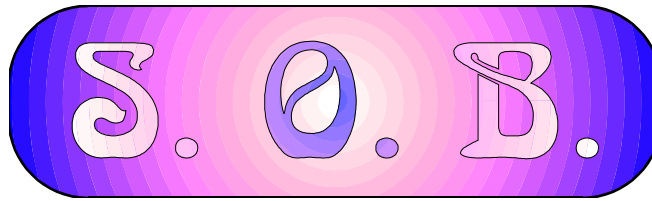


Number 172

August, 2011



Notes from Hades

I had a short trip to Geneva the week of July Fourth, but didn't get to do any sightseeing, since I had meetings every day I was there, including the day I arrived. It was a busy trip, but quite productive.

Most of the activity has been taking place at home. I have become quite active in my sons' Cub Scout pack, assuming the Committee Chair position, organizing the annual Pinewood Derby (where the scouts design small wooden cars from kits and race them down an inclined track). I am also volunteering at our district's summer day camp, which takes place the week after I write this. I'm in charge of the science program, which will include water rockets and solar observing. It's more than enough to keep me busy.

This issue, Basset has completed, with Eric Brosius gaining his third Outpost victory in *S.O.B.* Congratulations! With the completion of Basset, I am down to only 8 active games. As such, I will start launching games as soon as I have the necessary game fees until I am back up to 12.

The next deadline is **Tuesday, August 23 at 5:00 p.m. Pacific Time. Please do not call or fax orders after 10:00 p.m. Pacific time.** My wife and I tend to retire early. Also, if you want to fax in orders, call first. We hang up on unannounced faxes.

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Game Openings

Purebred. Machiavelli. Have Ward Narhi(\$), Bob Robles(\$), Pasquale Giovine, Walt O'Hara, Mike Scott, Kevin Wilson(\$), Jerry Roalstad, Jack McHugh. This game is full and will start as soon as all game fees are received.

Golden Retriever. Seafarers of Catan. Have Chris Geggus(\$), Dave Hooton, Mike Scott, Bill Scharf(\$). Will take up to 2 more.

Rottweiler. Industrial Waste. Have Andy York(\$), Eric Brosius(\$), Richard Weiss(\$), will take up to 1 more. **Starts next issue with whoever is signed up**

and paid.

Pick of the Litter. Silverton. Have Dave Hooton, Paul Bolduc(\$), will take up to 4 more.

Russian Wolfhound. Kremlin. Have Walt O'Hara, Mike Scott, Bob Robles(\$), Bill Scharf(\$), Jack McHugh. Will take up to 1 more.

Dog Show. Outpost. Have Eric Brosius(\$), Andy York(\$), Andy Lewis, Dave Hooton(\$), Bill Scharf(\$), Kevin Wilson(\$), Dave Hood, will take up to 3 more.

Portuguese Water Dog. Goa. Have Brad Martin(\$), Chris Geggus(\$), will take up to 2 more.

Dachshund. Age of Renaissance. This will use the EuroGames rules. Have Paul Bolduc(\$), Chris Geggus(\$), Bob Robles(\$), Jack McHugh, will take up to 2 more. Players who have a (\$) after their name have paid the necessary game fee.

Wish List

Power Grid. Players will have the choice of 10 maps and several deck options. Have Dave Hooton, Chris Geggus, will take up to 4 more.

Phoenicia. A game similar to Outpost set in ancient times. Have Cary Nichols, Andy York, will take up to 8 more.

Puerto Rico. Will start after Plantation Dog ends. Have Chris Geggus, will take up to 4 more.

Machiavelli. This game will start after the next Machiavelli game finishes. Have Bob Robles, will take up to 7 more.

Gunboat Machiavelli. This game will start after the second Machiavelli game finishes. Have 1, will take up to 7 more. This box will be checked if you have signed up.

Robo Rally. Map to be decided. Have Chris Geggus, Brendan Whyte, will take up to 6 more.

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-subscribers.

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

Chris Hassler a.k.a. Cerberus

2000 S. Armour Court

La Habra, CA 90631

Phone: (562) 690-7827, Fax: (562) 690-7827

chassler@roadrunner.com

On the Web at: <http://www.sob-zine.org>

Subscriptions cost \$3.00 per issue (\$4.50 overseas).

Barking Up the Wrong Tree

Summer 1259

Miller Number 2007Bpw10

Advanced Rules, Natural Disasters, Special Military Units, Conquest, Gray Press, Ultimate Victory

Deadline Fall 1259 8/23, Tuesday

Aragon and Milan engage in a massive naval battle with both sides giving way at different points. Venice consolidates a line against Milan in the north, giving up Como to gain Tyrolea. Florence and the Pope hold the line.

Spring 1259 Retreats

Aragon F Ligurian Sea retreats to Piombino

Orders

ARAGON (Scharf): F PROVENCE supports F Piombino to Ligurian Sea, F Gulf of Lions to CORSICA, F Sardinia supports F Gulf of Lions to Corsica (cut, DISLODGED, retreat Central Mediterranean, Gulf of Lions, OTB), F TYRRHENIAN SEA supports F Gulf of Lions

to CORSICA (cut), F Piombino to LIGURIAN SEA

FLORENCE (Whyte): A MODENA holds

MILAN (Renken): A Tyrolea to Milan (Dislodged, retreat Swiss, garrison,

OTB), A TURIN supports A Pavia to Como, A Pavia to COMO,

A PARMA to Cremona, F SAVOY to GENOA, F Ligurian Sea to

Tyrrhenian Sea (DISLODGED, retreat Gulf of Lions, SAVOY,

Lucca, OTB), F (EM) Corsica to SARDINIA, G PAVIA convert to

A
 PAPACY (Robles): A PISA holds, A BOLOGNA supports Florence A Modena, A FLORENCE supports A Pisa, A URBINO supports A Bologna, F Rome to PATRIMONY, G ROME convert to A
 VENICE (Partridge): A Como to TYROLEA, A MILAN supports A Como to Tyrolea (cut), A BERGAMO supports A Milan, A MANTUA to Cremona, A VERONA to Mantua, A CARINTHIA supports A Como to

Tyrolea, F Upper Adriatic to FERRARA

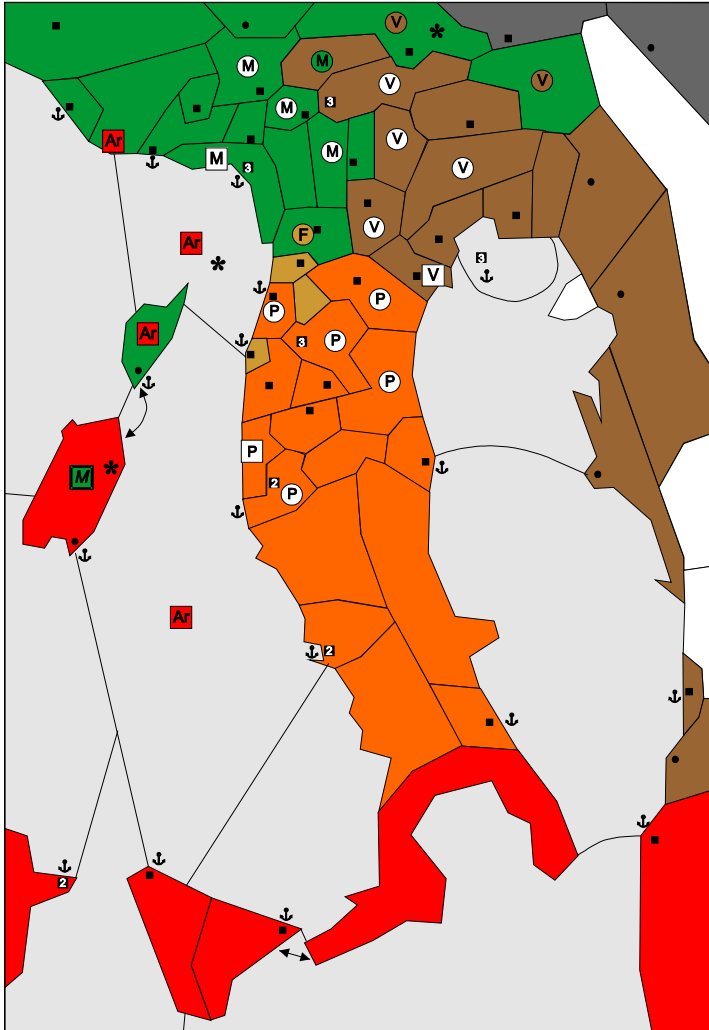
Your ducats:

Press

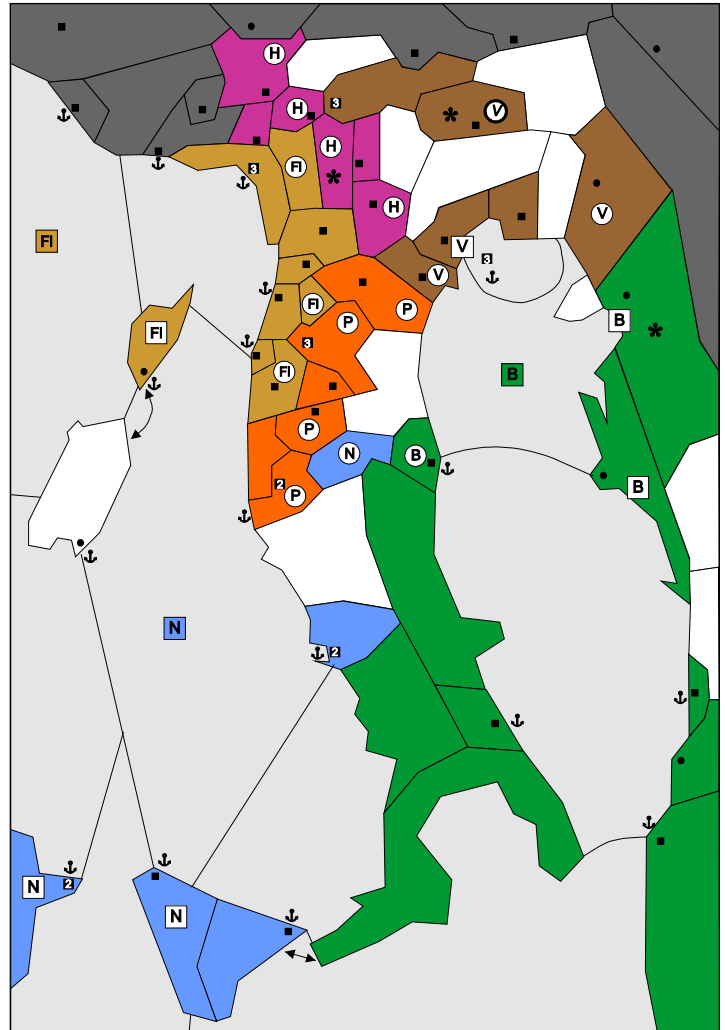
Aragon to Venice: If your fleet moved south...we're going to have problems.

Florence: <chantant> "moi en florence, toi en Franks, nos deux mondes sont differentes... et j'ai peur que la mien sera terminée trop tôt..."

Barking Up the Wrong Tree



Bolognese



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

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

Bolognese

Fall 1052

Miller Number 2010?????

**Advanced Rules, Special Military Units, Conquest, Gunboat, Gray Press, Ultimate Victory
 Deadline for Winter/Spring 1053 8/23, Tuesday**

The Byzantines continue to advance north along the Adriatic while Venice and the Holy Roman Empire continue their clash in the north. The Pope held a defensive position while Pisa and the Normans clash over Sardinia.

Summer 1052 Retreats

Venice F Upper Adriatic retreats to Venice

Orders

BYZANTINES □: A ANCONA supports Norman A Capua to Spoleto, F Upper Adriatic to CROATIA, F Lower Adriatic to UPPER ADRIATIC, F DALMATIA supports F Upper Adriatic to

Croatia

HOLY ROMAN EMPIRE □: A ANCONA supports Norman A Capua to Spoleto, F Upper Adriatic to CROATIA, F Lower Adriatic to UPPER ADRIATIC, F DALMATIA supports F Upper Adriatic to Croatia

NORMANS □: A Capua to SPOLETO, F TYRRHENIAN SEA to Sardinia, F PALERMO to Tyrrhenian Sea, F Central Mediterranean to

TUNIS
 PAPACY ☐: A BOLOGNA supports A Florence, A FLORENCE supports A Bologna, A Arezzo to PERUGIA, A ROME holds
 PISA ☐: A SIENNA to PISA, A PISTOIA to PISA, F GULF OF LIONS to Sardinia, F Ligurian Sea to CORSICA, A Modena to FORNOVA
 VENICE ☐: A Parma to Cremona (DISLODGED, retreat Milan, Modena, OTB), A FERRARA to Mantua, A (EM) Verona to TRENTO, A Friuli to CARNIOLA, F Venice to PADUA, F Croatia to Dalmatia (DISLODGED, retreat Istria, OTB)

Your ducats:

Notes

The Normans have conquered the Muslims. Tunis, Palermo, and Messina are now considered home areas of the Normans, and they gain the Muslim variable income die roll.

Press

Pisa – Normans: I had no reply to my proposal for islands so I took them. I remain to know your intentions as soon as possible.

Spring 1053 Income

Provinces and cities that are underlined do no produce income while those that are in italics could change hands depending on retreats.

Provinces

BYZ Aquila, Bari, Salerno, Otranto, Durazzo, Albania, Ragusa, Ancona, Dalmatia, Croatia 10
 HRE Montferrat, Pavia, Cremona, Mantua, Turin, Parma 6
 NOR Naples, Palermo, Messina, Spoleto, Turin 5
 PAP Bologna, Florence, Arezzo, Perugia, Patrimony, Rome 6
 PIS Genoa, Fornova, *Modena*, Lucca, Pisa, Piombino, Sienna, Pistoia, Corsica 9
 VEN *Milan*, Ferrara, Padua, Treviso, Trent, Carnola, *Istria* 7

S.O.B.

Seas
 BYZ Upper Adriatic 1
 NOR Tyrrhenian Sea 1
 PIS Gulf of Lions 1
 VEN Venice 1

Cities

BYZ Bari, Durazzo, Albania, Ragusa, Ancona, Dalmatia, Croatia 7
 HRE Montferrat, Pavia, Cremona, Mantua, Turin 5
 NOR Naples (2), Palermo, Messina, Turin (2) 6
 PAP Bologna, Florence (3), Arezzo, Perugia, Rome (2) 8
 PIS Genoa (3), *Modena*, Lucca, Pisa, Piombino, Sienna, Corsica 9
 VEN *Milan* (3), Ferrara, Padua, Treviso, *Trent*, Carnola, Venice (3) 11

Totals

Variable income die roll was 3.

	Variable	Provinces	Seas	Cities	Gross
BYZANTINES:	3	10	1	7	21
HOLY ROMAN EMPIRE:	3	6	0	5	14
NORMANS:	6	5	1	6	18
PAPACY:	3	6	0	8	23
PISA:	3	9	1	9	23
VENICE:	3	7	1	11	24

Game Summary

	1051	1052	1053
Byzantines:	3	4	7
Holy Roman Empire:	3	5	5
Normans:	1	3	4
Papacy:	3	4	5
Pisa:	3	5	7
Venice:	3	5	7

Pateel

**Turn 8, Funeral Commission through Parade
 Turn 9, Cure through Health, 8/23 Tuesday**

Funeral Commission

None

Replacement Phase

Anatol Mischif advances to Industry Minister by age. F becomes a Candidate by age.

Politburo

Office	Policitian	Condition	Influence
Party Chief	Petr Niewitko (D)	82, +, ?	3 (PaH)
KGB Head	Lech Schukrutoff (B)	80, ++, ?	
Foreign	Mikail Strychnin (T)	80, +	1 (BBC)
Defense	Antonj Talksalott (J)	71	6 (BBC)
Ideology	Victor Wasolin (Z)	60	5 (KMFC)
Industry	Anatol Mischif (I)	68	
Economy	Ulan Putschnik (Y)	62	1 (Fin)
Sport	Oleg Satin (O)	62	2 (Fin), 7 (BBC)

Candidates: F, P, U, V, W

Intrigue Cards

Rehabilitation Phase

Finlandia declares 1 IP on Putschnik. Putschnik rehabilitates X and R, aging to 62.

Parade Phase

Niewitko attempts to wave (dr = 4) and fails. Ages to 82.

People: X (61, ++), R (64)
 Siberia: L (68), N, M (66)
 Kremlin Wall: A, E, S, K, H, G, C, Q

Players

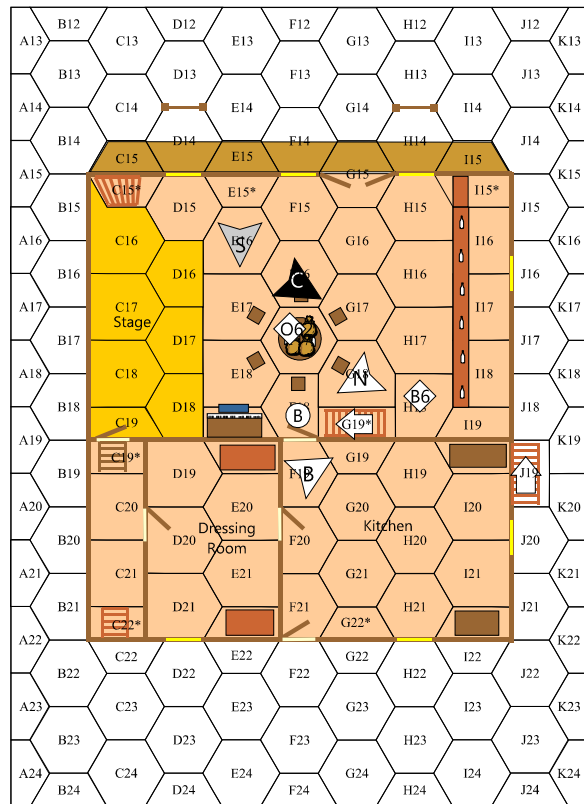
Player	Faction Name
Bob Robles	Karl Marx Fan Club
Ward Narhi	Finlandia
Pasquale Giovine	Bolshevics Born in Calabria
Mike Scott	The California Connection
Bill Scharf	People are Heroes
Brad Martin	Zapadniye Front

KMFC have one wave. ZF have one wave. PaH have one wave.

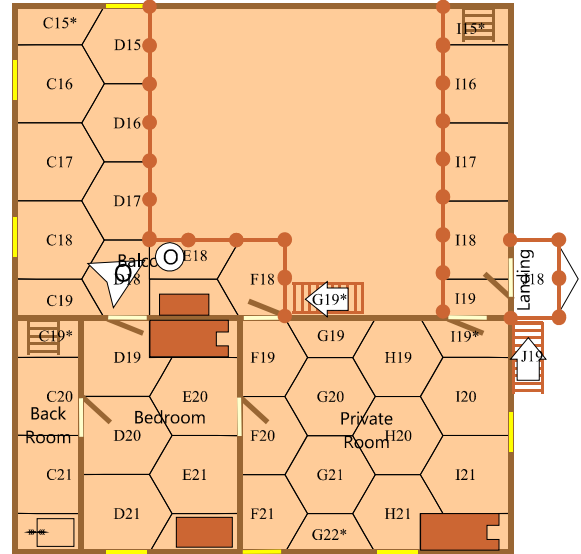
Undeclared Influence

Frontier Dog
Turn 18
Turn 19, 8/23 Tuesday

Frontier Dog



Frontier Dog
Second Story



- Hitching Post
- Stairs
- Door
- Window
- Player
- Gun
- Knife
- Bottle
- Money Bag
- Player (dead)
- Aim Points
- Player (down)
- Table
- Chair
- Head

Segment 1

- Old Man:** Card 5 – Cock/Aim/Shoot (Aim at F17), turn 1 of 2
- Banker:** Card 5 – Cock/Aim/Shoot (Aim at H18), turn 1 of 2
- NCO:** Card 1 – Advance (ahead right to H18), turn 1 of 2

Segment 2

- Old Man:** Card 5 – Cock/Aim/Shoot (Aim at F17), turn 2 of 2
- Banker:** Card 5 – Cock/Aim/Shoot (Aim at H18), turn 2 of 2
- NCO:** Card 1 – Advance (ahead right to H18), turn 2 of 2

Segment 3

- Old Man:** Card 6 – Cock/Aim/Shoot (Aim at F17), turn 1 of 2
- Banker:** Card 6 – Cock/Aim/Shoot (Aim at H18), turn 1 of 2
- NCO:** Card 2 – Run (ahead right to G18), turn 1 of 1, draw 2 delay cards (38 and 60), 2 delay points

Segment 4

- Old Man:** Card 6 – Cock/Aim/Shoot (Aim at F17), turn 2 of 2
- Banker:** Card 6 – Cock/Aim/Shoot (Aim at H18), turn 2 of 2
- NCO:** Delay

Segment 5

- Old Man:** Card (3) – Turn (straight ahead), turn 1 of 1
- Banker:** Card 7 – Shoot (does nothing), turn 1 of 1
- NCO:** Delay

End of Turn

NCO loses 1 delay point.

Westerners

Side	Player	Character	Location	Bonus Cards	Skills	Delay	Endurance	Comments
A	Paul Bolduc	Old Man (O)	UD18>UE18	5, 7, 8	BR +1		25	HEAD in UE18, 6 AIM points in F17
B	Andy Lewis	Shaggy (C)	F16>G17				0	DEAD
C	James Pratt	Banker (B)	F19>G19				20	HEAD in F18, 6 AIM points in H18
D	Mike Scott	Smith (S)	E16>E17	8	BR +2	N/A	0	SERIOUS 3, UNCONSCIOUS

E	Chris Geggus	NCO (N)	G18>F18	9	BR +1	1	16
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Weapons

Character	Holstered	Gun Hand	Other Hand	Both Hands	Ammo
Old Man	Knife	Empty	Empty	C36c, cocked	C36c: △△△△△⊗
Shaggy	Knife, Money Bag	C45, uncocked	Empty	Empty	C45: ⊗⊗⊗⊗⊗
Banker	None	SW45, cocked	Empty	Empty	SW45: ○○○○○⊗
Smith	Knife	C45c, cocked	Empty	Empty	C45c: △△△△△△△
NCO	SBR	C41, uncocked	Empty	Empty	C41: ⊗⊗⊗⊗⊗

Procyon

Turns 28.6 through 30.6
Turns 31.1 through 33.1, 8/23 Tuesday

Turn 28

6th: **Dave Partridge (Whynoms)**

Venus-Orion Oligarch Merchantile) Rolls Used: 5 5

Lonely Station – B – (R) – (Y) – B10 – (R10) – B10 – (Y) – B – (R) – Goliath(p).

Sells Impossible Furniture for \$180 plus \$70 demand (from the cup: Demand for Grease at 9a and Impossible Furniture at 8). Sells Impossible Furniture for \$180 (from the cup: Melf Pelts at 5). Sells Other Shoes for \$160 (from the cup: Servo-mechanism at 7b). Buys 2 Megalith Paperweights for \$180, the Portable Pipe Organ for \$80 and picks up the Fare to 5. Not for Hire receives

\$85 in port commissions and \$40 in factory commissions.

ZOOM: Rolls Used: 2 4 6 6

Jellybeast Landin(s) – Jellybeast Landing(p) – B – Jewel Port(p).

Sells Impossible Furniture for \$180 (from the cup: Canned Traits at 1b).

Buys Bionic Perfume for \$80, Guard Plants for \$60, and a Shield for \$60.

Not for Hire receives \$20 in port commissions and GEGS receives \$30 in factory commissions.

Turn 29

1st: **Andy Lewis (Humans/Mystery Machine 5) Rolls Used: 5 6 6**

Space Station Planet.

Sells Pedigree Bolts for \$200 (from the cup: Demand for Perfume at 3). Sells Chicle Liquor for \$90 plus \$60 demand (from the cup: Demand for Pelts at 6 and Bionic Perfume at 1a). Buys 2 Designer Genes for \$120 and a Life Project for \$160

2nd: **Paul Bolduc (Dell/Not for Hire) Uses Mulligan Gear: 3 becomes 4, Rolls Used: 5 * 3**

Jewel Port(p) – R – B – Y – B – R – B – Y – B – R – Rumble Port(p).

Sells Bionic Perfume for \$140 (from the cup: Melf Pelts at 5). Buys Visible Holes for \$100. Gains \$24 in port commissions.

3rd: **Bob Robles (Eeep/ep/Bender's Freedom Brigade) Rolls Used: 1 3 3**

Airhome(p) – A – R10 – A – A – TeleGate 1 – TeleGate 3 – A.

4th: **Andy York (Qossuth/Qossuth Entrepreneur Division) Rolls Used: 3 5**

Interstellar Biosphere – B – (R) – B – (R) – (Y) – Galactic Base – NC5 – TeleGate 6 – TeleGate 5 – Space Station.

5th: **Chris Geggus (Niks)**

Cutty Sark Rolls Used: 2 3 5 6

NC3 – R30 – NC3 – B20 – NC3 – R – Y – A – Dryport(p).

Sells Designer Genes for \$120 plus \$80 demand (from the cup: Visible Holes at 4c and Finest Dust at 4a). Buys Factory for \$200, and Glorious Junk for \$100. Receives \$50 in port commissions and \$50 in factory commissions.

Ganymede Enterprises Going South Rolls Used: 5 5

Y30 – B – (R) – A – Dryport(p).

Buys 3 Space Spice for \$90. Receives \$9 in port commissions.

6th: **Dave Partridge (Whynoms)**

Venus-Orion Oligarch Merchantile Rolls Used: 2 3

Goliath(p) – (R) – B – (Y) – B10 – (R10) – B – (Y) – B – (R) – Aerie.

ZOOM: Rolls Used: 5 5 5 6

Jellybeast Landin(s) – Jellybeast Landing(p) – B – Jewel Port(p) – R – B – Y – B – R – B – Y – B – R – Rumble Port(p) – Rumble Port(s).

Buys Rainfall for \$200.

Turn 30

1st: **Andy Lewis (Humans/Mystery Machine 5) Rolls Used: 1 6 6**

Space Station – Jump Start to TeleGate 1 – R20 – Y – Aerie – Y – R – B – R – B – Y – B – A – Ice Station(p).

Sells Designer Genes for \$120 plus \$120 demand (from the cup: Designer Genes at 9a and Chicle Liquor at 7a). Sells Designer Genes for \$120 plus \$60 demand (from the cup: Visible Holes at 4c and Space Spice at 2). Sells Life Project for \$240 (from the cup: Life Project at 9a). Buys Infinite Puzzles for \$120 and 2 Psychotic Sculptures for \$320. Not for Hire receives \$110 in port commissions and \$60 in factory commissions.

2nd: **Paul Bolduc (Dell/Not for Hire) Rolls Used: 5 * 3**

Rumble Port(p) – R – Y10 – B10 – R10 – Y – B – R – Bypass – R – Y – B – R – B – R – Y.

3rd: **Bob Robles (Eeep/ep/Bender's Freedom Brigade) Rolls Used: 5 6 6**

A – Jellybeast Landing(p).

Buys Bionic Perfume for \$80. Not for Hire receives \$8 in port commissions.

4th: **Andy York (Qossuth/Qossuth Entrepreneur Division) Rolls Used: 2 6**

Space Station.

Sells Custom Hives for \$220 (from the cup: Rock Videos at 4b). Sells Chicle Liquor for \$90 (from the cup: Demand for Genes at 10). Sells Chicle Liquor for \$90 (from the cup: Immortal Grease at 6). Buys Life Project for \$160 and

2 Designer Genes for \$120. Mystery Machine 3 gains \$80 in factory commissions.

5th: **Chris Geggus (Niks)**

Cutty Sark Rolls Used: 1 5 5 6

Dryport(p) – A – Y – R – B – R – B – Y – B – R – B – Y – R – B – Rainfall(p) – B – B – Rumble Port(p).

Sells Glorious Junk for \$200 (from the cup: Demand for Spice at 4b). Buys factory for \$200 and Spectral Analyzer for \$160. Receives \$80 in factory commissions, Not for Hire receives \$56 in port commissions.

Ganymede Enterprises Going South Rolls Used: 2 3

Dryport(p) – A – (R) – B – Y30 – (R30) – B30.

6th: **Dave Partridge (Whynoms)**

Venus-Orion Oligarch Merchantile) Rolls Used: 3 5

Aerie – (Y) – (R) – B – (R) – B – (Y) – B – A – Ice Station(p).

Sells Megalith Paperweight for \$160 (from the cup: Chicle Liquor at 7a).

Sells Megalith Paperweight for \$160 (from the cup: Voll Silk at 1b). Sells

Portable Pipe Organ for \$160 (from the cup: Other Shoes at 8). Picks up Fare to Base. Not for Hire receives \$48 in port commissions.

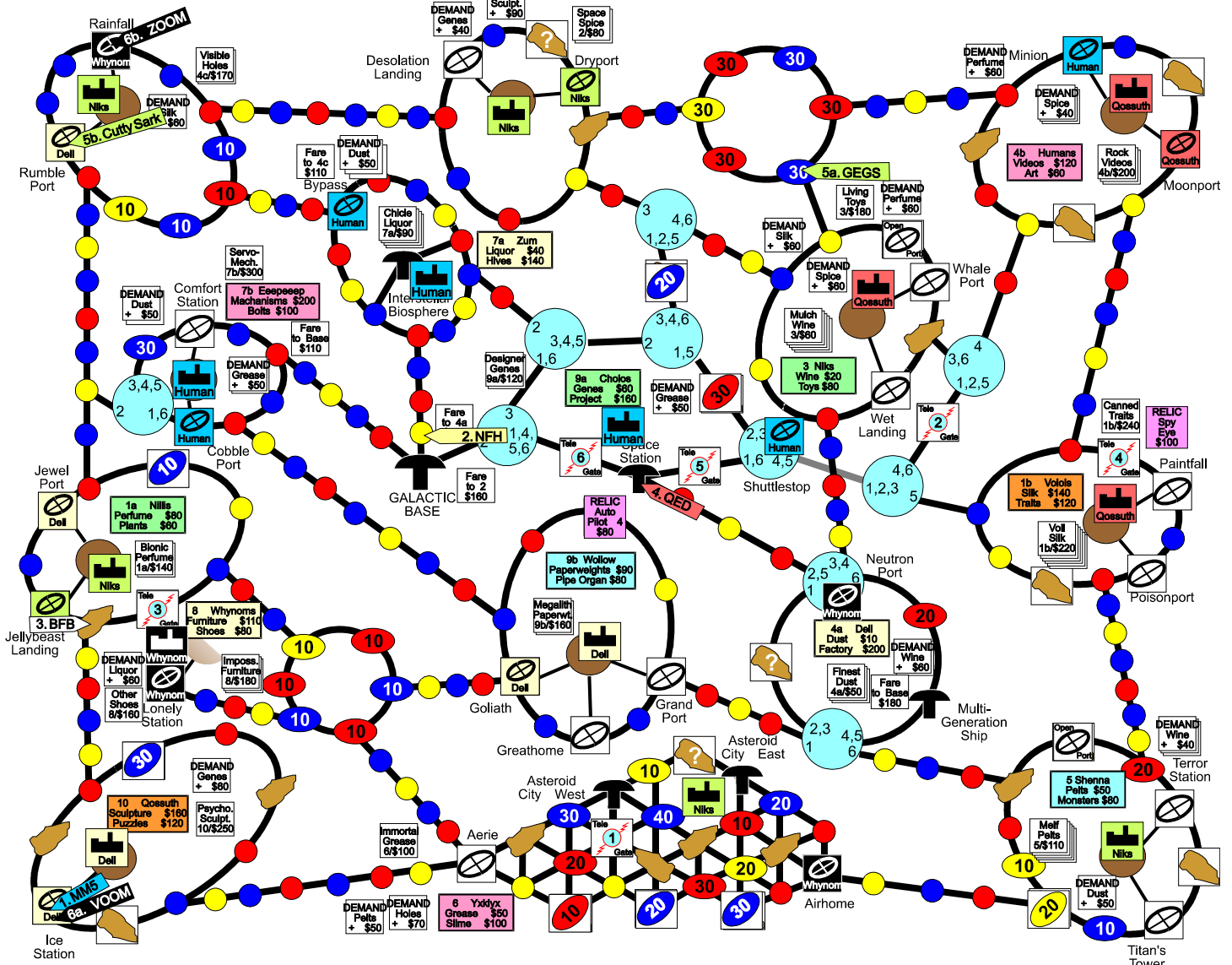
ZOOM: Rolls Used: 1 2 3 6

Rumble Port(s) – Rumble Port(p) – B – B – Rainfall(p).

Sells Guard Plants for \$140 (from the cup: Demand for Bionic Perfume at 4c).

Sells Bionic Perfume for \$140 plus \$60 demand (from the cup: Space Spice at

2 and Psychotic Sculpture at 10). Buys 2 Visible Holes for \$200. Gains \$54 in port commissions.



1. Mystery Machine 5				\$821
Transport				
31: 1 2 4 //32: 3 6 6//33: 2 3 6				
Hold1	Hold2	Hold3	Hull	
Psychotic Sculpture 10/\$250	Psychotic Sculpture 10/\$250	Infinite Puzzles 10/\$250	Shield (\$60)	
Cholos \$200	Cobble Port \$200	Eeepoop \$100	RELIC Jump Start \$120	
Shuttlestop \$200	Minion \$200	Bypass \$200	Zum \$200	

2. Not for Hire			\$731
Needle			
31: 1 1//32: 3 5 (use 1*3)			
Hold1	Hold2	Hull	
Visible Holes 4c/\$170		RELIC Mulligan Gear \$120	
Ice Station \$200	Qossuth \$200	Shield (\$60)	
Rumble Port \$200	Goliath \$200		
Wallow \$100	Jewelport \$200		

3. Bender's Freedom Brigade				\$860
Transport				
31: 3 5 6 // 32: 2 2 6				
Hold1	Hold2	Hold3	Hull	
Immortal Grease 6/\$100	Immortal Grease 6/\$100	Bionic Perfume 1a/\$140	1a \$80	
			RELIC Switch \$100	

Current status:

1a (Nillis): 2 Bionic Perfume

1b (Volois): 6 Voll Silk, Spy Eye Relic, Canned Traits

2 (Graw): Demand for Designer Genes (+\$40), Demand for Impossible Sculpture (+\$90), 2 Space Spice

3 (Niks): 1 Demand for Space Spice (+\$60), 5 Mulch Wine, 1 Demand for Voll Silk (+\$60), Living Toys, 1 Demand for Bionic Perfume (+\$60)

4a (Dell): 3 Finest Dust, 2 Demand for Mulch Wine (+\$60), Fare to Base (\$180)

4b (Humans): 3 Demand for Space Spice (+\$40), Demand for Bionic Perfume (+\$60), 3 Rock Videos

4c (Wraiths): Demand for Voll Silk (+\$60), 2 Visible Holes

5 (Shenna): 3 Demand for Mulch Wine (+\$40), 5 Melf Pelts, Demand for Finest Dust (+\$50)

6 (Yxklyx): Demand for Visible Holes (+\$70), Demand for Melf Pelts (\$50), 1 Immortal Grease

7a (Zum): 4 Chicle Liquor, 3 Demand for Finest Dust (+\$50), Fare to 4c (\$110)
7b (Eepeeep): 2 Demand for Immortal Grease (+\$50), 2 Demand for Finest Dust (+\$50), Fare to Base (\$110), 1 Servo-mechanism
8 (Whynoms): 3 Impossible Furniture, Demand for Chicle Liquor (+\$60), Other Shoes

9a (Chola): 2 Designer Genes, 1 Demand for Immortal Grease (+\$50)
9b (Wollow): 2 Megalith Paperweight
10 (Qossuth): Demand for Designer Genes (+\$60), 1 Psychotic Sculpture.
Base: Fare to 2 (\$160), Fare to 4a (\$140)

4. Qossuth Entrepreneur Division \$830
 Scow
 31: 3 3 3 5 //32: 1 2 2 6 (use 2)

Hold1	Hold2	Hold3	Hold4	Hull
Designer Genes 9a/\$120	Designer Genes 9a/\$120	Life Project 9a/\$240	Comb. Drive (\$300)	RELIC Spy Eye \$100
Niks \$200	Volois \$200	Moonport \$200	Human \$100	RELIC Gate Lock \$100
				Shield (\$60)

5a. Ganymede Enterprises Going South \$661
 Freighter
 31: 4 5 //32: 3 5

Hold1	Hold2	Hold3	Hull
Space Spice 2/\$80	Space Spice 2/\$80	Red Drive (\$120)	Shield (\$60)
Shenna \$100	Yxklyx \$200	Jellybeast Landing \$200	
Nillis \$100	Dryport \$200	Graw \$200	Wraiths \$200

5b. Cutty Sark
 Clipper
 31: 2 3 4 6 //32: 2 3 4 5

Hold1	Hold2	Hull
Rock Videos 4b/\$200	Spectral Analyzer 4c/\$250	Shield (\$60)

6a. VOOM \$1957
 Merchantman
 31: 4 5 6 //32: 1 1 3 (use 2)

Hold1	Hold2	Hold3	Hold4	Hull
		Fare to Base \$150	Red Drive (\$120)	RELIC Yellow Drive \$80
Airhome \$200	Neutron Port \$200	Whynoms \$100	Fare to 5 \$110	
Lonely Station \$200	Rainfall \$200			

6b. ZOOM
 Clipper
 31: 4 4 5 5 //32: 1 1 4 4

Hold1	Hold2	Hull
Visible Holes 4c/\$170	Visible Holes 4c/\$170	Shield (\$60)

Basset

Turn 16

End of Game Statements, 8/23 Tuesday

Commander Actions

Lowreyville opens up the bidding on a Moon Base at 201 and gets it for 210 (MWa, MTi, Re11, Re12, NC18, NC20, OM30, MO45). Buys a population factor to man the Moon Base (Or3, Or4)
MMC opens the bidding on a Moon Base at 204 and gets it (MTi, Mi17, Mi17, Mi18, Mi19, Mi19, OM35, MO45). Buys 3 ore factories (MWa) and 4 population factors (Mi20).
Little Green Men opens the bidding on a Space Station at 120 and HBDC gets it for 138 (Or2, Or2, Or5, Wa6, Wa8, MWa, Ti8, Wa9, Re12, Re13, Re13, Re14, Re16). Opens the bidding on the second Space Station at 120 and BarterTown

gets it for 132 (Or4, Wa6, Wa7, Wa8, Ti9, Ti9, Ti9, Ti11, Ti11, Ti12, Re14, Re15, Mi17). Passes.
HOBO opens the bidding on Robots at 50 and gets it (Wa7, MO45). Buys 3 population factors (Re10, Re10, Re11).
ShaggyMobile buys 2 population factors (Ti10, Ti10)
Cosmic Nomads buys a research factory (MWa) and a robot (Or1, Wa9).
BarterTown transfers a robot from an ore factory to man the Space Station.
HBDC buys a population factor to man the Space Station (Wa10)

The Players

	Outpost Name	Commander	Factories	Upgrades	VP
1	MMC	Eric Brosius	OrF, OrF, OrF, OrF, OrF, WaF, WaF, WaF, WaF, TiF, TiF, TiF, TiF	HE, No, 3OL, Ec, Ou, SS, MB, MB	89
2	Lowreyville	Michael Lowrey	OrF, OrF, WaF, WaF, WaF, WaF, TiF, TiF, TiF, TiF, NCF, NCF	No, HE, 2Sc, Ou, Ec, SS, MB, MB	87
3	BarterTown	Andy York	OrF, OrF, WaF, WaF, WaF, WaF, TiF, TiF, TiF, TiF, ReF, ReF, ReF	HE, 2Ro, La, OL, SS	45
4	HOBO	Dave Hooton	OrF, OrF, WaF, WaF, WaF, WaF, ReF, ReF	No, DL, Wa, La, Sc, Ro, MB	44
5	Little Green Men	Dave Partridge	OrF, OrF, WaF, WaF, WaF, WaF, ReF	No, 2Ec, Wa, OL, Sc, La, Ro, SS	43
6	ShaggyMobile	Andy Lewis	OrF, OrF, WaF, WaF, WaF, WaF, TiF, TiF	2HE, Wa, 2Ou, PC	38
7	HBDC	Kevin Wilson	OrF, OrF, WaF, WaF, WaF, WaF, WaF, TiF, ReF, ReF, ReF	2DL, Wa, La, Ou, SS	37
8	Cosmic Nomads	Cary Nichols	OrF, OrF, WaF, WaF, WaF, WaF, WaF, ReF, ReF, ReF, ReF	2DL, No, Wa, Ec, La, Sc, Ro	35

HBDC is Heavenly Bodies Development Corporation. MMC is Mud Mining Corporation. HOBO is High Orbit Biological

Press

HBDC to The Rest: Someone needs to teach me the strategy to this game. I suck at it!

Notes

Since two players have gain more than 75 victory points, that's the game. Congratulations to Eric Brosius for his victory!

Hunter
Turn 13, Phases IV – VI, Turn 14, Phases I - III
Turn 14, Phases IV – VI, Turn 15 Phases I - III, 8/23 Tuesday
Turn 13

Operations

Red (Nichols) accepts claim #31 for \$320, operates claim #63 (\$50, 3 lumber), #31 (\$80, 6 gold). Delivers 1 lumber from Lumberton to Pueblo for \$200, and 6 gold from Cripple Creek to Pueblo for \$1650. Collects \$130 in passenger revenue. Hires a second prospector for \$400.

Orange (Hooton) operates #40 (\$40, depletes). Delivers 2 silver from Ouray to Denver for \$800. Collects \$400 in passenger revenue. Buys a 24 train for \$200.

Green (Longdin) operates #116 (\$30, depletes), #109 (\$20, 1 copper), #117 (\$50, 4 lumber). Delivers 8 lumber from Pinos Altos to El Paso for \$1600. Collects \$200 in passenger revenue.

Brown (Partridge) operates #76 (\$20, 3 coal), #36 (\$50, 1 silver), #75 (\$20, 2 coal), #67 (\$30, 3 coal), #72 (\$30, 4 coal). Collects \$410 in passenger revenue.

Blue (Scharf) operates #86 (\$20, 4 coal), #42 (\$40, 1 silver), #43 (\$50, 2 silver). Delivers 3 silver from Leadville to Denver for \$1200.

Aqua (Brosius) operates #119 (\$40, 3 coal), #58 (\$40, 2 lumber), #122 (\$20, 2 coal), #114 (\$30, 2 lumber). Delivers 1 coal from Cuba to Santa Fe for \$120, 2 lumber from Dolores to Santa Fe for \$320, and 3 coal from Farmington to Santa Fe for \$360. Collects \$90 in passenger revenue.

Determine Price Changes

Gold: -2 to \$250 Copper: +3 to \$280 Silver: Remains at \$400

	Denver	Salt Lake City	Pueblo	Santa Fe	El Paso
Lumber:	Remains at \$200	-1 to \$240	Remains at \$200	Remains at \$160	-2 to \$120
Coal:	Remains at \$120	Remains at \$100	Remains at \$80	-1 to \$100	Remains at \$140

Turn 14

Move Prospectors and Surveyors

Red (Nichols) surveys El Vado to Vallecitos and La Madera to Taos, prospects the deck and #66.

Orange (Hooton) surveys Mack to Cisco and Glenwood Springs to Orestod, prospects #28.

Green (Longdin) surveys La Madera to Taos, prospects #66

Brown (Partridge) surveys Steamboat Springs to Orestod and Steamboat Springs to Walden, prospects #78 and #54 (P+1).

Blue (Scharf) surveys Raton to Cimmaron, prospects #28.

Aqua (Brosius) surveys Gallup to McGaffey and Socorro to Butte Junction, prospects passenger line #18

Dispute Resolution

Red draws claim #69 (coal at Schofield) and has first right of refusal. Red and Green have a dispute over the La Madera to Taos line. Red: 8; Green: 4. Red wins, surveyor becomes +1. Red and Green also have a dispute over claim #66. Red: 3; Green: 5+3. Green wins, prospector becomes +1. Orange and Blue have a dispute over claim #28. Orange: 4+3 ; Blue: 9+1+3. Blue wins, prospector becomes +2. Red spends \$240, Orange spends \$200, Green spends \$60, Brown spends \$560, Blue spends \$320, and Aqua spends \$900.

The Players

Player	Color	Starting Location	Money	Trains	Snowplows	Personnel
Cary Nichols	Red	Denver	\$1,720	9, 15		S+1, S, P, P
Dave Hooton	Orange	Denver	\$1,100	9, 24	+2	S+2, S, P
Michael Longdin	Green	El Paso	\$6,260	9, 15, 24		S, S, P+1
Dave Partridge	Brown	Salt Lake City	\$3,355	9, 24		S, S, P+1, P
Bill Scharf	Blue	Pueblo	\$3,490	9, 15, 24		S+1, S, P+2
Eric Brosius	Aqua	Santa Fe	\$700	9, 15, 24	+3	S, S, P+1

Purchased Claims

#	City	Owner	Type	Goods	Operation
63	Lumberton	Red	Lumber	7	\$50
31	Cripple Creek	Red	Gold	6	\$80
47	Ouray	Orange	Silver	8	Depleted
108	Lordsburg	Green	Copper	11	Depleted
107	Santa Rita	Green	Copper	6	Depleted
109	Pinos Altos	Green	Copper	9	\$20
117	Cloudcroft	Green	Lumber	4	\$50
66	Vallecitos	Green	Lumber	N	\$30
25	Bingham	Brown	Gold	6	Depleted
68	Scofield	Brown	Coal	1	Depleted
26	Marysvale	Brown	Gold	1	Depleted
76	Craig	Brown	Coal	6	\$20
36	Eureka	Brown	Silver	2	\$50
75	Rangely	Brown	Coal	7	\$20
67	Coalville	Brown	Coal	3	\$30
72	Emery	Brown	Coal	4	\$30

#	City	Owner	Type	Goods	Operation
78	Bowie	Brown	Coal	N	\$40
54	Steamboat Springs	Brown	Lumber	N	\$40
49	Silverton	Blue	Silver	3	Depleted
86	Canon City	Blue	Coal	4	\$20
50	Silverton	Blue	Silver	N	\$50
42	Leadville	Blue	Silver	1	\$40
43	Leadville	Blue	Silver	2	\$50
28	Leadville	Blue	Gold	N	\$60
106	Cuba	Aqua	Copper	1	Depleted
119	Farmington	Aqua	Coal	10	\$40
58	Dolores	Aqua	Lumber	4	\$40
122	Lee Ranch West	Aqua	Coal	5	\$20
114	McGaffey	Aqua	Lumber	2	\$30

Purchased Passenger Lines

#	Type	Route	Payoff	Owner	Notes
3	A	Denver – Colorado Springs	\$50	Red	

#	Type	Route	Payoff	Owner	Notes
5	A	Denver – Pueblo	\$80	Red	
1	A	Denver – Boulder	\$20	Orange	
9	B	Denver – Leadville	\$120	Orange	
8	A	Denver – Leadville	\$260	Orange	1
4	A	El Paso – Deming	\$60	Green	
13	B	El Paso – Santa Fe	\$140	Green	
2	A	Salt Lake City – Provo	\$20	Brown	
16	B	Salt Lake City – Grand Jct.	\$250	Brown	2
11	B	Salt Lake City – Grand Jct.	\$140	Brown	3
6	A	Santa Fe – Albuquerque	\$90	Aqua	
18	C	Gallup – Santa Rosa	\$500	Aqua	

¹ Discard after 4 Leadville depletions

² Discard when 22 is taken. Good for \$250 toward card 22.

³ Discard when 20 is taken. Good for \$140 toward card 20 or 21.

Available Claims

#	City	Type	Claim	Operation
48	Ouray	Silver	\$60	\$40
89	Walsenburg	Coal	\$60	\$30

Available Trains

Type	# Available	Cost
9	0	\$80
15	2	\$120
24	3	\$200
42	8	320
72	8	\$500

S.O.B.

#	City	Type	Claim	Operation
97	Elizabethtown	Gold	\$140	\$40
74	Elk Springs	Coal	\$60	\$20
38	Aspen	Silver	\$100	\$40
56	Hot Sulphur Springs	Lumber	\$60	\$30
73	Hiawatha	Coal	\$60	\$20
69	<i>Scofield</i>	<i>Coal</i>	<i>\$40</i>	<i>\$30</i>

Claims in italics are under first right of refusal.

Available Passenger Lines

#	Type	Route	Payoff	Cost	Notes
14	B	El Paso – Albuquerque	\$220	\$405	
21	C	Salt Lake City – Colorado Springs	\$600	\$930	
20	C	Salt Lake City – Pueblo	\$600	\$930	
10	B	Denver – Aspen	\$130	\$250	
12	B	Pueblo – Grand Jct.	\$150	\$310	4
23	C	Salt Lake City – Santa Fe	\$900	\$1340	
7	A	Pueblo – Santa Fe	\$120	\$280	

⁴ Discard when 20 is taken. Good for \$150 toward card 20 or 21.

Available Snowplows

Type	# Available	Cost
Die +2	2	\$40
Die +3	3	\$80
Die +4	5	\$140
Die +5	6	\$200

Dogbreath

Epoch IV Guptas, Goths, and Huns

Epoch IV Byzantines, T'ang Dynasty, Arabs, and Khmers, 7/12 Tuesday

Marching Through the Ages (Lewis) plays Rebellion in the Eastern Deccan (vs. rebellion; A: 3, 1; D: 4; loses). **BYZANTINES:** Army and Capital Balkans (Greek armies eliminated), army Western Anatolia (vs. Goths; B: 5, 3; G: 2, 2; wins), Danubia (vs. Goths; B: 5, 2; G: 1; wins, fleet Black Sea unsupported), fleet Black Sea, army Dalmatia (vs. Goths; B: 2, 1; G: 4, 2; loses), Dalmatia (vs. Goths; B: 6, 1; G: 4, 3; wins), Northern Appenines (vs. Goths; B: 5, 1; G: 3; wins), Southern Appenines (vs. Goths; B: 4, 3; G: 6; loses), Southern Appenines (vs. Goths; B: 6, 5; G: 6; B: 5, 1; G: 1; wins, city eliminated), Eastern Anatolia (vs. Huns; B: 4, 3; H: 3, 1; wins), fleet Western Mediterranean (vs. RHMS; MTtA: 6, 2; RHMS: 2; wins), army Shatts Plateau (vs. Carthaginians; B: 6, 3; C: 6, 3; B: 5, 2; C: 4, 4; wins, Capital reduced to city). Points: Dominance in Middle East (6), Southern Europe (6), Presence in North Africa (2), China (3), Northern Europe (2), 1 Capital (2), 2 cities (2), 2 Seas (2), and 3 Monuments (3) for 28 points.

Royal Manticoran Historical Society (Wilson) plays Sub-Saharan Migrants in Central Africa and East Africa. Plays Jewish Revolt in Palestine (vs. Assyria; J: 3,

2, 1; A: 3; J: 4, 3, 1; A: 3; wins, city and fort placed). **T'ANG DYNASTY:** Army and Capital Yangtse Kian (Han army retreats to Si-Kyang), Great Plain of China (vs. Sassanids; T: 2, 1; S: 6; loses), Great Plain of China (vs. Sassanids; T: 5, 2; S: 5; T: 4, 4; S: 5; loses), Great Plain of China (vs. Sassanids; T: 1, 1; S: 6; loses), Great Plain of China (vs. Sassanids; T: 4, 1; S: 2; wins, city eliminated), Chekiang (vs. Han Dynasty; T: 3, 1; H: 5; loses), Chekiang (vs. Han Dynasty; T: 6, 5; H: 5, 3; wins), Wei River (vs. Sassanids; T: 2, 2; S: 3; loses), Wei River (vs. Sassanids; T: 4, 2; S: 6; loses), Wei River (vs. Sassanids; T: 4, 4; S: 5; loses), fleet South China Sea (vs. The Questioner; RMHS: 5, 3; Q: 4; wins). Points: Dominance in North Africa (4), Presence in Middle East (3), China (3), India (3), Southern Europe (3), Northern Europe (2), 1 Capital (2), 2 cities (2), 3 Seas (3), 6 Monuments (6) for 31 points.

Arachnids (Bolduc) NMRs! Have ARABS.

KHMERS are absent.

Players

Player Name	Player Faction Name/Color	Empire Strength Points	Victory Points
Chris Geggus	Great Explorers Grabbing Samples (yellow)	32	78
Andy Lewis	Marching Through the Ages (red)	33	68
Dave Partridge	The Questioner (green)	39	77
Dave Anderson	Time Traveler (orange)	39	76
Paul Bolduc	Arachnids (blue)	40	52
Kevin Wilson	Royal Manticoran Historical Society (purple)	48	107

Notes

Will Andy York please submit standby orders for the Arachnids!

Positions

Arachnids: NILE KINGDOM: Army, city, and fort Upper Nile. MAURYA: Armies Sumatra, Mekong.

Time Traveler: MACEDONIANS: Army and city Lower Tigris, Lower Indus, armies Persian Salt Desert, Western Ghats. KINGDOM: Army, city, fort Malayan

Peninsula. HUNS: Army and Monument Zagros, Tarim Basin, Central Europe, armies Eastern Steppe, Western Steppe, Dniepr, Caucuses, Baltic Seaboard, Lower Rhein, Northern Gaul.

Marching Through the Ages: Fleets Black Sea, Western Mediterranean. ASSYRIA: Army Palestine. SASSANIDS: Army, city, and Monument Great Plain of China, army and Monument Upper Tigris, army Wei River. BYZANTINES: Army and Capital Balkans, army, city, and Monument Shatts Plateau, army and Monument Southern Appenines, armies Northern Appenines, Dalmatia, Danubia, Western Anatolia, Eastern Anatolia.

Royal Manticoran Historical Society: Fleets Red Sea, Eastern Mediterranean. CARTHAGINIA: Army and Monument Nile Delta, armies Libya, Nubia, Southern Iberia. MAYANS: Two armies and Capital Central America. ROMANS: Army, city, and Monument Crete, two armies and Monument Middle Tigris, Ganges Delta, army and Monument Albion, armies Central Massif, Levant, Ganges Plain.

The Questioner: Fleets South China Sea, Bay of Bengal. PERSIA: Army Eastern Ghats. HAN DYNASTY: Armies Yellow River, Yangtse Kian, Chekiang, Si-Kyang, Szechuan, Irrawaddy. GUPTAS: Army and Monument Persian Plateau, armies Western Deccan, Upper Indus, Hindu Kush, Turanian Plain.

Great Explorers Grabbing Samples: SCOTTS: Army, city, and fort Highlands. REBELLION: Army, city, and Monument Eastern Deccan. GOTHS: Army and Monument Morea, armies Pindus.

Epoch V Empire Draw

Event Cards

Plantation Dog

Turn 10

Turn 11, 8/23 Tuesday

Andy L. selects the Captain, gains 1 doubloon, and delivers 4 coffee to Ship 2 for 5 VP, Paul delivers 1 indigo to Ship 1 for 1 VP, Chris delivers 2 indigo to Ship 1 for 2 VP, Richard delivers 2 coffee to Ship 2 for 3 VP, Andy Y. delivers 1 corn to Ship 3 for 1 VP (Ship 3 sails), Andy L. delivers 1 indigo to Ship 1 for 1 VP, Richard delivers 1 indigo to Ship 1 for 2 VP.

Paul selects the Builder and builds Tobacco Storage (1 doubloon, 3 Quarries, Builder bonus), Chris builds a Sugar Mill (3 doubloons, 1 Quarry), Richard passes. Andy Y. passes, Andy L. passes.

Chris selects the Trader and trades sugar for 2 doubloons plus 1 bonus doubloon.

Richard selects the Craftsman, and produces 3 coffee, 1 indigo, and 2 corn, Andy Y. produces 4 sugar and 1 corn, Andy L. produces 1 indigo and 4 corn, Paul produces 1 sugar and 2 indigo, and Chris produces 2 tobacco, 1 sugar, 2 indigo, and 1 corn, and receives 3 doubloons from the Factory.

Andy Y. selects the Mayor, and places colonists on sugar plantation and 2 in San Juan, Andy L. places a colonist on a sugar plantation, Paul places a colonist on Tobacco Storage, Chris places a colonist on the Indigo Plant, and Richard places a colonist in San Juan

The Players

Player Name	Role	Plantations	Buildings	San Juan	Doubloons	Stored Production	VP
Paul Bolduc	Builder	Indigo, Indigo, Quarry, Quarry, Quarry, Coffee, Sugar	Connection Hut, Indigo Plant (2), Small Sugar Mill, Church, Large Market, Tobacco Storage (1)		4	1 Sugar, 2 Indigo	6
Chris Geggus	Trader	Indigo, Quarry, Tobacco, Corn, Sugar, Indigo, Tobacco	Indigo Plant (2), Aquaduct, Black Market, Tobacco Storage (2), Small Sugar Mill, Factory, Wharf, Sugar Mill		8	2 Tobacco, 1 Sugar, 2 Indigo, 1 Corn	9
Richard Weiss	Craftsman	Indigo, Coffee, Quarry, Corn, Quarry, Coffee, Corn	Small Market, Coffee Roaster (2), Small Indigo Plant, Harbour, Small Sugar Mill	3	8	3 Coffee, 1 Indigo, 2 Corn	9
Andy York	Mayor	Corn, Sugar, Sugar, Tobacco, Sugar, Sugar, Sugar	Sugar Mill (3), Small Sugar Mill, Small Indigo Plant, Small Warehouse	2	4	8 Sugar, 1 Corn	21
Andy Lewis	Captain	Corn, Coffee, Coffee, Indigo, Corn, Quarry, Corn, Corn, Sugar, Sugar	Hacienda, Storehouse, Coffee Roaster (2), Small Indigo Plant, Trading Post		4	1 Indigo, 6 Corn	20

Player in bold is the Governor for next turn. Plantations and buildings in bold are manned. Buildings that can be manned by more than one colonist will have the number manning them in parentheses after the building name.

Available Items

Colonists: Supply: 14 Colonist Ship: 10 **Trading House:** Sugar **Victory Points:** 57

Cargo Ships: Ship 1 (capacity 6): 5 Indigo Ship 2 (capacity 7): 6 Coffee Ship 3 (capacity 8):

Commodities

Corn: 0 **Indigo:** 0 **Sugar:** 0 **Tobacco:** 7 **Coffee:** 0

Buildings

Column 1	Column 2	Column 3	Column 4
Small Indigo Plant (1d, 1VP)	Indigo Plant (3d, 2VP)	Tobacco Storage (5d, 3VP)	Guild Hall (10d, 4VP)
	Sugar Mill (4d, 2VP)	Lighthouse (7d, 3VP)	Residence (10d, 4VP)
	Hospice (4d, 2VP)	University (8d, 3VP)	Fortress (10d, 4VP)

Column 1	Column 2	Column 3	Column 4
	Guesthouse (4d, 2VP)	Library (8d, 3VP)	Customs House (10d, 4VP)
	Office (5d, 2VP)	Specialty Factory (8d, 3VP)	City Hall (10d, 4VP)
	Small Wharf (6d, 2VP)	Union Hall (9d, 3VP)	Cloister (10d, 4VP)
Forest House (2d, 1VP)	Large Warehouse (6d, 2VP)	Wharf (9d, 3VP)	Statue (10d, 8VP)

Roles

Builder, Captain, Craftsman, Mayor, Prospector (1d), Prospector (3d), Settler(2d), Trader

Plantations

Quarry, Forest (x12), Tobacco, Tobacco, Corn, Corn, Coffee, Sugar

Discard Pile: Tobacco, Tobacco, Indigo, Indigo, Indigo, Indigo, Tobacco, Tobacco, Coffee, Indigo, Coffee, Indigo, Sugar

Pedagoguery

Neutrinos are ephemeral things. Nearly massless, they interact with other matter only through the weak nuclear force and gravity. This gives them the ability of passing through other matter nearly unscathed. If we could see neutrinos with our own eyes, for example, the Sun would appear vastly different, as we would see the core where the nuclear reactions occur, not the photosphere where photons finally can escape the sun's matter. Thus, neutrinos can provide us with information not attainable through other means. However, it is this very property that makes detecting neutrinos so difficult. How do you build a detector for something that can pass through the entire Earth without a trace?

In order to detect neutrinos, you need large amounts of matter to detect the infrequent interaction of a neutrino with ordinary matter. One of the first large scale neutrino observatories was in the Homestake Mine in South Dakota. It consisted of a large tank of tetrachloroethylene (C_2Cl_4). It was built underground to shield it, somewhat, from the neutrinos that are generated when cosmic rays strike the upper atmosphere, since its primary purpose was to observe neutrinos coming from the sun. If a neutrino of a sufficiently high energy hits a nucleus of chlorine 37, the chlorine atom can absorb it, spitting out an electron and transforming into argon 37, which can be periodically flushed out of the tank and measured.

The problem with this type of observatory, however, is twofold. First, it only detects relatively high energy neutrinos. The bulk of the neutrinos produced by the sun are produced during the proton-proton reaction when two protons interact and one of them undergoes reverse beta decay to become a neutron, spitting out a positron and a neutrino. Those neutrinos have much too low an energy to cause chlorine 37 to transform into argon 37. The second issue is that it only detects electron neutrinos. Neutrinos come in three "flavors", each paired with one of the three leptons in the standard model. So, you have the electron neutrino, the muon neutrino, and the tau neutrino. Add on top of that the strange ability of neutrinos to morph into other neutrino flavors. In addition, a neutrino can have one of three mass states, labeled 1, 2, and 3. The really weird thing, however, is that a given flavor does not imply a given mass, or vice versa. The mass determines how it propagates through space and the flavor determines how it interacts with matter.

The two states interact as the neutrino travels, causing the neutrino to assume different flavors as it travels. When it finally arrives at a detector, the ratio of neutrino flavors detected will tell the investigators something of what was originally produced. For example, simple beta decay, which produces only electron neutrinos, will be detected as a 5:2:2 ratio of electron, muon, and tau neutrinos.

Modern detectors get around the problems of the Homestake Mine detector by using ordinary matter, usually water, and photodetectors to detect the interactions of neutrinos with ordinary matter. The first of these, the Super-Kamiokande, situated in an old zinc mine north of Nagoya, Japan, is a giant spherical tank filled with 50,000 cubic meters of ultra pure water and surrounded by photodetectors. When a neutrino strikes a nucleus in the water, it will knock free a lepton that corresponds with its flavor. That particle will typically be traveling faster than the speed of light in water (but less than the speed of light in a vacuum), which produces Cherenkov radiation. The pattern of the Cherenkov radiation provides a clue to the identity of the particle that causes it.

A more recent, and more ambitious effort is called Icecube. It involves lowering strings of detectors deep into Antarctic ice over the space of a square kilometer. Overall, the detector volume is one cubic kilometer. Like Super-Kamiokande, it is the pattern of the Cherenkov radiation that tells us the type of particle that causes it, and thus the type of neutrino that was detected. Electrons produce light over a nearly spherical area. Muons, by contrast, interact less with their surrounding matter and produce a cone-shaped pattern over a much larger area. Tau particles are massive and highly unstable, so they produce two spheres of light – one where they are produced, and another where they decay.

These and other observatories in operation or planned over the globe are starting to give us a glimpse of the neutrino universe. They will undoubtedly provide information we cannot see in any other way, and the possibility of surprising results.

Next time, how Earth's history can help us identify extrasolar Earth-like planets.



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Standbys

Anybody who gets onto my standby list automatically receives one free issue of *S.O.B.* In addition, if you actually submit standby orders, you get another free issue. So, let's get those people standing by. The current standby list is:

Machiavelli (gunboat and regular): Steve Koehler, Bill Scharf, Bob Robles, Mike Scott, Ward Narhi, Paul Bolduc, Pasquale Giovine, Andy York, Cary Nichols, Lee McConnell, Dave Partridge, Dale Horsely, Brad Martin **Dune:** Steve Koehler, Paul Bolduc, Kevin Wilson, Ward Narhi, Andy York, Cary Nichols, Bill Scharf, Dave Partridge, Brad Martin **New World:** Andy York, Bill Scharf, Cary Nichols, Dave Partridge, Brad Martin **Merchant of Venus:** Paul Bolduc, Carrie Lewis, Bob Robles, Andy York, Cary Nichols, Dave Partridge **Outpost:** Michael Lowrey, Kevin Wilson, Andy York, Cary Nichols, Bill Scharf, Dave Partridge, Brad Martin **History of the World:** Andy Lewis, Paul Bolduc, Kevin Wilson, Chris Geggus, Andy York, Cary Nichols, Dave Partridge, Brad Martin **Stellar Conquest:** Paul Bolduc, Kevin Wilson, Andy York, Cary Nichols, Dave Partridge, Brad Martin **Liftoff!:** Dennis Cain, Andy York, Cary Nichols, Bill Scharf, Dave Partridge, Brad Martin **Age of Renaissance:** Bob Robles, Michael Lowrey, Cary Nichols, Dave Partridge, Michael Longdin, Brad Martin **Kremlin:** Andy York, Andy Lewis, Pasquale Giovine, Cary Nichols, Bill Scharf, Dave Partridge, Michael Longdin, Brad Martin **Silverton:** Cary Nichols, Bill Scharf, Dave Partridge, Brad Martin, Andy York, Eric Brosius **Settlers of Catan:** Michael Lowrey, Chris Geggus, Cary Nichols, Dave Partridge, Brad Martin, Andy York **Gunslinger:** none **Industrial Waste:** Michael Longdin, Brad Martin **Puerto Rico:** Brad Martin, Andy York **Power Grid:** Brad Martin, Andy York **Robo Rally:** Andy York

Standby Calls

Andy York for the Arachnids in Dogbreath.