

STRATEGY GUIDE

BY PAWEŁ GARYCKI & GEOFF SPEARE

3H1. The Glory Rush

In the antebellum phase, don't make the mistake of waiting until you have the "perfect" combination of thruster, robonaut, and refinery. A player who departs early can collect multiple glory chits and return them to LEO.¹

- a. **Fundraise Operation** becomes invaluable in Module 3 to prepare for War. If you grab an early lead in glory, set the Active Law into honor. The Law here is Paleoconservative Directive

¹ GLORY is the old way of to invoke national pride to justify investment in space. Think Apollo program. The new justification is Exoglobalization. They don't "tell stories" or "make research" in space, exoglobalists just use the space for their daily activities. Loyalists like "stories", they like space mysticism, they like doing the impossible. Secessionists regard this as sentimentalism and just do possible things, proving the "glories" and other stories are things of old. This is similar to Christianity conversion mechanism in the boardgame *Greenland*. Polytheists collect those trophies (glories) for many VP and Monotheists just ditch them and do the mining (Exoglobalization). —Paweł Garycki, 2020

(Fundraise income = 1 Aqua per glory chit), which increases the motivation for political intervention for those with glory, and removing it for those without it. With each fundraise, you entrench this Law.

- b. **Parallel Strategies.** The pursuit of glory does not consume Operations other than refueling. After a glory mission is underway, you can participate in auctions and prepare industrialization missions. If a robonaut is sent as well, sites can be claimed at the same time (though watch out for Claim Jumpers!).
- c. **Solar Sails & Non-Crew Dirt Rockets** are useful glory-seekers, as they either do not need fuel or can refuel at any Site with just Crew. An active Mooncable or Dharma Refuel faction privilege is also useful to sustain a glory rush.
- d. **One-Way Martian Glory.** If in a super hurry to snatch martian glory before your opponent, just 3 tanks of water will get a Crew with a fuel consumption of 8 or 9 to deimos in 2 Turns, without needing a single boost or auction. It's a one-way trip, though.

- e. Propaganda & Diplomacy.** If you are Independence, the outbreak of War/Anarchy will kill your delegates in honor (unless you corrupt them, and you can only corrupt one per Turn). To avoid the ruination of your political dominance, you will need to use *diplomacy* (3B3b) to sway honor into the independence bloc.
- f. Footprints & A Flag.** Unless using the *Quick Start Variant* (V1), winning the glory race is the easiest way to grab points and paleoconservatism is the best way for your long-range plans to be uninterrupted by War, or to win the War. But don't forget that glory can be stolen from you if you lose a battle (3D9b).

GEOFF'S TIP: Pursuing M patents and Sites is a traditional strategy, but this edition weakens that, to the point where D may be the new M! Possible D targets are at Deimos, Hygeia Family, and the Jovian Trojans (greek camp). Further out are the moons of Uranus. [3H]

3H2. Faction War Readiness

a. Player White (honor)

- + Marine attack/defense.
- + Can negotiate or enable negotiation at any time (with Home Bernal).
- + Starts Loyalist so doesn't need to petition authority for its Home Bernal.
- + Delegates never become corrupt (with Home Bernal).
- (NASA) Restricted faction privilege due to ban on boost (use Space Elevator or Lofstrom Loop Bernals to evade this).
- + (ISRO) Dual platforms including a raygun.

+ (ISRO) Good at ET Home Bernal at refueling precious isotope fuel, acting as a new currency.

b. Player Yellow (unity)

- + Biological warhead attack/defense means that even Sails can be used as kamikazes against Factories.
- + Starts Loyalist so doesn't need to petition authority for its Home Bernal.
- + (UN) Dual platforms.
- + (B612) Dual platforms, including a raygun.
- (B612) Lower rad-hardness of Crew.

c. Player Purple (authority)

- + Antimatter bombs ranged attack/defense.
- + May do war crimes, including a powerful Human kamikaze.
- + Controls the Home Bernal Anchorages of Independent players.
- (China) Obsoleted faction privilege as Felonies become legal.
- + (ROSCOSMOS) Increased rad-hardness of Crew.
- + (ROSCOSMOS) Dual platforms including a raygun.

d. Player Green (equality)

- + Fighting mirror ranged attack/defense.
- + Starts Independent so enabling an ET Home Bernal.
- (Anonymous) Dual platforms.
- (Anonymous) Open Source FINAO faction privilege is limited by Wartime restrictions on FINAO.

e. Player Gray (individuality)

- + Beamed gray goo ranged attack/defense.
- + Starts Independent so enabling an ET Home Bernal.
- (SpaceX) Obsoleted faction privilege due to War/Anarchy restrictions on auctions.

- + (Norse) Dual platforms.
- + (Norse) Scrum Troubleshooters faction privilege beneficial for post-combat Glitch repair.
- (Norse) Lower rad-hardness of Crew.

f. Player Red (freedom)

- + Jammers guarantee being the first to attack.
- + [Starts Independent so enabling an ET Home Bernal](#).
- + (Shimizu) Dual platforms, including a raygun.
- (Shimizu) Skunkworks faction privilege becomes obsolete due to Wartime restrictions on Auctions.
- (Shimizu) Lower rad-hardness of Crew.
- + [\(NASDRA\) More easily fueling their second Bernal due to Mooncables, useful in exiting the Earth ☉ Zone.](#)

3H3. Playing Hardball with Dropstones

Industrializing a dropstone location that matches the Spectral Type of key cards you hold gives a potent military advantage. But this won't be a surprise attack.² Here is a list of dropstone military bases and products:

2 NOWHERE TO HIDE. *"I know this is going to start all you submarine lovers and cloaking device fans foaming at the mouth, but there ain't no stealth in space. The exhaust or waste heat from a terawatt starship could be detected from Alpha Centauri by a primitive passive sensor. The Space Shuttle's much weaker main engines could be detected past the orbit of Pluto. The Space Shuttle's maneuvering thrusters could be seen as far as the asteroid belt. And even a puny ship using ion drive thrusting at a measly milli-gee could be spotted at one astronomical unit. As of 2013, the Voyager 1 space probe is about 18 billion kilometers away from Terra and its radio signal is a pathetic 20 watts (or about as dim as the light bulb in your refrigerator). But as faint as it is, the Green Bank telescope can pick it out from the background noise in one second flat. Even the waste heat from life-support is readily detectable."* — Winchell Chung, [Atomic Rockets/Project Rho Website](#), 2013.



a. Spectral Type D.

- Many **Synodic Comets**.
- **Asbolus & Pholus** are Centaurs³ that can bombard all Zones except Neptune and are rather easy to prospect.
- **Methone** of Saturn has a bizarrely smooth surface like an egg, which might indicate that it harbors a CUDO,⁴ the ultimate dropstone. Submarine Factories and Colonies here are immune to counterstrike.
- (iceberg) With a Colony here, produce & promote the Neumann Matter Robot, and send it on a ride.
- (iceberg) Crossfire Focus H-B Fusion (requires a colony) TW Thruster + Diamonoid Tether generator.
- Helical Railgun robonaut with Diamonoid Electrodynamic Tether generator (this is the only option for three of Saturn's **Norse moonlets**).⁵
- (iceberg) H-B Cat Inertial Robonaut + Diamonoid Electrodynamic Tether generator.

3 CENTAURS. As suggested by the half-man, half-horse beasts they are named for, these worlds behave sometimes like comets (outbursts and comas) and sometimes like asteroids. They have eccentric orbits that are unstable since they cross one or more giant planets. As hinted by luminosity measurements, centaurs can be classified into two colors: very red and blue. Nobody knows why. The water signature on the Centaur Chiron disappeared after high activity. Nobody knows why this would be either. Centaurs labeled on the map include comet schwassmann-wachmann 1 (♃ 9:00), chiron (♃ 12:00), elatus (♃ 1:00), echeclus (♃ 10:30), okyrhoe & pholus (♃ 11:00), chariklo (♃ 9:00), and asbolus & hylonome (♃ 10:00).

4 CUDO stands for compact ultra dense object. These hypothetical objects with nuclear density or greater are theorized to reside in the cores of some comets and moons, which would explain some mysteries in understanding cometary impacts.

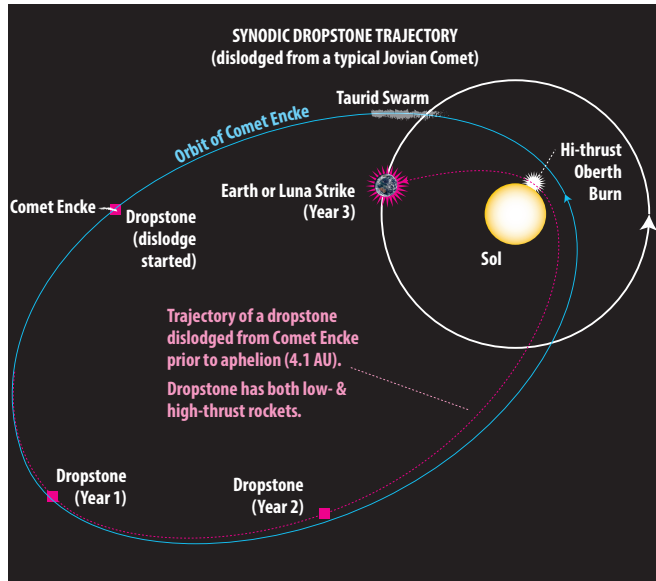
5 NORSE GROUP is a diverse group of retrograde irregular moonlets of Saturn.

- (iceberg) Colliding Beam H-B Fusion thruster + one of a couple of **D** generators/reactors.
- Ablative Laser robonaut is a winner.⁶

b. Spectral Type S.

- **Sycorax** in the Uranus system.

6 D-SITE. As their name suggests, nothing is known about **D**-sites other than they are dark (**D** = "dark"). They are supposed to be leftovers from the formation of the solar system, but this may be overturned when the Lucy spacecraft arrives in the Jovian Trojans (scheduled 2027).



- **Skoll** in the Saturnian system (needs dirt thruster).
- **Synodic Comet Icarus.**
- (iceberg) Amat-catalyzed Fission-Fusion + Free Radical Hydrogen Trap reactor.
- (iceberg) Saltwater Zubrin GW thruster.
- (dirt) Wakefield e-beam + Z-pinch μ fission generator.
- (iceberg) D-D Inertial Fusion robonaut.
- (iceberg) Timberwind + Free Radical Hydrogen Trap or VCR Light Bulb Fission reactors.

c. Spectral Type V.

- **Setebos & Prospero** in the Uranus system.
- **Synodic Comet Encke**
- MagBeam robonaut.
- Ablative Nozzle with H-⁶Li Fusor or Fission-augmented D-T Inertial Fusion.
- Pulsed Plasmoid thruster.

d. Other Spectral Types.

- **Himalia Jovian Moonlets**⁷ do not offer a complete set of patents because there is no thruster for **C** Spectral Type that has a base thrust of 3 or more.
- **Spectral Type H**, which are some random Synodic Comets, do not provide the necessary supports.

e. Broaden your Baseball Field.

- The Mini-Black Hole Future which opens up endless possibilities, including in the Neptune Zone (e.g. **arrokoth**).

7 HIMALIA GROUP is a group of prograde irregular moonlets of Jupiter that follow similar orbits to Himalia and seem to have a common origin.

3H4. Military Bernals: A Guide to Death Stars.

a. Bernals share certain capacities during War/Anarchy:

- **If Independent**, you might be able to establish an ET Home Bernal.
- **Gun & Kamikaze** may easily unanchor it; a buggy might unanchor it.
- **Raygun, Fighting Mirror, & especially Dropstones** may destroy as well as unanchor a Bernal, especially the ones with low rad-hardness. An attacker may be deterred by the penalties for genocide.
- **Amat Bomb Ranged Attack** is possible if you have the amat bomb faction weapon (e.g. Player Purple).
- **Damage of its Dirtside** may harm orbital production and refueling and lowers dirtside hydration VPs.
- **Repair.** If a Bernal gets unanchored, providing it with a generator and dirt allows it to move and/or re-anchor.

b. Antimatter Factory (2B4a).

- **Ranged Attacks** with both amat bombs and gun (rad-hardness = 9, rad-hardness = 10 as Lab).
- **Supports Provided** for Cat-Fusion Z-Pinch Torch Robonaut for a buggy attack, Ablative Nozzle for a gun attack, N-⁶Li Microfission thruster for a gun attack, Amat-catalyzed Fission-fusion or partially Colliding FRC ³He-D Fusion for a gun and Project Valkyrie for an additional gun.

c. Cancer Hospital (2B4b). Although fragile, it's protected by the red cross chit & can't be politically unanchored. Beware the Purple faction.

- **Lab** also has the red cross chit. Your Crew and Colonists have a rad-hardness of at least 7, so much more durable in battles.

d. Climate Control Bernal (2B4c) has a gun (rad-hardness = 8).

e. Collimator Bernal (2B4d) has a gun, especially the Lab (rad-hardness 9).

- **Powersat** gives you access to fighting mirrors.
- **Thrust Enhancement** helps Mobile Factories (e.g. as kamikazes).

f. Diplomatic Bernal (2B4e) is fragile (rad-hardness 6).

g. Lofstrom Loop Microgravity Bernal (2B4f) is a gun, especially the Lab (rad-hardness 9).

- **Allows Boost & Homesteading** during War/Anarchy.
- **Doubles FINAO costs** for all players (**3B5b**).
- **As an ET Home Bernal** may help construct Space Elevator at Mars/Phobos, Saturn (if anchored to ring moonlets), Uranus (if anchored to cordelia), Neptune (if anchored to despina), Pluto/Charon and Haumea. Can promote at Pluto or Uranus.
- **Lab.** Because Factory damage shuts down factory-assist, this will stop your exports on 6+ size worlds.

h. Pharmaceuticals Bernal (2B4g) is fragile (rad-hardness 6) and its Ability (imposing academia hand limits) is especially situational in War/Anarchy.

- **Enables Beamed Gray Goo.** An extra raygun dice gives the punch needed for ground targets, but at the cost of a vendetta bribe.
- **Lab** imposes the academia hand limits upon those who use the research grants law (peacetime only, as all Laws are shut-down in War/Anarchy). The beamed gray goo is also here.

- i. **Solar Cell Factory (2B4h)** is fragile (rad-hardness 6).
 - **No Combat Value.**
 - **Lab** is a gun, and gives +2 to Solar-Power thrust. If returned to Home Orbit, it gives +3 to Solar-Power thrust.
- j. **Space Elevator Bernal (2B4i)** is fragile (rad-hardness 6). Note that the Elevator stick is itself immune to attacks.
 - **Evades Boost and Homesteading restrictions**
 - **Doubles FINAO costs** for all players **(3B5b)**.
 - **As an ET Home Bernal** may help construct Space Elevator at Mars/Phobos, Saturn (if anchored to ring moonlets), Uranus (if anchored to cordelia), Neptune (if anchored to despina), Pluto/Charon and Haumea. Note that at Mars and eventually at giant planets you'll likely promote it afterwards, however at Mars you must be in a hurry before the War breaks out.
 - **Lab.** Note that having a damaged Factory on a 6+ size site affects you because of the shutdown of factory-assist.
- k. **Tourism Cyclor (2B4j)** has no combat value.
 - **As an ET Home Bernal**, it may help navigate through the Rad Belt to Europa, Enceladus,⁸ Saturn, Miranda, Puck, Cordelia and Uranus. However, at giant planets you'll likely want to promote this to have a Lab.

8 ENCELADUS is a moon of Saturn famous for its tiger stripes with geysers that eject enough water to form Saturn's E-ring. The south pole location of the stripes make the moon into a north-moving rocket. Assuming a total power of 5.8 GW and a mass flow of 200 kg/sec, in game language this rocket has a thrust of 12 and a fuel consumption of 5. Although there are various theories for the power source for the geysers, the moon contains amorphous ice overall while the stripes are filled with crystalline ice. Although Saturn lies well beyond the frostline, Enceladus is electrically connected with Saturn and the high energy irradiation (perhaps 300 MW) into the south pole could be sustaining a recrystallization reaction that powers its jets. Flash-freezing of the ejected water creates more ASW snow to sustain the reaction, without needing a subsurface ocean.

3H5. Atlas of Strategic Locations

- a. **Mercury ☿ and Venus ♀ Zones**
 - **Heliocentric Dropstones** travel rapidly to here from the solar oberth.
 - **Powersat & Fighting Mirrors** are obtained by industrializing any asteroid up to the Earth Zone.
 - **Dyson Bubble Future** gives you access to blocking sunlight to your opponents during combat.
- b. **Earth ⊕ Zone**
 - **Home Bernal.** If an Independent, your Home Bernal will be unanchored during War/Anarchy unless you petition authority.
 - **Antimatter, Collimator, & Lofstrom Home Bernals** have offensive ranged weaponry.
 - **Lofstrom Loop or GEO Space Elevator** evades the War restrictions on boosting and doubles FINAO costs for all players **(3B5b)**.
 - **Phaeton & Icarus** are the closest Dropstone iceberg locations.
 - **Luna.** With no particular War significance, remember you can prospect it without permission. Expect some buggy combat between competing sites. **Beware on your Elevator - it may be destroyed.**
- c. **Mars ♀ Zone**
 - **Martian Factories** are safe from orbital rayguns and mirrors due to the dusty atmosphere, but are vulnerable to dropstones and buggies.
 - **Hellas Basin & North Pole** are the closest Sites for an ET Home Bernal. Boost-cost-reducing Bernals can help build the Phobos Space Elevator.
- d. **Ceres ♁ Zone**
 - **This Zone** is relatively safe from dropstones because of solar oberth being so far away and there are no giant planet flybys here.
 - **Synodic Comets** allow you to drop icebergs throughout this Zone and are good spots for ET Home Bernals. **The Beehive Ark Future makes all of your tiny Sites into safe havens.**
 - **Ceres** is the closest Submarine,⁹ immune to attacks.

9 CEREREAN OCEAN. Analysis in 2020 on images of Occator crater from Nasa Dawn spacecraft show the presence of hydrohalite, confirming a salty subsurface ocean.

- **The Gefion Family** is a good location for your ET Home Bernal.¹⁰ Unless you can industrialize one of its dry **S**-types, this Site won't be able to produce any isotopes, as there is none for Spectral Type **C**.
- **Vulnerable to Frostline Dropstones:** hertha, lutetia, hygiea, eichsfeldia, one of karin cluster and all comets.
- **Sites with Hazards** (including all comets) are a bit safer against ranged attacks and give extra VP if the endgame Law is in individuality. *Some asteroid families can berth an ET Home Bernal.*
- **Hertha, Lutetia, & Psyche** are promising **M** Sites for an Antimatter Lab.

e. Jupiter Zone

- **Himalia Moonlets** are the dropstone threat throughout this Zone (**3H3d**). *Two Factories here can berth an ET Home Bernal.*
- **Io** is an easily forgotten source of Powersat, enabling fighting mirrors especially to Independents. *It is also a host of Mass Beam Future, significantly boosting the FV of your guns (3F2b).*
- **Galilean Moons** (the 4 big moons of Jupiter) have Hazards which slightly lower the firepower of ranged weapons. They are unstable against frostline dropstones. *The 3 that are icy¹¹ can host a Submarine and are good locations for ET Home Bernals and isotope production.*
- **Synodic Comets** make good **ET Home Bernal Sites** and dropstone bases, but allow several years for the stones to travel. On most Sites a runaway crystallization attack is possible (safe sites include 2 Trojans in each family). You can drop a frostline dropstone in this Zone.

10 GEFION FAMILY is an asteroid family of **S**-type asteroids, plus interlopers such as Ceres and Minerva, located in the main asteroid belt. It has more than 2,500 known members.

11 JOVIAN ICY MOONS. The lattice order of ice is dependent on its condensation temperature and rate, its temperature history, and its radiation environment. Low temperatures and high radiation fluxes favor amorphous ice (ASW) on the surface of Europa, and lower radiolytic fluxes and higher temperatures would favor crystalline ice on Callisto, with the two equally balanced on Ganymede. –G. B. Hansen, *Amorphous and Crystalline Ice on the Galilean Satellites: a Balance between Thermal and Radiolytic Processes*, 2003.

- **Centaur**s (in the 3 outermost Zones) are useful for the Mini-Black Hole Future, giving you access to the vast array of Dropstone locations (**3F2a**). Chiron is a potential ET Home Bernal site.


f. Saturn Zone

- **ET Home Bernals** can be anchored almost anywhere in this system. *There are many Submarines.*
- **Norse Moonlets & Methone** pose a Dropstone threat throughout this Zone. Phoebe and Methone are icebergs, and the rest are dirty. You may intercept those stones and icebergs at Saturn Flyby. One direction allows you to bypass the Ring Hazard (think Encke Gap).
- **Titan** is defensible due to the protective atmosphere and its Submarine. *To build an ET Home Bernal, you must have Dirtsides at two lake Sites.*
- **Enceladus** not only hosts Submarine but is also a good location for your Antimatter Lab.
- **Saturn itself** has a protective atmosphere, *and an ET Home Bernal in the dust ring has an impressive Dirtsides Hydration of 16 in the unlikely event that all its moonlet Dirtsides get industrialized. Boost-cost-reducing Bernals can help construct the Space Elevator if you survive the Epic Hazard Roll.*
- **Kreutz-Sungrazer** is still an option for dropping icebergs up till Saturn Zone. Beware of melting there. *Its Golden Apples Future allows you FINAO during War and makes you the recipient for the FINAO payments of your opponents! (3F2f).*

g. Uranus Zone

- **Sycorax & its Moonlet Friends** provide some isotope flexibility at designing Uranus-targeted self-sustained dropstone launchers. You may intercept them at the Uranus Flyby.
- **Three Icy Moons** provide Submarines with a promising Spectral Type **D**. **Tourist Cyclor ET Home Bernal on or near the ring Rad Belt can help pass through it.**
- **Uranus** itself is quite a safe haven for enabling a Submarine (with Spectral Type **H**) and having the beam-protective atmosphere for its aerostat combat. **Beware of the Elevator's destruction. Cordelia can contribute to an ET Home Bernal and with the boost-cost-reducing Bernals can help construct Space Elevator.**
- **Synodic Comets Pholus & Asbolus** are suitable as self-sustained military bases plunging dropstones upon almost the entire Solar System. **They can also be used with the apocalyptic Mini-Black Hole, Footfall or New Venus Futures. Both are easy to prospect given their size and possess the friendly D isotope for good patent combos.**

h. Neptune Zone

- **This Zone** is safe from Dropstone attacks. Solar-Power is shutdown so the solar-dependent weapons will not work there.
- **Triton** is a good Spectral Type **M** that is also a Submarine. **This M site is a good destination for your Antimatter Lab. It is also a host of Mass Beam Future, which makes your guns more powerful (3B2b).**
- **Neptune itself** is only protected by its atmosphere. **Beware of your Elevator at despina. This moon itself may contribute to a neptunian ET Home Bernal. With boost-cost-reducing Bernals it would be easier to construct a Space Elevator there.**
- **Two Solar Exits** invite your ad-astra Futures to intercept a Dropstone.
- **Pluto  System & Haumea** welcome boost-cost-reducing Space Elevators as ET Home Bernals. Especially if you attempt the Beanstalk Future, be aware that your Space Elevators can be attacked.

3I. Panspermia War (Paweł Garycki)

This is the *Panspermia Scenario* (Core Appendix **V12**), with some extra rules for interspecies War. These rules can also be used for continuing a grand campaign from *Bios:Origins* on Venus or Mars (**V8**) or Earth if ending with a different species shape than the archetype (**V7**, use **3Ic** shape resolution).

- Number of Players.** 2 or 4 competitive. See **V12a**
- Setup.** See **V12**, and using any Modules **except Module 0 is not used and Module 3 is used.**
- Martians and Venusians** (continued from *Bios:Origins*). These humanoid species come from a different home world - with a similar Goldilocks biochemistry. Accordingly, consider references to "Earth" in the Modules to refer to Mars or Venus, whichever is the actual home world. Similarly, LEO = LVO or LMO (e.g. Security Zone). If your Martians/Venusians/Earthlings evolved a non-Archetype shape, gain the following:
 - **Flyers.** Gain the *marines* faction weapon (**3D6c**).
 - **Swimmers.** In combat, enemy Submarines defend as ordinary colonized Factories.
 - **Armored.** Humans add 3 to their printed rad-hardness and have a gun.
 - **Burrowers.** On Sites, your attackers always attack first, even before jammers, and your Humans are immune to *collateral rolls* (**3E2i**).
- Starting Loyalty.** Earthlings start as Loyalists (☺), while alien species are Independents (☹).
- Research Auctions** are per **V4c**.
- Piracy.** Use the *Piracy Variant* (**3Ac**). Thus combat is always allowed but not mandatory.
- Colonists** are unchanged.
- Home Bernal.** See **V12c,d,e,f,g,h**. Your designated Home Bernal cannot ever become an ET Home Bernal.