SPACECRAFT
OF THE FIRST WORLD WAR

FLOGG'S CLASSIC OF THE MARTIAN CONQUEST

REVISED & EXPANDED

BY WILLIAM FLOGG, EDITED BY M. SOLOMON PENN

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A COMPENDIUM OF FIGHTING VESSELS OF THE GREAT POWERS

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WITH SPECIAL THANKS TO
MICHAEL DOSCHER

HEPHAESTUS PRESS
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***Dustjacket: The* Ottaviano Augusto *is depicted in the action that destroyed the cruiser SMS* Freya.**
Cover: A facsimile of the cover of the 1972 edition showing the Martian Punitive Expedition of returning in triumph.

ACKNOWLEDGEMENTS

William Flogg
-
Wishes to dedicate the new edition to all veterans of the Martian wars,
except for Williams, on account of him still owing Flogg £5.

M. Solomon Penn
-
Dedicates his work to Shulamith, and what might yet be. Dust and light!

Michael Doscher
-
Dedicates his contributions here to his mother, and possibly Snoopy.

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PREFACE TO THE NEW EDITION

For a variety of reasons, the full truth was denied to us as surely as the heavens were for those dark years after Icarus. I sought to preserve and pass on what I knew of the spacecraft of the period, both personally and professionally at the time. In the intervening years I have also accumulated a substantial (and unexpurgated) archive of other writings and other information on the subject. Circumstances did not always allow the truth to be told plainly, both due to the political situation, and that the causes of many events were simply unknown to us. As my own expertise is limited to matters astronomical and military, I did not (or attempted not to) bore or mislead the reader with speculations outside of my area of knowledge. If desired, there are abundant sources elsewhere for such things. By the same token much has been said plainly in this new edition that needed to be omitted previously, due to the changes in circumstance seen both at home and abroad.

By dint of both sustained and renewed interest (as well as the assistance in various capacities of both Mr. Penn and Mr. Doscher), I have brought forth this new and expanded edition of *Spacecraft of the First World War* in hopes of both satisfying the curiosity of readers and addressing the shortfalls of the original book. Even now, there are certain deficiencies that I have left as they were, lest the Ship of Theseus leave us all on the dock.

In particular, I have omitted much technical information one would expect to see in accompanying tables and such: Dimensions, displacement, range, compliment, and the like. The simple truth is the published figures are either wildly inaccurate or complete fabrications, and I refuse to be an accessory to the crimes of previous writers without adequate consideration. For those desiring hard technical data, I am assured that the margins of the new edition will be of sufficient size to allow the addition of whatever numbers the reader finds sufficient to their needs.

The target here is as it has been: To both present a general picture of the craft of the period and some sense of where they fit into life, both in service and in the consciousness of the period. If the latter seems eccentric, I am possessed of the conviction that to know a thing involves not just knowing the thing itself, but knowing what others know of it and how it affects them. If this approach seems suspect, then perhaps it can at least be entertaining. The gossip of the ancients is regarded to us now as history, and their other fancies similarly enshrined and made respectable.

There is also the question (and accompanying regrets) of what has been left out that should perhaps have been included. The rest of the world did not sleep through either the Martian invasion, nor the wars that came after. Much as I would have liked to include more on Japanese and Brazilian efforts in space in particular, I am limited by both my own language skills and a lack of available source material. I will write only what I know. As the worldwide situation improves, and should time grant me the opportunity, it may be possible to add more information about humanity's first decades in space. Until then, I choose to rest on the laurels of my own irresponsibility, thoroughly unencumbered by the intellectual rigor required of serious scholars. I just like writing about spaceships, and that seems unlikely to change.

-William Flogg

INTRODUCTION

The War after *The War of the Worlds*

"When ships to sail the void between the stars have been built, there will step forth men to sail these ships."

-Johannes Kepler

So significant was the Martian invasion to the course of human history that history itself might be divided into the eras of 'before' and 'after' those terrible days. 1902 saw a series of what was at first thought meteorites to fall upon the Earth. Subsequently revealed to be artificial and of Martian manufacture, these disgorged cargoes of fearsome three-legged war machines. Armed with heat rays and poison gas, they burned and slew their way through any resistance put up against them. Cities were laid waste, and the Martian tripods seemed poised to conquer the nations of the world and turn humanity into their cattle. With some mixture of providence and irony, the Martians sickened and died within weeks, due to their exposure to the microbes of Earth, to which they had no resistance. As dreadful as those events and the implications of a universe potentially teeming with malign intelligence were, even more transformative were the inventions and the knowledge left behind by the Martians when they succumbed. To be threatened by the possibility of subjugation and slaughter on the one hand, and be granted the tools to fight back on the other left the nettle to be grasped.

In the years that followed this invasion, mankind watched the skies with fear and expectation, even as it prepared defenses and counterstrokes for a second wave of Martian attackers that never materialized. As the machinery and weapons of the invaders were examined, certain questions arose about the nature of the cylinders that carried them to our world. Lacking apparent means of slowing down, the shape and mass of the cylinders dictated that they should have buried themselves all the way to bedrock upon impact. This shock would have destroyed all the interior fittings and equipment, as well as have been spectacularly lethal for the Martians inside. This brought back to mind observations made of Mars via telescope, prior to the invasion, of great flashes along the equator. Believed some species of heat lightning at the time, the likelihood of these being the reports of great guns increased. Thus one problem became two: How did the Martians survive launch *or* impact? The answer came in the form of the discovery that made even the invasion itself pale in comparison: The Martians could control gravity, and use it to effect travel from their world to ours.

The decade following the invasion saw a flurry of scientific advances culminating in the construction of the first spacecraft of human manufacture, as well as the founding of the League of Earth. The latter was an international organization that coordinated defense and aerospace efforts between nations, and for the few years that it operated as an effective entity, it speeded up the development of gravity control technology. These international efforts culminated in the mass-production of gravity engines, which in turn allowed the fleet that would become the Martian Punitive Expedition to strike at Mars in 1916.

The gravity engine itself was fiendishly complicated in its early incarnations, but it also produced effects that were initially difficult to comprehend, let alone master. By employing an engine running on conventional fuels and feeding its output into a set of nested coils of peculiar alien metals, a field was generated around the engine which created an artificial gravitational pull. This pull could be directed wherever desired, effectively allowing an object with a gravity engine to fall 'up'.

While an incredible discovery, the technology took some time to make it of practical use. The coil temperatures ran in excess of two thousand degrees, so the first test examples of the gravity engine quickly deformed. Cooling would merely keep the reaction from occurring, but the injection of water or other bulk reaction mass (combined with improved coil alloys) keep the engine functional at the cost of emitting clouds of superheated steam.

Thus equipped, the spacecraft of the Martian Punitive Expedition set out to attack the invaders where they lived, and did so under the flag of a unified Earth. Expecting a climactic battle, the fleet found instead a nearly deserted Mars. The dead planet offered little resistance other than automated defenses and a handful of dying Martians among ancient ruins. With victory coming cheap, Mars was occupied by the nations of Earth. While cooperating at first, old jealousies and a new revolution in Russia saw former rivals resuming their old ways.

Surprising few, war came in 1922 with a (not altogether unprovoked) attack on the British installation on Phobos by Germany. Following the destruction of an American spacecraft, the conflict became general. The next year, a newly-crowned French king brokered the Peace of Triteste and the heat of battle moved to a cool mutual suspicion. The Russian forces on Mars, cut off by revolution at home, either returned to Earth or vanished into secret places beneath the surface of Mars. Almost forgotten, these forces re-emerged in 1926 with a fleet of derelict and largely alien vessels and fight a desperate (and ultimately futile) battle to reach Earth.

The cargo these strange ships carried was unknown, but they raced towards destruction fearlessly. With no survivors, their true motives were unknown, but many whispered of the 'Dream Plague'. A nebulous disease that was either mass hysteria or some evidence that the long-dead race that created the Red Martians was sending their minds forward from the distant past in search of new bodies. True or not, such fears set the tenor of the time.

War returned in 1927, with the imperial aspirations of Germany crushed by Britain, seemingly for good. Soon after this an alien vessel (if indeed it was a spacecraft) of incredible destructive capabilities wiped out the British fleet. This was followed shortly by the so-called Icarus Event, where all known gravity engines failed irrevocably, turning Earth into humanity's prison. In time, this and the deadly attacker known only as Nemesis were overcome, and the stage was set for the world we now know.

The 20th century was a century bounded by iron, and defined by it. From the engines of war to the engines of industry humanity sat astride powers and hazards dreamed of by neither prophets nor kings in the eons before. The invaders came with iron, and were in turn defeated by the Earth and the invisible life that permeates all things upon it. We in turn conjure iron from the Earth and chase the stars and the secrets they illuminate. Within this green cradle of life, we hold ultimate responsibility for all that was created and cherished by our species, and have both reason and instinct to defend it against all comers.

In assembling this compendium, it is hoped to be of some use for the student and the interested layman in understanding the story behind humanity's first spacecraft and their capabilities. As we venture forth in both time and space we look back upon a point where all things changed and the world that we knew ceased to be. We are not the species we once were, but we may be more. The setbacks and victories of the past can be useful in understanding both the circumstances of the present, as well as the possibilities inherent in the future.

KEY EVENTS

1902 Martian Invasion.

1905 Bombardment of Mars proposed.

1908 Launch of USS *Vulcan*.

1909 Radioheliogaph invented.
First flight of the *Boris Godunov*.

1910 League of Earth founded.
First flight of R-3 from *Daedelus*.

1912 Boat 113 'Faust' undergoes tests.

1913 First *Upshur*-class laid down.

1915 Ascent of Empress Anastasia.
Gravity drive reproduced.

1916 Martian Punitive Expedition.
Martian Occupation begun.
Disappearance of SMS *Bayern*

1917 Martian Partition complete.

1918 HMS *Manchester* lost.

1919 Russian Revolution.
British use of Walsingham repeater.
Monarchist Russian fleet trapped.

1920 Port facilities constructed on moon.
Czarist Russians isolated on Mars.
Loss of the *Gloire*.

1921 Discovery of wreck of the *Bayern*.

1922 Blockade of Phobos Station.
War declared.
Gravity Bottle in widespread use
American Fleet gathers.

1923 Dream plague manifests.
French Crisis/return of monarchy.
Beginning of 'The Peace of Trieste'.

1924 Launch of the *Charles Martel.*

1925 *Charles Martel* travels to Neptune.

1926 Neomartian drive on Earth

1927 Fairchild FX-Regulus first flight.
Miniaturized gravity engines.
Resumption of hostilities.
Neptune breakout of British fleet.
Battle of the Equator/First Terawaki.

1929 Signing of the Manchester Accords.
Nemesis appears.
Destruction of British Home Fleet.
Icarus Event- Gravity drives fail.

1932 Gravity drive damping defeated.
Destruction of Nemesis.

An unnamed American skyboat, possibly the USS* Poe*, cruises past New York during the peace. Supplementing the space-capable gravity control vessels of the navy, a significant number of craft operated within the atmosphere with more basic means of propulsion. Restricted to operating above the Earth proper, these craft were coordinated to respond in force to reports of Martian cylinders or other threats appearing on the surface.

SECTION I – AMERICA

WARSHIP - AMERICAN

USS *VULCAN* GRAVITY VESSEL

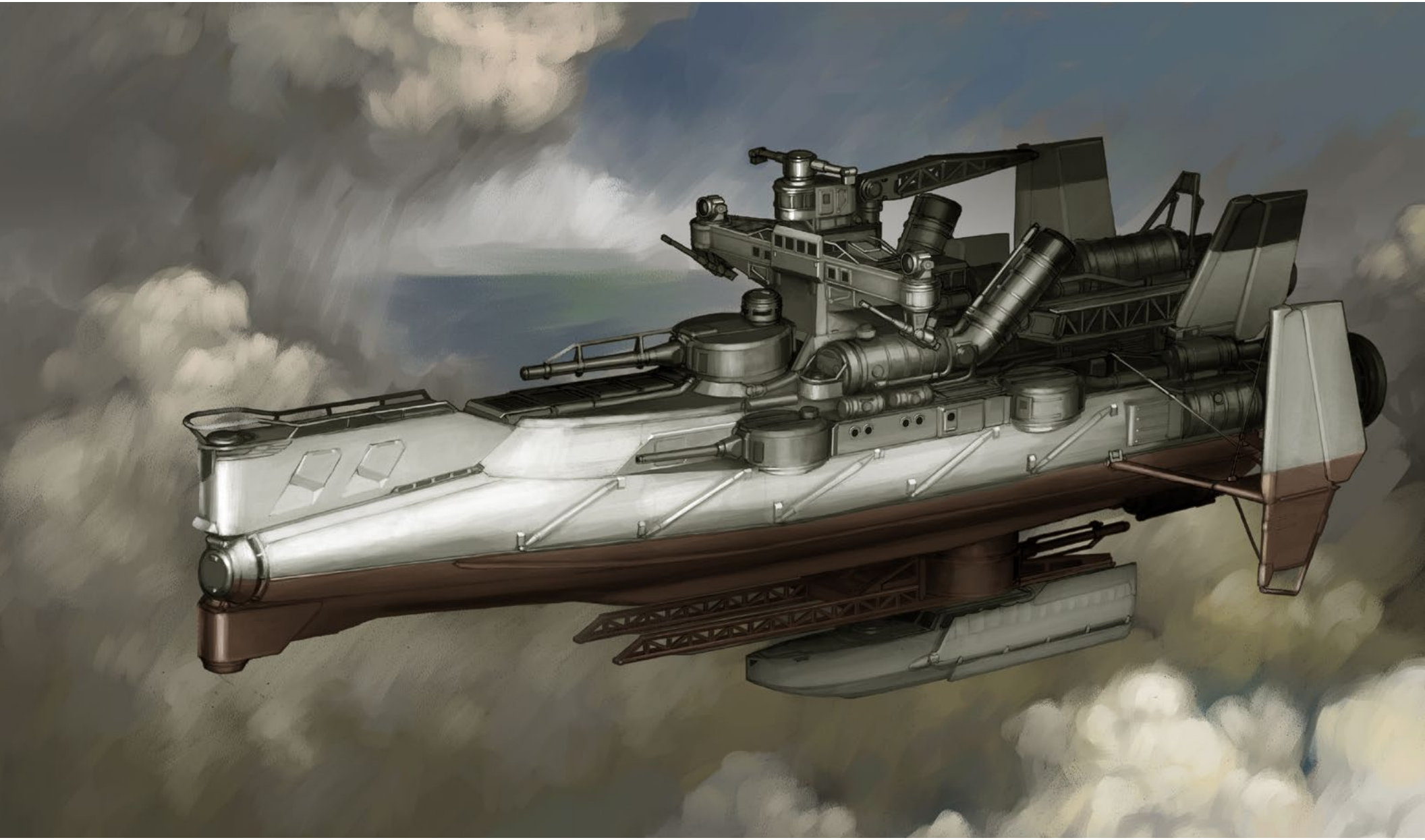
The spring of 1908 saw the opening of the Louisiana Purchase Exposition in St. Louis, and the first public flight of the USS *Vulcan*, which was the crowning wonder of the fair. Reconstruction and recovery after the invasion had delayed the fair from its planned date of 1904, and her final incarnation was both grander and wider in scope.

To this end, the War Department found it the ideal venue for the unveiling of the first military spacecraft of the United States Navy. For some years after the invasion, many hands worked to repair the damage done over those fateful weeks in 1902. Cities were rebuilt, and a fleet was able to return to the seas. Under the shadow of skyscrapers and factories, brilliant minds also worked in secrecy, far from parades and speeches.

In their inhuman bloodthirstiness and their hubris, the invaders left many things behind. Among their dead were wonders never before seen by the eyes of man, and curiosity wedded wariness to give birth to a new world. There were flying machines, great walking building and mining machines, and the indestructible cylinders themselves which first brought the Red Martian forces to our world. The artifacts and machinery recovered yielded many secrets. Most discoveries were small, but some were not.

As is often the case, the greatest of discoveries is often heralded quietly. While featureless from the outside, the cylinders concealed many things. Mounted at the opposite end of the cylinder from the hatch opening was a heavy hemispherical casing with a sort of turbine. This was mounted crossways in a stout bronze casing. Piping ran to an adjacent tank of water in what appeared to be a closed circuit. The engineering team was called in, and drawings and models were made. Wet cell batteries and a modest generating plant were found between the piping and the hull. The cylinder was also determined to be double hulled during this exploration. No obvious controls were found at first, but the electrics were found to be hooked up to a timing mechanism in a transparent casing. The control mechanism itself was accidentally discovered when electric floodlights were brought in. When the electric cables were run to the far end of the interior, the weak radio signal they created caused the clockwork to begin running, and stopped when the cables were withdrawn. A control console from a tripod was then retrieved, and two mysteries were solved. One was small: Some tripods had an additional cluster of controls, and it was determined that they wirelessly controlled machinery in the cylinders. The grander mystery was solved when certain lit and blinking buttons were pressed in a very specific order (discovered via exhaustive permutation), and another small switch engaged on the tripod console. With the press of a final button the world changed.

The water hissed from its tank and the depths of the mechanism glowed with heat. Turbines hummed and spun unseen. Workman, engineer, and floodlight fell, but upwards! Bulbs shattered, and men cursed in the dark and groaned. There was a silence, then a hushed murmur that became laughter and finally cheers. The mechanism controlled gravity. When the switch was turned slowly back, the battered occupants settled gently to the floor. Here at last was the secret of the cylinders. Through this wondrous machine the answer came



Cropped from a commemorative mural done in the rotunda of the Missouri state capitol, the USS* Vulcan *is depicted here as she appeared during her first public flight in 1908. While modest in armament and ungainly in aspect, certain features that would later become standard are already present. These include angled thermal stacks and the prominent placement of torpedo armament along the centerline of the hull. Also evident is the naval orign of her hull and much of the thinking that went into her design, including the somewhat optimistic fitting of an inverted launch ramp for aircraft on her keel.

to a question which had plagued everyone from admiralty boards to engineering departments: How were the Red Martians able to survive being fired from the great guns that launched them, as well as survive their subsequent impact upon the surface of Earth? The answer seems obvious, in hindsight: In mastering gravity, they had also mastered space. Wonder again mixed with fear among scientists, generals and statesmen. Having blocked the killing blow of the red planet, another more terrible stroke was anticipated, and time was of the essence.

The cylinder was retrieved from the Nebraska cornfield where it impacted, and was brought by rail (a spur to the site having been constructed) to an unassuming and heavily guarded facility on the Iowa side of the Mississippi River. This 'gravity engine' was removed from the cylinder and fitted to a test stand, and over the next four years yielded up the secret of flight. Ultimately, the engine was fitted to the hull of one of a new class of semi-submersible gunboats. This was useful to both conceal the nature of what was being experimented with, and to test the suitability of making the ship fly.

The gravity engine did not truly nullify gravity, but rather reversed it locally, causing the device to want to fall upwards when the engine was at full power. As this was both dangerous and of limited use, many schemes were tried for modulating the effect. These were reasonably successful, while our attempts to understand the nature of the materials and reactions that caused the engine to function were slower going. At the time of her unveiling they were still a mystery. Nevertheless, on a moonless night in March the *Cairo*, now rechristened the USS *Vulcan*, slid for the first time from the brown waters of the Mississippi into the starry sky. She hung there for ten long minutes, silently drifting in the chill breeze like a giant's castle from a fairy tale. Other nights saw other, longer flights until May arrived, and with it the fair.

She sailed down the river under her own power, still wearing the disguise of a surface vessel. Having discreetly navigated snags and river traffic, the opening of the fair found her in mid-river, across from the main pavilion. She gleamed white and gilt in the first dawn of May, and as the speeches from the riverbank ended and the band began to play, she slipped her moorings and slid into the sky. The gasp from the crowd turned in an instant to wild cheers, and as the band struck up again (for they were as dumbfounded as anyone) the *Vulcan* sailed over their heads and over the city. She made altitude, turning away from the rising sun and into the west, ultimately disappearing into the clouds as the fairgoers still cheered.

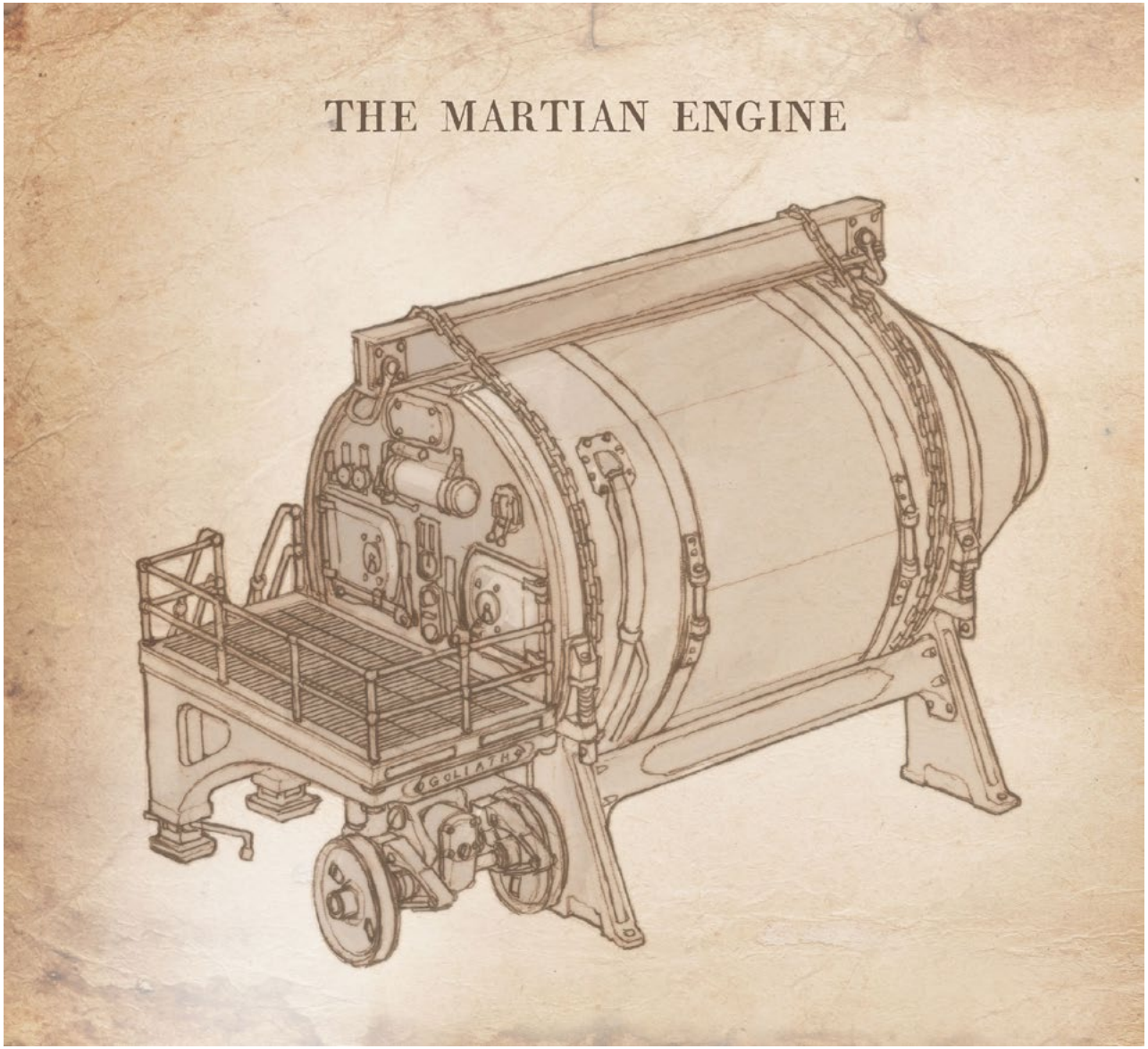
From that point, she sailed on a goodwill tour to the west coast, then to cities all over the country to show what was possible. In the fall she stopped at Newport News for refitting and minor modifications, and from there journeyed to South America and ultimately made the flight to Europe, being greeted by great crowds in London, Paris, and all the capitals of the continent.

While a tremendously prestigious accomplishment, the USS *Vulcan* was also a bit of a charade, having at her core an alien device that was not yet understood, and might never be for all that was known. It also began in earnest a certain competition between the great powers, though the new arms race this would lead to was something undreamt of, let alone planned for. For the summer of 1909, kings and prime ministers spoke of unity and rebuilding, generals and admirals spoke of defense, and all eyed the now silent Mars with trepidation, rather than the desires that would follow.

Unlike so many other vessels, the *Vulcan* ended her days in quiet obscurity. The gravity drive was eventually un-

derstood and replicated, and a flying ship was soon no longer a novelty. After 1911 her armament was deleted, and she participated in pressurization tests, going to low Earth orbit and back as industry sought the materials and manufacturing techniques needed to safely get a vessel to another world. She was never really scrapped in any sort of conventional sense. Her gravity engine went to another vessel once her hull began to succumb to fatigue cracking. Her pressure hull wound up as the nucleus of a research outpost on the Moon, and her fittings and armament were scattered to a hundred places. Her main mast stands amid the ruins of Port Sampson, the former American naval base on Mars, and can be sometimes discerned by telescope. The base itself remains in a state of arrested decay and is preserved as a memorial to those lost to the events of 1929.

While the lead boat of a planned class of six, events overtook the *Vulcan* and her sister ship the USS *Weyland* was never completed. The remaining four vessels were canceled before construction began. Experience here would later translate into the advances of the *Nevada* class, as well as have significant implications for the colonization of Mars herself.



A contemporary illustration of the prototype gravity engine, here on a test stand with a temporary engineering rig. Not pictured is the extensive fuel and water supply and associated trunking and funnels. Such censored illustrations gave the public the impression that these devices were self-fueled and fully self-contained.

Honeywell's Modern Forum, ***March 8 1909, p. 18***

WARSHIP - AMERICAN

USS *UPSHUR* CLASS TORPEDO VESSEL

The USS *Upshur* class was an exercise in overkill on some levels, being little more than an engine with weapons and basic crew accommodations attached to it.

As the chaos of the invasion transitioned into an uneasy peace, the nations of Earth looked to rebuild. This was all done under the expectation of there being subsequent waves of Martian cylinders and their lethal cargoes. Mars herself was kept under a constant surveillance, looking for the telltale flashes of great guns firing the cylinders into space. Naturally, this atmosphere led to a reordering of priorities. Survival was uppermost in the minds of all, as it seemed unlikely that subsequent waves of invaders would be so ill-prepared for the microbes of Earth. While the danger of disease may be incomprehensible to the inhabitants of a largely sterile world, the wireless reports of the sick and dying Martians back to their homeworld would suggest some agent (perhaps akin to the black smoke) which could be guarded against. The next wave would be prepared for the dangers of Earth. There would be no *deus ex machina* next time.

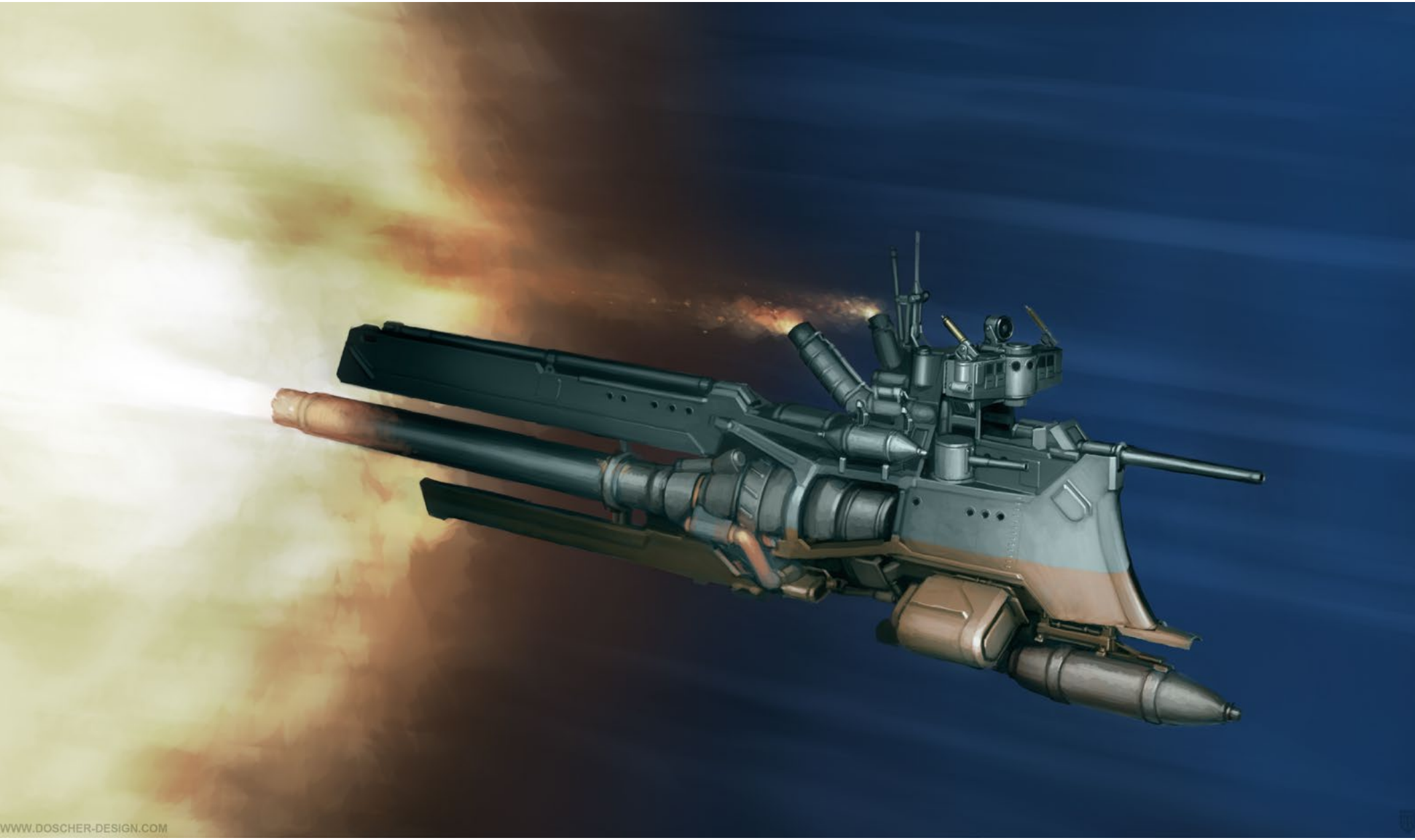
While a mood of pessimism followed the initial joy and disbelief at the survival of the human race, the future was still there to be prepared for. The particulars of the Martians and their weapons were scrutinized. Mars was a riddle that would take a lifetime or more to solve, but certain initial hypotheses could be drawn with confidence. Based on this, defenses both traditional and novel were put in place with all the speed that could be mustered. While the invaders would likely learn much from the initial encounter, much was learned here as well.

In a peculiar reversal, the heat ray wielded by the tripods found application as an engine. It was discovered that the focusing coils and power source could be scaled up and the expelled energy used for impulse under Newton's third law. While not suitable for applications requiring travel beyond the orbit of the moon, it could provide substantial thrust. The range issue was as much about heat buildup as it was about fuel use. Reaction mass could be used to absorb heat from the engine, but as that was expended the vessel became dangerously hot.

Initial atmospheric tests masked some of the danger as much of the heat was wicked away by the air. With the winter of 1912 and trials outside of the atmosphere began, the hazards became obvious. The heat ray technology was radiothermal in nature, and as operating temperatures rose, power output increased beyond what was indicated by the control instrumentation.

Disaster struck the following spring as Boat 113 (the testbed vessel receiving no official name, but unofficially called the *Faust* by her crew) overheated while undergoing time trials at the edge of the atmosphere. Her helm unresponsive and her engine jammed wide open, she accelerated until she broke up over the north Atlantic with no survivors. The impact of her bow and drive sections off the Hebrides was observed by fishing vessels, and caused much of Europe to go into a state of alert, fearing the arrival of more Martian cylinders.

The problem was addressed by spacing the crew and fighting compartments in a standoff from the source of the heat, but this was only partially satisfactory. The early-model gravity engine was placed just ahead of the reaction mass tanks and



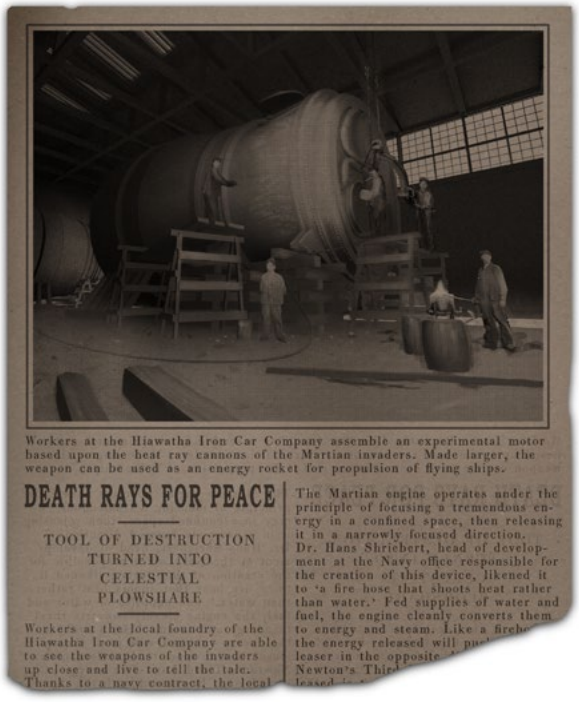
Her engines running at overload during speed trials, the USS* Butler *proved a truly breathtaking sight. With the plume from her thermal engine giving her the appearance of a shooting star, she could attain remarkable speeds for short periods. Even with the great heat of her engine isolated from the inhabited section of the ship, operating too long at this output would make her uninhabitable as well as exhaust her fuel and reaction mass. While later gravity engine-based vessels soon overtook the type, these striking appearance of these early craft caught the imagination of the public.

the gigantic heat ray apparatus mounted behind that. The entire assembly was then mounted to the rest of the hull via four large struts. This limited the transfer of heat to inhabited sections, even under heavy load. This also further limited her internal usable volume, with fuel bunkerage and crew endurance limiting her operating radius to no further than the moon.

Armament was a mixture of old and new, seeing both scavenged guns from surface vessels as well as the first deployment of the inertial torpedo. Names aside, it bore little resemblance to either the spar or floating weapons of the 19th century, nor to the self-propelled underwater torpedoes of the present day. Instead, this was a large explosive charge carried at the nose of the vessel which was ejected at the target at standoff distance. While no use against a target capable of maneuvering, it was designed to intercept the trajectory of an incoming Martian cylinder and either damage the cylinder or throw it off course. The hull thickness and overall mass of the cylinders made straight up destruction unlikely, but even a small breach of the hull would kill the Martians inside, due to either heat or asphyxia. Even an alteration of course by the blast could be fatal to the cylinder, resulting in either too steep of an approach, or skipping off the atmosphere in the case of too shallow an angle.

All said the class consisted of some twelve vessels, laid down over a two-year period from 1913 onward. While innovative, much of what seemed promising turned out to be a dead end. The heat ray drive did not scale adequately, and its prodigious appetite for fuel and reaction mass limited her range and ultimately doomed further development in favor of the gravity engine. Waste heat generation as well as the dangers associated with radiation also presented difficulties that made the gravity engine a more attractive alternative.

While a credible threat as a point interceptor, the upcoming arms race and subsequent open conflict saw the type laid up and ultimately scrapped, her crews and fittings transferred to more modern vessels. The two of the type that were retained as test platforms, the USS *Webster* and the USS *Douglass*, were lost fighting the Neomartian fleet during their desperate drive to reach Earth. A partial example of a heat ray engine of this time is on display in the Navy museum at Savannah, but is in a somewhat different layout than those utilized by the *Upshur* class. It does nonetheless give an impression as to the size an of these early spacefaring engines, and by extension the vessels that used them at the dawn of space flight.



Workers at the Hiawatha Iron Car Company assemble an experimental motor based upon the heat ray cannons of the Martian invaders. Made larger, the weapon can be used as an energy rocket for propulsion of flying ships.

DEATH RAYS FOR PEACE

TOOL OF DESTRUCTION TURNED INTO CELESTIAL PLOWSHARE

Workers at the local foundry of the Hiawatha Iron Car Company are able to see the weapons of the invaders up close and live to tell the tale. Thanks to a navy contract, the local

The Martian engine operates under the principle of focusing a tremendous energy in a confined space, then releasing it in a narrowly focused direction. Dr. Hans Shriebert, head of development at the Navy office responsible for the creation of this device, likened it to 'a fire hose that shoots heat rather than water.' Fed supplies of water and fuel, the engine cleanly converts them to energy and steam. Like a fireh... the energy released will pu... leaser in the opposite ... Newton's Third ... leased ...

A local news article concerning the engine fitted to the* Upshur *class from the* Wichita Advertiser*, March 13, 1914

DEATH RAYS FOR PEACE

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TOOL OF DESTRUCTION TURNED INTO CELESTIAL PLOWSHARE.

Workers at the local foundry of the Hiawatha Iron Car Company are able to see the weapons of the invaders up close and live to tell the tale. Thanks to a navy contract, the local builder of railroad locomotives is now in the flying ship business as well. Captured Martian machinery has been studied

and improved upon, and fearsome powers are tamed under the yoke of industry. Those improvements are being put in place for the new flying ships which will be able to travel to Europe or South America in hours rather than weeks, speeding the rebuilding of the damage that yet remains from the invasion. Travel to other worlds may soon not only be possible but practical as well, with commercial applications possible within our lifetime.

The Martian engine operates under the principal of focusing a tremendous energy in a confined space, then releasing it in a narrowly focused direction. Dr. Hans Shriebert, head of development at the Navy office responsible for the creation of this device, likened it to 'a fire hose that shoots heat rather than water.' Fed supplies of water and fuel, the engine cleanly converts them to energy and steam. Like a firehose, the energy released will push the engine nozzle in the opposite direction, under Newton's Third Law. The energy thus directed is to be teamed with the crowning wonder of the gravity drive, and ships of several hundred tons may be made to float upon the air and operate profitably within that medium. Dr. Shriebert estimates that such vessels will become commonplace within the next few years, commenting that 'the journey to the stars begins in Wichita, with stops all along Main Street, USA.'

Contemporary USN uniforms were the basis for the first generation of distinct space uniforms utilized by the United States from 1912. Depicted is an officer in anti-flash white and a seaman engineer in powder handling gear. He holds a Mk. I Engagement Computator in its distinct brass housing, being the gunnery version for firing solutions under local control.

WARSHIP - AMERICAN

USS *NEVADA* CLASS GRAVITY VESSEL

Inherent in all fielded designs up to 1915 was the implicit understanding that they were stopgaps put in place until longer range vessels could be created. While the gravity manipulation technology of the invaders had been isolated, it had neither been duplicated nor fully understood by any of the powers in possession of it. Experimental units tended to either be inert or to destroy themselves in spectacular fashion, which slowed progress. Salvaged examples were little more than black boxes that consumed fuel and responded to control inputs. While sufficient for improvised defenses against an opponent incapable of maneuvering, this was inadequate for taking the fight to Mars.

Indeed since the last tripod fell, there were plans in place to repay steel with steel, and take revenge upon the aggressors. What form this might take was dependent on many factors, but the determining one proved to be time. As early as 1905 it had been proposed to use the recovered cylinders to launch a counterattack on Mars, in hopes of capturing or disabling the great guns at the red planet's equator. This proved unworkable, as the layout and metallurgy of the guns that launched the cylinders was completely unknown, and would have taken years to duplicate, even with suitable facilities for their production. Further, the cylinders themselves proved to be too valuable as troves of information on otherworldly technology, so their use to land companies of sappers and marines was out of the question. Revenge was a dish best prepared carefully.

The very swiftness of the 1902 invasion had the side effect of reducing military casualties, navies excepted, as mobilization had not gotten fully underway until a week into the invasion. While the slowness to respond was something of a scandal in the British press, it was recognized to have been a blessing in disguise by the higher levels of government. While there was much loss of life, the massing of ground forces would make them even more vulnerable to the ranged and area weapons of the tripods and their support aircraft. An analysis of tripod tactics during the invasion showed a dual approach- in the absence of effective resistance, the Martians sought to cause panic and destroy transport capability so as to effect paralysis. While successful, the lack of a total Martian victory left most crucial facilities lightly damaged at worst. While the capability was there to destroy cities wholesale, there is ample evidence that the ports and shipyards were to be captured intact if at all possible. While these were all pieces of a puzzle to be assembled at a later date, the result was that rearmament after the invasion could proceed apace.

Added to this was the improving of relations between Britain and the United States. While food and other humanitarian aid from the continent had prevented starvation in the winter of 1903-04, America was well-placed to work with the crown government to exploit the captured alien technologies. While remaining friendly rivals, the two empires worked together to tease out the secrets of the cylinders and their malevolent cargoes. With the USS *Vulcan*, the United States could travel to space, but was all too aware that they were doing so with a machine they did not understand and could not duplicate. The *Upshur* class, with their ungainly means of propulsion and crude gravity control, was little better. What was needed was an

The USS **Nevada**, *pre-refit. An illustration depicts her shakedown cruise and first journey into space,as seen from the gravity tug* **Atlas**. *She does not yet have the distinctive heat stacks and external impeller that made her appearance so distinctive. This illustration, taken from the magazine* **Aegis**, *shows a variety of things that were very different in the early days of space travel. While the persistence of the blue uniform is striking, the general simplicity of the earliest craft serves to underscore the nature of gravity control in such a way that was not yet appreciated when the* **Nevada** *and her contemporaries first flew. Later understanding of the reality-bending nature of the gravity engine itself serves to explain such peculiar phenomenon as the clinging of air to these fantastic vessels as well as their penchant for the bending of time itself. While many of these early stories of space travel end in tragedy, there is a hope and wonder that has been bestowed upon what came after.*

integrated system employing both gravity and flight control. This arrived through a process of elimination in the summer of 1915.

While the basic principles of gravity control could be demonstrated with the Martian machines, making copies proved to be far more difficult. Intricate and temperamental, the reaction could be duplicated in the lab with the proper materials. Scaled up, attempts to copy the action of the Martian engines tended to either not function or fail violently. Part of the delay in duplicating the effect was ascribed to accidents among key researchers. Most famous of these events was the near fatal injury of Dr. William Voenig, and the death of several of his key engineering staff in October. While safeguards had been believed adequate at their facility in rural Michigan, the phenomenon of the gravity field expanding geometrically when power was applied in a linear fashion was poorly understood. A runaway reaction occurred, and much of the building was torn wholesale into the air, only to fall to earth again once the power lines supplying it had parted. A memorial to the tragedy was erected after the war, nearby.

Lessons learned, the event was still a breakthrough. It became possible to break down the gravity engine into seven distinct components and to understand the relationship between them. Heat was a concern in early tests, and much thought was put into how to cool the engine under heavy load and prevent a runaway reaction. Subsequent tests showed that heating the focusing chamber was actually the key to greater efficiency, and that the temperature would stabilize around 1200° F. on its own. While this limited the materials that could be used for the focusing chamber, it was also discovered that this was the only part of the reaction that required such temperatures, which simplified things. America had her gravity engine, and by extension so did Britain.

The other great powers had not been sleeping, but neither Russia nor the nations of continental Europe had yet made the critical breakthroughs needed. Speculation as to why this was is still an issue of contention to this day. At any rate, the USS *Nevada* loped off her slipway that winter to far less ceremony than her forebears. The lead vessel of her class, she was in some ways less impressive than either the *Vulcan* or the *Upshur*, but was the first practical design put into space and capable of reaching Mars. Tests showed a peculiarity of the drive in that a 'bubble' of breathable atmosphere would cling to the vessel for some time after entering a vacuum. The implications of this took some time to comprehend, but was seen at the time as a useful side effect in that air scrubbers would bear a lighter load than originally anticipated. The flip side was that waste heat and exhaust gases needed to be vented further away from the hull. This need gave the Nevada class a very distinctive appearance after refit that led her to be nicknamed 'Winthrop's Broccoli' in a series of cartoons in the popular weekly *Wham*. These depicted president Winthrop as a luckless farmer attempting to sow a crop of spacecraft in the rocky soil of Mars. His efforts were thwarted weekly by Tin Tim, the Barleymaker, and a variety of other thinly disguised caricatures of leading figures. All this entered the popular idiom and inspired poems, musical theater, and at least one duel. Winthrop himself never acknowledged the existence of the phenomena, and even his biographer skirts the issue.

After Europe and America dusted off and took stock, they considered for the first time a full-scale invasion of Mars. While there had been no additional activity visible from Earth, preparations continued apace. In the spirit of cooperation prevalent at the time, the drive technology was shared with all the major powers, with certain exceptions. It was hoped to

fit out the fleet of a unified Earth as soon as possible. The red planet had been silent since the invasion of 1902, but the intervening decade had not softened the feeling of threat. There could be but one empire to rule the known planets, and Mars had missed her chance, it was felt. Humanity would not give the Martians a second chance.

Departing in fanfare with the rest of the international force that comprised the Martian Punitive Expedition, the *Nevada* and her sister ship *Kansas* exhibited extensive teething trouble, and found themselves having to be towed by gravity tugs on more than one occasion. Once on station, these vessels gave good service, even if the actual invasion of Mars was something of an anticlimax. The fleet approached unopposed, and the bombardment of the gun complexes on the equator went unanswered. When companies of marines and sappers were landed, they found only deserted cities and silent machinery. While some resistance was later encountered, neither ship was ever fired upon in anger during the campaign.

Both ships gave sterling subsequent service operating in a support role for infantry, as well as shuttling men and materiel around the combat zone as needed. While relatively small, the crudity of the gravity control on these early vessels meant that smaller ships such as these were able to operate more safely and closer to the surface of the planet than the dreadnoughts of the other powers. This proved fortuitous, as the planet proved quite hazardous for combat troops. Both craft continued to operate in this role until the *Kansas* was wrecked on a routine flight. Coming in too fast and too low, she struck a ridge and came to rest in the southern highlands, her gravity engine crippled. Though her hull maintained integrity and the crew was rescued some days later, it proved impractical to either repair her engines in situ or recover her via tow. Stripped and abandoned, the hulk was subsequently occupied for a time and improved by squatters, possibly monarchist deserters from the Russian forces. Abandoned again, it served as a shelter for the Bixby family in the events later turned into the novel and teleplay *Castaways!*.

The ultimate fate of the *Nevada* was a mystery for several years. Following the entrenchment of Earth's empires into the underground cities and installations of the Martians, her role as close support vanished. Much of her armament deleted, her engines were upgraded, and she was used as a shuttle between Mars and Earth, serving most famously in bringing back technology from the automated factories at the equator and stranger artifacts from the library tombs at the poles. Much of this was done in secret, both for purposes of national security as well as a more general fear about what was being uncovered. The Grey Martians seemed like dreams, and the Dream Plague was not yet a thing imagined, let alone understood. This would change.

The *Nevada* vanished on a return trip to Earth in early 1922, as international tensions ran high. Her fate was blamed on the Germans, who denied involvement. Due to the secrecy of her cargo, the issue wasn't pressed, and she was marked 'overdue' and largely forgotten in the greater conflagration that followed. A decade later, her wreck was discovered and almost fired upon by a nervous captain fighting a very different war. She was largely intact, though her forward hold had ruptured and the contents long vanished. There were indications that her crew held out for some time, but the specifics were never made public. She is marked with a radio buoy as a hazard, and access is prohibited. She may sometimes be made out by telescope, though her orbit is decaying and will probably impact the moon sometime in the next century.

WARSHIP - AMERICAN

WRIGHT-MARTIN SFC-2 ARMED SCOUT

Operating under the aegis of the Wright-Martin company, the SFC series (Space Fighter, Type 'C') was the fruit of a program ran in parallel with the attempts to duplicate the Martian gravity drive. Rather than copying the drive, two research teams sought to dissect its workings for different applications and possibly miniaturize it for use in something smaller than the cylinders to which the originals had been fitted. It was recognized that the cylinders and their contents almost certainly gave a distorted view as to the breadth of what was possible with the control of gravity.

While initially emerging out of contracts related to competing Navy and Army Space Corps programs, the Hall-Scott and Packard efforts were later rationalized by the War Armaments Board to tackle different parts of the same problem. Hall-Scott would concentrate on new applications, and the Packard team would explore the feasibility of miniaturizing of the extant device. This arrangement caused a certain degree of friction between the involved parties, but proved fruitful. While where the credit lies is rather muddy, an innovation that emerged from this arrangement was what came to be called 'gravity bottle' propulsion. What was stumbled upon was the discovery that the center of the gravity reversal field could be offset from the drive, either in terms of locus of effect or even having the field affect another vessel than the one generating the gravity field. A simpler version of this was already in place as the gravity tug. This was a specialized vessel with an outsize drive that could be used to move large masses without having to use a tow line or other physical contact.

What the researchers had discovered was more exotic: You could mount the gravity engine in a large vessel or fixed installation and mount the reaction chamber in a much smaller vessel. The 'charged' reaction chamber became the locus of the gravity field and the charge persisted (first for minutes, but soon increasing to hours) even when the reaction chamber was moved away. This enabled a small vessel, like a fighter, to have the capabilities of a gravity engine without the bulk. As the effect diminished with time, the smaller vessel would need to return to the mothership to renew the effect. While imperfect, this solution offered the ability to use single seat scouts as a viable solution for interdicting larger vessels.

The SFC series is emblematic of the type, resembling very much an aircraft of the period, but of far more robust construction and materials. While lift and control surfaces were not useful in space, it was found that their inclusion was the readiest way of preventing the craft from tumbling as it ascended or descended. The fine control taken for granted with later designs was not yet developed. Likewise, the pressure suits the pilot and gunner wore were bulky enough that leaving the cockpit open to space was the only real option for getting an effective range of motion. Indeed, the entire machine could be looked at as an oversize jetpack for the pilot.

While initially proving too fragile to make interception speeds, the influx of Martian alloys and manufacturing techniques made even these early designs somewhat effective. Launched from the surface, these saw success when used against German GV/X bombers when open war broke out in 1922. While the alliances of this first part of the war were

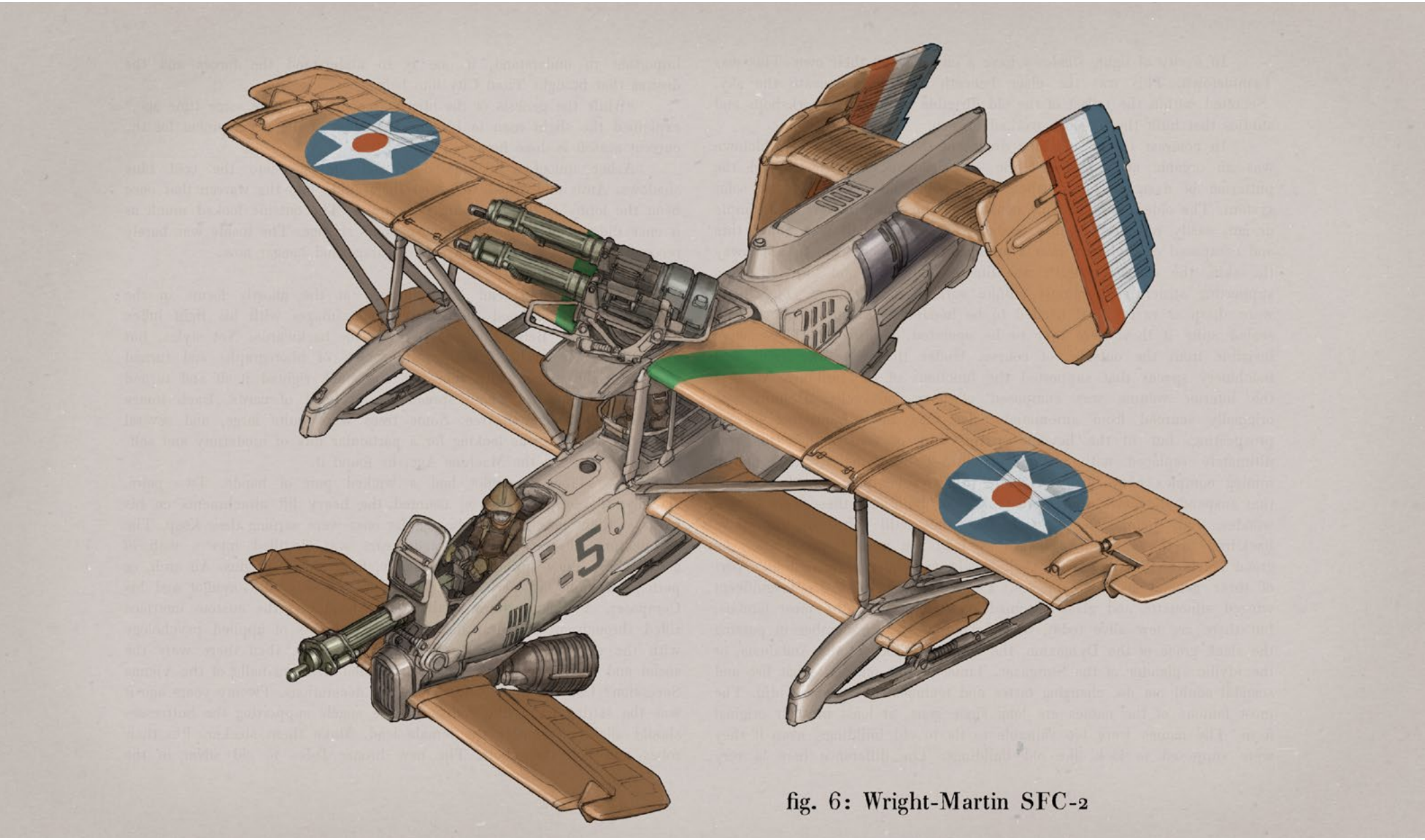


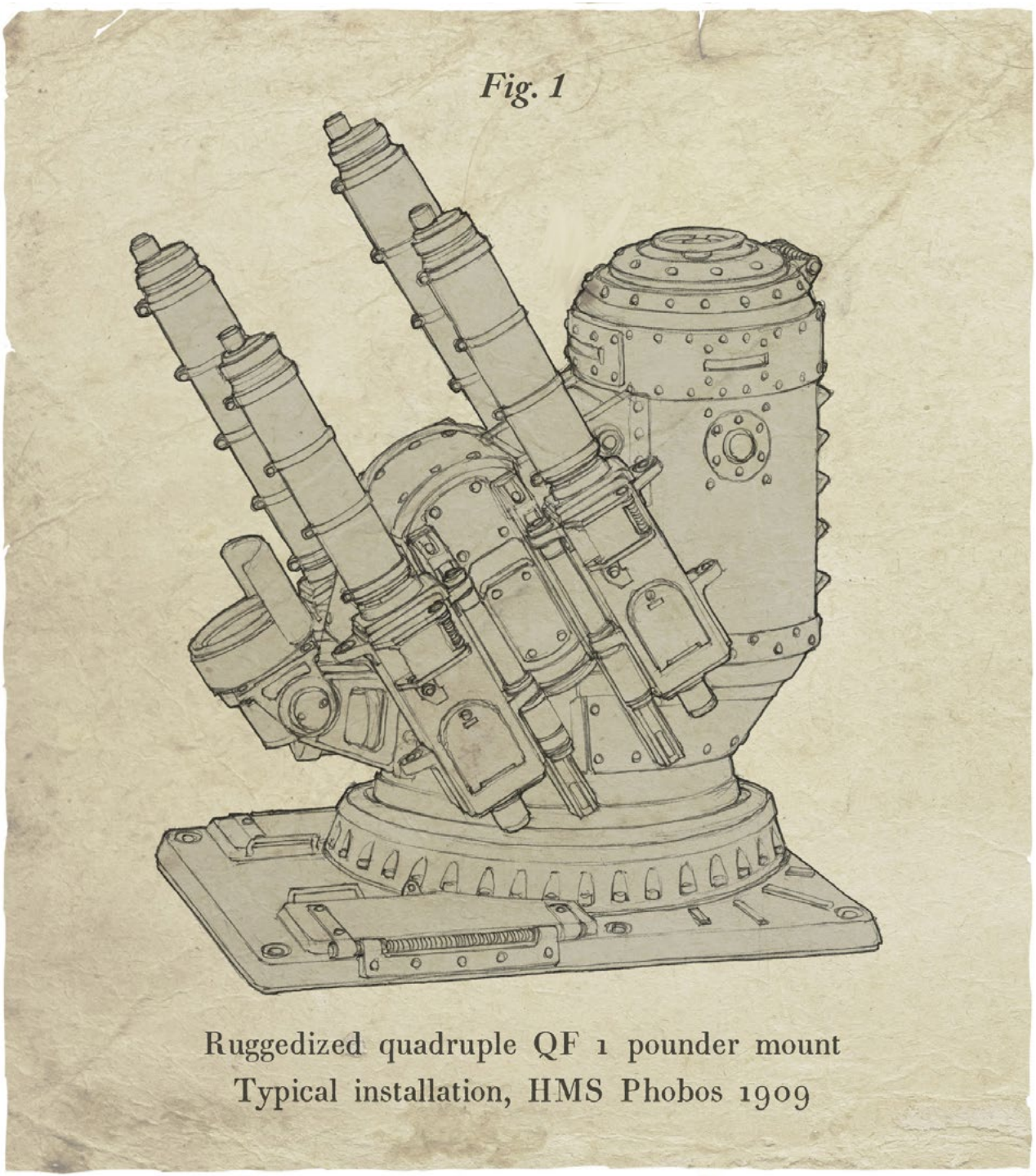
fig. 6: Wright-Martin SFC-2

Wearing the livery of the pre-1922 Mars Expeditionary Navy, this SFC-2 is an early example of a production machine. While often mistaken for aircraft of peculiar proportions, the aerodynamic properties of gravity bottle spacecraft were a secondary consideration. Without the need for lift, the function of the winglike vanes were both for steering and balance. Early gravity bottle engines in particular were subject to positive feedback loops if the throttle was advanced too quickly, and the ersatz 'wings' seen here acted much like the balancing pole of an acrobat. Also notable is the combination of relatively heavy armament and flexible mounts, an early solution that proved largely ineffective except at point-blank range.

tentative at best, the German gamble to knock America out of the war early failed. If unopposed, the symbolic raids on New York, Washington DC, and Charleston might have had a different effect. However, the combination of civilian casualties and significant losses by the bombers making the sneak attack had a galvanizing effect instead. Note that while these were the same machines that were to give the British so much trouble offworld next year, the Imperial Space Corps (*Kaiserliche Raumkorps*— KRK) had not worked up the tactics needed to launch their payloads from standoff ranges. Fully a dozen machines were lost to all causes from a total of 51 committed.

Base armament was the Maxim One-Pounder(S), which was a ruggedized version of the dual-use naval weapon. It incorporated a forced-pump system filled with mineral oil to both cool and warm the barrel and lock, enabling it to operate in space without excessive stoppages. While this would seem a light armament to modern eyes, with tungsten-cored rounds it was sufficient against most extant armor, and moreso against the relatively fragile machinery of the day. Directed by radio, the scouts were to be put up into a picket to intercept incoming targets on a known trajectory. Closing speeds in the arrangement were unrealistically high, and the success the SFC enjoyed against the initial German attack was largely happenstance combined with a previously unknown property of the gravity drives: When two gravity fields intersected that were pointed different directions, they would cancel out. This was known, and exploited by the British with their Walsingham apparatus. What was not known was that the effect was not instantaneous, particularly at very high speeds and levels of potential energy. The net effect was that when bomber and interceptor got within about a half mile of each other, it was like their engines collided, tearing them violently off their mounts and leaving what was left at the mercy of physics. The Wright-Martin crews were rumored to have practiced suicide tactics because of this, though the government denied it. Four pilots and one gunner survived this effect, to be picked up in decaying orbits by their fellows. A photograph of one such rescue, with a pilot and his gunner lashed to the wing braces of another machine, made the cover of *Gala* magazine the next week. After that, the entire affair took on a mythic dimension. From that time forward, the 29th Scout Squadron of the Army Space Corps used the 'Little David' name and patch it bears to this day. The events of that day were eventually fictionalized into the film *Nine Minutes of Glory*, it being notable for both the large amount of screen time given the Wright-Martin SFC-3 (modified to resemble earlier SFC-2 machines) and being the last role of Carol Loma before her untimely death at the age of 31.

The Germans were deceived as to the real nature of their losses for some time. The bomber fleet was ultimately moved offworld, those small numbers were still occasionally used for harassment raids. The Wright-Martin SFC series was largely removed from service by the time of the Neomartian drive on Earth in 1923, being too small, too slow, and too fragile for war service. Attempts to fit the tiny fighters with more substantial armament resulted in structural and stability problems, accelerating their retirement. After the buyout of Wright-Martin, Curtiss built two fully enclosed and pressurized prototypes under the SFC-4 designation and offered them as potential parasite fighters for staging from patrol craft and long-range bombers, but this was not taken up. A few, fitted with more modern engines, found their way into the civilian market. The surviving SFC-4 prototype may be seen on static display at the Toledo Flight Center, though is in poor condition and incomplete, lacking its engine.



Depicted here in a clipping from a training manual, the Maxim One-Pounder and its space-hardened (S) variant were the armament of choice for small craft through much of the first half of the 20th century.

Appearing singly or in pairs on gravity bottle scouts and in armored quadruple mounts on fortress ships, these scaled-up machine guns were adapted to the harsh environment of space via a dual-purpose jacket that was filled with oil which was circulated with a rudimentary pump actuated by the firing cycle of the gun. This uniquely protected the weapon from both extreme heat and cold. Thus configured, the weapon was both rugged and reliable. Chambered for a 37mm explosive shell, the One-Pounder was produced first as a light naval weapon and then as a lightened infantry version for potential use against Martian tripods and aircraft. The invasion of Mars saw these examples repurposed again and many examples were used on both British tripods and armor.

Known as the 'smudgepot' in service, the weapon enjoyed a grudgingly positive reputation for its combination of ruggedness and performance combined with the difficulties involved in keeping the weapon clean in service- the oil from the jacket having a tendency to seep during temperature changes and mix with burnt powder and dust.

While first manufactured in Britain and later under license in the USA, copies appear in the inventories of all the major combatants and some rechambered weapons are held in reserve to this day.

WARSHIP - AMERICAN

USS *LONGSTREET* CLASS SPACE CARRIER

WARSHIP - FRENCH

MADA RAPIÈRE V ATTACK SCOUT

Causes and consequences aside, America found herself at war with Germany in 1922. The ambitions of the various powers on Mars had put them at loggerheads for some time, but the loss of offworld support by the czarist Russian forces had left them unable to resupply their extensive holdings in the south, and saw a gradual retreat into the cave complexes at the pole. This ceding of territory, almost by default, saw the two rival powers brought into direct contact with one another with predictable results. Germany had blamed France for the disappearance of the Bayern, and the discovery of the wreck in 1921 seemed to bear out German suspicions. France in turn was in turmoil, and the fate of the Gloire had rioters screaming for war. Into this perfect storm was thrust the newest of imperial powers, with her far-flung patchwork of allies and possessions. While this chaos, by most accounts, was not something cynically hoped for, it was a contingency that had been planned for, for some time previously. While America had never been a serious contender for winning the 'tonnage race', her development of alternate modes of propulsion allowed smaller craft improved range and performance when operating from larger mother ships. The Wright-Martin SFC designs had proven out the concept, but a new generation of scout and fighter craft were replacing them when fighting broke out.

Gravity bottle-powered designs had been in service for some time, but typically as short-range interceptors defending fixed sites. The launch and recovery of fighters (then still called scouts) from a larger vessel, able to recharge and service them, gave the concept far more flexibility. While many designs already in service could be adapted to carry one or two fighters and be expected to successfully launch and recover them, a dedicated platform was needed to be truly effective. The USS Longstreet class showed the development of the space carrier at a point where it had matured enough to dominate the war at the frontiers of American space. While built on a comparatively narrow hull, she had flight decks and associated upperworks that were much wider, the whole braced crossways for strength. Central to the design was a pair of mated gravity engines, placed above the hull and between the two decks.

While her fighters were initially suspended from the underside of the flight deck in open racks, this was found to be unsuitable during trials. Retrofitted to the lead ship and added on the ways to all subsequent vessels, the hangers were fully enclosed in airtight shells of an inverted trapezoidal cross section. While not a true pressure hull, this arrangement did simplify maintenance. Fighters were moved from their place by means of a crane and trapeze arrangement. Charging of the gravity bottle of the smaller vessel was straightforward, consisting of placing the two drive systems in close proximity and allowing the field to interact for some ten minutes. This was accomplished via a fixture amidships, between the flight decks. A secure attachment was needed to prevent

The Longstreet class carrier USS **Wayne** *launching a pair of MADA Rapière Vs at the edge of the atmosphere sometime in 1922. Carrying two squadrons totaling a dozen machines, these early space carriers showed the effectiveness of the gravity bottle fighter as an emerging technology. While superseded by newer technologies, the core concept of light attackers able to refuel and rearm from a large and mobile mother vessel would prove to be the death knell of the fortress ship and the extensive baggage train they required.*

the smaller machine from flying off due to field interaction. The fighter was removed from the hangar rack via crane, locked to the charging fixture with the crane still attached. Once charged, the lock was disengaged, and the crane hoisted the machine to the flight deck. Launch could be accomplished by either the machine's own power, or with some combination of this and gravity manipulation by the carrier. Fighter recovery was more straightforward under most circumstances, though hangar stowage could be tricky.

The war record of the class speaks of their identity as transitional types. While planned as a class of twelve, only three saw active service. This is not to say that they were unsuccessful or poorly captained, but rather that events passed them by rapidly. The USS *Wheeler* was lost as the result of a sneak attack by parties unknown in March of 1922, but the *Longstreet* and *Wayne* survived the conflict to be relegated to training duty and ultimately lost during the Icarus Event. There is more than a little irony in the *Wheeler* causing more damage to Germany through her destruction than the ships which survived. Events ensured war between the European rivals, but the loss through perceived treachery of the carrier goaded America into the conflict. This, combined with her blatant aggression on Mars, saw Germany isolated.

This is, of course, the most common interpretation of events. Various parties have advanced others. While it seems foolhardy in hindsight, the German attack at Ophir suffers from no lack of justifications. The most common of which is that the Germans feared a sneak attack as well, being overextended and lacking support as they encroached upon Russian territory and saw war as just a matter of time. Whatever the justification, an American vessel had been destroyed and some three hundred officers and men lost. They would not be the last, whether to Germans or more subtle forces. President Winthrop seemed to anticipate this in his choice of words when speaking to congress:

'Having seen the depredation of our world by forces more terrible than our fellow man could have once imagined, those same fellow men have now redoubled their efforts to match the invader in barbarism and wanton destruction. On this day war has been declared upon this great republic, the declaration written upon iron with the blood of the innocent and the heroic, written with the hand of iniquity. It is the fate of those who have so recently fought for and won this world for mankind to have to now fight again for freedom.

Kings and their subjects may fight for empire, but it is not for plunder that America now enters into war upon Germany and her allies. Rather, it is to protect her citizens, and all who love peace, from banditry and depredation, no matter should it walk in a tripod or sit on the Kaiser's throne. We seek to restore peace not just on Earth, but on all these worlds and the starry sea that divides them. I stand before you, my countrymen, with solemn resolve for what we must do, for while it grieves me we must bear this burden lest we face greater disaster from inaction, and history condemns our sloth in the face of tyranny.'

The MADA (Ministère de la Production de Défense Astrophysique) Rapière V was constructed under license until indigenous designs could be produced in quantity. While the relationship between America and the Third Republic was tense during this period, there was mutual benefit to be gained technically, as well as a political need for continuity and stability among Atlantic powers in light of German and Russian events. President Winthrop needed not support the French prime minister to oppose the likely alternative.

Gamesmanship aside, the Rapière was an excellent machine, if a typical one of the period. Having lost their technical

edge over the other powers with the fate of the *Gloire*, she sought to play catchup and to apply her advanced gravity engine technology to miniaturization much as America had done. As development of the craft under the MADA aegis was begun before the development of a suitable propulsion setup, her construction was quite robust. This made the Rapière suitable for operation from the emerging class of vessels broadly called 'space carriers'. Earlier designs were either too fragile, or too small to carry usable loads the desired distances.

A robust and striking looking machine, the Rapière was somewhat larger than her contemporaries and carried a crew of two in an enclosed cockpit, though most examples were not pressurized. The interior was spacious by the standards of the day, improving crew comfort and endurance. Reaction tankage was held in the wings in a pattern that would become typical for smaller fighting machines, and landing skids were borne upon smaller stub wings that could carry ordinance externally. Anti-spacecraft loadouts usually consisted of solely rockets, with surface missions carrying some combination of rockets and bombs.

Her adoption by the US Space Corps was never meant to be more than a temporary arrangement and a means of training up crews to fly the new Fairchild machines specifically designed for carrier operations. Caught flat-footed by German strikes on Britain's Martian fleet, America had no choice but to enter the war with the weapons she had, rather than the ones she wanted. The Rapière V constituted the strike wings of all three of the *Longstreet* class which America had upon entry into the war. These were supplemented by a number of earlier III series machines, the IV being an experimental mark which was never produced in quantity. The type saw extensive service in the early months of the war, both on Mars and Earth, and acquitted itself well in both strike and anti-fleet roles. The type was phased out of American combat service by the time of the French Crisis in 1923. Being relegated to training roles, none saw action against the Neomartians. Superseded rapidly, the surviving examples had all been scrapped by 1929, their obsolete controls and finicky engines making them unsuitable for civilian use. There had been tentative plans to refurbish and re-engine some hulls, but the Icarus Event and aftermath made the entire enterprise moot.

While the iconic French craft did not serve long, it did much to bring together a variety of developments and ideas that existed elsewhere or in fragmentary form. Instead of the earlier American approach of small machines with open cockpits, it maximized the scale of what was suitable for the role and introduced the fully enclosed and glazed cockpit which was to become the standard layout in succeeding designs. The larger scale also proved prescient for the fully gravity-controlled fighters and bombers that would see service in the later 1920's. It is illustrative that the peculiar history of humanity's ascent into space shows that the most influential designs are not always the most numerous or longest serving. Much of what is tried ends in failure but the lessons learned bear fruit elsewhere, even if through obscure and circuitous means.

WARSHIP - AMERICAN

CURTISS JTN PATROL BOMBER

While first in space, the American fleet was never as numerous as the English, particularly in terms of capital ships. This was for a variety of political and economic reasons, but the upshot was that by 1922 England had lost too many ships that she could ill afford, and the survivors were being overtaken by both time and technology. American quarreling and indecisiveness a decade earlier enabled her to learn cheaply from European mistakes. Where the old powers built dozens of great fortress ships, the Americans built smaller craft in greater quantities as well as the support infrastructure to allow these vessels to sortie freely among the inner planets. Among the capital ships that America did build were ships to act as mobile bases. From these ranged smaller vessels which were capable of entering the atmosphere of planets and returning safely to orbit.

Using technology reverse engineered from the mining equipment of the invaders, Curtiss built a remarkable vessel. Able to operate in both space and most planetary atmospheres, the JT series lay between single seat scouts and larger gunboat designs with a crew of a dozen or more. A crew of three sufficed for most missions, though crew endurance could be the limiting factor in regard to range. The type demanded a hearty breed to man her, but in return gave a punch powerful enough to knock most anything else out of the sky. Their use bled the strength of the Inner Powers fleet, and put imperial America in a stronger bargaining position. If this was not in terms of combat losses, it was certainly true of tying up and slowing down enemy capital squadrons, vulnerable as they were to gravity-based weapons which would ultimately make them all but obsolete.

The high-water mark for the type comes later, when they proved instrumental in the destruction of the Neomartian fleet, preventing the Dream Plague from reaching Earth. The scrapyard fleet of the surviving czarist Russians struck by surprise and would likely have overwhelmed the pickets put in place during the very young peace. However, the sacrifice of the two squadrons of recruits working up on the type at the navy base at Pago Pago proved instrumental in breaking the attack. Their engines at overload, they burned fuel and reaction mass at a clip that ensured they would not be able to return, even if they survived the battle. Indeed, it seems many either rammed the strange vessels of the Russians, or detonated their gravity bombs so close that both attacker and defender were destroyed. So close was the final battle (in more ways than one) that shortwave sets in the northern hemisphere could pick up the radio chatter: Terse directions, prayers (in both English and Russian), screams, cries of momentary elation, and a strange buzzing sound that some scholars believed was the spoken language of the long-dead Grey Martians. Above the din a clear voice arose, singing a version of 'Spanish Ladies', the lyrics adapted by an unrecorded hand:

We'll rant and we'll roar like true Rebel pilots
We'll rant and we'll roar across the black sea
Until we break clear of the broad blue horizon
Our angle of a-scent is twenty-five degrees

Soon this one voice was joined by another, then another, until a chorus of young pilots and their crews rang out across the airways. This continued for no more than

Silver wings turn to gold in the sunlight. The American fleet gathers in orbit above Venus, summer 1922. The USS* St. Louis *is seen here following her conversion to a monitor, and below her is an unidentified carrier of the* Longstreet *class. The assembly of so large a fleet so far from Earth marked both an expansion of the capabilities of man in space as well as the death knell for the cooperation that still existed (in name) between nations after the invasion.

a minute as the voices went silent one by one, and all coherence dissolved into static. There would be no survivors of the 79th Pursuit Squadron, though legends persisted of castaways on tropical islands for some time.

Curtiss JTN rocket bombers were commonly used as orbital pickets late in the war. This was both because of their suitability for trans-atmospheric work as well as a dearth of suitable ship targets from the end of 1927 onwards. The Pyrrhic victory of the British Fleet at the Battle of the Equator left the American Empire in an uncertain position. While nominally allies with the victor, the British were unable to meet their obligations to join the Americans in blockading the Inner Powers on Mars. The Germans were not in a position to press any large fleet actions in space, but were sufficiently well-supplied and dug in with positions in the northern hemisphere. Expanding upon Martian workings, the German strongpoints were elaborate enough that a siege would be impractical. While the British had a sizable army in the southern hemisphere, to openly assault the subterranean fortresses left behind by the Martians would be suicidal.

The German reoccupation of the sites supporting and supplying the great guns that first brought the invaders to Earth is tinged with irony. It placed the Kaiser's forces where they could not only defend themselves but menace their enemies on Earth, containing as they did the great batteries of guns last fired in 1902. Time was of the essence. While England was unable to press her advantage due to losses sustained, the Americans had a possible solution in the long-range rocket bomber.

Some of these vessels even operate today on an experimental basis, being re-engined with new technology in light of the Icarus Event and the implications surrounding it. It seems likely that the type has not seen its final battle.

1. Airfoil Section Float
2. Access Hatch
3. Optically Flat Armored Glass
4. Cruise Propeller
5. Variable Pitch Blade
6. Stub Wing
7. Wing Brace
8. Atmospheric Lifting Wing
9. Aileron
10. Steering Airbrake
11. Alloy Blade
12. Propeller Hub
13. Manual Turret (20mm Vickers Fitted)
14. Thrust Motor Heat Exchanger Housing
15. Empennage Boom
16. Rocket Nozzle
17. Empennage
18. Horizontal Stabilizer
19. Trim Brakes
20. Turbine Intercooler
21. Dual Rudders
22. Vertical Stabilizer
23. Hydraulic Amplifier
24. Stabilizer Framing and Actuator
25. Anti-Flutter Balance Mass
26. Reinforced Alloy Framing
27. Vertical Stabilizer Framing
28. Rudder Structure
29. Ladder Frame
30. Reaction Mass Tank
31. Oxidizer Tanking
32. Upper Wing
33. Aileron
34. Signal Light
35. Navigation Light
36. Access Cap
37. Stub Wing Structure
38. Reinforced Leading Edge
39. Reaction Mass Trim/Overflow Tank
40. Bomb Bay Door
41. 8" Rocket Torpedo Rack
42. Reaction Mass Trim Tank
43. Auxiliary Cargo Compartment
44. Access Hatch
45. Stueben 'Condor' Dual Motorjet Powerplant
46. Standoff Missile w/Mk. III Gravity Warhead
47. Turbine Bypass Feed
48. Main Reaction Mass Tankage
49. Access Hatch
50. Catch Ring Shock Damper
51. Copilot's Seat
52. Pilot's Seat
53. Streamlined Float
54. Pilot Controls and Instrumentation
55. Docking Catch Ring
56. Double Thickness Alloy Skinning

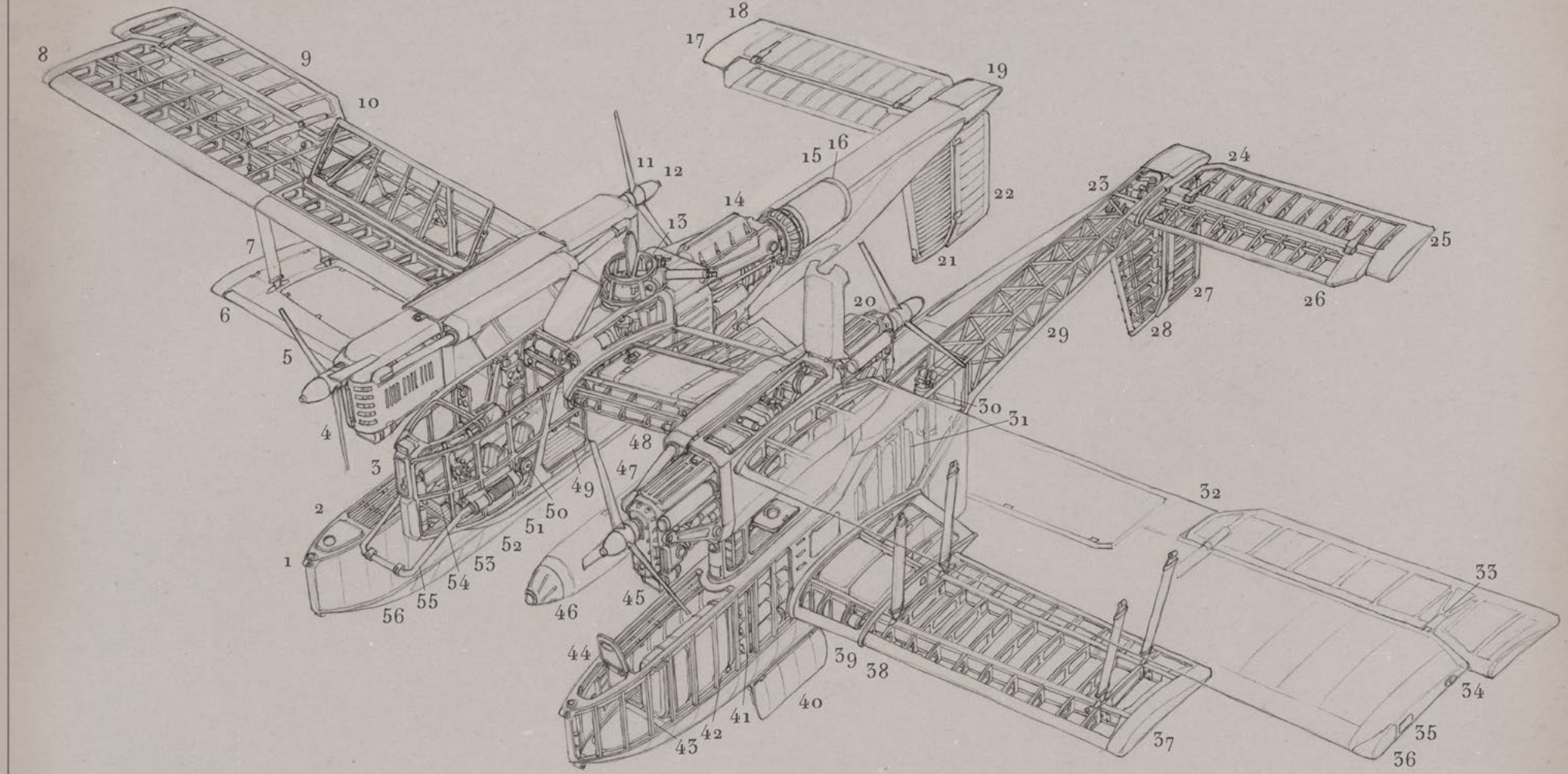


Fig. 2 - Cutaway View, Foreward Quarter

Seen in cutaway, the extensive fuel and reaction mass capacities of the type are made evident. Also of note is the peculiar upper wing layout, offering good forward visibility and sufficient clearance for large external payloads.

WARSHIP - AMERICAN

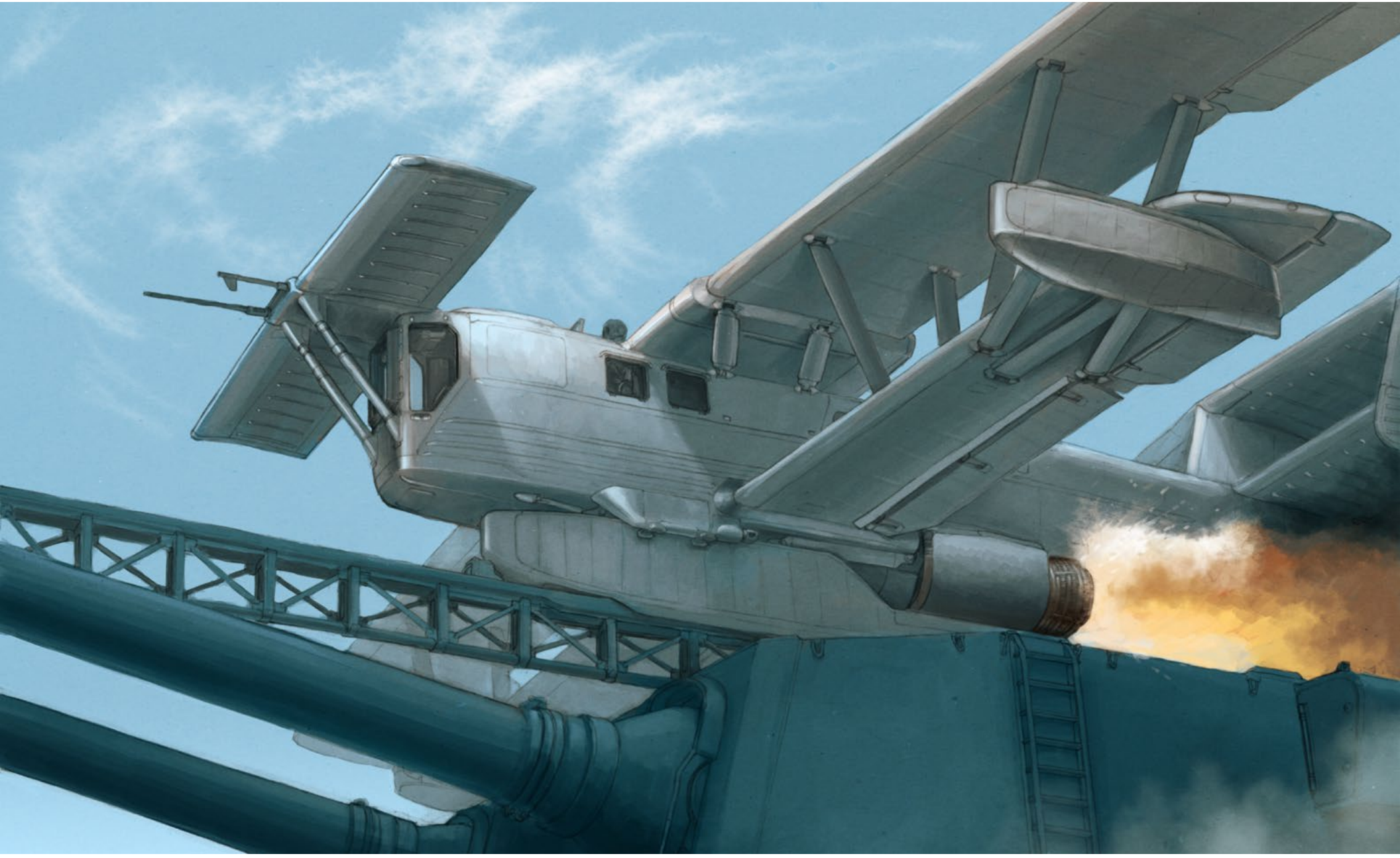
FAIRCHILD FC GRAVITY SCOUT

Hot on the heels of bomber development was the next generation of fighter. While much larger than previous machines of the same role, the FC series was both faster and possessed far greater range. As gravity drives became progressively more miniaturized and further departed from the Martian examples captured twenty years earlier, a variety of interesting capabilities and side effects made themselves known.

The materials revolution was in full swing, and the FC (Fairchild, Combat Model) was a far more radically different machine inside than even her muscular outer appearance would suggest. The secrets of Martian metallurgy had been cracked, and more exotic alloys replaced the aluminum and steel of the early war. Her optics were synthetic sapphire, and her wings and hull were coated with thin films of gold and a peculiar cobalt compound, now lost. Heat discoloration patterned her ventral quarter with subtle rainbows and for the first time many sections of the gravity engine were made of ceramic, or other materials more difficult to classify.

Fairchild was something of an upstart, seeking to leapfrog Curtiss and their seeming contentment to merely improve upon alien designs. The courts had not yet ruled on where the treasure trove of Mars ended, and patentable innovation began. To this end, the 'Farmingdale Mafia' as they were known (not at all fairly) by their competitors discovered something very strange. Test hulls without gravity engines were subject to a variety of stresses that engined machines were not. These included some very dramatic failures that would surely have been fatal to the crew of a manned vessel. While the loss of the *Gloire* raised questions, and the tendency for large vessels to drag a bubble of atmosphere with them was known, the connection and the implications of these phenomena struck like a thunderbolt: The reversal of gravity within the field was a subtle bending of time and space. The mechanism by which the malfunctioning French engine had turned her crew to dust was a sort of time travel, wild and uncontrolled. Discreet measurements taken from both the USS *New York* and the secret berth from which she was launched confirmed something even stranger, if that is possible. Radioheliograph and acoustic signals revealed a phenomenon of a sort of 'double echo' to every signal sent and received. The truth that emerged was that both points still occupied the same spot, in an esoteric way. Air, and too a lesser degree, atmospheric pressure, was shared between a running gravity engine and the point in space where it was first engaged. The smell of seawater onboard dreadnoughts in space was explained, as was the occasional appearance of ghost ships and the disembodied sound of machinery back on Earth. Rather, these would be explained… as soon as Fairchild had made the greatest space fighter the world would know.

Armed with this new knowledge, the design team sequestered themselves at the isolated Yasgur Aerodrome and crafted the prototype of what would be known as the Regulus in a mere seven months. Several personal fortunes were placed on the line, as well as the fate of the company. The result exceeded all expectations. The machine which rolled out of the barn on a hot August morning in 1927 was a dull silver, tinged with blue or gold, depending on the light. With that first flight, every-



A Fairchild FC-X Regulus being launched from a turret catapult on the dreadnought USS **New York.** *Using a mixture of gravity bombs and conventional armament, smaller types such as these were used to shield surface fleets from orbital attacks and interdict atmospheric intrusions.*

thing changed. The FC-X had taken the gravity bucket a step further, and the craft had a fullsize gravity engine at its launch point that recharged the onboard 'bucket' via their coterminous location in time and space. The initial foray into the air was short, but yielded inconsistencies between onboard and earthbound chronometers afterward. Subsequent flights showed the effect to be at least partially controllable. These further implications were lost on none of the parties involved.

Rapidly accepted and put into serial production, she dominated the skies wherever she was deployed, though the war was already all but over. Germany was on the defensive, and the other Inner Powers were seeking a separate peace with a reborn Russia. Too large for extant carriers, the proud dreadnoughts of a decade earlier now served as mobile launchpads for the new generation. While inglorious, triumph salved many indignities.

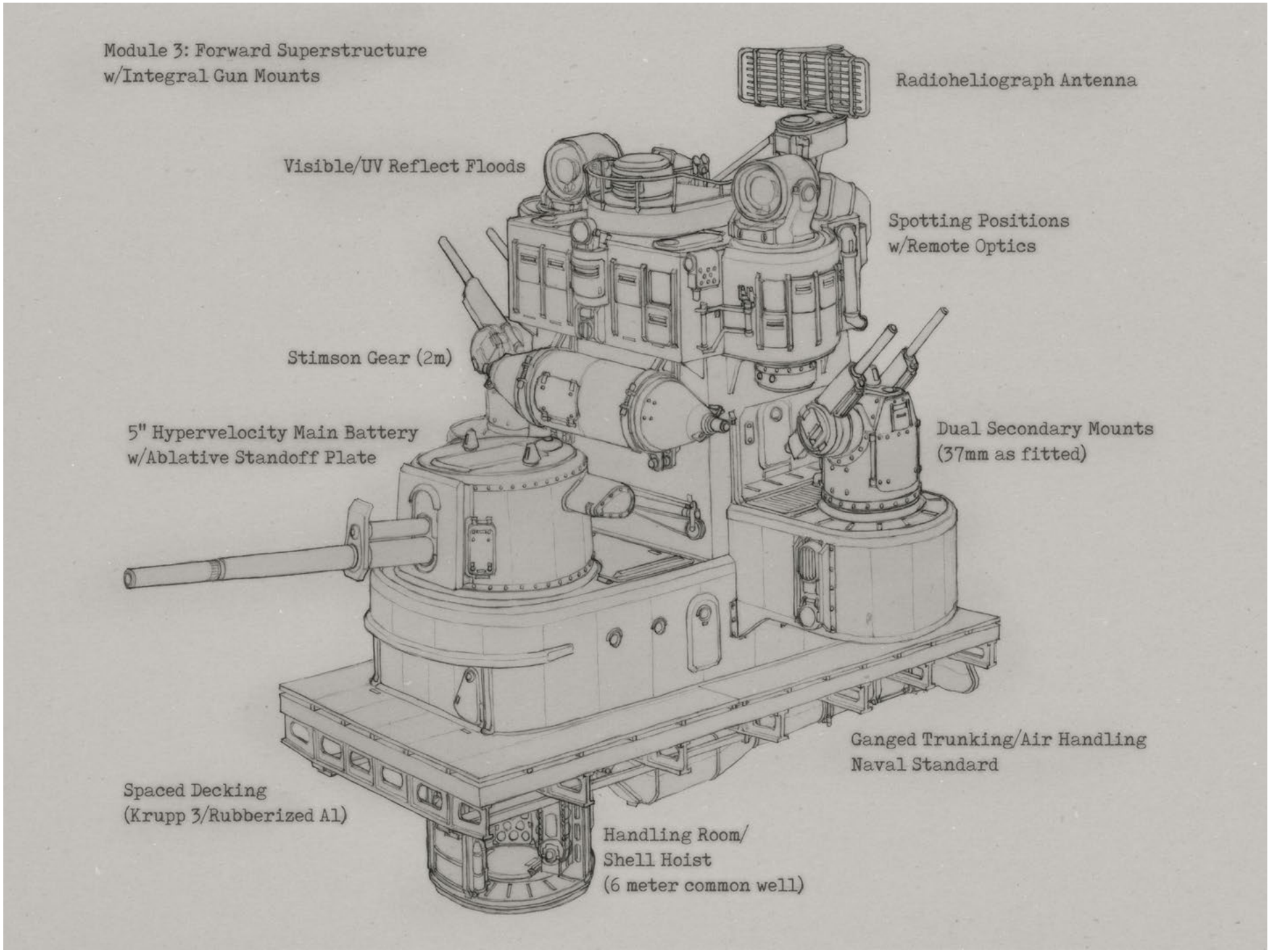
Postwar, the type was important both as a basis for more evolved technologies and as an initial point of inquiry into the deeper questions that her technology raised. These questions also coincided with archaeological discoveries on Mars that suggested that the invaders of 1902 were descended from a more highly advanced race that had died out milennia ago. These 'Grey Martians' as they came to be known had left behind automated factories and cities that the 'Red Martians' later took advantage of, while not fully comprehending. This line of reasoning led to much speculation as to the effects of the Martian cities upon those who dwelt in them, and whether the Grey Martians had caused the madness of the czarist Russian holdouts, and if the Dream Plague (as it would be later known) was some ancient and malign influence attempting to return to power.

While tantalizing, the resurgence of hostilities in 1927 forced a pause in research, and the near universal failure of gravity engine technology two years later, in what would be called the Icarus Event, led to a change in priorities for all involved. Dependent as the Fairchild FC series and its descendants were upon gravity control, the type faired poorly during the disaster, with nearly all deployed examples being lost, either with the failure of their own engines in flight, or with those of the carrier they were operating from. Those reserves held on Earth fared better, and some would even fly again in the early 1930's, in reserve and training capacities. The present day finds many examples in private hands, with various degrees of modification. The semi-retractable floats were problematic in service, and have been removed from most civilian machines, though the navy museum at Savannah has an excellent example in original configuration and livery.

Depicted opposite is one of the planning drawings from the unbuilt USS* Montana *class, which was to be a follow-on to the* New York *class and its variants. Visualized as combination fortress ship and carrier built along British lines, these were to have carried the Fairchild FC and its descendants into space before events overtook their construction.

Seen here are both the short 37mm rocket guns which were the planned replacements for the ubiquitous QF 1-Pounder guns, these proved disappointing in service, as well as a 5" battery rebarreled to fire hypervelocity rounds. The standoff plates called out in the drawing are quite common on transitional mountings and represent a sort of insurance policy in the case of barrel failure. While all these fittings may be operated under local control, integration with spotting and radioheliograph ranging was already standard.

Of additional note is the modular nature of her upper works, with advantage being taken of Martian fabrication techniques in the place of many machined and cast fittings. While never matching Britain for total tonnage nor France for speed of construction, American designs represented to some degree a synthesis of the two. This, combined with a far greater emphasis on carrier construction, saw the nation in a strong strategic position prior to the Icarus Event.


Module 3: Forward Superstructure
w/Integral Gun Mounts
Radioheliograph Antenna
Visible/UV Reflect Floods
Spotting Positions
w/Remote Optics
Stimson Gear (2m)
5" Hypervelocity Main Battery
w/Ablative Standoff Plate
Dual Secondary Mounts
(37mm as fitted)
Ganged Trunking/Air Handling
Naval Standard
Spaced Decking
(Krupp 3/Rubberized Al)
Handling Room/
Shell Hoist
(6 meter common well)

WARSHIP - AMERICAN

USS *SHREVEPORT* CLASS CRUISER

American military thinking had been dominated by the space carrier and the long-range bomber for most of her ascendancy. As the 1920's drew to a close, it was recognized that the dreadnought and the cruiser still had roles to play in American interests. The favored platforms of the US forces were excellent for striking at enemy space and ground assets, but were found wanting in terms of endurance and escort ability. Cargo vessels need not be warships to be effective at moving men and materiel as needed, but to escort them with fighter screens based off of relatively fragile carriers put an excessive strain on man and machine. The sortie rate was simply too high to be effectively maintained on long journeys.

To address this need, a new class of cruiser was first laid down in early 1927, and the building program vastly expanded and accelerated following the British disaster at the Battle of the Equator. While a victory, royal losses were so high there that she was forced to withdraw three squadrons back to Earth, leaving Mars and Phobos to fend for themselves. It was a building race between America and Germany, and while Germany had more experience with cruiser designs, America did have access (at least in part) to French implementation of the Martian manufacturing technology. It would be a race for effective control of access to Mars and control of Phobos Station, and shrewd design choices would determine the fate of empires.

While diminutive compared to her forebears, and downright tiny compared to a *Charles Martel* (let alone an *Emperor of Mars*), the *Shreveport* class was in many ways a quantum leap beyond much that had come before. Having a fraction of the weaponry and the compliment of a current-generation dreadnought, her fire control systems and engines made her effective firepower greater than vessels many times her displacement. Gone were the days of local fire control and manual plotting, though even this class betrays some transitional features, notably in hull design. In shape, her hull is still of a form derived from her naval origins, though the vestigial ram has been replaced by a heat cannon, and her gravity engine moved forward. Most prominently of all, the impellers and heat exchangers of her gravity engine have been moved to a pair of large outriggers, and the integration of the supporting systems made more general. Fire control sees at least partial integration with the radioheliograph, and are able to plot ranges and distances with a useful degree of accuracy. With a complement of barely 50 officers and men, mechanization is much more prevalent and even the main batteries incorporate autoloaders.

In terms of her systems, the gravity engine gives the appearance of being far smaller than on earlier vessels, but this is far more the result of gravity control being broken up into subsystems with a greater degree of design flexibility, rather than a true reduction in size. It became possible to make the engine fit the hull, rather than the other way around. Serviceability and efficiency were also improved in the process, with the class seeing improvements in range beyond the design specifications. Crew accommodations were improved in the process, and the tight quarters typical of early spacecraft were mitigated to some degree.

America launched several of these vessels in the middle years of the 1920's,

Seen here upon her fateful encounter with the 'city of glass' observed upon the surface of Titan, the* Shreveport*-class cruiser USS* Charleston *is easily the most famous of her class. Combining a number of diverse innovations, these vessels might well have transformed space warfare had Nemesis and Icarus not occurred. Note the prewar color scheme.

and not a moment too soon. They were able to counteract the German threat more effectively than the larger (but far less numerous) dreadnoughts of the French. It also gave Britain a chance a recover, as well as for America to demonstrate the full range of her capabilities as an imperial power. In the end, nearly four dozen of the class and the follow-on USS *San Diego* class had been constructed, a truly remarkable number. Most survived the war, but the same cannot be said of events after, and there are no known surviving examples of the type. Being frontline assets at the time of these twin disasters, those which weren't destroyed fighting Nemesis perished in the dark some two weeks later.

While the Icarus Event was their undoing, in the few years these remarkable cruisers were flying, they made (and broke) many records, and recorded accounts of many extraordinary things. Some were so strange that they had not been seen before or since. While many records have been lost in the chaos that came afterward, one of the strangest things to survive was the discovery by the USS *Charleston* of ruins upon the surface of Titan. These had been mistaken for methane or clathrate ice floes by earlier surveys, such was its concentric and almost floral appearance. The site would have remained in obscurity, but for observations by the watch and engineering crews of the *Charleston* of unusual energy fluctuations in the ship's systems as they cleared the far side of Saturn. These fluctuations were within safe limits, and seemed to coincide with the electric discharges of a magnetic storm in the atmosphere of Titan. This was a heretofore unknown phenomenon, and it was undertaken to approach more closely to better understand the effect upon gravity engines. As the moon filled the sky beneath the cruiser, it became obvious that the discharges were not from the atmosphere, but rather the surface of Titan. Whatever it was, it pushed the clouds aside and pulsed rhythmically, inducing strange behavior in the gravity drive. The horizon glowed, and a curious sight soon slid underneath the *Charleston*. A description by the first officer survives, being among the effects of his estate returned to the family in 1930 following his ship being declared overdue in the wake of Icarus. It is as follows:

It was glass, it was sea life, it was the architecture of Cordoba and that of the Salisbury plain. It was all these things, and more I cannot name. All ghostly and electric, like the dream of a city on this dead world. There were successive rings of walls, stepped and spiraling around something I couldn't see at the center. The captain crossed himself, and I squinted, trying to see into the center of the pulsing light. I couldn't. The light flowed out from the center, down what must have been streets or canals. Conduits of some sort. It moved like liquid and shone like foxfire. Green. Gold. Dark again. The lights on the ship are almost out, the bulbs looking like dying coals. The radioheliograph has gone berserk, showing vast shapes around us which simply cannot be there. I had to relieve the operator. It has to be a city below us, or some other structure crafted by intelligence and purpose. By God, what unclean things must dwell in this outer darkness.

We were over it by then and could see it clearly. It was a city, and it was drawing us to the center. To the light. I still couldn't see what was making the light, but I could make out a shape. An outline. It was like an egg. Scale was difficult to guess, the affordances being unlike anything familiar. The helm wouldn't respond, and we started to tumble. The captain said something I couldn't make out. The pulses of light made a hissing sound. I thought I heard voices. The pulses became so frequent they flowed together. I think I screamed, or at least called out. I knew we were lost. In that moment I caught the eye of Captain Johnson as he looked away from the terrible light that filled the bridge. So sad, as if saying 'I'm sorry'. Then

came a deafening noise and I must have lost consciousness then.

When I came to an orderly was tending to me. I had two ruptured eardrums and assorted bruises, but nothing more serious. The city had vanished. Shattered, like the glass that seemed to compose it. Our damage was slight, so we took a survey of the site and found nothing of any note. The shards of strange crystal were like grains of sand on a beach. We took some back, but I never heard if anything came of it. We were sworn to secrecy, and carried on with our patrol. The captain was never quite the same, but then neither was I.

I write down this entry in the same spirit of all that is written in this journal, in hopes that it may be of some aid to future historians. The present age is one of passing wonder, and the hindsight of those who were not there may conceal the spirit of it in their attempts to reveal the facts of the matter. Humbly, I offer my recollections of what I have seen.

-Lt. Arthur Pew, October 17, 1929, Ashford Naval Sanitorium

While little was made public about the reactions of the crew to what they had seen, psychological evaluations made upon the return of the *Charleston* to Earth show a peculiar pattern among those who saw the glass city. The crew responded admirably to both the stresses of space flight and the peculiar nature of what they had experienced. While some complained of strange dreams, these may be explained by the disruption of the circadian rhythms experienced by those away from the normal day and night circle for extended periods of time. More concerning was the recurring and unconsciously collaborative nature of these dreams. While written off initially as the idle talk of sailors elaborating upon each others stories, the lack of interaction between many of those affected made this less likely. Of further concern was that all dreamt of the glass city sooner or later, and ultimately dreamt the same dream. In this converging dream, all walked through shining tunnels below the ice of Titan upon alien limbs. They converged upon a palace at the center of the glass city, wherein dwelt what one junior officer anonymously described as a 'a king made of light, with a forest for a throne, and his palace was like an egg'. While poetic, the description more clearly illustrated the minds of those afflicted than what was afflicting them. Most of even the worst cases recovered after thirty days of leave, but whether the dream faded or they merely learned not to speak of it is up for debate.

Current hypotheses lean towards the explosion that destroyed the glass city being some sort of self-destruct mechanism triggered by the emanations of the American ship's gravity engine. This may have been either to prevent capture of the city (and the secrets therein) or to serve as a sort of warning beacon for whoever (or whatever) was monitoring the site. Tied in many minds to the mysteries of Mars, the dust of the glass city was searched for clues large and small. While the silicate nature and total destruction of the city (if indeed that's what it was) prevented meaningful laboratory analysis, the photographs taken from orbit yielded some clues. While the city was gone, the impressions left in the ice suggested something of great complexity with a significant underground component. The pattern and shape of the site show some similarities to the more ancient Grey Martian sites. Subsequent events have prevented a return to the area for further exploration, but there are hopes to mount an expedition to Titan sometime in the next decade.

WARSHIP - AMERICAN

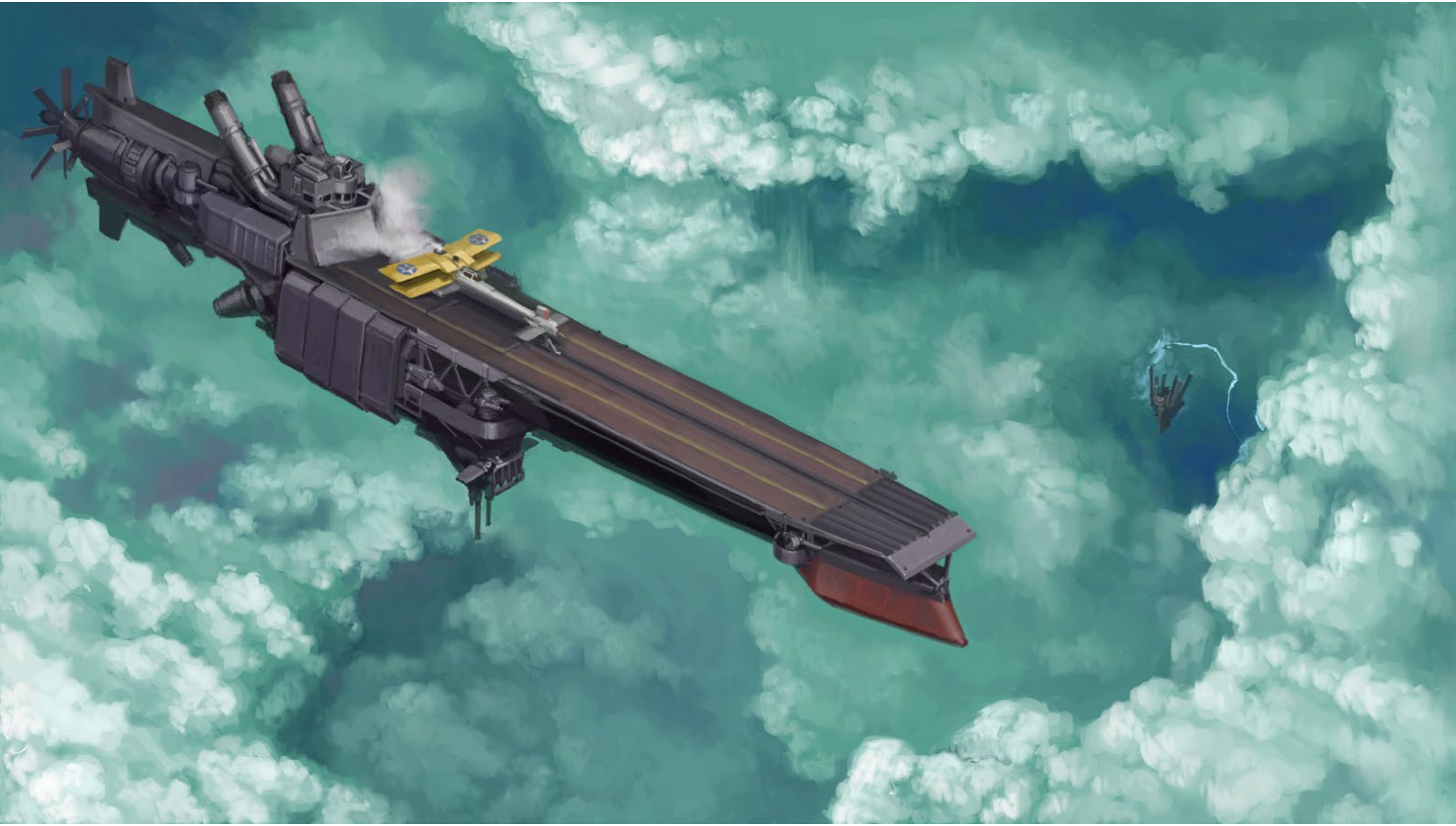
USS *PORTER* SPACE CARRIER

In the eyeblink between peace and disaster, the USS *Porter* was the swan song of American space vessel design in the old style. Using the USS *Charleston* class cruisers as a template, this new design was an extension of lessons learned there, but imported back into the realm of the space carrier. To the uninitiated eye, the Porter appeared to be a step backward. She carried only a single squadron of fighters, and possessed a compliment of barely a hundred. Like the *Charleston* however, she made what came before mostly obsolete. While carrying a maximum of eight machines, the ones she carried were not the fragile, short-range craft of the previous generation. Rather, these were evolved Fairchild designs based on the FC series. These long-nose craft, called 'Pikes' in service, possessed far greater range, and internal bomb bays as well as improved crew layouts and controls.

The *Porter* herself was a marvel, and an example of the accelerating rate at which human technology was changing as it mastered the works of the long-dead Grey Martians. Exotic alloys could be conjured from mere tailings, and water could be induced to burn as fuel. More than one shudder went through the scientific establishment when they discovered what powers the Red Martians had within their grasp, but were unable to use for whatever reason. Gone were the elaborate procedures associated with charging the early 'gravity bottle' engines. The new fighters employed miniaturized gravity engines that allowed the new fighters to be stored ready for flight right on their hangar racks, and they could be launched from a cold start after a mere five-minute warmup. It was a time of ambition, tempered with a wariness born out of a war between worlds, and a renewed war that now stretched across two worlds.

The engines and sensors grew even more sophisticated, and the tie between the physical location of the gravity drive (and by extension the vessel around it) and the point in space where the gravity engine was last engaged was exploited. Instantaneous communication proved possible, if of limited practicality. Even more tantalizing was the possibility of moving coherent physical matter between these two points. For if breathable air or fuel might be moved thusly, then raw materials or even actual space vessels might be moved in an eyeblink around the solar system. It looked to be the dawn of a new age, with humanity able to move unimpeded through the stars, masters of all they could see. As is almost always true, the reality was more complex (and more troubled) than the aspiration. From the dark fate of the *Gloire* came a tantalizing glimpse of travel unbounded by space or even time. In many ways the latest designs were surpassing what the Grey Martians were able to do in all their eons below the surface of Mars.

Launched in the spring of 1929, the USS *Porter* retraced the journey of the *Charles Martel* to the outer planets, though this journey would take weeks, rather than months. She lifted off from Newport News like many others before her, drifting up into the cloudy sky. It was a common sight for the shipyard, and a common enough sensation for her veteran crew. At the edge of the atmosphere, many things changed. The carrier accelerated quickly, both kinetically and through a bending of space. The stars seemed to smear and go out for those aboard, and if anyone was watching this



The sole member of the USS **Porter** *class makes a fateful sighting in the upper atmosphere of Neptune. She prepares to launch a fighter to shadow the unidentified vessel seen in the storm below. Some months later, the mystery ship would be well known by the navies of Earth. They would call her Nemesis, and her arrival would herald the closing of the skies.*

small vessel from orbit, she herself would blur, then vanish utterly, so great was her speed. The dark was disconcerting, and her regular pauses to fix star positions were as much for the sanity of the crew as they were for navigation. Uranus was out of position for an easy approach, and too direct of a retracing of the early trek by the French was seen as provocative. Neptune was handier, and would convey the message needed without undue rancor. Less than a month after setting out, the USS *Porter* was taking a survey of one of the outer planets.

While cramped and still subject to the privations of space travel typical of the day, life aboard this new vessel was more tolerable than a long journey would have been on an older member of the fleet. Better insulated and with more efficient life support and heating equipment, heavy insulated clothing was unnecessary in most of the interior spaces. Even the large hangar deck could be pressurized to a degree, simplifying operational and maintenance tasks when far from port. To maximize interior space, fighters were loaded from vertical racks in the hangar via a rotating crane that placed them upon the flight deck. While the flight deck itself was not strictly necessary for the launch and recovery of gravity-capable fighters, it did prove useful for launching the craft when heavily-laden. This was because the interaction of two artificial gravity fields could sometimes make the output of the weaker field subject to fluctuations that would hamper control. A sticky problem to solve from an engineering standpoint, the large deck of previous carriers was retained here to sidestep this hazard as well as speed the recovery of returning fighters.

The fighters themselves were the V variant of the famous Fairchild FC, with an extended fuselage and reworked nose. Of all-metal construction, this mark of the FC had been designed from the start for carrier operation with wings that rotated to the side 60 degrees to better facilitate rack storage on the space carriers then being laid down. An unusual arrangement, this resulted in a stronger wing box and simplified plumbing for the fuel and reaction mass tanks that constituted most of the interior volume of the wings. While not strictly needed in space, these dual-use structures helped stabilize the machine in flight and made atmospheric operations more practical. The crew consisted of a pilot, navigator, and engineer. While gravity engines had come a long way, long distance operations required an expert hand in case of malfunction or other trouble.

Skimming the blue atmosphere, her 'pikes' were launched and recovered experimentally, with no great difficulty. Some had been modified to carry great cameras in their bomb bays, hoping to glimpse something more than endless clouds and the distant pinpoint of the sun. The experience of the USS *Charleston* above Titan was still fresh in many minds, and protocols had been put in place to moderate both curiosity and caution. The darkness unsettled all. There was never any expectation of being able to do a full survey of even a significant part of Neptune with a single carrier and squadron of fighters. The unspoken directive was to take pictures of anything interesting you can, and to look for anything unusual. This directive was to reveal things unsought, and to remake our understanding of many things in the process. To journey so far into the depths of space without a concrete goal seems a questionable strategy in hindsight, but the spirit of the age sought answers in the void with equal measures of inquisitiveness and paranoia.

It began with 'The Shadow'- a shape appearing on some photographic plates of the upper atmosphere on Neptune. The storms that wracked the blue world had their own lightning, though they were little more that distant flashbulbs to the crew of the *Porter*. Occasionally, there would be

something very out of place backlit by this lightning. 'The Shadow' (as it was called) was of indeterminate size, but symmetrical and possessed of a jagged and geometric silhouette. Additional photographic sorties showed 'The Shadow' to be following the carrier, and it was slowly gaining. Fighters were launched to intercept this menace, to at least determine its identity and intentions. A partial transcript follows, being from the debriefing of one Lt. Myron Schultz, as to his encounter with 'The Shadow':

Cpt. Foster: What did it look like, in terms of particulars?

Lt. Schultz: It didn't look like anything at first. Just a dark spot in the clouds. I turned on my helio pinger and got a range of about 300 or so, relative. I dialed in the span in my sights and got something too big to believe. We still thought we were dealing with Germans, or maybe [redacted].

Foster: What was your closing speed?

Schultz: Fast. Me and Nielsen were calculated to intercept the target in thirty seconds, but it sped up so quickly the calculator couldn't keep up. I broke hard one way, and my wingman went the other in the confusion.

Foster: Did you see it?

Schultz: Yes.

Foster: For the record, what was it?

Schultz: A warship. Very large, and of no known type. Generated a huge amount of waste heat. It did something to the clouds- some sort of static discharge. I was able to see it clearly. No markings, but with some features analogous to known designs. Guns. Antennae. Heat funnels. It reminded me of a claw, or maybe a crown.

Foster: What did you do then?

Schultz: We tried to chase it, but it pulled steadily away. Got some photos, but her exhaust plume obscured the details of her configuration. The Porter *was hopelessly outclassed, so she withdrew further over the horizon and we made rendezvous later that day. Never saw it again.*

Less than a month later a single vessel matching the description of 'The Shadow' would single-handedly destroy the British Home Fleet near Luna. The battle would claim all the vessels that sought to engage this new menace, as well as the lives of some ten thousand officers and men. The worst was yet to come, for as this strange machine appeared in different quarters, gravity engines would malfunction and fail, resisting all attempts at repair. Ships fell from the sky, or died quietly in the depths of space. In the span of a few weeks, the empires of man simply ceased to be. The stars were denied to kings and presidents, and this harbinger acquired a new name: Nemesis. Her story and fate are continued elsewhere.

The USS *Porter* survived her initial encounter with Nemesis and would survive what was later called the Icarus Event as well, being in port for refit at the time. She would fly again some three years later, with the introduction of new approaches to gravity manipulation inspired by the so-called Walsingham Repeater of the British. Currently, she is a museum ship in St. Louis, permanently moored at a spot close to where the USS *Vulcan* first sailed into the sky a lifetime ago.

Far above the Pacific Ocean, the British engage the German fleet in the famous Battle of the Equator (also called First Terawaki). Depicted is the British flagship **Emperor of Mars.** *She would be lost in this engagement, along with four other fortress ships in a Pyrrhic victory for Britain.*

SECTION II – GREAT BRITAIN

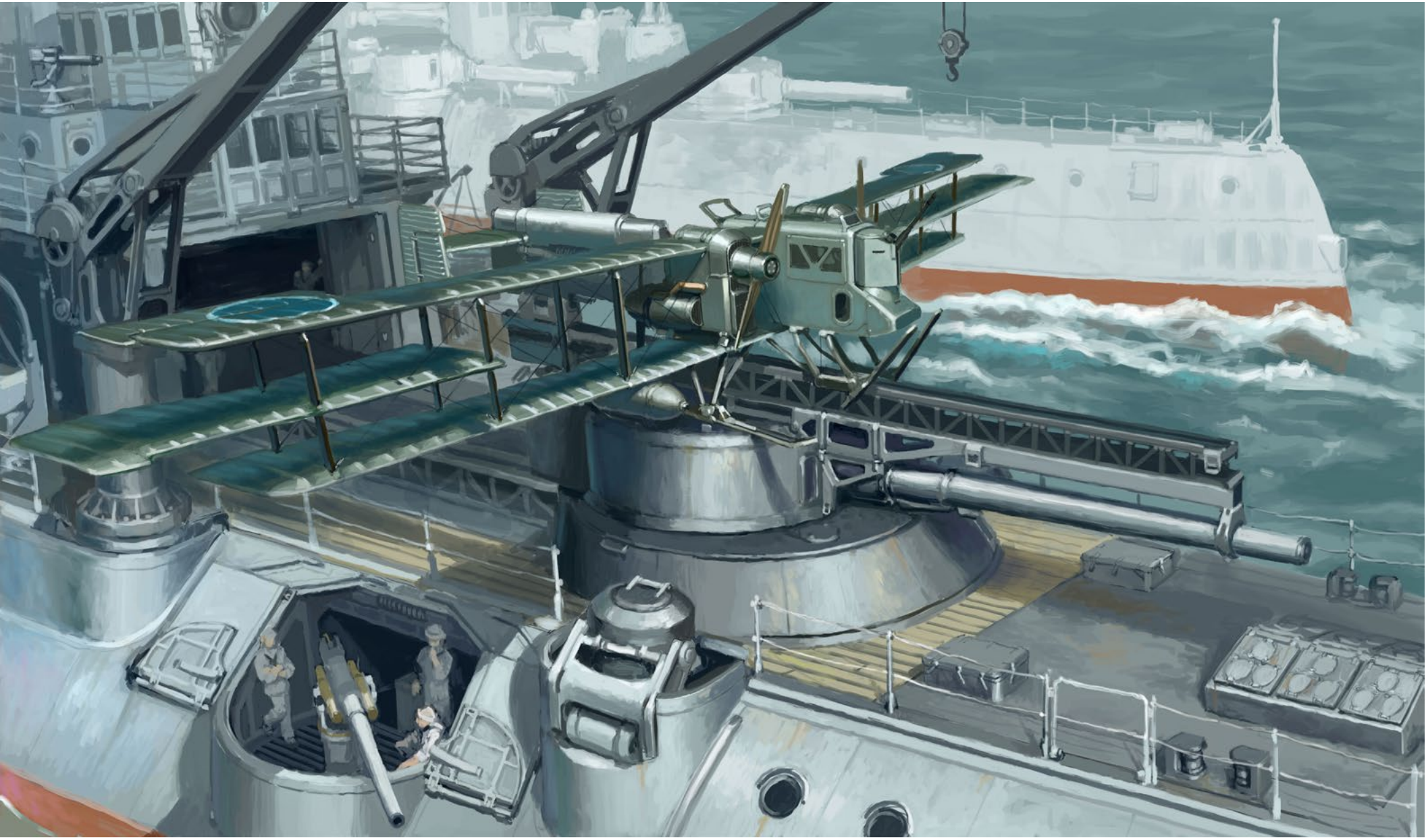
ROYAL AERONAUTICS MINISTRY R-3 BOMBER

The speed and initial success of the Martian invasion carried with it such a shock to the empires of the Earth that many of its implications took quite some time to fully appreciate. The so-called 'Ashes of 1902' led to many conclusions in the popular imagination, often along millenarian and apocalyptic lines, but there was a unity that emerged from the ruins, however briefly. The invaders fell to unseen serpents in their new and stolen Eden, and their passing left behind the full array of weapons and other technology they had brought with them to conquer this world. This arsenal would prove the seed of a new chapter in human existence.

Britain was hardest hit of any of the powers, but the aliens perished before they could consolidate their gains. The concentration of cylinder impact sites in the south of England and near French ports on the continent suggested a strategy of cutting off lines of transport and communication. This operation having failed, the global powers of the previous century were handed the arms of the next century on a platter, so to speak.

Like many things, the efforts to understand the Martian technology began humbly. Once the tripods were not an obvious danger, it became imperative to secure the equipment and installations of this alien civilization on against souvenir hunters and the (very natural) desires of the local populace to see all purged with fire. Credit goes to the initiative and forward-thinking nature of junior officers and policemen in the field. Quick thinking prevented panic and ensured what could be preserved for study, was. Indeed, the scientific nature of the education of these young men resulted in the capture of two living Martians. While these creatures did not live long after the fact, the observations gathered and the prompt refrigeration of the specimens yielded a series of insights into the nature of life and civilization on another world. For his efforts, the 22-year-old Corporal Wallace Stevens was commissioned a lieutenant in the Royal Engineers, and made a member of the Royal Victorian Order, the youngest to be ever made thus. Gratitude shown to the owner of the icehouse where the Martian remains were stored is not recorded, though tours were offered by the owner for some time after the event.

The most tangible fruit of the new spirit of international collaboration was the Daedelus, a dreadnought that incorporated many new features in armament and armor. In battle, she could flood tanks that were akin to torpedo blisters and ride very low in the water. As Martian heat rays fired in a straight line, she would be difficult to hit at even moderate ranges. Likewise, water attenuated the heat ray, so hits on the saddle tank would vaporize the water inside, rather that pierce the inner hull. The steam was vented upward, away from the vessel. Balloons were tried for spotting, but this was discarded as impractical. Experiments were also undertaken to use powerful pumps to spray a curtain of water around the Daedelus, further weakening the strength of the heat rays. It was speculated that the invaders had limited experience with water and its characteristics due to at least one tripod firing at a naval target at point-blank range and being burned to death by scalding steam. The great navies of the Earth hoped a recount would put them on top, but few others thought that the Martians would try the same thing



Here we see the R-3, a test aircraft designed to evaluate both Martian chemical rocket technology and their gravity control technology. The craft is fitted to the aft turret of the **Daedelus***, herself an experimental design incorporating ideas for countering a second invasion that would never come. Also of note are the markings— the R-3 wears the blue roundel of the League of Earth, an international technical and defense organization conceived of in the ashes of the failed Martian invasion.*

twice.

The flights of other vessels in 1909 and 1910 put the question of a war with Mars on another footing. Here was flight, on a level with magic. The flights of these first space vessels was followed shortly by the formal establishment of cooperation between most of the governments of the world. The Treaty of Zurich formalized the exchange of technologies between the industrial nations for forming effective and coordinated resistance against invaders from another world. The League of Earth is both commonly misunderstood and abused by the popular mind of the present, but represented a sincere (if flawed) attempt to unite humanity in the face of ultimate danger.

Paralleling international developments, the British attempts to build an effective flying machine for gunnery spotting got a big shot in the arm. Their use of aluminum instead of wood for framing, and their harnessing of chemical rockets to boost the takeoff performance of the meager powerplants of the day, was supplemented by a host of technical improvements garnered from elsewhere. Indeed, her wing design was in part derived from the fliers that the Martians deployed for reconnaissance on a corps level. The mystery as to why they were so ill-used was solved by an examination by members of the Royal Society that concluded that they were designed for a much thinner atmosphere with far less local variation in air temperature. The Martian machines generated adequate lift, but the drag of the thicker air hampered their performance. Combined with the various strong updrafts and downdrafts in air around the English coast in June, their loss rate becomes explicable, and the mercurial and miserable English weather proved an ally to the defenders.

It's debatable whether the R-3 could be considered a spacecraft. It was not first designed as such but was structurally strong enough to go to the edge of the atmosphere. Aircrew suiting provided a pressurized environment, but only just. While the 'R' series (for 'Royal Navy') resembled the fragile aircraft of the period, the materials and construction techniques involved were a quantum leap made possible by the capture of the automated factories and mining facilities the Martians had begun to set up. Aluminum and magnesium replaced wood and cloth, though the ancestry of these early designs was still evident. Central to this new identity was a scheme to mount a recovered Martian gravity drive on a warship and use this as a motive source for launching a smaller craft into the sky.

As mad as this may seem in hindsight, the thinking at the time was purely in terms of combating a ground invasion by extraterrestrial forces. Serious consideration had not been given to combat in space. Nevertheless, on a July morning in 1910 something extraordinary happened. At a secluded anchorage in the Severn Estuary, the R-3 was launched from an improvised mount on the aft turret of the *Daedelus*. Her boilers replaced by the salvaged gravity engine, she was little more than a barge at this point. A small group of launches and pleasure craft carried VIPs and technical staff. The test pilots boarded the smaller vessel, and at exactly nine o'clock a switch was thrown and the rocket motor on R-3 smoked, then came to life. Thirty seconds later another switch was thrown, and something stirred deep within the belly of the warship beneath. It rained upwards and the Daedelus shed flaking paint and bits of flotsam into the sky. There was a hum, a hiss, and a roar. The R-3 shot from her launch rail and into the morning, heading north and ascending, the gravity engine doing what the rockets could not. It was to have been a short flight, a simple feasibility test. Fate intervened in the form of a technical problem which plagued the Martian engines but was not understood until sometime later. The gentle lift in-

creased slowly at first, but then began a runaway reaction which saw the R.3 with twice, then three times, and ultimately six times the force of gravity. She accelerated straight up, with the gravity engine jammed wide open and glowing red hot. The heat jammed the training gear, and the engineers were no more able to move the area of effect off the poor R.3 than they were able to shut off the field. Thirty seconds later and the runaway operation of the engine ceased, her internals completely seized. It was only then that the wonder of the onlookers began to turn to horror. The R-3 seemed to have vanished utterly. A search was organized, and the recriminations began.

Two days later, a very strange story came out of small village near Nantes, on the French coast. The local constabulary received reports of a Martian attack, but the accounts were contradictory and confused. One old woman said she saw an angel, and identified it St. Michael, 'with great silver wings and a flaming sword'. The army was called in, and at a farm called Chateau Brochard, the mystery was solved. The R-3 had come to rest there, in a bean field. Her motors torn away, she had glided in. The crew had been pulled from the craft by the old farmer and his wife, unconscious . Caring for the injured airmen as best they could, a runner was sent to the village, but the message became garbled en route. By the time help arrived, the engineer had regained consciousness, but the pilot had succumbed to his wounds. It was some time before the engineer was able to talk. Once he was stabilized and transported back to England, he was debriefed by the project director and representatives of the Board of Admiralty, as well as their French counterparts. The sworn statement of the engineer, one Flt. Lt. James Francis, comes down to us explaining what he experienced:

"It was dreadful beyond words, but beautiful in some moments. Edwards (the pilot) fought for our lives the entire time. The acceleration gauge pegged seconds after we launched. I knew something had gone wrong, but the noise and vibration was so great in the cockpit that I had difficulty communicating with the pilot other than with hand gestures. He knew something was wrong too, but tried to ride the beam all the way up. Keep us straight, keep the wings on. I must have passed out. When I awoke, it was in a blue darkness. The Earth was far below and shone like a jewel. The sun was impossibly bright, and we were somewhere over the Channel. Edwards was still moving but couldn't communicate. He was horribly burned from the sun exposure. We seemed to hang there for hours, but it couldn't have been too long. We arced downwards, and I lost consciousness again. They said it was the cruise engines tearing loose that saved us. Altered our center of gravity and allowed us to land so gently. I can only credit poor Edwards, God rest his soul."

By accident, Britain was the first to send a man into space. While both tragic and absurd, the role of happenstance continued to loom large as the mysteries of Mars were unlocked. The remains of the R-3 may be seen in the Imperial War Museum, and the *Daedelus* continued for some time in service as a test platform before being sunk as a gunnery target in the late 1920's. The relationship between the British and French technical establishments warmed somewhat as a result of this exercise. Both warship and spacecraft were of transitional types. Neither could be counted as successful, but ideas begun with them would find more potent manifestations in that which followed.

ROYAL AERONAUTICS MINISTRY RA-6 'SHRIKE' SCOUT

Perhaps understandably, the British clung to their terrestrial empire more tightly than the lesser powers of our world, and her space units reflected these priorities. This was especially true of the first generation of space-capable fighters fielded in quantity by the Royal Navy. Used primarily as point interceptors and rapid reaction forces, the early small craft of the British were quite crude at first, with very limited endurance. Anticipating a defensive war against an invader who needed several hours to deploy after landing, a requirement for a fast, light vessel for use in scouting cylinder impact points was circulated. These would also direct ground or naval artillery to destroy cylinders before they could disgorge their deadly cargoes. While the cylinders had proved largely impervious to conventional shells, there was hope that newer cobalt-tungsten alloys could readily pierce the Martian armor, which was determined to be a sandwich of ceramics, steel, and lighter alloys which wicked heat away from the shell into the impact medium the cylinder found itself in. As fallbacks, there were varieties of chemical and biological agents determined to be suitable for making the tripod operators feel unwelcome. Curiously, there were also trials undertaken to see if sealed cylinders could be wedged shut by either warping the threads of their hatches with thermal shock or sealing them with quick setting concrete or bitumen. The finish and materials of the cylinders prevented any of these novel attacks from showing sufficient promise to proceed past testing, but the newer shells showed potential.

Against this backdrop of old ideas and desperate notions, the British came up with what was arguably the best of the first-generation space scouts. While little more than a glider fitted with an efficient chemical rocket, the design became much more potent when combined with fixed and naval gravity catapults. Thus, the small craft would travel in arcs, being launched from one site to the edge of the sky then coming back down in an assisted glide to be popped back up as needed and as stores and the air supply held out. These were not comfortable machines to operate, with the fact the first space suits were both cumbersome and prone to malfunction. There were dangers and reversals of fortune to space flight in 1912 that would be difficult to imagine a decade later, let alone now. Many things were learned quickly, though extracting a great price in the process.

While there were designs deployed before the RA-6 (later called the 'Shrike' officially and 'Little David' less so) these were largely experimental designs, both ad hoc and almost entirely dead end in nature. The Royal Aeronautics Ministry (before such craft were put under the purview of the Royal Space Fleet) design managed to distill many hard-won lessons into a robust, simple, and arguably elegant design. Alloy over tube steel, they resembled an aircraft of the period in general configuration while diverging in particulars of construction, role, armament, and performance. Weight, within reason, helped her ascend more quickly and in one piece. Built like a biplane with a vee-tail, the nose contained the combustion chamber of her rocket motor, with nozzles to each side, venting at an angle between the wings. Armament was fitted to the centerline, and typically consisted of rockets or bombs, the sophistication of which evolved rapidly over even her short

Three RA-6 'Shrikes' of XXIII Squadron RSC on maneuvers somewhere above the pole, accompanying a strike aircraft. Operating out of the Hebrides anchorage, these machines were the first line of defense for the north against potential Martian attack from 1913 to 1917.

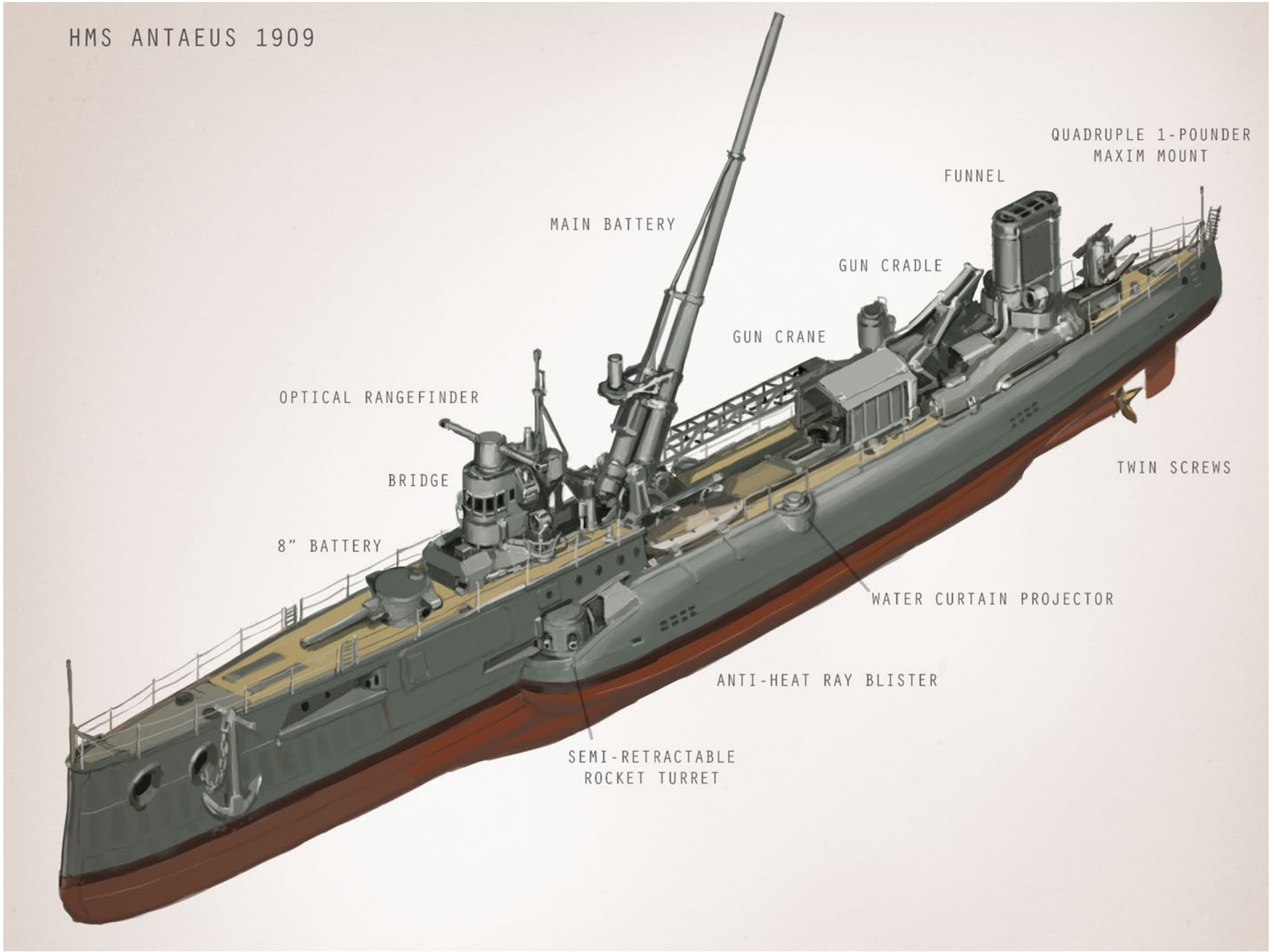
service. Integral with the design was the need for a pressure suit capable of keeping the pilot alive and combat capable during his flight. While the first suits were little more than deep-sea diving suits, the poor visibility and impaired manual dexterity of these repurposed suits forced newer, more suitable designs to emerge. These can be recognized by their great glass helmets and improved gauntlets, though they incorporated many additional features that are less obvious. Air was supplied via a closed rebreather, using a reactant that emitted oxygen upon exposure to water vapor in the user's breath. While the permangenate rebreather was simple and functional, it did mean that the craft had an additional ignition source on top of the the propellants and explosives that were its stock-in-trade. Fires and crashes were almost inevitably fatal, and training accidents took a high toll.

For all their limitations, the RA-6 saw itself carried along with the Martian Punitive Expedition in 1916 as scouts, though they saw limited action due to both a lack of surface targets to engage and the performance and range penalties they paid in the thin air. During the run up to open hostilities between Britain and Germany on Mars, they were more of a phantom threat than a concrete military asset. Many machines were abandoned, though the type was considered for refurbishment and fitting with new engines in the early 1920's. Examples of captured RA-6's were used by the Neomartian Russians when they attempted their breakout and return to Earth in 1923, though no examples survived the battle.

The type, both overtaken by technology and savaged by operational and training losses, sees no survivors on public display. For boaters able to access the site, the former Hebrides anchorage holds some six examples of the machines upon the wreck of Gravity Barge Number 6, the former sky monitor HMS Antaeus. While skeletonized due to the dissolution of the magnesium in their outer skins, they are otherwise pristine. The water in Loch Tamnabhaigh is very clear, particularly in the coldest months (though the weather can be treacherous), presenting a fine view of both the lost barge and her charges at a shallow depth of only some fifty feet. As a war grave diving is not permitted, other than the yearly placing of a wreath on her wreck marking the anniversary of her loss. The tragic chain of events that led to the implosion of gravity engine is detailed in Banistre Key's book on the event, *The Weight of Ice: Survival and Decision at the Edge of the World*.

The HMS* Antaeus*, before her conversion to Gravity Barge Number 6. Seeking naval artillery that could engage targets well over the horizon, her massively reinforced hull made her a suitable candidate for launching light spacecraft when stripped of her armament and engines, then fitted with gravity engines to propel them.

One of the HMS* Chronos *class, these ships were specialized craft designed after the Martian invasion to engage tripods from over the horizon. The Martian arsenal being dominated by either gas or line-of-sight weapons, one possible way to combat them was attacking from where their heat rays would not reach. Designed to operate in squadrons of two to six ships, their gunfire would be directed by forward observers operating from concealment and communicating with wireless or other signals. In addition to a heavily reinforced keel, the 14" battery was mounted internally on a sort of sled or platform buffered by a series of cylindrical chambers partially filled with oil. Acting as oversize pneumatic struts, these absorbed much of the recoil of firing. Note the fitting of water curtain projectors and anti-heat ray blisters on the hull after the manner of those first incorporated into the design of the* Daedelus*. With the changes that came after the Martian Punitive Expedition, these ships were made redundant and found new lives in gravity bottle research.


HMS ANTAEUS 1909
QUADRUPLE 1-POUNDER
MAXIM MOUNT
FUNNEL
MAIN BATTERY
GUN CRADLE
GUN CRANE
OPTICAL RANGEFINDER
BRIDGE
TWIN SCREWS
8" BATTERY
WATER CURTAIN PROJECTOR
ANTI-HEAT RAY BLISTER
SEMI-RETRACTABLE
ROCKET TURRET

HANDLEY PAGE S/100 DUAL ENVIRONMENT BOMBER

While ubiquitous, the Handley Page S/100 represents the end of an era for a particular set of technologies and the tactics used to exploit them. Tied to ground launch and guidance, the type would be overtaken later in the war by longer-legged and more independent craft. While it can be argued that this delay was largely doctrinal, the technical difficulties of a tiny vessel finding its way through space unassisted cannot be ignored. This is not to disparage either the capability or fame of the type, but rather that the design could be seen as the dividing point between purely terrestrial concerns and what came later.

Developed as both companion and projected replacement for the RA-6, the S/100 was both larger and more capable. Ideally the role of point interceptor and strike craft were to be undertaken by different and more specialized systems, the rapid evolution of both tactics and the nature of the adversaries faced saw roles mixing to a chaotic degree. Conceived of as a true dual-environment weapon, it asked much of pressure suit designs of the period, though a significant amount of technology transfer from Mars eased things to a degree. While constructed much like an aircraft of the period (not coincidentally being designed and built by one of the leading aircraft manufacturers of the period) and retaining all appearance of a contemporary aircraft, these were the first generation of machines to benefit from Martian materials engineering.

This filling of old bottles with a new and alien wine was due to the increasing availability of exotic alloys and novel raw materials produced by the construction cylinders that accompanied the invaders in 1902. In a ratio of roughly 10:1, these so-called 'construction cylinders' had specialized machinery and associated technical crew to aid in creating forward bases for the invaders, in addition to producing refined metals and raw materials to ease the construction of additional facilities to aid the invading forces. The loadouts of the cylinders both varied and had interdependencies that took some time to understand. The so-called 'Black Cylinder' that impacted in the West Midlands immediately began turning out large quantities of regular plates and spars of a woven fibrous material of extraordinary resilience and lightness. In the chaos of the invasion, it was some weeks before the site was fully secured and by then the 'infernal loom' as the Birmingham papers called it had created a great stock of these parts to an unknown end. When the control signals were deciphered and the works shut down for analysis and potential reverse engineering, the mysterious silver-black material was quite a curiosity. Much was carted away by the local inhabitants for shelter and repairs, despite official warnings to the contrary. So prodigious was the amount of material left at the site that some even burned it as fuel, though this made a choking black smoke and left a crystalline ash that irritated the skin. More constructively, it was learned that the material (called 'hobs bone' by this time) could be worked like wood, with certain precautions. It was with this last revelation that some nameless engineer got a gleam in his eye and a trainload of this strange material found its way down south to Farnborough and revolutionized the fortunes of the ailing Handley Page company.

Until this point in time, space vessels were either essentially ship hulls thrown

HANDLEY PAGE S/100(S)

Depicted striking the Pan-Austrian fleet anchorage at the mouth of the Yalu, the Handley Page S/100 represented the might of Britain in space and across the world for many in the early 1920's. Seen here is the (S) (for 'Short') variant noted for its narrower wingspan and reliance on almost pure thrust rather than lift for sustaining flight.

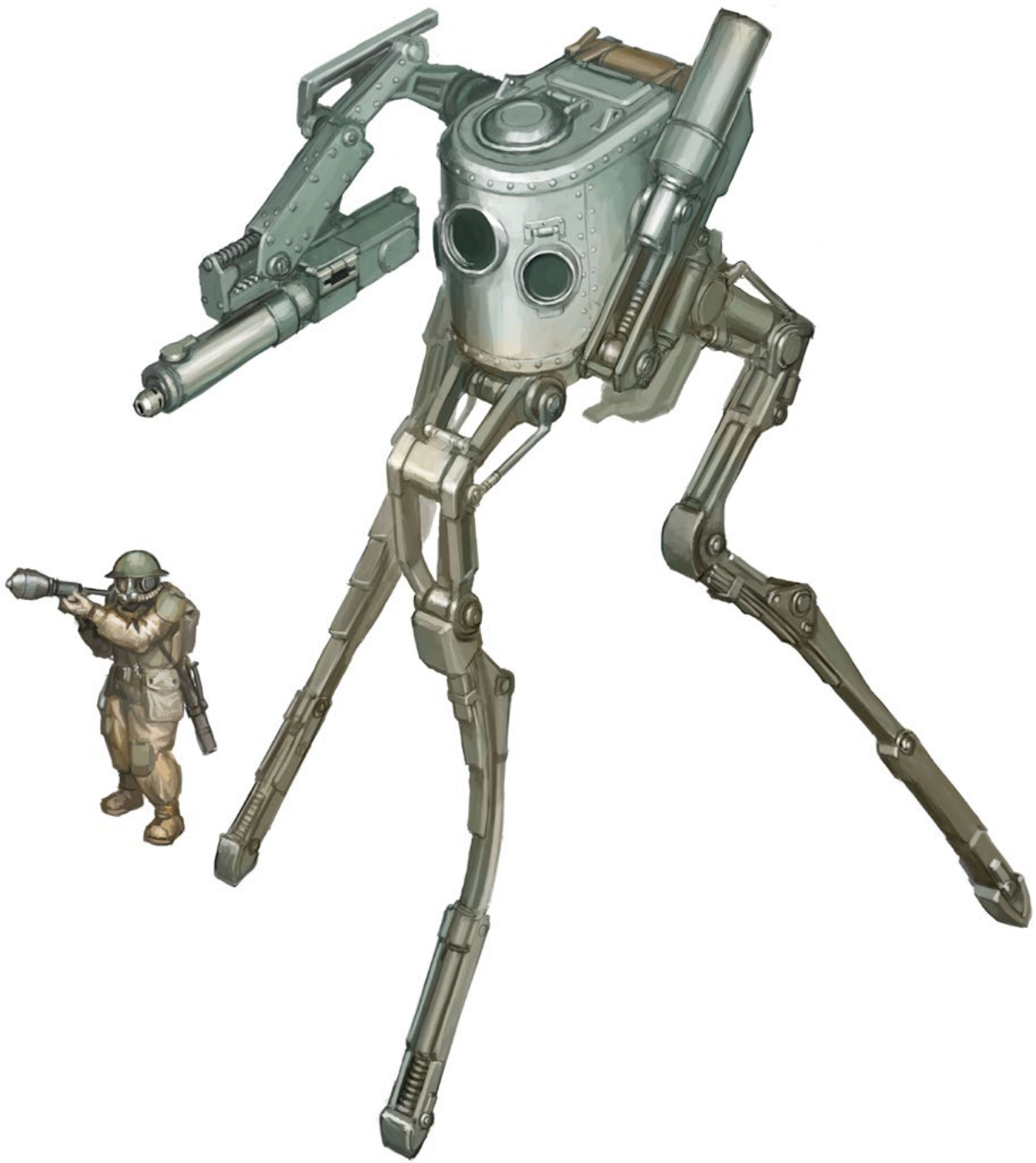
In many ways using new materials to cheat old ideas into practicality, the S/100 is easily mistaken for a contemporary aircraft. While early marks (such as the one shown) used radiothermal engines, the basic structure was amenable to gravity bottle propulsion and even full gravity engines once they became sufficiently miniaturized. Substantially overbuilt but too short-legged for frontline use after the mid-1920's, the type soldiered on in a variety of utility and training roles until the late 1930's.

into space by their gravity drives, or fragile kite-like craft projected into orbit via an external power source and left to make their way home at the whim of fortune and Newtonian physics. The S/100 and her descendants were different, as the vastly lightened and strengthened components made it possible to add proper engines and made for a craft able to fight credibly both against vessels in orbit as well as strike ground and naval targets upon the surface of the Earth. While not able to operate autonomously or at long range (by the present understandings of the terms) they were a great leap forward. Manned by a crew of three to four, the considerable workload could be spread out among many hands. Propulsion setups were varied, but the most common type consisted of a pair of radiothermal engines for cruising and a chemical rocket for orbital insertion and emergency boost. While internal tankage was sufficient for this (barely) in practice the S/100 was typically launched via gravity catapult like its forebears.

While able to carry a substantial payload, aiming at the speeds involved was a problem that plagued the emerging class of 'bomber spacecraft' that blurred the line between surface and space warfare. Able to both drop conventional bombs on targets within a gravity well and fire rockets or recoilless guns at space targets, the evolving art and science of fire control was sorely taxed by the closing speeds involved.

The type served in quantity wherever there was a British presence. While conceived of in the bomber and strike role, when pressed into service as interceptors and armed with rockets they extracted a heavy price from long range German bombers. Continuously improved and built in quantity through the early 1920's, large numbers were stockpiled during the French-brokered peace. Few expected the peace to hold, so preparations continued. While German facilities on Mars and more distant outposts were savaged by S/100 raids, the so-called 'Rotten Peace' and subsequent Icarus Event prevented any sort of final victory. Unprepared to stand against the Neomartians and being too short-legged to get caught out by Icarus, the type largely languished for want of functioning engines. While many were scrapped, some continued in service for several years after the defeat of Nemesis and the new generation of miniaturized gravity engines came into production. These refurbished examples are almost unrecognizable, due to subsequently being fit with pressurized cockpits and the deletion of the now-redundant boost engine and associated dorsal fittings. The spun carbon used the framing of the type is subject to fatigue with age, so even these rebuilt examples are vanishing rapidly from service. Though there are numerous preserved examples in museums, very few are spaceworthy. The legacy of Britain's first space bomber is also iconic enough that there are a number of reproductions on the market built with modern materials and features. These vary in the authenticity of their appearance, but almost universally fail to capture the wild and haphazard character of early gravity engine flight. As copies are copied from copies, the original often becomes obscured and history recedes into legend with nothing to mark its passage.

Being one of the most famous spacecraft of the day, the 0/100 is also depicted on the reverse of the Prometheus Medal, minted in 1942 to celebrate the ten-year anniversary of the defeat of the potent alien vessel known only as Nemesis. Why idealized, the craft depicted is generally understood to be the Dick Turpin, flown by Lt. Xavier Nash (later Lord Nash) during the so-called Battle of the Moon.



Contemporary with the S/100, the British had also developed a number of heavy and light combat tripod designs based on captured Martian machines. More effective than tracked or wheeled vehicles in the low gravity and harsh surface conditions of Mars, the tripod came into its own in surface combat. While useful where they could be deployed, some means of moving these machines rapidly around the battlefield was desirable.

After the ascent of the gravity bottle as a means of giving greater performance to smaller vessels, the Handley Page S/100 was explored as a potential tactical transport. With reworked engines and a large bay opened up in the lower fuselage it became possible to transport a light tripod like the Mark III depicted here directly into combat. While not without considerable hazards, this mating showed promise and some dozen examples were converted to combat tripod carriers, receiving the designation S/100(T).

WARSHIP - GREAT BRITAIN

HMS *MANCHESTER* CLASS CRUISER

WARSHIP - UNKNOWN

UNIDENTIFIED TORPEDO VESSEL

While in contrast with the massive fortress ships that served as the centerpieces of the great fleets as well as the smaller and more nimble types that hunted them, the British initially experimented with more intermediate types. The HMS *Manchester* and her less-famous sister the *Birmingham* were laid down in pursuit of a class of vessel that paralleled the range and self-sufficiency of the oceangoing cruiser. This type would be in marked contrast to the then-unbuilt Emperor class and her support fleet, being able to travel to the edge of human space and back unescorted and with a useful payload. While this was a realistic goal for 1929, when work began in 1917 the technology simply wasn't there to support the design. First taking flight the following spring, the HMS *Birmingham* proved unable to make orbit and was promptly 'put on a diet' and began an extensive rebuilding. Modified rather than rebuilt, her sister the Manchester was completed first and was attached to the fleet after a shakedown cruise in order to work up tactics for what was a very novel (and somewhat fragile) vessel for the era. In practice, she was a disappointment. While lightened considerably, her gravity drive was underpowered for her displacement. She struggled to reach space and was difficult to control when reentering a gravity well. The fuel and reaction mass saved by operating a lower-rated drive proved minimal, and her machinery was so overtaxed by operating at the upper limit of its performance that she required overhaul after less than a year of service.

In the end, it was just too much. In search of a role, the Manchester had difficulty fulfilling any given her. Unsuitable for even training duty, due to her finicky machinery and the shortage of highly-trained personnel needed to operate and maintain it, she was laid up until slated for sale to Japan as part of a technology transfer agreement. This rather remarkable episode and the skulduggery associated with the agreement was emblematic of a change in the political winds. Mars had been conquered, nominally, leaving the secrets of the ancient races which dwelt there as prizes for those who could claim them. Competition resumed, albeit neither instantly nor with a lack of reflection among the participants. Britain wanted allies for her part, rather than enemies or slaves as she expanded to other worlds. Analysis of her foreign policy lies beyond the scope of this book, but Cleeson Darnell's *Throne of Stars: Elizabeth Versus Mary* is a good introduction to the subject and does a credible job placing it in a historical context.

Being untouched by the invasion, and seeking some way forward among the stars, Japan sought access to the Martian technology in exchange for leased naval bases in the Kuril Islands. Russia protested this as provocative, but lacked the space or naval strength after the revolution of 1919 to make a credible threat. Indeed, Britain needed not build permanent facilities so close to Sakhalin to accomplish her goal of keeping the Russians spread thin while she consolidated her gains on Mars. In ex-

Three unidentified torpedo vessels engaged in a strike against the former HMS **Manchester***, which was being sold to Japan as part of technology transfer agreement. Agents acting on behalf of Russian interests were suspected, but nothing was ever proven. The nature of the operation implied an intimate understanding of the disposition and movement of Imperial forces, which threw suspicion elsewhere.*

change, the Japanese got possession and support for a current generation space vessel and the option for more. Whatever the limitations of the *Hosho*, as she was to be called, it was understood that the pace of change was great enough that the best strategic option for Japan was to begin training a nucleus of junior officers now to take best advantage of the indigenous vessels to be built in the name of the Emperor within the next ten years.

In the end, it never happened. Just after midnight on the 12th of October the *Manchester* suffered a highly suspicious malfunction of her gravity drive while being fumigated, just prior to being turned over to her Japanese crew. Unoccupied, she was seen to lift from her berth and launch skyward, snapping her lines and drifting out over the sea. Some ten minutes later, a great light and rumble like thunder was noted by merchant ships and flaming debris fell for some miles along the Welsh coast. Gravity drives of the era were by no means particularly safe or predictable, and this loss could conceivably have been the result of happenstance. As suspicious as the view from the ground was, the actual destruction of the *Manchester* was also witnessed by the three-man crew of a patrol zeppelin who only happened to be close to shore due to compass failure. What they described seeing was infinitely more shocking: As the out-of-control cruiser spiraled up above the cloud cover, a trio of smaller vessels emerged from over the horizon to the west and closed rapidly. At close range, they fired multiple rocket torpedoes at the *Manchester*, which exploded once her boiler was ruptured. The attackers then accelerated upward, their rockets vanishing again out to sea as the clouds below were lit by a greater conflagration. Few details of the attackers could be made out in the time glimpsed, but their general configuration would be familiar to any space naval officer in the world. They were orbital gunboats: Ubiquitous, even if purists objected to anything in the sky being called a 'boat'. Fast and heavily armed, but fragile and short-legged, the type lent itself to deniability.

It was a shocking reversal to a shocking occurrence, and reactions within the government ran the gamut, even as they tried to keep the account of the zeppelin crew secret. Within a few days, Captain D.R. Smith and his aircrew were questioned, arrested, released, and ultimately told not to speak of the matter. It became a diplomatic incident between Britain and Japan, which began a long series of events that saw a realignment of alliances in the Pacific, particularly after reverse engineering of the construction cylinders reduced the capital outlay needed for heavy industry and put a premium on the value of raw materials.

Russia was suspected by all involved, who loudly proclaimed her innocence and accused England of attempting to start an arms race in the far east. Torpedo fragments recovered from dredged wreckage had Italian manufacturers markings, but this proved little. In the end there was no sale, no treaty, no cruiser, and no culprit found. On another tragicomic note, the truth was ultimately revealed to the public to quash wilder stories and a general sense of panic that clung to the entire affair. It was felt Russians were preferable to Martians as a bugbear. In a footnote that further strains credulity, Captain Smith was revealed to be a German agent some years later and fled the country for Italy. He was subsequently something of a picaresque folk hero in popular novels, depicted as being all manner of things from half Martian, to falling in love with a faerie which he rescued from captivity (assisted by the ghost of John Dee), to even more difficult to follow yarns involving riding dinosaurs through the hollow interior of the Earth. In light of all this, the desire for anonymity by the rest of the aircrew is understandable.

Following the dissolution of the technology transfer agreement with England, Japan found herself both unable to meet her modernization goals and in conflict with Russian expansion in the Pacific. Concentrating on atmospheric and surface defenses, Japan later signed treaties with South American nations as the Martian manufacturing techniques were obtained by other means. Here we see a Japanese atmospheric patrol craft intercepting the Russian proto-fortress ship **Navarin** ***somewhere over the Sea of Japan.***

WARSHIP - GREAT BRITAIN

HMS *DAEDELUS* CLASS SKY MONITOR

British tactical doctrine in the years after the invasion saw spacecraft as an adjunct to traditional ground and naval forces. Due to the distances involved, the idea of a space vessel that could effectively fight in space was an idea that took some time for the powers of Earth to come around to. The first Martian cylinders were really just landing craft on predetermined courses set at the time of launch, and if intercepted had no ability to defend themselves. The medium of interplanetary space was seen as a way to get to the battle, rather than space itself being the field. While easy enough to decry the narrowness of military thinking at the time, the years leading up to the grand multinational operation that would be known as the Martian Punitive Expedition saw such a sense of urgency about bringing the fight to the homeworld of the invaders that all other considerations were secondary.

While initial British work on gravity control was done under the aegis of international cooperation, she did not neglect to develop independent capabilities. While the initial rush of brotherhood and cooperation in the face of an implacable enemy had not faded, Britain was still preeminent among the naval powers in both warship tonnage and the industrial base to make more. The tripods with their terrible weapons had killed many and caused a great terror but they had not wrecked the transport hubs of the channel, nor the shipyards of Dublin, Edinburgh, and Liverpool. The trades of the engineer and shipbuilder were turned with remarkable ease from spacegoing to oceangoing vessels. To keep air in and to keep water out are very similar tasks at the heart of things.

To say who was first into space is a complicated question, and the answers are likely to often say more about who was asked than the question itself. The USS *Vulcan* and the *Boris Godunov* had both beaten the English into space, but these were ships based around salvaged Martian gravity engines that were neither understood nor reliably controlled. Likewise the R-3, dependent as it was upon external power, might not meet a strict definition of a spacecraft, at least as it was understood in the 1920's. Arguably, the first true spacecraft of human manufacture was Gravity Hulk No.1, also known as SV *Goliath*. The Royal Academy had gained access to a Martian gravity engine very early on, it being removed from one of the famous impact sites near Weybridge. The caveat was that it was not in working order, nor was it likely to be made so without considerable effort. As the tripod crews and their support personnel had succumbed to the microbes of Earth, there was an interval where they lived and moved, but could not effectively use their weapons. It was in this short gap that two squads of picked infantry, assisted by poachers, worked their way into the Martian camp with incendiaries and demolition charges. Effectively unopposed, they set fire to the Martian flying machine there, killed two tripod operators and threw demolition charges into the cylinder. While seen as unhelpful by the engineers later trying to make sense of the wreckage, the situation was such that the Royal Society now had an alien gravity engine to examine that would not be snatched away by the army or the navy for immediate and desperate employment in a vessel of limited capabilities.

The broken gravity drive and a small staff of experts in engineering, physics, and

Here we see the HMS* Asterion *and the HMS* Cerebus*, two sky monitors of the* Daedalus *class engaged in a bombardment against the Martian Remnant. The view is likely from the carrier HMS* Inescapable *(formerly the MV* Acadian Princess*) prior to her loss in 1922.

metallurgy were moved to a quiet manor on the outskirts of Grantham, Lincolnshire, with two basic directives: 1. Figure out how it works, and 2. Figure out how to make more. Little was heard of them until 1915, when they had workable answers to both parts of the directive. It may also be observed the while the discreet work comprehending and duplicating the alien technology lacked spectacle when performed at a laboratory scale, England seemed to not be in a hurry to share her findings. While old mistrust could account for this, the Martian Punitive Expedition was undertaken not so much under a mutual veil of secrecy, as in an atmosphere of more general uncertainty and mystery. Whatever old mistrust existed, greater was the mistrust in fortune and the secrets that the night sky might hold.

The first vessel to be fitted with a gravity engine of human manufacture was the aforementioned SV *Goliath*, though known to most soon after as the Teapot, her squat and round proportions making her the centerpiece of a cartoon illustration on the cover of *Punch* the following week. This depicted the various leaders of Earth as characters in the mad tea party scene of *Alice in Wonderland*, with George V smiling on as the Cheshire Cat while First Sea Lord Hammerstone proffs the ungainly vessel at the recently ascended Empress Anastasia of Russia while proclaiming 'Clean cup! Move down, move down!' and a jabberwocky with three legs stalks through the Tulgey Wood in the background. Resemblances and notoriety notwithstanding, the layout of the vessel was dictated by both the bulk of her gravity engine and the role that the warships derived from the design were to play. Waterborne performance was seen as incidental, and the hull was monstrously overbuilt along the lines of a bomb ketch. It was felt that the type could be used as a great mobile gun platform, enabling a sort of spaceborne siege upon Mars.

For those who either experienced the Martian invasion firsthand or grew up in the shadow of it afterward, the fear of what might fall suddenly from the sky was almost universal. The fact that the cylinders which fell were projectiles fired by guns of a caliber exceeding thirty yards was not a source of public fear, but privately scientific and military minds came to understand the materials engineering involved and the degree to which Martian technology eclipsed that of any nation of Earth. Any hope for the survival of humanity lay in what clues could be gleaned from the cylinders and what lay within them. While it was once assumed that the nature of these projectiles was such that the buried end would consist of a conical tip much like a conventional artillery shell, this proved not to be the case. Instead what was found was a stepped structure with a flat face on the extreme end. This was covered with the remains of what seemed to be an ablative plate made from a crystalline form of aluminum oxide and silica. Though exotic, these materials were at least of a conventional metallurgy able to be understood by pre-invasion science. While the ablative plates on the cylinders answered why they hadn't buried themselves all the way to bedrock on impact, the physics of their journey and arrival still didn't add up. It was in these attempts to reconcile the weight of the cylinders and their behavior that gravity control was first suspected, though it was ultimately American research that first isolated the gravity engine and its basic functions.

However fascinating and humbling they were to contemplate, the creations of the Martians were both understood and reproduced with time. Gravity control provided the answer as to both the behavior of the cylinders as well as the reason for anything inside surviving the launch forces that sent them to our world (to say nothing of the impact upon arrival). It was discovered that it was possible to counter-

act not just gravitational forces but inertial ones as well. This made it possible to fit the massive main battery that was the signature feature of the design. For use against static fortifications, the massive 48" mortar was a byproduct of an abortive effort to develop a supergun capable of hitting Mars from Earth. This effort was later abandoned, but not before yielding interesting results in the realms of ballistics and metallurgy. Prior to the occupation of Mars, invasion by Martians was still feared and the heat ray was a weapon potent enough that it was felt the best way to combat it was from a distance. Firing in a straight line, vehicles and installations utilizing the heat ray were theoretically vulnerable to artillery shelling them from over the horizon. While accuracy could not be assured at these ranges, heavier shells with an increased area of fragmentation and overpressure still showed promise. Combining these new house-sized guns with gravity engines capable of preventing the recoil from tearing the hull apart, yielded a sort of flying siege engine designed to take part in the Martian Punitve Expedition.

Though a few were completed in time for the mission to attack Mars, the emergent class of warship was notable for applying the principles of Martian gravity reversal drives to shock loads as well as suspension and locomotive needs. This enabled the prodigious shell weight of the main battery, which proved so useful in operations against the remaining turret complexes at the Martian poles. While the initial Battle of Mars proved to be anticlimactic, the automated defenses that greeted the Martian Punitive Expedition were effectively immune to all but the heaviest weapons and prevented the landing of surface forces. Deep set in the Martian bedrock, hidden energy and ballistic weapon positions proved hazardous as scouts approached the poles. Firing from over the horizon, the four vessels of the class were able to pound these hidden redoubts into dust without being able to be fired upon in return.

While initially effective, the *Daedelus* class, as they came to be called in service (not to be confused with the earlier experimental ship of the same name), were quickly superseded by newer types. Due to the stresses involved, the hulls exhibited cracking and deformation almost immediately and saw poor serviceability as a result. In addition, the lack of isolation between the hull and the gun carriage resulted in almost debilitating shock to the crew upon firing of the massive 200cm main battery. These factors, combined with the poor atmospheric performance of these vessels, even when fitted with massive steering engines, saw them all withdrawn from service by 1918. Their engines and armament were transferred to new vessels and surface defenses respectively, and they were subsequently scrapped. No real trace remains, though the Martian gravity engine that began the affair is now on display at the Royal Academy museum at Woolsthorpe Manor.

WARSHIP - GREAT BRITAIN

HMS *DURANDAL* CLASS GUN CARRIER

"...and there among the dust did the blood, bones, and sinews of another brave crew join that dust. For an instant their fate was as another small star in the heavens, visible to a few upon the Earth and of unclear import to those who noticed."

-EF Samson, writing for *The Praxis* upon the loss of the HMS *Meurglys*

The HMS *Durandal* class was a small series of small stopgap vessels that used a boosted-chamber 16" gun firing along the centerline. The improved gun technology was the result of new alloys and propellants derived from Martian sources, which allowed higher chamber pressures and a correspondingly higher shell velocity. The shorter travel time this resulted in went some ways in making up for the rudimentary fire control most vessels still employed. It also led to a series of rather eccentric designs being developed and used in combat. While the *Daedelus* class of artillery ketches could claim greater durability and tactical finesse than its fragile Russian contemporaries and their reckless captains, the 'Sword' class could offer no such alibi. By opposing the recoil forces with the direct output of the gravity drive, it was made possible to fit a weapon of great size to such a small (some would say overly so) hull as this. These were to be used as pickets operating from a larger vessel or installation, screening important sites and travel chokepoints. While a hit from this weapon had a good chance of disabling all but the largest vessels, the reload rate made them only truly effective in packs. On their own, a miss with the initial shot left the vessel nearly motionless until she could accelerate again and defenseless but for her 5" battery and small guns.

The type has its origins in 1926, with a need to replace losses from the costly repelling of the Neomartian attempt to break out of their exile on Mars and reach Earth. Not only had many ships and crews been lost, but the contemporary success of France's new 'fortress ship' *Charles Martel* in making the round trip to Uranus in a matter of weeks, showed that space warfare was becoming more mobile and less predictable. While the nations of the planet were at peace, none expected it to last. Britain then lacked the numbers of capital ships needed to face her opponents in the field, and more subtly check her erstwhile allies. While France had begun to apply the technology gleaned from the construction cylinders somewhat earlier than England, the greater industrial base of the latter allowed her to catch up quickly. The real chokepoint was neither manufacturing capability nor manpower, but rather the availability of iron in sufficient quantities to keep up with the building programs underway among the empires of Earth. The shortage of trained sailors was endemic.

While the technology of the construction cylinders allowed the creation of self-replicating factories and support facilities to proceed apace across Britain, they still needed Australian iron to build their fleets. In time, the shipyards would be sown across the Empire, but the technology was so new and had such destabilizing implications that it was kept securely at those facilities which could maintain a pantomime of conventional shipbuilding techniques. Labor difficulties and a need to compartmentalize operations complicated matters further, so the first hulls of the class were built by conventional means at smaller yards in Ireland, though the great

Depicted here is the loss of the HMS* Meurglys *to the German cruiser* Gessler*, this operating in a commerce raiding role near the Jupiter trojans. The small asteroids and their associated debris served to shield vessels from being detected on the radioheliograph.

guns were made by more exotic techniques in the purpose-built facilities at Woolwich. Fitting out was done downstream at the Isle of Dogs, though as gravity engines became more reliable they were launched skyward directly from the arsenal grounds.

The tinge of madness that colored the design seemed to permeate most everything about the small vessels. This included the imaginations of her engineers and captains who, having grown up in the shadow of one war and come into adulthood during the intermission of another, carried an air of recklessness and fatalism about themselves. Survival was not a question dwelt upon, as the sacrifice of small craft to defend against the dreadnoughts of the other powers was a foregone conclusion. For the moment, there was speed and there was might. Their crews were known for tuning their engines far beyond the original design specifications and the dexterity of their maneuvers was legendary. Fitted with autoloaders, the guns could fire once a minute or so, but few captains expected to fire at a target more than once. You either hit with the first shot (which did the trick), or you didn't have a chance to fire another.

With the attack on Phobos Station providing a pretext for the beginning of hostilities (if not an adequate explanation) the 'Sword Pirates' as they called themselves had their moment. Pursuing the German bombers as they retired, they exacted a high price from the attackers. Buoyed by this initial success, the type was deployed more widely, often in roles for which it was not designed. The slow rate of fire and the loss of engine power for a few moments after each shot left them vulnerable, their speed being their only real protection.

Combat tactics typically consisted of two pairs of machines closing on a target at high speed from slightly different angles. Dreadnoughts or bombers would need to either increase speed or turn. Having committed, they would be then vulnerable to an attack by the second pair of machines. The main battery could fire high explosive or armor-piercing shells, but in practice high explosive was used almost exclusively with a flechette round seeing some experimental use against fighters. Deployed in teams of four they were very formidable, but singly or even in pairs they were vulnerable to countertactics and the impetuousness of their own captains. The secondary 5" battery in the forward turret was nominally to bombard targets that could not fire back or were otherwise crippled, but when combined with the QF 1-Pounder mounted aft , it often just gave captains the mistaken idea that their ships could brawl at close range with any hope of survival. This was not a mistake that was often made twice, having either learned better or perished in the attempt. A radioheliograph set was fitted, and plotting between the different vessels in a group resulted in a degree of triangulation that made target acquisition at range more likely. Some have suggested that the ability to see trouble from a distance had been designed to impart a degree of foresight and caution in their commanders, but this seems unlikely, and the opposite effect was achieved if anything.

One of the more famous examples of this class and the character of their captains comes from the loss of the HMS *Meurglys* while hunting German commerce raiders near the asteroids. Named for the sword of the traitor Ganelon she was considered unlucky, and doubly so after the death of her first captain in a training accident. Succeeding him was one Lieutenant Adam Esterklaus, scion of the émigré family of the same name. While enjoying a reputation as something of a rake and foisted off onto the officer corps for the usual reasons, he showed a great aptitude for both command and space combat. Preferring to hunt his quarry singly, he met his match against the *Gessler*, a converted raider that

had been attacking outposts and supply bumps at the edge of British space. Because of the prodigious appetites of early gravity engines, it was necessary to refuel and resupply space vessels frequently, with the only alternative being to have a train of supply vessels following behind. Through the use of a strange draught of Martian origin, the Germans were able to slow the metabolisms of their long-range patrol crews, vastly improving the endurance of these shadowy threats. While the great gun of the *Meurglys* could punch through most any armor of the day, firing on the *Gessler* saw the shell pass completely through the ship before it detonated harmlessly on the other side. The raider closed the distance before the *Meurglys* could reload, ramming her to spectacular effect. There were no survivors, and it was not until the signing of the Rotten Peace in 1929 that the raider captain's account of the action was made available to other concerned parties. Rumors that the family paid a great sum to have the remains of Lieutenant Esterklaus located and returned to Earth are dubious at best, and that his remains were discovered to not be fully human borders on the libelous.

In an unusual development, there were attempts to utilize both manned and unmanned hulls as ramming weapons in the late 1920's. Based on Italian discoveries concerning force fields created by interacting gravity engine effects, there was a desire to weaponize the phenomena. The thinking was to make a sort of ram based around an area of highly compressed space and time. Exotic in the particulars of the underlying science, the 'unstoppable force' that such a device embodied was readily grasped. By replacing the 16" main battery with a massive ram and the field generation gear, the converted vessel was capable of punching through virtually any amount of armor. This 'energetic ram' as it was called also rendered the attacking craft invulnerable to ballistic or heat ray attacks from the front while the ram was energized. While attractive in theory, initial tests found this useless as an effective weapon due to secondary gravity effects often destroying the attacker as well as the target. This was postulated to be due to the rapid and violent interaction of two artificial gravity fields, but as the result often was either both vessels being reduced to fragments or vanishing utterly, this line of research was dropped. Reports did mention certain less explicable effects, but the significance of these was not appreciated until well after the Icarus Event.

While an initial success, the type suffered as effective countermeasures were worked up and her opponents became more sophisticated, both technically and tactically. The gun carrier concept was slowly eclipsed by improvements in engine technology and were made completely obsolete by the introduction of fighters with full gravity control. Loss rates were very high. Some three hundred were built over a two-year period, but no intact example survives, though many had their guns stripped and incorporated into surface defenses after the Icarus Event. These defenses were in turn superseded by advances in the early 1930's that saw these sites in turn stripped and abandoned, so even surviving 16" guns are rare.

WARSHIP - GREAT BRITAIN

HMS *EMPEROR OF MARS* CLASS FORTRESS SHIP

WARSHIP - GREAT BRITAIN

HMS *YS* CLASS ARTILLERY KETCH

There are no vessels as iconic as the *Emperor of Mars* and her sister ship, the *Empress of Luna*. Few larger or grander, they were the face and the van of British power from their introduction in 1923 to the loss of the *Empress of Luna* in 1927. Their strength, and ultimate vulnerability, embody many of the contradictions of the age as well as the empire that built her. Conceived not so much as a space vessel as a mobile fortress, they were designed as complements to fixed fortifications. This is in contrast to the conventional thinking which saw space vessels as analogs to naval power. Whereas American emphasis was placed on mobility and the German emphasis was on stealth, the British space forces sought to dominate via control of movement. To this end, their initial efforts were along the Russian lines of building large vessels that mirrored their terrestrial counterparts. As gravity drive technology improved, it was discovered that a stronger gravity field could interfere with smaller ones that came into contact with it. Thus, it was found possible to use the capital ships of the Royal Space Fleet to restrict the speed and maneuverability of vessels they came in contact with. The advantages being obvious, this effect was studied and made controllable, ultimately being incorporated into fixed sites controlling access to British colonies on the inner planets.

While the fixed sites came to be known as 'Walsingham repeaters' and were first seen protecting approaches to Phobos Station in 1919, fitting such a huge apparatus to a vessel proved more difficult. As the name implies, the technology depends on the overlapping of two gravity fields and repeating their signals. This is done in such a way as to interfere with any weaker field that comes in contact with it. Surface installations could take advantage of the natural gravity fields of their respective locations, but to make such a thing mobile presented serious (but not intractable) problems, as two gravity engines had to not only be moved together but kept adequately maintained and fueled. Neither of these was a small feat for the time.

It was against this technical background that the new coalition government of Prime Minister Harris confronted tensions between the British Empire and a newly monarchist France. While old alliances die hard, new expansions make for new neighbors, and new disagreements. The atmosphere of restrained expansionism with its burden of secret treaties and tacit understandings was rapidly changing as the secrets of the red planet were deciphered and plundered. Things could change quickly, but they had not changed yet.

The two great vessels were laid down simultaneously, in adjacent slipways, in the summer of 1921. Belfast yards were used, both due to their having sustained less damage in the invasion and to maintain a strong imperial presence there. Originally designed as pure warships along the lines of the *Charles Martel*, their planned tonnage and compliment crept upward from practically the moment they were

The HMS **Emperor of Mars** *and her support fleet break orbit over Neptune, sometime in 1927. While truly an awesome sight, these large fleet assembles proved increasingly vulnerable to attacks via long range bombardment, prompting their removal to the fringes of human space.*

laid down. While clear enough in conception, the teething troubles of the new French dreadnoughts and the calamity of the Neomartian drive on Earth led to a rethinking of roles, and work was suspended until some time in late 1922. The vulnerability of Earth and her possessions to massed attack gave planners pause. This vulnerability, combined with the success of the Walsingham repeater in restricting German movement, led to the conversion of the great vessels into something a little more unique.

Where once there was to be a boxy citadel along French lines, the superstructure was now dominated by a great dome, wreathed in ducting and crowned with prominent thermal vents. The internal layout was secret, but it was obvious from the proportions that there were a pair of massive gravity engines placed in relation to each other like the lobes of an hourglass. This symbolism proved a source of mirth as the *Emperor* first took shape under the shadow of St. Anne's, with many a joke and popular song referencing the vessel in relation to either the passing of time or the female figure. She was covered in scaffolding and tarp for much of her construction, but when this was removed, and she first slid from sea to sky on Coronation Day in 1923, it was obvious that everything had changed. While nominally in service from that fall onward, the *Emperor* and the *Empress* would require until the next spring to fully fit out. That being said, much of their strategic role was already being filled: Their ability to restrict engagement and hamper disengagement by her opponents in combat forced a change in strategic thinking by Britain's rivals. It was easy enough under the circumstances for the French crown to make overtures of peace to her old rivals, or even between them. Russia had her own troubles consuming her, and movement was less important to fortress ships that sought to close with, batter, and board their opponents. Germany had the most to lose, but with her emphasis on long range bombing paralleling the American use of carrier-borne strike craft, there was a lot of 'wait and see' in the air. In the end, all agreed to the French-brokered peace, though the smiles came through clenched teeth.

They took no part in the abortive Neomartian attack upon Earth, the *Emperor* still fitting out and the *Empress* undergoing a shakedown cruise that put her in a position ill able to intercept the attackers. She was in a position soon after however, to broker a ceasefire with the German forces on Mars and ascertain the identity of the attackers, though their true motives would remain obscure for some time. Some historians have given credit to the timely (and effectively unopposed) arrival of this super weapon and her train to Mars as an effective preamble to the Peace of Trieste. Just as many readily observe that happenstance is not strategy, and the inability to act with speed and flexibility would come back to haunt the British in short order.

The class was never numerous, being so expensive in resources and technical manpower that it was never seriously countenanced to build more than the two. Those two that did serve gained a reputation for awing all those who saw them, as well as a degree of luxury previously unknown in space travel. They were the Empire, made mobile. Transporting VIPs and royalty all over the inner planets, they never failed to impress. Their drive configuration left a great deal of interior space that couldn't be used for other purposes due to proximity to the drive itself. These spaces could only be inhabited when the gravity drives were at minimal output, but they served as formal and ceremonial spaces when receiving dignitaries or on other state visits. Indeed on one trip to Mars, the American military governor attended a formal dinner aboard the *Empress* where a tropical jungle had been transplanted and cultivated in the toroidal space around

the gravity focusing chamber. The cries of birds and monkeys were reproduced via discrete loudspeakers, as the embarked fauna had fared less well than the flora.

For the most part, these two great machines ruled the field by reputation rather than presence. Two vessels could hardly be everywhere needed, but their presence would stack the deck in any conceivable fleet action. This was balanced by the fact that the vessels were so large and ungainly that their movements were easily tracked through a variety of means. When the *Charles Martel* traveled to Neptune in 1925, it was observed that she was not the first vessel capable of doing so. Both Empress and Emperor were capable of transiting such a distance themselves, but not alone. The strength of the British squadrons concealed the fact that they acted as life support for their flagship, with a prodigious appetite for fuel, reaction mass, and the supply needs of their vast crews. Their maintenance requirements were also mounting rapidly after only a few years in service. Representing such a tremendous capitol investment, they soldiered on in the face of renewed hostilities with the Germans, and a change in government in parliament.

1926 was a year when little seemed to happen, but it contained the seeds of a disaster that wouldn't manifest until the next year. Britain had split her fleet into two squadrons: The home fleet, based on Earth, and the outer fleet, nominally based on Mars and currently taking up station in Neptunian orbit. Germany seemed poised to take Mars, having moved swiftly to take the underground places occupied until recently by the Czarist Russians. The British fleet could do little against the deeply held positions, so surface forces settled in for a long siege. Germany both lacked a strong fleet presence here and was using rocket bombs in quantities that had earlier driven the British from Phobos. Starving the Germans out seemed the safer option.

The events of 1927 are legendary, and few events more so than the Battle of the Equator. Many actions and decisions related to it remain controversial to this day, but the gist of it is that the Germans pivoted brilliantly in the face of a superior British fleet. Fast ships and three waves of bombers eluded the Lunar pickets and struck the British home fleet as the Emperor of Mars struggled to make orbit. She was lost, with almost the entirety of her crew and three other capitol ships, the HMS *Pharsalus*, *Insatiable*, and the *Rodney*. While a tactical loss for the Germans, who suffered badly, the loss of the jewel of the home fleet was a disaster. The assault on German Mars was called off, and the remaining squadron called home. Never more would the *Empress of Luna* leave sight of Earth, lingering in an almost stationary orbit until the so-called Icarus Event saw her perish ignominiously as her gravity drives malfunctioned and failed. She and her entire crew perished at the hands of Nemesis, without ever seeing the forces that destroyed them. She fell from the sky as a fireball, illuminating the night in the Russian steppe with an eerie green glow one could read by in Yakutsk. She came to grief far to the north, though the exact site has not yet been located.

Many writers have written cenotaphs in varying tones for these vessels, but in his autobiography Prime Minister Harris said this: "The conception, construction, and loss of these great ships have been frequent fodder for cautionary and moralizing tales, but these do a disservice to the complexities of history and the prices paid when facing the unknown. It seems a certainty that we will never see their like again, and that all that we do in the future to face the stars and the dangers they hold is informed by the reckless hopes of the past. To sneer in hindsight is to neither study what was nor to anticipate what will be."

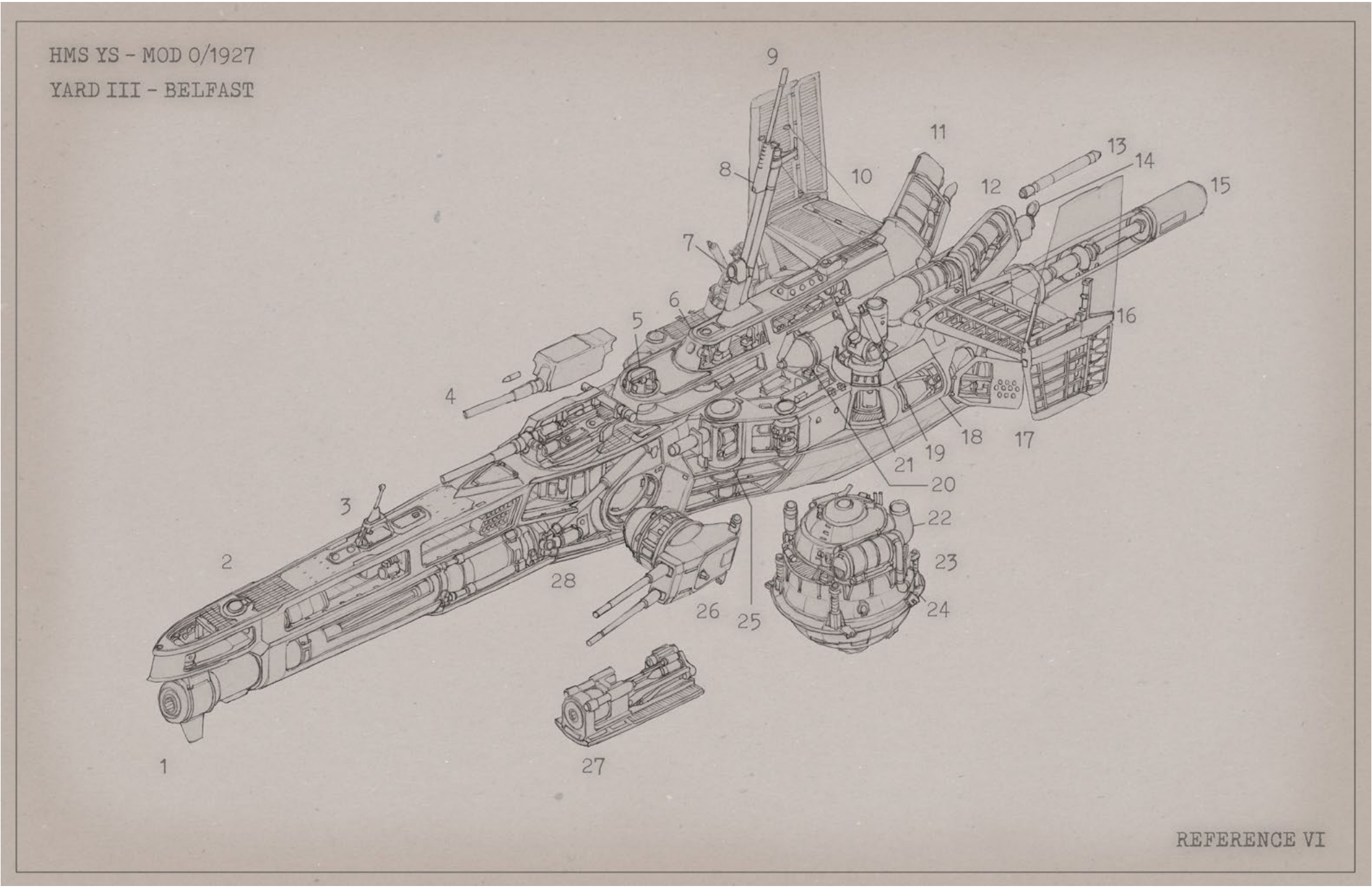
Serving alongside the great vessels of the outer and home squadrons were a myriad of smaller craft. While on the whole less storied, they constituted much of the true strength of the fleet, both on Earth and at points more distant. From resupply to minesweeping, many of the tasks that made the triumphs of the Emperor of Mars and her ilk possible were done by small vessels few have heard of. While space prevents this book from going into the design and service of all these myriad types, there are some that stand out and give an impression of the broader variety and roles involved.

The *Ys* class, sometimes called the *Arcadia* class, were designs that came out of the emerging need for a breed of smaller defense and raiding vessels. While Admiralty strategic thinking saw the British fleet centered around great vessels of unprecedented firepower, these would never be numerous enough to meet the needs a far-flung empire and its myriad needs. While the roles of gunboat, picket, and general fleet hack were filled by stopgap and improvised designs early on, these types were never adequate. Too maintenance intensive and too fragile, attrition thinned their numbers rapidly when war broke out with Germany. As weapon systems improved and the shadow of war loomed again in the early 1920's, the need for purpose-built vessels in the role was impossible to deny. Into this gap came a new type of vessel: the artillery ketch.

A swift vessel built around a powerful central battery, they were in almost every way the antithesis of the great vessels being built at the same time in Belfast. Indeed, their design was conceived to counteract the advantage that large, well-armored fortress ships enjoyed at the time. Some historians liken them to the contemporary Russian 'gun carriers', but this is a false equivalence. One analogy was between the boar spear and the knight's lance. While pompous, the analogy holds more than a little truth. Too small to be large vessels too large to be small, the artillery ketch boasted a degree of tactical flexibility that was unusual for the times. Typically deployed either in pairs or fours, these were split in battle into two sections as a common tactic. One would engage at speed from the front, and the other would attack from the flank. Speed was life for these powerful but lightly-armored vessels. The intricate dance of a first-generation space fleet was easily disrupted, and even the mightiest of the fortress ships might balk at risking collision with her escorts or, speed depleted, being a sitting duck for a follow-up shot.

In all configurations, some two hundred and fifty of these sleek machines were built, and another fifty or so can be added to the total if the enlarged *Samson* or 'Hero' class is considered.

1. **Main Battery**
2. **Escape Hatch/Accessway**
3. **Airlock/Emergency Helm**
4. **Main Turret (Sectioned)**
5. **Fire Control**
6. **Bridge**
7. **Passive Radioheliograph Sensor**
8. **Bracing Spar Mast**
9. **Antenna**
10. **Atmospheric Steering Surfaces**
11. **Heat Stack**
12. **Exhaust Stack**
13. **Rocket Torpedo**
14. **Chaser Rocket Torpedo Tube**
15. **Gravity Field Generator**
16. **Steering Surface Substructure**
17. **Atmospheric Steering Brake**
18. **Auxiliary Chemical Engine**
19. **Dual QF 1-Pounder Mount**
20. **Transfer Cylinder**
21. **QF Turret Gunner Access**
22. **Engine Trunking**
23. **Gravity Engine**
24. **Gravity Engine Mounting Frame**
25. **Defensive Rocket Turret**
26. **Lateral Turret**
27. **Sectioned Main Battery Breech**
28. **Main Battery Recoil Buffer**



The HMS* Ys *as she would have appeared in 1927, in a cutaway from a contemporary article on the British navy. Note the extensive buffering mechanism for the main battery as well as the aerodynamic steering surfaces and drop-in nature of the gravity engine, all hallmarks of third-generation designs.

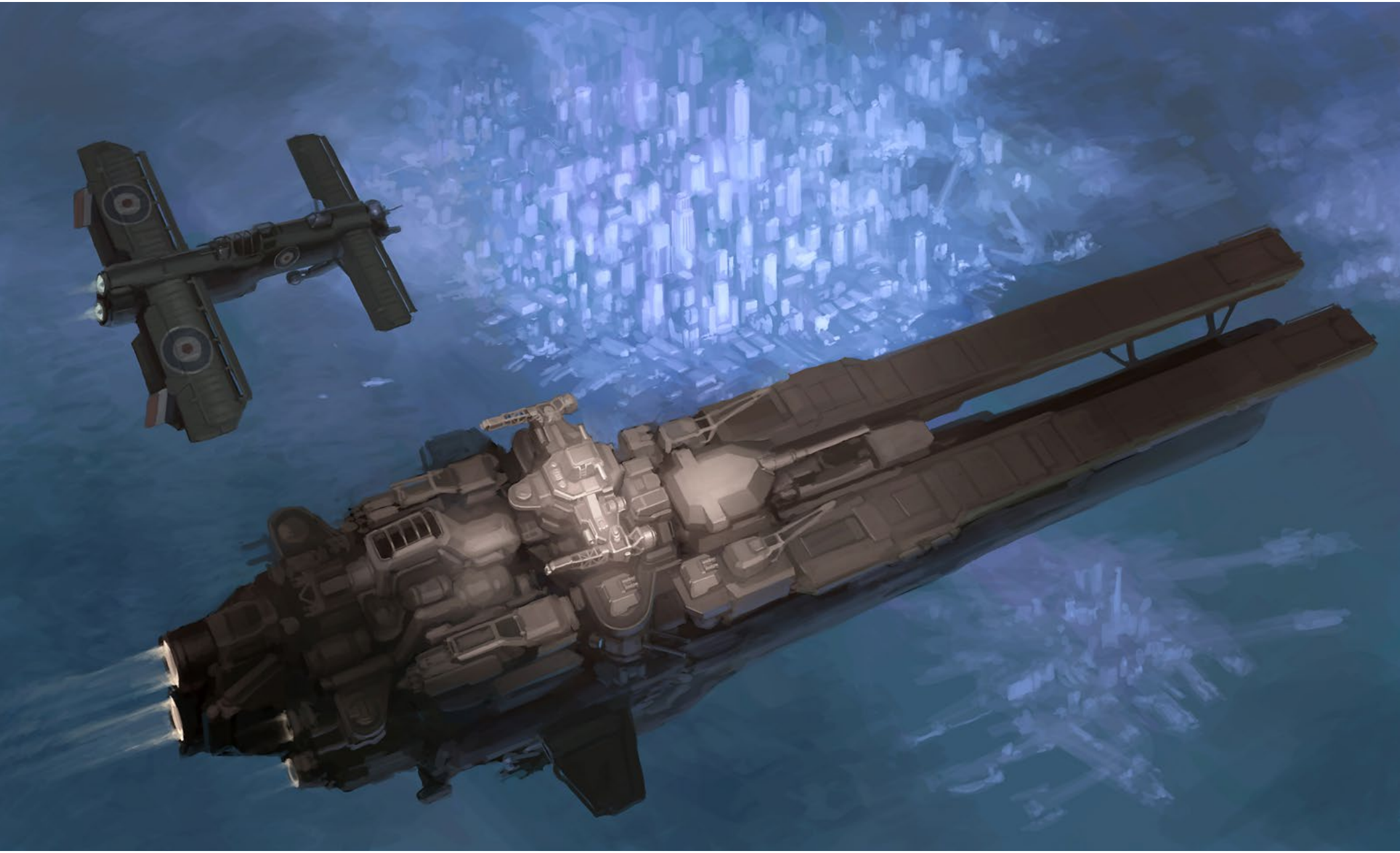
HMS *INEXORABLE* CLASS CARRIER DREADNOUGHT

Taking a cue from the Americans, the British sought to mix the firepower and protection of a dreadnought with the striking range of a carrier. While not a fully satisfactory mating of capabilities, it did cause a rethinking of tactics following the brokered Peace of Trieste at the end of 1923. Ineffectuality had turned into slaughter so quickly in the war that the survivability of all extant designs was called into question. Gun technology was not up to the sudden advances introduced into combat by Martian technology, and in turn, fire control lagged even further behind. The effect was to have weapons that couldn't hit their targets unless closing to distances more appropriate to naval battles of the previous century. Gravity bottle technology made the great dreadnought in danger of being obsolete, with scout craft being fitted with ship-killing armament that could disable large vessels before they closed with the enemy.

The class was, in essence, a compromise between a fortress ship and a carrier built along American lines. As such, her role within a large fleet was ambiguous and the herald of another change in tactics, as carrier borne craft grew larger and more capable. Deployed on its own with one or two light escorts the strengths and unique capabilities of the type become clearer. The question of specialization versus generalization seems to recur every generation in spacecraft design, and yield a different answer each time the question is asked. With the plethora of increasingly specialized vessels finding themselves out of their depth as Germany changed tactics in 1923, generalization was once again ascendant. Nowhere was this more evident than with Britain's conversion on the ways of the lead vessel of her new class of fortress ship, the *Inexorable*, to a new form of hybrid dreadnought-carrier. She and her sister, the HMS *Inescapable*, were to be outfitted with a considerable main battery in addition to the ability to carry scout vessels, as well as intermediate strike craft such as America was developing at the time.

While seen by some as a purely reactive move, and embodying a crisis of confidence in the vast fortress ships of the *Emperor of Mars* class currently under construction, this was seen by the admiralty as a complimentary approach, rather than as a hedging of bets. German commerce raiders had proved troublesome in the fighting from 1922-23, but also quite fragile if brought into open battle. The rationalization and move towards miniaturization in gravity engine technology improved drive efficiency, freeing up engineering and bunkerage space that made practical the embarkation of space fighters and attack craft without interfering in the original capabilities of the vessel to engage enemy fortress ships. This combination of capabilities was deemed ideal for not only commerce raiding but engaging enemy raiders as well. The end of the Peace of Trieste was widely seen as a continuation of the previous hostilities following a temporary pause in actual fighting, rather than a missed opportunity at a lasting peace.

Smaller than the equivalent French vessels, the class was meant to project power at a greater distance than a fortress ship like the soon to be completed *Charles Martel*. They in turn dwarfed most of the German fleet, though again their roles differed somewhat. With the main battery consisting of a single 16" hypervelocity gun forward of the base of the superstructure, this



The HMS **Inexorable**, *flying over a (mostly) rebuilt Manhattan after the Peace of Trieste. With her flies one of the unusual SVI 'Falcon' thermal bombers, a purely atmospheric unit, these utilized thermal engines and were something of a stopgap due to the difficulties inherent in their radiothermal propulsion and the hazards this brought to carrier use. The type was quickly relegated to training duty once more suitable types became available.*

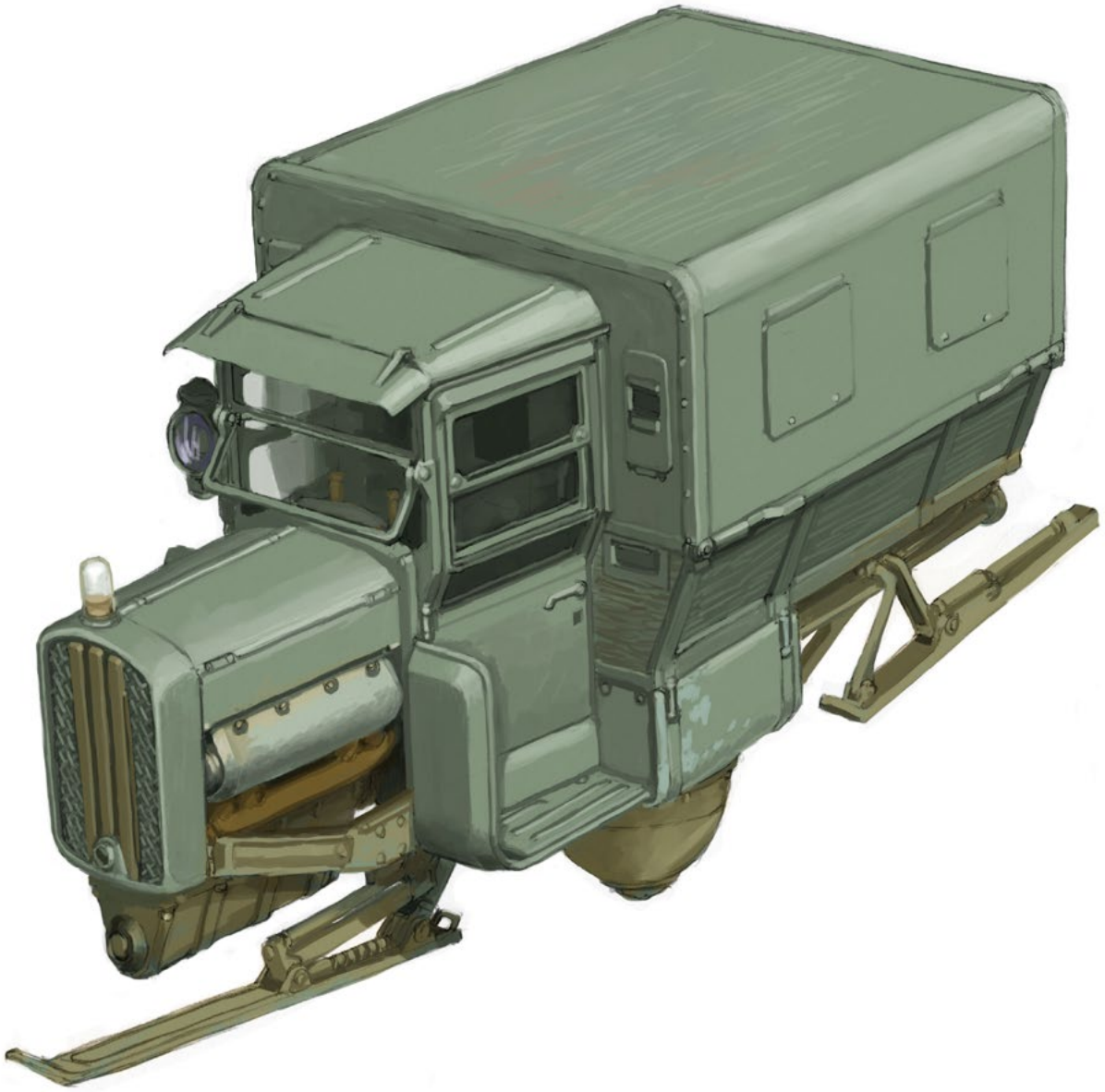
overlooked a pair of 12" wing turrets to the sides which constituted the secondary armament. These were mounted on sponsons which were extended back into the main mass of the hull just forward of a pair of launch elevators. The class retained the somewhat tight arrangement of contemporary American carriers in that embarked fighters were stored in racks below the dual launch decks. Recovery of fighters was always an involved affair, but this arrangement made it difficult to deploy the full wing quickly, especially in combat.

Construction of the HMS *Inexorable* was fairly rapid, the production of the high-chromium steel required for the hull was facilitated by the new smelting and forging techniques derived from the technology of the automated factories erected by the Martian construction cylinders. Very much a transitional type, this first vessel of the class embodied many lessons taken from French as well as American sources, as Britain sought to outmaneuver Germany diplomatically as well as strategically. A general air of intrigue prevailed. Whether in orbit or in space, life on board these newer spacecraft was a decided improvement over previous standards. Gone were the makeshift quarters and limited facilities that characterized the so-called 'pig rockets' that had come before. While neither luxurious nor particularly comfortable by civilian standards, to serve in space was no longer the constant state of privation undergone by the first spacecraft to Mars.

The launch and recovery of fighters and other small types was similar to contemporary American efforts, though with a greater capacity and flexibility due to the larger internal space available. With the rapid evolution of small fighting craft, handling gear was forced to be somewhat agnostic, and both ships of the class operated mixed squadrons for almost the entirety of the their service. Further, the type was sufficiently flexible that they could also operate as motherships for smaller torpedo and assault transport vessels, but this was never used operationally due to fighters and bombers having fewer platforms they could operate from. In contrast, smaller types could operate from freighters and generally be left to make do.

Completed too late to combat the Neomartian Remnant, the HMS *Inexorable* served a relatively uneventful five years until distinguishing herself at the Battle of the Equator, her strike craft proving pivotal in preventing even greater disaster from befalling the British fleet. In port, undergoing refit at the time of the Icarus Event, she was one of the few major spacecraft to survive the disaster, though her gravity engine ceased to function like all others. She remained in port as a receiving hulk as planetary defenses were reorganized. With the lifting of the hyperspatial jamming that came to be known as the 'Icarus Effect' in 1932 there was talk of a fresh refit and fitting of new gravity engines, but the extensive corrosion that manifested itself in a hull no longer optimized for immersion in seawater made this impractical. She was broken up in the mid-1930's and much of her equipment incorporated into surface defenses. Much of the woodwork from her officers mess was salvaged, and may be seen incorporated into the lounge of the Wayland Club in London. While a private club, the lounge is open occasionally for charitable events and gives some hint of life aboard a military spacecraft a half century ago.

While her hybrid design was a fashionable concept that was later abandoned, the engineering layout of her propulsion and other internal systems was, in many ways, a predictor of things to come. The lessons of Icarus and the mysterious vessel known only as 'Nemesis' inflicted years of suffering on an already devastated Earth. Those that survived ultimately prevailed, with lessons learned serving as the basis for much that has come since.



In time, many of the technological developments associated with third-generation gravity engines would see employment elsewhere. With the ongoing drive towards miniaturization and improved reliability, by the time of Icarus the use of gravity bottles had become common in a variety of flying vehicles for use on Earth and Mars. At first restricted to military and industrial vehicles, these 'jump trucks' as they were called became frequent sights at shipyards and naval bases by the late 1920's.

Pictured here is the Albion Twelve, a light truck frequently used with infantry and support units. With the box bed and widened 'greenhouse' cab, this example was designed for use on Mars, the additional space for the driver improving range of motion when wearing a pressure suit. Though of limited carrying capacity, the Twelve employed a fully self-contained gravity bottle and regenerative engine. This made the type quite easy to maintain in service and able to operate with little to no atmosphere and within a broad band of temperatures. Steering and forward motion were accomplished by effectively 'tilting' the gravity field, which naturally made operating in full vacuum impossible. Fully pressurized models were also made, but these were uncommon.

WARSHIP - GREAT BRITAIN

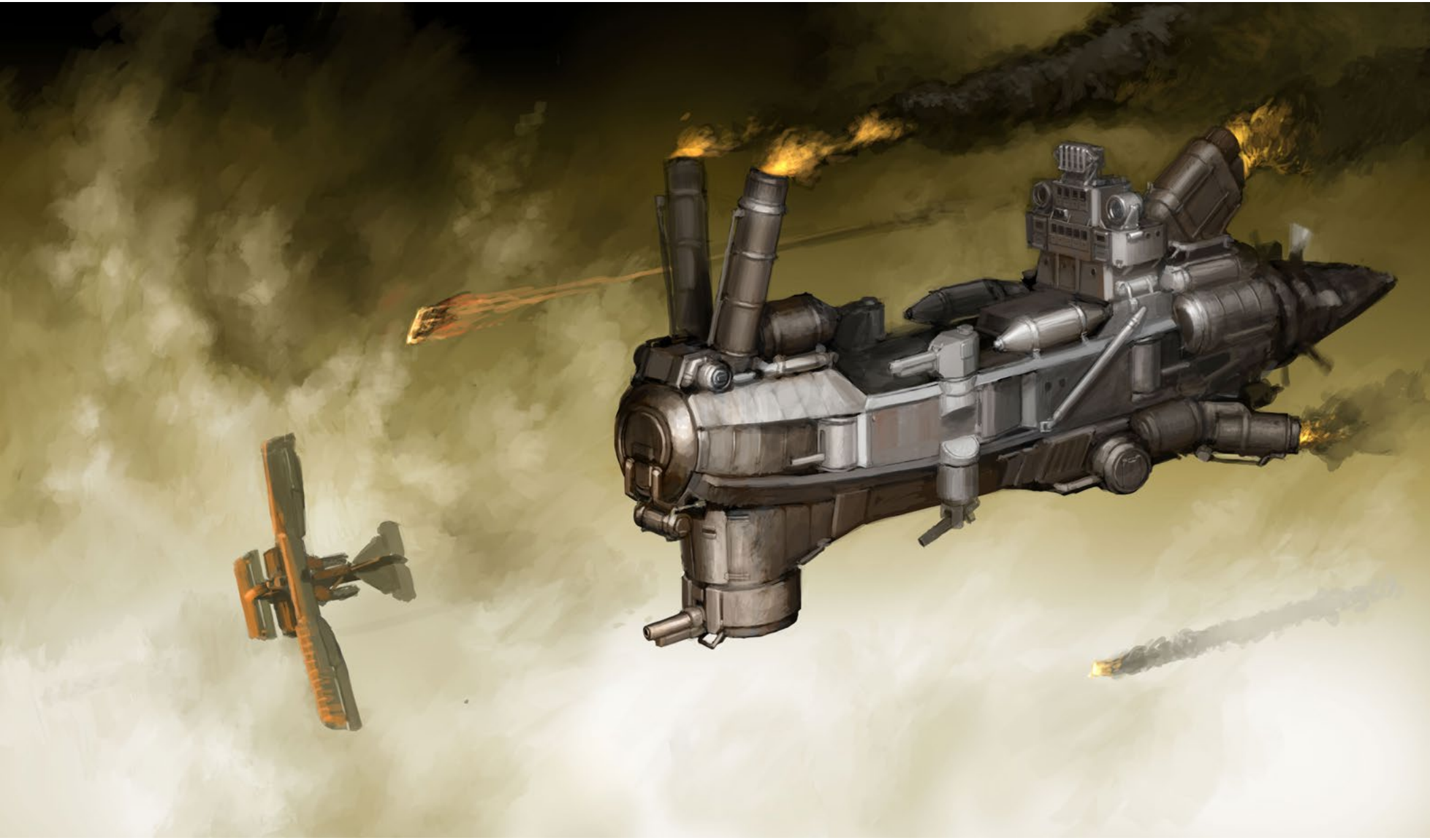
HMS *AMARANTH* CLASS PICKET GUNBOAT

In the scale and tragic grandeur of the conflict, the smaller vessels at obscure posts are often overlooked. It's easy to do, when the brave perish and the only living witness is the distant sun. In some cases evidence surfaces of the sacrifices of crew long after their loss. The spacelanes are full of the debris of war, and more than once a wreck has drifted back into record like an accusing ghost. This is not to suggest malice or neglect on the behalf of either chroniclers or the powers that employ them. To look up into the night sky is to suspect the vastness of space. To serve there is to know it. Many vessels served with quiet distinction in this vastness during the last war and may so serve again someday. Happenstance made the war an exercise in boredom for some, with lonely patrol vessels and gunboats often never finding the enemy. Search though they might, the size of the areas involved made picket and patrol duties exercises in blind man's bluff. The battle fleets of the great powers were hemmed in by circumstances: Physics, logistics, intelligence, and expectations made their movements relatively predictable. Smaller, long-range vessels operating singly or in pairs were another matter. Where the British felt their flanks threatened by German raiders, there simply were not enough frontline vessels to cover all likely approaches to her holdings on Mars, Phobos Station or her outer anchorages. While mining these approaches showed promise, manned coverage was far preferable. It was one thing to make sneak attacks hazardous, but another entirely to give proper warning to the fleet and other potential targets.

Even at the height of prewar shipbuilding speeds, the British could never hope to produce the vessels and crews needed to oversee an empire that saw possessions on three worlds and commanded spaces beyond these. Into this gap came a wide variety of improvised and smaller vessels operated either by colonial crews or private concerns operating under contract to the crown. Gravity drive improvements saw increased safety and endurance from the drives themselves and decreased associated costs. These advancements saw in turn the fielding of platforms which would have been impractical even five years before, and inconceivable ten years before.

As Russia was wracked by revolution and Germany dug in on Mars, there was a growing sense among the British high command that their fleet was not well adapted to fight more than one adversary at once. The unifying danger of Martian invasion had faded by the early 1920's, and old tensions had returned. For all the industrial might of England, France was gaining an edge with regards to ship production. Her comparatively late entry into the task of building up her fleet combined with access to the refining and manufacturing technologies of the construction cylinders found her catching up quickly to Britain's early lead.

The political situation between Britain and France was in question, though not where France stood in regard to British expansion on Mars. Indeed, the Third Republic was moribund by this time and wracked with internal conflict. Britain had her building program for capital ships, but the new generation of fortress ships would not arrive in quantity soon enough to check the French *Gloire* class if France decided to press the issue. Refusing to grasp either nettle, the British government



HMS* Aster *under attack at the edge of the Venusian atmosphere. While not particularly fast or durable by the standards of larger warships the empire gunboats could resort to maneuvers that smaller attackers could not hope to follow. While vulnerable to smaller and faster attackers in open space, these advantages vanished at the edge of the atmosphere where frictional heating could initiate a deadly and one-sided game of chicken.

kept with their current building program for large ships but utilized commonwealth and other allied yards to construct a great quantity of smaller vessels for patrol and planetary defense purposes.

Gravity drive production had started to become rationalized, but not yet miniaturized. Gunboat-like displacements were seen as both the minimum practical size for effective range and armament, as well as small enough to be built by any shipyard able to build marine hulls on the scale of an ocean trawler. Many of the completed hulls were built in Canada and Australia, then fitted with gravity drives in Belfast on fitting out there. Testing was largely carried out in the Hebrides, weather permitting.

Most of the three main classes were named after the flowers and birds of the British empire, in honor of their colonial and commonwealth origins. The *Amaranth* and *Kookaburra* classes were laid down in overseas yards starting in early 1921 with an eye towards defensive applications, particularly in regard to Britain's growing base on the Moon. The loss of the Gloire later that year and the German blockade of Phobos the next year led to a reshuffling of priorities and orders for these two classes being cut significantly, and the numbers made up for with the new *Violet* class, this being an enlarged version of the *Amaranth* with a heavier main battery.

Operating both singly and in cooperation with American forces above Venus, the type gave a good account of itself when open war broke out with Germany in 1922, While not maneuverable or well adapted to give chase the type proved very tough on the defensive, proving both a small target for capitol ships and prone to using the upper atmosphere of planets with a sufficiently thick atmosphere as protection. This was accomplished by skimming along the upper layers in such a way as to discourage pursuit by enemy fighters due to their relative susceptibility to frictional heating.

With crews and captains drawn heavily from colonial and commonwealth forces, the gunboats of this class varied considerably in crew composition and experience, as well as in the details of how they operated. This is not to say that the crews were of low quality, but rather that the normally rigid command structure of the navy often allowed captains to run their ships as they saw fit and not quibble about regulation details. Chronic manpower shortages of the era proved an opportunity for many who would not have had the chance to get into space otherwise. These varied from ex-navy and railroad workers in their 50's to foreign auxiliaries and an interesting variety of misfits standing guard at the edge of the empire. Where possible, crews were raised from the same locality and captained by a reserve officer familiar with local customs. Engineering officers were typically reservists with mechanical backgrounds who were given crash courses in the operation of gravity drives, wished the best of luck, and sent on their way. This worked out somewhat better than might be feared but did give rise to certain perceptions as to the nature of service on these lonely vessels. The glue that bound together operations on these vessels was the inclusion of four or five petty officers from the reserves on each vessel. Usually older sailors, their lack of youthful vigor was more than compensated for by their experience. Their role was very much like the infantry tradition of having auxiliaries led by a few veteran soldiers embedded in their number. If properly captained, these green sailors and old salts would take pains to impress each other in their work. While drunkenness and gambling were the typical problems associated with idle sailors, discipline among this emergency fleet was somewhat better than expected. It was certainly better than feared by some and predicted by the press, who wrote breathless stories about colonial crews and their likelihood to turn pirate as soon as they

were no longer under the watchful eye of the regular navy. While fictional examples were prominent in picaresque novels of the period, the vast majority of crews defended hearth and home adequately well, and some even with disinction. Having seen Earth invaded with humanity on the brink, then plying the spacelanes in a British warship a mere twenty years later, gives even the least imaginitive mind some sense of focus and motivation.

It was vessels of these types which were some of the first to both identify and engage the makeshift fleet of the Neomartians as they broke out of their long siege below the surface of Mars and sought to reach Earth. Indeed the first inklings of what was occurring came in the form of the HMS *Crocus* reporting signals of a peculiar buzzing sound with intermittent faint voices being broadcast on all frequencies from the red planet. These signals were followed up with the launch of a haphazard mix of vessels the exiled Russians had either secretly repaired or built from scrap. Coming from multiple concealed launch sites, the largest vessels emerged from the overrun Mons Daktylus repair facility, abandoned by the British during the blockade as indefensible. Failing to respond to hails or warning shots, the surprise breakout overwhelmed the picket vessels. Hopelessly outclassed, it was the poor speed of these vessels and the resultant inability to pursue that kept these pickets from seeing greater losses.

The type soldiered on after the breakout. Losses suffered among newer types in combat against the Neomartians saw many of these old gunboats recalled to cordons around the Earth. With the fall of the Third Empire and the subsequent French-brokered peace with Germany, many of these vessels were stripped of armament and used to transport Martian artifacts back to Earth. The cleanup operation against the Neomartian Secession of the czarist Russians emerged in eerie parallel to the initial conquest of Mars, where a large military force sought combat below the surface of the plant with a dug-in enemy, but found only deserted ruins and automated defenses.

By the late 1920's, the type was seeing the end of its useful life. Technically and tactically overtaken, most were either scrapped or incorporated into static defenses. There were few in service to be lost by the time of the Icarus Event, though the *Space Station 51* (ex-HMS *Dogwood*) witnessed much of the one-sided battle with the Nemesis from orbit and reported what she saw for as long as she could. It was these poignant final words of the crew that served as an epitaph both for the ship and for the aspirations of the age:

"We'll be back. We always come back. Mars couldn't take us, nor can this. Though we fall, others will rise up and avenge our brothers. The air is pretty bad here, and our orbit is decaying. Hot. Sun's coming up, and the dawn looks purple. The Earth is blue and green and so beautiful. If this is to be the end, I can think of no more beautiful thing to see in our final moments. God save the King!"

COMMERCIAL VESSEL - GREAT BRITAIN

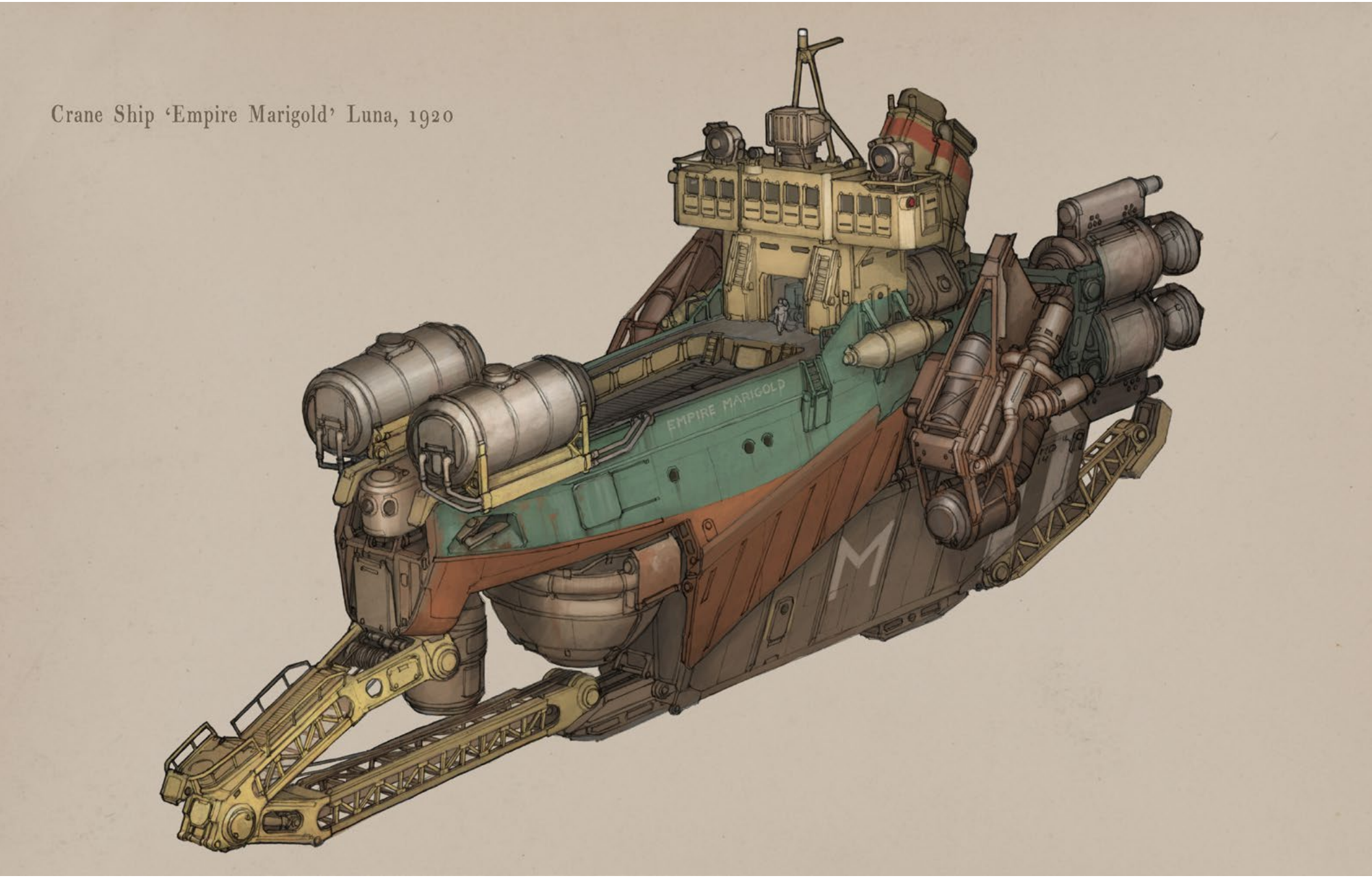
SV *FLOWER* CLASS TUG

For every great and glamorous dreadnought there are a bevy of other, less photogenic, vessels that keep them safe and operational. The *Flower*-class working boats are one of the most ubiquitous, having seen service with all the great powers and most of the lesser. The type finds its origins at the very beginning of the conflict, though the thread has become quite entangled with the intervening years. The genesis for both the class proper and many related vessels lies in the conversion of extant commercial ship hulls into flying and spaceborne vessels with the addition of a gravity engine and rudimentary balance and maneuver gear. While the earliest gravity engines were unsuitable for use in support vessels (due to their weight, experimental nature, and overall poor reliability) improvements gradually opened the field to a range of tugs and transport vessels that served with distinction.

Older readers may recall the radio series *Star Tubbs* which, while a broad comedy, gives at times a surprisingly good amount of insight into the realities of living, working, and occasionally fighting on one of these 'fix-up' vessels. It was rumored at the time that the characters of Captain Fennel and his engineer Rancid were based upon real individuals that one of the writers had served with, and that the real captain had threatened legal action at some point. While a possibility, the networks were certainly also known to spread rumors along these lines as a form of advertising. Whatever the origin of the characters, the experience of serving with the so-called 'Brown Sky Navy' was one many could identify with.

While portrayed in popular culture as either barely-spaceworthy flying deathtraps or largely immobile garages, the support and utility vessels fielded in the time between 1909 and the Icarus Event were varied in both function and form to a degree that's difficult to appreciate a half century later. Early space vessels were complex and, in some ways, very fragile, and the speed with which they could cross interplanetary distances left them forever in peril of outrunning their supply lines. One could scale up war vessels only so far to increase bunkerage of fuel and other stores, and this brought other problems with it. Happenstance saw the creation of the gravity tug to steer the larger craft in port, and ultimately to orbit and beyond. Piecemeal, other types were found useful and these became classifiable into broad types.

The role of the tug is easy to grasp due to the ready equivalent in a seagoing version. While the primary role of such vessels is guiding larger types in tight quarters, the nature of space travel is such that they were frequently seen in larger, longer range configurations for both towing gravity-capable vessels in salvage and rescue roles as well as positioning static installations and equipment in orbit and interplanetary space. This allowed both improved serviceability among the fleet as well as the freeing up of gravity capable assets where other systems could fill the role of early warning and planetary defense. Of these tough vessels, the *Flower* class of the British empire is both archetypal of the breed and fairly well known. While not military vessels in the strictest sense, the capabilities of the class were a response to an admiralty requirement for merchant marine vessels able to follow and assist the space fleet. This requirement



***The SV* Empire Marigold*, an example of the ubiquitous* Flower *class reworked into a more specialized role. The application here being that of gravity tug, a vessel with an outsize gravity engine for port and shipyard work. Source:* Flamell's Guide to Working Craft: 1922**

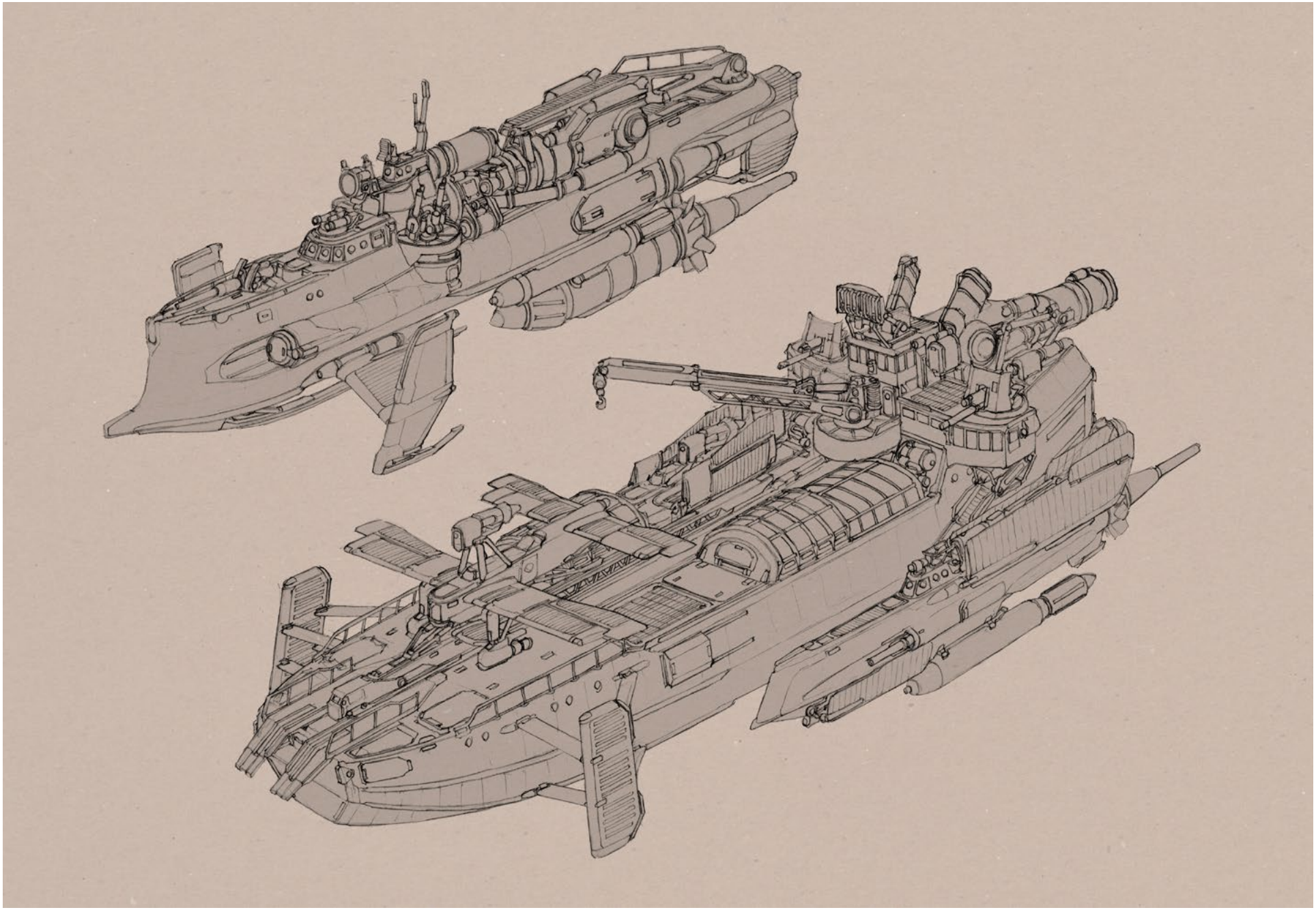
was written as a response to the somewhat haphazard resupply and support aspect of the Martian Punitive Expedition and the subsequent occupation of Mars by the empires of Earth. While nominally under fleet command, the operation of these vessels by private civilian masters and crews could sometimes result in a certain tension between the admiralty and the so-called 'greenback navy' due to differing priorities, if not allegiances. This also cuts to the peculiar relationship that existed between most nation states and private enterprise at the time. While some industries had been nationalized after the invasion of 1902, many more had entered into relationships with their respective governments that could be best characterized as ambiguous and intertwined. While not ideological in nature, a possibility for exploitation existed that would later come to a head.

In the end, the durability of these tugs and the initiative of their crews made them invaluable to such a degree that the *Flower* class and follow-on *Forest* class were some of the longest serving vessels ever built. Refurbished and re-engined, most of those which survived the Icarus Event serve to this day. One of the more famous examples is the SV *Empire Marigold*, which served as a sometimes tug, sometimes smuggler between the Earth and Luna for several decades before being converted to a 'high hauler', which is to say adapted to moving masses of bulk ore in microgravity. The additional equipment has left her silhouette greatly changed, but a casual inspection will show much of the hull that was launched more than a half century earlier.

Support barges are a related vessel, being derived from either repurposed hulls or new construction of the most basic sort. Typically not trailing the fleet but rather stationed at useful locations, these small craft served to repair, maintain, and resupply both the great fleets and the lonely cruisers that patrolled the borders of the various empires. Support barges varied greatly in capabilities and accommodations depending on their location and role. One might be a fully stocked and manned repair facility, another an ersatz listening post with the means to shadow and even intercept raiders, and another still might be little more than a supply cache without even gravity control. While these small installations often push the limit of what can be called a 'vessel', much of what happened closer to the limelight would not have been possible without their service. Space travel was unreliable and dangerous, often based upon principles only half understood. Everything in sky was experimental. It took an army to keep the dreadnoughts flying, and implement logistics on the scale that crosses between worlds.

The final leg of this tripod of necessity was what was sometimes called a torpedo boat but was given the more official (but awkward) sounding name 'auxiliary patrol craft'. Whatever the name, the role encompassed various small craft of maritime origin that were fitted with either gravity bottles or grafted-on full gravity engines. The ratio favored the latter more as time went by, but the role remained the same: maintain a short range credible threat by use of small craft with rocket torpedoes. While range and accuracy were never the best, odds added up and the Germans saw fit to keep their big vessels at a distance.

As fighters and scouts improved, the 'tin coffin' was largely replaced with more maneuverable and survivable designs. So rapid and basic were the conversions of these reluctant spacecraft that many of them were returned to maritime service in the 1920's and 30's. While several are still extant and viewable by the public, it is much rarer to see examples with their wartime drives and armament still fitted, though the navy museum at Savannah has a recovered hulk awaiting restoration.



The availability of space tugs and other support and supply vessels made possible the deployment of a great variety of short range space and atmospheric vessels with a variety of specializations. Depicted in a contemporary naval document are a light torpedo vessel and a space-capable tender barge for aircraft.

WARSHIP - GREAT BRITAIN

RFAE P.B. 03 INTERCEPTOR

Few vessels are more iconic than the silver winged scout fighters of the Royal Fleet Arsenal Establishment, particularly the P.B. (Planetary Based) series. Its ascent (and ultimate eclipse by circumstances) can be seen as a small-scale echo of the conflict at large. So iconic is the type that separating truth from legend is difficult even with the perspective of time. A pinnacle of two-seater fighter design, the P.B. 03 was not the first to take advantage of the miniaturization of the gravity engine technology, but was among the most refined, most effective, and arguably the most beautiful of the smaller craft which fought in the war.

First flying just a few months after the American Fairchild FX, the prototype for the P.B. series benefited from additional development time as well as a much more advanced gravity engine design. While retaining many of the external features of earlier craft, the P.B. was an entirely novel machine. While giving the appearance of being fabric covered, this flexible skin was a woven covering of aluminum and stainless steel fibers put under tension to give the wings additional strength while remaining flexible under load. While not as exotic and capable of a covering as the *marsglas* being used by Germany, the British solution also avoided the hazards associated with alien materials. Likewise, her gravity engine was stabilized internally and lacked the external impeller of earlier devices based on the French approach. The tendency for the gravity drive to develop dangerous oscillations under load was addressed differently, with power being applied intermittently at a high frequency to the gravity coil, rather than damping the coil output. It was found that the tendency of the coil to 'reset' and realign itself with nearby gravity sources was just as effective a way of controlling the system feedback inherent in gravity control. The Martian machines encountered never operated in continuous flight, so a solution could not be gleaned from their remains. In defense of the French and their earlier designs, the Royal Arsenal solution only really became viable once the precision machining of the timing mechanism could be done to sufficient tolerances. Irregularities in timing induced vertigo in personnel within the area of gravity control and could sometimes create sympathetic vibrations sufficient to cause structural damage.

The new engine, developed under great secrecy, was known internally as the Model 36, and colloquially as the 'unicorn'. The cover story was that it was a new chemical engine, and the ring of blue light the gravity engine emitted at its aperture could be explained (at a distance) as the jet of a rocket. In closer proximity it had characteristics that bordered on the uncanny. The firing of the gravity drive created a glowing halo around the conical focusing lens. This effect had to do with the agitation of hydrogen atoms on the border between normal time and space and the somewhat altered reality that surrounded the improbable machine itself. While this was certainly curious to behold, most minds involved in the development process did not appreciate the full implications of this at first. Barely twenty years in space, even the scientific establishment was not yet fully ready to consider the implications of gravity control and its bending of space and time.

The structure of the P.B. 03 was developed in parallel with the engine, and was largely dictated by it. As this was to

A contemporary image of the P.B. 03 prototype, undergoing timing trials. Regarded at the time as a graceful machine, it represents the culmination of all the lessons learned in small spacecraft design prior to the Icarus Event. Clearly visible is the heat ducting and exposed trunking for the Model 36 miniature gravity engine and the distinctive glowing ring associated with it in operation. Also visible is large optical gunsight and exposed firing position of the gunner, this position only made possible with parallel advances in spacesuit design and the tendency of the gravity field to deflect high velocity space dust away from the fighter.

be a dual environment fighter based planetside, range was not as critical as performance was. The British eschewed the American trend towards larger, fully pressurized cockpits and instead wedded the platform to a new generation of pressure suit with superior comfort and range of motion. Combat performance was boosted by a pair of radiothermal engines in outrigger pods (which also held the armament) which could be used for short bursts of up to ninety seconds at a time. These engines consumed reaction mass at a prodigious rate, as well as producing sufficient waste heat to be a danger to both crew and structure due to convection through the atmospheric 'bubble' that clung to the gravity drive as the fighter left the atmosphere.

While first designed as a single seat fighter, the prototype was completed in a two seat configuration with a gunner engineer behind and somewhat above the pilot in a semi-enclosed position with the radio and a sophisticated optical gunsight. This was seen as the ideal crew size for splitting the considerable workload involved in the operation of a spacefaring vessel with few automated features. The tendency of contemporary American and French types to have crews of three or more and improved endurance as a result was viewed as a bad bargain by the British due to the increased size and weight this entailed. While armament could be varied by the nature of the sortie, the classic configuration was a pair of QF 1-pounder Maxim guns, though later examples often sported Morden rocket guns instead. While adequate for the beginning of the conflict, the Maxim armament and lack of provisions for bombs or rockets made the type unsuited for operations against fortress ships and surface installations. While these were sometimes retrofitted in the field, performance suffered to the point that the practice was abandoned entirely and other types used instead. First deployed in secret, the six pre-production machines were hastily made ready to participate in a royal review marking the anniversary of the Martian Punitive Expedition. The silver machines made quite an impression on all who saw them streaking overhead. The king was heard to say, "The angels mean business!"

It was a difficult time, and the French-brokered peace was not expected to last, and indeed it did not. Deployment of this new, superior fighter forced the German rocket bombers to increase the standoff range in their bombardments of Phobos and Mars, with a resulting decrease in accuracy. German fighters were squarely on the defensive, but their typical longer range enabled them to disengage if they could make the P.B. 03 overheat their engine. Likewise, these fast craft were not effective against capital ships as they were first configured. The Battle of the Equator saw them employing occasional ramming tactics against larger German vessels as their 1-pounders proved wholly inadequate and the rocket guns were not yet widely issued. While ineffective, the bravery of the crews became legendary. This was further cemented by an almost total destruction of all surviving examples in the Icarus Event, along with the loss of their crews, with a stylized P.B. 03 standing at the center of the London memorial that was constructed in the late 1930's.

While a small handful of the type survived the initial widespread malfunctioning of gravity engines and were able to get to safety before complete failure of the coils, most either perished on reentry or silently in space as their cockpits became more lonely graves. From this event also comes the curious story of Captain Marsh. Thorton 'Ziggy' Marsh and his gunner, one Sgt. Hunley were among the unfortunates chasing the mysterious ship known only as Nemesis on the day when gravity drives everywhere failed. The day would later be known as the Icarus Event, and on that day all empires died. Marsh spent four days in space, three more than his oxygen

supply should have made possible. By using his radiothermal boosters he was able to control his craft well enough to make a controlled descent and crash land in the Canadian north, where he was rescued by hunters. His gunner did not survive, nor was there any adequate explanation for his own survival. Badly burned, he spoke of 'the silent king' and 'those purple caves' to the hunters who dragged him from the wrecked fighter and dressed his wounds. They later said he spoke at times in a language they had never heard before. When he was ultimately debriefed, he denied it all. The results of his physical examination were rumored to show certain physical abnormalities, but the examination results were never made public. In the general chaos that followed the Icarus Event, Captain Marsh was rumored to have changed his name and moved to Australia in the early 1930's. His wrecked P.B. 03 and personal equipment were returned to the Royal Arsenal for analysis, but they subsequently vanished as well. It is not known if there are any other surviving examples in an intact state, though replicas are comparatively common.

In the case of smaller, short-range craft, the emphasis shifted to personal protection rather than maintaining the integrity of a pressure hull. The Bollinger Mk III 'rubber duck' suit is an early example of one of the more successful types. Here it's seen fitted with a rather ponderous armored helmet, which is mounted to the shoulders and its movement buffered by an arrangement of leaf springs at the collar. The face shield is aluminum crystal, with an inset flat plate to allow a distortion-free view of the cockpit instruments. When pressurized, the ribbing at the arms helps maintain the profile of the sleeve, aiding with range of motion. The bracing at the ankles is something associated with many early single-seat designs where the foot controls could sometimes be subject to violent feedback at the edge of the control envelope. These were only fitting to machines offworld or otherwise away from the possibility of a water landing, for obvious reasons.

A French squadron is engaged by the Germans in a sneak attack in the fall of 1927.

SECTION III – FRANCE

WARSHIP - FRENCH

INCROYABLE CLASS INTERCEPTOR

We sang songs to drown out the rumbling of the engines, and at least challenge the shrieking of the wind. We were bright blades piercing the breast of the night, recalling Roland and Oliver at Roncevaux, as was only fitting. We perched on columns of fire, arcing in a gentle parabola and feeling none of gravity's curse, having solved the riddle of the Martian gravity engines.

It was just a drill, just a show for our allies and enemies. We all knew though. We knew we were going to Mars. We knew we were going to fight something ancient and terrible, and dig it out of its hole. It had tried for us, tried to conquer and harvest our world, and failed. The ogre and the dragon are terrible, but how much more terrible is the knight with revenge in his eye and steel in his hand? Well, we all know how that turned out!

Still, we were young, and the universe was a new thing. Those old ships were deathtraps, with their fulminate fuses and the engines we really didn't understand yet. It was intoxicating, though. Intoxicating not like any wine that mortals know, but like falling in love and foreseeing your own death at the same moment. It was a different time.

-Michel de Traci-Bocage,
Mémoires du Futur

The Incroyable *class was a stopgap class of vessels designed to intercept a third wave of Martian landers that never came. Fast, lightly armored and terribly fragile, they were the first space vessels to be fielded by the French republic in any number. While cursed with a number of design deficiencies and poor serviceability, they did give the French crown an edge in practical engine design that extended up to the time of the loss of the* Gloire.

-Dominic Rossignol, *Origins of the Fall*

The dawn of space travel was different for each nation to accomplish it, both in the particulars and the national mood which accompanied it. While each offers a distinct perspective, there are common threads running through all their efforts. While where one built great mobile fortresses to watch over their empire, and another built fast, small machines constructed as much of nerve as of hope, the unifying factor was a defiance of fate, and to not cower before the hidden terrors of the universe when they were revealed. The character of French space vessel design reflects this well, while also showing in the evolution of her space forces the reversals of fortune that marked her history in this period.

France had a terrestrial empire at the time of the invasion that, while if not as vast as that of Britain, was just as farflung. A close rival in the arts and sciences, she lacked the industrial and manufacturing base that her rival across the channel enjoyed. However, working with this rival and other strange bedfellows under the aegis of the League of Earth in 1910, technology and resources were shared among the nations in order to best repel another wave of Martian attacks. While naval and artillery strategies were pursued in order to detect and neutralize cylinders that had impacted but had not yet cooled sufficiently to discharge their deadly cargoes, it was also desirable to detect and intercept unwanted visitors as early as possible. France, through the École Polytechnique, undertook a program to develop one of the first spaceborne systems designed to intercept

In a sight that gave renewed hope for the ability of the Earth to defend itself, a flight of the first* Incroyable*-class interceptors make orbit in early 1913. In addition to the* Incroyable *herself the* Audacieux *and* Impénitent *make up the formation.

and destroy Martian cylinders before they entered the atmosphere.

The idea of using surface gunnery or rockets to destroy incoming threats was something that had been explored from the very beginning, but doing this from the surface of the Earth had certain technical (and later political) problems that would not be surmounted until the British fielded specialized artillery ships some years later. While it was initially assumed that the cylinders arrived on a purely ballistic trajectory, the mass of the cylinders should have made a much larger crater than observed. Astronomical observations of flashes on Mars (later to be determined to be the muzzle blast of the cylinder launchers) combined with impact sites and the times of impact showed that the cylinders each altered course at least once, likely very close to Earth. There seemed an opportunity to use the great velocity of the cylinders against them and destroy them with shells or mines before they had a chance to course correct. While the cylinders were armed with a potent heat ray, this was mounted inside the great threaded hatch and could not be deployed in space.

The natural solution would be to but the entire system in space, giving both better lead time and removing the complication of atmospheric friction when attaining a firing solution. It was to this end that the Third Republic turned the thrust of their technical and scientific expertise. While not the first human vessel in space, the prototype *Audacieux* and the *Incroyable* class which sprang from her innovations were firsts in many important respects. Rather than being based on a salvaged Martian drive or being an externally powered 'kite', the French vessel was of entirely human manufacture. This is not to say that the French edge was so great that they understood the intricacies of Martian technology before the other nations, but they did have a workable solution to the problem of building spacecraft in any sort of quantity.

One of the peculiarities of the design was having a gravity engine of simple design and modest output, with thrust being provided by radiothermal emitters (derived from the Martian heat ray) vaporizing inert reaction mass for thrust. The genius of the design was applying current human understanding of gravity control to a device of low enough output to avoid the dangerous feedback loops that would plague more powerful gravity engines for some time. A gravity engine of these specifications was not sufficient to propel a vessel into orbit, but was invaluable in maintaining stability and directional control, as well as saving on the use of reaction mass outside of the atmosphere.

The *Audacieux* first took to the skies in 1912 under the auspices of the League of Earth, that organization having been founded three years earlier to facilitate the common defense of the planet. This radical new design showed great promise, but the prototype proved difficult to keep on target and subject to certain viscous handling characteristics when reentering the atmosphere. So great was the reaction mass expended upon exiting the atmosphere that the center of gravity was changed in the vessel to a degree that it would tumble if throttled up or down too quickly. This behavior nearly led to the loss of the vessel upon her maiden voyage, and it was only the quick thinking of her bridge crew that prevented tragedy. While this first flight was planned to take the *Audacieux* up in a horseshoe shaped path from the English Channel, over the Atlantic, and then back to a waiting tender near Mallorca, it was found that the tumbling at lower throttle settings was uncontrollable. Subsequently, thrust was kept much higher and the vessel placed into a nose-up attitude that used atmospheric braking to make a safe landing. The ship ultimately came to rest in a marshy area east of Krakow, where she stayed until she could be repaired and

floated out on a channel dug to the Vistula. While nominally Russian territory, the Polish situation was sufficiently complex that the technology onboard had been accessed in depth by agents of a number of concerned powers, not all of them signatories of the League of Earth charter. Breakthroughs in gravity drive technology were subsequently reported in a number of quarters. Ignoring this remarkable coincidence, France refined the design and ultimately produced two dozen of these iconic vessels.

The layout was oriented around placing the largest gun available along the centerline with the engines and reaction mass tanks behind it. The gravity engine was placed near the bottom of the hull, with local gravity pointed 'down' relative to all points above it. It's worth noting that the gravity engine was not placed where the output could counteract the recoil forces of the main battery, as was common in later vessels. Instead, the gun and cradle were all on an exceptional long rail with a two-stage buffer system to absorb weapon recoil. Ingeniously, this action also worked to automate certain parts of the loading cycle, though a crew of six was still needed to service the 16" gun. She bore a number of other innovations, including hardened mounts for her one-pounder Maxim guns and a very early version of the radioheliograph. This latter device permitted rudimentary tracking and range information for nearby bodies, but was both quirky and fragile in the field. Additionally, the earliest sets gave this information as sound, requiring a skilled and patient operator to interpret the signal. While eventually useful, the earliest incarnations of this Martian technology earned it the nickname 'EG'. While at least one member of the press dutifully took down that this stood for 'Electro-Grammatifone', the resemblance of 'EG Board' to 'Weegee Board' was obvious when spoken.

For such a promising design, the class saw almost no action. Often grounded with teething troubles and various other modifications, these vessels, designed purely as interceptors, lacked the range to join the Martian Expeditionary Force and conduct operations offworld. Combined with the inherent heat and radiation dangers of her radiothermal drive and being generally overtaken by gravity technology, the type faded from service rapidly. Relegated to training work by the early 1920's, none were in service by the time of hostilities with Germany. Embrittlement due to the neutron output of her engines further shortened the service life of this class, and after being written off most of the stripped hulks were sunk in deep water off Guyana. No examples survive, but the barrel of one of the 16" guns is incorporated into the flagpole topping the war memorial at the Hôtel des Invalides.

WARSHIP - FRENCH

PLUTON CLASS ASSAULT CUTTER

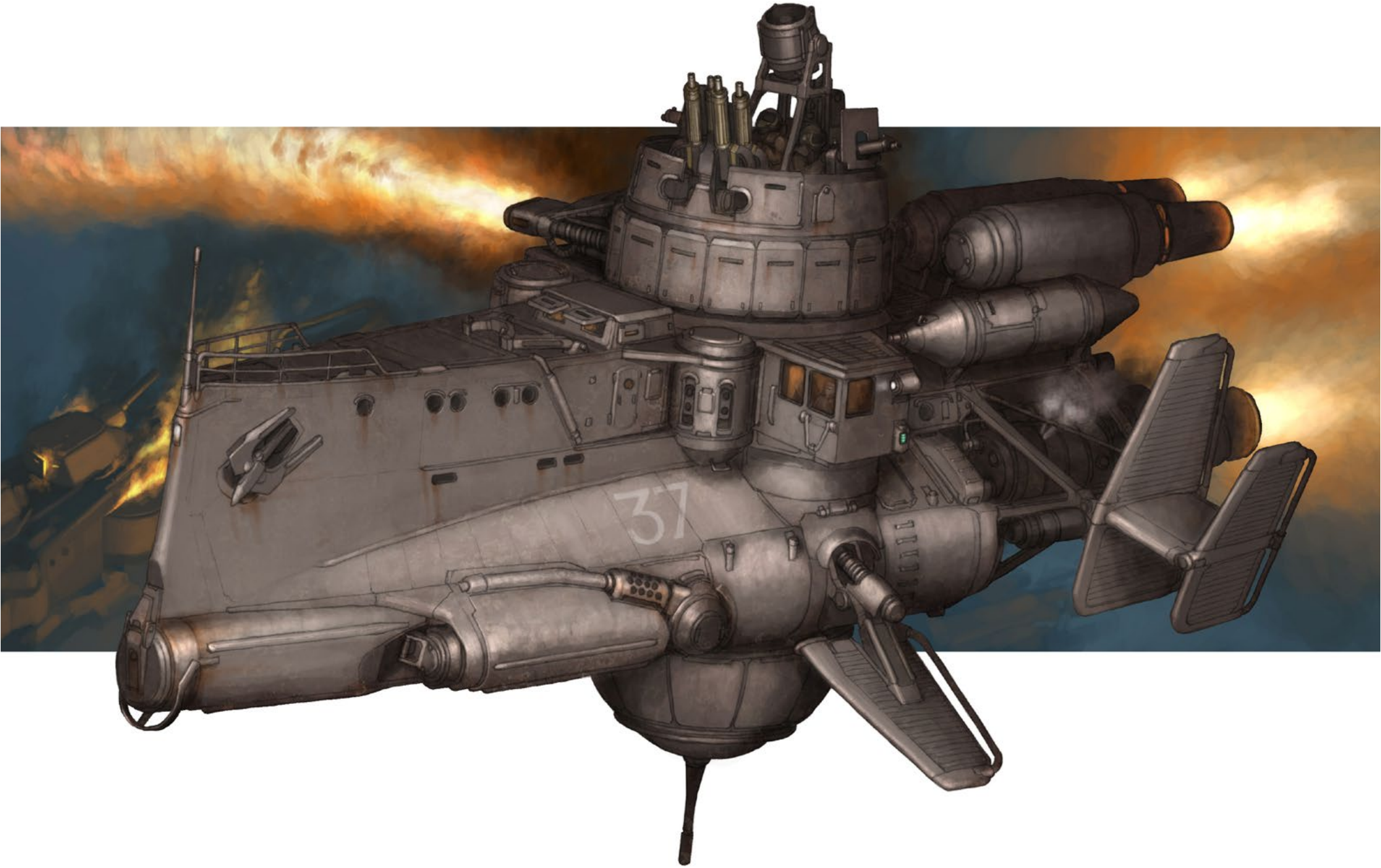
In many ways the antithesis of the sleek and graceful lines of the first French vessels in space, the *Pluton* class had a blunt, almost brutal appearance. While her pure form suggested her nature as an engine of destruction, her role as a flame throwing vessel, formally an 'Assault Cutter' moves her form into the realm of infamy.

It was a principle discovered early that when launching from the surface of the Earth, gravity engine-equipped craft carried a bubble of breathable air with them. While this was initially thought to be the result of aerodynamic forces and the fluid turbulence of air, it ultimately led to the understanding that the gravity nullification effect of the Martian technology involves a local alteration of spacetime that links an active drive to the point where it was first engaged. While the implications of this and the true nature of the gravity drive technology would be understood in time, for the moment it meant that any vessel with such a device would have a bubble of breathable air around them that would extend their range. While making the oxygen requirements of the crew more easily met, this local atmosphere was prone to fouling and causing asphyxia in case of fire. The Pluton class was planned from the beginning to exploit this vulnerability.

Although the design was marked by many as a turning point from weapons designed to fight Martians to weapons for fighting other nations, this is not borne out by the record. Conceived of prior to the Martian Punitive Expedition, the type was seen as an air and spaceborne platform for incendiary weapons for use against bunkers and other strongpoints prior to landing infantry on Mars. The secondary vulnerability of capital ships of the era to fire was seen as potentially useful, but downplayed as unnecessarily provocative. The mad dash to hit back at the invaders saw these secondary concerns unaddressed for some time, and the doubts planted with the other members of the League of Earth would have consequences later. Survival of humanity was foremost in the minds of all— for the moment.

Due to shortages of both steel and yard space, as well as the urgency of martialing forces for the expedition to Mars, the first vessels of the class were constructed largely from salvaged and converted hulls. These included not only ships lost during the 1902 invasion, but examples of the semi-submersible *Ambiorix* class were taken over from the regular navy prior to completion. This last matter caused some difficulty, as it brought to the forefront the conflict between the navy and Chardin's coalition government. Acting through a special directive drawn from scientific and industrial leadership, the so-called 'Blue Coalition' exerted power over many aspects of both the economy and defense preparations. While seen as necessary by the ruling government, the cancellation by fiat of programs undertaken by the French armed forces, particularly the rebuilding of the Marine Nationale, was not received kindly by the senior leadership of same. To be fair, it was seen at the time as a question of maintaining a stance that was either fundamentally offensive or defensive, and resources prevented the hedging of bets that would make this palatable to both parties. The *Pluton* class was decidedly offensive.

Few would call these small vessels



Stubby and businesslike, the* Pluton *class operated at short range with a turreted flamethrower for use in boarding actions against enemy vessels or assaults on static fortifications. Disliked by her crews and singled out in action by the enemy, these vessels were feared but of limited effectiveness.

lovely, but they were considered important enough that the Martian Punitive Expedition was delayed an additional two weeks to ensure that the *Pluton* and the *Orcus* were able to accompany the fleet. Stubby to the extreme, the class was built around a first-generation gravity drive of human manufacture. These early drives required a significant level of training and skill from their engineers beyond the usual requirements, to the point that both these lead vessels contained elements of the development team for the drives themselves. Topping the inverted dome that contained the gravity engine was a large turret and with a sort of open breastwork above this, containing spotting gear and a mount for four Maxim guns. These were open to space and manned by navy personnel in pressure suits, with the option to have space for a number of similarly suited marines stationed there to repel borders. Nobody knew what to expect from the Martian defenses, and no chances were being taken. The turret itself contained the great flame projector which was the raison d'être of the class. Working on a similar principle to Greek fire, the projector fired a stream of thickened gasoline mixed with a hypergolic agent that ignited the mixture when coming into contact with air. This effect was enhanced with a variety of other experimental agents including everything from metallic sodium to chemicals that would produce thick smoke when ignited. It was known from dissections that the Martians breathed air. From their equipment it would seem that wore little personal protection independent of their tripods and other great machines, so a breach of their underground defenses would give ample opportunities to incapacitate the defenders with fire and asphyxia.

Beyond the turret and the lower dome, the *Pluton* class could be described as little else than a hodgepodge, with crude chemical engines at the stern and a variety of winglets projecting from the hull. While giving the appearance of aerodynamic surfaces, these were in fact elements of the gravity engine, serving to act as balancers for the gravity field and improving control at low level. The torpedo tubes of the *Ambiorix* class were retained, but repurposed as fuel and reactant bunkers. Convention anchors and other naval fittings were left in place as well, as a practical consideration, there being few facilities other than naval ones able to accommodate these early space vessels and their frequent needs for maintenance and repair.

The *Pluton* and the *Orcus* were ready in time to accompany the initial expedition to Mars, it would take most of the trip to make them ready for battle with any amount of confidence. The *Orcus* spent most of the trip there under tow by the Russian monitor *Petropavlovsk* while her malfunctioning gravity engine was being rebuilt en route. Once at Mars, the initial bombardment of the great gun pits at the equator produced no reaction from the defenders. As shell impacts produced dust and debris plumes from attached spaces underground, general layouts of the complexes surrounding the gun pits could be surmised. The *Pluton* and her sister moved to within close range of one of the larger of these complexes (called 'Oberon A' by the tactical planners, later to be part of the Mons Daktylus shipyard facility) and contingents of Russian and British marines were landed. Finding no resistance but automated gas and heat ray defenses, the marines were re-embarked and the subsidiary complexes were secured in the same manner. Engineers were detached to deal with automated defenses and a more general survey taken of the planet. This denouement proved short lived as the south pole was approached, there proving to be far more potent installations there and indications of intelligent and coordinated defenses. Deep-set en-

ergy and rocket weapons were concealed beneath the ice caps, giving little indication as to their presence before attacking at short range. Losses were considerable before the breaching of the defenses at the south pole permitted the landing of troops and support tripods in the tunnels that connected these installations. The *Pluton* and *Orcus* were instrumental in locating these positions once the general layout of the defenses was determined. By breaching the tunnels out of range of the weapons the outposts contained, the flame projectors were employed upon whatever was within, which produced telltale plumes of smoke and steam wherever these complexes opened upon the surface. From there, it was a simple enough matter to bring the guns of the fleet to bear upon these sites and silence them.

While hard fought at times, the campaign for Mars was over far quicker than anyone had anticipated. The armies of Mars never materialized, and their fortresses and cities seemed almost completely deserted. No living Martian was ever found in the ruins, though this was put down to the lethality of the tactics employed against them. It was a great victory and celebrated as such, though many questions lingered. Victory was declared by the fall of 1916, though exploration of the extensive subterranean works had barely begun. With nothing left to burn, these two vessels were withdrawn to Earth, having acquired a lethal (if unsavory) reputation.

Though early and relatively crude spacecraft, the type fulfilled a role that would not be made obsolete until fighters and scouts with miniature gravity drives became common a decade later. Though brutally effective as close quarters, few were sad to see the type vanish from the battlefield, so great was the primordial fear of fire. Footage survives of the destruction of the SMS *Morgenstern* by the *Nyx* during the Battle of Phobos, which was widely seen in newsreels at the time. As bitter as feelings were, seeing the tiny figures emerge from their vessel engulfed in flame and jump overboard as glowing motes to fade out in the void gave many pause. The loss of the *Nyx* in this same engagement fit a moralizing narrative, but is probably best regarded as the fortunes of war.

Of the dozen vessels constructed, none survive. The Smithsonian has a variety of recovered fragments in storage at their Annapolis facility, but there are currently no plans to incorporate them into an exhibit.

WARSHIP - FRENCH

GLOIRE CLASS FORTRESS SHIP

Few vessels evoke the range of emotions that the *Gloire* does, having been the initial triumph that ultimately led to the surrendering of French technical superiority in engine design. The complex series of events that led to her demise has been a source of speculation and recrimination in many circles, for her loss represents not only the ship itself and the lives of her officers and crew but also a turning point in the growing tensions between the great powers. With the revelation of her secrets to Germany and her allies, France could no longer be assured of a strategic edge in her designs.

Launched in the fall of 1917, the *Gloire* was the embodiment of a number of new ideas. Indeed, she was the first French capital ship to be built from the ground up as a true spacefaring vessel. Earlier examples used extant hulls and fittings extensively. This was partially out of a conservative approach to construction techniques, but was mostly the result of expediency. France needed ships badly, both on the seas and in the sky. She also needed them quickly. The partition of Mars, once tenanted, gave a little breathing space and the high command was able to take stock.

While most earlier flying vessels (the distinction between flight and space travel not yet being clear) were designed with the assumption that they would be traveling by sea at least as much as by air, this turned out not to be the case. While it was frequently necessary to land in water (on Earth, at least), the need to travel across it never materialized. It was at this point that the hydrodynamic hull began to fade from use, though certain features remained for some time. Dedicated space facilities were years if not decades away in any significant numbers, so extant port and shipbuilding facilities were needed to build, provision, and maintain the new vessels— they flew to their berths, rather than sailed.

Onto this chaotic scene came a requirement from the French navy for a wholly novel type of vessel: The fortress ship. She was to be far larger than anything that had come before in the French arsenal, and her role was just as novel. Rather that a short range vessel dominated by a single heavy weapon, the *Republique* class was to be as the name implied— heavily armed and armored, with long endurance and a large crew. The thinking was that the technology was ripe enough that a vessel could be thought of as an independent entity, able to operate for weeks and potentially months away from support facilities. This was seen as both leapfrogging the need for off-planet installations as well as providing protection for the construction of those selfsame installations.

In all these matters (and indeed in many more) time was seen of as the essence. While her rivals had advantages in various combinations of fleet sizes, logistics, and overseas colonies, the Third Republic achieved breakthroughs in gravity control technology that would give her clear superiority for a time. The gravity engines that first came to Earth with the cylinders of the Red Martian forces were comparatively simple applications of the then-new science of gravity control. Their sole function was to preserve life and good order inside the cylinders as they were fired from the equatorial cannon installations on Mars, and subsequently impacted Earth. The gravity engines, as they

Falling out of control over Mars, the* Gloire *is seen here being intercepted by German* raketentruppen *who took control of the deserted vessel. The loss of her crew under mysterious circumstances combined with the vessel falling into German hands resulted in a major scandal that brought down the Chardin government in France and set in motion wider events abroad.

were called, generated a field that was able to make the contents of that field immune to physical action from outside that field. Reverse engineering the engines responsible for this demonstrated the possibility of using this same technology to both resist, as well as reverse, the operation of gravity within a set area.

This is where the technology stood at the time of the Martian Punitive Expedition: Space vessels 'pushing away' from planets with their gravity engines and steered by chemical rockets. Maneuver within the pull of a planet using the gravity engine was also possible to do by 'tilting' the directionality of the field, but this was inefficient and fraught with hazards. Upon this scene burst a discovery by an engineering team working in secret at the rebuilt École Centrale des Arts et Manufactures, in a facility moved to Nantes for safety and discretion. In hindsight, their discovery seems almost elementary: By running two gravity engines in parallel, it becomes possible to damp one field with another. Positive feedback loops that made fine maneuvers via gravity control exhausting and dangerous for small vessels (and impossible for large ones) were now a simple matter of rotating one field while keeping the other fixed. The technical brief asserted that the system could be retrofitted to all craft above a certain practical minimum tonnage, while hinting that much larger masses could be moved by scaling up the system.

This was all good news to the government of the republic at a time when it was desperately needed. The economic recovery of France was going slower than expected, and her colonies on Mars were not yet net exporters. The invasion hadn't hit her as hard as England, but there was enough damage to her port and rail facilities that moving food and other essential supplies was difficult. Unrest was becoming more widespread, and the winter of 1916-1917 had seen protests and limited riots in Paris. Confidence in the government was at a crisis point.

Against this backdrop prime minister Chardin needed to both placate the citizens and cement French power against her rivals. Such a huge advance in spacefaring might would do both, as well as restore the confidence of the military in the government, whose support for the 'Blue Republic' coalition had been tentative at best. With Britain encroaching on her earthly colonies and Germany on her celestial ones, it was do or die.

The *Gloire* was planned to be such a game changer that she would render everything else in the sky obsolete. With a crew of four hundred and an endurance of several weeks, she could outstay anything she came across, as well as outfight it. Her main armament consisted of eight 10" guns in single mounts, supplemented with a variety of fast firing gun and rocket mounts for use against smaller targets. She retained a heavy torpedo launcher mounted on the centerline, though this would be of little use against a moving target. She also featured an oxygen rebreather of innovative design and a surprising number of other features. Crowning all of these were her gravity engines. The pinnacle of French (and indeed human) gravity control technology, her engines were both massive and capable of performance like nothing else before. Her well-publicized launch coincided with a cooling of relationships between neighbors. There were even suspicions that the heart of the *Gloire* was a heretofore unknown Martian artifact, recovered by France in secret.

The engine was quite cumbersome, being essentially two engines with additional control facilities. To a large degree they dictated the shape of the hull, making it very deep and somewhat hatchet like. The two lead vessels looked more like static fortifications than ships while they were under construction, being so short and tall. The intelligence services circu-

lated rumors that they were part of static defenses for Paris and Le Havre, but the natural confusion of the times made their efforts redundant. In the end it was decided to launch the *Gloire* as the lead vessel, as the facilities at Le Havre were better able to accommodate the crowds and visiting dignitaries. This would also avoid the uncomfortable spectacle of putting a ruined Paris on display for the world.

The launch went smoothly enough, though the bottle of champagne to christen her failed to break on the first blow. The second proved successful, and the *Gloire* slid into the sky with a hiss that became a rumble, then a low roar. She lingered, then slid out of sight down the coast, her fitting out to be accomplished at a secondary facility near Saint-Malo. It seemed the savior of the republic had arrived, though there were some concerns. Space vessels of the era could be noisy things, but there were discreet questions raised about the level of vibration encountered once she rose out of the water. Quick calculations showed that these should almost completely disappear in the void of space, but anti-resonance weights were attached in key locations as a precaution.

The ship fell burning out of the night, her crew missing. She was intercepted by German pickets above Mare Erythraeum in May 1920, and boarded by *raketentruppen* when she did not respond to hails. This was a pivotal moment in many ways: Not only did it mean that the Anglo-French technical advantage in engine design had evaporated, but also that the Martian gravity technology could be used to warp time itself. The crew was subsequently found to have been reduced to dust, an engine malfunction aging everything within the gravity field in a highly accelerated manner. This grisly event and the scientific implications of the event were almost lost amidst the political ramifications. Her officers and crew lost, and the ship itself was in the possession of France's old enemy. A shadow play followed as the Germans scrambled to learn everything they could from the now derelict vessel while making diplomatic excuses for their delays in returning the vessel to France. France saw riots and the burning of Chardin and his ministers in effigy. The army was called in and were not so easily called out again. A French squadron headed towards Mars to secure the *Gloire*, by force of arms if necessary. An agreement to repatriate the vessel was arranged just prior to the arrival of the French 'salvage mission' and no blood was shed. While largely intact, the metal of her hull had undergone molecular changes consistent with great age. She could not travel under her own power, and the vessels sent for her recovery were ill-suited for the now apparent size of the task. Towed to orbit, she was stripped of all her equipment and representative samples of metal from her hull for further study on Earth. The hulk that remained was put on a course to the sun, seen as a suitable funeral for her luckless crew.

In time, though almost too late, the implications of this tragedy would come to be understood. While the gravity drive was considered by most to be a 'finger on the scale' in regards to Newtonian physics, the effect of this strange machine was actually a controlled bending of time and space. Vessels took with them altered rules of physics and of time itself. As the Martian warrens were explored and their secrets brought to light, only then did the history of the Red Martians and their strange and nameless forebears, called the 'Grey Martians' for sake of simplicity, come to light. The Martian cosmology and the lost knowledge contained in the library tombs of the poles lies far beyond the subject of this book, but it bears saying that this event and the mad drive of Neomartian Succession to make landfall on Earth, mark a point where something very old awakened again.

WARSHIP - FRENCH

CHARLEMAGNE CLASS FORTRESS SHIP

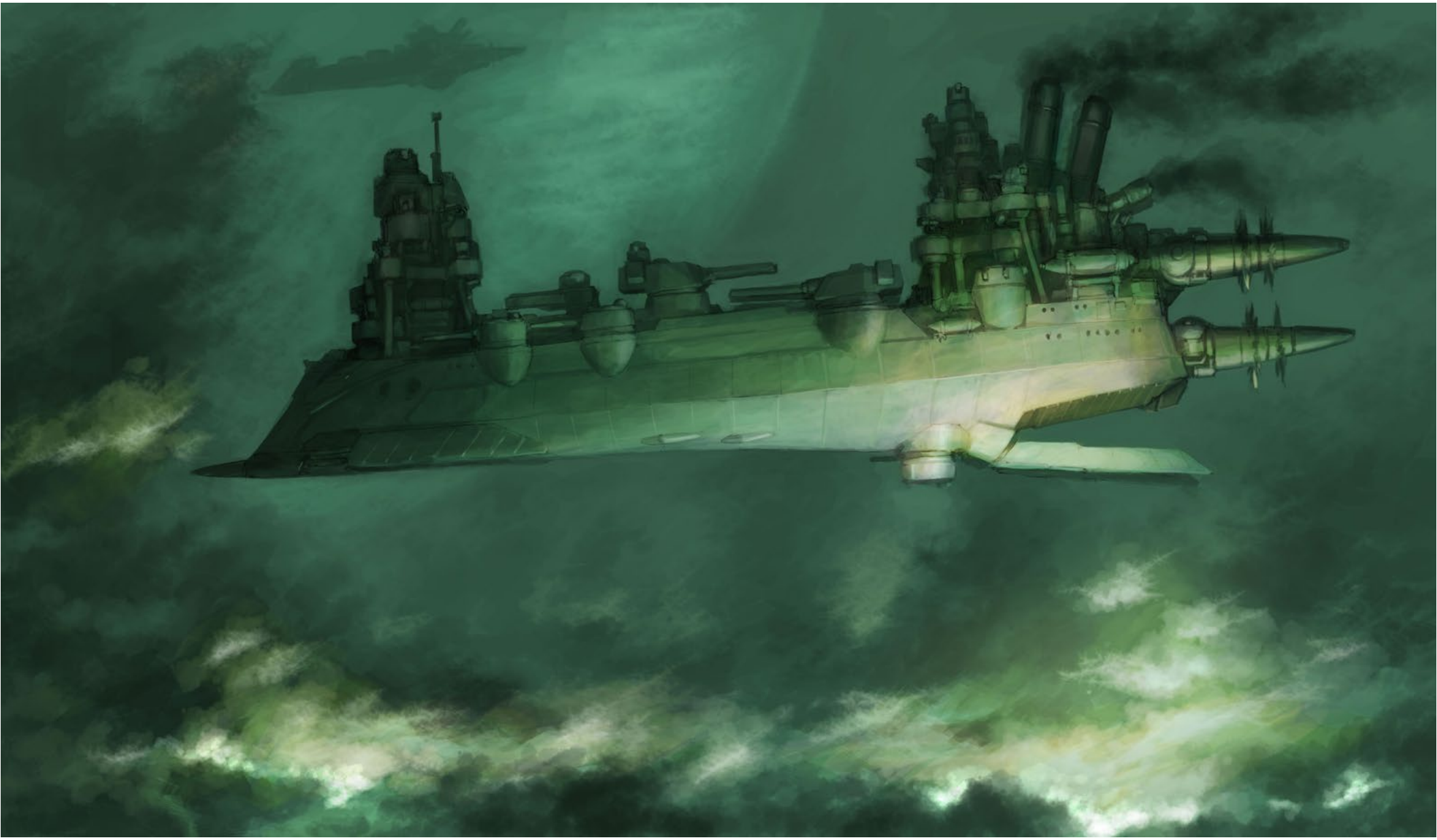
In the fall of 1921, the French navy had a serious problem. With the disastrous loss of the *Gloire* the previous spring, the Inner Powers had attained parity in engine design. This was in addition to the scandal that led to the downfall of the Third Republic and a souring of relations with the English crown. There were other considerations as well, many of which would take the rest of the decade to see to their full effect. Against this backdrop, the freshly minted Third Empire embarked on an ambitious new building program of both capital vessels and long range bombers. It was believed by both King Charles and the high command that the relatively intact industrial base of France put them in a position to break the stalemate in spite of their loss of technical superiority over Germany and her allies.

The *Charlemagne* class was an attempt to expand upon the strengths of the *Gloire*, while offering much better range and improved reliability. It was also a watershed for French manufacturing, having reverse engineered the construction cylinder recovered from the impact site in Guyana some years before. The implications of the ability to electrically smelt pure metals from low quality ore was not quickly understood, but once the written Martian language was deciphered, it became possible to make a wide variety of usable materials with minimal facilities. Indeed, inherent in the design of these alien factories was the ability to create other factory facilities not limited by the dimensions of the cylinders that first brought them to Earth. A second industrial revolution spread quickly through France, then across the continent. The new technology spread like the alien life that had preceded it, and in no time Charles IX was able to enact his plan to fight quantity with even greater quantity.

The new ships were immense, and produced with great rapidity. *Charlemagne* took barely nine months to complete on the new slipways at Nantes, which earned her the nickname 'Le fils de Charlie' with a characteristic mix of mockery and pride. The *Charles Martel* was completed shortly afterwards at Le Havre. Two other ships of the class, the *Maréchal Ney* and the *Jean Bart*, were canceled soon after they were laid down, so great was the speed of technological change.

Along with the rapidity of their construction, the keynote of the type was their massive size, being larger than anything even the British had launched, and would be thus until their launching of the *Emperor of Mars* a full two years later. Indeed, the finding of suitable crews became a problem on fitting out. While much of the operation of the newer vessels could be learned with minimal training, a nucleus of skilled seamen was indispensable. Space experience was always in highest demand, and went for a premium, even during the economic difficulties of the time.

While their gravity engines were not significantly different from those that had come before, they did see improvements in output, range, and efficiency over the previous generation. Indeed, it was found that the time dilation effect that the gravity drive could induce was not only repeatable, but controllable. A public demonstration of the *Charlemagne* traveling to the moon and back in a single afternoon was soon followed by an audacious trip to Uranus by the *Martel*. The voyage took the greater part of a year, yielding both tech-



The* Charles Martel *swoops low over a moon of Uranus. The carbon dioxide clouds and electrical storm are an unusual phenomenon for the icebound and near-airless Titania. It's thought to be a side effect of operating gravity engines within her pull, but the outer planets bear witness to a number of unexplained spectacles.

nical and political treasures in the name of the French crown. The first half of the voyage was conducted in secrecy, but having arrived in the orbit of Uranus, they transmitted the message 'Pour Dieu et le roi' via radioheliograph. Now was time for scandal again, though not with France as the victim.

A partial account was later printed in some of the popular newspapers from an anonymous source claiming to be part of the Martel's crew. It wove a fantastic tale of living stars hiding beyond the sight of the most powerful of human telescopes. These stars were supposedly inside hollow planets in the orbit of Uranus, and were thin shells lined with forests and oceans, within which were the abode of angels. The vessel was reputed to have brought back one as hostage, and this angel was kept in a hidden and luxurious prison under royal control, subsequently marrying Prince Martin in a secret ceremony. As these tales grew in both popularity and improbability, their publication was suppressed by the royal censor and the author or authors searched for. While never found, they were assumed to be republicans seeking to embarrass the monarchists with tales of the king committing various foolish and impious acts upon the very doorstep of heaven.

A somewhat soberer but still remarkable account emerged some years later among the papers of an English country vicar, of all places. The account was taken down by him on the deathbed of an expatriate who had served as a rating aboard the Martel many years before.

'We saw sparks fly, divide, and expand upon themselves like they were trees in a forest of light and smoke. I suppose we traveled for a long time, but I can't say how long. A few weeks. It was like being in a prison. A prison made of night. Everything was dark, but the stars seemed so bright, they scared us. So close, like they might hit us, or the sky would tear and pitch us into an even greater abyss. I took my vows when I came back, as it was either that or the bottle.

For us, the world was a small place, and made of iron. We lived for those long weeks in a world seventy feet wide, and two hundred long. When the condensers leaked, you could still smell the mud of the river when she was built. The ship, that is. While sometimes you could smell mud, everything tasted of metal and oil. The water, the food, and even the very air after a while. The gravity drive let a little air cling to us- a sort of bubble. It bleeds away after a while, but for the first few weeks the air isn't too bad. You can even go outside, and walk around the deck a little. The Earth seemed so large when we first left, but it quickly receded and we seemed to be falling down a well, a well with no bottom.

In the end, I think most of us lost track of time, and just tried to stay busy. It wasn't hard, as there was always much to do just to keep everything working. It was all too new, and needed constant maintenance and adjusting. I avoided looking at the portholes, even as they filled with the eerie blue of Uranus. We flew low over Titania, and saw strange things. What sort? I don't know. I could never make myself look. I've never considered myself a coward, and feel proud of my actions as a boy… during the invasion, you know? The men who looked out through the glass at those sights, when I saw their faces, I knew I could not look upon it. I just could not.

In the end, the captain made some announcement about reaching our destination and read a congratulation from the king. I don't remember the specifics, but you know the sort of thing I mean. It was a quiet trip back, and we broke down near Mars. We had to be towed home, though we got the drive repaired in time to impress the British and scare the Germans… or was it the other way around?'

The name of the crewman was not recorded, or at least not shared with

the vicar's executor. The fate of the *Martel* is known, having been lost during the Neomartian breakout. Her bell was recovered from the crash site on the moon, and was enshrined in the royal chapel following the rebuilding of Chartres. The *Charlemagne* both survived the war and what came after, seeing work as a training ship then as a receiving hulk overseas. She was scrapped sometime in the late 1930's.

The legacy of the class may be seen as representative of the broader fate of the fortress ship concept where the general tendency towards increased displacement and more varied capabilities resulted in spacecraft that grew significantly larger with each generation. This tendency was dependent on a constant cycle of technological improvement and innovation to match the ambitions of the empires that created them amid an evolving strategic situation. Martian technology at first offered a seemingly limitless number of secrets (many not adequately explored by the Red Martians) to exploit and adapt to the needs of space warfare. While the ruinous expense of such a grand building program as seen among all the great powers would be subject to some sort of economic check, the means of producing steel and other metals quickly and cheaply egged the process on. Even when confronted with a shortage of skilled labor, engine design offered a safety net in the form of improved reliability and greater automation. What labor remained necessary to maintain the new machines required less of a technical background, and time between overhauls was increased. With the improvement of weapons and the gunlaying to aim them accurately at the speeds and ranges involved, the spiral was complete as the world raced towards the stars, as well as war. The increasingly range and lethality of scouts and bombers was poised to change things once again, and the very elasticity of time and space were coming into play.

Icarus and its handmaid Nemesis ended all this. As these disasters were in turn overcome and mankind once again reached for the stars the fortress ships provided not a template for the great vessels that came later, but rather an inspiration. While space travel today is vastly different than it was fifty years ago, it would not exist at all without the hard-won lessons of a another age.

Seen here in a contemporary cutaway, the immense size and internal layout of the Charles Martel *make clear the departure from earlier designs that these new vessels embodied. Crewed by hundreds, it resembled a tiny and isolated city flying through space.*

While a tremendous investment in resources and manpower, so great was the rate of change that she was to be refitted as combination carrier and fortress ship in 1927, but was lost in combat against the Neomartians prior to this being able to be carried out. While the Charlemagne *was never similarly converted, she did have one turret and her rocket torpedo launcher deleted in favor of stowage and catapult space for a pair of scout craft prior to Icarus.*

1. Impeller Shaft Fairing and Balancing Arm
2. Dual Interferometric Gravity Impeller
3. Magnetic Suspension Ring and Coupling
4. Third Generation Gravitic Nullifier
5. Turbine Overflow Vent and Scrubber
6. Aft Radio Rangefinder
7. Boiler Stacks
8. Optical Tracking Array
9. Optical Rangefinder
10. Gunnery Spotting Tower
11. Bridge
12. Turreted Thermoelectric Cannons
13. Short Range Electric Cannon
14. Primary Battery, 11-inch Dual Mount
15. Combination Shell Hoist/Autoloader
16. Gun Breech and Buffer
17. Quadruple Rocket Torpedo Launcher
18. Torpedo Hoist and Reloading Ram
19. Forward Searchlights (x2)
20. Radiocomputer Computer Station
21. Telescoping Aerial
22. Optical Rangefinder
23. Gunnery Plotting Station
24. Short Range Electric Cannon
25. Conveyance Pod
26. Jackstaff
27. Bow
28. Magneto-Electric Ram
29. Gravitic Modulator
30. Reinforced Inner Hull
31. Secondary Battery, 8-inch Mount
32. Armory
33. Oxygen and Potable Water Regeneration
34. 8-inch Gun Magazine and Shell Hoist
35. Brig
36. Enlisted Quarters
37. Rocket Torpedo Launchers (2 Each Side)
38. Sick Bay
39. Rotary Torpedo Magazine
40. Warrant Officer Quarters
41. Enlisted Mess and Kitchen
42. 11-inch Shell Hoist
43. 11-inch Magazine
44. Laminated Hull Plating
45. Double Keel
46. Rocket Turret Magazine
47. Octuple Mount Rapid-Fire Rocket Turret
48. Thermal Ray Generator Plant
49. Dual Thermal Ray Turret
50. Gravitic Modulator
51. Reaction Mass Holding and Trim Tank
52. Electrical Generation Plant
53. Captain's Day Room
54. Main Engineering Access
55. Gravity Engine (x2)
56. Engineering Access and Storage
57. Reaction Mass Recirculation Pump
58. Sump Tank
59. Magnetic Impeller
60. Reaction Mass Overflow Vent

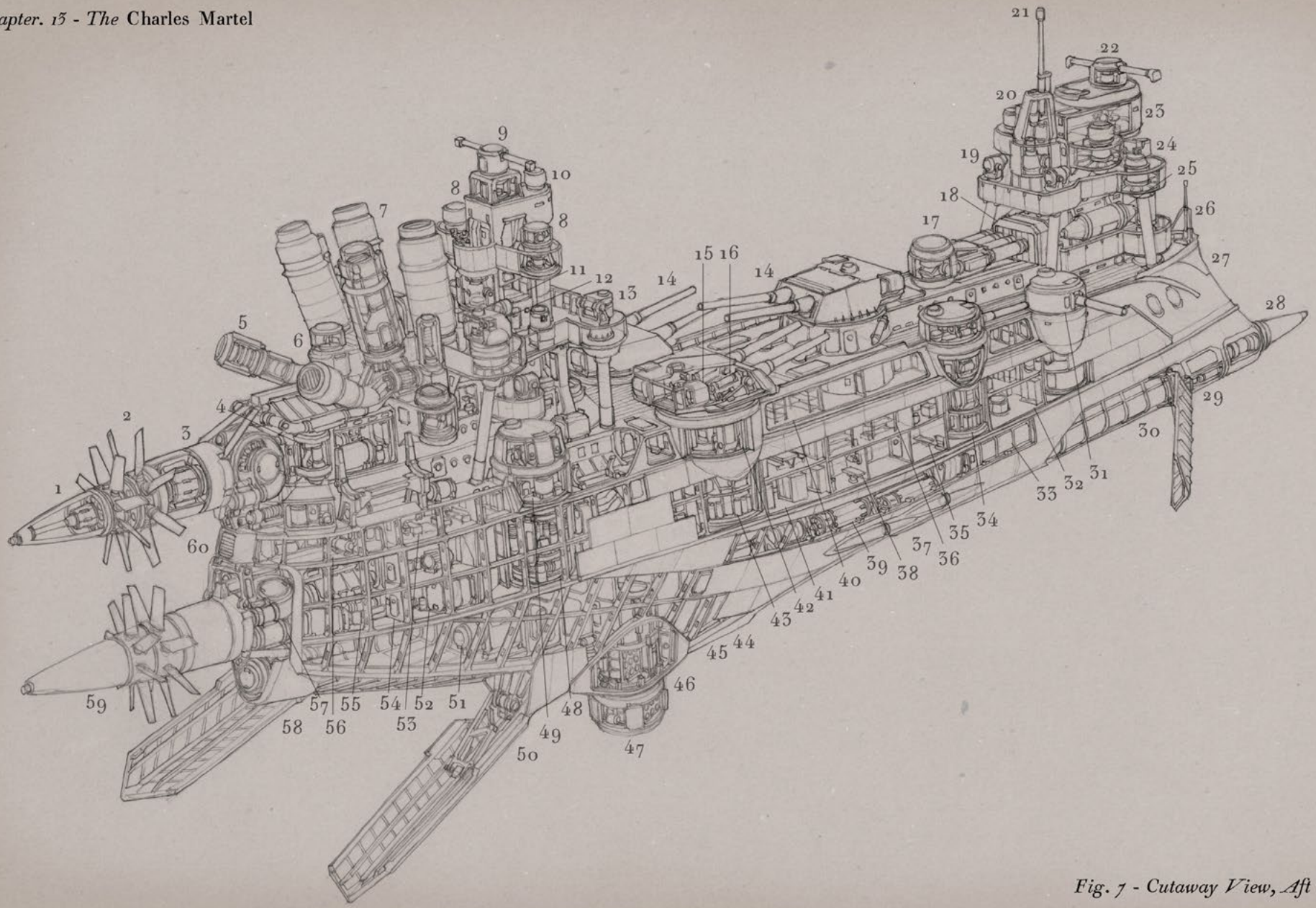


Fig. 7 - Cutaway View, Aft Quarter

WARSHIP - FRENCH

DORAND DO. XXIII ROCKET BOMBER

Distinctive in both their weapon systems and their ungainly profile, the Dorand DO.XXIII was a trans-atmospheric bomber built around a secret French program which sought to produce remotely controlled weapons based upon the feedback and navigation systems used by the invaders. Large, complex, and relatively fragile, the free fall and later (depicted here) rocket-boosted bombs required not only a large platform to bring them within range, but specialized transmission gear for their control. Existing vessels capable of operating at high speed at the edge of the atmosphere were either too small to carry the weapon, or not maneuverable enough to launch at an optimum height and angle while still avoiding the area of effect. The DO.XXIII was an unusual but effective solution. Taking advantage of the latest efforts to miniaturize the Martian gravity drives, the French scaled up one of their existing bomber prototypes, while adding a third drive on an adjustable airfoil. This configuration allowed the craft to break cleanly from the path of their payload, without having the accuracy problems inherent in a larger source of artificial gravity.

The program was later known by its codename of 'Hauteclaire', and it found its genesis with the emergence of fast, hard-hitting vessels that undercut the effectiveness of the fortress ships that were center of most space forces by the mid 1920's. While large vessels and short-range fighters dominated fleet tactics at the time, the distances involved made coverage of territories on three worlds difficult with the resources available. Germany and her allies, having been put at a disadvantage early on due to lack of direct access to Martian technology, developed innovations in long-distance bombing that spread British and French forces even further. Planetary defenses found themselves deploying pickets in ever expanding distances in attempts to interdict German bombs before they fell on military and industrial facilities on Mars.

Due to the thin atmosphere of Mars and the majority of Red Martian weapons being either energy based (with the resulting lack of drop and windage in a firing solution) or affecting a large area (such as the black smoke), there was precious little information available from the invaders on fire control. While many advances in this field had been made by humanity, they were still rapidly outpaced by the improvements in gravity engine technology. As former comrades turned on each other, battles in sky and space had to be fought at close quarters to have any chance of hitting anything with the weapons currently in use. Whatever the failings of naval gunnery were at the beginning of the 20th century, increasing engagement speeds and distances by orders of magnitude only made the accuracy problems worse. To cross the vast distances of space only to engage the enemy at ranges of under twenty miles to ensure actually hitting them seemed backward, and the British use of the Walsingham repeater to suppress gravity engine activity (and therefore channel movement) further bogged down tactics. The consolidation of forces to more closely support planetside holdings and the chokepoints to access them made these forces in turn vulnerable to German long-range bombing tactics. Upping the ante, the French worked on a program to be able to guide dropped weapons remotely onto stationary targets. The mid-1920's find tactics in flux, as the distances involved are grappled with

As strange looking as it was deadly, the DO XXIII used an unusual engine configuration with a rotating forward section to better facilitate the launch of the long-range missiles that emerged as a cornerstone of French strategic thinking. Nominally in response to the German rocket bombing campaign, French missiles employed increasingly exotic warheads in an escalation of stakes for control of Mars and even Earth.

as a thing in of themselves, as opposed to merely the medium of transit to the battlefield.

Miniaturization of gravity engines was proceeding apace, seeing the implication of the Martian automated factory technologies applied to novel designs instead of the original Red Martian ones. While the manufacturing processes of the factory cylinders are often likened to the growth of living vegetable matter, it might be more correct to equate their action with the formation of ice in water or the formation of crystals in a supersaturated solution. While these cylinders could produce standard designs from limited control input on the part of the invaders, a deeper exploration of these facilities showed that both the form and nature of what could be made with them to be highly programmable. The input was based upon a complex hierarchy of irregularly shaped metal cards or cams, with functions not unlike the punched cards used to operate a Jacquard loom. These Martian examples differed in that they operated in not just on and off states, but stacked and interlocked in such a way as too have their actions modify and elaborate upon one another in a way that resembled Boolean Algebra, but was fundamentally different in ways that go beyond the scope of this book. Suffice it to say that the extant works of the Martians were a Rosetta Stone, and the factories and laboratories of Europe were its Champollion.

These new, mass-produced engines never quite attained a status as a consumer good, but they certainly began to be produced on an industrial scale. Experiments and accidents led to the realization that local gravity control had warlike applications other than propulsion, and the possibility of ramping up the field strength of a gravity engine to the point it would crush anything within its area of effect was explored for the first time. Available guidance technology dictated such a device would only be effective against large, immobile targets gave the French royal science ministry pause, as the only targets within range that met these criteria were cities and industrial facilities. While there were many in both the new royal government and the remnants of the Third Republic that felt Germany had given *casus belli* for escalation with their use of rockets against Mars and Phobos, there were many that regarded the bombardment of Earth's cities as a barbarity and an inadvertent attempt to finish what the Martians had started. That this research was secret, even from most of those within the defense and industrial sectors, would further complicate matters.

The machine itself was both advanced in design and ungainly in appearance. In its defense, the appearance was the result of the arrangement of its gravity engines and the need, in essence, to obey two different sets of gravitational fields simultaneously. Initially designed to drop something like the German rocket bombs plaguing Mars, early prototypes were modified to carry heavier payloads that were in of themselves space vessels. While this line of research was initially explored as a way for a flight of bombers to carry a parasite fighter with them for defense, technology had overtaken this concept by the time of the first flight of the DO.XXIII. This concept was replaced with increasingly sophisticated concepts for guided payloads based upon a variety of targeting concepts. Whether timed or based upon gravitic or radioheliograph principles, it was felt that these were the most viable systems to conduct warfare over the distances involved. While never regarded as a pleasant machine to fly, they exhibited good survivability and were an effective tool in the campaigns for the Martian poles. The fitting of increasingly exotic warheads to the Hauteclare series was thought in some quarters to have been one of the catalysts for the Icarus Event, but both the Bourbon throne and the signatories of the Manchester Ac-

cords deny this. While highly speculative, the lines of reasoning involved thinking of gravity as a sort of light in the darkness of spacetime. Stars and other great masses would show as great wells of light near, and would blend together into a glowing mist when seen at great distances, like fireflies or the phosphorescence of tropical seas. Artificial gravity sources, by contrast, would appear as sparks that were tiny in size, but very bright and fast moving. Those who watched the skies sometimes suspected that something was watching back, either watching silently from the edge of the cosmic firelight or coming nearer across the vast gulf of space out of some unknown mixture of curiosity and darker motives. Known principals were such that approach via even more exotic means could not be discounted, as the Italians and Austrians had discovered independently, in the reverse.

Speculation aside, these craft saw use against German forces on Mars, ultimately forcing the evacuation from their positions formerly occupied by the Martian remainder of the czarist Russian forces before their withdrawal deeper undergound. While one of the few systems able to strike deep enough to penetrate the ancient subterranean installations, they were far less effective when confronted with effective space defenses. Eventually even the inadequate German fighter cover cut their numbers to the point that they were withdrawn from frontline service, and none were still serving at the time of the Icarus Event. No intact examples survive, but the engineering college in Madrid has the frame of an upper wing section on display suspended from the ceiling in the administration building. Rumors that one was found on Mars embedded in quartz underground have not been substantiated, but the principle of partial spacetime slippage, called the Giacomo Effect, has been documented elsewhere.

The legacy of the DO. XXIII and the French bomber program is complex matter, and even now feelings run high about its significance and legacy. While domestically seen as a prudent response to the German rocket bomber attacks at the time, it was seen abroad as something potentially more sinister even among allies. Gravitic weapons had potentials that were unknown at the time, and the bending of time and space to destroy a target was something even the most battle hardened of the combatants had difficulty wrapping their heads around. The rumor that the use of these weapons drew Nemesis as a scourge are certainly false, but in keeping with the sentiments of the age.

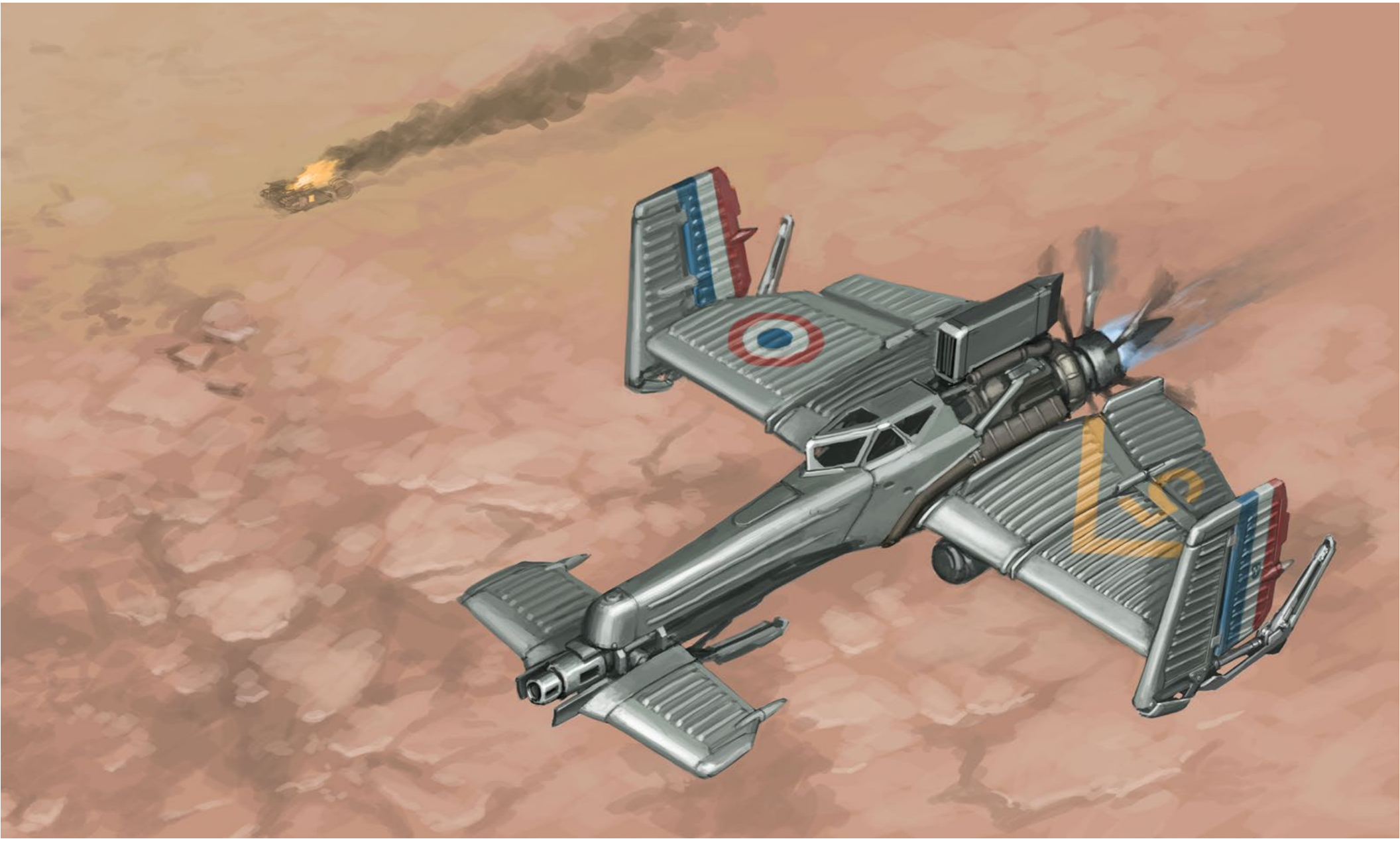
WARSHIP - FRENCH

MADA FAUCON SCOUT

While French capital ship and weapon design of the period is burdened with ethical and even existential questions, her fighter designs of the period culminated in one of the truly classic designs of all time. With smaller, more capable engines giving a free hand to engineers, they were largely unencumbered by the weight and volume limitations that saw earlier scout designs being fragile and ineffectual when confronted with larger enemy vessels. The emergence of the rocket gun as a viable weapon starting in the mid-1920's saw the small scouts of the prewar period evolve into much more lethal craft and a slow eclipsing of the fortress ship as the dominant archetype of space combat began. Like many intriguing developments of the period, research into hybrid rocket-guns began as a mistaken assumption about the Martians and their tools. Before the gravity control principles of the cylinders had been discovered, the hypothesis had been that the great guns that launched the invaders on their journey to Earth had some sort of mechanism that imparted thrust relatively slowly to the cylinders and also decelerated them prior to impact upon the Earth. It was difficult to imagine a scenario where either rocket assist or some sort of more exotic solution would not come into play with the use of these weapons. While the Red Martians had very little in the way of bodies, post mortem examination revealed what they had would not be capable of surviving the force of 1800 times the normal action of gravity upon them. Further, cylinder impacts at these velocities would lead to the burial of the cylinders to depths in excess of a hundred feet in most soils.

The basic problem with arming small vessels was one of weight, combined with the strain of firing on the hull. Conventional guns offered the best initial velocity and accuracy, but at the expense of great weight. Rockets offered large shell weight from a lighter platform, but at much lower accuracy. It was a team working at Fabriqué Royale à Toulon (FRT) that first offered a hybrid solution, that of a hybrid system that fired a rocket like an automatic cannon shell, but that incorporated a solid fuel rocket motor to fly faster and hit harder. These hybrid shells could be tipped with a variety of warheads, yielding different balances between armor piercing, high explosive, and incendiary performance. Initial velocity would be lower than a 'pure' gun equivalent but would neither drop off in velocity nor require as heavy a weapon and mount to fire it.

As these weapon systems matured, so did gravity drive technology and metallurgy. They came together in a design that while not wholly revolutionary, represented an evolutionary apex of fighter design. Built around a strong transverse box spar, there was planning throughout the design process for a variety of engines and weapons to be fitted, including some that had not yet been designed. Envisioned as a dual-environment fighter, the craft was given a large aerodynamic area and conventional control surfaces. The engines fitted almost invariably followed the French scheme of the drive core having an external rotating element that was frequently mistaken for a propeller. While the superficial appearance was similar, the function of this device was more akin to the balancing pole carried by a tightrope walker. The generation of an artificial gravity field is subject to fluctuations of area and output due to the inherent instability of the effect. Earlier genera-



While originally entering service as a scout and dual-environment fighter, the MADA Faucon proved readily adaptable to the ground strike role. Here seen flying above the surface of Mars, a Faucon of 4th Flotille 'Giverny' cruises past its handiwork sometime in 1928. Between the effectiveness of attacks from above and the ubiquitous dust of the red planet, the use of wheeled and tracked vehicles on the surface was almost universally abandoned.

tion devices were much more massive in a way that damped this effect. As the gravity drives grew smaller, varying schemes were experimented with to control the phenomena. Prevalent in French approaches was to use a rotating element with a strong gravitic 'charge' (The analogy is erroneous, but useful) to, in essence, reflect the cone of gravitic control back to center and maintain stability. Later engines saw even this dispensed with, but for a time it was a common characteristic of the technology.

As the Martians became less mysterious (both militarily and technically) the attitude of desperation and cosmic terror slowly became one of confidence and even hubris. There was a growing realization that the Red Martians and their creations could not just be comprehended by humanity, but exceeded by them. Indeed, the Red Martians were seen as little but the degenerate survival of a species and civilization far more ancient and accomplished. These nameless progenitors left behind vast archives of strange knowledge stamped on leaves of paper-thin copper, concealed in library-tombs far beneath the surface. There was a sense of humanity seeing over the horizon to something far larger. In the spirit of the age, the infinite was seen as a prize to be fought for. When the first of these new fighters took to the skies, it was crewed by pilots who saw themselves as crusaders, liberating the airless and ancient world in the name of old allegiances.

Deployed to Mars almost immediately upon resumption of hostilities with Germany and her allies, the type did sterling work against the fighters and surface forces arrayed there against them. German bombers in particular fared poorly against the 6" and 8" rocket projectiles that the so-called 'Silberbussard' fired against them. Tanks and tripods without air cover were especially vulnerable to attack by these craft, and only salvaged Martian heat ray weapons prevented German and Austrian forces from being driven underground. Even the effect of thermal weapons could be mitigated by approaching targets at high speed and very low altitude. The distinct appearance of the craft was the result of them being coated with an unusual silver and titanium film which game some protection against such weapons. By the signing of the so-called 'Rotten Peace' in Manchester in 1929, French designs ruled the skies over Mars.

As the prevalent frontline type of France at the time of the Icarus Event, losses were as catastrophic as might be expected, with no craft outside of the Earth's atmosphere surviving the universal failure of gravity drive technology. Some few pilots were able to glide to safety, and a few even of these survived the environments where their now dead vessels came to rest. Between 1929 and 1932 some surviving hulls were lightened and given broader wings to operate as aircraft, but the effort was largely hopeless. Without the magic of gravity control, the type was grossly overweight as any sort of combat unit. These dark years, called the New Fear, saw a variety of different reflections upon the events of the previous half century, with varying conclusions drawn. The skies were watched again, and a frightful shadow crept back into the mind. The search for meaning was as universal then as it ever was, but the clues provided might lead the inquirer elsewhere than it might now. It was to the glory of the times and those who made and flew these craft that they once again worked in secret against an unseen foe. The Icarus effect turned out not to be the fundamental altering of physical laws that it was feared, but rather a revelation that the distortion made in space and time by the gravity engine created a link between all operant gravity control fields. It was through this link that the mysterious intruder, a vessel known only as Nemesis, was able to disable the gravity engines of all human craft within the solar system.

It was the finest hour of the type when, fitted in secret with engines developed on a different gravity control principle, some sixty examples of the Faucon, once again blazoned with the blue roundel of a united Earth, joined the international fleet that fought and finally destroyed the Nemesis and ended the captivity of humanity. The victory came at a terrible cost, for as many as died to the guns of this new invader, the new engines caused many casualties as well. In an elegant solution to escaping the control field of the Nemesis, the new gravity engines existed in a spacetime that was out of sync with normal matter. Damaged or overtaxed engines failed in gruesome and sometimes spectacular ways, often turning the pilots to dust much like the effect observed on the *Gloire* years earlier. In addition, some went out of phase in a more exotic way, either vanishing utterly or turning to ghostly apparitions unable to interact with their surroundings.

One Faucon pilot, a Captain Georges Otho, was said to have come through the ordeal intact to the fanfare that awaited him upon his return. Some weeks after this engagement he reported a loss of appetite and a general malaise. Going to a resort near Biarritz upon the advice of his physician, he subsequently found sunlight and any sort of touch increasingly painful, leaving great bruises upon him. His conditional deteriorated rapidly, and experts were called in. Hotel guests were awakened to a horrific sort of hollow screaming in the night and when Captain Otho was checked on it was discovered that he was embedded in the floor and was slowly sinking though it. Translucent and raving he told of terrible sights becoming more concrete to him with each passing minute. In a moment of calm, he dictated a letter to his wife and was shriven. His face barely above the floor, he went quiet, seeming to listen for something. It was in this silence that the commotion downstairs first became apparent to those assembled. As the unfortunate pilot slipped through the floor, voices and the sound of hammering became louder. There was a muffled cheer somewhere below. A runner appeared, requesting those assembled to immediately come to the suite directly below. There, a strange site greeted them. The Captain lay upon a sort of scaffold, directly below the point at which he had slipped through the floor upstairs. Looking slightly more corporeal, sheets of roofing lead had been laid out upon the rickety and improvised structure which arrested his descent. The door to the balcony had been knocked out and the scene was attended by a motley mixture of scientific and naval personnel clad in lead aprons. A small gravity engine off a military truck was being winched up to the balcony by cursing sailors and distressed hotel employees. Seeing this pandemonium, Otho's physician and an engineer there both became aware of the possibility of saving the patient, and how that might be accomplished. By dragging the engine into close proximity to the hapless pilot and modifying the output, Captain Otho was compelled to fully reappear. The name of the engineering officer who had come up with this solution is not recorded, but his exclamation that 'Splitfoot will be made to bow to the king!' later became something of a rallying cry and was immortalized as the motto of the 8th Flottille 'Mephisto'.

Coverage of the event was suppressed for many years, and the fate of Captain Otho remains a secret to this day. Some say he recovered, while some say he needed to remain in a gravity field for the rest of his life. A variant of this latter story maintains that his ordeal left him able to see through time and space, and is retained in secret luxury by the house of Bourbon as a seer. The curious reader will find no shortage of written speculation on this point, though as always, a certain shrewdness is called for. Rearmed and re-engined, the Faucon is still seen in service to this day.

WARSHIP - FRENCH

MADA/DORAND ASTRID PATROL BOMBER

Germany was not the only nation to master fast, long-distance small craft. While less fabled than the German machines of the same period, the spacecraft of the Marine Nationale were no less capable. Conceived of as bomber hunters and patrol craft, their prey were the German bombers and the auxiliary vessels that serviced them. The fighting had not yet spilled over to the Earth, so a certain unreal atmosphere prevailed. The nations of Earth continued to rebuild their cities and the wars of empire were something, most literally, of another world. Martian wonders streamed back to Earth, both from the hidden places deep within Mars as well as from the secrets tied up in the weapons used to invade Earth. It was as if each new discovery was a message from a place long since vanished. These revealed secrets were not distributed evenly, and with hope of cooperation between empires long since gone, new lines between have and have not were drawn. Unable to keep up with the shipyards of Dublin and Nantes, Germany retrenched to her outer holdings. From there she was able to bombard much of the inner planets with long range rocket bombs. Her GV/X series bombers undercut the effectiveness of the enemy fleets and even the gravity engine damping effect of the Walsingham Impeder.

In response to this new threat, the French developed the Astrid, a long-range patrol craft as a joint design between MADA and Dorand. Merging many of the distinctive hallmarks of the two manufacturers, the Astrid also employed many new innovations. Gone were the external impellers on the gravity engines. These were replaced by an innovative scheme that placed the dual engines in an overlapping field and slightly out of phase. This had the result of gravity output fluctuations canceling each other out with a minimal loss of efficiency. The strong box spar that was required for this setup to function well determined many other features of the craft as well as the overall layout. While not luxurious by any standard, the overall size of the craft permitted somewhat more room than what was typical of a small craft of the period, even if much of this was taken up with fuel, reaction mass, and the supplies needed for long patrols. These typically had a crew of three, consisting of a first and second pilot as well as a combination engineer and radioheliograph operator.

As advanced as the type was, it arrived both too early and too late to live up to its potential as a bomber killer. Just as the type saw deployment in numbers in 1928 the German rocket bomber threat had abated, their numbers cut by accidents and the inability of Germany's beleaguered industrial base to replace losses. In a recurring theme, an answer had been found to a problem which no longer existed. Production orders for the Astrid were curtailed as a result, and those that were built saw little action. Many existing machines were modified to the Astrid *bis* A standard, which replaced some of the fuel and reactant tankage (as well as the second pilot) with a more advanced radioheliograph set and associated signal gear. Range and endurance were both reduced, but coverage area was somewhat improved due to sensor range.

Produced on an experimental basis, the Astrid *bis* C 'Romarin' contained gravity drive modifications that allowed her to detect artificial gravity sources at distances far greater than any radioheliograph.

Seen here hard pressed to escape a larger German force, the MADA/Dorand Astra would typically use a combination of speed and range to either avoid or outrun hostile spacecraft while it acted as the eyes of the French forces in the inner solar system. While comparatively light in their payload, the far-ranging craft acted as spotters for heavier weapons including the French missile program. The appearance of one of these silver machines would typically cause a German squadron to abruptly change course if the intruder could not be shot down before it had transmitted the location of the enemy.

While never produced in quantity, it was the deployment of this secret variant which tolled the death knell for enemy commerce raiders harassing distant outposts. Typically, these variants were deployed in pairs at the edges of allied space, operating from a tender. Triangulation was used to locate enemy vessels and fighters, or larger vessels were guided in based upon this information. While some argued that fighters should be deployed in concert with the type from remote bases, it was felt in the end that it was better to conceal the existence of the technology and maintain the ruse that the raiders had been located via conventional means. It was not until after the end of hostilities that the existence of this technology was revealed even to France's allies, a move that caused no small amount of hard feelings between France and Britain, with the British arguing that the technology would have given advance warning of the location (and possibly the abilities) of the approach of the Nemesis and the subsequent Icarus Effect.

Secrets between erstwhile allies being what they are, France never possessed a sufficient number of machines to make such a scheme viable, even if the nature of Nemesis and her impending actions had been known beforehand. Evidence suggests that this advanced alien vessel was capable of detecting and homing in on the 'Romarin' detection sets and that two teams of these and their tenders had been destroyed by Nemesis a full year prior to the first confirmed observation of the vessel by a flight crew from the USS *Porter*. This is supposition of course, as the vessels involved simply failed to check in and were declared overdue. Fearing discovery of the ruse or perhaps the action of a more powerful raiding force, a task group was in the process of being assembled to search the last known locations of these teams when recalled abruptly to Mars. This was done in light of the disaster at the Battle of the Equator where the British lost the core of their fleet to an aggressive, almost suicidal, attack by the remains of the German bomber force and the bulk of her remaining fleet. Two additional teams of Astrids were deployed to search for signs of the earlier vessels, but when one of these disappeared as well, the French high command decided they had had enough and recalled all remaining units to the inner planets. This action caused friction with the British as the promised support for the breakout of their trapped fleet at Neptune never materialized, and the surviving vessels anticipated German attacks via ambush and passive means, such as mining, as the British attempted to return to Earth. Unknown to them at the time was the withdrawal of all German units from the Neptunian blockade to have the required strength to attack the British within sight of Earth. While the breakout was successful and without loss, relations were strained between the two nations as a result.

With a peace, of sorts, signed the following year, most extant examples were withdrawn to the inner planets. Of these, two squadrons were withdrawn to Mars and one detached to serve with the British at Phobos. Additionally, a training squadron was created back on Earth, operating out of a base at Guyana. Although the Astrid had acquired a reputation as an 'unlucky' craft, an unusually high number survived Icarus and the almost wholesale destruction of Earth's space navies that accompanied it. This was ironically the result of the type showing poor serviceability when operating from the corrosive atmosphere of Earth and most training machines being grounded upon routine inspections, showing stress cracking at the engine mounts. While offworld examples were nominally kept at full readiness this was not the case in practice, with neither base nor squadron commanders willing to risk more than the minimum number of personnel in peacetime until these ma-

chines had been thoroughly inspected and repairs made.

While earlier encountered by the Americans, it was Astrids of the French 11th Flottille 'Étranger' which first fought Nemesis in combat. However brave the crews, the initial contact with the intruder was both short and one sided. Before their loss, they were able to transmit the position and course of the intruder, enabling an interception to be made, though this resulted in the defenders again being overwhelmed and nearly wiped out before Nemesis withdrew from the fight for unknown reasons, possibly related to the beginning of the initial Icarus event. This saw wildly unpredictable behavior from all gravity-based technologies for some hours before a complete failure of all such machinery in the solar system within twelve hours. With the loss of nearly all spacecraft in their possession, the great powers of Earth retrenched and watched the skies once again. Due to the grounding of the type before the disaster, the Astrid was in a unique position when the interference field created by Nemesis was defeated three years later, and ultimately took part in the battle which finally saw her destruction.

The machines used in this fight were heavily modified, being turned into single-seat 'giant killers' with an abundance of gravitic and ballistic weaponry. Casualties were high, but several machines survived the fight and some of these are on static display. A particularly fine example, christened 'Le Grand Ferré' by her crew, is the centerpiece of the royal space museum outside Paris. None are known to be in flyable condition, their structural fatigue problems never having been fully solved. While a historically significant spacecraft, the Astrid is regarded with a degree of ambivalence by the public as a symbol of an increasingly complex cosmos and the uncertainty of humanity's place within it.

Largely responsible for this ambivalence have been the anonymous statements of certain Astrid pilots and crews about the events of 1932, including statements concerning seeing writing in English upon the hull of the Nemesis as well as seeing human figures within. Speculation that the Nemesis was created in secret by a foreign power is not credible, but in light of other events the possibility that this intruder comes from elsewhere in time and space is both fantastic and chilling in the extreme. The possibility that these accounts are fabrications by factions and individuals seeking to either profit from their deception or embarrass the monarchy cannot be denied as a possibility either.

WARSHIP - FRENCH

PERSEPHONE CLASS CRUISER

This vessel marked a transition in design seen late in the conflict. Her drive is of a new type, marked by a lack of external impellers and a motley assortment of attenuators (often mistaken for airfoils). Following the hard lessons of the *Gloire*, the Persephone shows a conscious and systematic use of gravity drive principles to manipulate space-time. In spite of all this, she retains a seaworthy hull and conventional (although rather light) weapons layout. She was the only vessel of her class, and served as part research vessel, part boogeyman to her rivals. Her fate was unclear, and a matter of speculation to this day. She was rumored to be involved with the appearance of Nemesis, the name given to the advanced vessel of unknown origin that wreaked havoc among the powers of Earth. As she disappeared without a trace, the origin of these stories is of questionable veracity, and even the rumors do not agree as to her significance and role. Some paint her as the first victim, passing through strange skies and awakening some terrible empire's curiosity. Some paint her as the provocateur of doom, leading something back to Earth that should have stayed far away and hidden out among the stars. It may also be that none of this is true, and that these tales spring up like so many others to try to explain the mysteries our world finds itself immersed in.

The secrecy of her design and launch, combined with the circumstances of her loss, make for a picture that is incomplete even now. First taking flight sometime in 1928, her design shows clearly the Martian influence, and on closer inspection the exotic nature of her makeup becomes more apparent. In many ways she was much more like the Gloire than one of the later designs, with her hull little more than a wrapper for the most advanced gravity engine of the day, with armament and crew accommodations finding space as best they can.

The vessel was at the center of a scandal relating to an outbreak of hysteria which would later be linked to the Dream Plague, but the general secrecy that marked the career of this ship makes discerning all but the most general of details difficult. As the Martian tunnels were explored, and the ancient knowledge of the Grey Martians streamed back to Earth, it brought with it various fads and obsessions about this ancient race. Enthusiast societies were formed, and some even sought to recreate the language and rituals of a race vanished for eons. Superficially similar to the Egyptian revival which preceded it, it slaked a certain popular thirst for the ancient and mysterious, and functioned also as a reverie for some upon the nature of human destiny amid the broader universe. While generally regarded as harmless, the suicidal desperation of the so-called Neomartian Secession in their attempt to reach Earth puts matters in a different light. Trapped and stateless following the Menshevik revolution in Russia, those forces remaining loyal to the Empress retreated underground and awaited a salvation that never came. They sealed themselves underground, refusing to make a separate peace with Germany and regarding all others as betrayers. For three years nothing was heard, and those that ventured underground into their tunnels were never heard from again. It's impossible to do full justice to the events of 1926 here, but when the Russians appeared again they did so ready for war, crewing

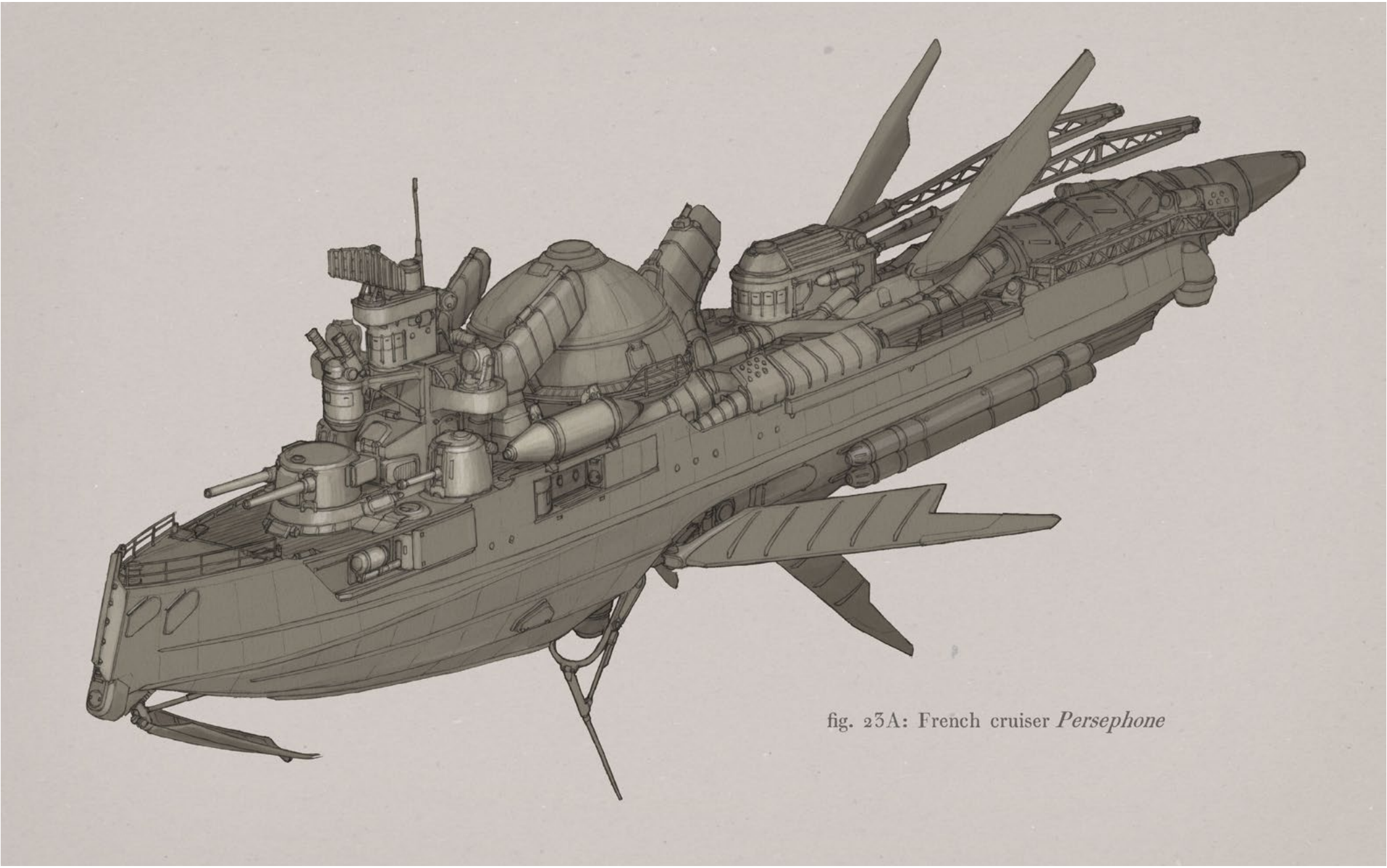


fig. 23A: French cruiser *Persephone*

With a variety of external fittings and machinery betraying her exotic nature, the short and strange career of the Persephone has spawned a number of theories about her disappearance and ultimate fate. Unusual even by contemporary standards, her gravity engine could be used to bend space and time on a deliberate if limited basis.

a fleet of old vessels with bizarre modifications. Festooned with images of saints and emperors, the fleet of the Neomartians (as they came to be called later) burst out from hidden places and headed for Earth at top speed. It's not known who fired first, or even what the full goals of the Russians were. Their radio signals jammed all frequencies and consisted of a cacophony of distorted hymns and prayers in Latin and Russian, these overlaid by a peculiar buzzing sound. This buzzing was later speculated to be the ancient Grey Martian language, but no known recordings survive. This makeshift fleet fired upon any who drew near, overwhelming the pickets with sheer numbers.

The instinct to shoot first and ask questions later as the Neomartians approached Earth is perhaps explicable in the light of other events at the time. Prior to this, there were an increasing number of strange cases on Earth of people thinking they were Martians, especially after prolonged contact with Martian artifacts. What might first be explained by enthusiasm and even hysteria transformed into something stranger as those afflicted sometimes recalled past lives on Mars and sometimes broke into a sort of growling chant made with the throat. This outbreak came later to be known as the Dream Plague, and it was rumored that the changes wrought included physical ones, though it was unclear what these were, or how they might be detected. It became a crisis, though most official sources took the line that this was mass panic rather than disease.

Against this backdrop France sought to bring the gravity drive to its full potential as a technology capable of bending time and space. The disaster of the *Gloire* and other extraordinary experiences on the part of the Austrian and Italian space forces showed what was possible, if only it could be controlled. To this end, a physics and engineering team had been working through the mid 1920's on a series of test hulls, with strange results. Working remotely, the research teams were able to speed up and slow down time within the gravity field relative to an outside observer, though this resulted in a number of accidents and had inherent difficulties in terms of monitoring and controlling the process. Such was the secrecy of the undertaking that much of what was discovered remains unshared with the wider world, and those lives lost in its pursuit have as yet no public names. What is known is that on the third of August 1927 an experimental gravity engine mounted to a barge off the coast of French Guiana vanished, along with a perfect hemisphere of the ocean some hundred feet across. With a boom the air rushed into the other, invisible hemisphere of tropical haze above the Atlantic coast and with a roar the sea returned. Observers from telescopes saw the barge and great attendant mass of seawater reappear in orbit far overhead and float there for ten long minutes until the onboard timer tripped and the barge (and seawater) returned. Where earlier there had been a terrible explosion as matter was superimposed on other matter, here there was merely a roaring outrush of air and a great wave which soon dispersed. In the middle of this phenomenon was the barge, steaming but intact. One more constraint had been conquered.

The hull of the *Persephone* had been under construction for some six months while these tests were underway, and with this success she was launched and fitted out at Le Havre. In an effort to disguise her unique nature her external attenuators were not fitted in the main yard, but carried on deck while she was floated upriver in the night. Final fitting of the impellers was done at a quiet spot on the Seine, her ships cranes having being rated for this very task. Launch was uneventful, but delays in final fitting meant that she took off near enough to dawn that this event was

witnessed by a large number of observers from the fishing fleet on the coast. Accepting secrecy as lost, her captain proceeded down the coast before ascending to orbit for her initial test flight. Indications are that this went well, though the details were never made public. It is known that the other powers quickly became aware that France was cooking up something new, and she was shadowed by German and British units as she made her way to Mars for further testing. Nominally at peace, the *Persephone*'s stalkers resolutely ignored each other. Halfway to Mars, she vanished, having spread her impellers like wings and engaged the more exotic capabilities of her gravity drive. A few moments later and she appeared in the orbit of Mars, lingering there for a few days before disappearing again. During this time, she did not answer hails or other attempts to communicate.

This lack of communication was not wholly unexpected, as it was obvious that the Marine Nationale had a new discovery that, if no longer secret, was at least something they weren't interested in talking about. The Persephone was subsequently seen in a number of places throughout human space. That she was sometimes seen in two places at once was written off as errors in reporting the time of observation. Other nations made inquiries to the French throne, and some even lodged complaints.

This went on for the rest of the season, and started to carry with it rumors of strange happenings accompanying the marvelous new vessel and her cloak of secrecy. Shadowed by allies as well as once-and-future enemies, photos revealed changes in the vessel not explicable by damage or likely field modifications. A movie capturing one of her 'blinks' as her disappearances came to be called revealed her silhouette or hole in space for a moment after its occurrence, and a strange vista could be seen through this gap. Other witnesses claim that as the vessel did a similar maneuver, something great and dark came through the hole, blotting out a wide swath of the stars for a short time after. Perhaps the most peculiar side effect was one of the last to be reported, but the first to manifest: the dreams. A mere unsettling waking dream was not likely a topic of conversation for the fighting space sailors of any nation, let alone entered into any log or report. The problem was that they grew in length, frequency, and intensity with time. What began as a vague impression of Mars bloomed into sensations of cold air and flying above cities of pink glass, with towers like coral showing movement of something inside. Always there was some impression of wings and a cold and distant sun. From there, many who followed the *Persephone* too closely were either unable to sleep or far too difficult to wake. Many ships that fell afoul of this effect returned to port, suspecting either blackdamp from leaking boilers or ergotism from infected supplies. The symptoms all vanished after gaining distance from the French vessel.

Those that persisted started to hear a buzzing, first in their dreams and then even as they worked. Initially it was like a headache, but the sound deepened then began to modulate and those afflicted heard it resolving itself into words. This was almost always fatal, with either catatonia or self-destruction following soon after. The madness associated with the *Persephone* continued in intensity until one day, the vessel ceased to reappear and was never heard from again. There was scandal, and allegations of everything from piracy to demonic possession. In the end, the fate of the ship was never determined and her mission never revealed. She was marked 'overdue' with no additional explanation, and the French regarded the matter as closed.

Seen here in a heavily retouched photo, the* Giulio Cesare *(ex-*Eisenprinz*) is depicted with the experimental heat ray weapons she was fitted with at the time of the appearance of Nemesis.

SECTION IV – ITALY

WARSHIP - ITALIAN

BASILISCO CLASS TORPEDO VESSEL

The Italian experience in the Martian invasion was somewhat unique, having seen direct violence by the tripods and their weapons but emerging with minimal loss of life and damage to property. This is counterbalanced by the relatively small industrial base the Kingdom of Italy enjoyed at this time, their colonial expansion having been disrupted by other events. Two cylinders fell within her territory during the attack, with one falling near Pavia in the north, and the second in the coastal waters of the Adriatic. There is circumstantial evidence that the latter fell in deeper water than anticipated due to limitations of the Martian surveys of the area. Subsequent examinations of captured sites on Mars revealed that while sophisticated, their telescopes were all purely optical in nature and subject to the limitations of visible light imaging. Tactics of the Martians typically involved driving on centers of transport and communication, causing destruction and terror on their approach so as to drive great masses of refugees and retreating ground forces before them so as to effect paralysis. The tripods in Italy would seem to have anticipated a variation on this, with one cylinder moving to cut off the peninsula from aid and the other moving south on a mission that can only be described as slaughter. Events unfolded somewhat differently. Impacting in thirty fathoms of water, the Adriatic cylinder was subsequently found to be the grave of its crew, its entry hatch buried deeply in mud. It was found that the deployment of the heat ray mounted inside the hatch to clear away mud from the entrance had proven lethal for the crew due to the generation of superheated steam. It was events like these which later brought into question the training and very nature of these invaders. The northern cylinder fared better, but delayed their approach south some days, apparently waiting for a signal from the south that never came. It was in the north that the Martians had one of their few successful deployments of their embarked aircraft, the Alps in summer having air sufficiently thin and calm to permit effective control. With very broad and lightly-constructed wings and a rudimentary tail, intact Martian flying machines resembled nothing so much as a condor in silhouette and were kept aloft via a flapping motion (making them technically ornithopters). Initial launch was accomplished with a sort of slingshot, the wings doubling as landing skids upon recovery with the machine slowing to a near stop before contact with the ground.

It is perhaps comforting to know that whatever their powers and intellect, the invaders were not immune to errors in judgment and intelligence gathering. Designed for a much thinner atmosphere, most Martian ornithopters suffered wing spar failure attempting to even take off on Earth. The experience has been likened to attempting to fly underwater. While perhaps not quite as extreme as this, only at the highest altitudes were these machines capable of flight on this world, and then only without their terrible cargo of black smoke cannisters (likely destined for Milan). Eventually the tripods of the northern cylinder ventured out of the highlands and began their brutal work, invisibly sealing their fate as they entered into the miasma of unseen life which permeates all but the hottest and coldest areas of Earth. By Piacenza the Martians were ill, and by the outskirts of Milan they were no more.

One of the few early types able to make the long journey, the **Drago** *is depicted here investigating the debris of the asteroid Ozymandias after its close approach to Earth in 1921. While the object was first feared to be another alien invader, the panic caused proved groundless, but still an impetus for improving early warning technologies.*

Hundreds of the local population died in fire and panic, but this was not the tens of thousands seen lost elsewhere. The blow of the red planet was weak, and the Kingdom of Italy recovered quickly by the standards of the times.

Following the invasion, Italian spacecraft development proceeded apace with a combination of experimentation and statecraft. Unlikely to match her neighbors in fleet size, she attempted to maintain her influence via the aggressive exploitation of Martian technologies and how these might be better implemented and even improved. A combination of her need for French engines and the ill-advised attempt by Russia to snatch the Adriatic cylinder from under the nose of the Italian navy cooled relations between Italy and Russia (the latter's attempt to set up a puppet government in Trieste not helping matters). Italy leaned west, and the Bourbon restoration reinforced these bonds. In light of these factors, many of the early types operated were a polyglot mixture of French and British designs, adapted to Italian needs.

The *Salamandra* class is one of the few wholly indigenous types manufactured in quantity, and it emerged as one of the better solutions to the problem of long-range patrols that didn't involve a large fleet with the attendant baggage train. Based around an innovation that improved the efficiency of her gravity engine, this class of high endurance patrol craft would see service with France and Brazil in addition to Italy herself. The nature of the innovation was such that two gravity engines could be mounted so that one field was nested inside another. While bulkier than a single engine core of the same capabilities, this arrangement yielded greater fuel and reactant mass efficiency. While not understood at the time, this was essentially a controlled version of the phenomena that had doomed the *Gloire*. While the spacetime warping effect that occurred was not obvious under the conditions of short journeys, the longer patrols yielded irregularities in positioning and communication that took some time to grasp.

In terms of more obvious capabilities, the *Salamandra* class was built for endurance and the needs of a crew that might be isolated for a month or more at a time. Provisioning space was more extensive than most vessels of similar tonnage and her weapon and support systems were modified to make maintenance in the field simpler. Gun armament was fairly light, consisting of a hypervelocity 5" main battery and a pair of 1-Pounder Maxim guns on periscope barbettes. The hypervelocity guns of the period differ from more conventional weapons by their greater barrel length, with higher muzzle velocities accomplished with a combination of improved propellant and metals technology derived from Martian sources. With fire control lagging significantly behind, shortened travel time from gun to target simplified what could be a tortuous firing solution when one vessel engaged another at speed. Likewise, the periscope barbette was a means of permitting direct control of lighter weapons without the need for crews to be in full pressure suits. This was accomplished by having the gunner stationed below the weapon mount and the station fully within the hull, control being accomplish via mechanical linkage and periscopic sights. Rangefinding could be accomplished locally, but a separate spotting station such as used on larger classes greatly increased accuracy, if only in a relative way. In addition to gun armament, the primary punch of the class was a pair of gravity torpedoes slung beneath the hull. These devastating weapons used an early version of the gravity bottle to propel themselves in a sort of artificial freefall towards their target. While easy for smaller vessels to evade, a single hit upon all but the largest of dreadnoughts was all but a

guaranteed kill. Losses to these weapons were minimal after a few initial (and spectacular) examples, but it induced a change in tactics on the part of Germany and her allies that saw capital ships either staying closer to safe areas or tying up a significant strength of smaller types to act as a screen. Venturing deeper into space than even most large vessels, the class excelled at deep space patrol, though this could be taxing upon the crew. Service here required certain psychological characteristics more commonly associated with monks rather than sailors. That being said, those who adapted prospered, but often had difficulty upon their return to a more normal environment. The isolation combined with a relative slowing of time had peculiar effects that were enhanced by the problems with radio transmission and reception that led several vessels to be marked overdue and feared lost, only to reappear some months later than expected. Time travel undertaken piecemeal was a difficult reality to adjust to, but foreshadowed the paradoxes to come.

The service history of the type is respectable, but ultimately proved more potent as a threat than an actuality. This was due to the immense areas involved rather than any deficiency with the class, but the fact that most came back with empty sacks was still troubling to naval planners. The inability of the engine design to scale well above the output required for a patrol craft such as this saw her innovations become something of a dead end. While built in quantity early on and serving with several nations, these craft proved unsuitable for later upgrades and were mostly relegated to reserve status by the late 1920's. The Icarus Event saw the loss of most of the remaining vessels, though the survival of the Basilisco is one of the stranger stories to emerge from this tragedy. While a somewhat elderly vessel at this point, this machine was at the apogee of her three-month mission and at the greatest point of time divergence from Earth. While the Icarus Effect spread across the solar system within a matter of hours, causing the malfunction and failure of all gravity drives, the *Basilisco* was spared from this effect, at least in part. Still able to communicate with Earth, albeit in a garbled manner, the vessel learned of the attack by Nemesis and what was the likely fallout of this encounter. Everywhere the gravity engines flickered and died, but this lonely patrol craft with her strange engineering was somehow unaffected. It was determined that her gravity engine would keep functioning just so long as she didn't slow down, so tenuous was her connection to normal space and time. Unfortunately, she lacked the fuel to return home, and at this pace she would be unable to reach any sort of safety before her engine ran dry. Such was the tradeoff between speed and efficiency. They must have known they were doomed, though their communications betrayed no panic. Until the end, the *Basilisco* stayed in communication with Earth and any vessel she could contact, explaining as much as she could about the strange phenomena that sustained her and forestalled doom. Nearly a week later, she passed out of range of any still with the ability to hear her. Assumed lost, she was struck from the naval list a month later. Never heard from again, she nevertheless still appears in folktales that claim she is sighted occasionally at the fringes of known space, a ghost ship afloat on the seas of time.

No vessels of the type survive, but the bow of one of the class is incorporated into a memorial looking out from the headlands near Sorrento. The identity of the relic is unknown, but is likely either the *Drago* or the *Orco*.

WARSHIP - ITALIAN

ARTA L. 3 SCOUT

Driven into the arms of the western allies by circumstance, Italy accounted herself a hard foe of Germany and Austria, while maintaining diplomatic pressure on the empire of Greater Russia. Attempts by the forces of the tsarina to seize a Martian cylinder in Italian territorial waters proved both abortive and a chance for Austria to force Italian neutrality until the resumption of open warfare in the fall of 1927. While frequently presented as the simple domination of the weak by the strong, the events leading to this paint a more complex picture. Not among the largest of the space navies fielded during the rebuilding of Earth, Italy was able to leverage her position strongly through a combination of technological innovation, statecraft, and covert action. Whereas a strong power might use their technical edge in an attempt to rule over all, Italy was both weak enough and clever enough to pursue a more subtle path. Concealing this new breakthrough from even (or especially, if you like) her allies in the west, she was prepared to resist either the great fortress ships of Russia or the bombers of Germany with greater effectiveness than anyone imagined. While there was uncertainty in Rome, the fear of being caught between warring giants yielded to something cagier, client to the secret knowledge that was to define the age. Italy could fight, but to do so her abilities had to remain a secret, lest enemies and allies tear these secrets from her to use against one another. The League of Earth was dead in all but name.

Emblematic of the synergy these three properties possessed was Italy's answer to both the gravity bottle fighter of the allies and the rocket troops fielded so effectively by Germany: a class of short range rocket fighter known colloquially as the *ratto di razzi*, or 'rocket rat'. This name was both a play on the phrase in Italian for 'rocket sled' and a fair description of the tactics used by the craft. Rather than embracing the ever-increasing bulk and sophistication of conventional fighters, or the high attrition rates of the Raketentruppen, the Italian marines instead developed tactics that called for small but potent machines that a single operator could ride rather than enter. Attacking both en masse and at speed, it was hoped that these tiny vessels would be able to, when launched from close range, close with enemy forces before effective weapons could be brought to bear.

First fielded operationally in 1922, the ARTA (Arsenale di Ricerca Technica Aerospaziale) L. 3 was essentially a gravity bottle craft scaled down to the point that the operator rode it more like a motorcycle than a fighter. With a wing spar design that allowed an empty craft to be able to be set up and broken down quickly, it became possible to deploy the L. 3 from a wide variety of platforms. This characteristic placed the machine in good stead as a tool for carrying out covert operations, launched from a mixture of military and civilian vessels under diverse circumstances. Though the first prototypes had metallized fabric skinning for the wings, production examples were all metal and the wings and tail strakes could be rapidly switched out in the field in any case. Skinning was the usual aluminum and magnesium alloy, though for operations in corrosive environments this was typically hot-dipped in a passivating layer that was then oversprayed with cellulose lacquer. Having no space for internal weapons, the

At the edge Venusian atmosphere, ARTA L. 3s begin their audacious attack run on an Austro-Hungarian artillery dirigible. While only causing light damage, the short range fighters forced the withdrawal of the **Größeres Königreich** *and misdirected Germany forces into searching for a phantom carrier on their flank.*

type could use underslung guns or rockets to supplement what mischief the pilot could make with their bare hands.

Perhaps the most famous of the operations involving these craft came in 1923, above Venus. Phobos was under blockade, and Germany had deployed floating batteries at the edge of the Venusian atmosphere to be able to bombard the British into submission when the planets were closest. Rocket projectiles fired from mounts on dirigibles proved difficult to intercept, and the relatively low altitude of the dirigibles made them tricky targets to attack directly. To this end, a squadron of L. 3s fitted with rockets was smuggled aboard the cargo vessel *Sunwise Atlas*, which was transiting nearby. Operating from over the horizon, these small craft supplemented the output of their gravity bottles with aerodynamic lift, greatly increasing their range. Both the pressure suits of the pilots and the machines themselves had been specially prepared to resist the acidic atmosphere of Venus which, even at the highest of elevations, was quite potent. The pressure suits had a number of modifications from the standard designs most of the major powers had adopted for pilots, boarders, and exposed gun crews. The pressure differential was lower at the projected mission height than would be encountered in deep space, and the buoyancy of the suit was something of a wild card. The character of the rubber and leather suit would essentially operate as a small balloon, but the practical effects of this were unknown. Some scenarios saw the suit as providing additional lift, but others saw the air resistance peeling the operator off the machine once it reached speed, and tests on Earth were inconclusive.

Embarking aboard the *Sunwise Atlas* from a French port, the two dozen volunteer Italian pilots carried false papers listing them as civil engineers hired to advise what was left of the multinational operations on Mars. The support and maintenance personnel that traveled with them possessed enough of a technical background to make their identities able to pass muster if boarded by the pickets of an unfriendly power. While the freighter was flagged as Dutch, her fittings and general configuration marked her as likely British in truth. While her true identity could be easily guessed, not so that of her passengers and cargo. With nobody wanting to (yet) fire the first shot, facades were treated with a polite credulity by most parties.

Transiting uneventfully to the orbit of Venus, the L. 3s were uncrated and the pilots suited up. Launching needed to be undertaken quickly, both for purposes of timing and to avoid overtaxing the cooling plant of the freighter by lingering overlong on the sunward side of the planet. The shipping crates incorporated the launching ramps into their structure in an ingenious manner which allowed rapid deployment on the deck. The ramps were sloped and incorporated a weighted cable attached to a lug on the front of the craft to speed them on their way. While a vertical takeoff was possible using purely gravity control, the L. 3 was difficult to control at low speed and interference from the gravity engine of the freighter made the ramp a useful expedient. Once away, it was discovered the buoyancy of the pressure suits was not the danger they were feared to be, and that the effects were minimal. After some three hours of flight, the force encountered the artillery dirigible *Größeres Königreich* on station, and unescorted. Firing their rockets in two waves, the Italians inflicted light damage and caused a general panic among the Austrians, who thought themselves the target of a major operation.

While the 'Gattina Spettrale' squadron was not particularly effective against the forces there, the presence of allied fighters so far inside their own lines had the Imperial forces searching for carriers that didn't exist for nearly a month. This splitting of their fleet made the blockade

untenable, and Phobos was relieved. The return trip caused heavy casualties where the attack on the enemy dirigible itself did not. Many of the pilots did survive, but only through nerve and luck. The atmosphere ate into the metal, and those that made it back did so by over-revving their engines and balancing upon them like rockets. Their wings were so pitted and fragile they were said to have looked almost skeletal when they crash landed back on the freighter. None might have made it back without the bravery of the freighter captain who came after them, not only halving the distance of their return journey but spooking the enemy into thinking there was a warship come to nibble on their flanks as well. Few of those that did survive their adventure did not do so unscathed, whether it was chemical burns to the skin or the lungs, and few lived to be very old. Most survivors were ultimately felled by either pneumonia or laudanum. There was distinction to their wounds though, and the hoarseness of an old man's voice coming from a young pilot entered popular idiom as the 'voce dell'arcangelo' and incurred great respect. After the operation, the freighter continued her journey to Mars to maintain her cover, the surviving L. 3s having been jettisoned in deep space. On approach to Phobos, the *Sunwise Atlas* was turned back by German pickets, though her previous activities had not been guessed.

The strategic success of the operation saw the L. 3 used elsewhere in capacities that are frequently secret even now. The type was ultimately built in substantial numbers both by Italy and abroad under license. Many are extant to this day, both in military and civil capacities. Indeed, production only ceased with the ascent of full gravity drives in all but the smallest craft from 1927 onward. Some civil models have been converted to the newer, more capable engine in a conversion known a ‘Largo’, but these are more for show and exhibition than practical work, with the riding stance making uncomfortable and even dangerous demands upon the body of the rider at high gravity flux. Early machines in original configurations are uncommon, but several are held by museums, with a particularly fine restored example in the 'Gattina Spettrale' livery being on display in the naval museum at Naples.

WARSHIP - ITALIAN

GIULIO CESARE CLASS CRUISER

The relationship Italy enjoyed with her neighbors may be taken as a microcosm for the tension between old allegiances and the new forces brought into the world by the Martian invasion and its legacy. While a class of only two vessels, the *Giulio Cesare* and her sister, the *Ottaviano Augusto*, had an effect out of proportion to their numbers. Rebuilt members of the Austrian *Donnerkind* class, transferred to Italy in exchange for Italy renouncing her claims on Mars, were pivotal to the later discovery of the true nature of the gravity engines at the core of all then-current spacecraft technology. The origin of these peculiar vessels is inauspicious, being at their heart a source of humiliation for the imperial aspirations of a unified Italy.

With the partition of Mars complete by 1917, the conquered planet was divided among the victors, if only nominally. The long siege of Mars and the race to secure the great guns in the equatorial canyons never materialized, with the armies of Earth finding Mars almost completely deserted. While there were substantial automated defenses guarding the entrances into the vast tunnel network underneath the planet, once these were breached the extent and age of what lay underground became plain. Deserted, dry canals ran from cities at the poles to great sunken fortresses at the equator, with automated factories and strange temple complexes hidden along the way. Domed chambers of great size concealed what might have once been there beneath a carpet of red weed, leaves dead and translucent in the arid darkness of centuries. Elsewhere were tombs and libraries, with knowledge encoded in the patterns of the ancient labyrinths that constituted their floorplans. Everywhere were strange wonders on science and art, all embodying the dying echo of a civilization of great age and subtle ways. There were almost no Martians. A few dozen fought and died manning the defenses at the poles, and the withered remains of a few hundred were found in the tunnels below. These were usually located singly, either at the controls of great machines or in sealed and silent rooms in the polar cities. Sometimes they were found clustered behind great doors to the surface, trapped and cut down by an unknown catastrophe. The armies of humanity swarmed through these hidden places, seeking a fight that had long since passed out of the realm of possibility. As victory was declared, the spoils were counted for division and the empires of Earth contemplated their future.

What the Italians lacked in raw manpower and fleet numbers, they made up for in technical expertise concerning Martian technology, having already made substantial inroads to comprehending the basic principles of gravity control and amassed a basic grammar of one of the Martian writing systems. As ambitions returned, the position of those without power to support them found themselves in precarious positions. Few were more precarious than the relative new and (relatively) unified Italy. Caught between empires, her independence depended very much on diplomacy and other cultivated friendships. It was seen as wisest to appear harmless, yet indispensable. This sufficed for a time to keep her neighbors in equilibrium, but ultimately the internal unrest of France and Russia saw even this balance upset and the young kingdom was forced to cede her (mostly hypothetical) territo-

In an illustration capturing her destruction of the cruiser SMS* Freya*, the* Ottaviano Augusto *utilized an energy ram that had the side effect of tearing a hole in time and space when it collided with the gravity engine of the German cruiser. Presumed destroyed after her disappearance in the resulting explosion, she reappeared in human space six months later with an unbelievable story.

ries on Mars to Austria in exchange for a number of older *Donnerkind*-class vessels.

It is well here to recognize that while the Italians found themselves outmaneuvered, they were quite capable of playing a longer game and recognized the potential of the technology they were exploiting and the might that could come from things other than the raw tonnage fielded by her fleets. Indignation and offense are easy to mime when they're expected, but behind this the naval forces of Italy were developing something new, disguised by the refit these vessels would require to see real duty. Six of the aged Austrian vessels were transferred, but only two of these were to be rebuilt as the *Giulio Cesare* (ex-*Eisenprinz*) and *Ottaviano Augusto* (ex-*Waldherr*). The remaining hulls were partially stripped for use as floating batteries, but this was a ruse. The vessels that were the true focus of the exercise were extensively rebuilt, with their first-generation gravity engines replaced with something far more exotic.

Experiences with the earlier *Basilisco* class had yielded a discovery that the beleaguered archipelago had kept secret from ally and enemy alike. While this class of long-range patrol vessels had revealed the ability of the gravity engine to bend time, however subtly, subsequent research had discovered that space could likewise be distorted in a useful way. In contrast to the earlier revelation where overlapping areas of gravity distortion altered the relative flow of time within the field, it was discovered that this created a boundary layer between the two states that proved largely impermeable to normal matter. While regarded as a curiosity and an inconvenience when this property was first discovered, the implications sank in with time, and it was realized that the field created by this could be both protection and a weapon in its own right. An impenetrable shield and an unstoppable ram, this discovery would rewrite fleet tactics and make everything else in the sky obsolete.

The hulls of the old Austrian vessels were rebuilt, with earlier forms reshaped into a sea change of new features, the old hull scarred with new protrusions of unexplained function. The ram bows of the vessels were rebuilt to accommodate a strange new weapon: the displacement field projector. While not fundamentally different in principal from the gravity engines at the heart of the earlier *Basilisco* class, the time dilation effect of the newer engine was enhanced considerably, resulting in an area in front of the vessel where normal matter and energy was unable to penetrate from one side to the other. The full explanation of the effect is somewhat complex, with the phenomena being not so much a shield as a distortion of space through which normal movement was impossible. This also underscored the fact that gravity control field was not attached to the engine, as the engine was attached to it. Each generation of spacecraft built on the principle of gravity control made it plainer that these machines could only function by altering basic laws of physics on a local basis. This was to have other implications, but these were not yet seen. Tests were carried, and the capabilities of this new system were analyzed, with the need for secrecy and misdirection setting much of the timetable. While subject to more than the usual teething troubles, the *Giulio Cesare* finally embarked on her maiden patrol in the summer of 1925. Largely ignored by the other powers, this new class saw her lead boat go on a lunar patrol that included field testing away from prying eyes. The results proved the displacement field projector to be nothing short of extraordinary, even if its full potential was not yet realized.

While proving itself essentially immune to shellfire from the front, the *Cesare* also showed itself able to punch through hulls with ease, regardless of armor thickness. The vessel returned home in triumph, though most of those gathered at the dock

to see her return didn't imagine her true capabilities. Her sister ship the *Ottaviano Augusto* was launched the following month, and incorporated certain improvements to her systems. The peacetime service of these vessels was largely unremarkable, but the resumption of fighting in 1927 saw the *Augusto* returning from Mars and isolated. Pursued by a German squadron consisting of the converted cruiser SMS *Freya* and two torpedo vessels, it was hoped by the German high command that seizure and interment of the nominally neutral Italian vessels would force a separate peace. While the mismatched nature of the encounter seemed obvious to Kapitän zur Stern von Liger of the *Freya*, events took an unexpected turn when rather heaving to, the Ottaviano Augusto accelerated suddenly, obliterating the torpedo vessel R. 6. Giving chase, the Freya began a pursuit which lasted some hours and saw the Italian vessel slowly outpace her pursuer. Having gained a lead but short on fuel and reaction mass, the *Augusto* turned again to ram.

The weapons of the *Freya* proved unable to pierce the displacement field of the *Augusto*, and the German vessel attempted to turn slightly out from the attack so as to meet the ram from the smaller vessel a glancing angle and minimize damage to her hull. What happened next was substantially different from what either captain visualized. When the displacement field of the Italian vessel impacted the overloaded gravity engine of the German vessel, the gravity fields of the two interacted in an exotic manner. The *Freya* was destroyed utterly, and the *Augusto* was thought destroyed as well, the surviving German torpedo craft finding no trace of her. Likewise, she did not respond to transmissions from other vessels and was reported as overdue. In the general conflagration of the renewed conflict, Italy mourned, but little other thought was given to the matter. Things might have ended there, but for the reappearance of the *Augusto* at Phobos Base six months later. Almost unrecognizable and her signaling gear destroyed, she gave the appearance of great age externally. While casualties onboard were light, the report of the Italian captain as to the action and subsequent six months was bizarre in the extreme.

While the basic mechanism of what had happened as a result of the impact was determined, subsequent events were far more mysterious. The captain testified to events that could scarcely be believed, and subsequently were not. In his testimony at a Board of Inquiry, he spoke of events one would attribute to folklore, if one dared to speak of them at all. He told of living stars, with great spaces in between with 'the voices of all who ever were, or ever will be' filling them and that this place was communicated to him as laying somewhere in the region of Aldebaran, though the specifics were unclear. The captain spoke as long as he was allowed to about the 'garden of secret suns' and the friends he made among their number. Ergotism was suspected, and the stores of the *Augusto* were searched and sterilized. When he showed no signs of recovering, the captain was subsequently sent to a sanitorium outside of Naples. The rest of the officers and men seemed to have little recollection of events after the collision, but this might have had more to do with them not wishing to share the captain's accommodations. It was rumored that the captain himself had subsequently disappeared from his comfortable, if involuntary, accommodations and a peculiar artifact left behind.

The *Ottaviano Augusto* disappears from public view after this, with the renewal of violence between nations acting to screen further research and inquiries. While the picture is unclear, it is widely assumed that the discoveries made here found their way into gravity research in the intervening years. Likewise, the fate of the *Giulio Cesare* is unknown, but was presumed lost during the Icarus Event.

In a frequent scene after the German collapse on Mars, war artist Sidney Palck depicts the general ruin which greeted the advancing forces of her enemies.

SECTION V – GERMANY AND AUSTRIA-HUNGARY

WARSHIP - GERMAN

HERMANN CLASS CRUISER

The German experience in the Martian invasion of 1902 was fundamentally different than that of the other industrial powers for a number of reasons, but one of the largest was the negligible amount of direct damage she suffered. Her ports intact and the tripods unable to follow up on their initial success in the Ruhr, Germany was hailed as the savior of Europe for her role in sending humanitarian and technical aid to her former adversaries across the Channel and the French frontier. These actions helped ease in a brief era of relaxed tensions across the continent, at least in regards to each other. All watched the skies, fearing a next wave of cylinders which never arrived. Austria-Hungary was likewise buoyed by the fortunes of Germany, though the directing of eyes elsewhere saw a renewal of insurrectionist violence.

While the tripods had laid waste to much, in their death they gave far more than they took in life. The engineering treasure trove that the Martian machines embodied was a legacy that would enrich any nation able to understand and implement the alien knowledge they contained, should they have access. The uneven distribution of this technological bounty was a specter that would return to haunt Germany and her allies once old rivalries reasserted themselves, but for the moment there was a common enemy. All the great powers united beneath the banner of the League of Earth, and footage of the vessels of the era frequently shows the blue roundel of the League replacing national insignia on markings and pennants.

It was in this spirit of political and technical cooperation that Germany conducted her initial experiments with gravity engine technology. Progressing along different lines than the other western powers, Germany cooperated with Austria-Hungary and the Ottomans to create a series of fortifications incorporating fixed gravity engines of immense output able to affect the gravitational pull of the Earth around them in a radius of some five miles. Doubling or tripling the pull of gravity would be uncomfortable and immobilizing for a human or other terrestrial organism but based upon examination of the Martian machines and post mortems of the pilots it was felt that this change would be lethal for the invaders. Thus, choke points could be created to channel the next wave of tripods, and even the black smoke was prevented from dispersing effectively across the battlefield due to its heavier-than-air characteristics. While a tactic with some promise, static fortifications did nothing to address the source of the threat. With the general adoption of gravity engine technology in 1915, space vessels no longer relied on captured examples for propulsion. Truly international in origin, these first engines were developed from a set of common plans shared freely between powers. In practice, these devices were mostly of Italian and French manufacture, these two nations having both the technical expertise and industrial facilities to make them in quantity, without having to compete with large shipbuilding programs for raw materials and factory output. Cooperation was the watchword, even as nations rebuilt themselves and eyed the stars with a curiosity that had not yet turned to envy.

It was in this environment that Germany built her first military spacecraft, albeit with a gravity engine of French

The Martian Punitive Expedition saw a unified fleet from Earth attack and ultimately occupy Mars. Among this international effort were a number of the earliest German and Austro-Hungarian vessels able to make the journey and credibly fight upon arrival. Most notably among these were the SMS **Donnerkind** *and her support vessels, here seen operating with an unidentified German monitor in the vicinity of a British moored picket. Whether purely metaphorical or of a scene during the initial occupation, such international operations would become far more rare in the coming decade.*

manufacture. This was widely seen both a technical and diplomatic triumph, showing cooperation between two enemies that had fought a bitter war within living memory. While subsequent events caused many to view this alliance as being one of questionable sincerity, Mars was a perceived threat that was so total in nature that bickering was seen as suicidal by all involved. First taking to the skies on a clear February morning in 1916, the lead vessel of the *Hermann* class, the SMS *Donnerkind* was named for the HMS *Thunder Child*, the torpedo ram of the Royal Navy which so distinguished herself in combat against Martian tripods in 1902. Such gestures of respect and magnanimity were the order of the day. In her details, the new vessel was quite compact but well-armed for her displacement and perceived role. Rather than the practice of later craft to be built for long range space combat, these first German ships were seen as mobile fortresses acting in support of ground forces. Crossing the void between the planets, the type would engage the fortresses and other surface installations of the Martians from close range, covering the landings of infantry and support equipment to seize and hold chokepoints in the subterranean defenses of the planet. Operating as a part of a multinational expeditionary force, the massed guns of the fleet would disable the great guns of the equatorial batteries once their location was pinpointed.

For her role in overwatch and support, the *Donnerkind* bore a great profusion of weapons in different calibers and types, with most operating under local control. The main battery, a 9" high-velocity gun in a single mount, was the exception in having a link to an optical rangefinder mounted above the bridge. This rangefinder could also communicate manually with the 5" and smaller guns, but this was of less practical use in combat. While a second 9" turret was originally planned for, this was ultimately replaced by a dual- and later quad-mount QF 1-pounder Maxim gun. This was an adaptation of the light naval gun for space use, her water-cooling system filled instead with oil and hooked to a pump and external radiator. Even operating within the atmospheric bubble that the gravity engine provided, water jackets were exposed to extremes of heat and cold that could disable and even rupture them.

The engine fitting is also of particular note, seeing one of the first field examples of an external impeller arrangement along the lines of what would be come to be known as the 'French model'. While frequently mistaken for a propeller, the counter-rotating blades at the rear of the vessel acted as dampers for the tendency of gravity engines to have dangerous output spikes when operating within the pull of a planet or other celestial body. While of limited significance at altitude, low-level operations saw vessels without this arrangement needing to constantly adjust their power output manually in order to maintain height. This was both exhausting for the engineering crew and hard on the machinery, and these factors affected the usefulness of the guns for accurate fire. The tradeoff being that the weight and bulk involved reduced the internal space further. Early vessels were renowned for their cramped quarters and need for support craft following in a sort of baggage train, and the *Hermann* class was no exception. When the *Donnerkind* deployed with the Martian Punitive Expedition she led a squadron of four other fighting craft, consisting of two Austrian converted naval ships and two specialized bombardment vessels based on barges. Not included in this number is a half-dozen cargo and tanker types serving as dedicated support for the squadron. Multiply this across the dozens of squadrons involved in the pacification of Mars and the difficulties become clear.

The action report of the *Donnerkind*

follows the general anticlimax that manifested in the initial operations against Mars. Where navies were steeled to sacrifice themselves against a relentless and more advanced foe for the survival of the human race, they instead found a world dead and almost deserted. The Martian guns were silent, and their underground cities and arsenals slept beneath the dust of centuries. The climactic battle was not to be, at least not here and not now. In the weeks following the initial bombardment the Germano-Austrian squadron scouted the poles (where automated defenses caused some casualties) and ferried ground forces from one destination to another. The mood of the operation was a complex mix of emotions, with triumph and relief tempered with a certain disappointment and hints of foreboding. The spirit is well captured in a letter written back home by a young officer serving aboard the *Donnerkind*:

My Dearest Florentia,

I write to you by the light of another world, and to tell you of our triumph and of my love. The Martians are beaten, and their guns abandoned. You will have read this in the papers by now, but I wanted to tell you in my own words. Soon our marines will roust the survivors from their holes and show them humanity is a dangerous enemy. My oath fulfilled I would take your hand upon my return, should you be willing.

The light here is the red of a dying fire, which seems only fitting. The Captain seemed pleased, but the crew is nervous, having expected a hard fight and received none. Marines and tripod operators return with tales of tunnel systems more extensive and ancient than anyone imagined, concealing who knows what. There is a feeling of being watched, but that is just nerves.
I bargained with a junior lieutenant for a piece of Martian jewelry he traded two bottles of port to a marine for. A curious thing, like silver and opal merged. Upon my return I would be honored if you would accept it as a token of my love, though its glitter would be outdone by your eyes and its grace no match for yours. Do you remember the willow tree by the pond?
Until my return,
-Hapi

The full name of the officer is not recorded and his fate is unknown, the translation being an account taken from an American paper some years later. As with most of the earliest vessels to transit to Mars, her end was peaceful and unglamorous. Serving as part of the occupation force, most of the fleet was so rapidly overtaken by technical (and political) developments that they never served elsewhere and were ultimately either scrapped or used as hulks on the surface on the planet. The *Donnerkind* herself saw most of her crew rotated home within two months and the vessel used as a sort of mobile headquarters during the partition of Mars. Her final fate is not certain but seems to have ultimately come to rest in the Mons Daktylus shipyard facility under British control. Even this may be only be indirectly inferred due to the appearance of many of her distinctive fittings upon the improvised craft fielded by the Neomartian Succession in their breakout attempt. Of the six vessels of the class, none are known to have survived but an 8” gun originally destined for one of the class is on display at the naval academy at Kiel.

WARSHIP - GERMAN

BAYERN CLASS GRAVITY MONITOR

The SMS *Bayern* had been one of the first vessels of the German Empire to reach the red planet, being part of the international Martian Punitive Expedition some years earlier. The circumstances of her leaving the squadron and subsequent disappearance are at present unknown but suggest her real mission was both covert and less international in scope. Her disappearance increased diplomatic tensions, and in hindsight foreshadowed some of the deadly mysteries of Mars. A later survey of the site suggested a runaway drive implosion, either accidental or the result of passive defenses constructed by the Grey Martians and their descendants. While her legacy was that of both a rallying cry and ultimately a warning, her origins were more straightforward, with the German emperor anxious to field great fighting machines along the line of the large Russian vessels making themselves evident at the time. While seen as a triumph of national industrial and military might, her initial development was an international effort. Her gravity engine being of an unusual Twardowski-style design, and compared to her contemporaries, she was able to make good speed even within the gravity well of a planet. Jointly developed with France and Italy, the engineering team that gained its name from its director, the visionary physicist Josef Twardowski, sought to move gravity engine design forward in ways that departed from the first-generation engines then in use. While most gravity control technology works on the same set of core principles and contain the same basic subsystems, there was much debate as to the best way to configure these elements for performance, efficiency, safety, and robustness. Twardowski's work involved designing a gravity control system integrated into the hull of the vessel it was propelling, rather than being a discrete module housed within the hull. This had certain desirable qualities, mostly in terms of field stability and efficiency. While seeming to have great promise, subsequent events would largely doom this line of research until much later on.

It was recognized from the very beginning that the control of gravity had applications far beyond that of propulsion, and the design of the Bayern sought to integrate parallel developments that Germany was undertaking in the field of gravity-based weapons. From the initial experiments undertaken with the pair of Martian cylinders in German possession (these being the tripod cylinder and associated engineering cylinder which had impacted near a small village in the Ruhr) installations were constructed with equipment that used increases or decreases in local gravity to destroy an invading force. For all their might and technological edge, the Martian invaders seemed as poorly prepared for the mud of Earth as they were for her microbes. What may have seemed a defensible bridgehead on the banks of the Rhine when seen from the telescopes of Mars were in fact muddy fields unsuitable for supporting the weight of heavy machinery. The impact depth of the cylinders here was much deeper than in Britain, and when the screw hatch opened the cylinder almost immediately flooded. What was to have been a squad of five tripods plus their support equipment and reconnaissance aircraft became a pair of bedraggled survivors who were only able to find firm footing by a judicious application of their heat rays to harden the

The loss and presumed destruction of the monitor SMS **Bayern** *was a mystery that threw suspicion on Germany's rivals, as well as limited further research into the innovative gravity control technologies she employed. When the wreck was found some years later by a patrol, the crash site was covered in the red weed of Mars in its rare flowering phase.*

mud. Moving east, these two survivors laid waste to Moers before turning south find a suitable crossing point with which to cut communications and cause general chaos in the Ruhr. Providentially, these tripods seem to have not retained their black smoke canisters in their struggle to escape the muddy grave that claimed their comrades, and their drive east was one of local terror and widespread fires rather than a wholesale slaughter of the civilian population. The tripod pilots succumbed to their illness on the outskirts of Essen, and the tripods themselves were duly taken under army control. It was from this experience that the German interest in gravity-based weapons sprang, as the performance of the Martian tripods under the influence of Earth's gravity suggest that they were optimized for the far gentler pull of Mars, and that even a modest increase of the forces they felt here could make them combat ineffective. It was in the post-invasion era of mutual cooperation that test sites were set up with French and Italian aid with an eye to stopping the Martians at natural choke points, though events quickly made these developments irrelevant.

One of the side effects of these developments was a recognition that the technology would be of far greater use if it could be made mobile, rather that wedded to static installations. Too bulky for airships and too dangerous to use afloat, the concept showed greatest promise when integrated with the gravity engine of a space vessel. It was with this vision in mind that the *Bayern* was laid down in 1914, to be completed just in time for participation in the Martian Punitive expedition in 1916. As a vessel that *was* a weapon rather than a vessel that carried weapons, the *Bayern* has variously been called either a monitor or a bomb ship but neither is an adequate description and the official classification as a *Spezialwaffenschiff* 'Special Weapon Ship' is a exercise in obfuscation on the part of the authorities who were not fully transparent with their allies about the new capabilities Germany possessed with the launch of the *Bayern*.

The appearance of this new craft was remarkably conventional, with the major differences being a lack of weaponry or other external fitting on the first third of the hull, and the generally light conventional armament fitted to a vessel of this size, consisting of five 8" guns in enclosed mounts and a number of the ubiquitous QF Maxim guns on the superstructure. Her hull was fully capable of berthing in either wet or dry accommodations, as were most vessels of the period (specialized facilities for spacecraft not yet being common). External engine fittings were also somewhat modest, though her angled waste-heat pipes at the rear of the superstructure gave her quite an aggressive, even Gothic silhouette. Like a cathedral in the midst of Romanesque fortresses, the *Bayern* struck out from Earth in 1916 to subdue the Martian threat. While visually impressive, her gravity ram (as it was called internally) was untested and not even fully functional as yet, with construction and engineering crews continuing their tasks en route to Mars, so great was the urgency of the mission. Once having arrived, the unveiling of this new weapon was visually impressive and, in the face of almost nonexistent opposition, somewhat of an anticlimax. At a range of three miles the gravity ram could pulverize surface targets in what almost looked like a meteorite impact, but the power of the weapon fell off quickly with range. To fire at something closer was to invite unpleasant second-order feedback in the gravity engine.

With the surface of Mars subdued, the subsequent fate of the Bayern lingered as a mystery which lasted for many years and led to an increase in diplomatic tensions between Germany and her neighbors. Lacking any centralized opposition, the Earth fleet fanned out to both determine the possible extent of Martian forces

and to accomplish a more general survey of the arid world and what resources the fleet might draw upon to support their stay here. The *Bayern* left for the northern hemisphere alone, her weaponry well-suited to combat the emplaced defenses near the poles. Having set out, she never arrived at her rendezvous and a search party was sent out to retrace her presumed route. When this found nothing, the fleet was reassembled and a wider search undertaken for both the Bayern and the possibility of more extensive Martian defenses in the northern hemisphere. When this found nothing, the recriminations started. It is one thing to lose a capital ship, but another to lose one of unstated and unknown capabilities in the midst of enemies recently turned allies.

It was only some years later that the wreck was discovered, having come to grief among the pockmarked terrain of the Arabia Terra. While this zone had been searched, it was far enough away from the planned route of the *Bayern* that it could not be seen, due to the location of the wreck in a deep meteor crater. An investigation of the site found debris scattered over a relatively small area, but displaying great violence. This suggested an explosive failure of the gravity engine after having landed, rather than crashing on the site. Some of the crew seem to have initially survived due to the improvised shelters that were still in evidence, though no sign of the crew was found. Nearby was also discovered a cave entrance with some evidence of having been artificially expanded, but a tunnel collapse prevented this from being explored further. Also of note was a peculiar growth of the red weed at the site in a flowering phase rarely seen on Mars and never on Earth. It would seem that the iridescent blooms were provoked to flower due to some conjunction of Martian soil and the water and fuel tankage of the Bayern, though more ghoulish scenarios have been put forward. A memorial was subsequently erected at the site and the area declared a war grave by joint decree of the occupying powers.

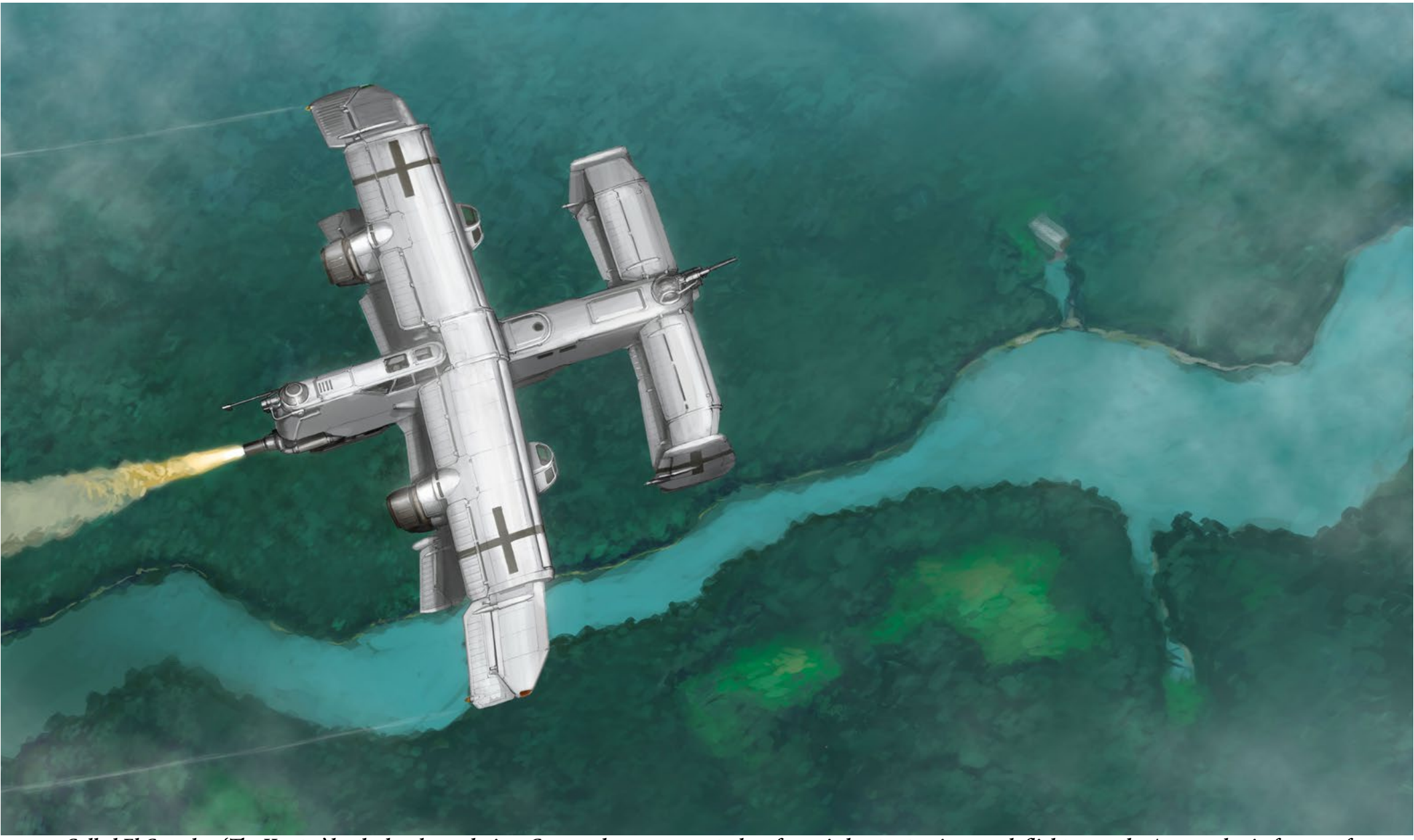
In an unusual development, the flowers of the red weed were found to have surprising nutrient and medicinal properties upon testing. Edible only when flowering, the rank leaves were unpalatable but nutritious. Within the scientific community there was speculation that the weed had been brought to Earth intentionally as a source of food for lower Martian life which were to be introduced to our planet after the invaders had completed their work. Even more disturbingly, the pollen of the flowers caused hallucinations when inhaled. While generally consisting of colors and lights, the visions seen via the samples recovered from the wreck of the *Bayern* were vivid and disturbing. Those laboratory personnel thus exposed watched glimpses of the the destruction of the ship and felt pain when either live or freshly cut flower blooms were dissected. While some alien strain of ergot fugus was first suspected, further testing led to disturbing hypotheses. Foremost was the possibility that the red weed was either a colony of plants able to communicate via unknown means or were the nodes of a single giant organism possessed of a common awareness and capacity for memory. While it has been speculated that red weed somehow took into itself some memory of the fate of the German ship, it must be pointed out that hysteria is a more ready explanation than the quantification of memory in such a way as it might be communicated between organisms from different planets. Be this as it may, the red weed became a fashionable additive to the food and pharmacology of the era prior to the side effects leading to this being banned in most countries by 1928.

WARSHIP - GERMAN

KMB 1 KONDOR PATROL CRAFT

While Martian technology is largely conceived of as a monolithic body of knowledge one may either draw upon or not, the truth is somewhat more complicated. The secrets borne by the tripods and the cylinders which carried them to our world were those of the heat ray and the gravity engine, but the mining and construction cylinders contained more specialized knowledge, as well as the practical means of implementing it. Containing machinery to refine metal from ore, mining machines operated in concert with the construction cylinders. These were the most advanced of the Martian machines to arrive on Earth with the invaders, having the capability of not only making spare parts for the Martian war machines, but also an infinite variety of other items. While the control interface and the programmable nature of these compact factories would take years to decipher, the value of such machines for even their most basic capabilities was incalculable. Indeed, if one were to discount the suffering and devastation wrought by the invaders over the course of a few weeks in 1902, their legacy with humanity was that of unparalleled advancement in industrial and military might. There would be advancement at least for those who possessed one of the rare factory cylinders, of which there were only a handful. Falling within the grasp of Britain, France, and America, these miraculous devices were clearly intended to be used to construct advance bases and associated hardware to support an expected second wave of landings and Martians in quantity. Fear and desperation drove the nations who, after the death of the first invaders, discovered both the extent and the order of the Martians' plans. As the wonders of gravity control were first discovered and then exploited by humans, other alien machinery began to reveal its secrets. The means to generate vast quantities of electricity and to employ this power to refine metals from base ores was contained in a few cylinders, and an even rarer few could take these refined ingots and convert them to the spare parts, structural elements, and other unidentifiable wonders the invaders would need to make our world their own. Even as the tripod pilots sickened and died their machinery continued, leaving stacks of ingots for their new masters.

For a few fleeting years humanity had a cooperation that might pass for unity, and a pale light of hope persisted through the dark days when all watched the skies and dreaded what might yet fall from them. As ships of Earth first took to the skies and the void beyond, the operation of the factory cylinders came to be understood. Subsequently their products were used in the production of gravity engines for the fleets of Earth. The programmable nature of the factories was mastered and the productivity of those shipyards which could draw upon this knowledge had revolutionary implications. The empires of our world found themselves divided into two groups: those with factory cylinders, and those without. Cooperation in the face of a common threat smoothed over these differences for a time, but the occupation of Mars resulted in a sort of land rush that saw all the major powers in a mad scramble for Martian territory and the secrets hidden therein. For a time, discoveries were shared but the growing incompleteness and complexity of the findings led to mutual perceptions of stinginess and double dealing. The recrimi-



Called El Cazador, 'The Hunter' by the local population, German long-range patrol craft carried out extensive search flights over the Amazon basin for one of the elusive factory cylinders of the Martians. Technology access being an area of contention between Germany and her neighbors, the failure of this program to secure indepent access to a factory cylinder proved pivitol in later international developments.

nations which followed saw the stinginess become real and, the survival of the species seemingly assured, the ambitions of empire came to the fore once again.

It was in the very uncertain year of 1918 that it became known there were more construction cylinders than first suspected, with at least two believed to have impacted within the Amazon basin. The construction cylinders arrived late in the invasion of 1902, and impacted in equatorial areas with great natural resources. Tasked with constructing automated factories and fortresses by the invaders, their crews succumbed to local flora and fauna even more quickly than their comrades to the north, due to the jungle environment. So swift even was their passage that their arrival was largely unnoticed until local reports found their way back to interested parties in Europe. Then the hunt was on for the technologies to make new empires from old.

Having had no construction cylinders impact within her territory, Germany had the most to gain from obtaining a direct line to the knowledge of the invaders via an impact site in the Amazon. The trackless jungles encouraged a search by air, if such could be accomplished before the impact site had been swallowed by the jungle again. To this end certain long-range scout designs currently under development were enlarged for additional range and storage space in response to an emergency government contract. Predictable under the circumstances, these were not proper gravity bottle craft, but something more ad hoc. Not of a single manufactured type, these machines were in fact several related models made by Gotha, KMB (Kaiserliche Maschinenfabrik Bayern), and Sternatom. Their designs represented an important transition from the earliest vessels (which were little more than floating batteries) to the sleeker dual-environment designs that would come later. Based on aeronautical rather than naval conceptions of how a spacecraft should be constructed, the earlier examples such as the KMB 1 'Kondor' still incorporated significant amounts of wood in their structure, though this anachronism was rapidly phased out in later marks. Carrying a crew between two and four, these machines were at first powered solely with chemical rockets, their range brought into the realm of the useful via the expedient of towing them to the edge of the atmosphere with a tug or warship and then extending their glide over the search area with their internal rocket motor. Operating in concert with colonial auxiliaries on the surface, much of the Amazon was searched by 1919. While discreet, this operation was stymied by British counterintelligence under the auspices of Operation Snark. This effort saw the preparation of a number of false impact sites designed to mislead German efforts to secure the technology of the construction cylinders. While successful in both delaying and misdirecting German efforts to develop upon Martian ideas, this resulted in a further twist that was by terms comical and darkly paranoid. British agents within the German efforts sent back reports of more cryptic discoveries involving a previous Martian presence upon Earth. The intelligence apparatuses of the two competing nations were both abuzz with reports of a sunken temple complex of uncertain age and Martian construction. This in turn proved to be a German ruse to both root out moles within the civil service and bluff Britain into a more equitable share of what she and her allies had discovered. While effective spycraft, it did little to improve the diplomatic situation.

Modest in performance, the German machines that oversaw these real-yet-fictional operations from above represent a technical brilliance that was largely unsung. KMB with their 'Kondor' and the slightly later efforts by Gotha and Sternatom (particularly the Sa X/100 'Draken'

of the latter) succeed in getting Germany into space with something relatively small and maneuverable without access to the Midas touch of the construction cylinders or true gravity bottle technology. Indeed, even the conventional rocket technology developed by Germany at this time showed sufficient promise to be developed into weapons which would later catch her enemies quite by surprise. This entire class of vessel would see some longevity even after the search for additional Martian impact sites was suspended in 1921. Many of the surviving machines were re-engined and transferred to Mars as tensions increased. Although inferior in performance to newer designs, the robustness and carrying capacity of these craft made them quite useful patrol vessels and light troop transports. So effective they were in this role that they were a major component of the assault on Phobos in 1922, once the initial shock troops had disabled the British gravity control defenses. Attacking in the second wave, these craft were able to land on the soft surface of the Martian moon and disgorge cargo where heavier vessels could not. Subsequently, these were also used to ferry men and materiel to wherever they were needed on the Martian surface during the initial fighting there, as well as ultimately evacuating the German forces from Phobos in the face of the impending arrival of a large British fleet. When acting in a scout or support role, it was most common to have two pilots, an engineer, and an observer that would act as a forward gunner if the craft encountered something that couldn't be outrun. As a transport, crew might be reduced to two, depending on flight length and whether newer, more reliable engines had been fitted. Ten infantry could be carried, but only with light equipment and a reduced fuel load. Five infantry and moderate support equipment was a more typical load for surface operations in 1922.

Although unglamorous in appearance, the type acquired a storied reputation for toughness and the unflappable nature of their pilots. Seemingly everywhere in the early months of fighting, most were withdrawn from service by 1924, by virtue of their airframes being completely out worn and superseded by newer types and tactics. Some were retained for training purposes, but after a fatal accident the following year, which was attributed in part to metal fatigue, these were retired as well. Thanks to the highly publicized nature of their exploits and their lack of military usefulness as the 1920's progressed, many excellent examples survive in both museums and private hands. Of particular note is a Gotha IV in her original 'Devil's Taxi' livery on display in Savannah and the fuselage of an early wooden-framed machine on display in the lobby of the administrative building of the Academia de Guerra in Santiago, Chile. Due to the aforementioned structural problems, there are no authentic machines in flying condition, though there are replicas of varying authenticity in private hands.

WARSHIP - GERMAN

ADLER CLASS GRAVITY CRUISER

To view the Germans and their allies as simple villains is to be blind to the full nature of their adversaries, as well as their situation. While relatively untouched by the Martian invasion, they could claim little of the plundered alien technology England and others garnered from the Martian cylinders and the horrors they disgorged. The invasion of Earth in 1902 was widely seen at the time as the end of history, when it might be better regarded as a sort of interregnum to the ambitions of empire. The danger of extermination by an alien foe had not just been averted, but the weapons of the enemy had been turned on him to what was regarded as great effect. Notwithstanding the hidden underworld and all its mysteries, Earth now ruled Mars and the reach of her presidents and emperors seemed very long to them, and even moreso to their neighbors. Britain in particular had gone from the country most devastated by the Martians to the greatest beneficiary of the alien technology recovered from them. While treaties were in place ensuring free exchange of the discoveries made from the legacy of the invaders, the practical application of these agreements was not always what it could have been. Already in the midst of an industrial revolution, Britain was well-placed to adapt alien techniques to her production of steel and finished goods. Electro-evaporative mining allowed pure metal to be drawn from even the poorest of ores and the forming techniques learned from the factory cylinders would in time revolutionize shipbuilding. France had both her own resources to call upon and her own internal problems to deal with, but Germany found herself once again the bridesmaid to British success (German dominance of continental europe notwithstanding).

It was under this shadow that Germany sought to arm herself with such spacecraft as might be adapted to whatever threat should emerge. Her earliest space-faring vessels had participated in the Martian Punitive Expedition but were poorly suited to counter the war vessels which Earth was building in ever greater quantity. Already at the cusp of dominating the seas and skies, British spacecraft production was in the process of seeing the last of its bottlenecks removed, and their hegemony would soon be absolute. With an instinct for either skulduggery or self-preservation (depending on the telling) Germany pursued a different path, seeking to develop vessels of exceptional range, stealth and self-sufficiency that they might be able to engage and disengage with enemy squadrons almost at will. Rather than a fleet of grand squadrons and their myriad support vessels, Germany (and after 1917 Austro-Hungary as well) pursued a different path, seeking to create a force of autonomous and self-sufficient vessels able to strike where least expected and then escape. This approach both coincided with and reinforced the view of elements within the general staff that the current political climate of a unified Earth benefited those with the greatest power disproportionately. Right or wrong, the mutual suspicion between nations after the occupation of Mars was first acted upon by Germany as part of a strategy that would ultimately see her blockade the British forces on Phobos.

The laying down of the *Adler* class was an exercise in window dressing designed to hide the full capabilities of the class from what were nominally still German allies. Gun armament was quite light

Shadows on the Rhine. The* Adler *class eventually found itself used as a platform for rocket bomb attacks, there were early experiments to use them to launch fighters and other smaller craft. They were also used on an experimental basis for covert missions due to their relative maneuverability under the influence of Earth's gravity.

and did not include anything over 8" in caliber. Performance was also relatively modest, especially in a thick atmosphere. The real strength of these vessels was their range and ability to extract higher amounts of power from their gravity engines for short periods of time. This *Notschwerkraft* (Emergency Gravity) setting was a unique technology fielded by German craft. For a period of minutes, a ship turning her engines to this setting had more than double her nominal available power. This enabled the effective use of a weapon for which the German Empire would become infamous: The rocket bomb.

Vessels of the worlds' fledgling space navies had used rocket weapons since the very beginning, but these devices were limited in terms of range and accuracy. Designed for use against enemy capital vessels at close range, they were useless in the face of smaller, more maneuverable opponents. The Germans rehabilitated the concept, opting to target enemy surface facilities and the lumbering support vessels that followed any large fleet. To this end, they designed rocket torpedoes that were larger and harder-hitting than those used elsewhere, although with a narrower cross section. With a significant amount of the internal volume of the *Adler* class devoted to such arms, it became practical to use these so-called *Spezialrakete* (Special Purpose Rockets) in massed long range bombardments. This was combined with extensions in range based upon improved engine efficiencies and a program that adapted the crews for both the extreme changes in gravity they would experience in combat as well as the privations of long patrols. While much was made of physical and mental conditioning that serving personnel underwent, the most extraordinary aspect of their preparations were medical in nature.

Though configured to allow its use as a sort of proto-space carrier via a launch ramp and recovery trapeze, fighter development by Germany was hampered by limitations in engine design and general metallurgy during this period. Having seen the potential of the dual-role carrier early on, she was unable to capitalize on the concept until much later, seeing these facilities on the *Adler* class being used almost exclusively for rocket weapons instead, and the recovery crane being deleted. Outfitted for stealth and endurance, the class was a natural fit for long-range weapons that could devastate an unaware enemy. Operating unsupported for any extended period of time was too much to ask for most vessels and crews of the period, but parallel developments in space medicine allowed German crews to shrug off some of the difficulties of life on a small spacecraft, via the biology of the Martian invaders.

It was well known that one of the most horrific aspects of Martian physiology was their feeding via the exsanguination of other living creatures. Grisly in the extreme, this also suggested a degree of biological compatibility between the invaders and Earth organisms. While research in this direction was largely not pursued for ethical reasons, the fate of a handful of marooned infantry on Mars led to a revelation. Cut off during the invasion of Mars, a platoon of German infantry had resorted to extreme measures when trapped in the ruins of a Martian observation post. Lacking supplies and believed lost by the high command, the survivors of the assault force had resorted to eating the Martian dead before being discovered by engineers more than a month later. While such things are not unknown in the fortunes of war, the survivors consumption of Martian flesh induced changes in their metabolism and cognition with remarkable implications. Not just surviving, the immured soldiers reported the healing of wounds both new and old. One man reportedly regrew a finger. All the while of their ordeal the Germans reported they were in a sort of sleepwalking state, and reported strange

dreams. While this was initially seen as the product of trauma and sensory deprivation, it soon became clear that their actual physiology had changed. While subtle and wide-ranging in implications, the ability to enter a dreamlike torpor with limited need for even oxygen for weeks at a time soon became instrumental in Germany's strategy. Once the agents within the alien tissue were isolated and reproduced, the legendary 'black elixir' of the German navy pushed man and the machines he wielded to places they had never been before.

In possession of this hole card, the German ruse became complete. The *Adler* class quietly became masters of the long range patrol, skirting the planets unseen and observing developments among Germany's neighbors. Thus placed, the blockade of Phobos in 1922 quickly went from being perceived as a paper tiger by Britain to a major failure of planning and intelligence which in turn brought down the government in the next election. When open war broke out some months later the type gave a good account of itself in the face of superior numbers, and the threat of bombardment British and French installations operated under only abated with the entry of America into the conflict and the widespread use of the gravity bottle fighter rendered the class vulnerable. While primarily a strategic resource, the Adler class had sufficient flexibility to see them repurposed to a variety of other roles, from (in an ironic reversal) blockade running, to covert operations, as well as undertaking more mundane transport tasks. The type soldiered on at the edge of human space and political will throughout the Peace of Trieste, though by the time fighting broke out again in 1927 they were declared obsolete, though their crews had become so adapted to their roles that it proved difficult to integrate them elsewhere. For many, the isolation and effects of the elixir had gone from a sacrifice done in the name of duty, to a psychological and even physical need. The peace accords of 1929 and general retirement of the type caused great difficulty for some crews, and at least one seems to have mutinied as a result and took the *Eisvogel* someplace unknown even now. The most famous 'Flying Dutchman' of the conflict, her legend grew and became conflated with other tales, until her story was that of a ghost ship overtaken by the spirit of a Grey Martian king, and doomed by him to wander until the return of a king of old to Earth who would break the curse and call his children home at last. Whether this king was Arthur, Barbarossa or a religious figure varies with the storyteller, but the truth is likely to be more mundane.

Due to the timing of their retirement, most of the vessels to survive the conflict also survived the Icarus Event, though the majority of these were later scrapped or greatly altered when gravity control became viable once again. None are known to exist intact, but an accurate (if static) replica was constructed of the *Eisvogel* for the Anglo-German film adaptation of Brigton Harte's novel *Starry Throne*. It is more famous subsequently as the *Juggernaut* in the serial *Tom Hammer: Star Agent*. The present day finds this prop undergoing restoration for display at the Film History Museum in Berlin.

WARSHIP - GERMAN

ROCKET INFANTRY

The racketentruppen, or 'rocket troops' were a unique fixture of the German space forces, being a highly aggressive approach to the use of boarders in close action against enemy vessels. Seen as alternately the ultimate manifestation of either bravery or foolhardiness, these were Imperial marine (and later army infantry) units that were equipped with rocket packs, body armor, and a specialized loadout of weapons designed for breaching enemy vessels and fortifications. While seemingly a suicidal tactic to employ in combat, the survivability and capabilities of the fighting men employed was bolstered by the use of drug therapies derived from Martian sources, including the so-called 'black elixir' which was to become the deepest secret of the German scientific establishment during the war, and a legend after.

The origin of the rocket infantry can trace its ancestry all the way back to the Martian invasion, where militia teams with punt guns attempted to engage tripods from ambush by lying in cover and firing at exposed parts of the pilots. While unsuccessful, the audacity of this tactic gained Imperial notice and a small section of anti-tripod riflemen were organized under one Colonel Junzt with their numbers recruited from hunters and colonial riflemen. These were trained to operate in pairs with express-chambered big game rifles and worked up experimental tactics to attack tripods at weak points while taking advantage of their pilots' blind spots. As the threat of a second invasion diminished, some of this specialist infantry were attached to the marines to serve as instructors, and their tactics adapted for the needs of the Martian Punitive Expedition. From there the initiative passes to the navy, with fighting sailors learning how to both keep up with the British tripods and how to breach the defenses of the Martian fortresses at the equator. The low gravity of Mars proved both forgiving and even encouraging of recklessness at times. Exactly when captured rockets were first used to hoist marine sappers over walls and pits in the storming of the equatorial defenses is not recorded. All that is known is by the time of the partition it had proven a valid tactic. While viewed as decidedly lightheaded by senior officers, it worked just well enough (and with few enough injuries) that it was taken up for further study.

The increase in tensions after the conquest of Mars saw the possibility of conflict between the powers of Earth come into the mind again, if not polite discussions. War between nations would now mean war in space, and the vessels that would fight these wars were armed with weapons so inaccurate (due to the forces involved) that they would need to fight at close range. This in turn suggested that boarding might be a viable tactic, and to attack thusly by surprise might make even the greatest dreadnought vulnerable to a small, well-trained force with proper equipment. Given their situation, the German high command jumped at the chance, and a school was set up outside of Regensburg. Based out of a disused quarry, army and navy personnel both learned to operate via rocket jump under controlled conditions as well as work and fight in the bulky spacesuits of the day, including working underwater in the flooded portions of the quarry to simulate weightlessness. The isolated and screened location, combined with the sounds of blasting being done at an active quarry a few miles

Whether equipped with either a rocket pack or one of the famous RF 12 rocket gliders, the fearsome appearance of the German rocket troopers made them famous among allies and enemies alike. Here is also shown the cut-down Gewehr 98 with grenade cup commonly used in boarding and assault operations.

away, served as a disguise for what was being undertaken. From there, more advanced training was undertaken on Mars, where a gravitational pull just over a third that of Earth proved more encouraging for the potential of racketentruppen tactics.

Training among ancient Martian ruins and the detritus of war, tactics and equipment were developed in parallel, and the classic appearance of these fearsome troops first took shape. Armed with pistols and satchel charges, their most famous weapon was a cut-down Gewehr 98 rifle fitted with a grenade cup and suitable sights. On his person he wore a pressure suit of waxed horsehide reinforced with spring steel bands and topped with armor for the upper body. On his head he wore a modified version of the 'coal scuttle' helmet with an integral rebreather and provisions for additional plates to protect the face. The armor for the torso was only partial protection from gunfire, initially being rolled steel of a modest thickness. Much of the function of the chest armor was to act as a counterweight for the rocket motor and its bulky fuel and oxidizer tanks, with a small compressed air tank in between. This tank both pressurized the fuel and oxidizer for the rocket motor, as well as providing emergency breathing air should the rebreather become fouled. Rocket controls were quite rudimentary, especially in early versions. Initially these consisted of an open and close mechanism for the valves, controlled from a switch at the belt, with ignition being automatic. Thrust and angle were controlled by setscrews on the motor, these needing to be set beforehand. These controls gave generally predictable arcs, though ranges were difficult to estimate in boarding actions and generally inadequate in actual combat. It is important to note that the equipment carried by a single raketensoldat could easily approach 300 pounds, and was never intended for use in the full gravity of Earth. When boarding an enemy vessel, he would bear this weight for only so long as it took him to engage his rocket and make the leap of faith that would put him into combat among the enemy. Having landed, the pack was detached via a pair of quick release clamps, and the process was cumbersome enough that a rocket soldier must, having boarded an enemy vessel, either 'triumph or die'.

This shortcoming led to the development of one of the more remarkable craft to come out the period, and arguably since. In service, the Wulf-Etrich RF 12 took the standard rocket pack and enlarged it and mounted it to a simple airframe. At a stroke, range and control were both improved significantly and the distinct 'angel wings' associated with the Imperial Rocket Infantry came into being. Popular imagination has added to the legend of the RF12 (*Regensburg Flugzeugbau*, Model 12) in the years since, but the reality of this machine was that of a sort of powered glider which extended the capabilities of the operator.

The famous 'silver wings' of the rocket troops also served to obfuscate the extraordinary capabilities of these elite soldiers once they began their systematic use of the so-called 'black elixir', which was in fact a battery of treatments derived from Martian sources. This program created mental and physiological changes in those who underwent it, which in turn gave unusual insights into Martian physiology. Popular myth paints German rocket troops as having been turned into super soldiers, with unmatched strength and dexterity gained at the price of their humanity. Some accounts went so far as to accuse them of inheriting the Martian penchant for vampirism. The 'monster in the machine' is a recurring motif in both fiction and the popular press, but the truth was subtler if no less disturbing. Medical and psychological records report a state like sleepwalking or perhaps lucid dreaming, but with no loss of general awareness. Laid upon this state was a peculiar sort of

heightened reaction speed that bordered on prescience. Those who undertook this treatment gained no real increase in speed (as borne out by high-speed photographic studies) but gained an easy anticipation of distance, mass, and the fineness of sensation required to master the weapons that would in turn conquer these forces. All this was done in a languor, as though under the influence of sleep, illness, or opium. While fine and good on the battlefield, these increases in ability were accompanied by other sensations that were less welcome, including the impression of growing additional limbs and generally hearing and seeing things which were not apparent to others present. These faded with a discontinuing of the treatment, which was usually necessitated after no longer than two years in service.

In combat, rocket troops gave an account of themselves out of proportion to the numbers fielded, fighting fiercely all the way up to 1927. They even saw later use in the attempted rescue of stranded vessels after the failure of their gravity drives following the Icarus Event. Their most famous engagements came early, the corps' finest hour occurring even before the fighting began with their recovery of the deserted and out of control French fortress ship *Gloire* in 1920. Being part of the initial operations against the British on Phobos, their weapons and tactics proved particularly effective against the defenders there. The British garrison was both overwhelmed by the speed of the infantry assault and not anticipating their vulnerability to specialist troops able to act as sappers without heavy equipment. As excellent as the rocket troopers were in their role, the attribution to them of wholly inhuman abilities did come off as something of an excuse for the lack of preparation on the part of their adversaries. While the source was classified until after the end of the war, the speed and endurance of these flying soldiers made them a foe to be respected by even the most elite formations.

In an unusual postscript, certain effects of the 'black elixir' proved long lasting even after cessation of treatment. Reflexes would return to normal within six months, though habituation would make attempts to obtain additional doses through clandestine means common. While less overt than when treatment was ongoing, visual and auditory hallucinations were quite common, and tentative links were made between these phenomena and the so-called Dream Plague, which seemed to be at the center of so much of the Martian Revival and associated millenarian organizations at the time. This led to the surveillance and sometimes persecution of ex-*raketen-soldat,* which led many to immigrate to America and various offworld settlements under new names after the war. While the majority of these veterans seek anonymity, they do correspond through their fraternal organization 'Wings of Earth' to the media on topics relevant to Mars and veterans of the wars there. Their sole point of contact for non-members is through a New York post office box, though it is rumored they have a retreat in Belize.

WARSHIP - GERMAN

CASTORP CLASS COMMERCE RAIDER

While not having full access to the Martian factory technologies that were being deciphered by the Atlantic powers from 1920 onwards, Germany nevertheless developed a number of innovative solutions based on the knowledge she was able to acquire. In many cases these solutions were unique in their repurposing and expansion upon Martian discoveries. One of the more exotic solutions seen during the conflict was the so-called 'thermal sail', a passive means of propulsion which allowed a vessel to be propelled via an external power source. This power source was not the sun (as the name implied) but rather the use of tuned versions of the Martian heat ray, firing from fixed installations. The beams from these devices could be trained upon a spacecraft and momentum imparted via photonic pressure. The development of this technology was the result of an intersection between the heat ray and a sort of woven metal mesh that was among the standard creations that the Martian factory cylinders were capable of producing. The mesh was a utilitarian material that was completely resistant to the power of the heat ray, though the principles involved took some time to discover. Not merely an insulator, samples fired upon in testing to determine their properties saw the offside of the mesh cooling in direct proportion to the heating of the exposed side. While initially ascribed to the Peltier effect, the thermal efficiencies involved were too high to be readily explained thus, and further testing was undertaken by Rheinoptik AG in 1916. In a recurring theme, this testing raised more questions than it answered as the material (Now named *Marsglas*) exhibited further properties that were never made public, nor appear in the surviving technical documentation. Interviews with a German defector who worked at Rheinoptik in the early 1920's are full of wild stories which must be treated with skepticism, but contain hints as to the fundamentally alien nature of the material. These include both self-healing properties as well as the crystalline structure of the fibers changing over time depending upon non-contact proximity to other samples. The conclusions in some quarters that the material is both alive and able to anticipate changes in its environment are dubious at best.

Whatever questions persisted, the material was seen as promising enough that the experimental *Daedalus* was constructed to test the principle of the thermal sail. Little more than a kite, this craft proved out the principle of propulsion via heat ray with a converted torpedo boat hull propelled by a beam fired from an installation on Mars, and later from a temporary mounting on the warship SMS *Hermann*. These being successful (if somewhat anomalous in the tendency of the Marsglas 'sails' to change properties over time), it was decided to move ahead with a manned testbed with potential military applications. One of the projected advantages of the sail technology was the reduced consumption of fuel and reaction mass. Range would be greatly improved for the same amount of bunkerage, or bunkerage could be decreased for any given amount of useful tonnage. When the coast defense vessel SMS *Kaspian von Ritter* was converted for this role, it was hoped she could do both. While sensationalized as the 'black elixir' that turned men into hybrid Martians, German research had made significant gains towards adapting the human mind

Ghostly and luminous as she sails past a derelict British outpost, the SMS* Castorp *presents a fanciful appearance that belies her deadly role. Operating at the edges of enemy space, this class of commerce raiders proved elusive to the stretched-thin forces of their enemies.

and body for space travel. Initial discoveries had been by happenstance, but developments since pointed the way towards a means of slowing human metabolism, and in the process, greatly reducing the need for air, water, and food. While likened to a sort of torpor or hibernation, consciousness persisted in a dreamlike state wherein both consciousness and action were possible but experienced as a thing 'happening some distance away, and perhaps to somebody else' as described by one member of the program. The crew consisted of volunteers, and was given training unique among the crews of the vessels of the Imperial Space Corps. In addition to what was needed for the normal operation of such a craft, techniques were taught to the officers and men to deal with the extreme solution and privation that would characterize much of a patrol which might last nearly two months, with most of that occurring in a twilight state between dreaming and waking. These techniques, being taught by a mixture of monks and yoga practitioners, led to the ship receiving the nickname 'The Abbey of St. Ritter' by her crew.

Launched in secret during the decaying peace that characterized the early 1920's, the vessel remained in the naval registry as the *Ritter*, but assumed a new identity in space as the cargo transport *Castorp*, complete with paperwork identifying her as a commercial vessel acting in the interests of the British empire. While converted from a waterborne hull, the transformation was both more complete and more finely finished than characterized many earlier types. The thoroughness of this conversion was the result of the complimentary needs of her means of propulsion and her disguise as a civilian vessel. As the name would imply, thermal propulsion involved subjecting both hull and works to intense and prolonged heat, with gaps or breaks causing unacceptable problems. Likewise, her weapons and general fighting character needed to be either disguised or retracted lest her prey become wary before the trap was sprung. The sails themselves were suspended between yards which were themselves retractable, and which in turn projected from masts which could be stepped down against the hull. In practice, these structures were rarely retracted due to both the cumbersome nature of the operation and lacking any real need for disguise at the edges of human space.

Initial propulsion into her patrol vector was accomplished via a large heat ray firing from a German cruiser on the far side of the moon, with the engines of the *Castorp* powered down except to change course or speed. Almost undetectable unless she engaged her engine, what was to be a shakedown cruise became her first war patrol when the fighting of 1922 found her out far past Mars in the void that would eventually lead to the outer planets. Upon receiving a coded radioheliograph transmission, her captain reversed course in an attempt to intercept the British 'baggage train' of support vessels that followed any offworld action of substance. In the following months, the *Castorp* destroyed or seized a number of minor British and French vessels, and forced much additional traffic to move in groups under armed escort. She also induced something of a panic into the Martian theater when, though failing to capture the freighter *Acadian Princess*, she was seen quite clearly by her bridge crew. Illuminated by searchlights, the *Castorp* looked like not so much a German raider but a Flying Dutchman or some other less distinguishable apparition, and even the gunfire of the *Castorp* failed to break this illusion. Escaping intact, the durable superstitions of the sea spread to the stars and the sighting of a new ghost ship was soon ensconced in myth. The craft became the central figure in the story of a navigator who boasted he could sail any sea by the positions of the stars, and was thus doomed to sail among them until

they fell from the sky on judgment day.

Seeing some early successes, the *Castorp* was nonetheless not an entirely successful design. It was initially envisioned that she would be directed through much of her patrol by outposts able to boost and redirect her movement via great heat rays, but these remained unbuilt as war overtook earlier plans. This resulted in either a vast reduction in range or loss of the ability to actively maneuver to intercept targets. The advantage lost, this was seen as sufficient justification to withdraw the vessel from service only a few years later. However, declassified records indicate that much of the real reason had more to do with the long-term effects of the 'black elixir' upon human beings. In addition to the obvious difficulties of spending months in a dreamlike state, the crew eventually gained the bad habit of remembering lives that were not their own. This was seen later as a precursor to the dream plague, and a hint of the designs of the Grey Martians. Without even windows upon the blackness for weeks on end, sailors compared fancies that might be dreams or memories in the dark, and in time all remembered a glass city beneath a strange sun. Eventually this phantasm seemed like home and they openly spoke of their longing to return. This was the high-water mark of Germany's troubled relationship with Martian physiology and the siren song it represented: To perfectly adapt to an alien environment is to become alien. Perhaps not overtly nor all at once, but the cosmos will extract its price from all those who venture far from home. The question as to whether the price is worth it is central to what was coined the 'problem of Mars' by later writers.

For all her unusual features and the initial difficulties she caused her enemies, the fate of the vessel was an anticlimax. With the offworld heat rays unbuilt, her sails were removed and she resumed her former identity as the *Ritter*, serving in a training role until her generally dilapidated state saw her broken up in the later 1920's. The sails themselves were subjected to additional experiment and testing due to the structural changes they underwent in service, having unexpected capacities for self-repair and adaptation that resembled living tissue. While tantalizing in its implications, the sails and bulk of the documentation were lost during the Icarus event along with the transport that was carrying it. Surviving crew members are naturally reluctant to speak of their experiences, and most popular accounts are wholly fictional in nature.

WARSHIP - GERMAN

GOTHA GV/X ROCKET BOMBER

The Gotha GV/X is arguably the most distinctive and infamous weapon to appear in the German arsenal during the conflict. Attacking at great distance, its rocket bombs were fired en masse and unseen at enemy fleet concentrations and support facilities. Difficult to detect and almost impossible to intercept, these attacks put within human control the sort of indiscriminate destruction that had been previously associated with Martians alone. Held up as the embodiment of German culpability in plunging the world into open war, the GV series has acquired a mythic quality that ignores both the full circumstances of its development as well as its true role in the fighting and the events which preceded the war. There were many deeds done by the German empire and her allies that reveal a willingness to use violence and terror when it benefited them, but to search for blamelessness on the part of her enemies is a difficult task. The empires of Earth continued their interrupted game, though with different pieces and some small revisions to the rules of play.

The origin of Germany's rocket bomber program may be found in the innovative weapons the British derived from Martian technology and the discoveries which proceeded from these spoils. The use of the gravitational impeder (sometimes called the Walsingham impeder after the development site which saw its genesis) was an innovation that gave the British forces on Mars a unique advantage over the other occupying nations, starting in the second half of 1919. The impeder took advantage of a quirk in early generation gravity drives wherein superimposing two active fields caused both to fail, via a sort of overload. At that time the Martian engines were being reverse engineered for production, but their operating principles were not yet fully understood. The plundering of the Martian technical corpus was well underway, but anything resembling a comprehensive understanding of it was still years off. Armed with little more than the drive itself and some theoretical calculations, the Imperial Science Ministry produced a drive variant that generated an output tuned to make anti-gravity flight within it impossible. It was these drives that made the impressive fortifications on Phobos secure from attack by gravity-engined spacecraft and in turn brought the other occupying powers of Mars to view Fort Kitchener as a potential threat.

The tensions in the early 1920's being what they were, Germany countered with a new generation of craft somewhere between a minelayer and a superheavy bomber. These exploited the neglected science of rocketry to fit solid fuel engines to 1200-kilogram bombs. Launched from the ramps that gave the GV/X series part of their distinctive shape, these weapons would fly in predictable arcs unimpeded by the impeder field. The peculiar vertical layout that was distinctive to the type was a product of drive layout, which placed the center of gravity some 20 meters above the upper wing. This was done to both act as a more stable firing platform and to counteract sympathetic vibrations that the hull would undergo when subject to air resistance. The rocket bombs were typically launched either from low orbit or the upper atmosphere, with accuracy being the greatest limitation to range. Fixed installations on the surface of planets were naturally the easiest to hit, with the difficulty increasing based upon the size and unpre-

It is said that the bomber will always get through, but it may not make it back again. While perceived as an unstoppable terror weapon by her enemies, Germany's rocket bomber program was plagued by development problems as well as a number of the Gotha GV/X bombers mysteriously exploding in service.

dictability of the target. At the expense of accuracy, the upper atmosphere of Venus or the Earth could be used to either brake or deflect the trajectory of the weapons. This arrangement also allowed the rocket to skip along the top of the atmosphere like a flat stone on a pond. Range was increased when firing from open space, but at something of a penalty to accuracy. This was not seen as a problem when attacking enemy forces on Mars or other planetary bodies, as the goal was not so much to destroy the forces there, as give them the impression of being overextended and force their withdrawal. Germany and her allies could not field the numbers they needed to storm Phobos or the Martian fortresses, so striking against supply lines and a careful application of siege tactics were the strategies pursued.

The Gotha GV sees its origins in an earlier line of development undertaken jointly by Gotha and Sternatom in response to an imperial requirement for an attack vessel utilizing a heavy gun and capable of accurate fire at extreme range. Rather than utilizing high speed and closing to fire point-blank, this was to be more of a 'flying fieldpiece' wherein targets were engaged at ranges that prohibited them from effectively returning fire. While the Gotha/Sa G never achieved the accuracy figures desired (space fire control still being in its infancy) the lessons learned about the stabilization of weapons within a gravity control field saw the project live on as a strategic rocket bomber. The basic shape of the hull of the earlier vessel was retained, though the internal layout was greatly altered. Gone was gun cradle and its elaborate buffer mechanism, and in its place was an endless loop style feed mechanism which allowed the timely handling of both payload and rocket motor resulting in a rate of fire that could approach two shots a minute. Deployed in sections of four machines, these would lay a barrage for no longer than five minutes before changing course and potentially laying another barrage on a different vector. With minimal defensive firepower, stealth and surprise were the only effective defenses the type could claim. Initial attacks by the type on Phobos in 1922 were a substantial surprise for the British and the destruction wrought upon Fort Kitchener was initially thought to be the work of sappers. It was only some weeks later when an analysis of the damage turned up fragments of rocket motors bearing German serial numbers, was the true nature of the attack understood. By this time the GVs had been withdrawn a substantial distance away and positioned themselves to bombard British and French installations on the surface, though actual barrages were used sparingly at first due to the difficulties associated with resupply in deep space.

As much as support would prove to be an Achilles heel for German forces later, the initial shock and surprise of the attack both demoralized the British and almost succeeded in forcing France into a separate peace. It also electrified German public opinion and helped make the arguments being put forward by those factions in the government that saw domination of Mars as the only way to secure the German empire against her rivals. Even these voices were not prepared for the prospect of total war, so the tempo of operations was kept relatively slow after the initial two weeks of hostilities that saw the Phobos fortifications reduced and ultimately overrun by rocket infantry. While these forces were ultimately withdrawn in the face of an approaching British fleet, this was not done before the gravitational impeders were disabled with some examples retrieved for study. While a tactical victory, the destruction of an American warship by German defenses during this occupation succeeded in drawing America into hostilities against Germany, an act that would have disastrous consequences in the long term. A contemporary expression

held that 'space is the thickest fog' is particularly applicable here, as the distances involved and the irregular nature of communications prevented clear and consistent understanding of the tactical situation on the part of everyone from individual captains all the way up to the general staff themselves. While a credible argument could be made for the destruction of the USS *Wheeler* being a case of misidentification in the heat of battle, the lack of any conciliatory diplomatic response (indeed, the lack of any official response whatsoever) served as a provocation that ultimately doomed Germany's imperial designs on Mars and made even an occupation of Fort Kitchener untenable.

All during the subsequent fighting on Mars and the associated spacelanes, the Gotha GV was a threat to any surface operation or observed concentration of enemy craft, gaining a reputation as an ever-present threat that could destroy any static target observed by German forces. While reshaping the battlefield with an attack that was effectively undetectable before it was too late, the Gotha squadrons had their own problems. Designed for an age of slow-moving dreadnoughts attacking at visual ranges, the introduction of the gravity bottle fighter forced the German bombers even further from the battlefield as they were hunted by the new generation of scout craft. While the Gotha GV was swift enough to exit an area before her rocket trajectories could be backtracked, resupply became much more difficult. Lacking the base of commercial transport craft Britain had to draw upon, the massive depots otherwise required to store, transport, and reload hundreds of rockets weighing more than a ton each proved the weakest link in the chain. While few of these semi-mobile installations were destroyed outright, the need to constantly shift position made German rocket bomber tactics far less effective than they might otherwise have been.

Largely drawing down during the Peace of Trieste, most were either in storage or undergoing refurbishment at the time of the Neomartian breakout and took no part. When hostilities resumed in 1927, improved models were widely fielded just beyond lunar orbit and prepared to bombard targets upon the Earth itself. While strongly placed and having the potential to inflict great damage upon ports and industrial city centers, it was this new threat that motivated the Gotha squadrons as a priority target for destruction by gunboats and long-range fighters. This in turn left the arguably obsolete fortress ships of Britain and France vulnerable in open battle. Determined to smash the British home fleet once and for all, the Germans fought the British in the last major battle before the Icarus Event. Mutually devastating, the smaller German fleet inflicted disproportionate losses upon the British by falling back in such a manner that the British fleet was hit by multiple bombardments launched by Gotha squadrons hours or even days earlier when they pursued. This was the result of the British being drawn into predesignated kill zones. While inspired, the destruction of the British van did little to prevent the subsequent destruction of the Gotha squadrons, to the degree that only a handful remained, and their scrapping under the Manchester Accords of 1929 was largely a moot point. Infamous as a symbol of the conflict, no intact examples are known to survive.

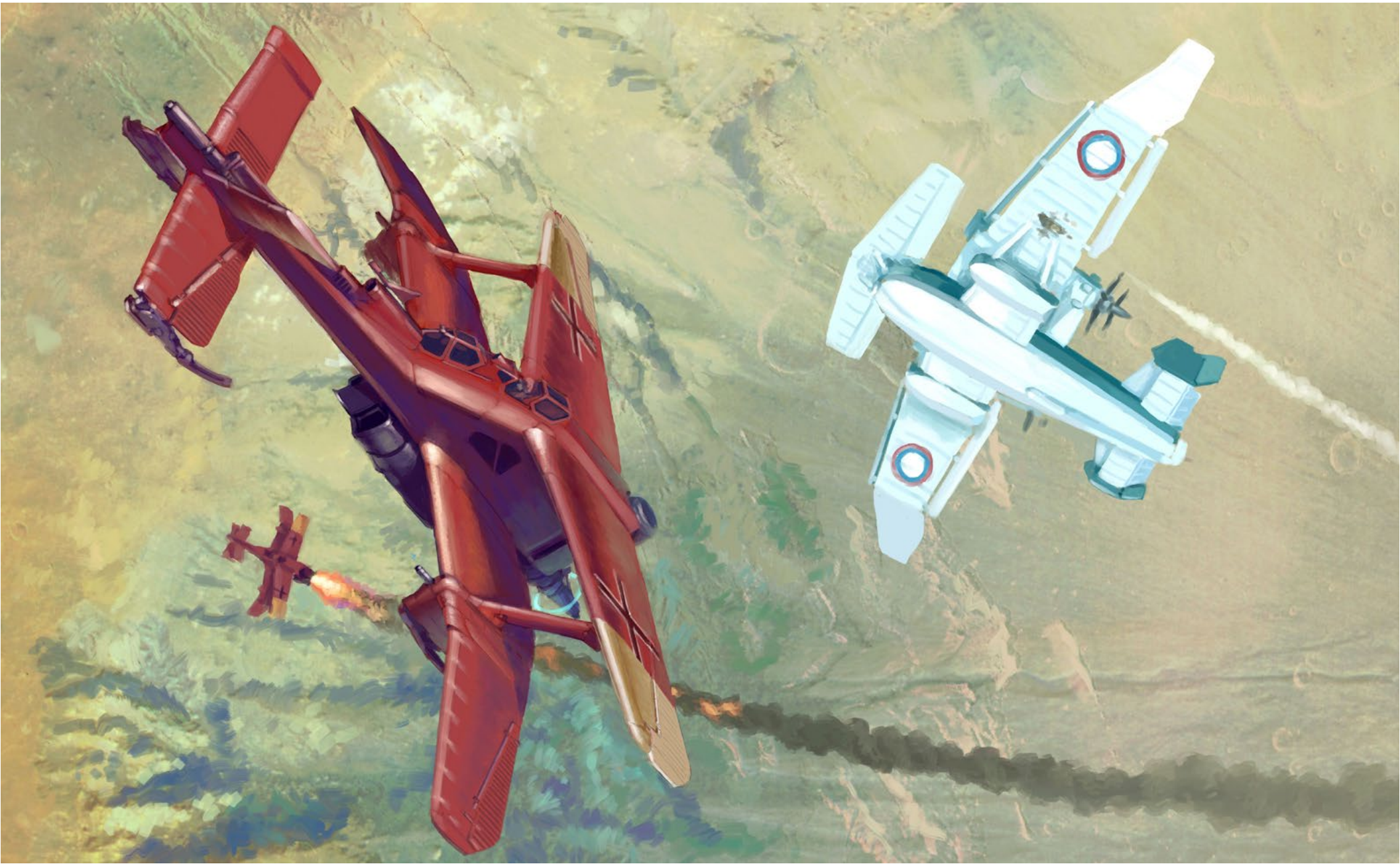
WARSHIP - GERMAN

HANSA S. III PATROL CRAFT

Germany came very close to calling Mars her own. While it's fashionable to insinuate that this was done through guile and nerve, such arguments qualify rather than disprove the assertion. 1922 saw her dominating the skies above Mars, with the Russians trapped on the surface and the British bottled up on Phobos. While the Americans were being drawn into the fray, they were months off from being involved in direct action for control of the red planet. Into this environment came the Hansa S series, a maneuverable and capable fighting machine with characteristics that seem excellent even by modern standards. While frequently mistaken for one of the contemporary gravity bottle fighters and scouts, the Hansa S (with the S. III being most common) was both immense and fully capable of gravity control. This misunderstanding may be attributed to the Hansa S being the size of a small patrol craft, but fully aerodynamic in her dual-role mission and being skinned in the metallized silica fabric commonly seen on smaller German machines. While looking like a fighter from a distance, this was no fragile gravity bottle machine but something on the order of a torpedo craft in racing livery. Most configurations carried a crew of five, these consisting of: A pair of pilots, a navigator, who also manned the rear turret, an engineer, and an assistant engineer, who also acted as a loader for the 3" hypervelocity gun that was mounted on the long axis of the craft. While fitted with an autoloader, feeding was most reliable when accomplished manually rather than with the elaborate carriage mechanism designed for the purpose. Miniature gravity engines still being in their infancy, the engineer's need for a second set of hands settled the matter as far as crew size went. Due to the low cyclic rate of the gun, there was no appreciable decrease in performance by having the gun be loaded manually.

Development of the Hansa S series was implemented as a crash program to supplement the needs of the fleet for rocket bombers, and act as screens for the bases and ships that would launch the bombers. This did not directly address the lack of capital ships and suitable carriers Germany faced in the early 1920's. The recent advances in shipbuilding attained by those powers with access to the technology of the factory cylinders (which did not include Germany) had put that game beyond the Kaiser's reach. The course that remained was a strategy that aimed to nullify the advantages of Britain and France by cutting the supply lines of their thirsty fleets and reducing the British installation on Phobos. This strategy was a point of no return for Germany, as well as her uncertain allies in Austria-Hungary and the Balkans. As she built up her forces in the German sector of a divided Mars, the illusions her leaders could maintain grew fewer with each passing week. Her bad faith was blatant, but hardly unprecedented. Whether it was the wealth of Mars that was the cause, or the disappearance of the Martians as a threat, the politics of the 20th century resumed and the race for supremacy began anew. Germany built up her bomber force on Mars in secret, and on Earth she constructed prototypes of a new type of spacecraft: one able to fight effectively both within the atmosphere (and gravity) of a planet, and within the void of space.

The S-series was heralded by some as the first true fighting craft to utilize a miniature gravity drive (a full five years



Holding a decided perfomance edge over the opposition, the Hansa S. III might have ruled the skies over Mars if produced in greater quantity. Here seen in combat with a Russian atmospheric craft, these machines were frequently involved with the border clashes that characterized the decaying political situation on Mars in 1921.

before the American FX-Regulus), but to make this claim strains the definition of 'miniature' to such a degree as to be of limited use. While the Ha-166 'Garm' was smaller than the powerplants that lay at the heart of the great dreadnoughts, they were still automobile-sized pieces of machinery in need of constant attention and largely deciding the shape and layout of any vessel they were mated with. That being said, their configuration and rationalization for production was still excellent, and the use of the atmospheric wings for fuel and reaction mass tankage freed up significant internal volume for crew and weapons. While not routine, test flights were not the exercises in blind faith that they were a decade earlier, and development proceeded quickly. It is a testament to both the competency of the engineering team at Hansa Werke and the emergency nature of the development program, that the S series went from prototype to full production in less than a year. The S. III was the primary mark manufactured, with the S. II being an experimental model and most of the S. I preproduction machines later being upgraded to the S. III standard. The modifications mostly consisted of structural strengthening and a discarding of the troublesome retractable undercarriage, in favor of the robust (if drag-inducing) set of fixed skids favored by most smaller machines. Water landings were not possible. The appearance of all these machines was dominated by the marsglas covering the vessel. Marsglas was a sort of metallized woven silicate fabric of Martian origin, and had extraordinary properties that Germany had harnessed elsewhere. In the case of the S. III, the tensile strength and the ability to disperse heat were of great value. While this was reputed to be the source of the bright crimson color that made the livery of the 'Wildejagd' squadron on Mars so distinct, this was in fact a conventional painted coating applied for safety due to the potential danger of touching the marsglas with bare skin due to the peculiar (and partially unexplained) properties of the material.

The primary armament consisted of a heavy automatic cannon mounted centrally with various marks and sighting systems employed and supported by a pair of heavy machine guns in the wings. Rockets or bombs could also be carried, but most strike loadouts eschewed external stores in exchange for additional ammunition for the cannon due to the murderous effectiveness of 57mm rounds against targets in the open on the surface.

Rushed to Mars to support the events leading up to the siege of Phobos, they proved a nasty surprise for the British, arriving in number on the doorstep of Fort Kitchener as the blockade was begun. American forces on the surface sought to meet their treaty obligations, but the handful of SFC-2s they were able to field were no threat to the full squadron of S. IIIs the Germans sent to support the blockade, and were withdrawn pending a diplomatic solution. This single act set in motion events which were to engulf two worlds in a conflict on a scale not yet seen before, and thought impossible ten years before. For months the blockade simmered as America demurred and Britain tried to decide who was the greater threat: A German emperor or a French republic, while Russia convulsed and the world held its breath. All the while newsreels sent back footage of these German 'red devils' and recriminations flew. Moralizing would come later. The Russian surface forces withdrew after some border clashes with the Germans, who then consolidated their positions. America gathered a grand fleet above Venus, but Germany hoped to force Phobos into submission before this massive undertaking was complete. In the end, it was war, precipitated by the destruction of an American cruiser attempting to force the blockade. While characterized by the Germans as an undeclared belligerent striking

a mine in German territory, the destruction of the USS New Orleans was the casus belli all had been looking for (with varying levels of reluctance).

Battle joined, the Hansa S. III gained a fearsome reputation to match its devilish appearance. A small and maneuverable target to hit with heavy gunfire, it was a tough target for gravity bottle scouts to engage due to its armor and defensive firepower. Designed for combat at conventional distances, their only real vulnerability was to the Walsingham Impeder which would interfere with their gravity engines to such a degree as to make flight impossible. These machines being at the heart of the British defenses on Phobos, their position remained battered but impregnable until being taken some months later by German rocket troops. Germany would hold Mars and bombard the British and French fleets from a distance, but it was their direct threat to these nations on Earth which resulted in full American mobilization and the anno terribilis of 1924, which saw bloody battles on two worlds and the end of the Third Republic in France. The ascent of a Bourbon pretender to the French throne was met with widespread derision, but the peace talks brokered by the new king resulted in the Peace of Trieste and a respite for a world that had seen war on an ever-increasing scale for more than twenty years.

Into this uneasy peace sailed the Hansa S. III, though attrition and wear had cut their numbers in half and international news coverage saw them singled out as archetypes of Teutonic bloodlust in the popular imagination. It was a year into the Peace that most of the remaining machines were lost during the Neomartian breakout from the Russian zone on Mars, though the devastation of the Secessionist sneak attack which acted as a prelude to the breakout was so swift and so total that the exact circumstances of these losses are unknown. Characteristically, the last stand of the 'red devils' is a blank page upon which a number of stories have crept, all contradictory and none with living witnesses. One newspaper account held that the Germans had joined with the British in common cause to fight in defense of Earth, and others claimed that the Germans had fled or been destroyed on the ground. One serialized treatment held that the 'black elixir' of the Germans gave them the power to resurrect the dead that lay beneath Mars, compelling them to give up their secrets and fight on behalf of the Kaiser, though this tells more about the appetites of the reading public of the day rather than historical events. Many more S. IIIs were dispatched from Earth to face the Neomartian threat, but these suffered badly and most of the survivors were in poor repair after the battle and the type was subsequently withdrawn from front-line service before the time of Icarus. No survivors are known to exist, the marsglas skinning being a peculiar hazard that saw the handful of remaining machines being scrapped (and their skinning incinerated) prior to 1927, though a number of replicas are on the market.

WARSHIP - GERMAN

KMB K. VI FIGHTER

When one thinks of the archetypal combatants in the battle for Mars, German space fighters in red livery come immediately to mind. While Germany came to the party relatively late in terms of developing small craft propelled via gravity bottle technology, she did develop several excellent types that were unburdened by the false starts that characterized earlier machines. The best and the most numerous of these designs was the KMB K. VI, a somewhat minimalist configuration that packed adequate firepower into a compact and powerful craft. Deployed in the months before the onset of hostilities in 1922, the K. VI was initially viewed as a secret weapon that had been developed in bad faith during the tensions of the previous years. While a dramatic narrative, the facts of her development were somewhat more prosaic. The refinement of gravity engine technology from the examples recovered from the Martian cylinders was initially an international effort, and early human-manufactured drives saw a great deal of commonality between designs. After the breakdown of cooperation between powers from 1918 onwards, one sees a divergence in approaches taken, and differing priorities depending on role. Nevertheless, certain features and discoveries occurred in unrelated research programs due to both common ancestries and basic principles of gravity control. As newer designs appeared during the heightened tensions of the early 1920's, there were popular assumptions that similarities between machines were either the result of espionage or hidden internationalist cabals within government and industry. While the sympathies of enemies-turned-allies-and-then-enemies-again were often complex, government inquiries generally yielded little but outraged headlines. There was also the growing realization that the original Martian engines were not the pinnacles of technical achievement they were once believed to be. While robust, the recovered machinery from the cylinders were strange and complex devices with fittings that suggested they were designed for different purposes than that which they were employed for. There were also indications that they were of great age, and not of Red Martian design or manufacture. These conclusions had to do with both the materials used and how they were assembled. While the evidence was largely esoteric in nature, it was difficult to avoid noticing that the tools, measurement systems, assembly techniques and even basic ergonomics of the gravity engines differed from what was recovered from the fortresses and deserted cities of Mars. A picture emerged of a civilization utilizing ancient devices as best they could, without being able to fully reproduce them. This more ancient species came to be referred to colloquially as the 'Grey Martians' to distinguish them from the newer species that were the 'Red Martians'. Purely a label of convenience, subsequent discoveries put into question even the planet of origin for either civilization.

As the secrets of many alien inventions were unlocked, novel applications were often found, and basic principles improved upon. This was nowhere truer than in the science of gravity control. A growing understanding of these principles revealed the possibility to project an artificial field onto an area quite removed from the gravity engine itself. These experiments led to a gravity field being induced in a given area

Seen here in combat with an American Rapière V with a fanciful depiction of a Russian fortress ship in the background, the K. VI came to dominate the skies over Mars in the early 1920's but could bring to bear less influence over events as time went on. With their striking performance and heraldic markings, the K. VI remains the archetypal German fighter of the period.

that did not included the gravity engine which had created the field. In short, induced gravity could be made to work at a distance. While a certain crude version of this effect had been seen as a potential weapon for some time, the persistence of the field after the gravity engine was disengaged suggested new applications. One could, in essence, make an object temporarily weightless. Technically, the gravitational field had roughly half the target mass inverted in direction, but the result was the same. Diminishing in effect over a few minutes at first, the field was prolonged into the range of hours and could be modulated during this time with what was termed a 'passive effect engine' but was known commonly as a gravity bottle. These devices made the space fighter as we think of it now possible, though truly miniature gravity engines wouldn't come until a half decade later.

Small craft powered by gravity bottle engines were deployed by many of the major powers beginning in late 1921, and became common the following year. Due to the parallel nature of many of these discoveries, suspicions of espionage were almost universal. While appearances contributed to the breakdown in diplomatic relations seen during the period, the effect was something inherent in the Martian gravity engines that was merely waiting for discovery and exploitation. Little appreciated at the time, much of the success of vessels operating under gravity control was due to the fact that while it appeared to originate from the engine, the artificial gravity field was actually a distortion in time and space which was induced via the engine to travel with it and behave in a consistent manner. Seeming mere semantics in the early 1920's, the more profound implications would take years to comprehend, let alone control.

In a field suddenly crowded with fast and lethal scouts and fighters, the K. VI distinguished itself with an abundance of these properties. Lightly built, the pilot was protected from space solely via a bulky suit that was more of a cockpit that the pilot wore, rather than the more conventional gear worn by British pilots. Heat and air were provided via connections to machinery inside the fighter, as well as a radioheliograph receiver. Armament was relatively light, consisting of a pair of rifle-caliber Maxim guns with 1000 rounds each. The gravity bottle was concealed beneath a streamlined fairing at the front of the fuselage, and sandwiched between the wings were a pair of radiothermal engines used for combat boost. Reactant mass was typically water with tankage in the wings. Never designed for long ranges or to fight large vessels, the K. VI excelled at close-range combat against the heavier French and British fighters. Initial encounters in combat showed great promise. While the armament of the K. VI was seen as inadequate by many in the German military and technical establishments, the torsion box formed by the wings (which, strictly speaking, were balancing masses that had been aerodynamically skinned, rather than true lifting surfaces) made for an exceptionally strong structure that enabled the gravity bottle to be used as offensive weapon. This was accomplished by making an extremely close pass at an enemy fighter such that the gravity fields would overlap perpendicularly. Gravity output would be temporarily put to maximum, often causing structural damage to the enemy craft. The MADA Rapière was particularly vulnerable to these tactics. Faster and more heavily armed, the French interceptor was prone to being outmaneuvered, particularly when at a numeric disadvantage. The nature of their construction made it vulnerable to failure under high gravity cross-loading, and the German fighters acquired a ferocious reputation. Seeking combat at point-blank ranges, many squadrons and individual machines came to be emblazoned with the traditional weapons of the

grenadier: the lance and the flaming bomb. These were often combined with heraldic or other colors, giving flights of the K. VI a flamboyant aspect with the pilots deliberately cultivating the trappings of knights of an earlier age. This image was also capitalized upon by both the German government and media as young K. VI aces very much became the face of the fight for those at home. Dominating the skies over Mars through 1923, the type was nonetheless hampered when fighting large vessels due to its light armament. Following the Peace of Trieste, a variety of cannon and recoilless guns were tried in test fittings, these attempts to turn the nimble fighter into a ship killer met with little success and were never taken into production. Also of note was an even more radical attempt to repurpose what was a capable but inflexible design, wherein modified K. VI examples were converted to unmanned torpedoes guided to their target by either a second K. VI connected in tandem, or mounted in the bay of a larger bomber. While showing a certain promise, this scheme was not pursued due to production priorities shifting to longer range types that did not depend on carrier or depot ships that Germany did not have. While an excellent machine that dominated combat in the early 1920's, the type was rapidly superseded by types with the range and power that only full gravity control provided, with the KMB XI being the most common.

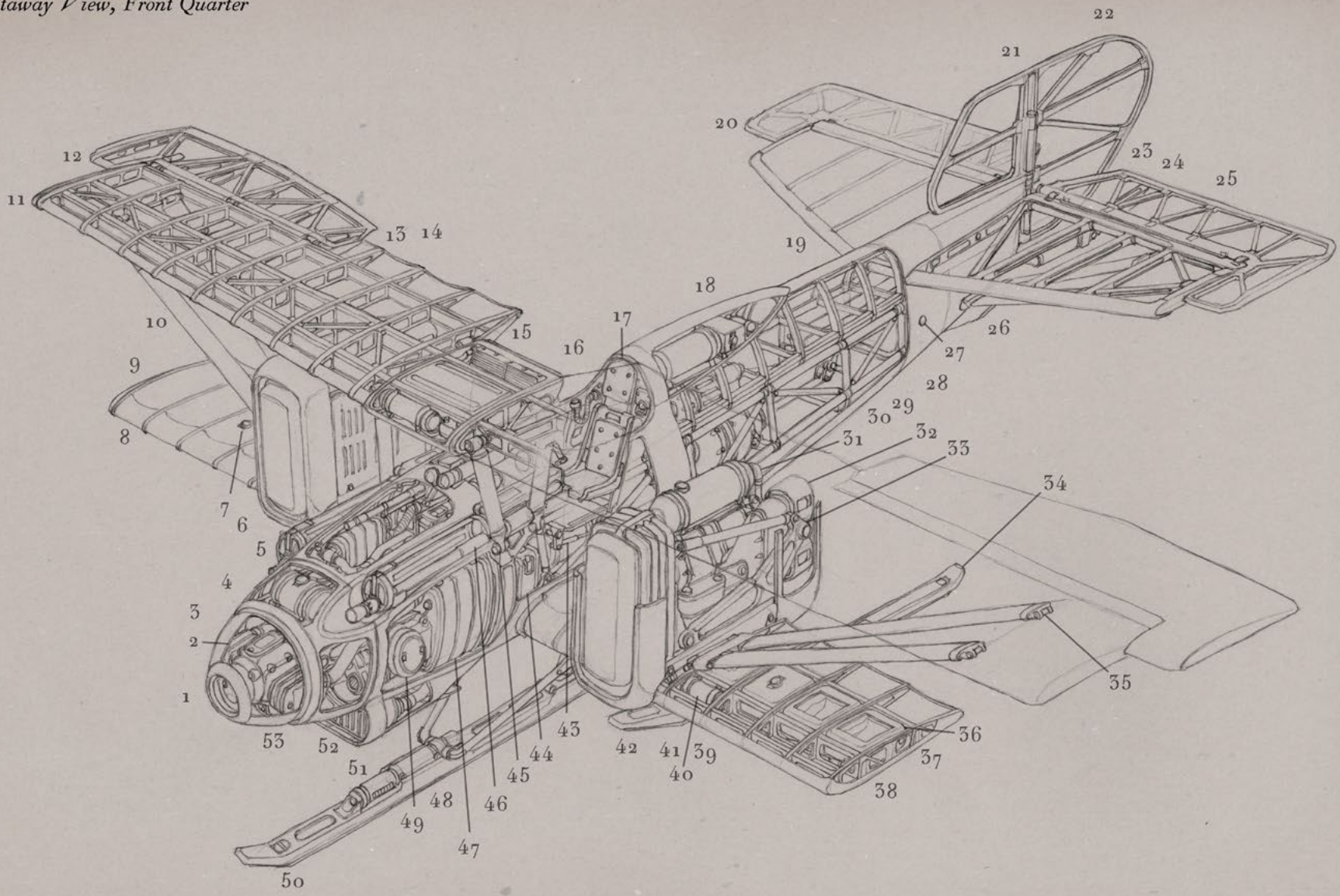
Passing out of frontline service by 1926, few participated in repelling the Neomartian attempt to reach Earth that year. While eager to fight, those training units which operated the machines were not able to get their craft skyward in quantity due to the limitations in the available charging gear and general poor state of the engines. It is widely speculated that the poor showing of the K. VI led to its general retirement after the battle, though the poor serviceability of the type at that point could also adequately explain the decision. Surviving machines are not uncommon, but flying examples have typically been converted to more modern engines due to the general lack of facilities for charging the older types. While typically fitted with dummy radiothermal engines giving an authentic external appearance, flight characteristics are greatly altered and not representative of the experience of early space combat.

In cutaway, the K. VI is striking in its simplicity and small size. Dominated by the gravity bottle engine and radiothermal rockets, the German fighter trades armament and range for performance. Characteristic of the thinking of the day, the cockpit is open leaving the pressure suit of the pilot to maintain a correct environment though the oxygen generated via external equipment.

While effective in their day, the limited facilities and space for additional equipment conisgned the type to short range roles and were eclipsed by the progressive miniaturization of gravity control technology.

1. External Start Lug
2. Gravity Induction Stir Motor
3. Induced Gravity Field Engine
4. Reactant Surge/Fill Tank
5. Dual Heavy Machine Guns
6. Radiothermal Engine
7. Wing Tank Fill Point
8. Reinforced Leading Edge
9. Stub Wing
10. External Bracing
11. Wing Framework/Wet Tankage
12. Atmospheric Control Surface
13. Control Surface Alloy Substructure
14. Wire Reinforced Trailing Edge
15. Reactant Pump/Heat Exchanger
16. Open Cockpit
17. Pilot Seat
18. Oxygen Generating Plant
19. All Metal Fuselage
20. Stabilizer Counterweight
21. Vertical Fin
22. Atmospheric Rudder
23. Empennage
24. Atmospheric Stabilizer
25. Alloy Framework
26. External Bracing
27. Lift Point
28. Metal Fuselage Skinning
29. Alloy Tube Framing
30. Empennage Control Rods
31. Radiothermal Reactant Surge Tank
32. Exhaust Nozzle
33. Engine Mount
34. Outrigger Skid
35. Bracing Connector
36. Reaction Mass Tank
37. Metal Skinning
38. Alloy Substructure
39. Stub Wing
40. Reactant Pump
41. Reinforced Leading Edge
42. Outrigger Skid
43. Control Linkage
44. Machine Gun Magazine
45. Support Bracing
46. MG Forced Cooling Jacket
47. Gravity Field Focus Coils
48. Skid Strut
49. Dual Thermal Ray Turret
50. Landing Skid
51. Shock Absorber
52. Heat Exchanger
53. Aerodynamic Fairing

Fig. 26 - Cutaway View, Front Quarter



Kaiserliche Maschinenfabrik Bayern KMB K. VI

WARSHIP - GERMAN

KMB XI FIGHTER

From the 1902 Martian invasion onwards, the power of the heat ray and its derivatives made it a weapon of intense interest for the armed forces of all nations capable of fielding a space navy. The devastating nature of the beam and the simplicity of calculating a firing solution for it, made development of a practical thermal weapon highly desirable. Given the increased speeds and distances involved in space combat, conventional weaponry was inaccurate at all but the closest of ranges. While targets on predetermined courses could be hit with some accuracy, the calculations involved could take some time. Naturally, this was not practical for the sort of combat that had been seen from 1922 onwards, with engagement ranges on the order of those associated with naval actions in the previous century. Thermal weapons, which fired in essentially straight lines, were seen as a highly desirable replacement for the shell and the rocket. This goal was frustrated by the difficulties involved with fitting a heat ray to one of the currently available platforms. While a tremendously effective weapon on the ground or in the air, waste heat is a serious problem when the device is used in a vacuum. Reaction mass might be used as a heat sink, but only to a certain point. While certain tests had been undertaken with fitting a heat ray in a rotating turret, certain problems proved impossible to overcome. First and foremost, a vessel with a powerful enough gravity field to retain an atmospheric bubble, built up waste heat at an unacceptable and even hazardous rate. Further, the ability of the hull to dispense heat via radiation was also reduced by the insulating properties of this bubble. The heat ray technology also scaled poorly, with larger devices tending to either fuse themselves solid under the heat of operation, or fail in such a way as to release dangerous amounts of radiation.

As a result of these setbacks, mountings on converted bombers were attempted with mixed results. While potent, fixed mounts proved too difficult to bring to bear on anything smaller than a fortress ship. Traversable mountings couldn't be fitted to such a small frame, and the entire project (codenamed Fafnir by the German high command) languished through the Peace of Trieste until the fall of 1927. With miniaturized gravity engines coming into production, the possibility of fitting a heat ray to a fighter was worth exploring. Studies had been undertaken as early as 1923 as to the possibility of fitting the technology to a gravity bottle craft, but passive engines neither scaled well enough nor offered the reliability needed for what was to be a heavy craft for its size. Full gravity control in a machine dexterous enough to dogfight was a godsend to the development program. The development of a production type by Kaiserliche Maschinenfabrik Bayern was elevated to emergency status by the war production board in mid-1927 to supplement the Hansa S. series as the primary fighter in German service going forward. This process was further accelerated to the degree possible, as a result of most of the remaining Hansas being lost during the Neomartian breakout. With this strange new threat both revealed and destroyed the previous year, frantic rearmament programs were undertaken by all the major powers regardless of the weariness now gripping the nations of the Earth. The cycle of devastation and rearmament that had gripped our world for the previous quarter century showed little sign of

Reverse engineered from captured Martian examples, the KMB XI was fitted with a powerful heat ray. While a devastating weapon against space or ground targets, heat buildup could rapidly become lethal for the pilot.

abating, and imperial competition took on a manic edge.

After brief trials on the Baltic Sea, the first two squadrons of pre-production machines transited directly to Mars to support beleaguered German forces there, and the Peace of Trieste at last broke down into open fighting once more. While not envisaged as typically making journeys of this distance, the new fighters functioned well with their crews of two trading off piloting for the two-week journey, and their reaction mass needs accommodated by caches on the way. Gone were the days of the freighters and tankers that constituted the baggage train of any fleet up to the previous decade. While gunnery practice had been undertaken on Earth, the otherwise uneventful flight allowed opportunities to test the fitted heat rays away from prying eyes. Though devastating in effect, so great was the waste heat generated by the weapon that shots of more than a few seconds duration caused the water being used for both reaction mass and a heatsink to boil. This in turn resulted in much of the water used by the gravity engine to bleed away into space as the overpressure valves in the wing tanks tripped to prevent the tanks rupturing. Given a seaplane hull, the KMB XI was designed to be able to refill her tanks after a water landing, though this would be of little use on Mars. While no substantial damage was sustained during the ferrying operation, it put into sharp relief the hazards courted when firing the heat ray for too long. In the end, it was all too easy for a hot-headed pilot to have their condition become terminal.

With these hazards in mind, combat tactics for the effective use of the heat ray varied by target and environment. Though devastatingly effective, to destroy targets moving at high speed and firing back was a more difficult matter than the Martians had to contend with. Even the most lightly built fighter would not obligingly disintegrate unless hit at close range with a long pull of the trigger. This presented its own problems with a hail of white hot debris being generated which the XI pilot had better hope he could evade. A good hit could cripple even a fortress ship, but shot placement was vital. While contemporary illustrations show Martian heat rays punching through warships much like an armor piercing shell, the effect was more complex. With contemporary armor plate consisting of a hardened outer surface being backed with a more elastic thickness of steel, heat rays caused the two materials to delaminate and shatter explosively. Spalling and heat caused most of the damage from hits like this, especially with the ignition of powder stores or the rupturing of boilers. More modern chrome steels could not be counted on for this effect, so pilots were advised to fire on exposed engine machinery and fire control equipment. While less likely to result in a dramatic explosion, the same results could be achieved with greater surety.

After their arrival on Mars, the KMB XI squadrons were used very much as fire brigades, being rushed to reinforce one sector after another in face of a growing American presence supplementing the already strong Anglo-French forces there. Enjoying an edge over most of the machines opposing them (with the possible exception of the Fairchild FC), the outnumbered German squadrons extracted a heavy price. The heat ray proved devastating against enemy fighters who often had no warning they were being shot at other than bursting into flame. Heavier units fared better, as the heat ray lacked the full power of the Martian examples, and required a sustained beam to penetrate thick armor. While far from invulnerable, fortress ships could often drive off these attacks with concentrated fire. Gun laying still being the weakest link in fleet effectiveness, kill were few though German tactics dictated the avoidance of pitched battles unless enjoying a numerical ad-

vantage of 3:1 or more. While decried as cowardly in newsreels, the German space forces were now engaged in extended rearguard action against an ever-increasing enemy force. By holding the line on Mars, it was hoped that the devastation wrought by her rocket bombers would either force Britain to the bargaining table or force France out of the war, due to deep divisions at home. The wholesale commitment of the American fleet to the conflict soon after made these expectations unrealistic, and German preparations to bombard the cities of Earth saw the prospect of mutiny by her own army come to the forefront.

As apocalyptic as the future appeared, the reality faced in 1929 proved far worse as an advanced spacecraft of unknown origin appeared, and single-handedly destroyed the British fleet in orbit above Earth. While initially blamed on either a German secret weapon or an attack by hidden Martian forces, the vessel dubbed the Nemesis proved a friend to no nation of our planet. Two weeks later, gravity drives all though the solar system flickered and died in a disaster that came to be known as the Icarus Event. Occurring too close together to be coincidence, this dual disaster saw virtually every spacecraft in service either destroyed outright or become an inert tomb for her crew as their means of propulsion failed irrevocably. As advanced as the KMB XI was, she fared no better in this unequal fight. All examples deployed offworld were lost, and any in the air above the Earth were inevitably wrecked, losing both machine and crew. One extraordinary exception occurred when a pair of XIs under the command of one Unteroffizier Lieber were able to survive gliding in from the upper atmosphere to make a relatively graceful landing in the middle of a Kansas cornfield. This was accomplished by carefully shepherding the water remaining in the wing tanks and a fortuitous change made in the design of the overpressure valves of the tanks in later XIs. Now routed though the nozzle of the boost engine, the steam from the overheated tanks gave just enough thrust to prevent the tumbling and breakup on reentry that would claim most fighters lost above Earth that day. By firing his heat ray and carefully controlling the heat of the tanks, Lieber and his wingman would survive Icarus and the dark years that followed, with Lieber himself rising to the rank of General some decades later.

Lieber's machine was put on display in Chicago for some time before being returned to Germany and undergoing restoration, and is now on display in Hamburg. While the only wartime example still in existence, several machines under construction at the time of Icarus were subsequently finished with modified engines, once this became viable, and served for many once gravity control became possible again. Replicas are also somewhat common and very popular at parades and other public exhibitions. The XI remains one of the consummate designs of the period, and in many ways was the most truly modern combination of gravity control and energy weapons in a configuration recognizable to even pilots of the present day.

The Russian squadron of the Martian Punitive Expedition opens fire during the initial bombardment of Mars in 1916.

SECTION VI – RUSSIA AND THE NEOMARTIAN SECESSION

WARSHIP - RUSSIAN

BORIS GODUNOV CRUISER

Russia's experience with Martian invasion was unique among the great powers. Her soil was never invaded, nor her armies defeated by terrors from another world. Tripods neither burned her cities nor slaughtered her populace. She acquired gravity control technology bloodlessly, and built some of the first vessels capable of traveling to another world and returning safely. While all of this is true, the reversals of fortune and dark legacy of the czarist exile on Mars speaks to a heavier burden than any other nation, if a subtler one. Tripods never trod on Romanov soil, yet Russia arguably experienced the most radical transformation of any nation as a result of the invasion. With the imperial crown lost to revolution and the bulk of her fleet choosing exile on Mars, the nation that exited the conflict bore little relation to the one that entered it.

While great changes were in store, the Russian ascent into space began modestly enough and along very similar lines to the other great powers of Earth. Having acquired a gravity engine from a cylinder which impacted elsewhere (and seeking to acquire more) the Russian navy fitted the Martian device to an available hull. At the time, the existence of vacuum in outer space was still only conjecture, and naval hulls were frequently used for experiments with gravity engines due to their robust construction and the ready means of transport. That a watertight vessel is readily made airtight was a happenstance only appreciated after the first few flights had been undertaken. The identity and origin of the hulls used also helped ensure that the control of the fledgling space force was held by the navy, their original sin as oceangoing ships making their old masters their new ones as well. In the Russia of Alexander, the matter was not settled without issue. In the imperial court the generals held greater sway and advocated for army control over space development, with somewhat breathless proposals made for city-sized fortresses in space, and of the potential for using the gravity engine directly as a weapon to crush or deflect enemy fleets from great distances. While impractical in hindsight, these visions captured both the popular imagination and played into the ambitions of certain factions within the nobility. It was a characteristic of the infighting of the time that the army and navy had competing programs for the development of space flight, with separate chains of command that not only did not share resources, but were also largely hostile to one another. While the reasons for this are rooted in internal politics from before the invasion, the net effect was a delay in achieving spaceflight until very late in 1909.

The navy ultimately prevailed in this competition, though had the emperor been in better health the situation might have been avoided entirely. The deciding factor was that the gravity engines simply weren't yet understood (let alone copied), and were available in very limited numbers. Russia had precisely one, and while it could take the hulk of an ironclad airborne, it had no hope of taking something larger aloft, though army experiments continued at an installation built near Osowiec Fortress for some time. In contrast, the navy effort yielded results quite quickly, owing to both expertise and facilities able to operate on this scale. Along with available hulls of the cancelled *Imperatritsa Mariya* class, these two hulls being left incomplete on the ways

Faced with decision to either take her untried gravity drive aloft prematurely or succumb to a sudden storm, the Boris Godunov made history in 1909.

after the invasion. Lessons learned fighting Martian war machines made these ships obsolete, though their hulls would be scavenged to make something not before seen by the shipyards of the Black Sea.

Now destined to fight enemies further abroad than the Dardanelles, the *Imperatritsa Mariya* had her upper works stripped away and the engineering spaces fitted with the gravity engine of a Martian cylinder. In lieu of a more conventional superstructure, the keel of the *Imperator Aleksander III* (sister ship of the *Mariya*) was inverted and the structures joined to make a torsion box thought capable of withstanding the strains of flight. While the American USS *Vulcan* was little more than a flying laboratory with nominal armament, the Russian navy was determined to be first into space with a true fighting vessel. To this end, she was the recipient of both (and some would say victim of) a crash building program and a certain amount of international assistance. As the Russian empire at the time was not known for its cosmopolitan character, technical attaches from England and America were both politic and discreet in their contributions. Seeing the potential for a new arms race even under the shadow of the threat of invasion, it was felt by these (and other) governments that tensions could be relaxed better via aid rather than containment. Indeed, it was this exchange program that was to be a prelude to the founding of the League of Earth the following year. As the navy achieved rapid progress with this aid, the Russian emperor ailed and the army fumed. Bad blood was created which would have far-reaching consequences later, but this was impossible to foresee at the time.

By October the newly-named *Boris Godunov* was ready, at least on paper. While significantly larger and more capable than the recently-unveiled USS *Vulcan*, she was beset with problems and various peculiarities, which a more prolonged development program would likely have sorted out. Beyond the expected technical glitches, there was the central issue of the ship being built with alien machinery of largely unknown function at her heart, and with many more Martian systems having been installed than her opposite number in America. These resulted in electrical problems when underway, but also earned her an early reputation as a haunted ship. Strange voices were sometimes heard over her speaking tubes when there was nobody there, and machinery tended to change settings if left unattended. These effects were written off as sympathetic vibrations and the semi-autonomous design of Martian equipment at the time, but not everyone was convinced. It's said that the admiralty had the vessel exorcised at one point, but if this is true, no record survives. By the middle of the month, the immanent icing of the Black Sea forced the issue of putting to sea for the first time as-is or waiting for the ice to clear in the spring. Pressures being what they were, it was decided to put out on the next clear day with a tolerable sea state, and on a Tuesday morning in October 1909 the first space vessel of the Russian navy put to sea.

Having been launched nearly a month earlier, the *Boris Godunov* had been undergoing fitting out and efforts to correct her major deficiencies, including dangerous vibrations when her engine was run up for the first time. This was corrected via the re-attachment of the ram bow of the *Aleksander III* in its inverted position. This corrected the vibrations, but introduced stability issues that were hoped would vanish when taken under gravity control. With the men still whispering about Martian ghosts and the electrical system misbehaving, she ventured into open water to the sound of a military band and under the eyes of the royal family as well as various dignitaries from abroad. This was intended to be a demonstration that any conventional vessel could make,

but the vessel was under gravity control and prepared for the treachery of the sea in October. While still in sight of land, the weather rapidly worsened and the stability problems encountered earlier caused her to roll violently in the swells. As the crew prayed and the engineers cursed, Captain Roslov decided he had had enough, and took her into the air unannounced. The hull ceased to creak and instead both ship and crew were filled with the low and unsettling vibration of a gravity engine running at maximum output. Overtaxed, the Martian engine lifted the *Godunov* into the air gently, as the alien machinery within her glowed red and burned fuel at a prodigious rate. With but minutes to spare, the captain guided her back to her berth and settled her gently into the water again. This was greeted with cheers from those in attendance, even as wind howled and the sky darkened. The curtain came down and the *Godunov* underwent extensive and discreet modifications, which in the end saw her fitted with French engines and corrected most of her other problems. Stability was always a tradeoff in early vessels, due to the differing requirements for a stable hull at sea and an optimum layout for gravity control in space. Only with later generations of gravity engines was this problem solved with any degree of satisfaction.

At the command of the recently crowned Empress Anastasia, the *Godunov* joined the Martian Punitive Expedition to lay waste to the Martian threat. Having participated in the occupation and subsequent partitioning of Mars under now Admiral Roslov, she was one of the vessels that went into exile when revolution swept Russia. Accounts are shadowy and the fate of the vessel never made clear, but circumstances pointed at a mutiny onboard that was quickly put down. This was followed by the admiral switching sides and refusing to recognize the new government after giving initial assurances that he would do so. Afterwards there was speculation that the empress had contacted him privately (with various conjectures made about the possible contents of her message), or that the ailment which slew the Emperor Alexander was some manifestation of the Dream Plague which in turn called the admiral to Mars and the hidden wonders there. The *Boris Godunov* was ultimately recorded as lost and the fate of Admiral Roslov unknown. It's said that Anastasia waited for a knight that would not return, ultimately leaving her to flee into exile as a new and warlike state arose from the chaos of the age. As always, the backwards glance of history awaited the next dictator. Rumors abound to this day that the engine and the voices sometimes heard from the alien machinery were living things, seeking to return to their creators down the long corridors of time, taking the vessel with her crew as hapless passengers on a journey to places not yet known to Earth.

WARSHIP - RUSSIAN

PETROPAVLOVSK CLASS CRUISER

Seeking to follow up their initial, if somewhat qualified, success with the *Boris Godunov*, the Russian navy pursued an aggressive construction program seeking to achieve an early lead in terms of fleet strength. Even as early as 1910, the emperor regarded the offensive potential of space warfare as the only realistic defense against extraterrestrial invasion. No doubt shaped by the traditional strategic position of Russia with her vast open areas and relative lack of natural defenses, it was felt that the time to defeat the Martians was before they landed. The dependence of the Martians on living creatures for sustenance limited their endurance in the cylinders, and so restricted the timing of their attacks upon the Earth to within a fairly narrow window when the planets were closest. This, in turn, resulted in a limited number of possible approaches to our world, which were able to be plotted and theoretically intercepted. While the material of the cylinders was almost indestructible, tests revealed that the contents of the cylinders were not immune to impact or shock. The gravity damping field nullified the effect of all physical impacts on the long axis of the cylinders, but experimentation revealed that lateral shocks were transmitted to the internal fittings. These fittings, in turn, lacked the resilience of the cylinder shells, and would turn into deadly fragments upon the impact of large caliber shells to the exterior, much along the lines of one croquet ball knocking another away. While this suggested sapping techniques that could be used to disable cylinders after impact, the depth to which they were buried and the great heat of a recently fallen cylinder made this largely impractical. More promising was the vulnerability of the cylinders to naval gunfire while still in space. While the closing speed was quite high, interception was comparatively straightforward if the appropriate firepower could be brought to bear. Certain schemes to erect superguns to fire upon the invaders from the Earth came to naught due to limitations in metallurgy and gun laying. If firepower could be brought closer to the target, it was felt that it would prevail.

Though archaic in certain respects, the class did also bring together a number of features that would come to define what would later characterize the great vessels known as fortress ships. These included gravity engines with external damping devices (commonly mistaken for propellers) and extensive trunking to vent the great heat generated by the gravity control machinery away from the vessel. This latter was done as part of the growing understanding that gravity control altered the physical laws surrounding the spacecraft ,and one of the side effects was a tendency for an atmospheric 'bubble' to surround the gravity field for some time after exiting the atmosphere of a planet (the stranger implications of this having not yet been explored). The class also utilized spotters and searchlights for aid in gunlaying, though the calibers involved were yet a haphazard mix and the radioheliograph was not yet in widespread use.

Gunnery at this time was a science still very much in transition. The weapons mounted on these early craft would have been in no way alien to the artillerists of fifty years earlier, and hitting another spacecraft with one was more art than science. Gunlaying in particular lagged, for as the Martians utilized ray weapons as

Emerging from the ice of the Bering Sea, the wreck of the* Petropavlovsk *appears after vanishing years before on a diplomatic mission. Prominent is her external damping machinery (often mistaken for a propeller) and thermal funnels. The latter being of comparatively light construction and showing little damage suggests her immersion in the ice being briefer than can be explained by known events.

their arm of choice they had no need of the complex ballistic equations that a shell would be governed by on Earth, let alone screaming through the void from one area of artificial gravity to another. This, combined with the great confusion of calibers employed, led to the class having some rudimentary fire control coming from the observers at the top of the mainmast. These personnel were also able to operate via driving chains a pair of searchlights above the bridge to illuminate targets in the blackness of space. While an improvement over what had come before, the need to close to less than normal naval ranges to fight, while whizzing from planet to planet in weeks was an unresolved problem.

In the feverish activity that characterized much of 1915, the new space dreadnoughts of the Russian navy first took to the stars with the *Petropavlovsk* being launched from the same works where the *Boris Godunov* was constructed some years earlier. While somewhat shorter, these new vessels were much broader at the beam and gave to the world the archetype of the impregnable space fortress that was to dominate popular accounts both at home and abroad for several years. While their construction was a point of national pride, they were also a manifestation of both cooperation with the League of Earth and a more spontaneous spirit of cooperation as nations worked together to build defenses against future attacks. As much practical as idealistic, this cooperation manifested itself as French gravity engines and an innovative implementation of gravity control technology as a weapon based upon German experiments. This latter consisted of both reinforcing the bow and setting up an auxiliary mode for the gravity engine to better cope with the shock of ramming. The international nature of much of the development of the class led the Petropavlovsk and her sister ships to being referred to as 'Napoleons' in service.

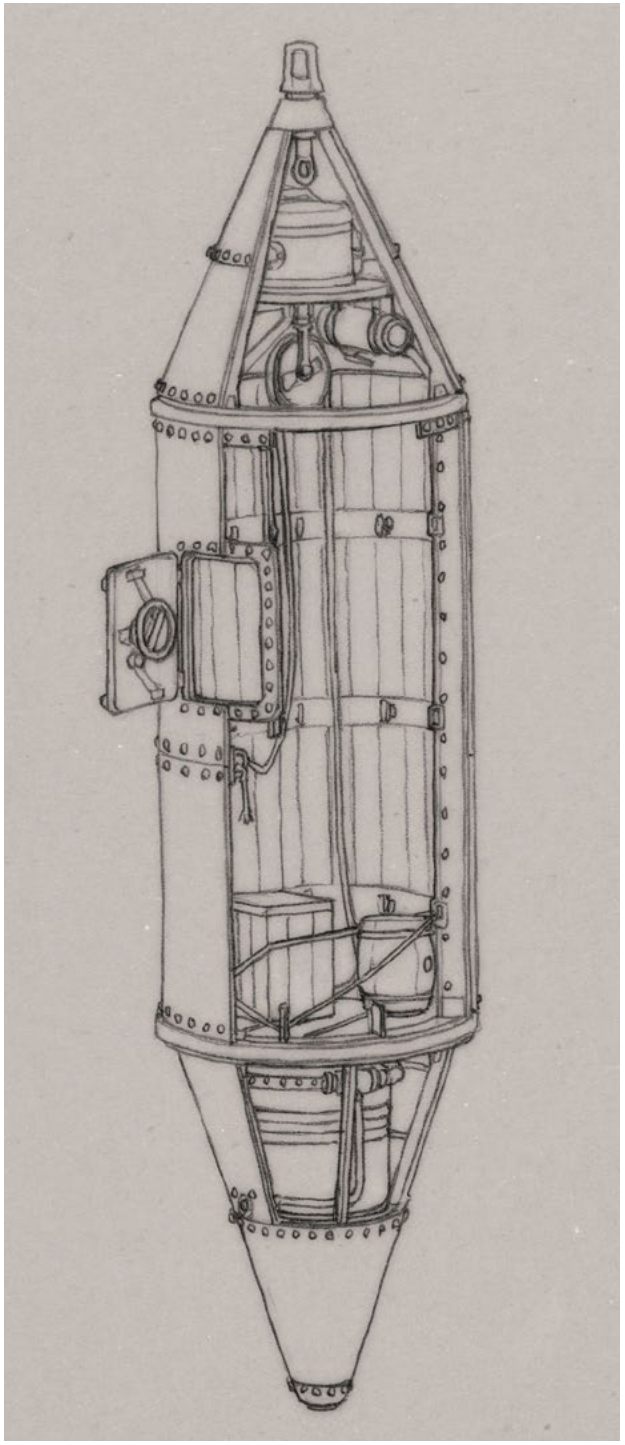
With further waves of cylinders never materializing, the *Petropavlovsk* and her sister the *Veliky Novgorod* first saw significant service as part of the Martian Punitive Expedition. In the bombardment of the Martian defenses they were truly mighty ships, with their distinctive short-barreled main batteries, they made short work of exposed fortifications. The invasion of Mars ending in anticlimax, the Russian ships served to oversee the occupation and ultimately the partition of Mars. Revolution on Earth saw the empress flee to Sweden in 1919 and establish a government-in-exile when the so-called Blue Faction took power. This in turn left the Russians on Mars to choose between loyalty to land or crown. With many crews approaching mutiny due to this latest upheaval, it was determined to send the *Petropavlovsk*, flagship of Admiral Kurayev, back to Earth to arrange any transitions in leadership among the Russian forces on Mars, and allay the mutual fears and suspicions of all parties involved.

Kurayev left for Earth with a selection of army and navy leadership, but his vessel never arrived. Treachery was suspected by both sides, leading to show trials on Earth, and revolts and purges among the Russians on Mars, with the bulk there either choosing exile or having it chosen for them. The army took the opportunity to denounce most of the senior naval command as czarists, and the tie between the 'Blue Russia' of Earth and the 'Red Russia' of Mars was all but broken. Those officers who returned to Earth were subject to arrest, and the chances for rehabilitation were slim. Those that stayed vanished into the underworld of Mars, succumbing by degrees to the Dream Plague, and remembering events of ten thousand years ago, which spoke to them in 'dreams sent to godly men and thieves' as one contemporary account put it.

The lost *Petropavlovsk* was ultimately found, but this raised more questions than it answered. She was discovered buried in the pack ice off Alaska several

seasons later, and was only made buoyant again by a runaway reaction in her oxygen plant. The explosion that resulted from this led to her discovery by the American outpost on Attu. What they found in the wreck has never been made fully public, and the fire which unfortunately followed erased all evidence of what the doomed warship brought back from Mars. This has led to speculation of an alien presence onboard, which was only prevented from being released on the Earth by the self-sacrifice of her crew. Alternately, the alien shadow walks abroad with ice and then fire erasing all witness of its passage. Of note is the fact there is little evidence to suspect either of these hypotheses of being true. Vessels of the day were both untried and unsafe, and fame does not automatically grant meaning.

Her sister, the *Veliky Novgorod* was refitted by the Neomartians and served as a sort of flagship for their drive on Earth after the breakout from Mars. Her upper works were emblazoned with a great icon of St. Cyril, and her conspicuousness as a target saw her succumb to gunfire soon after breaking through the pickets. Fragments of the great ship fell on Mars for some years after, and a number of significant pieces are held in both public and private collections.



One piece of equipment seen on Russian vessels of the period, which later became standard, is the cargo container known to all spacemen as the 'iron dog'. While widely mislabeled as a lifeboat following certain miraculous escapes described in the papers of the day, these were more general purpose devices to enable movement of stores, and the odd daredevil, from one spacecraft to another while underway. Transfer from ship to ship was accomplished by running a line under tension between them and easing the container between gravity fields via various methods.

Early devices were little more than iron tubes lined with teak and made somewhat airtight with gutta percha, but later marks incorporated labor saving winches, pumps for transferring water and fuel, and even basic gravity bottle machinery for standalone or specialized applications. Depicted here is a common type of the later Imperial Russian Navy, distinguished by the threaded mounts and differing tapers of the two ends.

IMPERATRITSA ANASTASIYA CLASS CONTAINED CRUISER

When one thinks of the archetypal Russian warship of the period, more often than not it's the great black vessels of the *Vostochnaya Krepost* (formerly *Imperatritsa Anastasiya*) class. Darling of newsreels before the revolution of 1919, they served as a sort of stock character embodying the Russian experience and perspective afterwards. These 'contained cruisers' as the class were called were imposing jacks-of-all-trades, capable of operating for extended periods afield with only basic support from field depots or tankers. Able to embark and launch attack craft and bombers, in addition to being able to engage both planetary and space targets with her guns, she could also sacrifice cargo space to act as a combat transport for infantry or armor. While viewed by some as a hopeless compromise, the dynamic nature of both alliances and technology after the partition of Mars gave this class a flexibility in the face of new threats. Emerging at a time of great political and social change, the Anastasiya class was the last of the pre-revolution Russian 'big ships' to be manufactured in quantity. Due to post-revolution changes in production priorities they were some of the most numerous of Russia's large space vessels, with the class comprising more than two dozen examples in all configurations.

Conceived on paper as a follow-on to earlier dreadnoughts, the design was soon modified to allow the embarkation of small scouts, using the 'gravity bottle' innovation that allowed the effective use of small craft operating from a base ship. While it was planned to develop domestic scout and attack types suitable for use by these new hybrid vessels, Russian designs for these never progressed beyond the prototype stage due to changing priorities. While the majority flew a variety of American and French scouts and bombers, the modifications required to act as a mothership for V-boats were minimal, which saw the class pressed into an even wider variety of roles. Their genesis came with the unexpected success of the Martian Punitive Expedition, which sought to silence the cylinder-launching guns of the red planet, but instead conquered it. That resistance from the moribund Red Martian civilization was either automated or nonexistent did little to decrease the challenge of occupation. While there were voices that argued for abandoning the arid and seemingly deserted world once the Martian facilities had been destroyed, the prize proved too tempting. The domed cities and strange sights underground were filled with wonders that if not claimed by one nation, would be claimed by another. As cooperation here did not preclude ambition, Russia (among others) embarked on an aggressive building program that sought to provide space vessels appropriate to these vast new territories.

Originally planned as an improved *Petropavlovsk* class, the 'royal' class vessels emerged as very different entities once improved gravity engines and high strength steel became available in quantity. Acquiring the Martian electro-evaporative technology for extracting metal from even low-quality ores was a top priority for industry, and its eventual integration allowed stronger hulls to be built more quickly. Indeed, warships of the period are marked in their character as being in a deep transition between technologies—and even basic roles. It was in light of this, that the *Imperatritsa Anastasiya* was laid

Seen here in a fleet review, the newly-crowned empress sails past her namesake the* Imperatritsa Anastasiya *in the royal yacht. Embarking either aircraft or rocket weapons, the class sought to consolidate warship roles within a single design operating independently for extended periods of time, hence designated a 'contained cruiser'.

down less like a naval hull, and more like a skyscraper of the period with an armored citadel within, and external fittings mounted on a flexible framework. While giving them poor seakeeping characteristics, the reduced mass and improved elasticity of the hull made these new vessels less susceptible to cracking under heavy gravity flux.

The two lead vessels of the class, the aforementioned *Anastasiya* and the *Imperator Nikolay*, were launched almost simultaneously in 1915. With the death of Nicholas II the following winter and the ending of the de facto 'Blue Regency', the great naval review that summer was one of the first public appearances of the ascendant Empress Anastasia. In a departure from traditional displays of sea power, the review began in the Gulf of Finland outside of St. Petersburg, but then took to the air in a tour across the breadth of Russia, finally reaching Vladivostok some two months later. This display served two purposes: Both as a demonstration of Russian capabilities and as manifestation of imperial power in counterpoint to the increasingly restive army. With these two vessels participating in the Punitive Expedition the next year, another six vessels of the class came off the ways by 1917 and immediately transited to the red planet in the land rush that followed, as the empires of Earth carved up their prize. Unity and cooperation, while still on the lips of prime ministers and kings, were falling out of favor as the dead cities of Mars revealed secrets that might remake the world, while making those nations which possessed them rulers over all. From innovative sources of power, to strange new materials and the means to make them, the underworld of Mars yielded rewards that proved encouraging and seductive for those that dug deep enough. With these came stranger secrets, and the history and customs of a far more ancient race than the so-called 'Red Martians' were intertwined with them. These 'Grey Martians' left behind bizarre library-tombs with records written in a language that took years to decipher, and were written in such a way as to merge language and architecture, with the story of their race only comprehensible if one read the stamped copper scrolls as they simultaneously moved through their ancient places underground. Linguistically, words meant different things in different places and depended upon which cardinal point the reader was facing. As this corpus was translated and studied it would eventually suggest a species regarding itself as mobile in time as well as space, but this was as yet undreamed of as the victors carved up the dead planet into what portions they could hold from the others.

While later embarking gravity bottle craft of varying roles, the class was first known for operating either light aircraft when on Earth, or rocket weapons when elsewhere. As aircraft had limited use outside of Earth proper, the launching ramps were typically used for rocket weapons in the Martian campaign. Newsreels at the time showcased purported developments in rocket fighters being based on these proto-carriers as well, but hindsight and the later opening of the Russian archives shows much of this to have been for propaganda purposes, rather than militarily useful systems. Exceptions to this included the experiments undertaken using rockets to propel cargo containers from spacecraft to spacecraft, as well as the mooring lines and now-standard rocket anchors used when an improvised mooring was desirable.

In the task of shoring up Russian interests on Mars these new Russian 'black ships' with their nitrided hull plates held onto vast areas for the empire in the northern hemisphere, shuttling engineers, scientists, and marines from one discovery to another. It was in this place that the Russian fleet found itself when revolution broke out back on Earth in 1919, with the empress fleeing into exile, as a republican

and anti-royalist government took control. With the vessel carrying the diplomatic mission to Earth from the Russian forces on Mars disappearing under suspicious circumstances, a further wedge was driven between sympathies among forces there, and a general mutiny was narrowly avoided. With Germany recognizing the new revolutionary government, and most other nations supporting the czarist government-in-exile as legitimate, the loss of senior fleet leadership further deepened the crisis. While the *Imperatritsa Anastasiya* returned to Earth and a new life as the *Vostochnaya Krepost*, many more ships and crews sought to hold out as part of an independent Russian Mars. Appearing as little more than a desert upon the surface, places below became sanctuaries for the homeless fleet and their crews. Lacking supplies and the wherewithal to keep their charges functional, many captains hid and abandoned their vessels among the ruined fortresses and massive gun pits at the equator, and ventured into the unknown world of a dead race. What they found there has never been fully described to outsiders, but rumor emerged of strange caverns lit by unknown means and populated by lush and edible plant life. Of note is that these forces were not only largely neutral in the open warfare that began in 1922, but had vanished from view completely. To most they became the stuff of legend among the other ghost ships of history. While their connection to the Grey Martians and the Dream Plague is assumed, the threads are hard to trace, and the Russians disappear from outside eyes until their breakout under a new aegis in 1923.

Returning to Earth, the *Imperatritsa Anastasiya* saw her captain acquitted in a politically-motivated court martial, but he never commanded a space vessel again. His former command was quickly renamed to something less aristocratic in character and used as the flagship for the home fleet during the Peace of Trieste. Obsolete by the time of the resumption of hostilities in 1927, she was stripped of heavy armament and used as a depot ship for V-boat squadrons until the time of the Icarus Event. She was undergoing resupply in the Gulf of Finland when her gravity engine failed, and heroic efforts were made to save her. Afloat but adrift without power, she was taken under tow by a flotilla of fishing vessels. Seeking to make port in rough seas, she foundered and had to be abandoned. Her guns and gravity engine were later salvaged, but the wreck remains largely intact and is sometimes visible from the surface, particularly when the ice begins to clear in the spring.

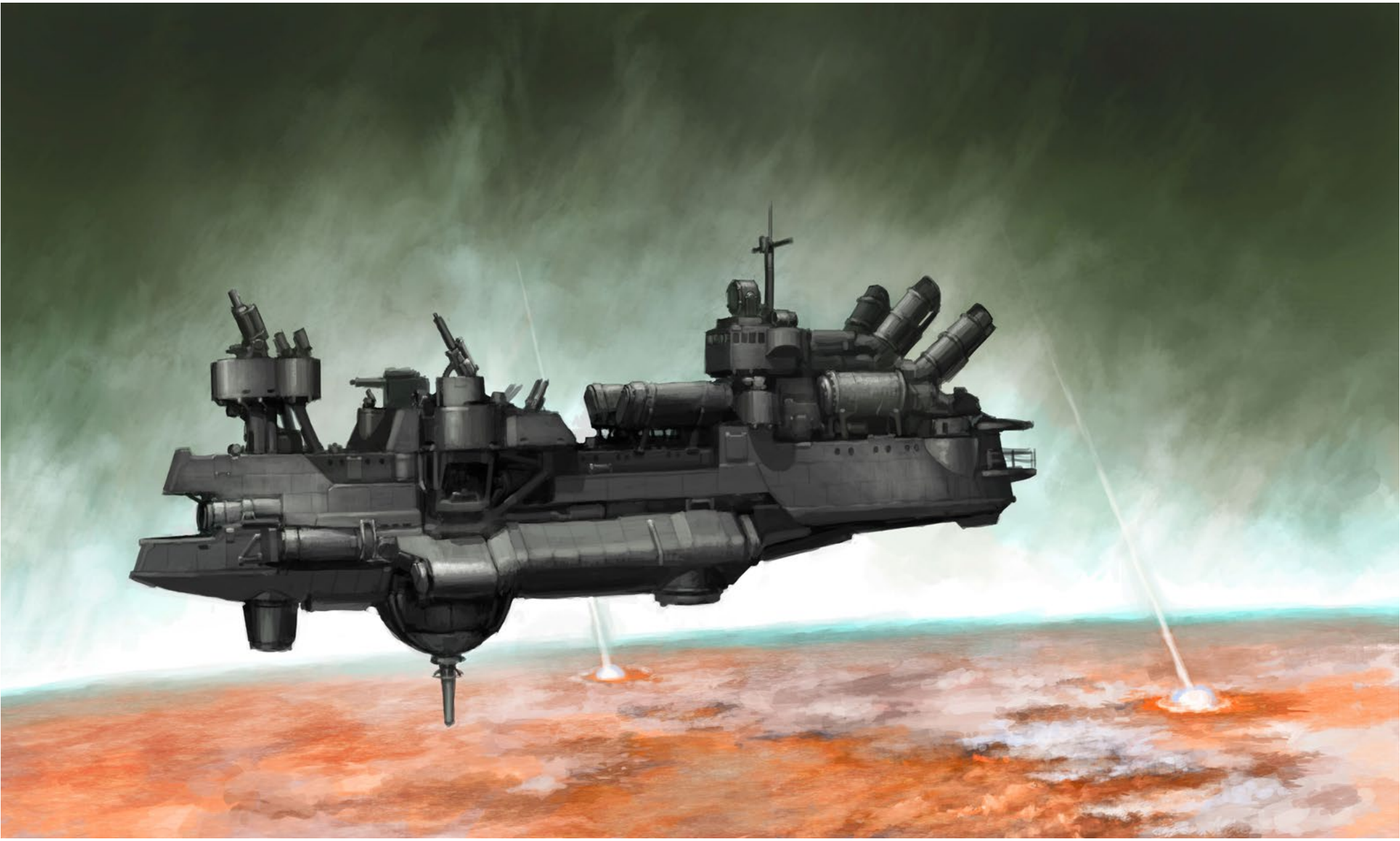
WARSHIP - RUSSIAN

FORTRESS BARGE

Static platforms capable of limited flight, fortress barges were an expedient implemented during Russian occupation of Mars to give ground forces below both support in ground operations and some measure of protection from enemy warships. While their mobility and capacity for maneuver were limited, they constituted an effective arm of the Russian forces on Mars. With imperial shipyards operating at full capacity to fulfill their goal of having ten space dreadnoughts in service by 1916, it became obvious a year earlier that even if this goal could be reached, it would be inadequate. As prototypes of the new gravity drives reached the operational testing phase about this time it was decided to also mate these systems to smaller hulls in support roles, these mounting a variety of scavenged naval guns in peripheral and support roles. In contrast to the glamor and publicity lavished upon the great dreadnoughts, these smaller vessels were regarded with contempt by the majority of the space forces, and such a command was regarded as a punishment to an officer seeking glory and advancement. In time attitudes changed, as these unlovely vessels demonstrated both capabilities and a general ubiquitousness that the larger craft lacked, but a rift persisted between those who served on capital vessels and those that served on the 'army boats', as they came to be known.

The earliest of these ugly ducklings were static barges designed solely to be towed into position wherever needed and deposited on either land or sea by a gravity tug or larger vessel. As French (and later domestic) engines became available, the mating of gravity control to these platforms became a natural extension of their design, and the fortress barge became a formal type. Lacking the need for a hull shaped for smooth movement through water, the initial examples built before the occupation of Mars varied widely in shape based upon available hulls and weapon fittings. While many were constructed from scratch at smaller shipyards on the Black Sea and the Baltic coast, just as many were hacked together from salvaged or cast-off hulls of one design or another, either whole or in pieces. Minister Voigin of the Space Armaments Ministry, when on an inspection tour of the western shipyards was confronted with a prewar hull that had been cut in two for use as a pair of barges, the openings plated over, and the aft section reversed in its new role. He is recorded to have said "Are these sister ships or recently conjoined twins?" with some bemusement. Aesthetics aside, the gap filled by these small vessels was an important one. Adapted for the vagaries of space under gravity control, they proved adequate for use as mobile watchtowers and early warning sentries, keeping station above the arctic circle on two-week rotation and reporting observed atmospheric and astronomical events.

It was during the invasion of Mars that these vessels fully came into their own, with the initial six towed examples deployed at the edge of the atmosphere as pickets, both spotting fire and identifying sites of interest invisible to the fleet in higher orbit. While almost completely deserted, the Martian installations had significant automated defenses, particularly in a perimeter around the launch sites at the equator. While incorporating a variety of anti-infantry measures, the primary danger to the fleet was a number of heat



Fiercely utilitarian, the fortress barge was a stopgap measure initially implemented to ensure adequate support firepower during the invasion of Mars. Unexpectedly flexible when fitted with gravity engines, the type proved ubiquitous through the 1920's.

rays in hidden casemates. Being scaled-up versions of the weapon used by the tripods, they had the capacity to seriously damage even the larger warships among the Expedition. These weapons were aimed by what was later determined to be radioheliograph, the firing solution being simplified by the straight-line nature of the weapon. As these devices were hidden on rolling carriages that only emerged to fire from the mouths of the caves that hid them, they were difficult to spot before their damage was done. The repair ship HMS *Redcap* was the most notable casualty to these weapons.

The solution proved to be moving the bombarding vessel over the horizon, and having an artillery barge move in low below the point the heat ray cannons could be depressed to engage targets. The heavy guns of the fleet could then be directed by the barges to seal off the cave mouths, their shells arcing parabolically even in the modest gravity present. Where some heat ray positions remained concealed, these could be provoked to fire and be subsequently destroyed by use of the large rocket torpedoes fitted to some barges. The massive Martian guns secured, the barges were then deployed at the edge of Russian holdings, much as they had been on Earth. Their role might have remained unchanged, but for the crippling supply and transport needs of what was now an occupation force. These needs, combined with the availability of a handful of more powerful gravity engines scavenged from both written-off Earth vessels (as accidents and fatigue cracking had seen many vessels written off) and unlaunched cylinders discovered in the Martian ruins, saw the artillery barges become far more capable craft, able to transit space under their own power. While never particularly comfortable to serve aboard, their hand-me-down engines (and additional weapons acquired in much the same manner) made them far more potent weapons than originally conceived.

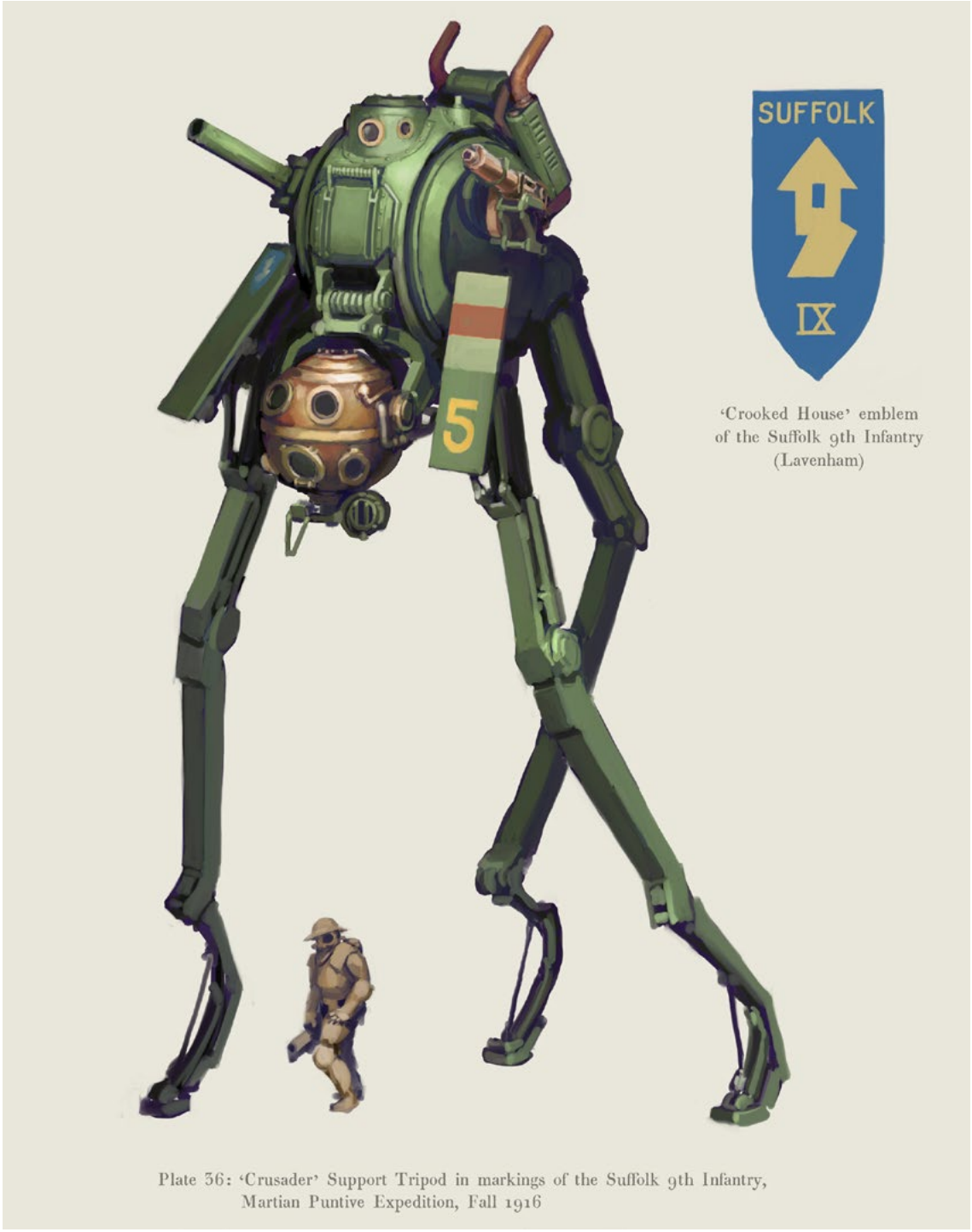
It was in this expanded role that these small vessels met the increased tensions between nations that followed the occupation. By this time their number on Mars was being expanded significantly in the light of both international tensions and an increasing number of looters and pirates not flying the flag of any nation. The purging of the officer corps following the revolution saw relatively few of the commanders of these vessels replaced, owing to the majority of them lacking significant status or ties to the *ancien régime*. This in turn caused additional resentment among the czarist officers and much mutual suspicion. When the bulk of the exiled fleet disappeared into the underworld of Mars, there were few of the artillery barges among their number. Recalled home, these aging vessels saw action with the resumption of hostilities in 1922. While not formally a combatant, Russian strength served to check German ambitions on Earth and dissuade them from extending their rocket bombing attacks to a bombardment of Europe. While the Russian fleet could not directly prevent this campaign from being implemented, neither did Germany have the resources to fight a land war should Russia be drawn back into the fighting. The following year saw Neomartian Secessionists make a desperate strike at Earth, appearing from hidden places below the red planet with a motley fleet that pressed on despite heavy losses from British pickets. Firing at any other vessel that appeared, the strange fleet seemed to have no other goal than arriving back on Earth. With rumors of the Dream Plague as a biological contagion (or worse), the darkest fears of Earth's empires seemed to have come to pass. Fighting several engagements over a two-week period, the last remnants of the Neomartians crashed into a cordon of artillery barges, mines, and scouts. Even given time to prepare defenses, the second battle for Earth was close fought, and

many ships and crews were lost, a significant number of them with fates unknown even now. Those that survived this engagement soldiered on until either scrapped due to age, or ultimately lost in the Icarus Event years later. It is remarkable that a craft manufactured in such numbers has no examples surviving intact, but there is a functional replica under private ownership in England. The stripped hulls of two vessels had been used as a blockhouse on the Polish frontier, but these seem to have been scrapped sometime in the 1930's.

In an example of both international cooperation and an effective combined arms operation, fortress barges operated in close cooperation with British tripods and their attached infantry to eliminate the remaining Martian strongpoints through the spring of 1917.

With a fortress barge acting as eyes and fire support for the forces on the ground, concealed heat ray emplacments and other booby traps could be eliminated with far fewer casualties and the overall pace of operations speeded up. With the breakdown in international relations later in the decade, these operations ceased and those participating in them became politically suspect, though no formal inquiry was ever made by either Britain or Russia.

Depicted here is a heavy 'Crusader' support tripod of the Suffolk 9th Infantry, with the distinctive bronze spherical cockpit that allowed these machines to operate at a greater range of pressures than unenclosed models.



'Crooked House' emblem of the Suffolk 9th Infantry (Lavenham)

Plate 36: 'Crusader' Support Tripod in markings of the Suffolk 9th Infantry, Martian Puntive Expedition, Fall 1916

WARSHIP - RUSSIAN

V-SERIES GUN CARRIER

If the great ships of the *Petropavlovsk* class could be considered the archetypal vessels of imperial Russia, the V-boat could be considered the archetype of the Russian navy post-revolution. Given the classification 'Gun Carrier' these vessels are something of an odd category without clear parallel elsewhere. Their basic character was that of light vessels fitted with short-ranged heavy weapons in fixed mounts, and they did this at the expense of protection while retaining speed and maneuverability. Their primary targets were previous generation capital ships, resulting in a reputation for poor survivability and foolhardy captains. The Russian V-Class is the most well-known and numerous class of this type, having seen extensive service with both the imperial and revolutionary Russian navies.

While Russia was known for her highly aggressive building program which saw her fielding large vessels in quantity earlier than most other nations, it was recognized after the conquest of Mars that these would be spread too thin to be an effective force. Artillery barges were constructed as a stopgap, but these were in many ways more like mobile fortresses than the far-ranging and hard-hitting force that was desired. At the time of the partition of Mars, gravity engines were precious and in very limited supply, as well as requiring constant maintenance and adjustment in the field. As cost and weight decreased and reliability improved, it became viable to put smaller and smaller craft under gravity control. Artillery barges were fitted with these new gravity engines as field expedients, but a longer-term solution was needed for small vessels with range sufficient to support the fleet. Into this vacuum emerged a newer series of smaller craft scaled to match the progressive advancements in gravity control. Using gravity engines designed along French lines with their distinctive external impellers serving to damp field fluctuations, these varied types shared distinct features that led them to be collectively known as 'V-boats'. While both of uncertain origin and not a designation used by the Imperial Space Forces, this name came into general use as a catchall for small, fast craft from later in the war. The Type 22 was both the most evolved and most numerous of these machines to see combat, fighting under many flags in the process.

Envisioned originally as scouts and screening elements for the fleet, improvements in engine and weapon systems in the early 1920's saw the V-boat put the future of the large single-role vessel itself into question. With the bulk of technical advancements in the 20th century being the result of the direct copying and adaptation of Martian technology, those fields not informed by the work of the invaders naturally lagged. Most visibly in the arena of space warfare were the deficiencies in fire control. Martians used the heat ray as their primary ranged weapon, rather than the ballistic weapons which are even now ubiquitous on Earth. As the heat ray fired instantly and in a straight line unaffected by gravity, the gunner's calculations for hitting a moving target were minimal. Adding to this, the thin atmosphere of Mars minimized beam dispersion. Because of these combined factors, Martian fighting machines had only the most rudimentary of optical sights, which were scarcely better than those fielded in 1902. While terrestrial gun laying improved rapidly in the years

Fast and deadly, the V-Boat proved more than a match for the sky monitors and dreadnoughts of the previous generation. Though easily destroyed if hit, the high closing speeds and slow traverse of the big guns of the old vessels made this more difficult than it appeared.

after the invasion, it would be decades before it was on par with the weapons they directed. In the interim, this resulted in enemy fleets needing to close to ranges of mere thousands of yards to have any hope of hitting a maneuvering vessel. As tensions resumed anew between allies, with Mars and possibly much more as a prize, few in command had any illusions about the comic dimension space combat might have. Ships might expend their entire supply of ammunition without even hitting anything unless they closed to point-blank range. The French had a possible solution with their small flame throwing ships, but these were in of themselves vulnerable. The fixed guns of earlier craft might hit large objects on known trajectories, but not a gravity craft under active control. Into this gap came the V-boat, albeit quietly at first.

War seemed inevitable to many as early as 1920, though the trappings of cooperation were still in place. Ambitions and navies grew, and the swords once raised against the sky rested fitfully. Heroes and villains here varied depending on the speaker (and the hour) but the V-boats soon seemed to be everywhere. While some served with army cooperation units before the Blue Revolution, the exile of the czarists and the wholesale disappearance of the old fleet saw these new types pushed to the fore. The Blue Russian government was hard-pressed to make good their losses via these defections, but the emergency V-boat building program was an acceleration of a decision made previously. Though mighty in their time, the great Russian fleet which first took the fight to Mars were vulnerable in the face of smaller, more lethal craft, which took full advantage of the technological treasure trove that alien world proved to be. The V-boat was one of the first of this new generation, being fully purpose built as a spacefaring design, and incorporated the improved steels that Martian mining techniques made not only possible, but cheap and abundant. Designed to fight larger vessels, their main battery was a pair of heavy guns on fixed longitudinal mounts. While initially fitted with 10-inch guns, these were later replaced with 9-inch hypervelocity guns. While seemingly a downgrade (if caliber is the only criteria), the massive increase in muzzle energy made them harder hitting and more accurate. Rate of fire was improved, though the liquid propellant used could be devilish to work with. Later versions also saw increasing numbers of light and heavy Maxim guns on remote mounts, but these only became commonplace once gravity bottle fighters were widely deployed.

It is with the open warfare of 1922 that the V-boat ascended into legend. Smarting from the loss of her fleet and still desperate to retain her claims on Mars, Russia used these newer, faster vessels to press her claims on Mars and defend them on Earth. While space here precludes going into the crisis of legitimacy post-revolutionary Russia found herself in, the support of Britain, France, and America for the czarist government-in-exile in Sweden combined with German recognition of the new government (while subsequently being in a state of undeclared war with it) left the revolutionary government with few friends. It was in this time of trial that the V-boat and their crews were put forth by the Blue Faction government as the saviors of Russia and the protectors of humanity. Part knight, part Robin Hood, and drawing on the legends of the *bogatyrs* of old, this vision of a new generation of fighting sailor, and the almost magical technologies they wielded, was not without some measure of truth.

While excellent fighting machines, much of the mystique of the V-boat comes from the synergy they enjoyed with the position Blue Russia found herself in, being either seen as illegitimate or ripe for the taking. Bereft of a more traditional fleet, the speedy new craft patrolled the surface of the Russian sector on Mars and

enforced her neutrality, and (for a time) made good her territorial claims. It was also one of the few effective means at hand to fight the undeclared conflict that was emerging between Russia and Germany. It would not be unreasonable to think of Russia post-1919 as a different nation entirely, though with many familiar names. While the changes wrought upon the nation and her fitful transition from monarchy to nominal republic have been written about extensively, they fall beyond the scope of this book except for a brief note about her new strategic position and the weapons brought to bear to defend it. Blue Russia had lost the red planet, though her flagging claims put her in a strong position diplomatically, being neutral (but not disinterested) in a conflict between two great alliances. Britain and her allies were strong but overextended, as demonstrated by the siege of Phobos station. Contrariwise, Germany and Austria-Hungary could not expect to hold territory in the face of superior numbers, but her rocket bomber program could strike at targets from hitherto unknown distances. The German advantage was evaporating, but Russian gamesmanship over the next two years would be telling.

In the face of intrusions by Germany, the Russian running of supplies to Phobos via V-boat made the blockade potentially untenable and brought both sides to the bargaining table with Russia, if not with each other. When open fighting broke out and America was drawn in, Russia cagily withdrew the bulk of her forces back to Earth. Seen as a withdrawal by some, this retrenchment gave her fleet a freer hand, though many viewed her new tactics as little more than piracy, her units interdicting foreign commerce under often questionable circumstances. The type continued in this capacity until the Neomartian breakout, which saw their decimation in the last-ditch defense of Earth. So great were the losses and so worn out were the remaining V-boats, that none remained of this once numerous and iconic vessel to be lost in the Icarus Event. There are no known surviving examples, though derelict hulls are rumored to be among the materiel at the abandoned base at Archangelsk.

WARSHIP - NEOMARTIAN SECESSION

SZENT KATALIN DREADNOUGHT

A strange and frightening coda to the Russian experience on Mars, the so-called Neomartian Succession, consisted of the forces upon Mars who remained loyal to Czarina Anastasiya and what vessels and equipment they had with them. Isolated and mutually acrimonious, these forces held onto the Russian sector of the newly partitioned planet until ultimately melting away to places deep underground in the face of German skirmishes. What they found there has been seen by few outsiders, and much is still guesswork and conjecture. While the discovery of underground cities and factories, and the wonders they held, are well known, the mysteries of Mars deepened with each new expedition. In secret places they found the chambers that came to be known as the 'library tombs' that were both burial places for the rulers of an ancient species, as well as an embodiment of much of their knowledge. This species would later be known as the Grey Martians, of which the Red Martians seemed to be descended. Merging architecture, commemoration, and recorded knowledge these miniature labyrinths were lined with stacks of texts on stamped copper sheets. Bound with gold, these trapezoidal books recounted knowledge unknown to the living for 30,000 years, and told of creatures that moved through time as one might move through space. While certain elements of the Martian language had been translated, what was found here was something else again. Only through hard work and genius did Mars find its Champollion, when Cunningham and Braski made their famous discovery that the written language of the Grey Martians meant different things in different places, and at different times. Only by carrying a text through the labyrinth and reading it in relation to the changing context of the chambers the reader passed through were the secrets of Mars made plain. It was far below even this strange faerie kingdom that the exiled czarist Russians found themselves, subsisting on strange crops such as still grew on the subterranean farms, and living among the dust of Mars, forgotten and forsaken. It was in these hidden places that they were said to have contacted some remnant of the intelligence which lingered from that ancient species and compelled these lost sailors to fulfill the designs of Mars. Hidden below the dark they prayed, and they plotted their revenge. This was not an unknown phenomenon elsewhere on Mars, nor even on Earth. Called the 'Dream Plague', this would come to been seen as the most dramatic manifestation of a madness which seemed to grip those with prolonged contact with Martian works or artifacts. One of the eerie characteristics of the affliction was the gradual recovery of the knowledge of the Grey Martians via hallucinations and automatic writing. What started as a neurosis became a cult, then a mass panic, and finally evidence that a long dead race was reasserting itself through unknown means.

When the Neomartian forces emerged from their long preparations underground, they were unnoticed at first, having been forgotten in the wider conflict between the empires of Earth. The exiles captured the abandoned dockyards at Mons Daktylus, and with these facilities dozens of incomplete hulls and abundant raw materials. Among these were the HMS *Phobos*, a cruiser which was fitting out at the beginning of the German blockade and

Seen here in her first and final battle, the* Szent Katalin *(ex-HMS* Phobos*) was the apparent flagship of the Neomartian fleet. Assembled from derelict and castoff components, the Neomartian ships displayed unexpect resilience and fighting prowess. Though no prizes were taken intact, some wrecks showed signs of incorporating unknown alien technology into their operations.

subsequently scuttled. This was hurriedly repaired by the Russians with the aid of Martian construction machines and mated with another destroyer hull on the ways there, much after the manner of the original *Boris Godunov*. Thus combined, the lower one served to house a 200 cm orbital defense cannon salvaged from the ruins. The gravity drive was aligned in such a manner as to absorb the recoil with the power of the drive itself, though the hull would likely buckle and deform after a shot or two. Festooned with this and a variety of other salvaged weapons, this strange hybrid was painted with the name *Szent Katalin*, and adorned with the image of this and other orthodox saints. This improvised dreadnought was to serve as a flagship for the Neomartians, and as an ark of some terrible secret they sought to return to Earth. Indeed, from the very start of the operation the Neomartian tactics were neither those of a force that sought refuge with a friendly power nor those of one that sought a decisive engagement with the enemy. From the first signs of the exiles' flight towards the home of humanity came both strange radio signals and no answer to hails save for shellfire. This vagrant fleet jammed all radio frequencies with buzzing sounds, which would occasionally lapse into voices singing in a highly distorted manner. To listen too long to this noise would invite disorientation and nausea, as well as auditory hallucinations of hidden exhortations and warnings in the signal. Nightmares were frequently reported as well, with the motif of a glass city being central.

Their radios jammed, those few British vessels standing picket duty were overwhelmed and destroyed, as both allies and enemies further away sought to understand what was happening. Spotted by a German scout, the trajectory and identity of the force was transmitted in the clear and what was later termed by scholars a 'divine invasion' sailed on as something bodiless and immortal reached out again for Earth. Later intercepted by an Anglo-French task force, the true extent of the secessionist preparations became evident as the task force faced a flotilla of more than fifty vessels. These were largely derelicts that had been made to fly via unknown means, and were of every size and shape.

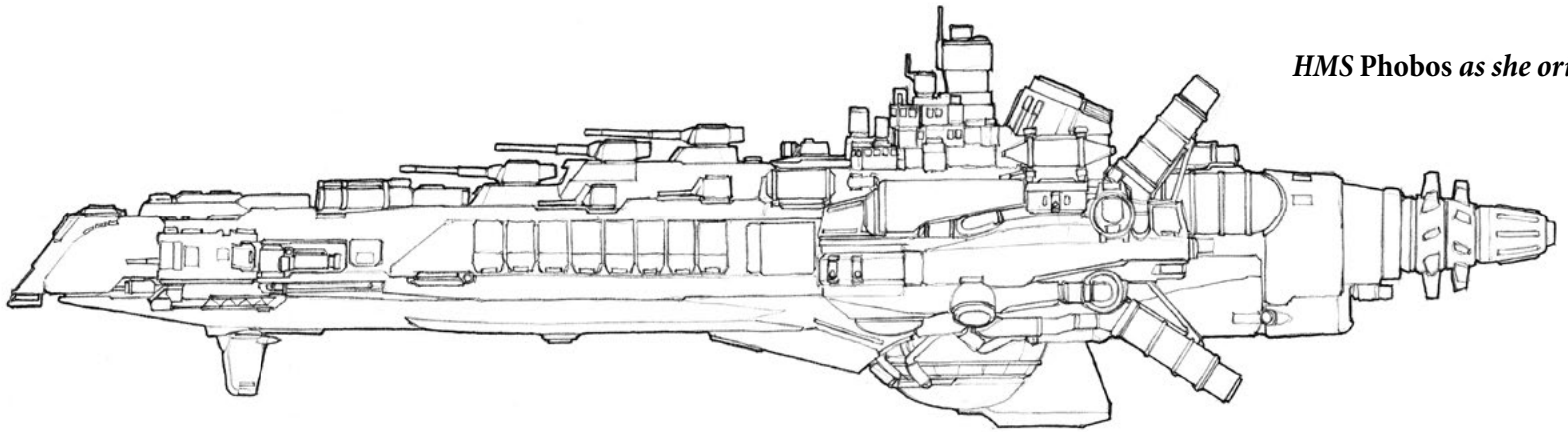
At the center of this ragged fleet flew the *Szent Katalin*, seemingly as a flagship or van for this implacable and deadly force. Communications and control were exerted via unknown means, but the position of this great ship at the center of the fleet made it of obvious importance and therefore a prime target. The Anglo-French task force was forced to withdraw after taking substantial losses, including the support vessel HMS *Polyphemus*. A victim of a ramming attack by a Neomartian vessel, the destruction of the fuel and other supplies it carried prevented pursuit and further engagements by the task force, necessitated the scavenging of fuel and reactant mass from damaged vessels after the battle. Neomartian losses were also heavy, and in the brief time available to examine disabled examples of these strange ships more mysteries came to light, foremost of which was the appearance that the hull interiors were lined with a strange substance that appeared to be some sort of woody vegetable matter. Dead Neomartians exhibited an appearance resembling hypoxia, but no thorough medical examination was possible at the time. Due to contamination concerns, the Neomartian hulks were scuttled with their dead interred onboard. No survivors were found, although the impulse to take prisoners had been weak at best.

Ultimately, the ex-*Phobos* was destroyed with the remainder of the Neomartian fleet within sight of Earth as the powers there once again found common cause against an alien foe. The flagship herself was only defeated once the bulk of the smaller craft were either destroyed by

gunfire or sacrificed themselves in ramming attacks against Earth vessels. The flagship kept firing, even as sections of her hull glowed red hot and her antennae and icons burned away. Even in death she was a terrible opponent. Locked in close combat, her main battery suffered a breech failure which in turn detonated her magazine. Several of her attackers suffered serious damage from this explosion, with the *Charles Martel* being nearly cut in two by the barrel of the *Szent Katalin*'s main battery, with this assembly having been blown clear of its mounting by the failure of the gun breech upon firing. The *Martel* was subsequently abandoned and scuttled, with the surviving warships taking off her crew.

Thus defeated, the Neomartians left behind little but debris and questions. With no intact prizes, there were few sources of intelligence about the motives and even full identity of their foes. While they were human and likely drawn from the numbers of the Russian exiles, there was reason to suspect other forces were at work as well. Analysis of photographs and film footage taken during the battle reveals a variety of craft not flying by any known principle, nor seemingly spaceworthy in even a basic sense. Hull breaches revealed glimpses of strange structures, with irregular branching longitudinal members that resembled tree roots. While fantastic to speculate that the Neomartian craft had living components, this hypothesis found some support when French vessels that had suffered damage from the detonation of the *Szent Katalin* were found to have fragments of vegetable matter embedded in their hulls. While charred and dead, these fragments displayed remarkable properties upon testing. Flexible, yet displaying a tensile strength that compared favorably to steel, this material was found under the microscope to have a cellular structure resembling that of the red weed which accompanied the initial Martian invasion.

Of the *Szent Katalin* herself there remained nothing but fragments, but even these were searched for during such remaining time as the Peace of Trieste might allow. Many of these fragments fell on Earth, their fiery plunges burning away what secrets they might have carried with them. The surviving fleets of Earth were greeted as heroes by their respective homelands, but suspicions grew as the extent of the threat posed by the Dream Plague grew. The home of humanity, once having been saved by the power of unseen life, was now in turn threatened by it.



HMS* Phobos *as she originally appeared in 1922.

NEOMARTIAN HULK FLEET

Eclipsed only by the appearance of the so-called Nemesis and the general apocalypse of the Icarus Event which followed, the breakout of the Neomartian forces from their hiding places on Mars and their subsequent drive on Earth was one of the most significant events of the period. Crewed and captained by czarist exiles, these craft were refitted in secret for what appeared to nothing besides the mad dash they participated in, their real goal remains obscure. If their crews sought refuge on Earth, why did they not respond to simple hails or seek safety with one of the myriad opponents and competitors of Blue Russia? Perhaps simpleminded and bloodthirsty revenge was their only goal, but circumstances suggest the desire to transport something to Earth that could not be brought there in either peace, nor with subterfuge. This cargo has been speculated to be some artifact of the Grey Martians, or perhaps a plague or other malign form of life. The destruction of the Neomartian flagship and the death of her entire crew has made their secret impenetrable.

While many of the Neomartian vessels had their origins as derelict or incomplete vessels (the bulk of these coming from the abandoned shipyard at Mons Dactylus) they were refitted in strange ways and often propelled via wholly unknown means. The origin of the base vessels themselves was often in question, and the totality of the destruction the Neomartian fleet met with on their attempt to reach Earth left few clues, but many questions. Their surprise breakout overwhelmed the pickets that were on station near the Russian sector, and those craft in the path of the Neomartians did not survive the experience. Those further away saw nothing, as radio jamming prevented the timely arrival of reinforcements. When battle was joined with the task force that intercepted them en route to Earth, the Anglo-French fleet beheld a strange sight: Ships of every size and description opposed them. Some were incomplete hulks, their bare metal scoured by Martian dust. There were many that were scarcely more than wrecks, including those that matched the description of vessels that had disappeared during the initial conquest of Mars and the partitioning of that world which followed. All had been crudely refitted and were now festooned with salvaged weapons and improvised antennae. Their hulls were painted with images of saints and also bore their names in Cyrillic. Strangest still was the other equipment and fittings they bore, things that must have been gravity engines or related machinery but were of heretofore unseen configurations. Through rents in rusted hulls and beneath salvaged plating the secrets of Mars pulsed with vengeful life.

With their crews silent and unseen, the Neomartians charged the forces of Earth, receiving their first losses from the heavy-caliber gunfire of the British monitors and assorted rocket torpedoes of their escorts. This 'zombie fleet' as it later came to be called returned fire as they closed the distance, though their accuracy was poor. At closer range the volume of fire characteristic of vessels of the period became evident, and no fewer than six Neomartian vessels were crippled or on fire within minutes. It was only at this point did the desperate intentions of the Neomartians begin to be evident, as the burning vessels took no steps to quench their fires or their crews to save themselves- rather they resorted to

Though based on the wrecks or incomplete hulls of other known vessels, the hulks of the Neomartian fleet were so varied in configuration and contained so many pieces of unidentified equipment that to classify them into recognizable roles is impossible.

ramming the enemy with as much speed as they could muster. Those that could not move destroyed themselves by overloading their gravity engines, their implosion visible from a distance as a brief ripple in the starlight followed by a corresponding explosion that seriously damaged nearby vessels.

Acting quickly, the Anglo-French commanders withdrew the bulk of their fleet to such range that their superior accuracy might destroy the Neomartians, while smaller craft with rockets and light guns screened them. Further Neomartian losses resulted, and their disabled vessels were fired upon until visibly breaking up. It was in this interval that a new disaster struck, as three unnamed Neomartian craft doubled back away from the action towards the support vessels that invariably followed the large fleets of Earth. While scarcely larger that patrol craft, these ships inflicted much damage before being destroyed by the escorts assigned to the support fleet. The greatest casualty was the HMS *Polyphemus*, a wet-tankage freighter carrying the substantial amounts of water and reaction mass needed for the gravity engines of the fleet. Her destruction by ramming made pursuit of the Neomartians untenable, and the surviving Anglo-French units were forced to scavenge these supplies from disabled vessels in order to return to Earth. Those craft left behind were fitted with radio beacons and subsequently recovered.

It was during this chaotic interval after the battle that the strangeness of the Neomartian designs became plain. Vessels had gaps in their hulls and often lacked visible systems for life support and fire control, though it was speculated that these were part of the strange (presumably Martian) equipment which made their silhouettes so distinct. The Neomartian casualties had a peculiar bluish cast to them, suggesting cyanosis but not conforming fully to those symptoms. No Neomartian was captured alive, nor any of their vessels captured in such a state that they might be towed to Earth as prizes or specimens for study.

Their numbers reduced by a third, the Neomartian fleet was wiped out three days later in what would be known as the Battle of Luna, though the name denotes its distance from Earth rather than the involvement of that celestial body. There at last, the Neomartians were stopped at a great cost. In perhaps the last great act of unity before Icarus descended, the empires of Earth fielded whatever vessels they could muster to stop these strange interlopers from reaching our world. No words had been exchanged with the czarists since their disappearance years before, and no declarations or threats had been made. The ragged machines now bearing down on Earth offered no sign or signal of their intentions but gunfire and the insectile buzzing of their radios. While assumed to be mechanical in origin, wire recordings made of the Neomartian jamming signals suggest that the sounds were made by a living organism. Whether or not these in turn were recordings is a mystery that died with the transmissions and the vessels that were their origin.

Better prepared for Neomartian tactics, the combined might of Earth defended itself and its home effectively, though the battle was a close fought affair. Such was the closing speed of the approaching fleet that interception was made difficult to the point of only being possible via the deployment of anything that could fly. Casualties were resultantly heavy, though the defending forces were now aware of the Neomartian penchant for ramming and worked up countermeasures to prevent the enemy from closing. This was accomplished via irregular movements and the use of towed mines. As fast as they were, the strange craft fielded by the exiles lost much of their speed when forced to maneuver. They could then be engaged large-

ly like any other opponent, though their (likely intentional) penchant for detonation still caused substantial losses.

The battle won, the forces of Earth resumed the suspicious quiet that was the Peace of Trieste. What fragments of the Neomartian ships that could be recovered offered clues, but no answers of substance. Many of the wrecks contained what seemed to be vegetable matter of great tensile strength, and it was conjectured that some sort of living organism acted as a structural framework for the decrepit hulls. Some of the recovered equipment was obviously alien in nature, but all was smashed and inoperative. Of their crews, few of the dead were recovered and seemed ordinary enough upon a post mortem, though fire and hard vacuum could conceal much. Victory was tinged with mourning, as the fate of the czarists was at last known. Seen as traitors to the new Russian government, and as martyrs to some, Earth brooded and bided her time until open war resumed a year later. Everywhere the 'sickness of Mars' manifested as a dual dread of that planets secret and ancient malice, and the burden borne by the Earth as it approached a quarter century of war. In his diary, Marshall Kartowski of Russia reflected on the age with a tenderness unknown to the public image of the so-called 'man of stone' of Blue Russia:

'I knew some them before the war, and before the revolution. I have my duty, and I will carry it out. I cannot say that the traitors were not brave, no matter what else could be said of them. Lost and damned, what ghosts whispered in their ears in the dark? How long until the light faded and home and family became not comforts but holes that the soul gnaws in itself? The say they were possessed— delusional recidivists in thrall to the ghosts that were the sole inhabitants that remained on that damned desert planet. In a way, I hope that this is true, and that those brave and misguided officers died long ago, with only their bodies left behind for the Grey Martian ghosts. It would be a mercy, both to them and perhaps to myself.'

While no Secessionist vessels were recovered, such was the scale and violence of the battle that wrecks and clouds of fragments fall to Earth even now, as spectacular meteor falls. While the bulk are debris from the vessels of the defenders, Neomartian remains are still in evidence, and any recovered artifacts should be treated with great caution. Where practical, authorities should be informed upon possible discovery of alien technology for safety reasons.

In 1929 a visitor known only as Nemesis appeared and destroyed the British Home Fleet in an unprovoked attack. Subsequently, all gravity engines throughout human space failed in the general disaster that came to be known as the Icarus Event.

APPENDIX – NEMESIS AND ICARUS

While not truly part of the Martian conflict, no history of the events of the early 20th century could be considered complete without brief mention of the vessel (if indeed that's what it was) known only as 'Nemesis', and the events that proceeded from its appearance. First sighted by an American carrier near Neptune, the strange and highly advanced intruder initially dubbed 'The Shadow' by the crew of the USS *Porter* flew at speeds impossible for the American fighters to match. A month later, the strange machine appeared above Earth and wiped out the British Home Fleet in an unprovoked attack. While initially thought to be the work of a German secret weapon, frantic diplomatic cables after the event showed Germany as ignorant as to the source of the attacks as her enemies. Fearing a repeat of the Neomartian attempt to reach Earth, a ceasefire was agreed upon, and the somewhat ragged space navies of our world formed a cordon around Mars and the new enemy was searched for. Progress had barely begun on this matter before a greater catastrophe occurred. Some two weeks after the attack, all known gravity engines malfunctioned and died within the space of a single day.

At a stroke, almost all the spacecraft of Earth were wiped out and their crews lost, barring those saved via strange and sometimes cruel providence. The stars were haunted by a new threat, and humanity looked once more to the skies in fear. Not only did all existing gravity engines cease to function, but the basic laws of physics seemed to have changed such that gravity control machinery no longer functioned anywhere. Humanity could no longer fly through space, leaving outposts on Mars and elsewhere holding out for weeks or months until their supplies ran out, and they then succumbed to either death or the mysteries below. While not a larder, Earth was now a prison.

Their differences set aside once again, the empires of Earth watched and waited, scheming in secret to understand what had happened. Their scientists experimented at length to unlock the relationship between time and space, and in the process found new ways to traverse both. For three years Nemesis was the sole force in the void beyond our world, moving as a threat which was more felt than seen. Surface fleets and troop concentrations were subject to attack, with special care taken by Nemesis to destroy shipbuilding and manufacturing facilities across the globe. The space age was murdered in its crib, and the industry to support the burgeoning population was destroyed piecemeal. To either cull or gloat, its motivations were unknown. For three long years the shadow reigned, dropping death and ruin from the skies without warning. In time the means by which this new invader had disabled all gravity engines came to be understood and new solutions found. Then, as the veil was pulled back on the nature of the problem, this new invader was challenged and finally destroyed by the fleet of a unified Earth. It was a force built in secret and operated on different basic principles of locomotion. The yoke lifted, the questions multiplied faster than they could seemingly be asked— What was this enemy? Were there more, and what other dangers hid in the darkness between the stars? Theories abounded, including that Nemesis was a human ship from the future, coming back across time to provoke our world into the preparations necessary to face a threat still unknown to us. Other explanations were offered, but in death Nemesis was as silent and implacable as it had been in life. While the events transpiring since have neither confirmed nor refuted any of the theories offered about this intruder, victory yielded respite and new hope. Questions as to the origin of this scourge and the meaning of our encounter with it marks the turning of the age and the opening of the cosmos to new possibilities for humanity.

All across the Earth, sights like this greeted the oberserver as the Icarus Effect caused all gravity engines to cease functioning. Spacecraft died in the void, and flying cars dropped from the sky. Nemesis prowled the skies jealously, destroying ships and factories unopposed. Those gravity vessels left unscathed were nevertheless immobile and powerless until such time as the secret of the effect was discovered, and Nemesis challenged and ultimately destroyed.

EPILOGUE

MARS AND BEYOND

The war was over, and humanity had lost.

While both a truism and fundamentally incorrect, these words were a common sentiment among the peoples of Earth in the early 1930's. Within a single lifetime, the species had seen all its great works laid low by powers it did not expect existed, let alone had looked upon the planet with covetous eyes. This happened not once, but twice, with the added danger of the Dream Plague, that strange disease which suggested an invasion of the present by the disembodied and alien minds of the distant past. In the end however, it was an era of 'almost'. Almost defeated, almost enslaved, almost exterminated. Almost. Almost. The word would take place alongside the 'if' of Sparta as a rejoinder and emblem of the age. The cage was not strong enough, nor the noose tight enough.

Though their impending demise was widely reported, nations and empires did not fade into irrelevance with the victory over Nemesis, but the time which followed was one that involved a certain degree of reflection. This was unavoidable under the circumstances as the industrial base of most major cities was devastated, and if not for the manufacturing and farming technology of Mars famine would have been widespread in the winter of 1933-34. After an interval of some few years the world was once again rebuilt and looked out across the stars with something other than fear. The dead were buried and the living considered their future and their place in the universe.

The years that followed have been treated elsewhere, where space is more abundant. Nations rose and fell, and the path to the stars proved long, and with many strange side journeys. As memories faded and the veterans of the invasion and the long wars that followed met the fate of all flesh, the threat of Mars becomes distant and almost quaint. The delvings below the surface are the province of scholars and antiquarians following threads through eternity and still seeking the origins of the Grey Martians. Gone is the immediate threat and the plundering of that dead world which followed. It is characteristic to moralize on such things, if only to sort events into some kind of order should they prove of later use. Mars, with its titanic struggles long over, presents the ideal confusion of accounts for the reader to impose any conclusion on that they might wish. Monarchist and revolutionary are equally comforted by heroes that may no longer speak for themselves, and are thus the most steadfast of allies.

This disclaimer given, it may be possible to imagine life in another time. To gaze upon the relics of early spaceflight is a luxury that might be indulged in the peace of the present moment. There are yet living a few who still remember life before the Martians, though they would have been very young then, and not at all young now. If this book has led its readers to perhaps imagine or speculate about life and death in another age it has accomplished the goal of its author. Though vanished irrevocably, those times must have seemed just as uncertain to its denizens as the present age seems to those who must abide it now. Similar and yet different, with flight accomplished by bolting alien engines to ill-suited hulls in defense of a lonely blue world. Time was still thought of as fixed, and humanity dwelt in the light of one sun.

Here, in this latest age of uncertainty we are left with an illusory sense of clarity about the Martian invasion and the all-too-human war which followed. Heroes and villains present themselves ready for whatever fable they are to be contorted to fit, or, if one is feeling generous, one may speak of 'human nature' as the cause of all troubles if the specifics of history prove

tiresome in conversation. Whatever needs we may fulfill in our survey of the past, the sense of its vastness is still inescapable. Like the shore of a great sea, the sands stretch out in the distance ahead and behind as we make our way, with each grain being a life as real and vital as our own. Unique and yet broadly similar, the grains are shaped by the sea and shape it in turn. To speak of the vessels and engines, the weapons and factories by which old battles were fought, is not to deny those lives lived (and lost) among them. By literary convention, a blank space has been left where the reader might imagine themselves in a previous age.

With an open seat at the table of history on offer, perhaps the reader might find themselves in conversation with voices long since silenced, now given new life. To speak of events in one tongue or another, and on this world or someplace far more distant. To see those first crude vessels with their iron hulls and black powder weapons take to the void carrying their cargos of hope and trepidation to an alien and hostile world. To live and to die with these first sailors among the stars, and perhaps experience some sympathy with the hopes and dreams of a vanished age.

From here, the journey leads humanity to the light of new suns, with strange and beautiful worlds emerging into our view. The stars themselves are as numerous as grains of sand on a beach, and countless are the mysteries of the universe we share with those stars.

If this book has done anything, may it be to convey some sense of a past not long gone in time, but very distant in experience. While the Martians failed to conquer, Mars suceeded in replacing the old world with the new, and compelling humanity to explore beyond its own birthplace. Some spirit will always seek the new, but carry the old with it, and this book seeks to record some fraction of the human legacy, if a slight one. Born these days are some children who have never set foot on Earth, and know of it only as the ancestral home of their parents or grandparents. New worlds bridge the past to the distant future, with the peace of the present a stop along the way. To speak of a 'crossroads' is cant, and the human experience might be better likened to the traffic on a river, with its myriad tributaries and destinations. Upstream and down, the river conveys us all to our destinations even as it itself flows down and past that sandy shore to a cosmic sea.

-Col. William J. Flogg, RN Ret.

FURTHER RESOURCES

While not intending to adhere to the rigor expected of a scholarly work, this book has been an honest (if incomplete) attempt to document the space vessels involved in the conflicts of the period. As such, it's documentation of other aspects of the conflict has been cursory at best. For those interested in reading more about the conquest of Mars and the conflicts which later sprang from this campaign, there are a number of excellent works, some of which have been mentioned in the text of the work before you now.

Interested laymen could do worse than to start with Ostrowski's *Mars: Conqueror and Conquered*, but that is by no means the only worthy book on the subject. Traci-Bocage's *Mémoires du Futur* (Translated as *King of Mars* by Falconer House) is an excellent treatment of the period from the French perspective and has substantial value as literature as well. In many cases, the very abundance of books on the subject can cause problems for interested readers. Dominic Rossignol's *Origins of the Fall* covers some of the same material, but is of a more peculiar and literary bent. His chapter concerning the extent of secret treaties and their role in the downfall of the League of Earth is an effort which well rewards any study made of it. Varying political circumstances have shaped much of what has been published on subsequent events, but the scholarship concerning Mars is largely intact. For a microcosm of the British spaceflight development program, Banistre Key's book *The Weight of Ice* does give a good insight into both British efforts, as well as offer a more general examination of the mood of the time among the engineering and scientific establishment.

For reasons of both language and politics, firsthand accounts of Russian and German efforts are more difficult to find in English, though this situation has improved in some ways in more recent times. While not particularly in depth, the entries on subjects related to these two nations in Whitehead's *Encyclopedia of Spaceflight* do cite a number of other worthwhile sources in a piecemeal manner. As always, it is important to consider both author and audience for such works and entries, when compared across editions, will show very different perspectives on the events.

For younger readers, there is no shortage of adventure and pictorial works concerning the events of the time. If one if pursuing accuracy and historical detail in addition to adventure, S. Tom Darnell's *Star Ace* series is highly recommended. Likewise the old serials put out by Eagle Pictures utilize much period footage of interest and have been reissued as home recordings.

This list is by no means comprehensive, and should not be seen as a slight to those sources not mentioned. The upheavals of war and the events which follow are such that resources once thought lost are being unearthed and republished, and new ones created. Time and space are always in motion, and it may be that the great history of the era remains yet to be written by hands unknown or as yet unborn. It is the sincere hope of this author that his own work might be remembered for providing some small inspiration for the greater works which will follow.

OTHER BOOKS IN THIS SERIES

Mysteries of Mars

Space Battles of the First World War

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