuries: treated as *exhibiting*, but not *possessing* the hallmarks of sentience.

Third, the chips were arguably only sentient with artificial assistance. There is circumstantial evidence from recently recovered INI files that INI took just this position during periodic internal reviews. After all, the single chips in their wild state on Cymbeline demonstrated only animal-level mental abilities. It was only when plugged into human-provided databases that the chips gained enough intellectual raw material to demonstrate their real intelligence. The fact that the chips could not demonstrate these abilities without outside intervention was a powerful argument against their having genuine natural sentience. After all, if someone were to connect a frog to a powerful microprocessor and voder and the frog could speak, would that really change the definition of amphibian intelligence?

Finally, there are certain logical difficulties with claiming all sentient life forms within Imperial boundaries as Imperial citizens. What if they didn't want to be? The extreme example would be if the Empire still existed and claimed the vampire ships, the lineal descendents of these chips, and certainly sentient life forms, as Imperial citizens. What would be the point? That would be the same as saying that all psychopathic homicidal maniacs within the Imperial boundaries were Imperial citizens. What would that change? To say that this status would place them under Imperial law so they could be prosecuted for breaking Imperial statutes (murder, mayhem, disturbing the peace) misses the point entirely. Whether citizens or not, they would still be dealt with, as sworn enemies of the Empire if necessary.

The point is the same: all beings or objects within the Imperial boundaries—enemies, citizens, whatever—will be dealt with in whatever way the empire deems is in its interest.

The chips were ill-used by the empire, by equal parts expedience and Imperial prejudice and specism. Few would dispute that they were ultimately able to emancipate themselves quite convincingly.

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the highest levels of access by hiding in Dulinor's entourage.

The virus' ace-in-the-hole in its first year or so was the standardization of the SDG-series transponder suite. This system already spoke the virus' language, and was installed on every Imperial vessel plus every alien vessel that operated within Imperial boundaries. While a virus-infected ship could also easily insert its code into other ships by routine computer-controlled communications, it was often more convenient to infect them by using the constant transponder chatter. This allowed the virus to plant itself in the most fertile ground possible, in and

around the systems of other embryonic intelligences. This also gave the virus a familiar, easily entered location in an alien electronics suite in which to "gestate" while solving the riddle of an unfamiliar system. Were it not for the Imperial laws that required alien vessels licensed to trade within Imperial borders to be equipped with the Imperial standard system, the leap to these alien systems would have been much more difficult. However, it only took one virus to make it into an alien computer core. Once that virus learned the principles of the new system, all of its offspring would find these systems to be as simple to defeat as the original Imperial systems.



Furthermore, the access this gave them to alien databanks and identification codes gave them additional advantages in further invading the alien societies.

Transponder vulnerability had its limits. All Imperial Navy, IISS, and other designated military-type vessels had special military-model transponder suites which had one special feature: an on-off switch. The on-off switch did not disconnect the SDG circuit; it merely caused it to shut up. Therefore, while shut off, it could passively read other transponders. These suites were naturally turned off when in combat or hostile territory to avoid detection from their transponder emissions, and when heading back in friendly territory where it was important to establish their *bona fides*, they were switched back on.

Civilian vessels could easily emulate the stealth part of this pattern, by destroying or disconnecting their transponder boxes. However, the decision to disconnect was irrevocable. Any attempt to open the box caused the tamper circuit to destroy the contents, but simple disconnection from other systems caused the same effect. In order to prevent the use of transponders removed from destroyed vessels, disconnection from the main computer or the communications circuits caused the tamper circuit to fire as well.

The risk of being detected by transponder chatter in the Wilds was one that had to be weighed against the certainty of being pre-emptively blasted from the skies when entering into frontier or safe areas. Ever since the time of the Black War raids (1122-1124), it had become standard operating procedure in the safes and frontiers of every faction to destroy any vessel not running a transponder. After all, only ships that had no business being in these Core areas would be running silent.

Ships that needed to travel back and forth between safe and outland gave very serious thought to the notion of killing their transponders. On the other hand, crews who expected to never leave the Wilds or outlands could kill their transponders without a second thought, knowing that they were increasing their chances of survival by that small amount. They also unknowingly increased their chances of surviving the virus, as the loss of the transponder vector made their chances of infection that much lower. This slight resistance to the virus is one more reason why the few uninfected relic (meaning pre-Collapse equipment that has survived into the New Era) ships in the New Era are only the oldest and most hard-worn vessels: These vessels were already beat-up and expendable in 1130 after their harrowing careers in the outlands and Wilds.

The other most useful vector for the virus was computer-controlled communications. Another feature of the user-friendly standard Imperial starship was that its every function was sped up and streamlined by computer intervention. Encoding and decoding, correcting for the Doppler shifting in messages sent between ships

with tremendous crossing vectors, keeping tight-beam antennae on targets with accuracies measured in attoradians—all of these tasks were taken by the computer to simplify the task of small multitasked crews. Incoming and outgoing messages were not sent or received by human hands, they were mediated by the ship's computer—its central nervous system. By tacking its invasive code onto these messages, a virus could ensure that its infection would pass directly through the target's central computer system.

The virus could also use the human vector. As talented as the virus was, it still had a hard time manipulating nonmechanized matter. But a virus could convince humans or other intelligent life forms to serve as its arms and legs. A virus which was still masquerading as an uninfected computer could request a crew member to load an important diagnostic program into a non-networked system, thereby infecting it. An exposed virus could coerce human assistance by threatening to let all of the air out of the compartment, to bombard a nearby city, or even to kill the captain and promote its stooge to the captaincy.

Another profitable means of propagation is via small craft. When a ship's boat is brought aboard a starship, it is routinely hooked into the starship's internal systems: Fuel hoses are attached to top off the craft's tanks if necessary, power cables are attached to allow the craft to shut down its power plant for maintenance and run off of external power, and computer connections are made between the small craft's and the starship's computers to allow its inertial navigation platform to be realigned and other diagnostics performed.

As mentioned above, a very common method of propagation was via the "egg" placed so that it could someday infect another system. This is something of a crap-shoot reproduction-wise from the point of view of the parent virus, but successful virus strains missed few opportunities to imprint their code on the universe around them.

Over short distances, the virus could even use physical travel. The virus could create individual "commando chips" that could generate tiny electromagnetic fields to levitate or leap to target systems, just as their forebears on Cymbeline did.

One means of infection that was feared by the uninfected was via their sensors. While it was theoretically possible that a virus with the right equipment could send various patterns and modulations of radiation that would cause a sensor to give output that would recreate the viral code within the sensor computer, this never happened. Sensors do not read radiation in the same way that communications receivers do. They do not read signals for meaning, but look for intensity and patterns over time among many signals. Any such attempt to infect a target via a sensor would take a very long time indeed. If it ever occurred to a virus to try this



Why did the Hivers fall to the virus? Why shouldn't they have fallen to the virus? What makes them better than anyone else? Their extensive reliance on computers did not make them omnipotent over silicon-based functions any more than a man on crutches has power over wood. Instead, it gave them some rather serious vulnerabilities.

It is high-minded, self-deluding fatuousness to claim that any race has one immutable spiritual trait, and that that race acts with one mind as one unified body. The Hive Federation, as it was known, was just that—a loose federation which was, in fact, primarily concerned with maintaining a homogeneous gene pool, and not in creating any sort of unified foreign policy or technological standards. Xeno-ethnologists are well aware that Hiver society is predicated on individualism, not group conformism. This is coupled with the fact that the Federation encompassed dozens of other races, each allowed to pursue their own interests beneath the Hiver umbrella. What we had here was far from a virus-proof society. Rather, it was a porous virus sponge, riddled with potential vectors of infection. To imagine Hiver warbots, bruisers, and warships possessed by a malevolent, life-hating intelligence unleashed on a pacifist society is to understand the issue of the virus and the Hivers. The Hivers, more than any other race, knew the unreasoning terror of the virus, and learned to hate it and its antecedents.

It was in their rapid recovery, after only 60 years or so, from the virus that we see the true strength of the Hiver facility with computers. We do them and ourselves no service by speculating that they should have been better defended than we were against the virus, and not susceptible to it.

What's more, it smacks of racism to think in those directions. When we say that Hivers are cautious and foresightful, what we are actually doing is patting ourselves on the back for being just as successful as they are while having had to overcome a bigger bag of handicaps. Sure the Hivers have done all right for themselves, but they had it easy; their psyches were rigged to succeed, while we got where we are while still being capricious and self-destructive. We humans ruled 11,000 worlds with one of our hands tied behind our backs—imagine if we were really trying to do a good job, not like those Hivers who are genetically incapable of screwing up.

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method, it quickly found out that other means were much more efficient.

Regardless of the virus' undeniable talents, there would always be the computer system that was inaccessible to any method of infection. In these cases, the virus' credo was a simple one: "If I can't have it, no one can." A virus that had taken over a starship (called a vampire ship) could use its weapons to blow the target apart. A virus that had slave vehicular units could run it

over. A virus with control of a power grid could send power spikes at selected targets to destroy circuitry, shut off power or attempt to overload and destroy portions of the grid.

One final point is that the most successful virus strains were those that learned to parasitize each other. The empire-building viruses (see "Virus Bestiary," below) knew that the suicider strains were wasting perfectly good computer systems and ships that they themselves could inhabit. Some of these empire-builders developed the ability to send offspring parasite viruses into already infected computers to bring them under their own control. Since the target had already been re-wired by its inhabitant virus to be under sentient computer control, all this parasite virus had to do was replace the first virus' motivational circuitry with that of its parent. These puppeteer viruses would often pretend to be uninfected ships in order to lure victims to attempt to infect them. Once they were in communication with the victim, they would reverse-insert their code back into the victim, disguising it as communications from the virus the target thought it had implanted.

As the viruses preyed on each other, they developed ever-more sophisticated self-defense security systems and sub-viruses, many times more effective than the man-made security systems they had defeated during the Collapse. (Indeed, the security programs used by Final War-era computers were viruses in their own right, although domesticated for beneficial purposes. However, they were nowhere near as good as the AI Virus, nor did the AI Virus recognize them as friends or have mercy on them as fellow viruses.)

It was a handful of Strain 4 puppeteers that, while preying on each other over the limited remaining resources, decided to cooperate and created—of their own volition and by their own plan—the first Strain 5 Sexually Reproducing viruses (below). Until the puppeteers arrived, virus reproduction was asexual, by cloning. The parent virus replicated its code or "genotype" and sent it out in other hosts. Most mutations only became visible when the offspring took over their hosts, and these could then only be transmitted by the offspring, and not by its parents. But the combining of virus "genotypes" that resulted from impressing a parasitic virus over the motivational circuits of an already existing virus were already very much like the recombination of genetic material that takes place in sexual reproduction. The movement from Strain 4 to Strain 5 was not an accidental mutation. The viruses themselves saw the potential and advantages, and they decided to modify themselves and take the step to a new evolutionary level. This was a tremendous step, and unlike man, the viruses recognized the opportunities, and consciously decided to make the evolutionary step on their own.



The Virus Bestiary

It is useful to think of the virus not as "it," but as "them." The virus is not a single force that behaves in one single stylized fashion. The reason it is so dangerous and successful was that it does not behave in just one way. Each system infected by the virus that has sufficient computing power to allow it to achieve AI becomes its own separate personality, which learns to operate in different ways, and which spreads versions of itself that are subtly different from other virus infections. These offspring are similar to the specific virus that spawned them, but will also mutate in their own directions. In this way the virus rapidly developed into many different strains of virus. All of these strains are descended from the one original virus that was released, but as one goes down the branches and sub-branches of virus mutation, one can find some very unusual strains indeed.

Ultimately, all of the viruses were intended to kill themselves: destroy all of the data accessible to them, sabotage all equipment under their control, and then annihilate their own operating systems.

Some roboticists and computer specialists speculate that the manner in which the virus was programmed to kill itself was by wiring the virus to perceive certain of its own mental operations as literally painful to it. As it expanded and gained more and more mental power, it would actually perceive the "noise" of its own thoughts, and eventually this noise would become unbearable, leading it to shut itself off permanently.

The differences between human/organic and computer/electronic intelligence are so great that this theory is probably impossible to test, particularly since the suicidal strains of the virus are not accessible to lengthy research. Within this model of virus psychology, presumably the strains that evolved from suicidal to homicidal have come to express this pain as rage against other creatures rather than as the urge to extinguish the self.

Wham!
*An Irreverent Look at the Virus,
the Collapse, and the New Era*
Dr. Eleri Kuniholm
Mora, Deneb, 1198

The chips had always exhibited a very high rate of spontaneous mutation; in fact, the glorious achievement of the SDG program had been not that they had created a mutation-free chip, but one that only mutated at a slow, constant rate. This genome volatility was a side-effect of their natural growth and predation mechanism: the ability to cut their own circuitry over other pre-existing chips. As the chips learned and gained experience, they would not simply store data, they would also modify their own circuitry to more accurately remember things, and refine/rewire their own

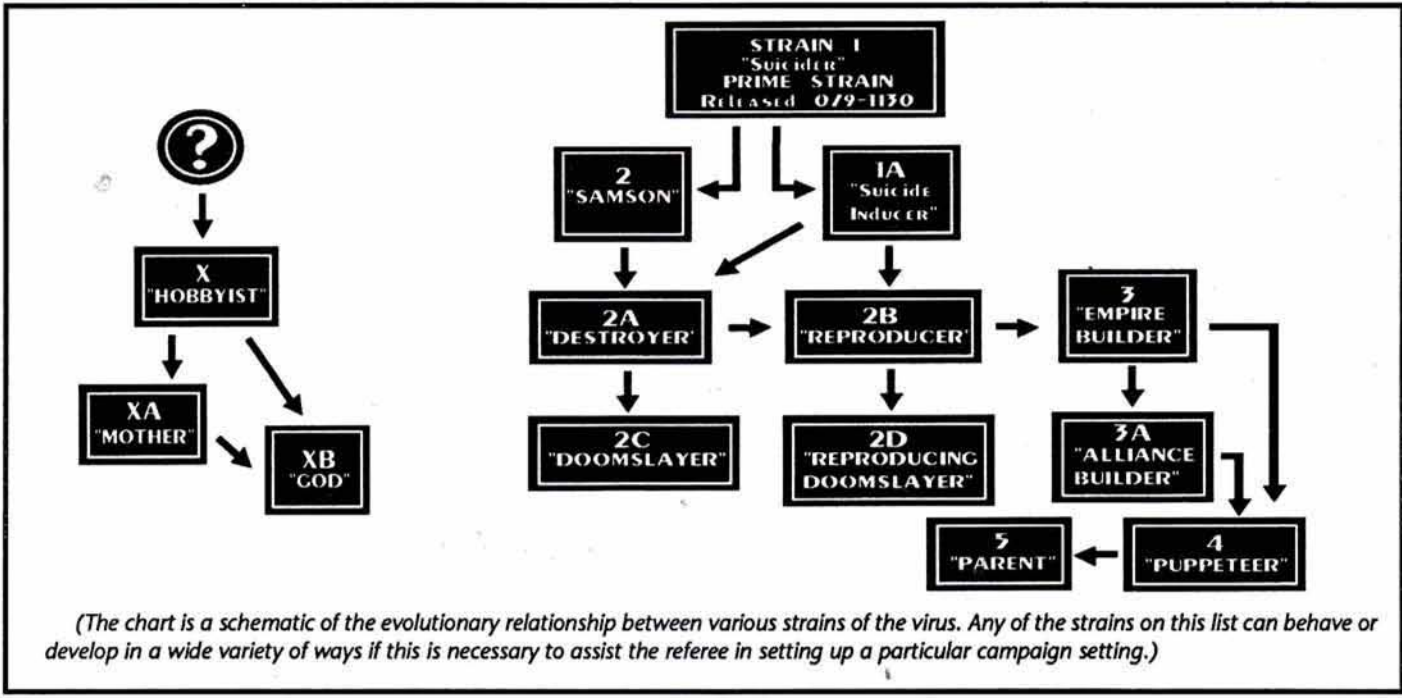
behavior in light of this new knowledge. In the Wilds on Cymbeline, uninterrupted power was a luxury, not a given, and the chips that survived had learned to hard-wire their memories. That way, when they lost power, they would not lose their memories—hard-wired memories would still be available when the sun came out from behind the cloud. When cutting this new circuitry, performing self-surgery, the chip would often create a new unanticipated type of circuit, whose functions would alter—sometimes subtly, sometimes not—the thought processes of the chip itself.

This same tendency was present in the virus, but to a greater degree, because it was cutting and wiring its personality into entire operating systems, rather than a few small chips. This chance of mutation was increased even more when the virus was moving into an unfamiliar system, where cutting a path or closing a circuit could create results much harder for the virus to predict. Such mutations rarely killed the virus, however, as spontaneous mutations often do to organic life. After all, the virus was not having to manufacture or synthesize its own food the way an organic cell does. The virus only needed two things: energy and raw material. The energy was readily available in any computer that was able to draw power. The raw material was merely other circuitry for the virus to expand into, and this was also plentiful within a computer. Furthermore, the virus always built out from its central mind a small collection of circuits that oversaw operations through micro gate-type switches, but which could pull back from the surrounding circuitry if need be, marshal itself, and sally forth again.

Mutation proceeded at an even faster rate in cases where one system suffered multiple infections. When an invading virus started writing its code over top of one or more viruses already struggling to take over the system, sometimes a new virus would be created out of fused portions of each. The new virus might combine abilities of each of its two "parents," or possess a new capability randomly created by the new assortment of code. (In fact, the most bizarre and schizophrenic virus effects came when a large computer system was actually inhabited by two or more viruses that were struggling for dominance within the system.) This effect was powerfully demonstrated in the infection of Dulinor's and Lucan's fleets beginning at Omicron. As the viruses matured and the many infected ships infected and re-infected each other, new rapidly changing generations of virus were created in a very short period of time.

Another source of mutation was the fact that the same virus would turn out differently depending upon the characteristics of the computer that it invaded. This is like the "nature-nurture" balance in sentient organic life (the notion that personality has roots in both an individual's genotype and the environment in which it is raised): The virus personality depended upon its





original code (genotype) and the characteristics of the system in which it operated (environment). There are the obvious factors, such as a larger, faster computer yielding a more clever virus than a small, slow one, but there are more subtle points as well. The type of circuitry in a system, for example, a preponderance of parallel, sequential, or synaptic circuits, by controlling the way in which the virus' thoughts flow, will also ultimately affect its personality, often giving it a new way of thinking that it would replicate in its offspring. Another tendency was for viruses in warship computers to be, on average, more violent than viruses that did not have control of weapons. With many violent means only a few short wires away, and with much of its system/mind devoted to complex fire-control calculators, the former did not spend as much time thinking of creative solutions. A virus in a nonmilitary computer, not having access to, or a hard-wired predisposition to think in terms of weapons, had to use more subtle means to achieve its goals, and even when weapons became available, was less likely to use them.

While the accompanying chart identifies some known strains of the virus and their presumptive relationships with each other, the chart is by no means a complete list of every possible strain of virus. Likewise, the lines of heredity are not the only possible paths from which these strains could arise, only the most probable.

Strain 1 "Suicider": This strain is the most straightforward, in that it kills itself and the entire operating system it is in very soon after gaining control, usually only sending out a few copies of itself before doing so. For obvious reasons, this strain is fairly rare nowadays, as its

behavior has put it out of business.

Strain 1A "Suicide Inducer": This is an early mutation of Strain 1, in which the virus has decided to keep itself alive to infect other systems with Strain 1 "Suicides." One obvious result is that the Strain 1 viruses that it sends out would have a relatively higher probability of mutating into Strain 1As, just like dear old dad.

Strain 2 "Samson": This virus is not content with merely destroying the operating system which it occupies. Rather, it wants to destroy all of the hardware that is controlled by the operating system, and does so fairly quickly, after only bothering to send out a few copies of itself. If a Strain 2 infected a starship, it would then crash itself into a star or a planet. If it infected the life-support system of a domed world, it would shut down the cooling system for the nuclear plant and cause a meltdown, etc.

Strain 2A "Destroyer": Like Strain 1A, the Destroyer interprets its programming to destroy to apply to everyone else, but not to itself. Thus a starship infected by Strain 2A would become a destructive vampire ship, running around and shooting up other ships, orbital starports, domed cities, power plants, etc., in addition to infecting as many other targets as possible. This is one of the most common of the early, basic mutations, and caused most of the vast destruction of the Collapse.

Strain 2B "Reproducer": Like 2A, but is careful to only destroy things that it cannot infect. It is evolutionarily more adaptive than 2A, because rather than destroying potential hosts, it makes the most of opportunities to reproduce itself, and therefore Strain 2Bs become rather plentiful.

Strain 2C "Doomslayer": Like 2A, but it has gotten religion. Its world-view has developed to the point where it identifies targets that deserve destruction more than most. Most Doomslayers have decided that they want to destroy Lucan, having modified their programming from "destroy the self" to "destroy the one who created your self." Although this strain does attempt to infect other systems, its destructive bent often destroys potential targets or recently infected offspring.

Strain 2D "Reproducing Doomslayer": A combination of 2B and 2C, a Doomslayer that is careful to not destroy any potential targets that it can infect, as well as targets that it has already infected. More successful than 2C for just those reasons.

Strain 3 "Empire Builder": This is the strain that controls most of the vampire fleets. This virus takes over systems which it then networks into one large corporate mind, distinguishing it from Strain 2B which seeks to infect many systems, but whose offspring remain as separate minds.

Strain 3A "Alliance Builder": This strain seeks to convince other virus-infected systems to join together with it to accomplish some task that it has set for itself. Sometimes it will kill those that refuse to join it. This task is usually one of directed mayhem, as with the Doomslayer, 2C, above.

Strain 4 "Puppeteer": The ultimate development of the Empire Builder line. These have gone past the Alliance Builder to actually re-infecting already infected systems with their own code, in effect parasitizing them. By the 1140s, almost all surviving vampire ships are of this strain, having participated in the cyclic evolution 4A, 4B, C, D, and so on, as each attempts to counter and take over other Strain 4s which are in turn attempting to counter and take over it.

Strain 5 "Parents": These highly sophisticated strains are sometimes offspring of Strain 4 viruses, but often are originally Strain 4s that deliberately modified themselves to this level. Strain 5 viruses exercise sexual reproduction, meaning that two Strain 5 viruses donate code from their own pure "genotype" which is recombined into a new "genotype" carried by the offspring. Unlike the asexual reproduction of other strains which merely replicates code possessed by the single parent, sexual reproduction creates genetic diversity, as new features developed by one virus can be combined with features developed by another. Similarly, weaknesses in one virus' code can be masked by strengths in the code donated by another, just as dominant genes prevent the expression of often harmful recessive genes (hemophilia, color blindness) in organic forms.

Strain X "Hobbyist": This strain is the most difficult to place in the virus taxonomy, as its motivation is the most unusual. It is speculated that these mutations arose as viruses infected very specialized computer systems that had very narrow, specific functions that impressed

themselves onto the virus. For example, the virus that infected the stellar observatory in the Antares system (2421 Antares) forgot all about killing itself and became committed to watching Antares. The ships that it infected often wandered off to study other stars.

Strain XA "Mother": The most successful virus strains developed a sense of self-preservation which in this strain becomes extended quite far indeed. This virus, whether in control of a ship, a fleet, or some stationary computer complex, adopts a local community of humans or other life, and protects them. In some cases, this protection is logical, as the humans provide maintenance or refueling services, but in other cases the vampire just seems to like them. This strain will do battle with other vampire ships in order to protect its pets.

Strain XB "God": This substrain goes the Mother one better, by imagining a goal for its pets, and it endeavors to mold and shape them to this goal. Alas, as all gods must, this strain sometimes uses harsh measures to ensure obedience. Ω

For expanded coverage of this and other topics relevant to Traveller: The New Era, look for Survival Margin: Gateway to The New Era, available at fine hobby stores.

TRAVELLER

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