

Notes from Hades

I mentioned last issue that things had been very hectic for me. Nothing much has changed in that respect. I am still spending four days a week in San Jose, and I will be doing so until mid-July. In the meantime, Celeste and I are trying to get as much of the yard done as possible before the piano recital for her students in early June. In the meantime, we have a number of events taking up time on the weekends. These include things like orchestral concerts, overnight camping at the San Diego Wild Animal Park, and a night using the 60 inch telescope on Mount Wilson. Overall, the pace doesn't look like it will slacken any time soon.

We have made significant progress on the yard, fortunately. Our most intriguing find was an espaliered apple tree. For those of you who are unfamiliar with espalier, it is simply a technique of pruning the plant so that all of the branches lie in a single plane on either side of the trunk. These branches are then supported on a trellis. This supposedly enhances the tree's ability to produce fruit. Celeste and I first got the idea of putting such a tree in our yard when we saw a bunch of them at Mount Vernon in Virginia. The intriguing thing about this particular tree that we found is that it has six main branches, each of which is a graft from a different variety of apple tree. So, we effectively got six apple trees in one.

We have one game starting this issue. In addition, the Gunboat Machiavelli game, Off the Leash has filled. It will start as soon as one of the existing Machiavelli games ends. Also, the Outpost and New World game starts are filling fast, so if you want in, you'd better hurry.

This issue's deadline to **Tuesday, May 2 at 5:00 p.m. Pacific Time.** Please note that games that are run by guest GMs or in a subzine could be on a different schedule, so look at the games themselves. **Please do not call or fax orders after 10:00 p.m. Pacific time.** My wife and I tend to retire early.

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Game Openings

Off the Leash. Gunboat Machiavelli. This game will start when the next Machiavelli game ends. Scenario and specific rules to be determined at game start by player vote, as usual. Have 8. This game is closed. You are signed up if this box is checked:

Pavlov. Dune. We will use the three variant powers (Bene Tleilaxu, Ixians, and Lansraad). Have Steve Koehler, Bill Scharf, Kevin Wilson, and Sara Reichert. Will take up to 2 more.

Hyena. Merchant of Venus. This game will start when Sun Dog ends. Will use the Fast Setup, Lost ? Box, Own Species Bonus, Customized Spaceships, and Agents, Bases, and Second Ships variant rules. Will use the combat rules if a majority of players agree. If so, the Variable Nova Balls and Mercenaries variant rules will also be used. Have Andy Lewis, Dennis Cain, Chris Geggus, Kevin Wilson, and Bob Robles, need 1 more.

Fenris. Settlers of Catan. Most of you are familiar with this game from when it ran in Andy Lewis' erstwhile subzine. Have Sara Reichert, Ward Narhi, Chris Geggus, Kevin Wilson, Steve Koehler, and Bill Scharf. **This game starts this issue.**

Canes Venatici. Outpost. This will again be the Expert rules version. Have Sara Reichert, Andy York, Phil Reynolds, Andy Lewis, Kevin Wilson, Michael Lowrey, and Bill Scharf. Will take up to 3 more.

Hounds of Tindalos. New World. This game will start after Coyote ends. Have Phil Reynolds, Andy Lewis, Kevin Wilson, Bill Scharf, and Bob Robles. Will take 1 more.

Wish List

None at this time.

In general, game ownership is recommended, but not required.

Note that a subscription to S.O.B. is not required to play in a game run by flier, but that a game fee will be charged to non-subbers.

S.O.B. is a zine of unusual postal games, and anything else I feel like including. Your publisher is:

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Subscriptions cost \$1.50 per issue (\$2.25 overseas).

Howling at the Moon
The S.O.B. Letter Column

Sara Reichert

I received S.O.B. #70 today. I note that the OUTPOST game ended, leaving room for the next one. As far as I can tell, this game is about SHOPPING!

You have to decide what to buy, and when, and at what price. I look forward to seeing how well I can do this against all those guys.

Feral Dogs

**Advanced Game, no Optional Rules, Black Press, Ultimate Victory, Gunboat
Summer 1462**

Deadline/Fall 1462 5/2 Tuesday

The Turks suffer a military disaster losing one fleet against the Pope and two more against French and Neapolitan moves that almost seem choreographed. Austria changes direction, moving out against France, while Venice and Milan start digging trenches along their front lines.

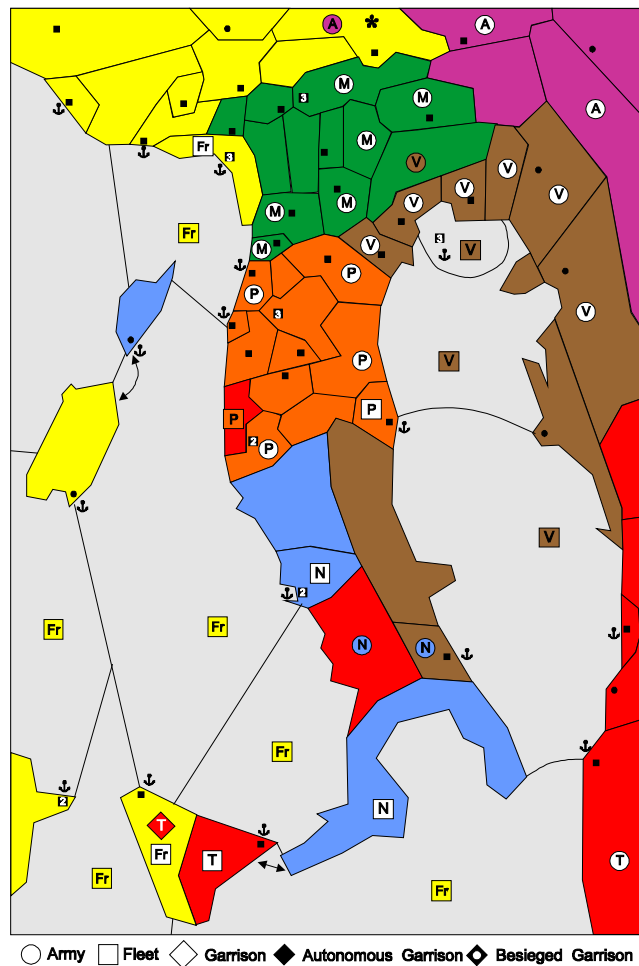
Fall 1461 Retreats

Turkish F Messina retreats to Otranto

Orders

- | | |
|----------------------------------|---|
| Austria <input type="checkbox"/> | A AUSTRIA supports A Carinthia to Tyrolea
A Carinthia to TYROLEA
A SLAVONIA to Croatia |
| France <input type="checkbox"/> | A Tyrolea supports Austrian A Carinthia (nso, DISLODGED, retreat
Swiss, Turin, Como, garrison, OTB)
F GENOA supports F Ligurian Sea
F Gulf of Lions to TYRRHENIAN SEA
F LIGURIAN SEA supports Milan A Lucca
F Tyrrhenian Sea to GULF OF NAPLES
F WESTERN MEDITERRANEAN supports F Tyrrhenian Sea to Gulf of Naples
F CENTRAL MEDITERRANEAN supports F Messina to Ionian Sea
F PALERMO besieges
F Messina to IONIAN SEA |
| Milan <input type="checkbox"/> | A MILAN supports Austrian A Carinthia (nso)
A TRENTO supports Austrian A Carinthia (nso)
A BERGAMO supports A Mantua
A MANTUA supports A Modena (cut)
A MODENA supports A Lucca
A LUCCA supports A Modena |
| Naples <input type="checkbox"/> | A Naples to SALERNO
A Aquila to BARI
F Bari to OTRANTO
F Capua to NAPLES |
| Papacy <input type="checkbox"/> | A PISA holds
A Pistoia to BOLOGNA
A Bologna to URBINO
A ROME supports F Sienna to Patrimony
F Sienna to PATRIMONY
F ANCONA to Lower Adriatic |
| Turks <input type="checkbox"/> | A Albania to DURAZZO
F Otranto to MESSINA
F Ionian Sea supports F Otranto to Messina (cut, ELIMINATED)
F Gulf of Naples supports F Otranto to Messina (cut, ELIMINATED)
F Patrimony to Rome (ELIMINATED)
G PALERMO converts to F |
| Venice <input type="checkbox"/> | A VERONA supports A Ferrara to Mantua
A FERRARA to Mantua
A PADUA supports A Verona
A TREVISO supports A Verona
A FRIULI supports A Verona
A CARNIOLA supports A Friuli
A CROATIA supports A Carniola (cut)
F VENICE supports A Friuli
F UPPER ADRIATIC supports Papal A Bologna (nso)
F LOWER ADRIATIC supports Papal F Ancona (nso) |

"Feral Dogs"



Press

Austria – Milan: As you cannot attack FRI any more, I propose to support you against COMO.

Austria – Venice: As you saw I tried something different and I hope that you will act accordingly.

France – Austria/Milan: Again, let me know if I can do anything to help.

France – Venice: Per your “Venice is open-minded” remark to the northern powers. How does that fit with “onslaught of French fleets...”, “the northern flood of France-Milan-Austria is going to sweep over us”, “We need to stick together...”, “throw in with them and you will extend your life only momentarily”. Apparently your meaning of “open-minded” is very different than most peoples’... Care to elaborate?

France – Venice: Don’t you realize that saying you’re an experience Machiavelli player is basically saying “I’m a vicious self-serving jerk that will do anything to win. And woe the pond scum that gets in my way.”?

France – Pope: Could you let me know what was the black press item this last time (the time before last round I guess). I didn’t notice and unfortunately I no longer have the zine to reference. Do you have any idea on who wrote it and

why? I'm usually pretty good at spotting such items and it's bugging me that one got by.

France – Milan: I haven't done anything anti-Pope this whole game long... in fact, I helped him by taking out Florence when no one else would and I turned the winnings from that contest over to him... Show me anyone else that's been that helpful in the whole game. My goal is to have a win that doesn't include Venice...primarily because I've seen more Venetian victories and shared victories than almost all of the other possible wins combined. I've been straight with the Pope and will continue being so. I'm just glad that we've put enough pressure on Venice so that he realizes he needs the Pope to survive... I just hope the Pope realizes he doesn't need Venice to share in a win in this game.

Milan – France: If the Pope doesn't join, we are blocked.

Milan – Pope: I am always interested in a cooperation.

Milan – New Venice: The old Doge had very bad intentions about my properties: what are yours?

Naples – Venice: Thanks for righting the wrongs of your predecessor.

Pope – Milan: None of your requests made sense, so I didn't know how to help you. I am going to reposition my units so that our border isn't so heavily guarded. Maybe you can do the same?

Pope – Venice: I am going to fight the Turk. If you don't have a problem with this and in fact aide me in doing so then I will help maintain the balance. I am moving to LA and hope you let me in one of these seasons. I won't support France or Milan against you, and I won't support you against them. If you insist Turkey (who has wronged me horribly by stealing papal lands) must be part of our alliance, then I'll have to work with France and Milan against you. If we do indeed work together well (and this will demonstrate to me that we can) then we should both be okay in the long term.

Pope – Naples: I noticed you didn't need the help into Aqu as you asked, so didn't know what to do.

Pope – France: I will join you in your crusade to rid this world of the Turks. I look forward to our long term cooperation.

New Venice – Austria: Here's a new idea for you. You've been stuck in the corner for so long, why don't you work with me. You can capture Tyr all by yourself and grow a little bit. If France converts his retreating army into a Garrison, then Swi and Tur are waiting for you. I think it's time you stopped being a two bit player and become a contender in this game. The risk if you don't is that France will continue to grow, and if I start to go down, I can make sure France wins. All I'm asking you to do is to make sure he doesn't by working with me now, and taking France down a notch or two. He's getting way to big to stop if we don't all act now, and I don't see the Pope doing anything about France's growth. If France manages to round the tip of Italy against the Turk, he'll be unstoppable. I need to find someone responsible enough to keep this game balanced properly. I'll give up a little bit to help you grow, if it will make you my ally. What do you say?

New Venice – All Except France: Please do something to stop France's surge towards the solo. I'll give up some of my SC's if you'll knock France down a peg or two. Anyone please!

Venice – All: Too much to hope for a Milanese NMR this time, I suppose.

Venice – Austria: You'll go nowhere fast going against me. Go somewhere else where you can really go.

Venice – Papacy: I'm doing my part to help you and hold off Milan. I hope you are doing your part, too.

Venice – Naples: Friends?

Venice – Turks: I think we're on the same wavelength.

Venice – France: How do you like Venetian press (and orders) now?

Citizen Dog

Advanced Game, Plague, Famine, Special Military Units, and Conquest, White Press, Ultimate Victory Fall 1458

Deadline for Winter-Spring 1459: 5/2 Tuesday

The situation in the north continues to be muddled as Austria strikes out at France while Venice attacks Austria. Milan and France continue their war, with Milan getting the worst of it. Meanwhile, Naples continues its relentless march on Florence.

Spring 1458 Retreats

Milan retreats A Savoy to Saluzzo

Orders

AUSTRIA A Tyrolea to SWISS

(Robles) A Austria to TYROLEA

A TRENT supports Milan A Verona (nso)

A Carniola to Friuli (DISLODGED, retreat Carinthia, Slavonia,

OTB)

FLORENCE A (EM) Urbino to FLORENCE

(Wilson) A PERUGIA to Rome

F PIOMBINO to Tyrrhenian Sea

FRANCE A SAVOY supports A Provence to Saluzzo

(Scott) A Provence to SALUZZO

A TURIN supports A Provence to Saluzzo

F DURAZZO to Albania

F (EM) Ligurian Sea to GENOA

MILAN A MILAN holds

(Giovine) A Genoa to Montferrat (DISLODGED, retreat Fornova, Modena,
garrison, OTB)

A Fornova to PAVIA

A VERONA to Trent

A Saluzzo to Turin (DISLODGED, retreat garrison, OTB)

Orders (cont.)

NAPLES A Palermo to ROME

(McConnell) A (EM) Sienna to AREZZO

A SPOLETO supports A Palermo to Rome

A Ancona to URBINO

F Lower Adriatic to ANCONA

F TYRRHENIAN SEA transport A Palermo to Rome

F CORSICA to LIGURIAN SEA

VENICE A (EM) Ferrara to DALMATIA

(Grib) A PADUA to Verona

A Friuli to CARNIOLA

A CROATIA supports A Friuli to Carniola

A RAGUSA to Albania

F UPPER ADRIATIC transports A Ferrara to Dalmatia

Press

Austria – Venice: Let's not get into a tit for tat sort of relationship.

Spring 1459 Famine

Poor Year, Column Only – Modena, Swiss, Verona, Bergamo, Urbino, Florence, Parma, Aquila

Spring 1459 Income

Provinces and cities that are underlined do not produce income while those that are in italics could change hands depending on retreats.

Provinces

- AUS Swiss, Tyrolea, Como, Austria, Hungary, Slavonia, Trent, Friuli (6)
- FLO Corsica, Piombino, Pisa, Lucca, Pistoia, Bologna, Florence, Perugia (7)
- FRA Avignon, Provence, Marseilles, Turin, Saluzzo, Savoy, Genoa, Durazzo, Tunis (9)
- MIL Montferrat, Pavia, Milan, Carinthia, Fornova, Parma, Cremona, Verona, Bergamo, Mantua, Modena (7)
- NAP Arezzo, Urbino, Ancona, Spoleto, Rome, Sardinia, Capua, Aquila, Naples, Salerno, Bari, Otrano, Messina, Palermo (12)
- VEN Ferrara, Padua, Treviso, Carniola, Croatia, Istria, Dalmatia, Ragusa, Albania (9)

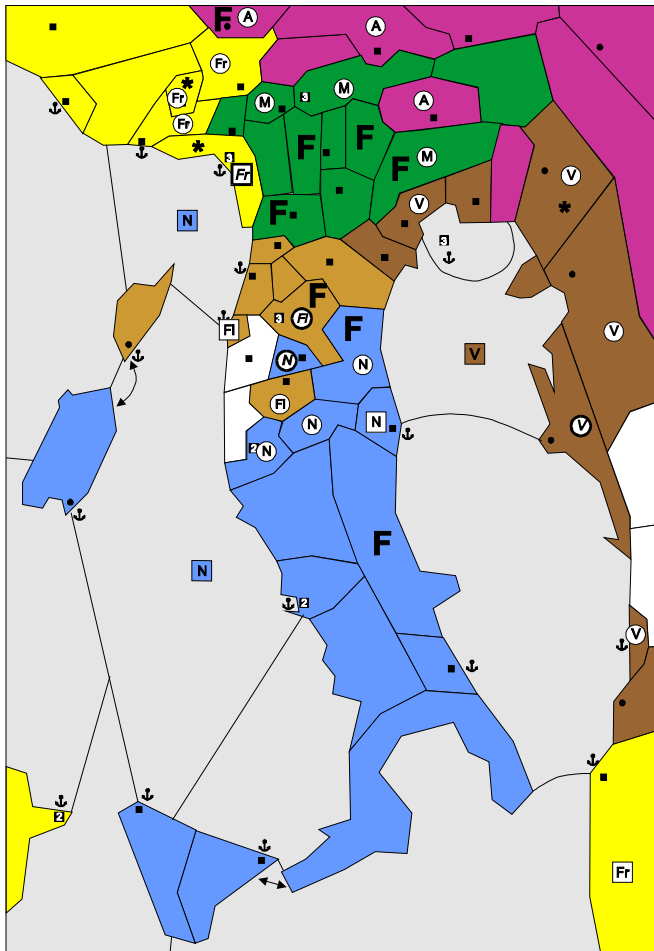
Seas

- NAP Ligurian Sea, Tyrrhenian Sea (2)
- VEN Upper Adriatic, Venice (2)

Cities

- AUS Swiss, Tyrolea, Austria, Hungary, Trent (4)
- FLO Corsica, Piombino, Pisa, Lucca, Bologna, Florence (3), Perugia (6)
- FRA Avignon, Marseilles, Turin, Saluzzo, Savoy, Genoa (3), Durazzo, Tunis (2) (11)
- MIL Montferrat, Pavia, Milan (3), Cremona, Mantua, Modena (7)
- NAP Arezzo, Ancona, Rome (2), Sardinia, Naples (2), Bari, Messina, Palermo (10)

Citizen Dog



○ Army □ Fleet ◇ Garrison ◆ Autonomous Garrison ◆ Besieged Garrison

- VEN Ferrara, Padua, Treviso, Carniola, Croatia, Dalmatia, Ragusa, Albania, Venice (3) (11)

Totals

Variable income die roll was 3.

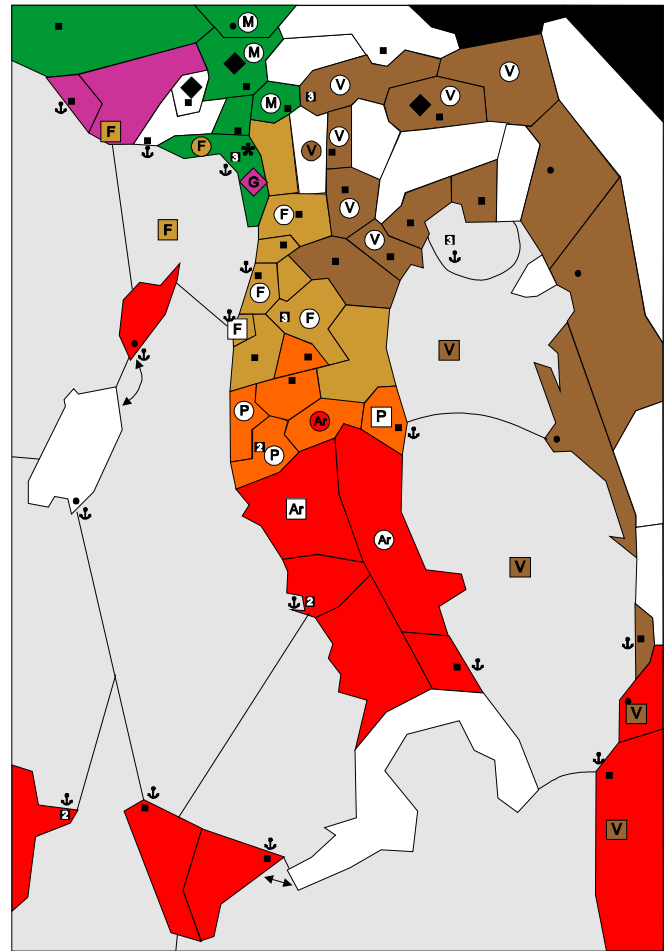
	Var.	Prov.	Seas	Cities	Gross	Treas.	Total
AUS	3	6	0	4	13	1	14
FLO	6	7	0	6	19	1	20
FRA	5 ¹	9	0	11	25	3	28
MIL	3	7	0	7	17	1	17
NAP	2	12	2	10	26	0	26
VEN	6	9	2	11	28	2	30

¹ If Milan retreats to garrison, variable income is 3 instead of 5.

Game Summary

	1454	1455	1456	1457	1458	1459
Aus	3	4	5	4	5	5
Flo	3	3	4	6	9	7
Fra	3	5	7	7	9	6
Mil	3	5	7	8	6	6
Nap	4	4	6	7	6	8
Pap	4	3	0	0	0	0
Tur	3	6	7	3	0	0
Ven	4	5	6	6	8	9

New Tricks



○ Army □ Fleet ◇ Garrison ◆ Autonomous Garrison ◆ Besieged Garrison

New Tricks

Advanced Game, Plague, Famine, Special Military Units and Conquest, Black Press, Ultimate Victory Spring 1256

Deadline for Summer 1256: 5/2 Tuesday

Venice and Florence seem to have matters well in hand in the north, much to the detriment of Milan and Genoa. Aragon and the Pope continue their war, with Aragon making sacrifices in his Balkan possessions to give the Pope a lesson on the loyalty of mercenaries.

Winter 1256 Builds

		Treas	Cost	Rem
Ara	Maintains A Capua, A Aquila, F Naples, no new builds	23	9	14
Flo	Maintains all, builds F Pisa, F Piombino, G Florence	22	21	1
Gen	Maintains all, no new builds	8	3	5
Mil	Maintains all, builds A Pavia	15	12	3
Pap	Maintains all, no new builds	18	12	6
Ven	Maintains all, builds A Padua, F Venice	35	33	2

Expenditures

Aragon spends 12 ducats to disband Papal A Spoleto
Genoa gives 5 ducats to Florence

Orders

ARAGON	A Capua to SPOLETO
(Whyte)	A AQUILA supports A Capua to Spoleto F Naples to CAPUA
FLORENCE	A FORMOVA to GENOA
(Robles)	A MODENA supports A Formova to Genoa A Florence to PISA F Ligurian Sea to PROVENCE F PISA to LIGURIAN SEA F PIOMBINO supports F Pisa to Ligurian Sea G FLORENCE converts to A
GENOA	G GENOA converts to A
(Scott)	
MILAN	A SWISS to Tyrolea
(Street)	A Montferrat to TURIN A Genoa besieges (DISLODGED, retreat Savoy, Montferrat, OTB) A PAVIA to Como

Orders (cont.)

PAPACY	A PATRIMONY supports A Rome
(Narhi)	A ROME supports A Spoleto (nsu) A Spoleto supports F Ancona (nsu) F ANCONA supports Venetian F Upper Adriatic to Lower Adriatic
VENICE	A Padua to FERRARA
(Reynolds)	A MILAN to Como A TRENTO supports A Cremona to Milan A CARINTHIA to Tyrolea A CREMONA to Milan A Mantua to PARMA A Bologna to MANTUA F Upper Adriatic to LOWER ADRIATIC F Lower Adriatic to DURAZZO F Ragusa to ALBANIA F Venice to UPPER ADRIATIC

Summer 1256 Plague

Good Year – No Plague!

Press

Aragon – Venice: You can hold it as long as you like, but it takes a REAL man to pull it off, *comme ils disent*.

Aragon – Papacy: My, what an icy Pop you are. Let's see if this thaws our relationship any...

Florence – Venice: Nice Doge, Nice Doge!

Venice – Milan: Who knows if plague and famine will strike me? But you can rest (in peace) assured that I (and Florence) will strike you!

Venice – Pope: Those Aragonians are heathens, you know. They just don't get it.

Venice – Florence: Better, much better.

Lupine

End of Game Statements

Andy Lewis It wasn't as close as I thought it might be. This is a great game, but definitely one I think you need to play a few times to understand the strategy to. The new version is a little easier to understand the strategy on because there isn't a multiplication at the end; it's straight VP. Thanks for running this Chris. It's one of my favorite games.

Chris Hassler. This game requires four dedicated, knowledgeable players. In all the times I have run it, I have not had that. The end result is that at least one player drops out somewhere along the way, another frequently requests to (but I can't allow it due to lack of standbys), and the one knowledgeable player runs away with it. While I do like the game and I do think it translates well to pbm, I don't think I'll be running it anymore.

Sun Dog

Turns 49.1 to 51.1

Turns 51.2 to 53.2 due: 5/2 Tuesday

Turn 49

Company	Starting Location	Die Roll	Ending Location	Notes
TE	Saturn Space Dock	1, 5	Federation Station VI	Gains \$400, buys 3 fuel stations for \$1500
Century 22	Federation Station VII	2, 4	Rhea	Refuels to full
vRE	Saturn Space Dock	3, 6	Saturn Research Lab	

Turn 50

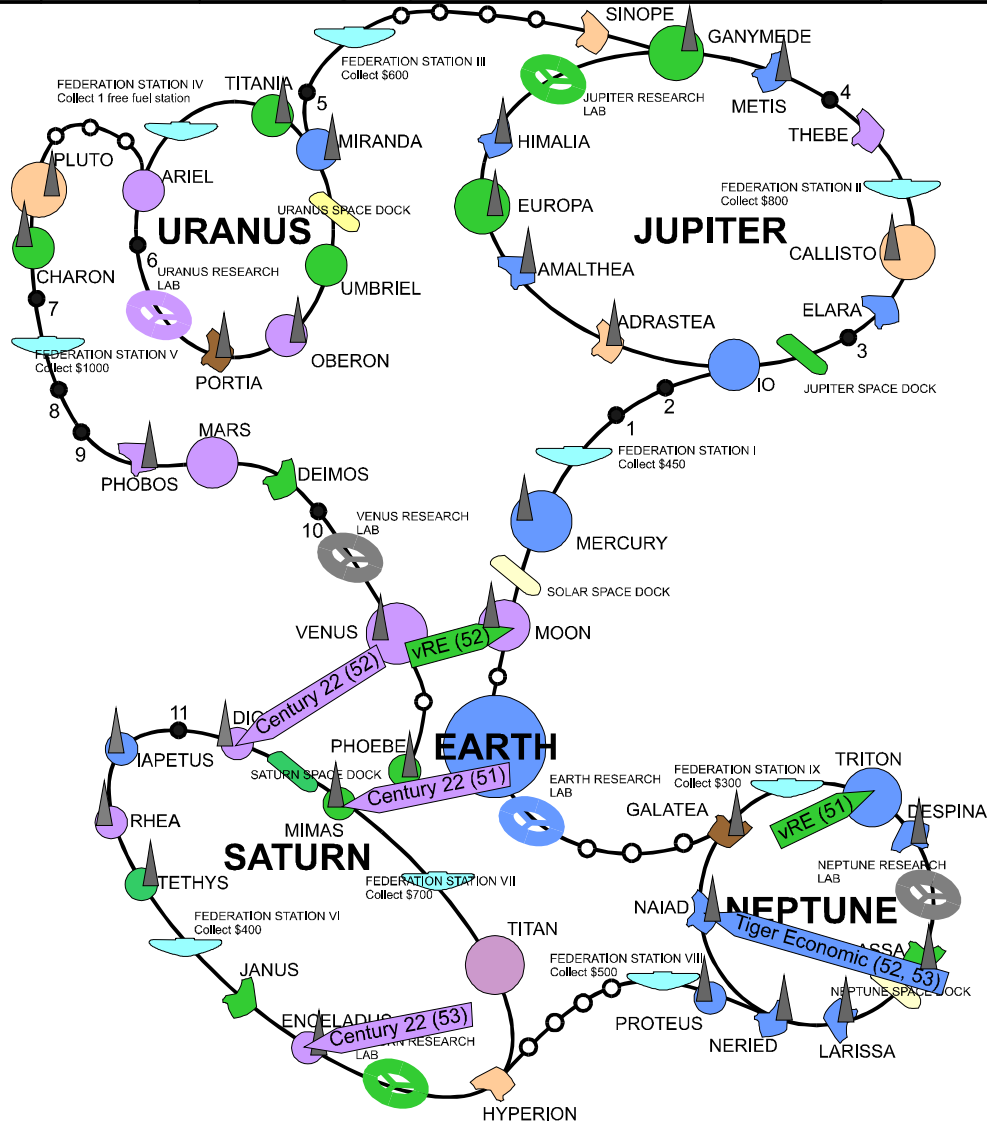
Company	Starting Location	Die Roll	Ending Location	Notes
TE	Federation Station VI	3, 3	Federation Station VII	\$100 gained, \$700 gained
Century 22	Rhea	1, 6	Titan	7 fuel used, buys Titan for \$350
VRE	Saturn Research Lab	3, 5	Neried	\$1150 rent paid to TE

Turn 51

Company	Starting Location	Die Roll	Ending Location	Notes
TE	Federation Station VII	3, 5	Federation Station VI	Gains \$400

The Players (After Turn 51.1)

Company	Player Name	Properties	Fueling Stations	Fuel	Cash
Tiger Economic (Blue)	Brad Martin	Io, Himalia, Metis, Miranda, Nereid, Triton, Earth Research Lab, Mercury, Elara, Proteus, Naiad, Larissa, Amalthea, Iapetus	5	14	8400
Century 22 (Purple)	Bill Scharf	Thebe, Ariel, Phobos, Venus, Oberon, Rhea, Mars, Moon, Uranus Research Lab, Dione, Titan	3	18	3985
van Rijn Enterprises (Green)	Andy York	Umbriel, Titania, Diemos, Mimas, Tethys, Saturn Space Dock, Jupiter Research Lab, Jupiter Space Dock, Phoebe, Janus, Saturn Research Lab, Thalassa, Europa, Ganymede, Charon	4	25	555



Notes

Unless the players have an objection, I am going to speed this game up a bit. Starting next issue, I will run four game turns per issue.

Turn 51

Company	Starting Location	Die Roll	Ending Location	Notes
Century 22	Titan	3, 6	Mimas	9 fuel used, owes \$300 to vRE
VRE	Neried	2, 4	Triton	6 fuel used, owes \$1600 to TE (must sell something to pay)

Turn 52

Company	Starting Location	Die Roll	Ending Location	Notes
TE	Federation Station VI	1, 3	Naiad	Red Shift 5, 5 fuel used, refuels to full
Century 22	Mimas	1, 1	Dione?	\$100 gained, 2 fuel used, may bypass Dione
VRE	Triton	4, 5	Moon	9 fuel used, owes \$1000 to Century 22 (must sell something to pay)

Turn 53

Company	Starting Location	Die Roll	Ending Location	Notes
TE	Naiad	4, 6	Naiad	10 fuel used, refuels to full
Century 22	Dione?	3, 4	Enceladus	7 fuel used, buys for \$750

Dogstar

End of Game Statements

Andy Lewis Congrats on the win Kevin. This was my best showing yet. I didn't get shut out of the He as normal which made it easier for me to move forward. The multiple DL is a strong option. In a game with this number of players, I think more of us need to insure that no one player gets that many because it becomes a crushing blow. The game isn't broken just the players defense mechanisms.

Bill Scharf. I finished middle of the pack. You either have to increase you hand size or beef up the value of the cards you receive if you want to stay competitive. The trick is, you can't do both at the same time. Either you're building factories to increase your buying power, or you're buying developments that allow you to use your buying power more effectively. Balancing those are the core of this game...and it's a good game. Thanks for running it, Chris.

Kevin Wilson. The first few times I played this game, all pbm, I've never played it face-to-face, I came in last or next to last. Then I came across a series of email

games run by Robert Greene. I learned a lot in those games although I didn't finish much better. But the learning paid off. Dogstar is the second game of Outpost in which I've played to finish in the last couple of months and I won both! I won a game in Mike Lowrey's Carolina Command & Commentary using the water, water everywhere approach and now this one in SOB using the Scientist and research approach. The other game finished a bit closer and it could have been bad draws on the others that let me jump into a lead that I kept. In this game, once the research and Labs kicked in, the lead just kind of grew. I'm not sure which is the better strategy, but the DL and Scientists do seem to be more predictable. Especially if you can get into them before the others do. I still don't think I truly understand all the nuances of the game even having won my last two. There is enough going on that usually until the very end it can be anyone's game. I guess I'll just have to keep playing until the mystery is gone.

Kennel Club

Turn 7 Phase 7 and Turn 8 Phases 1 – 3

Turn 8 Phases 4 – 6 due: 5/2 Tuesday

Turn 7, Phase 7 – Purchase Tokens

Hamburg (Martin) buys 6 tokens. **London** (Scharf) buys 32 tokens. **Venice** (Cain) buys 15 tokens. **Genoa** (Cousins) buys 29 tokens. **Barcelona** (Koehler) buys 5 tokens. **Paris** (Burgdorf) buys 6 tokens.

Turn 8, Phase 1 – Card Draw

Barcelona does not buy off a surplus

Hamburg does not buy off a surplus

Phase 2 – Expansion

Barcelona, Venice, and Genoa buy cards.

Your card was _____

Phase 3 – Play Cards

Barcelona (Koehler) plays Henry Oldenburg (protected) and Grain (Hamburg gains \$36, Venice gains \$64, Barcelona and London each gain \$16, shortage removed).

Paris (Burgdorf) plays Alchemist's Gold on Venice (Venice loses \$54) and Prince Henry (\$6 protection)

Hamburg (Martin) plays plays Pirates/Vikings in Acre, Alexandria, and Trebizond, Spice (Hamburg and Venice each receive \$36, shortage removed), and Leonardo da Vinci (\$5 protection, gains \$30 rebate for Human Body)

Venice (Cain) plays Cloth (Hamburg, Genoa, and Venice each gain \$20) and Fur (Hamburg gains \$7 and Venice gains \$112)

Genoa (C. Cousins) plays Metal (Genoa gains \$96 and Paris gains \$24)

London (Scharf) plays Religious Strife (Venice misery goes to 175, Barcelona misery goes to 150, Hamburg misery goes to 125, Paris misery goes to 500, Genoa misery goes to 450, and London misery goes to 400, Papal Decree becomes an unplayable misery burden) and Cloth/Wine as Wine (Genoa gains \$20, Hamburg, Barcelona, London, and Venice each gain \$5)

The Players

Player	Country	Misery	Tokens	Money	Order	Dominance	Ships	Advances
Dennis Cain	Venice	175	15	\$235	4	16	O-3	A, B, E, F, I, N, O, R, S, T, U, V, X
Steve Koehler	Barcelona	150	5	\$131	1	13	O-2	A, B, E, F, H, I, J, K, N, O, R, S, T, V, W, Y
Brad Martin	Hamburg	125	6	\$192	3	13	O-1	A, B, C, E, F, I, J, K, L, N, O, R, S, T, U, V, X, Y
Martin Burgdorf	Paris	500	6	\$65	2	5	8	A, E, F, I, N, R, V, W
Caleb Cousins	Genoa	450	29	\$199	5	12	10	A, B, E, F, H, I, N, O, R, S, V, W, X
Bill Scharf	London	400	32	\$82	6	7	4	A, E, F, I, J, K, N, O, R, V

Players are listed in reverse tie breaking order

Commodity Log

Commodity	Brad	Caleb	Steve	Bill	Dennis	Martin
Stone (2)	2	3	--	--	--	3
Wool (3)	--	--	5	4	--	--
Timber (4)	2	--	2	1	2	--
Grain (5)	2	--	1	1	3	--
Cloth (6)	2	2	--	--	2	--
Wine (7)	1	2	1	1	1	--
Metal (8)	--	4	--	--	--	2
Fur (9)	1	--	--	--	4	--
Silk (10)	--	--	1	--	4	--
Spice (11)	1	--	--	--	1	--
Gold (12)	2	--	--	--	2	--
Ivory (12)	1	1	3	--	--	--

Shortage, Surplus

Your Cards: _____

Press

London – All: Here’s a little religious strife...it’s on th house, you don’t owe me anything.

London – All: And here’s a wine payout. Take that, and that, and you take that. Revenge will be MINE!

London – Paris: Please speak out and let us know you are a person. There have been some accusations that you’re only a (poorly) written computer program. Judging from you play I still think you’re a person but am unsure, please respond and silence your detractors.

Coyote

End of Game Statements

Andy Lewis What a lucky win that has. It turned out to be a luckier (and had to be) than I thought it was going to need to be. I realized looking at things that there was no way I was going to win on money and turn 9 is the last one you can win on PC so I went for it. Kevin was in such a strong position with that city continuing to produce every turn with depleted. I had no chance to pirate him because of the turn order and besides that's a pretty iffy proposition. This is a fun game and I'm glad Chris runs it so that I can have a chance to play it. It really doesn't lose too much in a play by mail format.

Brendan Whyte Wow, that ended quick! I had a feeling Sweden was going to walk away with it, but no one seemed to want to beat up on him. I had a go at least. I started off ok, and then tried to take out the Dutch, but when they got stubborn, I decided to spread the pain a little, and try to annoy everyone on the board, though I had an eye on the Swedes as the people to watch. Where were the Spanish and French when needed? Well done to Andy for winning. Good game, I had fun.

Kevin Wilson. I really don't get this game. I suspect it plays better face-to-face where the players can do a better job of holding back the leader. I really thought I would have a chance this time with the mines and cities I found and all the

gold I looted. I just lost too many settlers and soldiers in some of the dice rolls. I was just getting the income I needed to build big fleets, bring lots of soldiers over and make room for more and more colonists and Andy runs out and gets the 5 areas needed to win. Seems like none of the games I've played in SOB have had much combat in them. I suspect combat is more important in slowing the leader and should be used more for that purpose. I hope someone who really understands it better than I do would explain it to me. Congratulations to Andy on his victory. Narrow or not, a win is a win.

Bob Robles. Well, my second game of New World was even more informative than my first...boy do I have a lot to learn. Congratulations to Andy for a well played game.

Chris Hassler. I think the biggest difference between the pbm and ftf versions of this game is that it is easier to sneak in a 5-area win in the pbm version. Despite Kevin’s comments above, he was really the front-runner for most of the game, because of his huge income. Andy had to take a big gamble to attempt the win, and was extraordinarily lucky that it paid off. In some ways that makes the pbm version of this game a different game than the ftf version. In any event, Andy’s gamble did pay off, and he deserves congratulations for a nice victory.

Dirty Dogs

Turn 7, Cure through Health

Turn 7 Funeral Commission through Parade due: 5/2 Tuesday

Cure

TCC declares 8 IP on Ludmila Patina (S) and 2 IP on Sergei Eastumuch (M). PURGE declares 8 IP on Tigran Zenjarplan (Q), 6 on Ludmila (S), 5 on Sergei (M), and 3 on Iwan Manjak (P). SODS declares 1 IP on Iwan (P). RE declares 4 IP on Sergei (M). Nobody goes to the Sanatorium. Alexi ages to 82, Tigran ages to 70, Eduard ages to 77, Diwan ages to 71.

Purge

TE plays Disarmament Talks Go Badly (15). First purge attempt must be against the Foreign Minister with a +3 modifier. Tigran attempts to purge Eduard (dr = 14+3-2, succeeds). Attempts to purge Diwan Palavarian (G) (dr = 11+2, succeeds). Ages to 72.

Spy Investigation

SODS declares 2 IP on Oleg Satin (O), and 6 IP on Sergei (M). STORK declares 4 IP on Sergi (M). SODS controls M by right of first declaration, but TCC, PURGE, and RE may change that depending on who they back, with each IP counting for 0.1 in favor of the player they back.

Sergei calls for a trial of Alexi Goferbok (C). RE declares 4 IP on Iwan (P). The votes are 4 guilty (M, O, P, and S), 1 innocent (C), and 1 abstention (Q). Since the two required innocent votes are not forthcoming, Alexi packs his bags and heads for Siberia. Sergei then opens an investigation on Tigran (Q). Ages to 70.

Health

Tigran Zenjarplan (dr = 6) gets sick.
Sergei Eaststumuch (dr = 12) remains healthy.
Oleg Satin (dr = 9) remains healthy.
Iwan Manjak (dr = 7) gets sick.
Ludmila Patina (dr = 4) gets sick.

Funeral Commission

We'll stop here while you decide who will be the next Party Chief.

Press

SODS – All but TI: I did what I could to keep this game from ending in a TI victory. Hope you did the same.

STORK – TI: I think your luck just ran out!

TI – All: My friends, what is this animosity? My faction is only fulfilling the will of the people... a function of all good members of the proletariat. Why don't you join me in doing what is best for all Russians?

Politburo

Office	Politician	Condition	Influence
Party Chief			
KGB Head	Tigran Zenjarplan (Q)	72 + ?, weakness position	10+ (PURGE)

Office	Politician	Condition	Influence
Foreign			
Defense	Sergei Eaststumuch (M)	70, strength position	3 (TCC), 6 (STORK), 5 (PURGE), 4 (RE), 6 (SODS)
Ideology			
Industry	Oleg Satin (O)	62	2 (SODS)
Economy	Iwan Manjak (P)	61 +, strength position	3 (PURGE), 1 (SODS), 4 (RE)
Sport	Ludmila Patina (S)	58 +	10 (TCC), 1 (TI), 6 (PURGE)

Politicians listed in **bold** are in the sanatorium.

Candidates: R, T (64 +), U, V, X (53 ++)

People: N, Y, Z

Siberia: F, I (83 ++), W, K (77 +), G (71), C (82)

Kremlin Wall: H, D, L, E, A, J, B

Your cards: _____

Your undeclared influence: _____

Players

Player	Faction Name
Chris Geggus	Reform Expansionists
Brad Martin	Party Urging Rigorous Government Efficiencies
Ward Narhi	Socialist Team of Reformed Tyranny
Phil Reynolds	Society of Old Depraved Socialists
Bill Scharf	Trotskyite Internationalists
Mike Scott	The California Connection
SODS have one wave. TI have two waves.	

Doggin' It

Turn 8, Phases IV-VII, Turn 9, Phases I-III

Turn 9, Phases IV-VII, Turn 10, Phases I-III due: 5/2 Tuesday

Turn 8

Dispute Resolution

Red (Scharf) pays \$250 to operate claim #17 (1 silver).
Green (Whyte) operates claim #6 (\$150, depleted), #15 (\$150, 1 silver), and #16 (\$200, 2 silver), gains \$1300 in passenger revenue.

Brown (Carl) passes

Gray (Cain) operates claim #1 (\$300, ¼ gold), delivers 1¼ gold for \$7500.

Gold (Bolduc) operates claim #2 (\$200, ½ gold) and #44 (\$100, 4 coal), delivers ½ gold to Salt Lake City for \$3000, gains \$100 from passenger revenue.

Blue (Martin) operates claim #38 (\$150, depletes) and #9 (\$250, ¼ gold), delivers 2 lumber from #38 to Santa Fe for \$1000.

No disputes. Red pays \$1100, Green pays \$1100, Gray pays \$400, Gold pays \$600, and Blue pays \$1800.

Notes

Gold has first option to buy the Lumberton claim.

The Players

Player	Color	Starting Location	Money	Personnel
Bill Scharf	Red	Denver	\$11900	S+1, P
Brendan Whyte	Green	Denver	\$6300	S, P+1
Joe Carl	Brown	Pueblo	\$250	S+1, P
Dennis Cain	Gray	Salt Lake City	\$14100	S, P+1
Paul Bolduc	Gold	Salt Lake City	\$6250	S+1, P
Brad Martin	Blue	Santa Fe	\$3150	S, P+1

Turn 9

Move Prospectors and Surveyors

Red (Scharf) surveys BB to Grand Junction, prospects claim #30.

Green (Whyte) surveys H to D, prospects claim #8.

Brown (Carl) passes

Gray (Cain) surveys Z to AA (\$400 line)

Gold (Bolduc) surveys FF to Y, prospects the deck (draws claim #39, Lumber in Lumberton, \$800 to start, \$250 to operate)

Blue (Martin) surveys South Fork to Pagosa Springs, prospects claim #27

Owned Claims

#	City	Owner	Goods	Type	Operation
17	Leadville	Red	1	Silver	\$250
30	Steamboat Springs	Red	N	Lumber	\$200

#	City	Owner	Goods	Type	Operation
56	Aspen	Green	4	Coal	Depleted
15	Aspen	Green	1	Silver	\$150
6	Georgetown	Green	½	Gold	Depleted
16	Aspen	Green	N	Silver	\$200
8	Fairplay	Green	N	Gold	\$250
42	Vallecitos	Brown	7	Lumber	\$150
64	Walsenburg	Brown	0	Coal	\$250
24	Ouray	Brown	0	Silver	\$200
1	Bingham	Gray	0	Gold	\$300
44	Scofield	Gold	4	Coal	\$100
2	Marysvale	Gold	0	Gold	\$200
66	Trinidad	Blue	13	Coal	\$200
67	Trinidad	Blue	4	Coal	\$150
9	Silverton	Blue	½	Gold	\$250
41	El Vado	Blue	N	Lumber	\$150
27	Silverton	Blue	N	Silver	\$150

Owned Passenger Lines

#	Type	Route	Payoff	Owner	Notes
4	A	Denver – Leadville	\$1350	Red	Discard after 3 more Leadville depletions
7	B	Denver – Leadville	\$600	Red	
2	A	Denver – Colorado Springs	\$250	Green	
3	A	Denver – Pueblo	\$400	Green	
8	B	Denver – Aspen	\$650	Green	
5	A	Salt Lake City – Provo	\$100	Gold	
6	A	Pueblo – Santa Fe	\$600	Blue	

Available Claims

#	City	Type	Claim	Operation
60	Durango	Coal	\$300	\$100
49	Hiawatha	Coal	\$300	\$100
23	Ouray	Silver	\$500	\$200
39	Lumberton	Lumber	\$800	\$250
58	Crested Butte	Coal	\$300	\$100
18	Leadville	Silver	\$500	\$200

Available Passenger Lines

#	Type	Route	Payoff	Cost	Notes
9	B	Denver – Grand Jct.	\$1350	D x \$75	Discard when 15 is taken. Good for \$1350 toward card 14 or 15
10	B	Pueblo – Grand Jct.	\$750	D x \$50	Discard when 17 is taken. Good for \$750 toward card 17 or 18
12	B	Salt Lake City – Grand Jct.	\$1250	D x \$75	Discard when 15 is taken. Good for \$1250 toward card 14 or 15
16	C	Santa Fe – Leadville	\$800	D x \$50	
1	A	Denver – Boulder	\$100	D x \$75	
18	C	Salt Lake City – Colorado Springs	\$3000	D x \$75	May not be taken by player who has card 14

Rover

1956

1957 due: 5/2 Tuesday

1956

Purchases

Republic of Texas (York) buys the One Stage Rocket Program (A) for 24MB, 1 additional one stage rocket for 3MB, the Orbital Satellite Program (1) for 6MB, and 3 additional orbital satellites for 3MB.

Cinnabar (Carl) buys the One Stage Rocket Program (A) for 24MB and the Orbital Satellite Program (1) for 6MB

Moonshooter, Unlimited (Reynolds) buys the One Stage Rocket Program (A) for 24MB and the Orbital Satellite Program (1) for 6MB

SCIFI (Cain) buys the One Stage Rocket Program (A) for 24MB and the One Person Capsule Program (a) for 18MB

Penny Pines (Scharf) buys the One Stage Rocket Program (A) for 24MB, 1 additional one stage rocket for 3MB, the Orbital Satellite Program (1) for 6MB, and 1 additional orbital satellite for 1MB.

Research and Development

Republic of Texas (York) 1: 8 dice (1, 1, 3, 4, 4, 6, 6, 6) = +31%. 8MB spent. A: 8 dice (1, 1, 2, 3, 4, 5, 5, 6) = +27%. 16MB spent.

Cinnabar (Carl) 1: 8 dice (1, 1, 3, 3, 4, 4, 6, 6) = +28%. 8MB spent. A: 8 dice (1, 1, 2, 2, 2, 3, 4, 5) = +20%. 16MB spent.

Moonshooter, Unlimited (Reynolds) 1: 8 dice (1, 1, 1, 2, 2, 2, 5, 6) = +20%. 8MB spent. A: 8 dice (1, 2, 2, 2, 3, 6, 6, 6) = +28%. 16MB spent.

SCIFI (Cain) A: 6 dice (1, 1, 2, 5, 5, 6) = +20%. 12MB spent. a: 6 dice (1, 2, 3, 3, 3, 5) = +17%. 6MB spent.

Penny Pines (Scharf) 1: 8 dice (1, 1, 1, 2, 2, 3, 4, 6) = +20%. 8MB spent. A: 8 dice (1, 1, 2, 3, 3, 3, 6, 6) = +25%. 16MB spent.

Declare Future Missions

Republic of Texas (York), **Cinnabar** (Carl), **Moonshooter, Unlimited** (Reynolds), and **Penny Pines** (Scharf) each declare 1 mission. Penny Pines' mission is a joint mission with SCIFI.

Missions

None

Players

Player Name	Dennis Cain	Joe Carl	Phil Reynolds	Bill Scharf	Andy York
Country	SCIFI	Cinnabar	Moonshooter, Unlimited	Penny Pines	Republic of Texas
Budget (1956)	60	60	60	60	60
Cash	60	60	60	60	60
1-Orbital Satellite		1 / 68%	1 / 60%	2 / 60%	4 / 71%
2-Interplanetary Satellite					
3-Lunar Probe					
4-Docking Module					
A-One Stage Rocket	1 / 30%	1 / 30%	1 / 38%	2 / 35%	2 / 52%
B-Two Stage Rocket					
C-Three Stage Rocket					
D-Liquid Fuel Strap-ons					
F-Kicker					
G-"Mega" Stage Rocket					
EVA Suits					
a-One Person Capsule	1 / 27%				
b-Two Person Capsule					
c-Three Person Capsule					
d-Two Person Module					
e-One Person Module					
f-Three Person Minishuttle					
h-Four Person Cap/Module					
Photo Recon	65%	65%	65%	65%	65%
Launch Facilities	1	1	1	1	1
Astronauts					

1957

Draw Event Cards

- Dennis Cain:** Production Delay: May not purchase rockets this turn. +10MB to budget.
- Bill Scharf:** Government Order: Next planned mission must be a multi-manned mission with at least one new astronaut. +30MB to budget if accepted, -12MB if declined.
- Phil Reynolds:** Influenza: Primary crew of next launch out of action (no effect). +7MB to budget.
- Joe Carl:** Budget Mismanagement: Loses 1MB. +1MB to budget.
- Andy York:** Scientific Breakthrough: +15% to One Stage Rocket. +1MB to budget.

Final Positions

Player Name	Dennis Cain	Joe Carl	Phil Reynolds	Bill Scharf	Andy York
Country	SCIFI	Cinnabar	Moonshooter, Unlimited	Penny Pines	Republic of Texas
1957 Budget	58	67	65	61	70
Cash	0	5	6	2	0
1958 Budget	68	68	72	91 or 49	71

SCIFI is Space Conquest Interplanetary Federation, Incorporated.

Press

SCIFI – All: I am SCIFI!

Dog Days

Epoch I Empire Selection

Deadline for Epoch I: 5/2 Tuesday

The Triffids (Geggus) gives to Gaming Through the Ages
 Royal Manticoran Historical Society (Wilson) keeps
 Amorphous, Cadaverous, and Nebulous (Reynolds) gives to The Triffids
 Kibbles and Bits (Narhi) keeps

Gaming Through the Ages (Lewis) gives to Peoples who Need Peoples
 Peoples who Need Peoples (Cousins) gives to Amorphous, Cadaverous, and
 Nebulous

Players

Player Name	Player Faction Name	Empire Strength Points	Victory Points
Chris Geggus	The Triffids (Green)	0	0
Kevin Wilson	Royal Manticoran Historical Society (Blue)	0	0
Phil Reynolds	Amorphous, Cadaverous, and Nebulous (Black)	0	0
Ward Narhi	Kibbles and Bits (Orange)	0	0
Andy Lewis	Gaming Through the Ages (Purple)	0	0
Caleb Cousins	Peoples who Need Peoples (Red)	0	0

Press

ACN to All: We will conquer THE WORLD! Well, at least a little part of it, for starters.

Initial Positions

SUMERIANS: Capital and 2 armies in *Lower Tigris*, 1 army each in *Middle Tigris* and *Zagros*.

Event Cards

Epoch I Empire

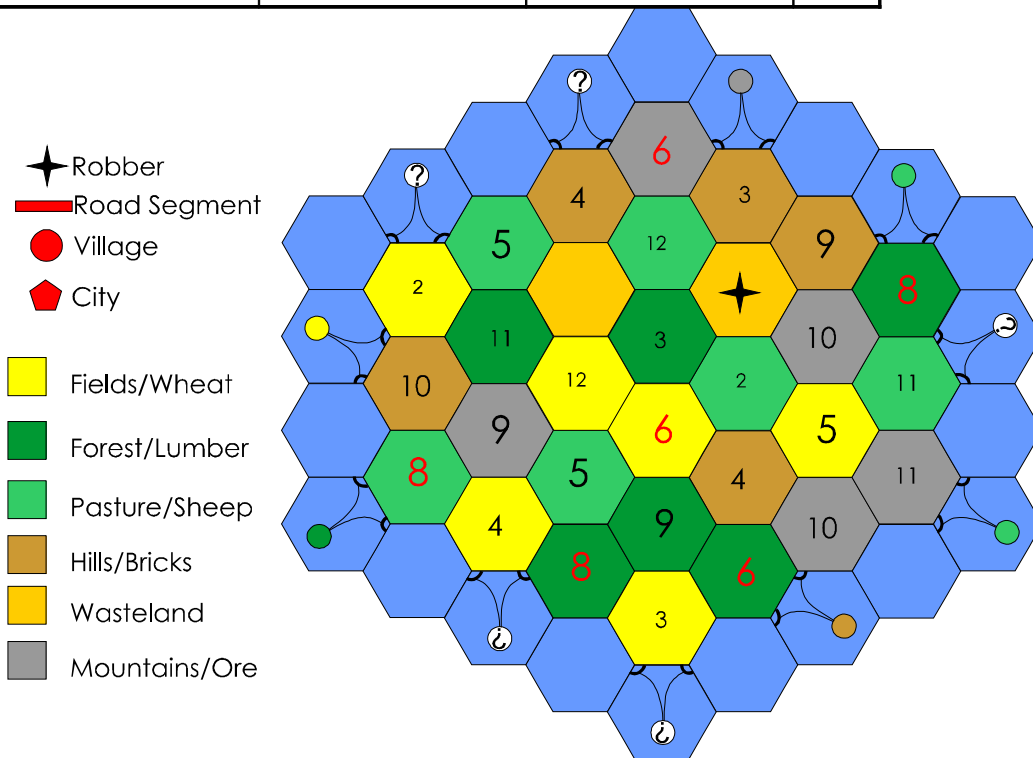
Fenris

Gamestart

Deadline for First Initial Placement Turn: 5/2 Tuesday

The Players

Player	Color	Resource Cards	Development Cards	VP
Sara Reichert	?			
Ward Narhi	?			
Steve Koehler	?			
Chris Geggus	?			
Kevin Wilson	?			
Bill Sharf	?			



Notes

- 1) All standard rules apply except as modified below.
- 2) Players may always make their orders conditional on something which has occurred in a previous phase or player-turn providing they would be able to do so in normal play.
- 3) In general, each mail turn will consist of a single game turn plus 1 player turn. However, I will split the turn if I get requests from at least one third of all players in the game (rounded up).
- 4) The following rules cover the orders each player should submit and the activities of the GM:

- A) **Raw Material Production:** The GM will publish the dice rolls of all players for the next turn.
- B) **Trade:** Each player may specify any trades they wish within the rules. Standing trade offers may be given.
- C) **Building:** Players may specify builds to be made. Remember that in the 5- and 6-player games, if any player makes a build, all other players have the opportunity to build at that time.
- D) **Play Development Card:** If desired, the player may specify the play of a development card. If a knight is played, the player must

specify where Robber is to be moved to. It is best to specify a first and second choice in the event that the Robber was moved in a prior turn.

- 5) The first mailing will consist of the map publication and the initial build order and orders will be required for the first build round. The second build round will be conducted on the second mailing.
- 6) The game will be played exclusively through *S.O.B.* and will not be played by flier. There is no game fee.

Trivia Quiz

You get 2 points for a solo answer, 1 point for sharing the correct answer with one other person, and ½ point for sharing the answer with two or more people. Every 10 points earn you a free issue. Research is allowed. Free issues are credited as they are earned. Players may submit a list of questions (answers must be included.) If used, five points are awarded. In addition, if no correct answers are received for a question, the supplier of the question receives two points.

And so, without further ado, the answers to last issue's questions:

Q1. A nobleman was very displeased when he received an expensive gift from the king. Why?

A1. The King was the King of Siam and the gift was a white elephant. The story goes that the King gave the gift of a rare white elephant to those with whom he was displeased and wished to ruin. The elephant was very expensive to keep but was sacred and could not be used for work. Also, as a royal gift, it could not be disposed of. This is the source of the expression "a white elephant."

Paul Bolduc receives 2 points.

Q2. Benjamin Franklin was a well-educated man. Why did he deliberately misspell Philadelphia?

A2. Benjamin Franklin was at one time in charge of the U.S. Mint. Forgery of banknotes was a great problem. He deliberately misspelled Philadelphia on a banknote in order to enable the detection of forgeries. Unfortunately for him, the forgers simply copied his deliberate mistake.

No correct answers.

Q3. A man making over \$10 million a year drives a small car, lives in a modest house, and insists that he can't afford luxuries. Why not?

A3. He works at the mint. He makes many millions of dollars a year but draws a modest salary.

Bill Scharf, Brendan Whyte, Caleb Cousins, Chris Geggus, and Ward Narhi each receive ½ point.

Q4. A man undressed to go to bed and hundreds of people lost their jobs. Why?

A4. The man was Clark Gable, the screen idol, who took off his shirt in a movie in which he was about to go to bed. He was not wearing an undershirt. So great was his influence that men stopped wearing undershirts and factories making them had to close down. In a later movie, he wore an undershirt and restored it to fashion.

Caleb Cousins gains 2 points. Bill Scharf and Paul Bolduc guessed pajamas, which is close, so I will give them ½ point each.

Q5. An art collector went into the art dealer, Sotheby's. He asked to have two items valued. One was an old violin and the other was an oil painting. The

experts studied them for days before confirming their remarkable findings. The collector was told that the two items were an original Stradivarius and a previously unknown work by Vincent van Gogh. At first, the collector was thrilled, but later he became very dejected. Why?

A5. The violin was a van Gogh and the painting was a Stradivarius.

Andy Lewis gains 2 points.

Current Scores

Chris Geggus	61	Andy York	48
Caleb Cousins	44	Dennis Cain	40
Paul Bolduc	38½	Brendan Whyte	35½
Andy Lewis	33½	Joe Carl	32
Bill Scharf	31½	Steve Koehler	27½
Ward Narhi	21	Dan Eisenhut	19½
Berry Renken	19	Brad Martin	16
Bob Robles	15	Tom Howell	11½
Kevin Wilson	8	Sean Cousins	7
Sigourney Street	½		

New Questions

Topic: Brain Teasers

1. A New York City hairdresser recently said that he would rather cut the hair of three Canadians than one New Yorker. Why?

2. A man hurried down an unlit road with a torch in his hand. He tripped and dropped the torch, which went out. No damage was done and no one got hurt, but the incident was reported in newspapers around the world. Why?

3. A fully loaded truck that weighs exactly 10 tons starts to cross a long bridge which at its center can carry a load of exactly 10 tons – no more. As he reaches the center the driver hears the bridge creak so he slows right down. Just then a flock of starlings lands on the roof of the truck but the bridge does not break. Why not?

4. A woman walked up to a man behind a counter and handed him a book. He looked at it and said, "That will be four dollars." She paid the man and then walked out without the book. He saw her leave without it but did not call her back. How come?

5. John was watching television. Just after the midnight news there was a weather forecast: "It is raining now and will rain for the next two days. However, in 72 hours it will be bright and sunny." "Wrong again," snorted John. He was correct but how did he know?

Pedagoguery

We owe our very existence to the fact that there are elements in the universe heavier than hydrogen. From the oxygen that we breathe, the carbon and nitrogen in our food, the phosphorus in our DNA, and the calcium in our bones to the iron in our blood, we literally could not exist without these heavy elements. Where did they come from, though? Actually, heavy elements come from a variety of sources from the very early universe to the hearts of massive stars.

Current theories lead us to believe that about 3 minutes after the big bang, the universe consisted of a soup of protons and neutrons. This soup was incredibly hot, millions of degrees Kelvin, but relatively diffuse, only about as dense as Earth's atmosphere. It was here that the first elements heavier than hydrogen were formed, in what is called the Big Bang Nucleosynthesis.

Prior to this point, the protons and neutrons were constantly colliding with each other, but were too energetic to stick, and so would just bounce off of one another. When the universe cooled to a critical point, a proton and a neutron could collide and stick together, forming deuterium, or heavy hydrogen. This was the first step. After that, additional collisions would form more deuterium, and occasionally a deuterium nucleus would be hit by a proton or neutron. If hit by a proton, it would form helium 3, if hit by a neutron, hydrogen 3, or tritium, would result. From there, helium 3 would be hit by either a neutron or a deuterium nucleus. Either way, the result is helium 4, with an additional proton if deuterium was involved. In the case of tritium, it would be hit by either a proton or by deuterium, and once again the result is helium 4, with an additional neutron if deuterium was involved. And there, things would pretty much stop. Due to a quirk of nuclear physics, there are no stable nuclei with atomic weights of 5 or 8, so if a proton or a neutron were to hit helium 4, or if two helium 4 nuclei were to collide, the result would quickly decay back into helium 4. The chances of a collision with deuterium are small, because deuterium is generally used up forming helium 4 just about as quickly as it itself is formed. So the Big Bang Nucleosynthesis finished by converting about 25% of the mass of the protons and neutrons in the universe into helium 4. There were small trace amounts of deuterium, helium 3, and lithium 7 produced, but they amount to only a few parts per billion. Tritium is radioactive with a half-life of about 12.5 years, so none of it would have survived to this day.

This leaves us with the question of how elements heavier than helium have formed. The short answer is that they formed in stars. The long answer is, of course, much more complicated.

Stars forge light elements into heavier ones in their cores, producing energy as a by-product. This energy is what prevents the star from collapsing under its own gravity. For the vast majority of its lifetime, a star fuses hydrogen into helium. The amount of helium produced in this way is pretty small compared with the total amount produced in the Big Bang, however. Furthermore, this still doesn't get us across the helium 4 barrier.

As a star ages, it collects more and more helium in its core. Since the helium is inert from the perspective of nuclear reactions, the core starts to condense as more and more helium accumulates. Eventually, the temperatures and pressures in the core reach the point where simultaneous collisions between three helium nuclei become common. Under the right circumstances, the three helium fuse into carbon 12. This is called the triple-alpha reaction. This reaction could not occur in the very early universe simply because it was not dense enough, and the chances of three helium nuclei coming together all at once was virtually nil. At the core of a star, however, the chances are much higher.

Once the carbon has formed, it will frequently be hit with another helium nucleus, forming oxygen 16. The process can repeat itself with oxygen 16 to produce neon 20, but that reaction is not as likely. In fact, if the core of the star remained static, nearly all of the carbon would be converted into oxygen. However, there is another process occurring in a star at that stage in its life. When helium burning occurs, the star is generally in the red giant phase. As a red giant, the star is usually convective throughout. This means that the whole star is roiling about internally like a pot of water boiling, and material deep in the star makes its way to the surface. Thus, some carbon is able to escape being converted into oxygen and is transferred to the surface of the star. This is an important process, because in order for these newly created elements to be made available to the universe at large, they need to escape the star. Since the core of stars like this will end up as a white dwarf, the elements created at the core will remain there, locked away. If they can get to the surface, however, then later in the star's life when it blows off its outer layers as a planetary nebula, the newly forged elements are sent into the interplanetary medium, where they can be recycled in new episodes of star (and planet) formation.

So, we have already identified the origins of the two most abundant elements in the universe: hydrogen and helium. What is the third most abundant? The answer is oxygen. There are about 85 oxygen atoms for every 100,000 hydrogen atoms in the universe at large. We know how oxygen gets formed: carbon-12 collides with helium-4 to form oxygen-16 in the hearts of massive stars. However, this usually happens at a depth where convection does not reach. However, if the star is massive enough, other reactions will occur when the helium in the core is exhausted, and oxygen burning will occur in a shell around the core. Eventually, a core rich in iron will be produced and the star will go supernova. Since the oxygen is produced outside what is now the core, the oxygen is blasted out into interstellar space by the force of the supernova explosion.

Carbon is the fourth most abundant element, with about 36 atoms for every 100,000 hydrogen atoms. Carbon, as we have already discussed, is produced through the triple-alpha reaction, and is released through planetary nebulae. It is also released through supernovae in a manner similar to oxygen.

The fifth most abundant element is neon with an abundance of 12 atoms for every 100,000 hydrogen atoms. Neon is produced when oxygen-16 and helium-4 collide, and it is released when the star explodes.

The sixth most abundant element is nitrogen, with an abundance of 11 atoms for every 100,000 hydrogen atoms. Nitrogen, however is produced via a very different mechanism than any of the other elements we have so far discussed. With an atomic weight of 14, you cannot get there from carbon and helium. However, there is a way that many stars slightly more massive than our sun produce nitrogen. Our sun fuses hydrogen into helium via the proton-proton chain. This is a fairly simple reaction whereby two protons fuse to form deuterium, then a proton hits the deuterium atom to form helium-3. Finally, two helium-3 nuclei collide to form helium-4 and two protons, thus starting the process over again. However, if conditions are slightly hotter, a different process becomes dominant. This is called the CNO cycle, and it uses carbon and nitrogen to catalyze the process. It goes like this. First, a proton hits a carbon-12 nucleus to produce nitrogen-13. Nitrogen-13 quickly decays to carbon-13. The carbon-13 is hit by another proton to form nitrogen-14. Nitrogen-14 is then also hit by a proton to form oxygen-15. Oxygen-15 decays to nitrogen-15, which is then hit by a proton to form carbon-12 and helium-4. When the process reaches equilibrium, there are about equal amounts of the four stable isotopes (carbon-12, carbon-13, nitrogen-14, and nitrogen-15) around. Some of the nitrogen gets dredged up to higher layers during the red giant stage, to get cast into the interstellar medium when the star becomes a planetary nebula.

Our next stop on the top ten is magnesium. There are approximately 4 magnesium atoms for every 100,000 hydrogen atoms in the universe, making magnesium the 7th most abundant element. Magnesium can be formed in one of two main ways. Either two carbon-12 nuclei collide to form magnesium-24, or a neon-20 collides with a helium-4 to form magnesium-24. Magnesium is released through supernovae explosions.

Number 8 on the top ten is silicon. Silicon is almost as abundant as magnesium at 4 atoms for every 100,000 hydrogen. It is produced by combining carbon-12 and oxygen-16 into silicon-28 and ejected into the galaxy by supernovae explosions.

Our number 9 element is iron. Iron has an abundance of about 3 atoms for every 100,000 hydrogen atoms. It is the end product of all fusion. Since iron-56 is the most tightly bound atomic nucleus, it takes energy to fuse iron into heavier elements and to split iron into lighter elements. In high mass stars, iron is generally produced when two silicon nuclei fuse. However, most of the mass of iron remains in the core, eventually getting trapped in a neutron star or black hole, as opposed to lighter elements, which are getting produced outside the core. For instance, supernova 1987A in the Large Magellanic Cloud, ejected into the galaxy about 1.6 solar masses of oxygen, but only 0.075 solar masses of iron. Where,

then does the iron come from? To answer that, I need to digress a bit and talk about supernovae.

Astronomers classify supernovae into two main types, called type I and type II. This classification was made when spectroscopes were first turned on supernovae, and arose out of what they saw. Basically, the difference is that hydrogen is present in type II supernovae, but not in type I. Type I supernovae are further subcategorized into type Ia, Ib, and Ic, with the difference stemming from abundances in other elements in the spectra. From a physical prospective, types Ib, Ic, and II are all the result of a massive star exploding when it accumulates too much iron in its core. The main difference between them arises from whether or not the outer shell of the star is blown off by the time this happens. If it is, the result is a type Ib or Ic supernova, otherwise it is a type II supernova. All of the supernovae that I have been talking about in this article so far have been of this type. Type Ia supernovae, however, are quite different. A type Ia supernova occurs when a white dwarf accumulates enough mass to exceed the Chandrasekhar limit of 1.4 solar masses. Since white dwarves are generally made up primarily of carbon and oxygen, when this limit is reached, it triggers a runaway fusion reaction of the carbon and oxygen which culminates in nickel-56. Nickel-56 is radioactive and decays with a half-life of 6 days into cobalt-56. Cobalt-56 is likewise radioactive, decaying with a half-life of 77 days into iron-56. Since the progenitor star is essentially destroyed, all of the resultant material is released into the galaxy. Type Ia supernovae are quite efficient at producing iron. Of the 1.4 solar masses of the star, about 0.6 solar masses of iron are produced. Thus, the mechanism for releasing iron differs from that for most other elements.

To round out our top 10, we have sulfur. Sulfur has an abundance of about 2 atoms for every 100,000 hydrogen atoms. Sulfur is produced when two oxygen-16 atoms fuse to produce sulfur-32. It is generally ejected in type Ib, Ic, and II supernovae.

Elements lighter than iron are generally all produced in manners similar to those for the top 10 most abundant elements. These generally involve fusion reactions that are less probable than those I described above. There are a few

exceptions, such as beryllium and boron. Since these two elements lie in the gap between helium and carbon, there are no good fusion reactions that can produce them. With these two elements, it is thought that they are produced mainly when heavier elements are broken up in interstellar space by cosmic ray impacts.

How are elements heavier than iron produced? Simple fusion is no longer the answer. It was here that a landmark paper by Geoffrey Burbidge, Margaret Burbidge, William Fowler, and Fred Hoyle pointed the way to the answer. This ambitious paper sought to explain the relative abundances of all elements found in the universe. For those elements heavier than iron, it introduced two different processes that explained the situation very well. They are called the s-process and the r-process.

The s-process and the r-process both suppose that a source of free neutrons exist. Since neutrons are not charged, they can be captured by a nucleus quite easily. The difference between the two lies in the fact that the s-, or slow process assumes that neutrons are absorbed infrequently, and that if the nucleus is unstable, ample time exists for it to decay. This results in a slow buildup of isotopes heavier than iron. A neutron will be absorbed, and if the nucleus is stable, nothing more happens. If the nucleus is unstable, it beta decays, emitting an electron and a neutrino, and changing the neutron into a proton, and thus the next heavier element is created. Elements such as barium, lead, tin, and indium are commonly created in this manner.

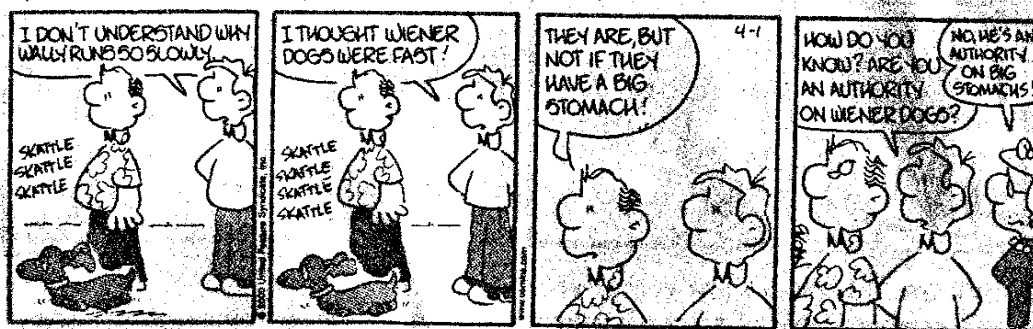
While the s-process occurs in the relatively quiet environment of a red giant star, the r-process happens in a much more violent place. The r-, or rapid, process assumes that the nucleus is bombarded by a flood of neutrons, and thus absorbs many of them before it has a chance to decay. This allows the r-process to create elements and isotopes that the s-process can't because if a stable isotope of an element exists that is heavier than an unstable one, that isotope can't be formed by the s-process. As you may have guessed, the only environments that can produce large numbers of free neutrons quickly are supernovae. Elements such as gold and platinum are made almost exclusively by the r-process.

Well, that concludes this issue. Next time, I will talk about the structure of our galaxy.

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Standby Calls

None this issue.