



Note: Tracks are now grouped by subcluster and scaled. Switching in subcluster is indicated by changes in track color. Track scale is now set by default to display the region 30 bp upstream of start 1 to 30 bp downstream of the last possible start. If this default region is judged to be packed too tightly with annotated starts, the track will be further scaled to only show that region of the ORF with annotated starts. This action will be indicated by adding "Zoomed" to the title. For starts, yellow indicates the location of called starts comprised solely of Glimmer/GeneMark auto-annotations, green indicates the location of called starts with at least 1 manual gene annotation.

## Pham 193868 Report

This analysis was run 11/02/24 on database version 579.

Pham number 193868 has 109 members, 9 are drafts.

Phages represented in each track:

- Track 1 : Sujidade\_52, Lika\_51
- Track 2 : Unstoppable\_51, Bovely\_51, Hydra\_52
- Track 3 : Leviticus\_51, Legacy\_50, BeardedLady\_51, EnochSoames\_54, Jash\_53, Esperer\_51, BryanRecycles\_53, Phettuccine\_51, SunsetPointe\_50, Indigo\_50, Izzy\_53, Oliynyk\_53, Rusticus\_53, Nerdos\_50, Ozzie\_50, Caliburn\_50, Aaronocolus\_51
- Track 4 : Lannister\_53
- Track 5 : Asten\_53, Ejemplo\_51, Dwayne\_53, Maneekul\_53, Triste\_54, Werner\_53, Yasdnil\_53, Whatever\_53, OzzyJ\_55, Chucky\_53, Emaanora\_56, Hippo\_53, Snorlax\_53, BarryBee\_56, SarahRose\_53, TuanPN\_51, TagePhighter\_55
- Track 6 : Toma\_52, Danzina\_54, Goby\_52, Dattran\_54, Godpower\_53
- Track 7 : Celeste\_54, Brataylor\_55
- Track 8 : South40\_52, Katalie\_52
- Track 9 : Nanodon\_55
- Track 10 : Eddasa\_53
- Track 11 : Lorelei\_53, Nabi\_53, Rana\_53
- Track 12 : Zemlya\_53
- Track 13 : RedBear\_53
- Track 14 : Alvy\_59, TinaBelcher\_56, BartholomewSD\_59, TrvxScott\_55, Daudau\_55
- Track 15 : Animus\_56, Janus\_57, SqueakyClean\_57, GirlDinner\_56
- Track 16 : Jevington\_54
- Track 17 : Amethyst\_55, Diane\_55
- Track 18 : Haizum\_56, Nishikigoi\_56
- Track 19 : Paedore\_57, Loofah\_58, ELB20\_55
- Track 20 : R4\_56, Triumph\_58
- Track 21 : Issmi\_57
- Track 22 : Tefunt\_55
- Track 23 : Thestral\_58, Bowden\_56
- Track 24 : Pablito\_54
- Track 25 : Andris\_56
- Track 26 : Hank144\_58
- Track 27 : Marav\_56
- Track 28 : Omar\_59
- Track 29 : Paolo\_57, Zainub\_57
- Track 30 : Superstar\_62
- Track 31 : Puginator\_57

- Track 32 : Caelum\_58
- Track 33 : Celery\_59
- Track 34 : Verabelle\_58
- Track 35 : Provolone\_55
- Track 36 : Alsaber\_55
- Track 37 : Speedwell\_61
- Track 38 : Saftant\_53
- Track 39 : Amela\_55
- Track 40 : phiCAM\_53
- Track 41 : Vanseggelen\_60
- Track 42 : Kaine\_56, Conan\_55
- Track 43 : Pavo\_57
- Track 44 : Verse\_56
- Track 45 : Dexers\_53, ElGato\_55
- Track 46 : Yosif\_58
- Track 47 : VieEnRose\_52
- Track 48 : Itza\_52, Urza\_51
- Track 49 : Celia\_51

***Summary of Final Annotations (See graph section above for start numbers):***

The start number called the most often in the published annotations is 21, it was called in 81 of the 100 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- Aaronocolus\_51, Alsaber\_55, Alvy\_59, Amela\_55, Andris\_56, Asten\_53, BarryBee\_56, BartholomewSD\_59, BeardedLady\_51, Bowden\_56, Brataylor\_55, BryanRecycles\_53, Caliburn\_50, Celery\_59, Celeste\_54, Chucky\_53, Conan\_55, Danzina\_54, Dattran\_54, Daudau\_55, Dexers\_53, Dwayne\_53, ELB20\_55, Eddasa\_53, Ejemplo\_51, ElGato\_55, Emaanora\_56, EnochSoames\_54, Esperer\_51, Goby\_52, Godpower\_53, Hippo\_53, Indigo\_50, Issmi\_57, Izzy\_53, Jash\_53, Jevington\_54, Kaine\_56, Katalie\_52, Lannister\_53, Legacy\_50, Leviticus\_51, Lika\_51, Loofah\_58, Lorelei\_53, Maneekul\_53, Marav\_56, Nabi\_53, Nanodon\_55, Nerdos\_50, Oliynyk\_53, Ozzie\_50, OzzyJ\_55, Pablito\_54, Paedore\_57, Paolo\_57, Pavo\_57, Phettuccine\_51, Provolone\_55, Puginator\_57, R4\_56, Rana\_53, RedBear\_53, Rusticus\_53, Saftant\_53, SarahRose\_53, Snorlax\_53, South40\_52, Sujidade\_52, SunsetPointe\_50, TagePhighter\_55, Thestral\_58, TinaBelcher\_56, Toma\_52, Triste\_54, Triumph\_58, TrvxScott\_55, TuanPN\_51, Vanseggelen\_60, Verabelle\_58, Verse\_56, Werner\_53, Whatever\_53, Yasdnil\_53, Yosif\_58, Zainub\_57, Zemlya\_53,

Genes that have the "Most Annotated" start but do not call it:

- Bovely\_51, Hydra\_52, Speedwell\_61, Unstoppable\_51, phiCAM\_53,

Genes that do not have the "Most Annotated" start:

- Amethyst\_55, Animus\_56, Caelum\_58, Celia\_51, Diane\_55, GirlDinner\_56, Haizum\_56, Hank144\_58, Itza\_52, Janus\_57, Nishikigoi\_56, Omar\_59, SqueakyClean\_57, Superstar\_62, Tefunt\_55, Urza\_51, VieEnRose\_52,

**Summary by start number:**

Start 15:

- Found in 2 of 109 ( 1.8% ) of genes in pham
- Manual Annotations of this start: 1 of 100
- Called 50.0% of time when present
- Phage (with cluster) where this start called: Hank144\_58 (BD2),

Start 16:

- Found in 4 of 109 ( 3.7% ) of genes in pham
- Manual Annotations of this start: 4 of 100
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Celia\_51 (BD6), Itza\_52 (BD6), Urza\_51 (BD6), VieEnRose\_52 (BD6),

Start 18:

- Found in 12 of 109 ( 11.0% ) of genes in pham
- Manual Annotations of this start: 11 of 100
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Amethyst\_55 (BD2), Animus\_56 (BD2), Caelum\_58 (BD2), Diane\_55 (BD2), GirlDinner\_56 (BD2), Haizum\_56 (BD2), Janus\_57 (BD2), Nishikigoi\_56 (BD2), Omar\_59 (BD2), SqueakyClean\_57 (BD2), Superstar\_62 (BD2), Tefunt\_55 (BD2),

Start 20:

- Found in 68 of 109 ( 62.4% ) of genes in pham
- Manual Annotations of this start: 3 of 100
- Called 7.4% of time when present
- Phage (with cluster) where this start called: Bovely\_51 (BD1), Hydra\_52 (BD1), Speedwell\_61 (BD3), Unstoppable\_51 (BD1), phiCAM\_53 (BD3),

Start 21:

- Found in 92 of 109 ( 84.4% ) of genes in pham
- Manual Annotations of this start: 81 of 100
- Called 94.6% of time when present
- Phage (with cluster) where this start called: Aaronocolus\_51 (BD1), Alsaber\_55 (BD3), Alvy\_59 (BD2), Amela\_55 (BD3), Andris\_56 (BD2), Asten\_53 (BD1), BarryBee\_56 (BD1), BartholomewSD\_59 (BD2), BeardedLady\_51 (BD1), Bowden\_56 (BD2), Brataylor\_55 (BD1), BryanRecycles\_53 (BD1), Caliburn\_50 (BD1), Celery\_59 (BD3), Celeste\_54 (BD1), Chucky\_53 (BD1), Conan\_55 (BD3), Danzina\_54 (BD1), Dattran\_54 (BD1), Daudau\_55 (BD2), Dexers\_53 (BD3), Dwayne\_53 (BD1), ELB20\_55 (BD2), Eddasa\_53 (BD1), Ejemplo\_51 (BD1), ElGato\_55 (BD3), Emaanora\_56 (BD1), EnochSoames\_54 (BD1), Esperer\_51 (BD1), Goby\_52 (BD1), Godpower\_53 (BD1), Hippo\_53 (BD1), Indigo\_50 (BD1), Issmi\_57 (BD2), Izzy\_53 (BD1), Jash\_53 (BD1), Jevington\_54 (BD2), Kaine\_56 (BD3), Katalie\_52 (BD1), Lannister\_53 (BD1), Legacy\_50 (BD1), Leviticus\_51 (BD1), Lika\_51 (BD1), Loofah\_58 (BD2), Lorelei\_53 (BD1), Maneekul\_53 (BD1), Marav\_56 (BD2), Nabi\_53 (BD1), Nanodon\_55 (BD1), Nerdos\_50 (BD1), Oliynyk\_53 (BD1), Ozzie\_50 (BD1), OzzyJ\_55 (BD1), Pablito\_54 (BD2), Paedore\_57 (BD2), Paolo\_57 (BD2), Pavo\_57 (BD3), Phettuccine\_51 (BD1), Provolone\_55 (BD3), Puginator\_57 (BD2), R4\_56 (BD2), Rana\_53 (BD1), RedBear\_53 (BD1), Rusticus\_53 (BD1), Saftant\_53 (BD3), SarahRose\_53 (BD1), Snorlax\_53 (BD1), South40\_52 (BD1), Sujidade\_52 (BD1), SunsetPointe\_50 (BD1), TagePhighter\_55 (BD1), Thestral\_58 (BD2), TinaBelcher\_56 (BD2), Toma\_52 (BD1), Triste\_54 (BD1), Triumph\_58 (BD2), TrvxScott\_55 (BD2),

TuanPN\_51 (BD1), Vanseggelen\_60 (BD3), Verabelle\_58 (BD3), Verse\_56 (BD3), Werner\_53 (BD1), Whatever\_53 (BD1), Yasdnil\_53 (BD1), Yosif\_58 (BD3), Zainub\_57 (BD2), Zemlya\_53 (BD1),

### **Summary by clusters:**

There are 4 clusters represented in this pham: BD6, BD1, BD3, BD2,

Info for manual annotations of cluster BD1:

- Start number 20 was manually annotated 3 times for cluster BD1.
- Start number 21 was manually annotated 52 times for cluster BD1.

Info for manual annotations of cluster BD2:

- Start number 15 was manually annotated 1 time for cluster BD2.
- Start number 18 was manually annotated 11 times for cluster BD2.
- Start number 21 was manually annotated 20 times for cluster BD2.

Info for manual annotations of cluster BD3:

- Start number 21 was manually annotated 9 times for cluster BD3.

Info for manual annotations of cluster BD6:

- Start number 16 was manually annotated 4 times for cluster BD6.

### **Gene Information:**

Gene: Aaronocolus\_51 Start: 36535, Stop: 36260, Start Num: 21

Candidate Starts for Aaronocolus\_51:

(Start: 20 @36541 has 3 MA's), (Start: 21 @36535 has 81 MA's), (24, 36514), (28, 36481), (40, 36358),

Gene: Alsaber\_55 Start: 39807, Stop: 39556, Start Num: 21

Candidate Starts for Alsaber\_55:

(10, 40023), (Start: 21 @39807 has 81 MA's), (40, 39633), (46, 39573), (48, 39561),

Gene: Alvy\_59 Start: 41274, Stop: 41014, Start Num: 21

Candidate Starts for Alvy\_59:

(Start: 21 @41274 has 81 MA's), (25, 41253), (40, 41106),

Gene: Amela\_55 Start: 40778, Stop: 40527, Start Num: 21

Candidate Starts for Amela\_55:

(Start: 21 @40778 has 81 MA's), (23, 40772), (30, 40697), (40, 40604), (46, 40544), (48, 40532),

Gene: Amethyst\_55 Start: 39703, Stop: 39398, Start Num: 18

Candidate Starts for Amethyst\_55:

(Start: 18 @39703 has 11 MA's), (34, 39577), (38, 39538), (47, 39427),

Gene: Andris\_56 Start: 40198, Stop: 39935, Start Num: 21

Candidate Starts for Andris\_56:

(Start: 21 @40198 has 81 MA's), (22, 40195), (25, 40177), (28, 40150), (40, 40030),

Gene: Animus\_56 Start: 40829, Stop: 40485, Start Num: 18

Candidate Starts for Animus\_56:

(Start: 18 @40829 has 11 MA's), (34, 40703), (38, 40664), (41, 40619), (42, 40613), (47, 40553),

Gene: Asten\_53 Start: 38957, Stop: 38700, Start Num: 21

Candidate Starts for Asten\_53:

(Start: 20 @38963 has 3 MA's), (Start: 21 @38957 has 81 MA's), (24, 38936), (40, 38783),

Gene: BarryBee\_56 Start: 38979, Stop: 38722, Start Num: 21

Candidate Starts for BarryBee\_56:

(Start: 20 @38985 has 3 MA's), (Start: 21 @38979 has 81 MA's), (24, 38958), (40, 38805),

Gene: BartholomewSD\_59 Start: 40393, Stop: 40133, Start Num: 21

Candidate Starts for BartholomewSD\_59:

(Start: 21 @40393 has 81 MA's), (25, 40372), (40, 40225),

Gene: BeardedLady\_51 Start: 36909, Stop: 36634, Start Num: 21

Candidate Starts for BeardedLady\_51:

(Start: 20 @36915 has 3 MA's), (Start: 21 @36909 has 81 MA's), (24, 36888), (28, 36855), (40, 36732),

Gene: Bovely\_51 Start: 36544, Stop: 36263, Start Num: 20

Candidate Starts for Bovely\_51:

(Start: 20 @36544 has 3 MA's), (Start: 21 @36538 has 81 MA's), (24, 36517), (28, 36484), (40, 36361),

Gene: Bowden\_56 Start: 41221, Stop: 40961, Start Num: 21

Candidate Starts for Bowden\_56:

(Start: 21 @41221 has 81 MA's), (25, 41200), (28, 41173), (40, 41053),

Gene: Brataylor\_55 Start: 38348, Stop: 38091, Start Num: 21

Candidate Starts for Brataylor\_55:

(Start: 20 @38354 has 3 MA's), (Start: 21 @38348 has 81 MA's), (24, 38327), (28, 38294), (36, 38237), (40, 38171), (43, 38153),

Gene: BryanRecycles\_53 Start: 37025, Stop: 36753, Start Num: 21

Candidate Starts for BryanRecycles\_53:

(Start: 20 @37031 has 3 MA's), (Start: 21 @37025 has 81 MA's), (24, 37004), (28, 36971), (40, 36848),

Gene: Caelum\_58 Start: 39922, Stop: 39611, Start Num: 18

Candidate Starts for Caelum\_58:

(Start: 18 @39922 has 11 MA's), (43, 39697), (45, 39670), (47, 39646), (49, 39628),

Gene: Caliburn\_50 Start: 36639, Stop: 36364, Start Num: 21

Candidate Starts for Caliburn\_50:

(Start: 20 @36645 has 3 MA's), (Start: 21 @36639 has 81 MA's), (24, 36618), (28, 36585), (40, 36462),

Gene: Celery\_59 Start: 39939, Stop: 39688, Start Num: 21

Candidate Starts for Celery\_59:

(Start: 20 @39945 has 3 MA's), (Start: 21 @39939 has 81 MA's), (28, 39885), (32, 39843), (40, 39765), (46, 39705), (48, 39693),

Gene: Celeste\_54 Start: 37814, Stop: 37557, Start Num: 21  
Candidate Starts for Celeste\_54:  
(Start: 20 @37820 has 3 MA's), (Start: 21 @37814 has 81 MA's), (24, 37793), (28, 37760), (36, 37703), (40, 37637), (43, 37619),

Gene: Celia\_51 Start: 35208, Stop: 34918, Start Num: 16  
Candidate Starts for Celia\_51:  
(11, 35376), (13, 35325), (Start: 16 @35208 has 4 MA's), (25, 35148), (26, 35145), (31, 35085), (36, 35067),

Gene: Chucky\_53 Start: 38996, Stop: 38739, Start Num: 21  
Candidate Starts for Chucky\_53:  
(Start: 20 @39002 has 3 MA's), (Start: 21 @38996 has 81 MA's), (24, 38975), (40, 38822),

Gene: Conan\_55 Start: 39767, Stop: 39516, Start Num: 21  
Candidate Starts for Conan\_55:  
(Start: 21 @39767 has 81 MA's), (40, 39593), (46, 39533), (48, 39521),

Gene: Danzina\_54 Start: 38041, Stop: 37763, Start Num: 21  
Candidate Starts for Danzina\_54:  
(Start: 20 @38047 has 3 MA's), (Start: 21 @38041 has 81 MA's), (28, 37981), (36, 37924), (40, 37858),

Gene: Dattran\_54 Start: 37914, Stop: 37639, Start Num: 21  
Candidate Starts for Dattran\_54:  
(Start: 20 @37920 has 3 MA's), (Start: 21 @37914 has 81 MA's), (28, 37857), (36, 37800), (40, 37734),

Gene: Daudau\_55 Start: 39694, Stop: 39434, Start Num: 21  
Candidate Starts for Daudau\_55:  
(Start: 21 @39694 has 81 MA's), (25, 39673), (40, 39526),

Gene: Dexers\_53 Start: 40049, Stop: 39798, Start Num: 21  
Candidate Starts for Dexers\_53:  
(Start: 21 @40049 has 81 MA's), (40, 39875), (46, 39815), (48, 39803),

Gene: Diane\_55 Start: 40444, Stop: 40100, Start Num: 18  
Candidate Starts for Diane\_55:  
(Start: 18 @40444 has 11 MA's), (34, 40318), (38, 40279), (47, 40168),

Gene: Dwayne\_53 Start: 38984, Stop: 38727, Start Num: 21  
Candidate Starts for Dwayne\_53:  
(Start: 20 @38990 has 3 MA's), (Start: 21 @38984 has 81 MA's), (24, 38963), (40, 38810),

Gene: ELB20\_55 Start: 40216, Stop: 39953, Start Num: 21  
Candidate Starts for ELB20\_55:  
(Start: 21 @40216 has 81 MA's), (25, 40189), (26, 40186), (40, 40039),

Gene: Eddasa\_53 Start: 37025, Stop: 36753, Start Num: 21  
Candidate Starts for Eddasa\_53:  
(Start: 15 @37058 has 1 MA's), (Start: 20 @37031 has 3 MA's), (Start: 21 @37025 has 81 MA's), (24, 37004), (28, 36971), (40, 36848),

Gene: Ejemplo\_51 Start: 38922, Stop: 38665, Start Num: 21  
Candidate Starts for Ejemplo\_51:  
(Start: 20 @38928 has 3 MA's), (Start: 21 @38922 has 81 MA's), (24, 38901), (40, 38748),

Gene: ElGato\_55 Start: 39671, Stop: 39420, Start Num: 21  
Candidate Starts for ElGato\_55:  
(Start: 21 @39671 has 81 MA's), (40, 39497), (46, 39437), (48, 39425),

Gene: Emaanora\_56 Start: 38907, Stop: 38650, Start Num: 21  
Candidate Starts for Emaanora\_56:  
(Start: 20 @38913 has 3 MA's), (Start: 21 @38907 has 81 MA's), (24, 38886), (40, 38733),

Gene: EnochSoames\_54 Start: 36821, Stop: 36549, Start Num: 21  
Candidate Starts for EnochSoames\_54:  
(Start: 20 @36827 has 3 MA's), (Start: 21 @36821 has 81 MA's), (24, 36800), (28, 36767), (40, 36644),

Gene: Esperer\_51 Start: 36351, Stop: 36076, Start Num: 21  
Candidate Starts for Esperer\_51:  
(Start: 20 @36357 has 3 MA's), (Start: 21 @36351 has 81 MA's), (24, 36330), (28, 36297), (40, 36174),

Gene: GirlDinner\_56 Start: 40330, Stop: 39986, Start Num: 18  
Candidate Starts for GirlDinner\_56:  
(Start: 18 @40330 has 11 MA's), (34, 40204), (38, 40165), (41, 40120), (42, 40114), (47, 40054),

Gene: Goby\_52 Start: 37813, Stop: 37538, Start Num: 21  
Candidate Starts for Goby\_52:  
(Start: 20 @37819 has 3 MA's), (Start: 21 @37813 has 81 MA's), (28, 37756), (36, 37699), (40, 37633),

Gene: Godpower\_53 Start: 37793, Stop: 37518, Start Num: 21  
Candidate Starts for Godpower\_53:  
(Start: 20 @37799 has 3 MA's), (Start: 21 @37793 has 81 MA's), (28, 37736), (36, 37679), (40, 37613),

Gene: Haizum\_56 Start: 40479, Stop: 40174, Start Num: 18  
Candidate Starts for Haizum\_56:  
(Start: 18 @40479 has 11 MA's), (26, 40425), (34, 40353), (38, 40314),

Gene: Hank144\_58 Start: 40774, Stop: 40472, Start Num: 15  
Candidate Starts for Hank144\_58:  
(Start: 15 @40774 has 1 MA's), (19, 40753), (Start: 20 @40747 has 3 MA's), (26, 40711), (28, 40687), (40, 40564),

Gene: Hippo\_53 Start: 38970, Stop: 38713, Start Num: 21  
Candidate Starts for Hippo\_53:  
(Start: 20 @38976 has 3 MA's), (Start: 21 @38970 has 81 MA's), (24, 38949), (40, 38796),

Gene: Hydra\_52 Start: 37193, Stop: 36912, Start Num: 20  
Candidate Starts for Hydra\_52:  
(Start: 20 @37193 has 3 MA's), (Start: 21 @37187 has 81 MA's), (24, 37166), (28, 37133), (40, 37010),



Gene: Indigo\_50 Start: 36531, Stop: 36256, Start Num: 21

Candidate Starts for Indigo\_50:

(Start: 20 @36537 has 3 MA's), (Start: 21 @36531 has 81 MA's), (24, 36510), (28, 36477), (40, 36354),

Gene: Issmi\_57 Start: 40372, Stop: 40103, Start Num: 21

Candidate Starts for Issmi\_57:

(Start: 20 @40378 has 3 MA's), (Start: 21 @40372 has 81 MA's), (29, 40303), (40, 40195),

Gene: Itza\_52 Start: 35141, Stop: 34851, Start Num: 16

Candidate Starts for Itza\_52:

(11, 35309), (13, 35258), (Start: 16 @35141 has 4 MA's), (25, 35081), (26, 35078), (31, 35018), (35, 35009), (36, 35000),

Gene: Izzy\_53 Start: 37072, Stop: 36800, Start Num: 21

Candidate Starts for Izzy\_53:

(Start: 20 @37078 has 3 MA's), (Start: 21 @37072 has 81 MA's), (24, 37051), (28, 37018), (40, 36895),

Gene: Janus\_57 Start: 40670, Stop: 40326, Start Num: 18

Candidate Starts for Janus\_57:

(Start: 18 @40670 has 11 MA's), (34, 40544), (38, 40505), (41, 40460), (42, 40454), (47, 40394),

Gene: Jash\_53 Start: 37025, Stop: 36753, Start Num: 21

Candidate Starts for Jash\_53:

(Start: 20 @37031 has 3 MA's), (Start: 21 @37025 has 81 MA's), (24, 37004), (28, 36971), (40, 36848),

Gene: Jevington\_54 Start: 38665, Stop: 38399, Start Num: 21

Candidate Starts for Jevington\_54:

(Start: 20 @38671 has 3 MA's), (Start: 21 @38665 has 81 MA's), (40, 38491),

Gene: Kaine\_56 Start: 39959, Stop: 39708, Start Num: 21

Candidate Starts for Kaine\_56:

(Start: 21 @39959 has 81 MA's), (40, 39785), (46, 39725), (48, 39713),

Gene: Katalie\_52 Start: 39063, Stop: 38773, Start Num: 21

Candidate Starts for Katalie\_52:

(1, 41049), (2, 41034), (3, 40452), (4, 39672), (5, 39630), (12, 39216), (Start: 20 @39069 has 3 MA's), (Start: 21 @39063 has 81 MA's), (25, 39027), (26, 39024), (40, 38880), (44, 38859),

Gene: Lannister\_53 Start: 37755, Stop: 37486, Start Num: 21

Candidate Starts for Lannister\_53:

(Start: 20 @37761 has 3 MA's), (Start: 21 @37755 has 81 MA's), (29, 37689), (40, 37581),

Gene: Legacy\_50 Start: 36630, Stop: 36355, Start Num: 21

Candidate Starts for Legacy\_50:

(Start: 20 @36636 has 3 MA's), (Start: 21 @36630 has 81 MA's), (24, 36609), (28, 36576), (40, 36453),

Gene: Leviticus\_51 Start: 36538, Stop: 36263, Start Num: 21

Candidate Starts for Leviticus\_51:

(Start: 20 @36544 has 3 MA's), (Start: 21 @36538 has 81 MA's), (24, 36517), (28, 36484), (40, 36361),

Gene: Lika\_51 Start: 37796, Stop: 37521, Start Num: 21

Candidate Starts for Lika\_51:

(Start: 20 @37802 has 3 MA's), (Start: 21 @37796 has 81 MA's), (28, 37739), (36, 37682), (40, 37616), (43, 37598),

Gene: Loofah\_58 Start: 40402, Stop: 40139, Start Num: 21

Candidate Starts for Loofah\_58:

(Start: 21 @40402 has 81 MA's), (25, 40375), (26, 40372), (40, 40225),

Gene: Lorelei\_53 Start: 37815, Stop: 37543, Start Num: 21

Candidate Starts for Lorelei\_53:

(Start: 20 @37821 has 3 MA's), (Start: 21 @37815 has 81 MA's), (36, 37704), (40, 37638),

Gene: Maneekul\_53 Start: 39000, Stop: 38743, Start Num: 21

Candidate Starts for Maneekul\_53:

(Start: 20 @39006 has 3 MA's), (Start: 21 @39000 has 81 MA's), (24, 38979), (40, 38826),

Gene: Marav\_56 Start: 39162, Stop: 38896, Start Num: 21

Candidate Starts for Marav\_56:

(7, 39474), (Start: 20 @39168 has 3 MA's), (Start: 21 @39162 has 81 MA's), (40, 38988),

Gene: Nabi\_53 Start: 37815, Stop: 37543, Start Num: 21

Candidate Starts for Nabi\_53:

(Start: 20 @37821 has 3 MA's), (Start: 21 @37815 has 81 MA's), (36, 37704), (40, 37638),

Gene: Nanodon\_55 Start: 37748, Stop: 37470, Start Num: 21

Candidate Starts for Nanodon\_55:

(Start: 20 @37754 has 3 MA's), (Start: 21 @37748 has 81 MA's), (40, 37574),

Gene: Nerdos\_50 Start: 36530, Stop: 36255, Start Num: 21

Candidate Starts for Nerdos\_50:

(Start: 20 @36536 has 3 MA's), (Start: 21 @36530 has 81 MA's), (24, 36509), (28, 36476), (40, 36353),

Gene: Nishikigoi\_56 Start: 40479, Stop: 40174, Start Num: 18

Candidate Starts for Nishikigoi\_56:

(Start: 18 @40479 has 11 MA's), (26, 40425), (34, 40353), (38, 40314),

Gene: Oliynyk\_53 Start: 37025, Stop: 36753, Start Num: 21

Candidate Starts for Oliynyk\_53:

(Start: 20 @37031 has 3 MA's), (Start: 21 @37025 has 81 MA's), (24, 37004), (28, 36971), (40, 36848),

Gene: Omar\_59 Start: 39059, Stop: 38754, Start Num: 18

Candidate Starts for Omar\_59:

(17, 39065), (Start: 18 @39059 has 11 MA's), (26, 39005), (31, 38945), (33, 38936), (34, 38933), (47, 38783),

Gene: Ozzie\_50 Start: 36639, Stop: 36364, Start Num: 21

Candidate Starts for Ozzie\_50:

(Start: 20 @36645 has 3 MA's), (Start: 21 @36639 has 81 MA's), (24, 36618), (28, 36585), (40, 36462),

Gene: OzzyJ\_55 Start: 38896, Stop: 38639, Start Num: 21

Candidate Starts for OzzyJ\_55:

(Start: 20 @38902 has 3 MA's), (Start: 21 @38896 has 81 MA's), (24, 38875), (40, 38722),

Gene: Pablito\_54 Start: 39238, Stop: 38972, Start Num: 21

Candidate Starts for Pablito\_54:

(Start: 21 @39238 has 81 MA's), (28, 39184), (40, 39064), (46, 39004),

Gene: Paedore\_57 Start: 40387, Stop: 40124, Start Num: 21

Candidate Starts for Paedore\_57:

(Start: 21 @40387 has 81 MA's), (25, 40360), (26, 40357), (40, 40210),

Gene: Paolo\_57 Start: 40338, Stop: 40072, Start Num: 21

Candidate Starts for Paolo\_57:

(Start: 20 @40344 has 3 MA's), (Start: 21 @40338 has 81 MA's), (26, 40308), (40, 40164),

Gene: Pavo\_57 Start: 39965, Stop: 39714, Start Num: 21

Candidate Starts for Pavo\_57:

(Start: 21 @39965 has 81 MA's), (40, 39791), (46, 39731), (48, 39719),

Gene: Phettuccine\_51 Start: 36531, Stop: 36256, Start Num: 21

Candidate Starts for Phettuccine\_51:

(Start: 20 @36537 has 3 MA's), (Start: 21 @36531 has 81 MA's), (24, 36510), (28, 36477), (40, 36354),

Gene: Provolone\_55 Start: 39805, Stop: 39554, Start Num: 21

Candidate Starts for Provolone\_55:

(Start: 21 @39805 has 81 MA's), (37, 39676), (40, 39631), (46, 39571), (48, 39559),

Gene: Puginator\_57 Start: 40384, Stop: 40118, Start Num: 21

Candidate Starts for Puginator\_57:

(Start: 20 @40390 has 3 MA's), (Start: 21 @40384 has 81 MA's), (25, 40357), (26, 40354), (40, 40210),

Gene: R4\_56 Start: 40376, Stop: 40113, Start Num: 21

Candidate Starts for R4\_56:

(Start: 21 @40376 has 81 MA's), (25, 40349), (26, 40346), (28, 40322), (40, 40199),

Gene: Rana\_53 Start: 37815, Stop: 37543, Start Num: 21

Candidate Starts for Rana\_53:

(Start: 20 @37821 has 3 MA's), (Start: 21 @37815 has 81 MA's), (36, 37704), (40, 37638),

Gene: RedBear\_53 Start: 39063, Stop: 38773, Start Num: 21

Candidate Starts for RedBear\_53:

(1, 41049), (2, 41034), (3, 40452), (4, 39672), (5, 39630), (11, 39255), (12, 39216), (Start: 20 @39069 has 3 MA's), (Start: 21 @39063 has 81 MA's), (25, 39027), (26, 39024), (40, 38880), (44, 38859),

Gene: Rusticus\_53 Start: 37025, Stop: 36753, Start Num: 21

Candidate Starts for Rusticus\_53:

(Start: 20 @37031 has 3 MA's), (Start: 21 @37025 has 81 MA's), (24, 37004), (28, 36971), (40, 36848),

Gene: Saftant\_53 Start: 39914, Stop: 39663, Start Num: 21

Candidate Starts for Saftant\_53:

(Start: 21 @39914 has 81 MA's), (23, 39908), (40, 39740), (46, 39680), (48, 39668),

Gene: SarahRose\_53 Start: 38969, Stop: 38712, Start Num: 21

Candidate Starts for SarahRose\_53:

(Start: 20 @38975 has 3 MA's), (Start: 21 @38969 has 81 MA's), (24, 38948), (40, 38795),

Gene: Snorlax\_53 Start: 38994, Stop: 38737, Start Num: 21

Candidate Starts for Snorlax\_53:

(Start: 20 @39000 has 3 MA's), (Start: 21 @38994 has 81 MA's), (24, 38973), (40, 38820),

Gene: South40\_52 Start: 39063, Stop: 38773, Start Num: 21

Candidate Starts for South40\_52:

(1, 41049), (2, 41034), (3, 40452), (4, 39672), (5, 39630), (12, 39216), (Start: 20 @39069 has 3 MA's), (Start: 21 @39063 has 81 MA's), (25, 39027), (26, 39024), (40, 38880), (44, 38859),

Gene: Speedwell\_61 Start: 41133, Stop: 40876, Start Num: 20

Candidate Starts for Speedwell\_61:

(Start: 20 @41133 has 3 MA's), (Start: 21 @41127 has 81 MA's), (28, 41073), (30, 41046), (40, 40953), (48, 40881),

Gene: SqueakyClean\_57 Start: 40848, Stop: 40543, Start Num: 18

Candidate Starts for SqueakyClean\_57:

(Start: 18 @40848 has 11 MA's), (34, 40722), (38, 40683), (41, 40638), (42, 40632), (47, 40572),

Gene: Sujidade\_52 Start: 38084, Stop: 37809, Start Num: 21

Candidate Starts for Sujidade\_52:

(Start: 20 @38090 has 3 MA's), (Start: 21 @38084 has 81 MA's), (28, 38027), (36, 37970), (40, 37904), (43, 37886),

Gene: SunsetPointe\_50 Start: 36646, Stop: 36371, Start Num: 21

Candidate Starts for SunsetPointe\_50:

(Start: 20 @36652 has 3 MA's), (Start: 21 @36646 has 81 MA's), (24, 36625), (28, 36592), (40, 36469),

Gene: Superstar\_62 Start: 41096, Stop: 40791, Start Num: 18

Candidate Starts for Superstar\_62:

(Start: 18 @41096 has 11 MA's), (38, 40931), (44, 40868), (47, 40820),

Gene: TagePhighter\_55 Start: 38970, Stop: 38713, Start Num: 21

Candidate Starts for TagePhighter\_55:

(Start: 20 @38976 has 3 MA's), (Start: 21 @38970 has 81 MA's), (24, 38949), (40, 38796),

Gene: Tefunt\_55 Start: 40393, Stop: 40049, Start Num: 18

Candidate Starts for Tefunt\_55:

(Start: 18 @40393 has 11 MA's), (26, 40339), (38, 40228), (43, 40168), (45, 40141), (47, 40117),

Gene: Thestral\_58 Start: 41212, Stop: 40952, Start Num: 21

Candidate Starts for Thestral\_58:

(Start: 21 @41212 has 81 MA's), (25, 41191), (28, 41164), (40, 41044),

Gene: TinaBelcher\_56 Start: 41160, Stop: 40900, Start Num: 21

Candidate Starts for TinaBelcher\_56:

(Start: 21 @41160 has 81 MA's), (25, 41139), (40, 40992),

Gene: Toma\_52 Start: 37813, Stop: 37538, Start Num: 21

Candidate Starts for Toma\_52:

(Start: 20 @37819 has 3 MA's), (Start: 21 @37813 has 81 MA's), (28, 37756), (36, 37699), (40, 37633),

Gene: Triste\_54 Start: 38969, Stop: 38712, Start Num: 21

Candidate Starts for Triste\_54:

(Start: 20 @38975 has 3 MA's), (Start: 21 @38969 has 81 MA's), (24, 38948), (40, 38795),

Gene: Triumph\_58 Start: 40532, Stop: 40266, Start Num: 21

Candidate Starts for Triumph\_58:

(Start: 21 @40532 has 81 MA's), (25, 40502), (26, 40499), (28, 40475), (40, 40355),

Gene: TrvxScott\_55 Start: 41206, Stop: 40946, Start Num: 21

Candidate Starts for TrvxScott\_55:

(Start: 21 @41206 has 81 MA's), (25, 41185), (40, 41038),

Gene: TuanPN\_51 Start: 38922, Stop: 38665, Start Num: 21

Candidate Starts for TuanPN\_51:

(Start: 20 @38928 has 3 MA's), (Start: 21 @38922 has 81 MA's), (24, 38901), (40, 38748),

Gene: Unstoppable\_51 Start: 36535, Stop: 36254, Start Num: 20

Candidate Starts for Unstoppable\_51:

(Start: 20 @36535 has 3 MA's), (Start: 21 @36529 has 81 MA's), (24, 36508), (28, 36475), (40, 36352),

Gene: Urza\_51 Start: 35162, Stop: 34872, Start Num: 16

Candidate Starts for Urza\_51:

(11, 35330), (13, 35279), (Start: 16 @35162 has 4 MA's), (25, 35102), (26, 35099), (31, 35039), (35, 35030), (36, 35021),

Gene: Vanseggelen\_60 Start: 39827, Stop: 39576, Start Num: 21

Candidate Starts for Vanseggelen\_60:

(9, 40139), (Start: 20 @39833 has 3 MA's), (Start: 21 @39827 has 81 MA's), (24, 39806), (39, 39674), (40, 39653), (46, 39593), (48, 39581),

Gene: Verabelle\_58 Start: 39493, Stop: 39242, Start Num: 21

Candidate Starts for Verabelle\_58:

(Start: 21 @39493 has 81 MA's), (28, 39439), (40, 39319), (46, 39259), (48, 39247),

Gene: Verse\_56 Start: 40772, Stop: 40521, Start Num: 21

Candidate Starts for Verse\_56:

(Start: 21 @40772 has 81 MA's), (23, 40766), (30, 40691), (40, 40598), (46, 40538), (48, 40526),

Gene: VieEnRose\_52 Start: 35225, Stop: 34935, Start Num: 16

Candidate Starts for VieEnRose\_52:

(11, 35390), (13, 35339), (Start: 16 @35225 has 4 MA's), (25, 35165), (26, 35162), (31, 35102), (36, 35084),

Gene: Werner\_53 Start: 38967, Stop: 38710, Start Num: 21

Candidate Starts for Werner\_53:

(Start: 20 @38973 has 3 MA's), (Start: 21 @38967 has 81 MA's), (24, 38946), (40, 38793),

Gene: Whatever\_53 Start: 38993, Stop: 38736, Start Num: 21

Candidate Starts for Whatever\_53:

(Start: 20 @38999 has 3 MA's), (Start: 21 @38993 has 81 MA's), (24, 38972), (40, 38819),

Gene: Yasdni\_53 Start: 39019, Stop: 38762, Start Num: 21

Candidate Starts for Yasdni\_53:

(Start: 20 @39025 has 3 MA's), (Start: 21 @39019 has 81 MA's), (24, 38998), (40, 38845),

Gene: Yosif\_58 Start: 40821, Stop: 40543, Start Num: 21

Candidate Starts for Yosif\_58:

(14, 40917), (Start: 20 @40827 has 3 MA's), (Start: 21 @40821 has 81 MA's), (27, 40773), (50, 40548),

Gene: Zainub\_57 Start: 40313, Stop: 40047, Start Num: 21

Candidate Starts for Zainub\_57:

(Start: 20 @40319 has 3 MA's), (Start: 21 @40313 has 81 MA's), (26, 40283), (40, 40139),

Gene: Zemlya\_53 Start: 37835, Stop: 37563, Start Num: 21

Candidate Starts for Zemlya\_53:

(Start: 20 @37841 has 3 MA's), (Start: 21 @37835 has 81 MA's), (24, 37814), (28, 37781), (36, 37724), (40, 37658),

Gene: phiCAM\_53 Start: 41755, Stop: 41498, Start Num: 20

Candidate Starts for phiCAM\_53:

(6, 42109), (8, 42103), (Start: 20 @41755 has 3 MA's), (Start: 21 @41749 has 81 MA's), (28, 41695), (32, 41653), (40, 41575), (46, 41515), (48, 41503),