

SAGITTARIUS EYE

ISSUE **23**
July 3305

Building

Blocks

of

Life

Also featuring:

Nova Imperium • Far God Cult

Krait Phantom • Dark Matter

Staying Cool in Space

Dance Dust • Robardin Rock

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SAGITTARIUS EYE

ISSUE 23

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Several news articles have passed across our desks over the last week (at the time of writing) concerning Nova Imperium, the misnomer for the collection of revanchists and traditionalists purged by Emperor Lavigny-Duval at the start of 3305. Rather than fade away following their leader's execution and their subsequent rout, they are thriving.

As our excellent guest contribution on the topic this month explains, Hadrian Duval has proven a skilful operator. He has filled the gap left by Kaeso Mordanticus, adopted his invented title, established wily alliances, and is steadily building his power base from the Paresa system.

Nova Imperium's message is a beguiling one. According to Mordanticus and his heirs, the thawing of relations between the Empire and the Federation is not strength through unity in the face of a common threat, but inexcusable weakness. Alliances do not strengthen the participants equally; they are a zero-sum game in which one party must take advantage of the other, and in this, Arissa is leading the Empire into vassalage to powerful foreign interests. Strength can only come by barring the doors and raising the drawbridge. "The Empire has been weakened by collaborating with its enemies," declared Mordanticus in late 3304. "Arissa Lavigny-Duval is a weak Emperor who must be removed." "The citizenry is afraid... of being weakened by collaboration with foreign systems. They look to the Emperor for salvation...and she offers them none," echoed Senator Pal Vespasian shortly afterwards. The boyish Hadrian Duval chimed in later with: "I've seen how diminished the Empire has become, and I know that new leadership is sorely needed." The unspoken whinge that the Emperor should be *male* permeates this chorus.

On January 25th (this writer's birthday) the openly treasonous Mordanticus was executed in the Imperial Senate chamber itself.

"Arissa Lavigny-Duval has revealed the true face of her regime — one based on brutality and terror," whined young Hadrian. The Emperor was now not only too weak, but apparently too strong as well.

This is not the first time in history that populists have massaged the facts in favour of a preferred narrative, but it is worth addressing.

Not only are Nova Imperium's accusations muddled, but their aims are illogical. They demand a new Emperor, presumably one who is much more tolerant of open sedition but also unwilling to pool resources with powerful potential allies against common threats. A Thargoid strategist would no doubt applaud the rise of Nova Imperium; any junior officer knows that a divided enemy is a weaker opponent.

This writer was born on the garden world of CD-63 201 4, in the heart of the Empire. He remembers the Federation, from his youth, as the great Satan — a nakedly exploitative collection of graceless factory worlds, devoid of honour. Upon leaving the Empire for the first time he quickly discovered that this isn't true; and, moreover, that similarly gross misrepresentations of our own culture are propagated elsewhere, which still prick him when he hears them.

If you cut this correspondent, you'll find his blood runs blue. He cares deeply about the fate of the Empire and is proud of its distinct identity and established institutions.

Strong alliances need weaken neither party. The absence of a consistent charge against the Emperor reveals the bankruptcy of ideas that hides behind Nova Imperium. Demanding change as a vehicle for your own ambition and chauvinism isn't a mark of love for your society, but of disrespect for it.



Souvarine



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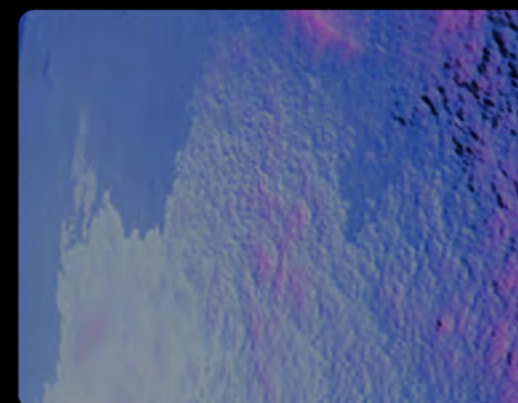
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The Rise of

NOVA IMPERIUM

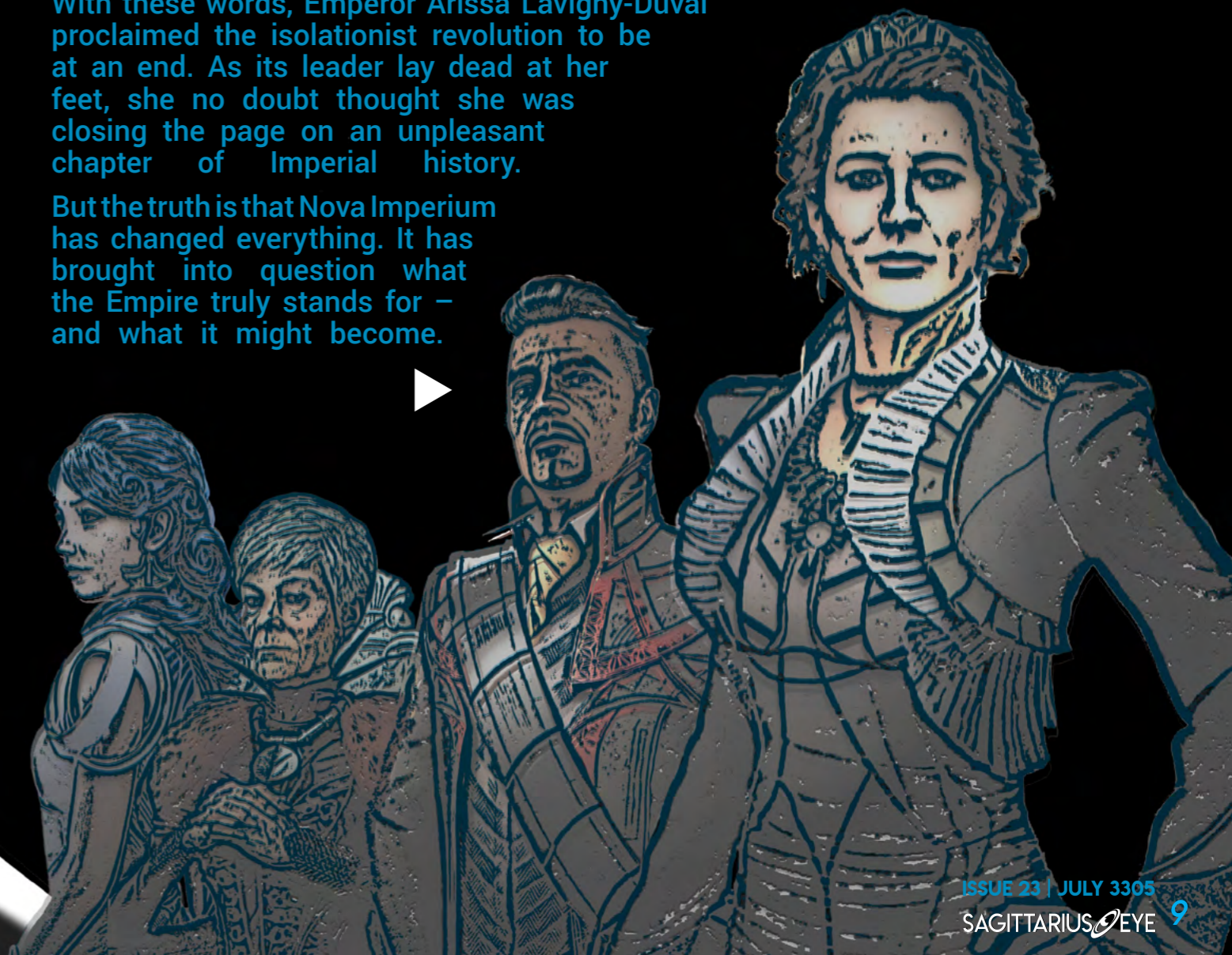


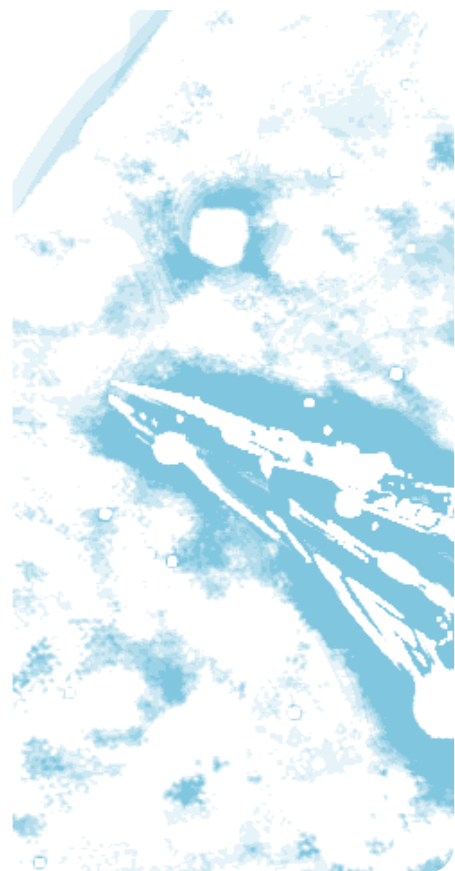
“There is no Nova Imperium.
There is only the Empire.”



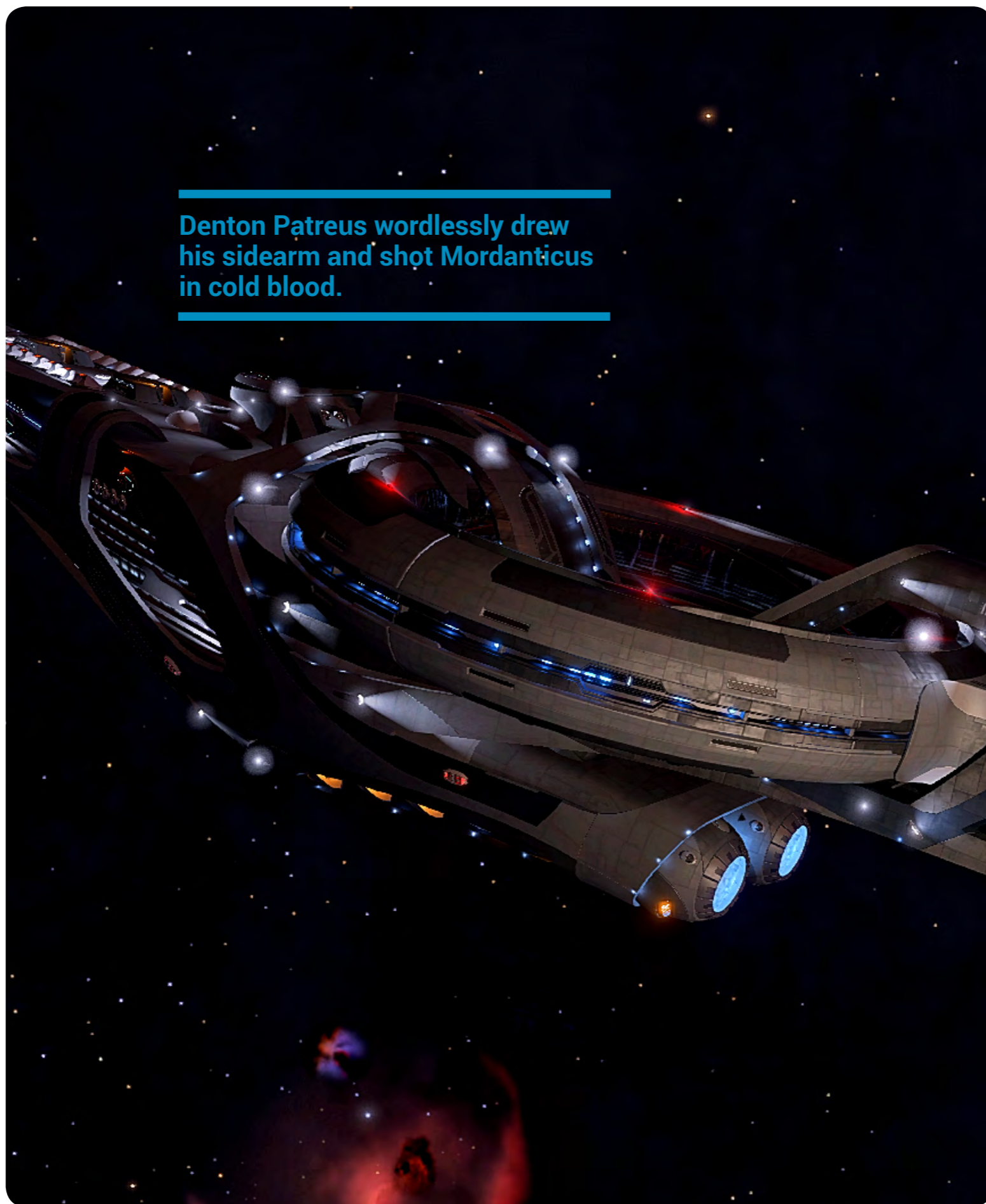
With these words, Emperor Arissa Lavigny-Duval proclaimed the isolationist revolution to be at an end. As its leader lay dead at her feet, she no doubt thought she was closing the page on an unpleasant chapter of Imperial history.

But the truth is that Nova Imperium has changed everything. It has brought into question what the Empire truly stands for – and what it might become.





Denton Patreus wordlessly drew his sidearm and shot Mordanticus in cold blood.



Prior to the return of the Thargoids in 3303, the Empire proudly held itself apart from the other superpowers, to the point of being engaged in a long-running cold war against the Federation. Its identity was defined by opulence and grandeur, as evident in its sleekly designed ships, with social structures based on honour and status. There was a strong sense of 'splendid isolation'.

Within a short time, the Thargoid conflict forced the superpowers to work together for their very survival. Aegis was formed, to unite all of humanity against the alien threat. The cold war was replaced by sharing resources and military cooperation, and it even seemed possible that an Imperial princess might marry a Federal ambassador.

The Empire was changing, but at too fast a pace for many. In such an unstable political climate, a traditionalist resurgence was perhaps inevitable.

Nova Imperium was established in mid-3304 and rapidly rose to prominence. It vowed to restore the Empire's purity, by severing all ties with other superpowers and focusing on defending its own people. The organisation's leader – decorated naval veteran Duke Kaeso Mordanticus – shrewdly referred to himself as the Emperor, a title imbued with the martial glories of yesteryear.

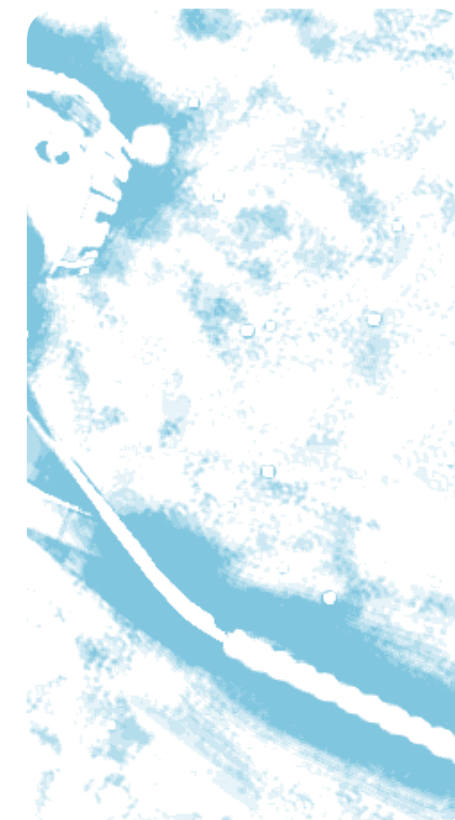
Naturally, the authorities downplayed this extremist group, yet were concerned enough to order an investigation by the Imperial Internal Security Service (IISS). From a leaked report, it's clear they understood how dangerous Nova Imperium could become:

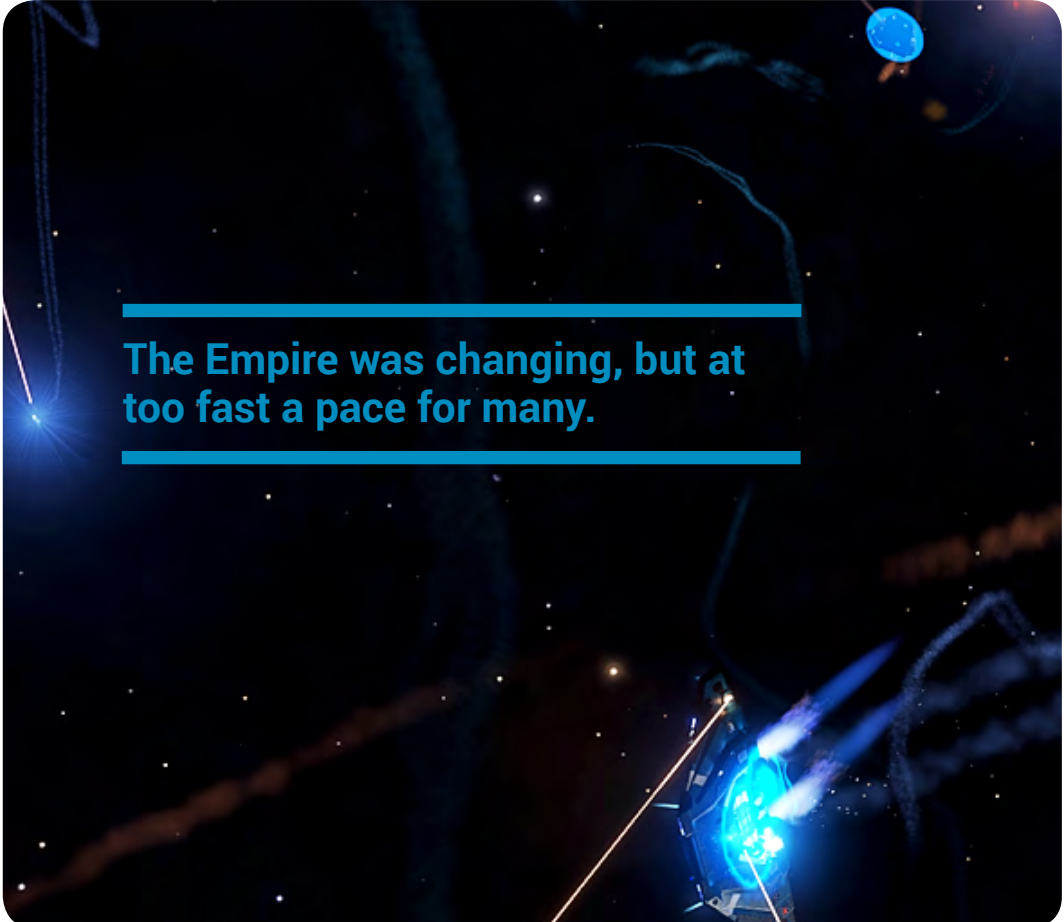

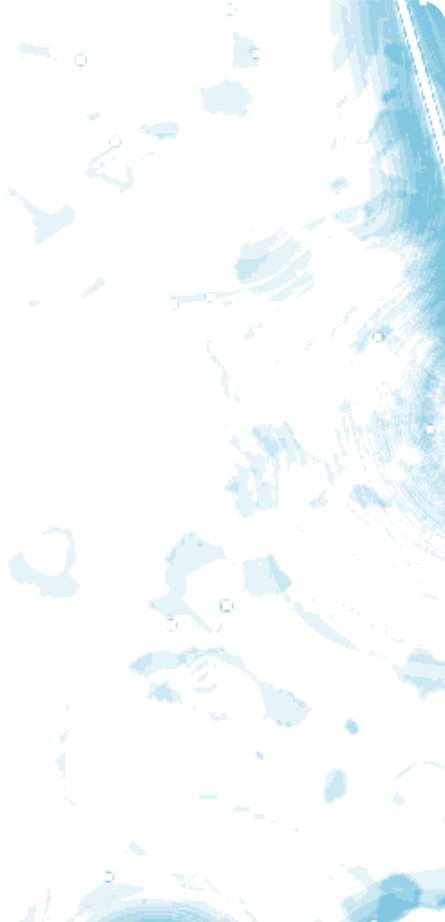
Its isolationist message resonates with those fearful of Thargoid invasion, and its rallying cry of 'Empire for the Imperials' aligns with the more conservative citizenry. ... Its threat potential should not be underestimated.

Even so, Nova Imperium might have remained on the sidelines if not for the Emperor's masterstroke. Using his network of contacts, he had unearthed a secret about the Imperial family...

Arissa, he discovered, was not the only illegitimate child sired by Emperor Hengist Duval. A brief affair with a household slave had resulted in a son, who was promptly banished and forgotten. Decades later, he had raised a child of his own – a teenage boy who was now scraping a living as a trader, having inherited his father's old Sidewinder. A boy whom Mordanticus had located and informed of his heritage.

And so in December 3304, Commander Hadrian Jansen was plucked from his humble space-faring life to be heralded as Hadrian Augustus Duval, grandson of Emperor Heng-





The Empire was changing, but at too fast a pace for many.

ist and figurehead of the isolationist movement.

The impact upon the Empire was immediate. The House of Duval's lineage had remained unbroken for a thousand years, and a new member of that family could not be ignored. It was also clear that many citizens felt more comfortable with the idea of a male Emperor, as was traditional until Arissa's coronation. Suddenly, Nova Imperium had transformed from a political outsider into a shaper of history.

Divisions of opinion among the citizenry were reflected in the Senate, where a growing minority openly declared support for Hadrian. These rebel senators stopped short of demanding that Arissa step down, but did agree with Senator Winterstone's claim:

The Imperial family must officially recognise Hadrian Duval as one of its own. Given that the Emperor has no children, such an act would secure the future of the Duval bloodline.

As for Arissa, her unexpected silence on the matter only fuelled the controversy. Although official statements dismissed Hadrian's legitimacy, the lack of direct response from the Emperor herself was generally interpreted to show indecision and weakness.

The ripples of unrest spread even beyond the Empire, affecting the Alliance and the Federation. Both Prime Minister Edmund Mahon and President Zachary Hudson voiced alarm at the prospect of inter-superpower cooperation ending, should the isolationists come to power. They even raised the possibility of direct intervention in Imperial affairs, to protect Aegis and maintain defences against the Thargoids.

During this time, both the Federal and Imperial Navies increased their supply campaigns and performed fleet manoeuvres in border systems. The sabre-rattling behaviour of the cold war had returned, but with a

greater likelihood of escalating to flashpoint.

As more people flocked to the banner of Hadrian Duval, the isolationist group quickly grew in strength as well as popularity. Emperor Mordanticus established a stronghold in his home system of Paresa, where well-armed ships of ex-naval and civilian supporters congregated. Nova Imperium now had the military muscle to support its political ideals.

This was not something that the Imperial establishment could tolerate, and so Admiral Denton Patreus ordered the illegal armada to disperse. But Mordanticus was gambling that the Empire's rulers would not attack their own citizens, for fear of inciting further rebellion.

Patreus' strategy was to get others to do his dirty work. Yupini Ltd, a corporation that also had a presence in the Paresa system, declared war against Nova Imperium with the support of independent auxiliaries. In response, Mordanticus put out a call to arms to any pilots pledged to Hadrian Duval, and the two sides met in combat. As was noted in The Imperial Herald:

Whether this is a one-off battle or the beginning of an Imperial civil war, the outcome of the Battle of Paresa will influence the future of the Empire.

This was a dramatic turning point in Nova Imperium's fortunes. Within days it became evident that most of the galactic community were still in favour of Arissa Lavigny-Duval. The isolationists had gathered some impressive firepower and fought valiantly, but there was little chance of withstanding such superior numbers.

When the Battle of Paresa concluded, not only was the Nova Imperium armada reduced to a fraction of its former size, but its commander was also lost. Yupini Ltd vessels had managed to disable and board the flagship of Emperor Mordanticus, taking him prisoner. He was immedi-

ately transported to the Achenar system to answer charges of treason.

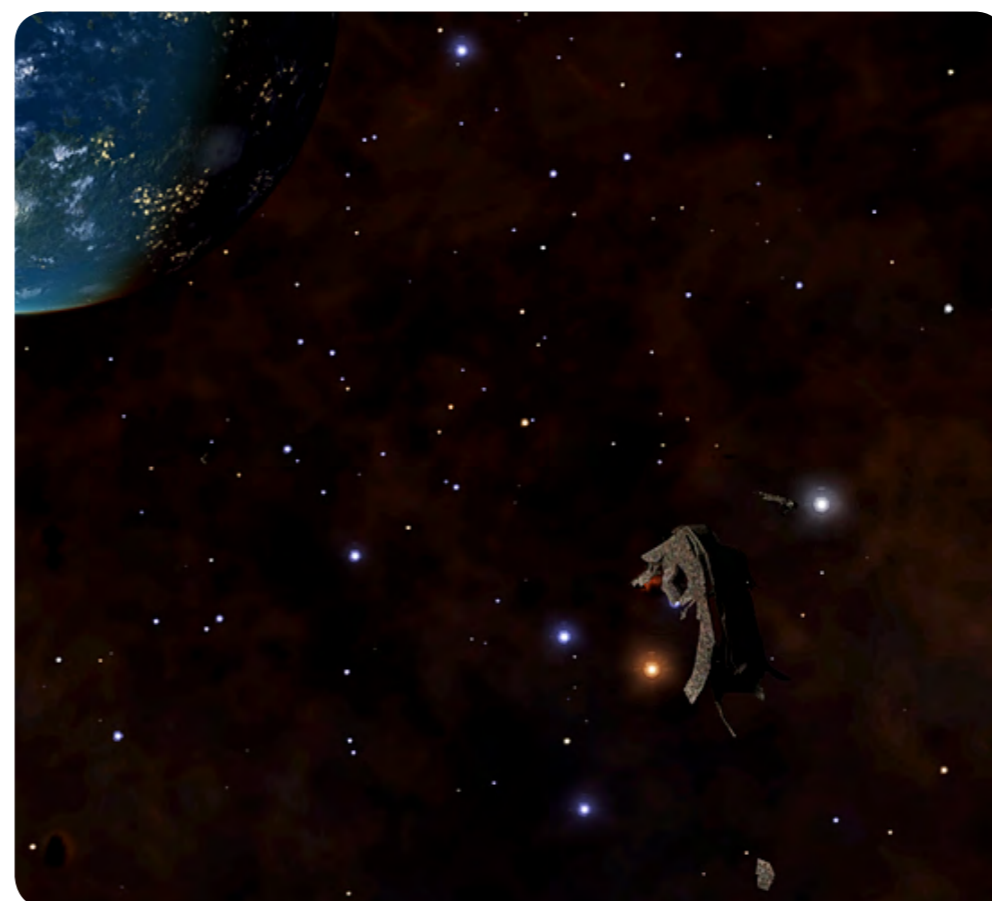
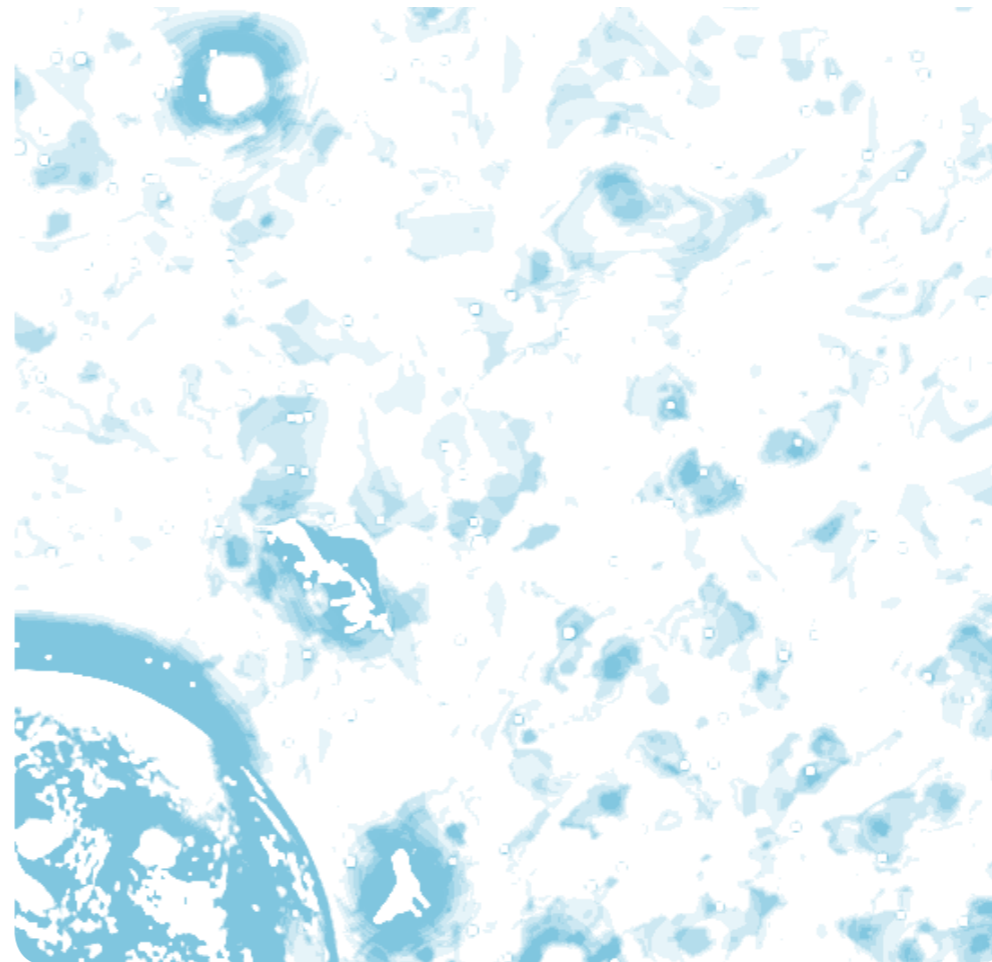
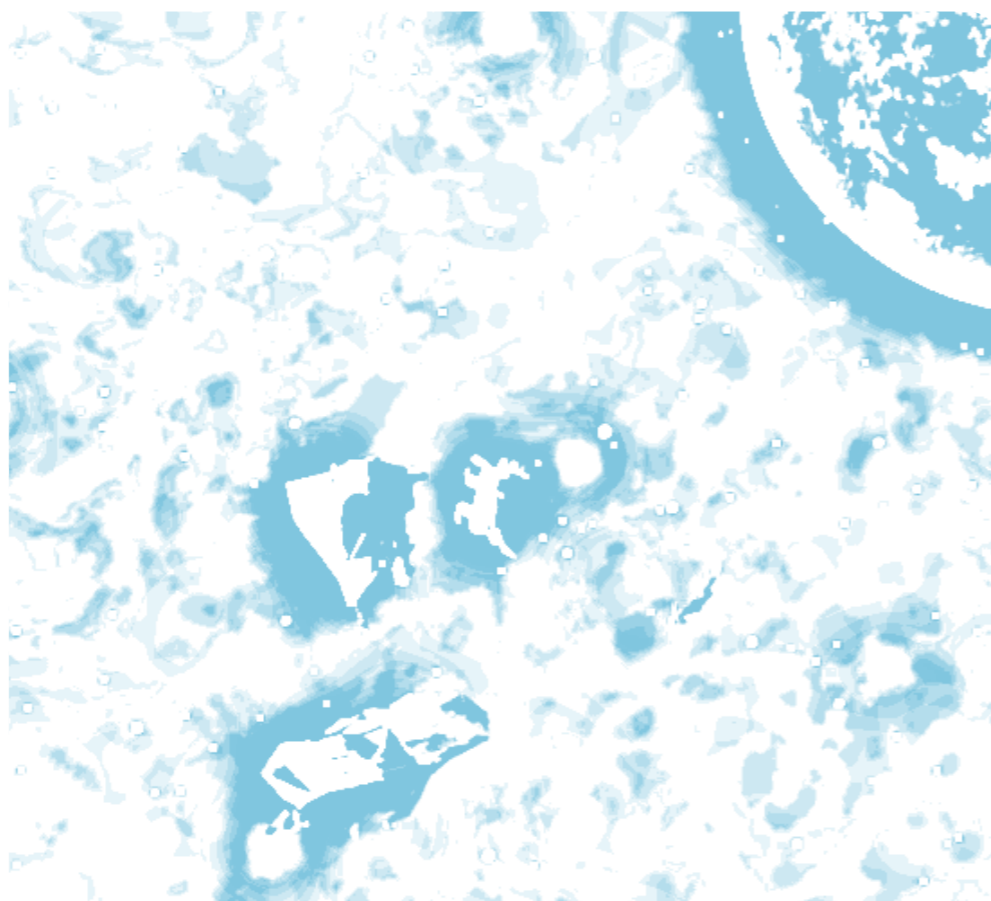
It was widely expected that an example would be made of this former-admiral turned traitor. All senators were recalled to Capitol to witness what would likely be a show trial in the grandest tradition, a way of dissuading future attempts at sedition. But nobody knew just how far Arissa was prepared to go to ensure this.

On 25th January 3305, Mordanticus was brought into Senate House in shackles, with the Galaxy watching via live transmission. The Emperor and the Imperator faced each other for the first and last time, before Denton Patreus wordlessly drew his sidearm and shot Mordanticus in cold blood.

Before anyone could react, members of the Imperial Guard entered the chamber and opened fire on selected senators. All those who had spoken in favour of Hadrian Duval were gunned down. As the Senate floor ran with blood, Arissa made her declaration that Nova Imperium was finished... but the massacre was just beginning.

Reports soon came in of Imperial soldiers raiding the homes of isolationist ringleaders, of civilian ships being blasted from the skies, and of citizens arrested or executed in the streets. It became clear that Arissa's long silence had been a delaying tactic, allowing agents and troops to be placed into position for a coordinated strike. The purge of Nova Imperium was thorough, calculated and merciless.

News of this act of political cleansing travelled across the Empire like a shockwave, yet there were few direct repercussions. Many were horrified by Arissa's actions, but an equal number were impressed at her resolve, and the majority seemed relieved that the threat of wide-scale civil war had been averted. Despite the executions and arrests, for most citizens, life went on.



Equally significant was the absence of official response from Alliance and Federation leaders. They were unable to condemn the bloodshed since it removed a group that threatened cooperation against the Thargoids, and so remained silent. As always, political expediency ruled the day.

The last remnants of Nova Imperium retreated to the Paresa system. From there, Hadrian Duval made a broadcast to confirm that as long as he survived, so would his cause:

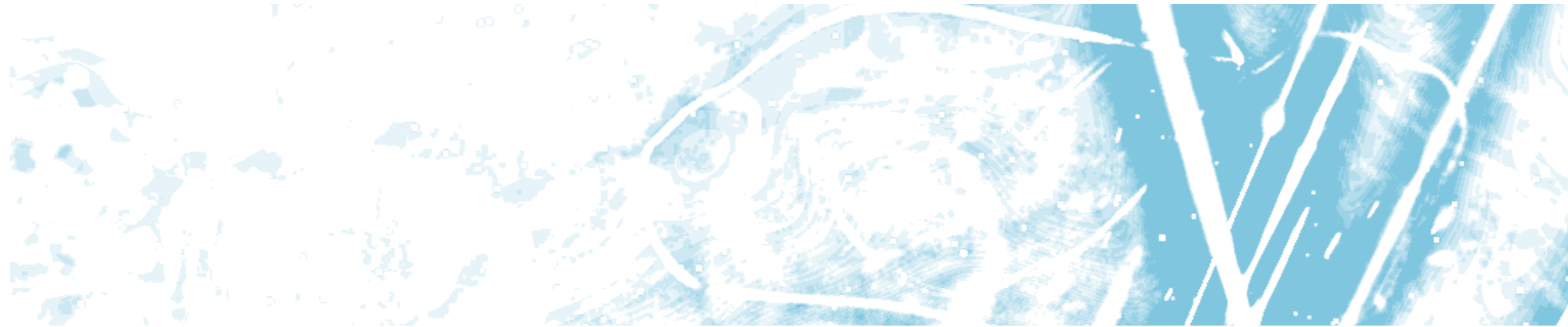
Our martyred leader will never be forgotten. In his honour, I have taken the title of Imperator Duval, until such time as the people choose me as their rightful emperor. Memento Mordanticus!

Despite this defiance, it was generally assumed that the conflict had played itself out. Arissa had won. She was clearly content to allow Hadrian to remain in exile, rather than risk further controversy by arresting or killing a young man she was related to. Few ever expected to hear the name Nova Imperium again.

And yet that name was being spoken, albeit as a whisper. By supporters who had survived the purge, rekindling their faith at clandestine meetings. By fringe political groups, wondering who was next to be declared enemies of the Empire. By senators who had seen their colleagues ruthlessly slaughtered. Hadrian's call to remember – Memento Mordanticus – became watchwords for those who could never forget Arissa's brutality.

In the aftermath of the purge, a handful of surviving pilots from the Battle of Paresa worked diligently to secure a powerbase for their new Imperator. A second military force, Nova Navy, was formed from fresh recruits flocking to their aid. In a few short months, not only had Nova Imperium gained total control of Paresa but was also expanding – directly into the home system of its old adversary, Yupini Ltd.

Further support came from an



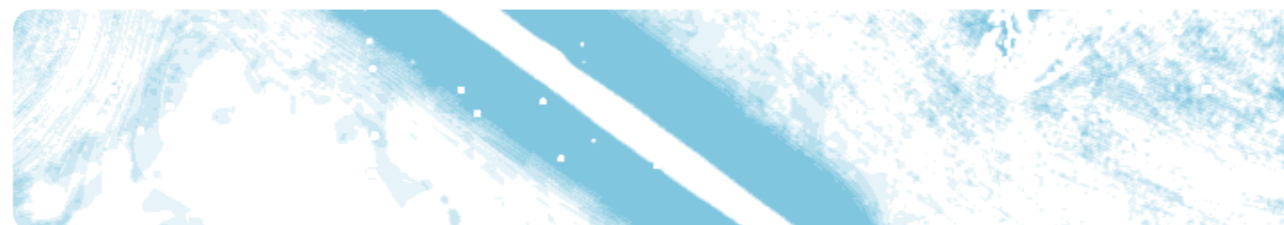
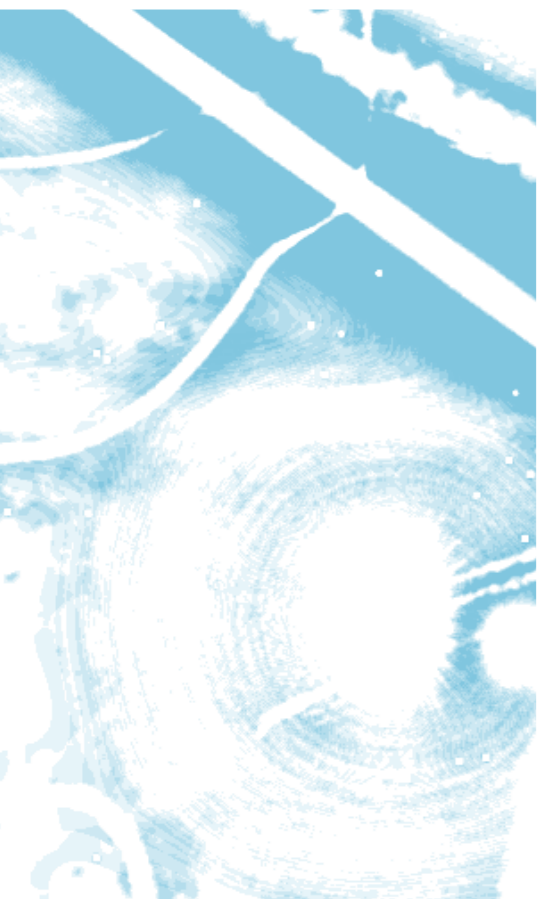
unexpected quarter in April 3305, when Princess Aisling Duval revealed she had secretly journeyed to Paresa and met Hadrian in person. Although initially unimpressed with his claim to the throne, perhaps fearing that it might supersede her own, the persecution of his followers had made her sympathetic. Aisling claimed that opening a dialogue with Hadrian might heal divisions within the Empire, despite her progressive approach differing from his traditionalist stance.

The two Duval cousins eventually agreed to a non-aggression pact, something which political commentators viewed as an astute move. Aisling and Hadrian have judged that this won't be enough for Arissa to perceive them as a challenge to her power, or risk further civil unrest.

Even without a formal alliance, Aisling's proximity may provide much-needed protection to survivors of the purge. In turn, Hadrian hinted that he may not be guided solely by his predecessor's principles:

"Although I stand firm on my previously stated beliefs, at Aisling's request I will review Nova Imperium's policies with an open mind."

More than anything else, this willingness to adapt proves that Hadrian Duval – the commander who became an Imperator – has emerged from the shadow of Mordanticus to stand as a ruler in his own right. Time will tell if Emperor Arissa was correct that Nova Imperium is no more, or if a New Empire can be forged by the next generation of the House of Duval.



The Rise of Nova Imperium

Text:
Coriander
Salamander

Design:
Donald Duck

Images:
OrangePheonix



The FEAR GOOD

Cult

The return of the Thargoids has had a tremendous impact on humanity, causing great military, political and economic change. But it has also reshaped the spiritual landscape, creating the most controversial religion in modern history.

With all their mystery and power, not to mention the casualties left in their wake, the species we call Thargoids often inspire awe as well as terror. For some this has evolved into outright worship, elevating the merely alien towards the divine.

There is no official name for what is commonly known as the Far God cult. This nebulous organisation makes no announcements, publishes no material and engages with no outsiders. This secretive nature makes it alluring to some and unnerving to others.

Most of the knowledge in the public domain comes from two people: independent journalist Gethin Okonkwo, and leading exotheologian Dr Alfred Ulyanov. Their work has revealed tantalising glimpses of a belief system that is unlike any other.

Dr Ulyanov's academic paper, published in June 3304, explained how this fringe sect had redefined the Thargoids in religious terms, believing that:

[Thargoid ships are] dark angels sent to prepare us for the true sacred presence, which will soon enter our plane of existence from another universe. They refer to this as the Far God.

The Far God itself is seen as omniscient, enigmatic and uncaring about petty human concerns. It does not even exist in our dimension, perhaps inspired by the theory that Thargoid ships can hover in hyperspace. Therefore, this alien superbeing is even more distant from us – geographically and theologically – than traditional deities. The 'far' aspect of the god's name carries more meaning than just a phonetic similarity to 'Thargoid'.

According to Dr Ulyanov's descriptions, followers of the Far God undertake a monastic existence. They wear unmarked hooded robes, and congregate in 'hive-chapels' that are shrouded in darkness. Mimicry of Thargoid paraphernalia includes walls covered with a black coral-like substance, pulsing green lights and an octagonal altar shaped like a Thargoid vessel. There is also a constant "reek of ammonia", reflecting the Thargoids' supposed predilection for worlds with ammonia atmospheres.

The sect is structured into chapters using a simple numeric system. Members follow a basic hierarchy with ascending ranks of Adherent, Witness and Herald, although others may exist. These seem to be awarded based on duration. When Gethin Okonkwo went undercover as a Far God cultist, within three months he was known as Third Witness of the Tenth Chapter. Presumably he would have graduated to become a Herald if he had remained longer.

Significantly, there is no overall 'grand master' or 'high priest' figure, nor indeed any kind of spokesperson at all. This is fitting for a faith that does not promote individualism. Instead, followers give up their past lives in order to serve the commune, adopting what is commonly believed to be the Thargoids' insectoid nature and hive mentality.

This minimalist approach is unlike other religions, where grandiose titles help to attract followers and convey a sense of importance. But Far God worshippers aim to divorce themselves from their human identities, so conventions such as personal names are abandoned.

Who would follow such a faith? This was a question asked by many, as awareness of the cult increased and the Thargoid conflict continued to rage. Why would anyone pray to a ferocious alien race trying to wipe us out?

As with most cults, it appeals mainly to those struggling to survive or fill the voids in their lives – people who have fallen between the cracks of society. But it also attracts fatalists, since the foundation of its beliefs is that the Far God will soon arrive in our universe, at which point all life will be extinguished:

"What the ignorant refer to as Thar-

goids are in truth the heralds of the Far God, preparing us for its manifestation. On that day, humanity will be destroyed, but we who have heeded the truth will ascend...and be transformed."

This 'transformation' is open to interpretation, but may involve actually becoming – or somehow merging with – a Thargoid vessel. Some suggest that this has already happened to the inhabitants of escape pods captured by the alien ships. Given how little is known about the Thargoids' biotechnology, or their reasons for abducting humans, the concept remains disturbingly plausible.

The apocalyptic nature of this creed is what first brought the Far God to public awareness, via Gethin Okonkwo's research into doomsayer cults. His work highlighted several radical groups such as Generation Omega, Homo Terminus and The Order of Extinction. Their shared conviction was that the war against the Thargoids would be lost, and the era of mankind would come to an end.

The most popular of these was the Church of the Eternal Void, which venerated that other ancient race, the Guardians. As Okonkwo observed, this religion ran along classic theological lines by describing the Guardians as 'beings of light' and the Thargoids as 'hellish demons' – a distinction that led to the Church declaring holy war against its rival.

This rapidly led to violence. Guardian-worshippers began openly attacking Thargoid-worshippers, in an echo of the galactic confrontation that took place between their gods millennia ago. This conflict was far more one-sided, since the fatalistic followers of the Far God had already accepted that death was coming for the human race, and so did not resist their fate.

As hive-chapels were firebombed and their inhabitants murdered, the security forces had no choice but to step in. Far God chapters only existed in systems where freedom of



Many found it easy to believe that the secretive, sinister-looking cultists were alien spies in human form.



“ Anyone remotely connected to the cult was arrested for questioning.

religion was protected by law. Therefore this illegal vigilantism was soon halted, and the Church of the Eternal Void was disbanded.

But greater trials were to come, since this incident brought about two shifts in public perception. First, by accusing them of serving the Thargoids, the Church made the Far God cult look like dangerous fanatics rather than harmless eccentrics. Second, it was now proven that they never fought back, not even to protect their own lives. They were a soft target.

In the Federation, a vocal campaign was spearheaded by Congressional candidate Juanita Bishop, whose inflammatory rallying cries were regularly featured by newsfeeds:

So the sick Thargoid-lovers can walk free, while those with the courage to oppose them are put behind bars. It's the traitors who worship the enemy that should be illegal! Do you really want these degenerates to creep into your home at night and do obscene alien things to your family?

The idea that the Far God sect was a fifth column of Thargoid agents quickly gained traction. Many found it easy to believe that the secretive, sinister-looking cultists were alien spies in human form. The logic that actual enemy operatives would hardly advertise their true nature was ignored — fear of Thargoid invasion was already widespread.

Juanita Bishop's campaign placed huge pressure on Federation authorities. While some in Congress viewed her rhetoric as inhumane, others were keen to be seen as 'tough on Thargoids'. When the Federal Intelligence Agency opened an official investigation into the sect, they were quick to justify this in quasi-military terms:

Given the organisation's proclaimed interest in the Thargoids, it is vital that we confirm they are not in contact with Thargoid forces, or being influenced by them.

The media was soon awash with harrowing images: hive-chapels being stormed by security troops, with unresisting Far God devotees dragged into armoured vehicles. Anyone remotely connected to the cult was arrested for questioning, including Dr Ulyanov himself.

This time, legislation on religious worship could not save them. Under Federal law, any action to undermine the enemy during wartime was legal, even suspending citizens' civil liberties. And if the Thargoids were the enemy, so too were their disciples.

There were also reports of hive-chapels being raided and found completely empty, with rumours that entire chapters had disappeared. Some said that the Thargoid spies were returning to their alien masters, others that cult members were simply abandoning their faith. This mystery contributed to the sense that the religion was unlikely to survive much longer.

Salvation came in the form of Gethin Okonkwo, who had been inspired by Dr Ulyanov's research to live amongst the Far God cult and covertly record his experiences using micro-cameras. His testimony illustrated the hardships they had to endure:

During this time, I visited hive-chapels in several different systems, narrowly escaping death when one was attacked by the Church of Eternal Void. On many occasions, I was physically and verbally abused by members of the public, including Juanita Bishop's campaign followers. At no point did I see evidence of actual contact with the Thargoids, bar the occasional use of alien material as holy artefacts.

Okonkwo shared his data with the Federal Intelligence Agency (FIA), which reluctantly admitted that there was no sign of enemy collaboration. All detained worshippers were freed and the sect was allowed to resume, albeit with many members dead or vanished. Even Congress conceded that things had gone too far, turning

Juanita Bishop into a scapegoat for cultivating civil unrest.

The mystery of the missing followers remained until a discovery was made in the Etain system. Two secret outposts had been established by the sect, named The Sanctum and The Prophet, both now abandoned with signs of having been attacked.

Voice logs left by individual members explained that the outposts were 'void-temples', and that they were placing themselves into suspended animation to await the arrival of the Far God. There was no trace of any cryogenic pods, so what actually happened to them remains unknown.

These emotive log entries exemplify the reasons why people join the cult, ranging from despair to righteousness to scientific curiosity. For some, their conviction remained undimmed by recent events:

I wasted many years on false religions and hollow human faiths. Now I worship something real — something powerful. The Far God calls to me in my dreams. It is coming.

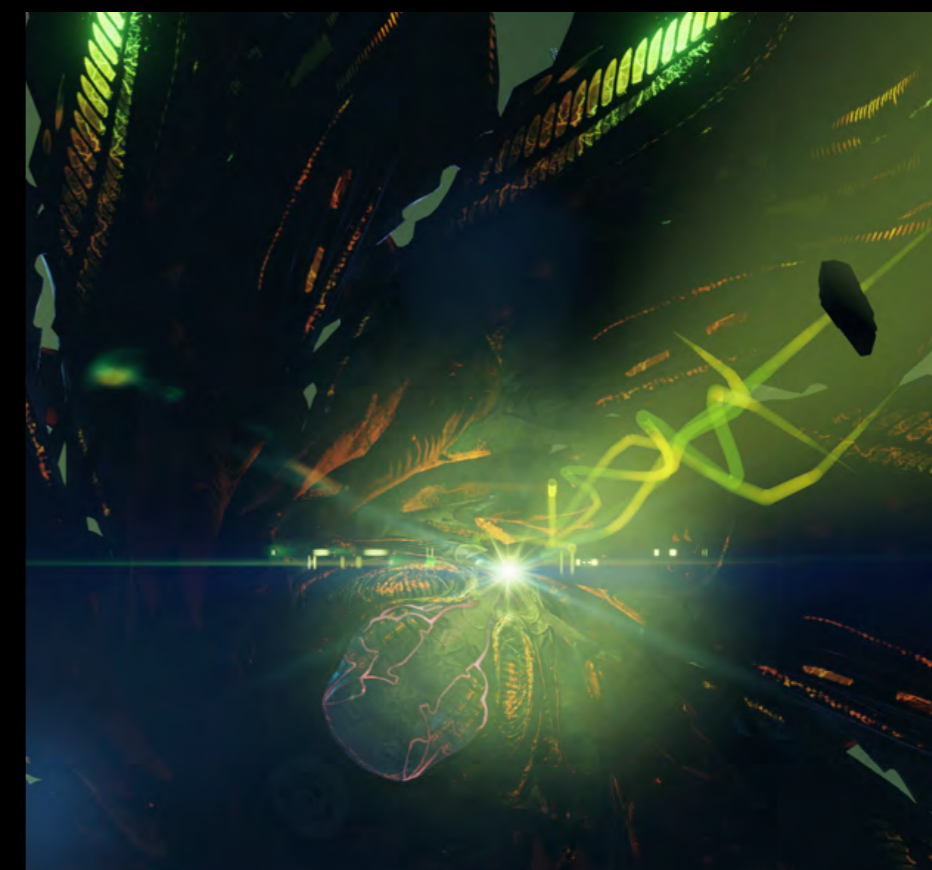
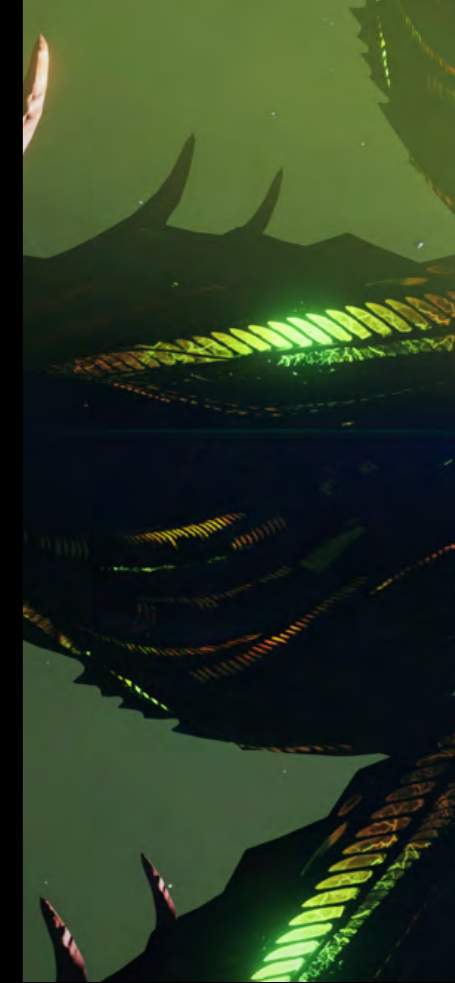
The Prophet held one more secret, revealed when a solitary cryogenic pod was excavated from beneath the ruins some months later. Its occupant, a teenage runaway, was revived and returned to her family. Although no other void-temples have yet been found, it seems probable that many others still sleep amongst the stars.

Despite depleted numbers, the Far God sect continues to defy extinction. Having survived persecution from all quarters, it now preserves itself by quietly seeding hidden

groups of believers far and wide, as many mainstream religions were forced to do during their early years.

It is ironic that a faith based around aliens has revealed much about our own inhumanity. It is, of course, understandable that many would be suspicious or repelled. There is every reason to suspect that a secretive underground cult that venerates hostile aliens would be performing inhuman, monstrous acts.

And yet there is no indication that this is the case. Examining the sect's history suggests that unlike the Thargoids they revere, they are always the victims, never the aggressors. They want nothing more than to be left in peace while they wait — for the end of the universe.



The Far God Cult

Text:
Coriander
Salamander

Design:
McNicholl

Images:
OrangePheonix

Canonn and the Thargoids:



THE HEROES OF HUMANITY'S GREATEST PUZZLE

One of the most recognized logos in the Bubble is a distinctly nerdy one. A test tube containing a Thargoid Sensor floats in the centre of three orbiting particles. Thousands of commanders — this correspondent included — proudly display it on their ships, having earned it in a community goal that gained incredible levels of support from across human-controlled space. Members of the Canonn, or the Canonn Interstellar Research Group, are as intellectual and dorky as their logo suggests.

The beginnings

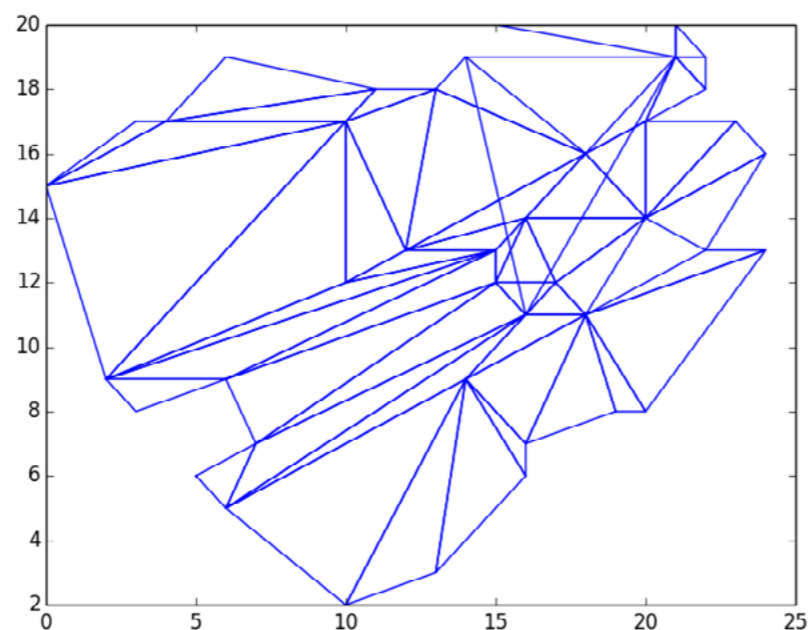
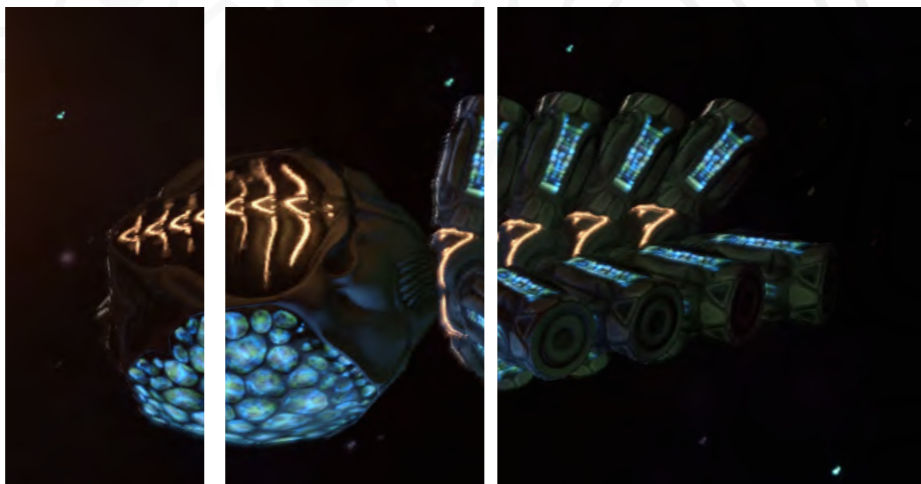
To understand Canonn and its significance, it's important to return to a relatively short period of time ago when many dismissed Thargoids as paranoid ramblings of onionhead addicts, and sentient alien life, if it existed at all, was completely unknown to us. A few short years after the creation of the Frame Shift Drive (FSD) – some say derived from stolen Thargoid technology – led to an explosion in interstellar exploration, and commanders began to discover mysterious 'Unknown Artefacts' being ferried in secret Federal convoys. Less than a month later, in April of 3301, an intrepid commander named Dr. Arcanonn started a thread on the Pilots' Federation forum which quickly became the longest thread in the forum's history, as he and other commanders began to ask questions about these mysterious objects.

Before long, Arcanonn became a powerful spokesperson in the galactic community. As leader of the burgeoning network of scientists that would become Canonn, he called out Federation President Jasmina Halsey on GalNet, demanding answers:

The potential repercussions of these artefacts are staggering. We still know very little but it is clear that the technology involved is very different to our own.

In the meantime, he and his team were hard at work deciphering the mysterious objects, having managed to obtain some of them from Federal convoys.

The artefacts damaged any ships carrying them, as Professor Palin had at that time not yet developed his corrosion-resistant cargo racks. Still, research commenced. A breakthrough came when Commander Jmanis recognized the sounds emitted by the artefacts as a variation on an ancient Earth encoding scheme known as Morse Code. These garbled emissions, when fed into a



■ A ship wireframe decoded from a Thargoid Sensor's broadcasts.

translator, displayed a readout of whatever planetary body or space station was closest to the artefact at the time: an early indication of its purpose as a spying device for the Thargoids. Soon after this discovery, in early August of 3301, Doctor Arcanonn formally announced the formation of the Canonn Interstellar Research Group, headquartered in the Varati system.

As the Canonn began to build up their reputation and numbers, they made further discoveries about the artefacts. For the first time, they were discovered floating in open space near the Pleiades Nebula. This greatly accelerated the collection process as scientists no longer needed to spend days searching for



Federal convoys to steal from. The artefacts now began to scan ships that approached them within a kilometre, and studies of their orientation revealed that, while free-floating, they oriented themselves toward Merope, in the Pleiades.

Intrigued by the Canonn discoveries, engineer Professor Palin opened an investigation of the artefacts, but was quickly shut down by Federal authorities. Undaunted, Canonn scientists continued to collect and study them. Calling on assistance from a variety

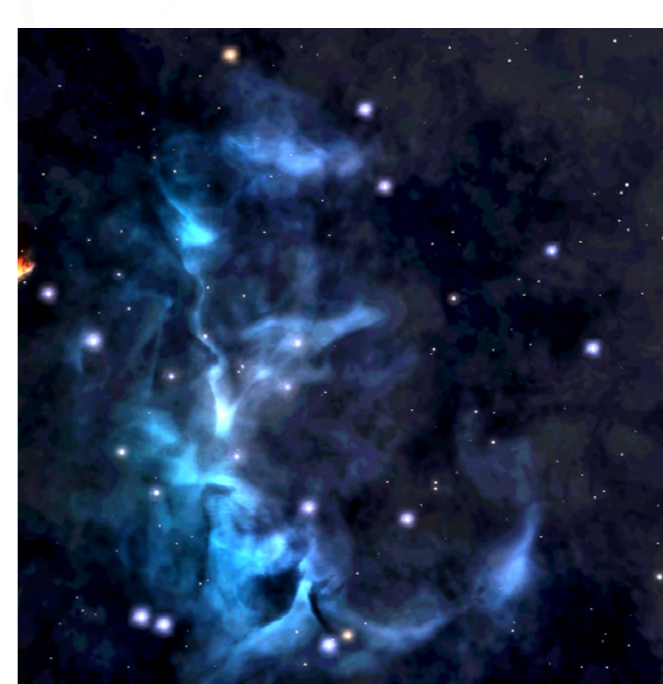
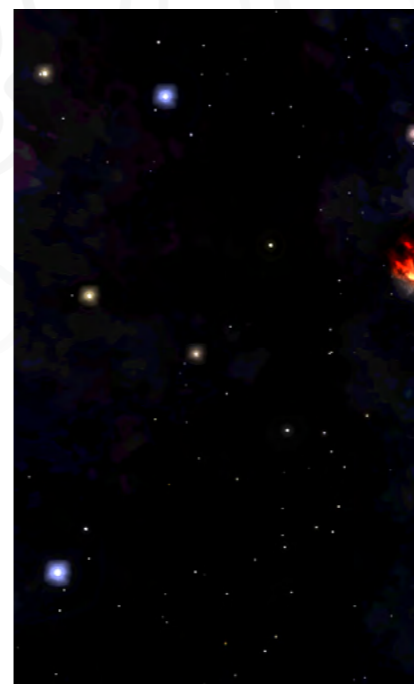
of independent pilots, they began to lock down systems where artefacts could be more easily found, displayed in the so-called 'UA shell,' and collected the objects en masse for study.

In early October of 3301, the artefacts began to emit new morse code messages. After a few days, Commander Mike Juliett Kilo deduced that these new transmissions were, in fact, primitive 'wire frame' drawings of ships scanned by the artefacts.

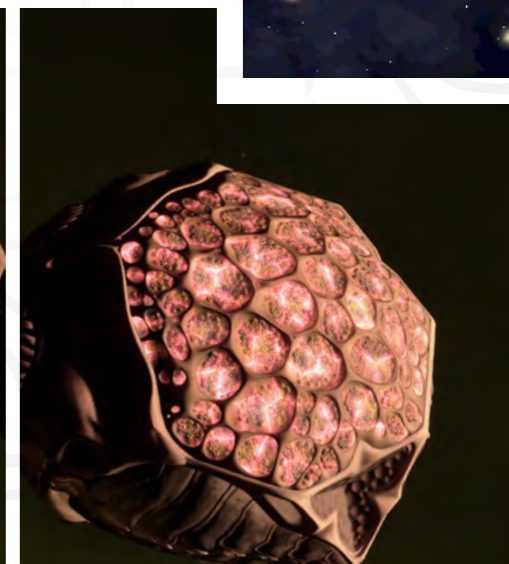
In the meantime, starports began to

mysteriously shut down their facilities, afflicted by technical maladies. It was discovered that the artefacts, when sold on a station's black market, would corrode that station's facilities, just as they would on any ship holding them in a cargo rack. While Professor Palin renewed his research in an independent star system, there were no further developments of note for several months.

Space rocks and probing ques-



These garbled emissions, when fed into a translator, displayed a readout of whatever planetary body or space station was closest to the artefact.



tions

In December of 3301, rumours of bizarre structures on the surface of airless moons began to circulate, and Canonn launched a search. By January of 3302, Commanders Octo and Snax had located alien structures on the surface of Merope 5 C. These structures were quickly dubbed 'barnacles', and commanders could harvest strange 'meta-alloys' from them which proved effective at counteracting the artefacts'



deteriorative effects on space stations. Commanders immediately swarmed to the barnacles, avidly harvesting meta-alloys, while Palin continued to conduct more research, developing his corrosion-resistant cargo racks and deducing that the artefacts' deteriorative effect was a self-repair mechanism. The Federation deployed capital ships to 'protect' the barnacles from commanders, although many

believed it was an excuse to exercise control over the valuable meta-alloys.

In June of 3302, shortly after Jaques Station's planned jump to Beagle Point failed and the station vanished from known space (presumably due to artefacts being sold at the station's black market), a new kind of alien object was found. This 'Unknown Probe' was similar in form to the artefact and was also being ferried around by convoys.



At first, the probe seemed to be a more inert version of the artefact. In July of 3302, after Jaques station was rediscovered and a meta-alloy transfer commenced to repair it, Canonn scientists discovered that scanning the probe with an Advanced Discovery Scanner

module caused the object to emit an EMP burst, which temporarily disabled all ships in its area. During the burst, the probes also emitted sounds similar to the artefacts. These noises were decoded to reveal audio spectrographs, conveying planetary data and transmitting it to a location on Merope 5 C. In August of 3302, free-floating probes were discovered.



Late in that month, a gangster named Otto Granger led Canonn scientists and other commanders on a chase to uncover a discovery he said "that the whole galaxy [would] want to see." Within three days, Canonn Commanders Noctrach, Balalaikax 3, and Ihazevich shared that they had found the discovery: a crashed alien spaceship which strongly resembled descriptions of Thargoid scout ships. The Empire was quick to seize on the discovery, deploying capital ships to 'guard' the wreck.

LCU No Fool Like One is a Canonn scientist. We spoke to him about his contributions to humanity's understanding of the Thargoids.

What's been the most useful contribution you've made to Thargoid research?

I'm glad you asked. Having personally conducted over 7,000 Thargoid autopsies I discovered that you could make a wonderful Thargoid resin jam. It's a bit feisty as the resin has a tendency to corrode utensils and as we unfortunately found out at Christmas it can eat through the hull of the Gnosis. I had asked Igor to use the meta-alloy pans that professor Palin had supplied me, but let's not dwell on that.

I've devised a delightful layered biscuit that has an aperture through which a glistening blob of Thargoid resin jam protrudes.

I'm hoping at some point that the council will allow me to set up a community goal to set up production facilities on the Gnosis so that we can sell the biscuits across the Galaxy.

What, in your view, is the biggest mystery about the Thargoids?

Where do they come from, where do they go? I was once lucky enough to encounter a Thargoid wake that, for reasons unknown, remained open long after the Cyclops had jumped out. There was an exclusion zone that I could not penetrate but inside there were tantalising glimpses of what looks like an orange star in a green nebula. I would do anything to find out how to unlock that technology and follow them into their realm.

Did any of the Codex revelations surprise you?

At the moment we are still cataloguing the data but there are certainly lots of very interesting finds out there. I'm very looking forward to visiting all of the phenomena our commanders have located; and who knows, maybe I'll create some new recipes.

Featured scientist:

LCU No Fool Like One



One of your most well-known tools is the Thargoid plugin used by many pilots. What made you create it?

I remember it well. It was back in October 3303 and I had just completed a plugin to convert still images to a more suitable format for transmission and a navigation system that would show you the location of the nearest Neutron star.

I was looking for more projects and found a message by Commander M Volgrand who was looking for people to fill in a survey to log hyperdictions and interactions with Thargoids in the Pleiades region. We established that it was possible to interface with the ship telemetry to detect hyperdictions and transmit the data to a central database as well as log any USS drops into non-human signal sources.

At the time the data was being loaded manually into a 3D star map created by Commander Piranha9, so I hit upon the idea of adapting Canonn's 3D maps to use our data so that it would be accessible, interactive and up to date.

How long did it take you to make it?

The short answer is that I had a working version within a day of responding to M. Volgrand. But the true answer is that it will never be finished as it is constantly evolving. The first modifications we added were links that allowed the commanders to manually enter data that wasn't available in the telemetry. The manual data capture became more sophisticated as the Thargoid threat intensified but eventually became obsolete when the Pilots' Federation released upgrades that gave us improved telemetry.

We now have a team at Canonn led by the head of R&D Commander Dme-haffy, who are working night and day to provide the next generation of infrastructure to support the huge volume of data we are getting both from the increased number of users and the new features.

How many people do you estimate use it?

By the time we decommissioned the old USS-Survey and replaced it with the Canonn plugin we had over 1,000 com-

manders using the software. Monthly usage was up to 600 commanders, but that actually translates to around 150 per day using the software. Usage appears to have died down a little as the change in Thargoids tactics means that AXI operatives are less reliant on recorded kills for monitoring progress.

eries and our small team are struggling to keep up with the effort of cataloging them.

Perhaps the most popular feature was the logging of kills. We will still be capturing this, but the sheer volume has been staggering and cause our data-

Other patrols we have configured provide commanders with the location of the nearest AX Combat Zones and damaged and repairing starports.

I'm currently working on a display that can show you what codex items have been identified in the current system you are in. This means that if you do a [full system scan] and find something that hasn't been reported before, you will know you have found something special.

The Thargoids remain inscrutable and we have been down a number of blind alleys in our research. Though we haven't made any real breakthroughs, the value of the data is that we are able to check the veracity of rumours and claims. One of the new features we are hoping to add in the near future is a system that will be able to alert us when something out of the ordinary occurs, such as hyperdictions or NHSS outside of the usual range or unique codex discoveries.

Have any of your models turned out to be spectacularly wrong?

I'm not entirely sure what you mean. I've had plenty of disproven theories and research that went down blind alleys, there have been many failures in my software that have left me red-faced. For instance, a recent bug [meant that] the Canonn plugin can, in some circumstances, uninstall itself. But no failure quite matches the moment when my secret human-Thargoid student exchange program was discovered by the ethics committee. Actually, perhaps it would be best if you didn't mention that bit. You can take that out, can't you?

What are you most proud of in your work?

I'm proud simply to have been accepted by Canonn especially after my suspension from the Miskatonic University by the meddling ethics committee. I would never have believed that I could have gone from disgrace to being elected to the Canonn Council in such a short space of time.



Eagle Eye installations monitor Thargoid movements

What is the data used for?

The original plugin was used for recording USS drops and hyperdictions. We have since stopped recording the USS drops as EDSM is now able to provide commanders with the ability to search for them. However, we are still collecting NHSS data to record Thargoid locations now at a much faster rate with the changes to the discovery scanner allowing commanders to gather information without having to encounter a Thargoid. In some ways, I miss the old days when you had to run the gauntlet to trigger the software.

The NHSS data we gather is displayed on 3D star maps which show us the disposition of Thargoid assets. The ability to visualise the data is essential.

As well as the NHSS data we are now capturing codex reports which will enable us to build up maps of other phenomena. There are a huge number of discov-

base to collapse on more than one occasion. There have now been over 460,000 confirmed Thargoid kills.

The logging of the data isn't the whole picture. We also have a patrol system, that allows us to quickly set up surveys of areas of interest.

Currently, we are guiding a group of students at the Miskatonic University through a survey of all the Thargoid Surface sites.

The aim is to build up a catalog of aerial photos of the sites so that we can classify them and so that we have reference images to go back when we get the inevitable claims that the sites are growing.

In parallel with this, we are searching for systems that have the right conditions for Thargoid surface sites. Students simply fly through the Pleiades and the patrol system tells them where to go next and what to do.

Guardians, non-sentient life, and more Thargoids

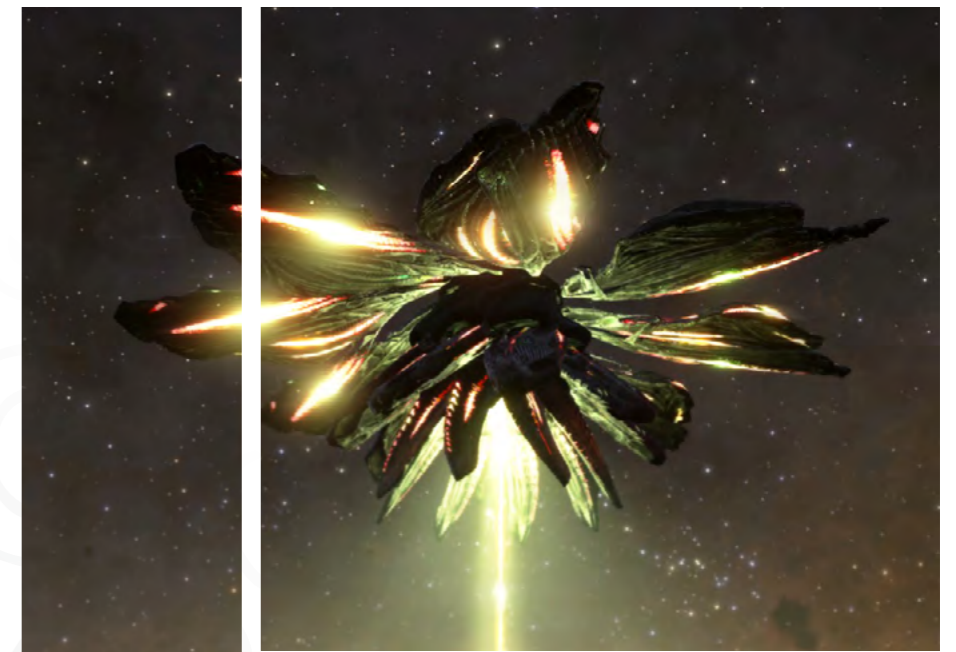
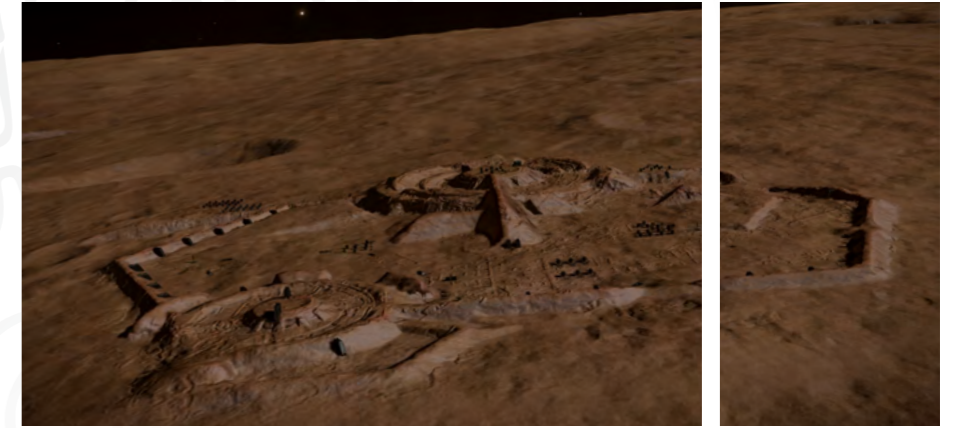
In October of 3302, Commanders xDeath and Basch Fon Ronsenburg reported yet another incredible discovery: that of a set of intact alien ruins on the planet Synuefe XR-H d11-102 1 b. Not only were the ruins intact, but they contained various alien artefacts that could be collected, as well as obelisks that transmitted data to ships that scanned them. It was the very beginning of humanity's investigations into the race we now know as the Guardians.

In the meantime, far from the Bubble in Colonia, commanders discovered non-sentient fungal life forms growing on planets, sustained by volcanic vents. These growths consumed the community with excitement for a while, until commanders began to find further alien crash sites back in the Pleiades. Along with these discoveries, they began to notice floating objects called Unregistered Comms Beacons, believed to be deployed by the Sirius Corporation; through deciphering transmissions from these beacons, Canonn scientists located a third crash site on HIP 17403. This site was the most significant yet, because the vessel located there was larger, and appeared to have brought down several human ships along with it. A greater discovery seemed imminent.

The return

In January of 3303, footage of a massive alien vessel, which snatched Commander DP Sayre from a hyperspace jump, spread like wildfire. Before long, any commander travelling through the Pleiades was at risk of being 'hyperdicted' and scanned, although the Thargoid vessels refused to engage commanders beyond these brief encounters. Conventional scanning technology was rendered ineffectual by these vessels.

In the meantime, Canonn busied itself with studying the other great alien mystery: the ruins discovered on airless worlds. Canonn started up

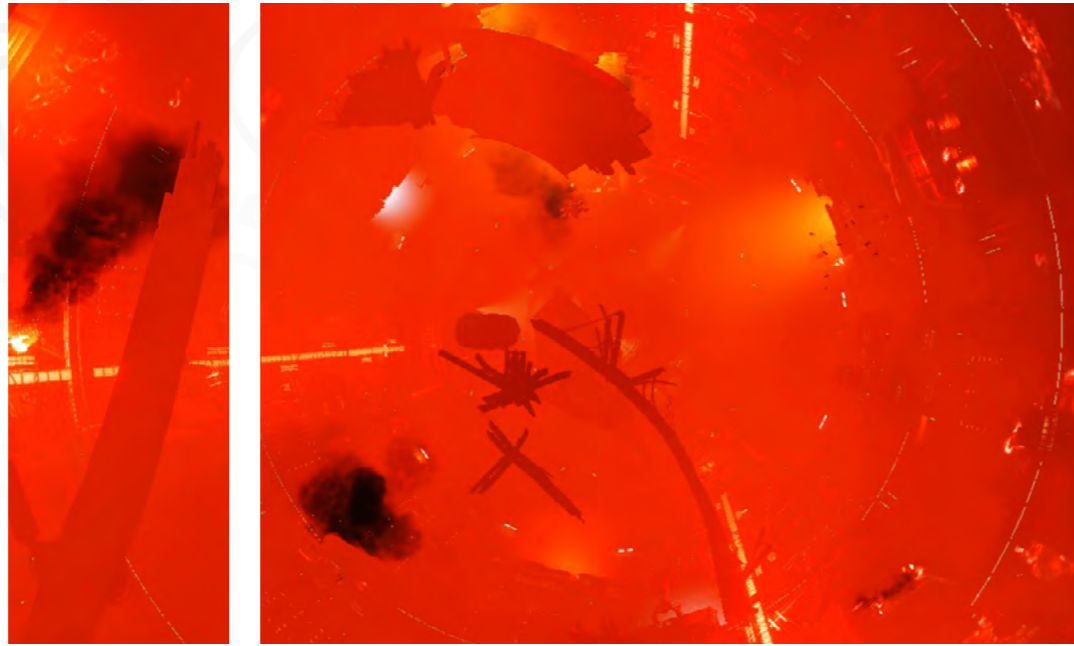


its new R&D division to assist other commanders in conducting studies of the ruins. The aliens in question were dubbed the Guardians, and with the help of various Commanders, Ram Tah deciphered a wealth of archaeological data about them. The Guardians, it seemed, had once been similar to humans, until great aspirations had brought them down.

In April of 3303, once again, the galactic community rang with the news of another shocking discovery. Commanders Lexic Meise and EfilOne discovered the hulk of a long-lost generation ship from the era before conventional space travel. The vessel, the Lycaon, was the first of many that would be discovered in the ensuing months.

As commander groups, Canonn among them, began to build great megaships in preparation for upcoming challenges, the Thargoids began to appear in greater numbers. Commanders discovered clusters of ships destroyed by the unknown vessels, which left clouds of corrosive green gas behind. The vessels also appeared above the mysterious barnacles, harvesting meta-alloys with beams of green light.

In June of 3303, Commander Edward Lewis confirmed the Thargoids' return to human space, and the destruction of a Federal capital ship. A beacon in the wreckage broadcast a message of warning for all commanders. Two weeks later, elaborate Thargoid structures were discovered on planets. Some believed they were bases, or crashed mother ships—either way, using the Unknown Artefacts and Probes (now reclassified as Thargoid Sensors and Probes, respectively) in combination with Thargoid Links found at the site, commanders infiltrated the sites in their SRVs. They activated intriguing displays at the structures' centre, which appeared to be displays of the Galaxy. It was a beautiful sight to see. Shockingly, artefacts retrieved from Guardian sites were met with more violent reactions from these facilities, which destroyed them in violent bursts. This was a hint



of some ancient conflict between these two elder races.

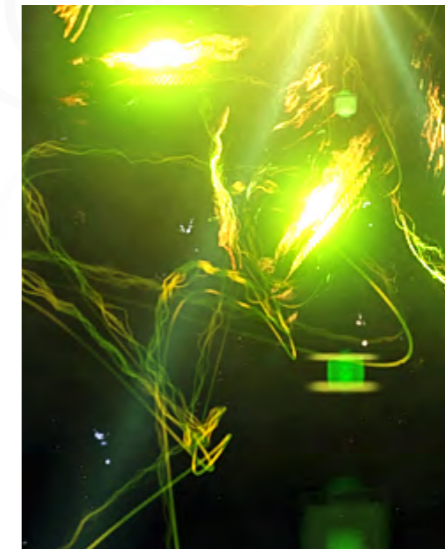
Canonn commanders working with the Thargoid Links discovered that they could detect the distance from the Links to whichever Thargoid site was closest at this time. In a matter of days, researchers had uncovered 208 of these sites, including one in the permit-locked system of HIP 22460. Significantly, all of these sites were located within the aforementioned UA sphere, within 150 light years of

Merope. More official authorities began to respond to these developments; Professor Palin enlisted commanders in the collection of Thargoid fragments for his research, and the three superpowers established the Aegis Initiative to guard against the Thargoid threat.

From then on, war with the Thargoids began to be joined. Now, the whole of the Bubble is engaged in the struggle.



Canonn scientists discovered that scanning the probe with an Advanced Discovery Scanner module caused the object to emit an EMP burst.

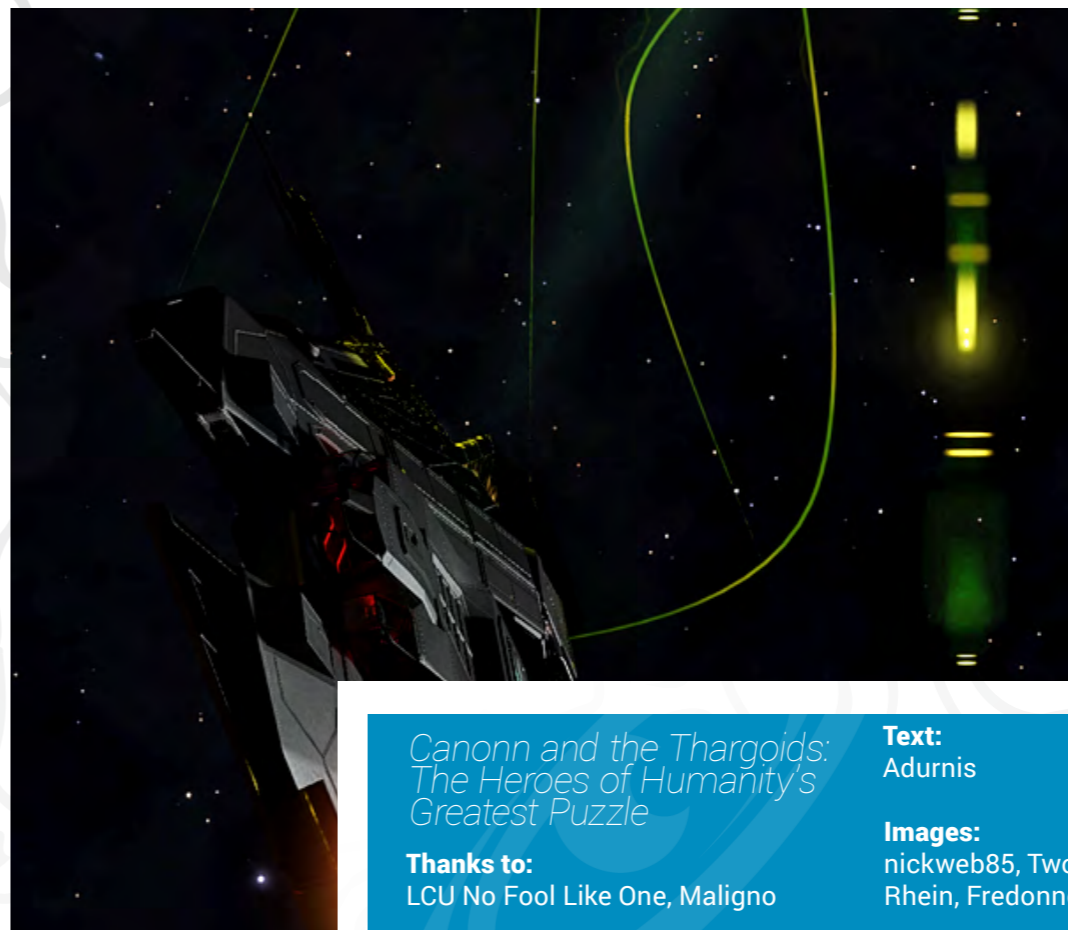


Real clear scientists

Canonn research has a well-earned reputation for thoroughness and scientific accuracy. Their policies are publicly available and very transparent, and their expertise is impressive. Just reading through any of their numerous reports can make a layman's head spin.

Recently, in conjunction with the Anti-Xeno Initiative, Canonn released a detailed report on the damage split of various kinds of weaponry (kindly brought to our attention by Commander Maligno). It's a perfect example of the kind of work they do: work that one might reasonably assume the Pilots' Federation or weapons manufacturers might provide, but instead, Canonn devotes their own resources to the task. The report included references to further studies on the effects of these weapons on Thargoid vessels — crucial war research, if ever there was any.

From the beginning of recent scientific discoveries, Canonn has been at the forefront of experimentation and the sharing of knowledge. As humanity's struggle against the Thargoids drags on, and its capacity for interstellar exploration continues to expand, we here at *Sagittarius Eye* hope that they will continue their excellent and vital work of understanding the Galaxy we live in.



Canonn and the Thargoids: The Heroes of Humanity's Greatest Puzzle

Text:
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Design:
Donald Duck

Thanks to:
LCU No Fool Like One, Maligno

Images:
nickweb85, TwoSpoons77, MAXimilian, Edelgard von Rhein, Fredonne, Donald Duck, OrangePheonix



Building

Blocks

of

Life

Space is full of life. It can be found on planets as varied as water worlds to gas giants; airless rocks to Earth-like garden worlds. But how does it start?

Brain trees growing in a vacuum do not obviously have much in common with the giant, nebulous creatures fabled to graze in the cloud layers of gas giants. First of all, let's establish what life is.

What is life?

Thermodynamically, life is an open system — a system in which energy and material exchange with the environment are possible. It makes use of gradients (of salt concentration, for example) in its surroundings to create imperfect copies of itself. It is a system of reduced entropy at the cost of energy. That means that life can reduce a state of disorder in a certain, partially closed-off area, by spending some form of energy. Life is an energy-powered anti-entropy machine that self-perpetuates.

This is a very complicated description for a simple cell: cells have a membrane to confine their relative internal order against a much more chaotic environment and are able to reproduce by making imperfect copies of themselves.

This is the physical description of life, focusing on energy and order. Biologists use a different, messier system to identify life: a checklist of characteristics, with problematic edge cases and exceptions. In biology, life is considered a characteristic of something self-preserving that furthers or reinforces its existence in a given environment. This can be described using these traits:



Water is an anomaly among molecules.

1. **Homeostasis:** the regulation of the internal environment to maintain a constant state. An example of this would be pumping water out of the cell that entered through osmosis.
2. **Organisation:** the structural composition of one or more cells which are the basic units of life.
3. **Métabolism:** the transformation of energy by conversion of chemicals and different forms of energy into cellular components (anabolism) as well as the decomposition of organic matter (catabolism). As mentioned above, life requires energy to maintain its internal organisation.
4. **Growth:** more organic matter is formed than destroyed. The system maintains a higher rate of anabolism than catabolism. Growing organisms increase the size of all their parts rather than just accumulate matter.
5. **Adaption:** living organisms change over time in response to changes in their environment. Without this, no evolution would be possible.
6. **Life reacts to stimuli:** be it a unicellular organism reacting to changes in the chemical composition of their environment, or a human closing their eyes to strong light. These reactions are often expressed through motion.
7. **Reproduction:** the ability to produce new individual organisms of the same species, be it through asexual cell division or sexual reproduction from two parent organisms.

So we can, somewhat messily, define it. But this doesn't explain how it comes about. For that, we need to go deeper.

What is life made of?

What are the fundamental molecules that formed the first small cells?

Despite the rich abundance of it that we've found in the cosmos, there is still no scientific consensus on the origin of life. The ancient Greeks had a rather simple solution to this: why believe that a structured and regular world arose out of an undirected process when you can believe that some intelligence designed it?

Over the centuries, what we've discovered about the universe has left less and less room for gods, however.

Most scientists agree that life on Earth originated in water. The models mainly build upon the Miller-Urey experiment and the work of Sidney Fox, whose experiments proved that amino acids and other organic molecules could develop under the conditions of the early Earth. They proved that water, methane, ammonia and hydrogen can, under the right conditions, form amino acids: the very molecules that make up all proteins. On top of that, phospholipids (compounds of fatty acids, glycerol and phosphoric acid) spontaneously come together to form lipid bilayers, the most simple form of cell membranes.

That this is the origin of biologically-relevant molecules is broadly agreed. However, what came after that is still up for dispute: DNA or RNA? Proteins or genes? Genes encode proteins, while proteins do all the cell's work. It's unlikely that they arose independently, as they have a sort of 'chicken and egg' relationship.

And what about water?

Water is the only solvent capable of supporting life on Earth-like worlds. This is because it is capable of dissolving all relevant molecules needed for life — or, perhaps, these molecules became important for life because they are soluble in water.

Water is an anomaly among molecules in that crystalline water, known as ice, is less dense than liquid water. It reaches its highest density at around 4 °C, while nearly every other substance we know of reaches its highest density when solid. That is the reason ice floats on water and why lakes or other bodies of water with enough depth only rarely freeze completely.

But not all life depends on water, does it?

We know, from records of INRA experiments, that Thargoids use ammonia instead of water as a solvent — they are 'ammonia-based' in the same way that we are 'water-based'. You may know ammonia as a (horribly stinky) solution in water. However, on planets big enough and with high

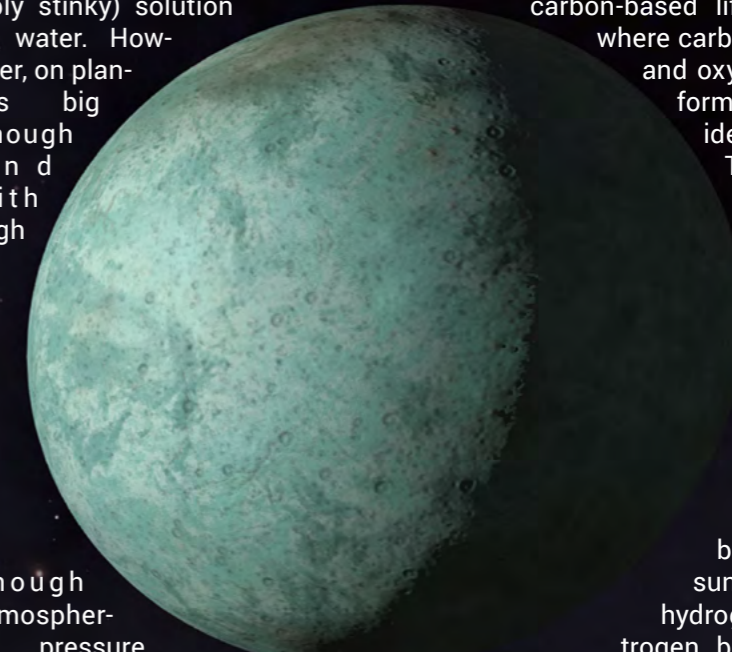
a planet with high enough pressure to support liquid ammonia and with an atmosphere consisting mainly of hydrogen and nitrogen, proto-life might have used this reaction as an energy source. This is similar to carbon-based life on Earth, where carbon, hydrogen and oxygen react to form carbon dioxide and water.

The ammonia produced this way would at least partially evaporate into the atmosphere, where it could then be split up by sunlight into hydrogen and nitrogen, both of which could be fed back into circulation. Again, this compares to plants on Earth which take energy from sunlight to split water and carbon dioxide to produce carbon compounds, with oxygen as a byproduct. This ammonia as solvent could be the cause of the caustic cloud that Thargoid vessels leave behind when destroyed.

There is even a theory of how this life may have come to exist. The chemical reaction by which nitrogen and hydrogen combine to form ammonia actually releases energy, so on

enough atmospheric pressure, ammonia can be a liquid by itself — and an excellent solvent for life forms. These life forms aren't like any we recognise from Earth-like worlds, but they most certainly fulfil all of the criteria for life mentioned earlier.

“ This ammonia as solvent could be the cause of the caustic cloud that Thargoid vessels leave behind when destroyed. ”





The sand there is what remains when these tiny life forms die.

But why carbon?

Carbon is a very versatile element that can react with a large number of other elements — hydrogen, oxygen, and nitrogen being the three most often used in physiological processes. Are there other elements that, like carbon, could act as some kind of universal link between other elements while at the same time being abundant in the universe?

There are, with certain limitations. The so-called 'carbon group' of elements on the periodic table are a sensible place to start looking.

The element directly below carbon is silicon. This element is a highly valued raw material for use in semiconductor technology (though this is mainly for its physical, rather than chemical, characteristics). Like carbon, it can form up to four bonds with other elements and is a very common element in the known universe, though not quite as common as carbon.

Silicon cannot react with as many different elements as carbon, but this is both a benefit for life as well as a limitation: it makes silicon less versatile, but also less susceptible to bond with impurities than carbon, which readily does.

Silicon has other drawbacks as a candidate for the basis of life. Functional groups in organic molecules often contain different elements, like hydrogen, oxygen, and nitrogen. They can contain elements like iron, phosphorus, and sulphur, among many more. Silicon can't form the basis of molecules this complex, which is why silicon-based molecules are often described as 'monotonous' compared to carbon-based ones.

The main reason for this is that the lower in the periodic table of elements an element is situated, the bigger (having larger mass and atomic radius) it becomes. Simply put, silicon is big, and has difficulty forming double bonds the same way carbon can. The 'carbonyl group', a fundamental group in all amino acids and many other organic molecules, features a double bond between a carbon and an oxygen atom. Silicon would be less likely to give rise to molecules of that complexity.

Silicon would also need to use a different solvent. Silanes are silicon-hydrogen molecules analogous to alkane hydrocarbons (which make up most of the fossils used during the 19th, 20th and 21st centuries for fuel). These silanes react very

strongly with water, which is why water couldn't work as a solvent for silicon-based life. However, polymers of silicon and oxygen (called silicones) are much more stable compared to silanes, and could be a viable option as a foundation for life forms with water as a solvent.

Furthermore, there are known forms of life in Earth-like atmospheres that, although their fundamental molecules are not built upon silicon, use silicon in their biology. Marine diatoms extract silicon from sea water and incorporate it into their cell walls in the form of its dioxide, called 'silica'. Go to the beach on an Earth-like world and look down — the sand there is what remains when these tiny life forms die.

So, life as we commonly think of it rests upon the versatility of carbon with water as a solvent; but this is not the only combination. Hopefully, as our ships develop the avionics to pierce the atmospheres of more worlds, our understanding of the stuff of life will broaden too.

Building Blocks of Life

Text:
LordTyvin

Design:
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Thanks to:
DrNoesis

Images:
OrangePheonix



KRAIT PHANTOM

We take a look at the Krait Phantom, the newest addition to the Falcon deLacy fold.

The Krait Mk II launched to much fanfare (and enormous popularity) in late June 3304, and was quickly followed in December by the Krait Phantom. How does the new variant shape up, now that it's been around long enough for commanders to gain a proper appreciation of the ship?

The recent history of Falcon deLacy and new variants of their ships has been spotty, to say the least. The Viper Mk IV, while having its advocates, has not set the universe alight. The Cobra Mk IV (covered in the previous issue of this magazine) is not at all well regarded — most commentators agree that it's slow,

underpowered, and overweight, and does not make a worthy successor to the legendary Cobra Mk III. Furthermore, its sale is limited to only certain Pilots' Federation members — a decision that seems bizarre, especially considering its lacklustre performance.

It wasn't entirely surprising that the ship-buying public were sceptical of the Krait Phantom, at least at first. Would Falcon deLacy once again remove all the worthwhile elements of its predecessor, or could they finally make a ship variant that was at least optimised in some way? ▶

Development

We covered the history of the Krait in detail in Issue 20 (Snake Off — Krait v Python) so we won't dwell on it here. But to recap: the original Krait Lightspeeder had always been a ship that had caught the imagination, despite its faults, and Falcon deLacy decided to recapture this legend in modern form. The Krait reboot, launched as the Krait Mk II, was an instant hit, catching even the Pilots' Federation hub at Jameson Memorial by surprise when, at one point on the ship's launch day, every single medium pad was occupied by a commander in a new Krait Mk II.

With the Phantom, Falcon deLacy's clear intention was to build a lighter weight budget version of the Mk II. The ship is priced at eight million credits less than the Mk II, the base model selling for 37.4 million credits. The basic hull weighs in at 270 tonnes, some 50 tonnes lighter than its older stablemate. This weight and cost reduction doesn't come without consequences, of course. The Phantom has fewer internal slots and lacks the Mk II's fighter bay. It has two large and two small hardpoints, versus the Mk II's three large and two small. Externally, both variants are similar, with the most striking difference being the main thrusters, which are grouped in-line on the Phantom, rather than the two rectangular pods on the Mk II. From the commander's seat, the Phantom retains the panoramic view (especially downwards) enjoyed by commanders of the Mk II, as well as the expansive bridge — it would be a disservice to both the Mk II and the Phantom to describe where the commander sits as a mere 'cockpit'.

The Krait Phantom seems to have been generally well-received, particularly amongst the exploration community.



Falcon deLacy have learned a lot from their earlier missteps.



The Phantom niche

Given the issues with all the failed cheaper and follow-up versions of successful ships that have been released in recent years, can the Krait Phantom break the spell and find a useful niche?

The main problem with many of these follow-up ships, particularly Falcon deLacy's, is that they have removed the one thing that made the predecessor worthwhile in the first place. For example, the Cobra Mk III's speed was a main selling point for that ship, but the Cobra Mk IV is very slow. Perhaps Falcon deLacy were fearful that a good Cobra Mk IV would have cannibalised sales of the Mk III, but instead, they handed the niche the Mk IV might have occupied to their competitors — the usual fate for a company worried about cannibalising their own sales.

Things are different with the Krait Phantom. It seems like Falcon deLacy have learned a lot from their earlier missteps, and have managed to release a variant that can fill its own niche without fatally compromising the design. The Phantom, for instance, is actually a bit faster than the Krait Mk II, and it retains the Mk II's good maneuverability. It is perhaps even more fun to fly than its predecessor. The Mk II was a decent exploration ship to begin with, but the lighter-weight Phantom is even better, and an excellent step-up for explorers from Lakon's Asp Explorer.

To get an idea what pilots think of the ship, we asked for opinions from the ship-buying public — and it seems like no one has a bad word for the ship. Unsurprisingly, many indicate that the Phantom's niche is exploration.

"I use mine for scouting," Dr Nagi told us. "[It's] easy to get a good jump range. I'm getting 65 light years with just engineering from Far-seer and the Guardian [frame shift drive] booster. Low fuel consumption means you can go far without main sequence stars."

Commander Yanick was a little cooler, but still very positive:

"To be fair, if you know the Mk II, the Phantom is only marginally different. I used the Mk II on Distant Worlds 2, and now the Phantom as a scout ship. Other than the range and the fighter bay, there's not much difference. The flying seems the same. It's a good, versatile ship."

In light of this, how do the ranges of the Mk II and Phantom compare?

A lightly engineered Phantom with a 5A shield will jump 56 light years at a time with a full payload, compared to the 51.75 light years of a Mk II with the same equipment. With the hold empty, the range increases to 60 light years. The test loadout to find these figures showed that the Phantom could simultaneously be a Fuel Rat and a Hull Seal ship, and carry an auto field-maintenance unit (AFMU) for repairing its own modules. "The Phantom is the best choice for a Fuel Rat, once you scrap the docking computer," according to Commander Outlier.

For years now, commanders' exploration ships of choice have been the Asp Explorer and — for those who want to go big — the Anaconda. The introduction of the Krait Phantom has added another option. Commander Awebob believes that the Phantom has taken the crown from Lakon.

"The Phantom is spectacular for exploration and is the king of the mid-sized exploration ships. The cockpit is clean and open feeling, while the Asp looks dirty inside. Getting your SRV back into the ship is very easy. Just run into the front landing gear and you're in position, and the flat top of the ship is a great perch for your SRV, nice for taking photos." So, no more of that awkward back-and-forth when trying to get into position for SRV recovery, and a good photo platform to boot.

Heat shedding is often a ship trait that is glossed over, but it can be an important factor in how a ship performs on a long expedition. After long strings of non-sequence stars, explorers have to fuel up. Heat shedding can make a huge difference in how long the task takes, determining whether you can remain close to the star with your fuel scoop operating at maximum capacity and be ready to go in thirty seconds, or are forced to sit at the margins, sweating it out while you wait for your fuel tank to fill at a snail's pace. It turns out the Krait Phantom is excellent in this regard.

"It's an easy ship to keep cool, so a ten-second fuel up at the exclusion zone border is a painless cinch," said Commander Raumfahrer Spiff.

The Phantom's ability to deal with heat also means that when 'jonking' (travelling at speed by dropping in a system, honking the discovery scanner, quickly checking for interesting planets on the FSS, then immediately jumping to the next star if the system contains nothing of note) is fast. A jonking explorer can skim the star with the fuel scoop running at maximum power, and recover the fuel used in the last jump before the FSD has cooled down. This is a great timesaver for Hull Seals and Fuel Rats on emergency calls. With good heat management, pilots can even start charging the FSD before they're outside of fuel scoop range, saving more time.



“The introduction of the Krait Phantom has added another [exploration] option.”

Hit or miss?

Faulcon deLacy have finally built a successor ship which is objectively good, albeit somewhat specialised. While it's more expensive than the Asp Explorer by a solid margin, the value proposition it gives is perhaps superior. It doesn't discard many of the most valued traits of the Krait Mk II; it retains excellent flying qualities and great speed, and adds further potential for travellers, whether the ship is used as a taxi to speed across the Bubble, or to journey to Beagle Point.

My previous taxi was an Asp Explorer. I recently switched to a Phantom and will never go back. I can fit all I need for material gathering, planetary mining and do all my engineering travel in it.

— Commander Mad Mags

Lakon — watch out.



“

I recently switched to a Phantom and will never go back.



Suggested combined Fuel Rat and Hull Seal build

An example of an exploration build suitable for both 'fuel ridding' and 'hull sealing', with adequate shielding in case of any hard landings. If you expect to deal with malicious customers, then shield boosters, 6A thrusters with dirty drive engineering, and more robust shield engineering are suggested — although this will come with a reduced jump range.

The total cost is about 90 million credits, and the ship will jump 60 light years at a time while the cargo hold is empty, or 56 with it full. Further engineering for weight reduction can squeeze out a bit more range if necessary.

Core internals

- Lightweight alloys
- 5A Power plant
- 5D Thrusters
- 5A Frame shift drive (engineered at Farseer Inc or Long Sight Base)
- 4D Life support
- 3A Power distributor
- 6D Sensors
- 5D Fuel tank

Optional internals

- 6A Fuel scoop
- 5H Guardian frame shift booster
- 5A Shield generator ('low power enhanced' engineering)
- 5E Cargo rack
- 3A Auto field-maintenance unit
- 3A Repair limpet controller
- 3A Fuel transfer limpet controller
- 2G Planetary vehicle hangar
- 1I Detailed surface scanner

Utilities

- OI Heat Sink Launcher

Krait Phantom

Text:
Mack Winston

Design:
McNicholl

Thanks to:
AweBob, Dr Nagi, Mad Mags, Outlier, Raumfahrer Spiff, Yanick

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SebastianWehmeyer, Sirruf, NickWeb85

WHAT'S THE MATTER WITH

DARK

MATTER?



Maybe we just don't understand gravity?

We think there's something there, but we can't see it. Just what is 'dark matter'?

In the 20th century, when mankind was restricted to just looking out into space rather than easily traversing it as a normal daily activity, many people took their gleaming instruments of the day and looked out at the stars. One such, a Swiss astronomer named Fritz Zwicky, would leave a legacy he could not have dreamt of at the time.

Science is all about cross checks and consistency: if two models predict different results, scientists test

them to determine which one better fits the evidence. Zwicky set out to test a model called the Virial Theorem. A very simplified form of it is: in a stable spherical distribution of gravitationally interacting objects, the total kinetic energy of the objects is equal to minus half the total gravitational potential energy. The proof is highly mathematical: suffice to say that we see evidence for it in small systems we observe, and even electrons orbiting atoms obey it.

At large scales we can look at individual stars. We can determine the stellar class of a star, and therefore its mass, from both its luminosity (brightness) and readings of spectral lines from spectrometers (which break starlight into its constituent parts, like a prism). Once we know the mass of a star, we know its gravitational potential energy relative to the system being considered.

A spectrometer can also give you a measurement of velocity. Just as



The mass predicted by the kinetic energy of the cluster was approximately 800 times the mass as measured from the luminosity

your onboard computer changes the pitch of the engine sound your wingman produces when they zoom past you (known as the Doppler shift), light behaves the same way. Light 'blue shifts' when the object producing it is moving toward you, and 'red shifts' when the object is moving away. Therefore, the presence and degree of red or blue shift in the spectral lines of starlight gives us an indication of in which direction, and at what speed, the star is travelling. This tells us the kinetic energy a star possesses — again, relative to the system being considered.

In 1933, Zwicky trained his instruments on a cluster of galaxies, the Coma cluster. After running through the calculations and comparing the two measurements he was able to take — the kinetic energy of the system, and the gravitational potential — he was faced with a startling result.

They did not match — and the inaccuracy wasn't small. Back then, if a number was within a factor of 10 of the predicted result, it was accepted

as accurate in astronomy. The mass predicted by the kinetic energy of the cluster was approximately 800 times the mass as measured from the luminosity, if the galaxies were made up entirely of stars. This was troublesome, and he coined the name 'dunkle Materie', or 'dark matter', for the missing mass.

The mystery remained a point of contention in the scientific community, which acknowledged the measurement but largely ignored it: dismissing it as a mistake, or readily explainable by a combination of the Virial Theorem's known limitations and the light-to-mass conversion not accounting for lower-luminosity stellar objects.

Around forty years later, with even more sensitive spectroscopy equipment available, an American astronomer named Vera Rubin trained her instruments onto our nearest neighbour, the Andromeda galaxy. She was interested in the rotational properties of the galaxy's gas clouds and stars.

Like Zwicky, she was presented with something puzzling. Andromeda is a spiral galaxy, much like the Milky Way: the distribution of stars and gas is in a spherical central bulge which transitions into a flat disc. On modelling the predicted velocities in such a matter distribution, Newtonian and Keplerian gravity predict a linear rise in orbital velocity from the galactic centre peaking at the transition to the disk, followed by a decreasing curve inversely proportional to the square root of the distance from the centre.

Instead, what was observed was a flattening of the orbital velocity curve out to very large distances, even in the ill-defined fuzzy edges of the galaxy.

In short, the whole galaxy was spinning — edges and all — much faster than predicted.

If galaxies spinning at those speeds are to be stable, and not spew their stars into the void, they must have enough mass (and therefore gravity) to hold the stars in place. Rubin deduced that there must be some additional unobserved material present within the galaxy.

Not wanting to accept this measurement uncorroborated, astronomers measured the rotation curves of as many galaxies as possible, to see if they rotated at similarly higher speeds than expected. They found that they did. Zwicky's analysis was revisited, and physicists began to refer to the missing mass as 'dark matter'.

Since then have come several other observations, such as discrepancies in gravitational lensing (the bending of light around massive objects as predicted by Einstein's Theory of General Relativity and readily observed around black holes). These discrepancies were observed around galaxy clusters, suggesting a large amount of unseen material extending far outside the optical component of a galaxy.

A 'smoking gun' for dark matter was discovered in the Bullet Cluster. This comprises two interacting galaxy clusters that have recently passed through each other. What is interesting is that the gravitational lensing places the centre of mass of the two clusters ahead of the observed luminous matter. This suggests that the dark matter present in each cluster passed through each other unper-

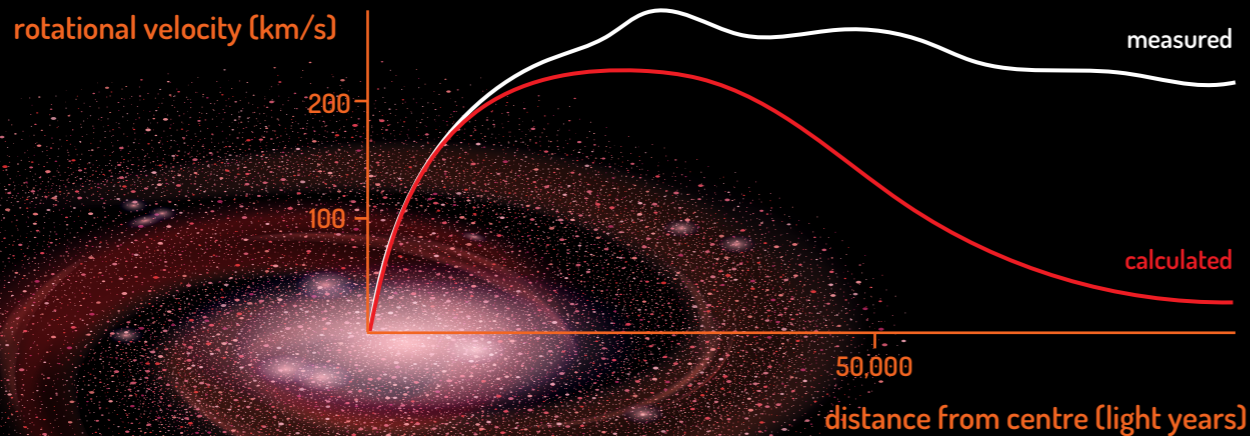
turbed except gravitationally, while the regular, luminous matter (stars) experienced an additional drag effect from local electromagnetic forces.

There have also been the discoveries of so-called 'dark' galaxies: extremely diffuse, low-density galaxies that have very high orbital velocities for no obvious reason. Again, lensing tells us there is a large mass that keeps those objects bound — we just can't see it.

So what is the matter with dark matter? Is it just matter we can't see, such as planets, black holes, dim stellar objects such as brown dwarfs or distant neutron stars? Or is dark matter just a 'fudge factor' to create an industry of work when, in truth, it is gravity that is misunderstood? Or is there something else at play entirely?

If dark matter is in fact just normal (what we call 'baryonic') matter — planets, dust and such — the best place to look is our own galaxy, the Milky Way.

In order for baryonic matter to explain the rotation observed, a huge amount of compact stellar objects would have to be present in a drasti-





■ Gravitational lensing in action

cally different distribution than that of regular stars. While black holes are hard to observe, we can observe close binary black hole systems (astronomical objects orbiting one another) and 'feeding' black holes that produce massive bursts of X-rays. The environment around the Milky Way is largely quiet — if there were many more black holes than we observe, at least a proportion of them would emit these X-rays. We also do not observe groupings of such objects in the halo around the Milky Way.

If we instead turn to dim stellar objects, such as brown dwarfs, to explain the missing mass, we should see a local density near Sol that is many orders of magnitude larger than we observe. In short, for the Milky Way to be spinning at the speed it is and retain its shape, there should be much, much more non-luminous stuff in it.

Ok, so it's likely not regular baryonic matter. What about our theory of gravity? Maybe we just don't understand gravity?

Perhaps, but any extension to gravitational models must fit the observa-

tions. Many people have produced so-called Modified Newtonian Dynamics models (MONDs), but they all feature one significant drawback: they cannot be made to fit gravitational lensing observations, and explaining the Bullet Cluster is simply impossible. So, the problem is likely not with our understanding of gravity.

With those two seemingly unlikely, let's round up the evidence and distill from it what we can state about dark matter:

- Does not interact, or only weakly interacts, with baryonic matter
- Travels at speeds much lower than that of light, so tends to clump around galaxies
- Interacts with gravity — it has mass
- Stable, or has a decay rate longer than the age of the universe

This doesn't give seemingly much to play with, but is actually a treasure trove to a theoretical physicist.

By the 21st century, particle physics had developed a model to describe most happenings around low, medium and high-energy physics, known as the Standard Model. This model was not complete and, much like dark matter, had observational problems in very specific areas. Any proposed solutions to these problems must not have contradicted predictions made by other parts of the Standard Model, in order for the whole to be a credible theory of how the universe works.

Working within these parameters, theorists proposed a few solutions to the dark matter conundrum:

- **Weakly Interacting Massive Particles (WIMPs):** a proposal and prediction made by several models, including one called 'supersymmetry'. These particles only interact via gravity and the weak nuclear interaction, responsible for beta decay, or radiation. These are considered the easiest to search for.

- **Axions:** a hypothetical particle that allows a coupling route between the photon and the magnetic field.
- **Heavy Sterile Neutrino:** the discovery of something called "neutrino oscillation" established that neutrinos have mass, and the proposed mechanism it operates by can predict a heavy 'dark sector' neutrino that interacts only gravitationally.

There are other, wackier, models beyond these three, as well. There are many families of theories to explain dark matter, the situation being more like a playground of models.

The first step, then, is to start searching for these proposed particles. The easiest to detect should be the WIMP — but how to find it?

First we must consider just how weakly-interacting the WIMP has to be. Neutrinos, for reference, have an interaction strength (cross-section) so low that the mean free path in lead is roughly a light year.

In plain speak, this means that if you constructed a lead bar one light year long and fired neutrinos down its length, around 37% of them would interact in some manner. WIMPs present far lower interaction strength than this.

Searching for it is thus a game of producing an enormous detector in which the WIMP may interact by the simplest of mechanisms and produce enough of a signature to be observed, all while not being swamped by natural background radiation (alpha, beta, gamma rays and neutrinos). This is actually quite hard.

It turns out that almost everything in the universe contains at least some radionuclides, so everything is radioactive in some manner. So any detector would need to be in the most inert place accessible by humans. The simplest manner of interaction that WIMPs should exhibit is known as scattering — their deviating effect on the trajectory of a particle.

Early in the 21st century, the largest dark matter detectors were therefore enormous systems comprised of many tonnes of ultra-pure liquid argon, xenon and, in other cases, single crystals of germanium and silicon. These detectors were buried deep underground in mines and tunnels in order to escape cosmic rays, and were built from naturally pure or radiation-shielding materials, so that if a WIMP did interact in the target material, its signature wouldn't be swamped by background radiation.

Once built, the only thing left to do with the detector was to watch it and wait as it quietly detected everything it was sensitive to, hoping to capture that tiny needle in a million haystacks.

How long should we keep looking? This question has been asked many times over. The parameter space for this experiment is very large, and it would be slapdash to not cover it the best we can before moving on.

One limit to how far we go is the so-called 'neutrino floor'. This is the point of sensitivity at which low-energy neutrino interactions begin to present a background in the detectors. To get there, scientists have build their detectors out of ultra high-purity materials, use extensive shielding techniques, and purify their targets of radioactive isotopes



to unprecedented levels. You might think giving the kitchen sink a thorough wipe down would mean it is clean — but for a dark matter experiment, even a fingerprint would create a glow of background events from dead skin cells alone.

So what is the matter with dark matter? It's a substance in the universe that clearly exists, but interacts with the rest of the universe in strange ways. We can't see it, we can only see indirect evidence of its existence — but our measurements of the universe predict that it is plentiful. Much more plentiful, in fact, than the plain old matter we know and see in stars, trees, spaceships, and ourselves.



What's the Matter with Dark Matter?

Text:
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Design:
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Thanks to:
DrNoesis

Images:
x1, ThatMykl

STAYING COOL IN SPACE

How do our ships cool in space?
What is the difference between
'heat' and 'temperature'?

Our human experience of heat — that is, primarily in an atmosphere — can give us a distorted view on just how heat behaves in space. Heat and temperature are very different, and require different management, in the near-perfect vacuum of space.

In a solid, 'temperature' is a measure of the vibrational energy its constituent molecules and atoms have. In a gas, where atoms and molecules are free to move, temperature is about pressure and volume — but is basically the average velocity of the molecules. Liquids are a transitional crossing state somewhere between that of a solid and gas, but temperature is still essentially a measure of kinetic energy.

Heat, on the other hand, is a measure of energy transference between objects. Heat transfer is the experience of temperature with which we are familiar, and it is a different thing to temperature.

If you placed a piece of metal and a piece of plastic in a boiling water bath for several minutes, then removed them, they would be at the same temperature. However, when you then touched each, you would experience that the metal felt hotter than the plastic. Why?

This is the interesting dynamic that is heat. Upon touching the metal, it transfers energy to your skin very quickly, causing your skin's temperature to rapidly rise and trigger a pain response. The plastic, on the other

hand, does not transfer heat quite as well so your skin doesn't get that rapid dump of energy.

The material property that governs the conversion of energy into an expression of temperature is known as the 'specific heat capacity' of the material ('specific heat' for short). It is the number of joules of energy a kilogram of the material will absorb or emit for every degree of temperature change.

There are three methods of transferring heat between one object and another:

1. **Conduction:** direct contact between the surfaces of materials.
2. **Convection:** temperature-driven bulk movement of liquids and gases in which cooler gas and liquid will tend to fall and hot gas and liquid will tend to rise. The result is a transfer of heat between the hot and cold materials.
3. **Radiation:** production of photon radiation by a material, typically in the infrared in everyday objects, though it can extend through the visible spectrum.

So what happens in space?

A Cobra Mk III carries a miniaturised fusion reactor capable of producing 15 megawatts (MW) of power. Regardless of the electrical power used to run all ship systems, all of the power produced and used will in some way end up as heat. This heat can't transfer by conduction or convection, as the ship is in a vacuum. Without the means to transfer heat, the ship heats up.

How much? Let's use a tonne of steel as an example.

Specific heat of steel = 510 J/kgK

Latent heat of melting = 247,000 J/kg

From 300 K to a melting point of 1,648 K (a change in temperature of 1,348 K), 688 MJ of energy is required. From a 15 MW power source that takes 46 seconds. Similarly, for melting, it requires 247 MJ of energy, requiring little over 16 seconds. That is a tonne of steel, melted in about one minute!

The unladen mass of an average Cobra is roughly 260 tonnes. If you assume that all of that tonnage is steel, the entire spaceframe will heat up by 30 degrees in roughly five minutes. Not ideal for human comfort!

How do we stop that beautiful spacecraft slowly turning into a ball of molten metal? We need to vent the heat into space as efficiently as possible.

As mentioned earlier, the vacuum around the ship prohibits the use of convection or conduction, so the only available passive method is radiation – which, unfortunately, is the least efficient. The production and emanation of light by an object at high temperature is known as 'black body radiation'. The flux of black body radiation is related to the 4th power of temperature, via the form:

$$Q = A\epsilon\sigma T^4$$

Where A is the surface area of the object, σ is the emissivity (how efficiently the material will emit light), ϵ is the Boltzmann constant and T is the temperature (in Kelvin).

What this equation says in summary is that, if you want to radiate a lot of energy, the material you use to do it must have a high surface area, high emissivity, and be very hot without melting. If, for argument's sake, the Cobra has a perfectly emissive surface with an area of 1500 m² (2x its silhouette area), the whole surface would be held at a temperature of 650 K – or 377 Celsius!



How do we stop that beautiful spacecraft slowly turning into a ball of molten metal?

However, our ships are incredibly good at keeping our fragile human body from baking via the use of efficiently-designed radiator surfaces, as well as recycling the plasma generated in the fusion core to supplement and preheat the thrusters. This helps remove heat from the ship.

The radiators on a vessel are sized to remove heat from the fusion core, with overhead, and are constructed from helium-flushed high-temperature tungsten plates or coils. Tungsten has a very high melting point (around 3,700 K), so if they're held at a maximum temperature of 3,600 K, the required surface area of our thermal plates is theoretically 1.6 m².

This represents an absolutely perfect system and doesn't take into account the heat efficiency of the fusion system, the thermal core heat pumps and the directionality of the radiators (as heat will want to emanate in all directions). In reality, there are losses in efficiency (as there are in nearly all energy transfers), in pumping the high-pressure helium fluid, and in achieving such high temperatures.



The flat surface area of the radiators on a Cobra is actually 18 m², so its cooling system has to have an efficiency of 10% with the power plant running at maximum capacity and all systems operational and functioning. In order to remove that heat from the ship and keep you cool on these occasions, the Cobra will open its radiators and emit a bright yellow glow – the glow being photons, radiating energy away from the craft. When the ship is idling (not using all available power so the power plant is generating less heat) the radiators





“ In terms of space ships, power equals heat.

remain closed. The radiator shields, as well as the rest of the hull, emit heat as infrared radiation.

In terms of space ships, power equals heat. The pips of the power distribution system can be thought of as electrical power, that rests in capacitor banks which we drain when we pull the trigger of our weapons or mining lasers. However, when the capacitor runs dry, the message that displays on the HUD is 'Thermal Overload'. That is because the capacitor represents the heat buffer the distributor can absorb before it reaches its working limit.

Thrusters and shield generators add heat. When standard munitions are fired, they generate mechanical and chemical heat. When energy weapons fire, the process of producing a laser pulse generates large amounts of heat as a consequence of inefficiency (as not all the energy supplied by the power distributor is converted into destructive force).

All this heat requires removal to prevent the ship, its systems and occupants cooking and ultimately melting. So, the removal of heat is of crucial importance for the maintenance of life in space.

Heat and the moderation of a ship's heat output (or 'signature') is also important from a tactical standpoint. In the 20th century the most commonly-used method of detecting flying objects was to pulse radio waves from a tower and watch for signals bouncing back. As technology progressed, modern combat aircraft employed both low radio

reflectivity paint as well as special airframe design to reduce their radio impact and effectively achieve 'stealth'. Such coatings come as standard in the 34th century, and as such radar has fallen out of use. Given the obvious issue as described above with the emission of vast amounts of energy in infrared and visible spectrums from a ship's passive and active cooling systems, the observation of heat has become the de facto method of tracking and monitoring nearby objects for ships' sensors. The scope itself is fed by an array of directional sensors mounted within the skin of spacecraft and objects of interest reconstructed via multilateration using the onboard computer.

Much like the use of anti-reflective coatings for reducing radar signature, a pilot can obtain some measure of stealth by manually controlling the radiator shutters and overriding the cooling systems. Though the thrusters will still vent some heat, the core of the ship will begin to store heat and increase in temperature causing structural stress – and ultimately damage and malfunctions if not controlled. However, the heat that is not being vented is also not giving away the ship's position, so 'silent running' is a good way of quickly making a ship harder to detect.

Heatsinks are often used in tandem with silent running, and many pilots equip them as a matter of course. With a command, the ship flushes the heat pump which drives the radiator, purging the ship's heat to a thermal bank (the heat sink itself).

The heat sink, once glowing white-hot with the accumulated heat of the ship, is then physically ejected, leaving the ship barely warmer than the surrounding void.

To nearby heat sensors the ejected sink will light up like a flare, so it can be useful to distract vessels, space stations or munitions while your ship escapes unnoticed.

Soon after ejecting the heat sink, of course, the normal action of the power plant starts heating the thermal distribution system again, and the ship will regain the lost heat within several seconds unless the radiators are opened again.

Heat finds its way into other aspects of life amongst the stars, too. Some combateers favour emissive munitions, thermal vent lasers, or other exotic weaponry effects – special characteristics that allow a pilot to impart heat to a target, increase their heat signature, or cool their own vessel. The frigid dust cloud left over from a cracked asteroid also provides excellent cover for ships seeking to remain undiscovered amongst the rings.

Staying Cool in Space **Text:** Eros Madelung **Design:** McNicholl **Images:** DasExorcist, NickWeb85

PASSENGERS WANTED

HAVE SPACESHIP
WILL TRAVEL

Since the advent of the frame shift drive, the Galaxy has become a smaller place. Voyages that used to take months can now be completed in hours. Stardreamer technology, once considered crucial for maintaining one's sanity and sense of time during these voyages, is now relegated to the junk heap.

Indeed, for a private individual to travel from one star system to another — or even to distant wonders — is easier than ever. Saud Kruger has emerged to accommodate this burgeoning market, offering ships from the humble Dolphin shuttle to the gargantuan Beluga megaliners. Gone are the coffin-like cryopods of yesteryear — even economy travellers can expect private quarters and facilities, with ready access to food and drink. These luxury cabins are specially crafted to combat the effects of zero-g upon the human body, ensuring that even the most spacesick of passengers arrive at their destination in healthy condition.

Commander Toxophilite manages the Toxo-tours fleet, which has offices in Colonia and the Bubble. He takes us through his fleet.

"TFS *Toxo-Tours 1* is our Dolphin, fitted out with all mod cons for executive travellers, with high-grade thrusters and a very low heat profile for those passengers requiring a little... discretion on their travels.

"Then there's our somewhat more utilitarian T7 rescue & mass transit vehicle, *TFS Ballistic Descent*, kitted out for refugee/ aid worker transport and doubles as a station rescue vehicle, extra thermal resistance for safety and heatsinks aplenty."

Toxophilite flashes a smile. "Take TOXO-TOURS, because most of our passengers get there and back alive!"

These different specialisms neatly encapsulate the breadth of passenger mission available to independent pilots. Someone with a ship and some time can rescue stricken people, smuggle criminals, or pilot science expeditions. Interstellar tourism is now big business.

Commander Azriall Ale'cen is enthusiastic about the life of an interstellar tour guide.

"I take sightseeing passengers," she begins. "I enjoy going to different places I wouldn't [have] thought to stop at. Some may be boring but others are interesting. I don't mind if they are economy, first or business class. We all just want to get out there, so why not tag along for the ride?"

You often get to see amazing sights.

The tourist beacons that have littered the Galaxy in recent years are favourite destinations for independent pilots and sightseers. They provide interesting information on the history of a place and tend to be deliberately left at scenic locations.

"Just this morning I went to Faulcon deLacy's 'beginnings' tourist spot and learned something new about the ships I love," explains Azriall. "Good excuse to get out there and explore the Galaxy."

Commander Tictak concurs. "I like running short-range missions, mostly VIP sightseeing. You often get to see amazing sights, like geysers, and get quite some money too. I usually use a Dolphin or Orca depending on my mood."

Turns out he was two hundred light years out in an Orca, being pursued by Thargoids.

Trips further afield can be risky. Commander Wrangler-Actual told us:

"I came to know one of the members of my small squadron (the Freelancers) because he sent me an SOS one night while I was out in the black. Turns out he was two

hundred light years out in an Orca, being pursued by Thargoids."

The conversation turns to passenger runs, and he smiles. "I do them occasionally. Once, I transported a group of prisoners in one cabin and the CEO of a company in the adjoining cabin. That was a memorable voyage..."

There are more urgent situations in which a passenger cabin might be required, too. Commander Zdenek-Joerg explains a little about the business of rescuing refugees of Thargoid attacks on stations.

"By far the most passenger missions for me has been rescue missions from burning stations in my cold-running *Rattaconda*. It doesn't even need heat sinks in those conditions! Someone's gotta help them, wouldn't you say?"

Zdenek-Joerg's comment strikes a familiar chord. Behind the gruff exterior of some of these flyers lies a softer centre. Sure, they're motivated to make a living and a profit, but anyone who takes a rescue mission is risking their life to save others. That theme is common, and it creates a bond.

Some, however, are more mercantile. Hatandsandalsguy told us:

"Mostly I do rescue missions in a Type-6 because it fills quickly and I can turn over the 52 survivors in a couple [of] minutes. No worries about pad sizing or excessive heat, as a single heat sink will keep me below 10% on exit. It's also an easy 700k per trip."



Then there are the scientists. With frame shift technology has come a boom in observational science, with the cost of visiting distant phenomena plummeting over the last few years.

"Here at Expanders Corp, we have a group of willing scientists. Our University of Astrophysics and Cosmology, under the supervision of Director Thomas Angela, is always working to get answers from the universe, and to collect important data," explains Commander Samurai83ITA.

"With my Phantom I often welcome scientists and explorers to take them to areas of scientific interest, thus taking advantage of expanding both my personal and university studies. They are not very long journeys (I don't go beyond 5000-6000 [light years]) but for the rewards that are obtained, they are good journeys."

There is another type of passenger willing to pay for passage — those for whom discretion is essential. Jaxxon Sonels is older, with dark eyes and a face that has formed deep lines. His thick black hair is tied back in a ponytail, and his flight suit is barely visible beneath a heavy leather coat and ragged black trousers. This pilot likes his Lavian brandy straight; his conversation, more so. He

begins speaking without preamble, his voice sandpaper and grit.

"Truth is, there are only two types of people in the world: those who are open about having a past, and those who ain't come clean yet. In this line of work, a credit is a credit. You follow?"

"I fly a Krait. Phantom model. Engineered. And if she runs just a little too cold for some badge to run a scan, well..." He takes a drink, leaning in close. "Let's just say that some clients value their privacy more than others — and are willing to pay top cred to keep it. It takes a real spacer to do it, but if you can keep your mouth shut and your ship cool, well..."

His wrist computer beeps. Jaxxon rises, finishing his drink. "You'll never want for work or interesting stories. Now if you'll excuse me..." He stalks off. He's left me to pick up the tab.



Co-Pawlots

Commander name: **Saberius**

Co-Pawlot name: **Jaxom Dribblepuss**

Jaxom Dribblepuss is a loyal assistant to the Mobius PvE Admin team. He sits through all approval processes and participates in long-haul flights. He has accumulated over thirty-four weeks of flight time with his human pilot.

Do you have a co-pawlot you'd like to show to the Galaxy? If so, hop onto our [submissions](#) page and send in a couple of pictures of them. Be sure to include their name, their role aboard your ship and any story about them you'd like to share.

Passengers Wanted: Have Spaceship, Will Travel

Text:
M. Lehman

Design:
Balthazarn Noxx

Images:
OrangePheonix,
TwoSpoons77

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Tictak, Toxophilite, WranglerActual, Zdenek-Joerg

Text:
Saberius

Design:
McNicholl

STATIONS YOU HAVEN'T VISITED

REBARDIN ROBEK

It is difficult to imagine a more appropriate (or clichéd) home base for a gang of outlaws. A hardscrabble asteroid base orbiting a primordial lava world, itself on the very edge of humanity's frontier. ▶

Bare, blasted-out stone complementing prefabricated metal. People as tough as the rock surrounding them. Ships with skulls and garish paint. These are the hallmarks of Robardin Rock, which the locals have come to call simply 'The Rock'. Yet to take the roguish types who frequent the forlorn station for common criminals or hapless drifters would be a mistake.

The face-value story of Robardin Rock is unremarkable: a suitable asteroid was located in high orbit above a metal-rich lava world and was swiftly transformed into a spartan facility that could accommodate nearly any ship and a decent civilian population. It was out of the way, and certainly beyond the reach of the Bubble-based superpowers. Like so many independent settlements, there exists no record of its construction, of the firms and individuals who oversaw its development, or of how such an unforgiving locale came to be frequented. It is impossible to know — at least, for this technologically-inept correspondent — how old the station is. Robardin Rock, for all intents and purposes, sprang into existence from nothing.

One is greeted with a sort of outlaw hospitality upon arriving. There is little of the highly-regulated structure with which docking tubes are regulated in the Bubble. If a visitor is known, he or she has the run of the base. If they are not, they are subject to direct questioning and body scans. Their ship, too, is inspected or not depending on one's reputation with the locals. It is a system with all the informality of frontier life, yet remarkably effective.

Uniforms are nonexistent on Robardin Rock, yet in a larger sense, one sees a certain roguish commonality of dress. Clothing is simple, often well-worn, and dark. Leather is preferred among the piloting community and those with whom they deal, and thick fabrics are favoured by most everyone else. It is cold on The Rock, its corridors and commons habitable but hardly accommodating, the scent of machine oil never far from one's nose. Living quar-

The story of Robardin Rock cannot be told without the story of The Nameless.

ters — such as they are — tend to be sparse affairs, the best of them akin to a Lakon stateroom and the worst possessed of bare piping and rock walls. A private commode is considered a luxury.

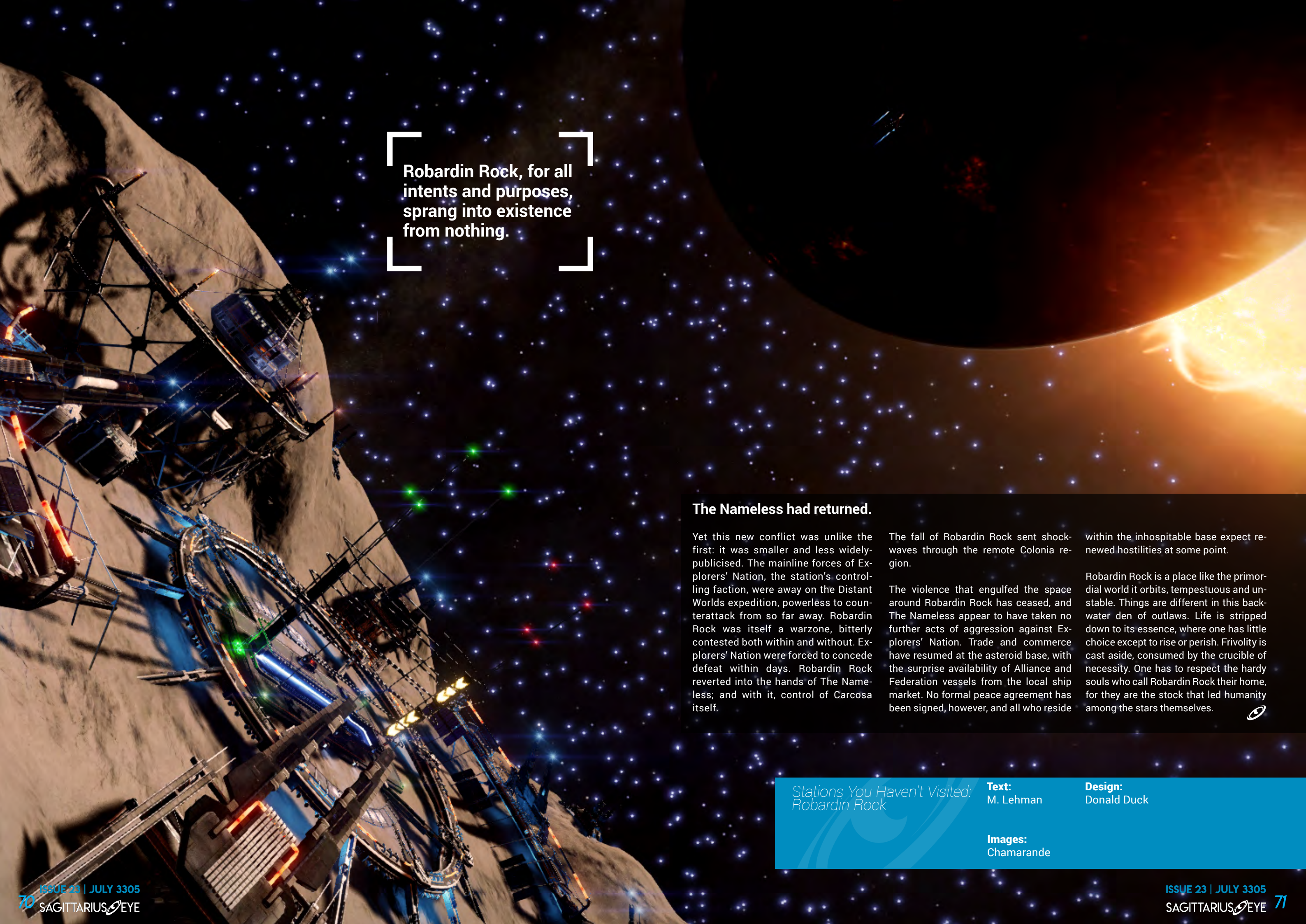
The story of Robardin Rock cannot be told without the story of The Nameless, for the fate of one has been the fate of the other. For all the interviews this correspondent obtained, none would speak openly of the ruling faction. They are a near-total mystery — emerging as Robardin Rock did, seemingly from nowhere — yet certainly well-funded and equipped. Theirs is a story worth telling, villainised though they are.

The Nameless arrived in Colonia during October of 3303, swiftly entrenching themselves in multiple systems. There exists no reliable record of where they came from or how they acquired their ships or assets, but the peace for which Colonia was known was forever dashed.

The remote region's first war ensued, both The Nameless and the Colonia Council appealing to freelance commanders for their aid. Yet the intrusive manner in which The Nameless entered Colonia turned popular opinion against them, and the conflict was lost.

For several months The Nameless were nowhere to be found, controlling not a single asset in Carcosa. Stability settled over Robardin Rock, the station being a source of military hardware to ward against future threats to the peace of the Colonia region. Peace seemed the order of the day.

That peace came to a crashing halt on the 1st of April 3304. From the black reaches of the void came ships — not the common traders and explorers of the Colonia community but highly-engineered predators the likes of which Colonia had rarely seen. Fer-de-Lances and at least one black-market Corvette wrought havoc upon Carcosa's trade lanes. Local authorities were overwhelmed.



Robardin Rock, for all intents and purposes, sprang into existence from nothing.

The Nameless had returned.

Yet this new conflict was unlike the first: it was smaller and less widely-publicised. The mainline forces of Explorers' Nation, the station's controlling faction, were away on the Distant Worlds expedition, powerless to counterattack from so far away. Robardin Rock was itself a warzone, bitterly contested both within and without. Explorers' Nation were forced to concede defeat within days. Robardin Rock reverted into the hands of The Nameless; and with it, control of Carcosa itself.

The fall of Robardin Rock sent shockwaves through the remote Colonia region.

The violence that engulfed the space around Robardin Rock has ceased, and The Nameless appear to have taken no further acts of aggression against Explorers' Nation. Trade and commerce have resumed at the asteroid base, with the surprise availability of Alliance and Federation vessels from the local ship market. No formal peace agreement has been signed, however, and all who reside

within the inhospitable base expect renewed hostilities at some point.

Robardin Rock is a place like the primordial world it orbits, tempestuous and unstable. Things are different in this backwater den of outlaws. Life is stripped down to its essence, where one has little choice except to rise or perish. Frivolity is cast aside, consumed by the crucible of necessity. One has to respect the hardy souls who call Robardin Rock their home, for they are the stock that led humanity among the stars themselves.

*Stations You Haven't Visited:
Robardin Rock*

Text:
M. Lehman

Design:
Donald Duck

Images:
Chamarande

how independent pilots shape galactic politics

To those who have been following the political landscape over the last few decades, it comes as no surprise that the Pilots' Federation is frequently mentioned as one of the most influential institutions in our Galaxy.

According to data gathered by EDDB and other commander community platforms, the Bubble is comprised of over 20,000 systems. Out of these, more than 6,000 are controlled by factions which are officially recognised as Pilots' Minor Factions (PMFs). This designation refers to factions founded by Pilots' Federation members or retrospectively acknowledged to be linked to a squadron of Pilots' Federation members.

The founding, or 'insertion', process has only been established over the last four years. It allows any group of commanders that numbers at least ten to found its own minor faction within a system of their choice, with the support and approval of the Pilots' Federation. Despite the recency of this, there are already nearly 2,000 PMFs that together control over a quarter of human space. It has become the new reality that politics is no longer decided by the superpowers, or even by their militaries.

It's the actions of Pilots' Federation commanders that matter now.

The ability to influence systems and factions to fit one's desires has always been the preserve of the wealthy and influential elite. In our modern age it seems that these independent pilots have become the new elite, with their vast wealth and collective influence.

There are about 75,000 factions in the Bubble; only 2.5% are PMFs. The sheer number of systems they have taken control of in only four years is a striking demonstration of the overwhelming power that independent pilots hold today. This is why the Galaxy's most powerful individuals seek their support, why factions rely on their contributions through community goals, and why humanity's overall defence against the Thargoids is so dependent on them.

The rise of new forces

Why is it that Pilots' Federation commanders have begun shaking up the galactic landscape so much, and so recently? Many of us have already forgotten about the major leaps that were made in hyperdrive technology over the last few years, about the efforts spearheaded by the Sirius Corporation and later the Engineers. These events have given those with the means to take advantage of them tremendous power to make money and go where the opportunities are. With these abilities, many pilots have decided to leave their own mark on our Galaxy.

This process began as early as 3300, when many would have described supporting a faction as a nightmare. While pilots are still not in direct control — merely steering and influencing changes is a tricky endeavour — clever technologies developed by commanders allow for better fine control than back in those days.

These early challenges did not prevent some groups from attaining massive influence, however. Two large groups operating in the days before the PMF were Communism Interstellar, a coalition of communist sympathizers who made it their mission to create a major area of space under communist control, and the Alliance Elite Diplomatic Corps (AEDC), a squadron of Alliance supporters which sought to expand the Alliance of Independent Systems and establish its equal footing with the Federation and Empire. Almost five years later, both groups are still around, and their achievements are clearly visible.

Communism Interstellar is now a major galactic power, rivalling many of the eleven official Powers in size. They have created a big sphere of communist governments around the Manite system. Encompassing several minor factions, the group controls well over 500 star systems. That's far bigger than the Alliance of Independent Systems was in 3300.



Meanwhile though, the Alliance has nearly quadrupled in size. In 3305, at the time of writing, it is now approaching 1,000 systems and can be projected to pass this number soon. This massive expansion was achieved due to the input of many prominent groups, but the AEDC is commonly credited for having spearheaded it.

The rules keep changing

The transformation of our Galaxy has been going on for a while. Yet the pace of galactic politics and the rules which dictate its nature keep changing.

Knowledge on how to steer influence changes efficiently is now more easily accessible than it was a couple of years ago, when groups still broadly settled on policy through trial and error (though experimentation is still frequent). At the same time, the development of popular tools like Inara and EDDB has made it easier to track and evaluate data across systems. Where Pilots' Federation tools are lacking, independent developers within the pilots' community have filled the gaps where they can.

The biggest recent change, however, is probably that the insertion of PMFs has become more popular and increasingly frequent. While for most of the last few years the process remained sporadic, slow, and demanding, this changed in 3304 with the introduction of a Pilots' Federation initiative that allowed many more factions to be inserted, much more quickly. As a result, far fewer groups were deterred by the insertion process and many more PMFs began actively expanding soon after their foundation. In early 3304, the majority of all inserted PMFs had never even taken control of their home system. Today, that is no longer the case. The Bubble is, slowly but steadily, becoming crowded.

This trend leads to more conflicts between commander groups. While clashes over systems and stations are not new, both in terms of direct confrontations as well as proxy wars via factions, they now often evolve



out of information shortfalls. In order to properly identify a PMF, a pilot is required to rely on third-party tools. Adding to the complexity, some factions are adopted by pilots who did not find them, meaning that they are not classed as PMFs. This is the case for old groups like Communism Interstellar and the AEDC in particular, but also for the powerplay communities that work on fortifying their areas of control.

Since the introduction of PMFs, the Pilots' Federation's policy has been to recognize only one faction per squadron. They ruled that new insertions could take place in almost any system without a PMF present. Groups which had supported multiple factions before this change would now have to defend their claims over systems, as newly-inserted PMFs would often not recognize them.

All of this has led to a dilemma. New PMFs are inserted right in the middle of a territory that is already claimed or worked on by an estab-

“ There are about 75,000 factions in the Bubble. ”

lished group. The new faction finds itself in a difficult situation since any sort of expansion could lead to conflict. Pilots who are new to politics are often unaware that non-PMF factions can sometimes be intensively supported. The fact that the Pilots' Federation does not provide any information on the support factions receive by pilots makes this worse: after all, anyone can claim that they are supporting a minor faction, but if only PMFs can have a legitimate claim to a system, the old guard will have to relinquish claims on hundreds of systems, claims brought about through years' worth of effort.





The new face of the Galaxy

Despite its new-found ability to insert factions, the Pilots' Federation still doesn't seem to differentiate between PMFs and other minor factions. All minor factions are treated by its networks in the same way. No information about levels of commander support is made available other than what squadrons display on their squadron page. New squadrons are allowed to pledge allegiance to any minor faction, regardless of whether it is a PMF or not.

Given the increasing number of Pilots' Federation members trying to shape galactic politics, we are bound to see more future conflicts between pilots in a political map that is rapidly changing. Our new age will give rise to new powers and philosophies, and cause old ones to decline. Galactic records are constantly overtaken.

In issue six of this magazine, we featured the Perez Ring Brewery. As a booming Alliance company, they had

managed to become the Galaxy's most populous faction in 3303. In 3304 their record was overtaken by the Sons of Seven Lords Interstellar PLC, a corporate meritocracy based around the Tawilo system who are known as the initiators behind the Great Galactic Census.

It's likely we will see more huge changes within the next few years. Perhaps the Pilots' Federation will change its policies again, or even provide commanders with new tools to reshape the galactic map.

An end to the old order

Factions which embrace independent pilot support will likely continue to be the dominant forces in our Galaxy. These will include factions that hand out permits like the Alioth Independents or Sirius Corporation; factions that enjoy pilot support because of their philosophy; or factions founded by a pilot group itself.

In the long run, the superpowers may lose relevance and be outmatched. More than half of newly-inserted PMFs are independent; that is, aligned to no superpower. Together, they control about three quarters of PMF-controlled systems and assets. It seems that the superpowers lack the broad appeal of independent factions, which can muster new recruits from all affiliations. If this trend continues, it augurs poorly for the Federation and the Empire.

Unless the superpowers start to offer independent pilots something for their support that goes beyond pure ideology, pilots will most likely choose to go their own way instead and leave their own individual mark. As statistics show, this is affecting the Federation the most. The percentage of civilized systems it controls is falling fast, from around 33% down to just 26% in only the last five years. It has lost over 1,500 systems, and yet it doesn't appear to make any moves to counter this existential threat. The Empire is losing systems at a slower rate, and hasn't responded either.

Blaze your own trail...

Whether these predictions become reality or not is mostly up to us independent pilots and how we continue to evolve as a community. We should be the last ones to speak of a stagnating Galaxy, because the power to change things lies in our hands more than anyone else's. So far we have made good use of it, but we should watch where we tread if we don't want to step on each other's toes.

“ the Alliance has nearly quadrupled in size.”



How Independent Pilots Shape Galactic Politics

Text:
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Design:
McNicholl

Thanks to:
Jane Turner,
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Tamara Bunk

Images:
NickWeb85, SebastianWehmeyer

RARE COMMODITIES SPOTLIGHT



The interstellar – and seemingly eternal – rock band, Jjagged Bbanner, have performed some incredible concerts over the decades. These events have become rarer and rarer as the ageing music maestros gradually lose their battle with the Grim Reaper.

Their music is appreciated by people from all walks of life. Whether you got a chance to watch Signora Mia Felicita perform hover-ballet to their strident tones, or your experience of them is in a concrete nightclub several floors down beneath the surface of an outpost on an airless world, that music means something. Even if you're wearing mag boots when you hear it, it makes you want to move.

Geawen Dance Dust conveys a similar experience. Some users claim it transforms any music they listen to, elevating their perception of it until the rhythm just hits. There are a variety of scientific claims and counterclaims as to why, but no one can dispute the result. You take Dance Dust and the music enters your soul, has a party down there, and refuses to leave.

The Geawen system is remote and drab. There are two orbital outposts and one planetary landing, with only the gas giant, Geawen C9, home to any kind of native population – in this case, mysterious sea creatures that generate plenty of tall tales amongst those who've been stuck in the system for too long. They are subject to a set of environment preservation orders, meaning that anyone who actually tries to take a look at them for themselves is breaking several laws and will find a bounty on their heads.

How Dance Dust is manufactured in such a system is anyone's guess. The commodity remains legal under the licensed trade policy of the Pilots' Federation, but it must contain some kind of refined substance that is peculiar to



Geawen Dance Dust

the Geawen system because attempts to retro-engineer or synthesise a substitute elsewhere always fail. That suggests the Geawen locals are in possession of some kind of special formula or secret ingredient. Maybe it comes from one of those kraken talked about in the bars on Obruchev Legacy...

Geawen Dance Dust can be taken in a drink, a tablet, or just swallowed in dust form. The dust is gritty and has no real taste, other than a slight metallic edge after swallowing. About ninety seconds later, the music starts – whether there's actual music being played or not. The effect lasts for hours... and hours...

Trying to focus on anything apart from the rhythm in your veins is all but impossible, even in zero gravity, which can lead to some difficult moments as users thrash around in time to some private beat that throbs between their ears.

Whilst it does make people dance, Geawen Dance Dust does not improve coordination (or indeed dancing). Warning: Do not use whilst holding sharp objects or standing near cliff edges.

Rare Commodities
Spotlight: Geawen Dance
Dust

Text:
Allen Stoud

Design:
McNicholl

Art:
McNicholl

PATREON

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Sagittarius Eye is the Galaxy's leading new network – created by commanders, for commanders, and supported by commanders.

We would like to thank those who have supported us over the past month:

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