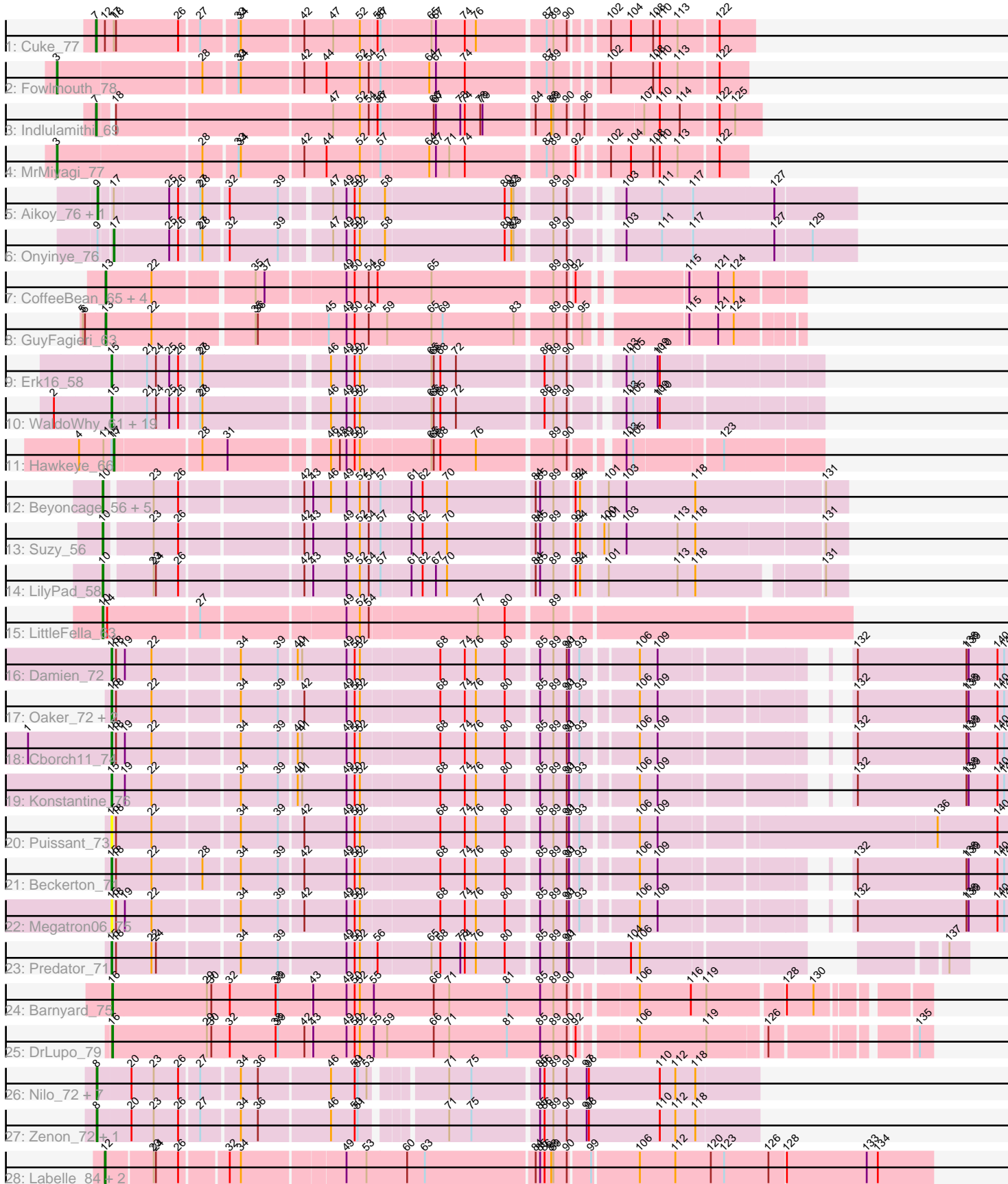


Pham 163590



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 163590 Report

This analysis was run 04/28/24 on database version 559.

Pham number 163590 has 69 members, 6 are drafts.

Phages represented in each track:

- Track 1 : Cuke\_77
- Track 2 : Fowlmouth\_78
- Track 3 : Indlulamithi\_69
- Track 4 : MrMiyagi\_77
- Track 5 : Aikoy\_76, Leopard\_75
- Track 6 : Onyinye\_76
- Track 7 : CoffeeBean\_65, Braxoaddie\_64, Polyuyuki\_64, Maselop\_64, Apiary\_64
- Track 8 : GuyFagieri\_63
- Track 9 : Erk16\_58
- Track 10 : WaldoWhy\_61, Troll4\_59, Visconti\_60, Butterscotch\_58, Helpful\_62, BigMama\_57, Chill\_61, Thoth\_59, PBI1\_56, Delton\_60, Gumball\_59, Giuseppe\_60, Penelope2018\_59, Mopey\_60, Adjutor\_58, SirHarley\_61, KandZ\_58, PLOT\_59, Prager\_59, Nova\_58
- Track 11 : Hawkeye\_66
- Track 12 : Beyoncage\_56, Sienna\_56, Djokovic\_56, Madi\_56, BiteSize\_56, Terapin\_57
- Track 13 : Suzy\_56
- Track 14 : LilyPad\_58
- Track 15 : LittleFella\_63
- Track 16 : Damien\_72
- Track 17 : Oaker\_72, Thumb\_73, Phreeze\_71
- Track 18 : Cborch11\_74
- Track 19 : Konstantine\_76
- Track 20 : Puissant\_73
- Track 21 : Beckerton\_71
- Track 22 : Megatron06\_75
- Track 23 : Predator\_71
- Track 24 : Barnyard\_75
- Track 25 : DrLupo\_79
- Track 26 : Nilo\_72, Candle\_68, Rope\_70, Papyrus\_70, Yelo\_69, Weiss13\_70, MontyDev\_70, Riparian\_72
- Track 27 : Zenon\_72, Send513\_70
- Track 28 : Labelle\_84, Madruga\_83, Patience\_85

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

The start number called the most often in the published annotations is 15, it was called in 28 of the 63 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- Adjutor\_58, Beckerton\_71, BigMama\_57, Butterscotch\_58, Cborch11\_74, Chill\_61, Damien\_72, Delton\_60, Erk16\_58, Giuseppe\_60, Gumball\_59, Helpful\_62, KandZ\_58, Konstantine\_76, Megatron06\_75, Mopey\_60, Nova\_58, Oaker\_72, PBI1\_56, PLOT\_59, Penelope2018\_59, Phreeze\_71, Prager\_59, Predator\_71, Puissant\_73, SirHarley\_61, Thoth\_59, Thumb\_73, Troll4\_59, Visconti\_60, WaldoWhy\_61,

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

- Hawkeye\_66,

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

- Aikoy\_76, Apiary\_64, Barnyard\_75, Beyoncage\_56, BiteSize\_56, Braxoaddie\_64, Candle\_68, CoffeeBean\_65, Cuke\_77, Djokovic\_56, DrLupo\_79, Fowlmouth\_78, GuyFagieri\_63, Indlulamithi\_69, Labelle\_84, Leopard\_75, LilyPad\_58, LittleFella\_63, Madi\_56, Madrugua\_83, Maselop\_64, MontyDev\_70, MrMiyagi\_77, Nilo\_72, Onyinye\_76, Papyrus\_70, Patience\_85, Polyuyuki\_64, Riparian\_72, Rope\_70, Send513\_70, Sienna\_56, Suzy\_56, Terapin\_57, Weiss13\_70, Yelo\_69, Zenon\_72,

### Summary by start number:

Start 3:

- Found in 2 of 69 ( 2.9% ) of genes in pham
- Manual Annotations of this start: 2 of 63
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Fowlmouth\_78 (AC), MrMiyagi\_77 (AC),

Start 7:

- Found in 2 of 69 ( 2.9% ) of genes in pham
- Manual Annotations of this start: 2 of 63
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Cuke\_77 (AC), Indlulamithi\_69 (AC),

Start 8:

- Found in 10 of 69 ( 14.5% ) of genes in pham
- Manual Annotations of this start: 8 of 63
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Candle\_68 (R), MontyDev\_70 (R), Nilo\_72 (R), Papyrus\_70 (R), Riparian\_72 (R), Rope\_70 (R), Send513\_70 (R), Weiss13\_70 (R), Yelo\_69 (R), Zenon\_72 (R),

Start 9:

- Found in 3 of 69 ( 4.3% ) of genes in pham
- Manual Annotations of this start: 2 of 63
- Called 66.7% of time when present
- Phage (with cluster) where this start called: Aikoy\_76 (AE), Leopard\_75 (AE),

Start 10:

- Found in 9 of 69 ( 13.0% ) of genes in pham

- Manual Annotations of this start: 9 of 63
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Beyoncage\_56 (DG1), BiteSize\_56 (DG1), Djokovic\_56 (DG1), LilyPad\_58 (DG1), LittleFella\_63 (DG2), Madi\_56 (DG1), Sienna\_56 (DG1), Suzy\_56 (DG1), Terapin\_57 (DG1),

#### Start 12:

- Found in 4 of 69 ( 5.8% ) of genes in pham
- Manual Annotations of this start: 3 of 63
- Called 75.0% of time when present
- Phage (with cluster) where this start called: Labelle\_84 (U), Madrugua\_83 (U), Patience\_85 (U),

#### Start 13:

- Found in 6 of 69 ( 8.7% ) of genes in pham
- Manual Annotations of this start: 5 of 63
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Apiary\_64 (CR), Braxoaddie\_64 (CR), CoffeeBean\_65 (CR), GuyFagieri\_63 (CR), Maselop\_64 (CR), Polyuyuki\_64 (CR),

#### Start 15:

- Found in 32 of 69 ( 46.4% ) of genes in pham
- Manual Annotations of this start: 28 of 63
- Called 96.9% of time when present
- Phage (with cluster) where this start called: Adjutor\_58 (D1), Beckerton\_71 (H1), BigMama\_57 (D1), Butterscotch\_58 (D1), Cborch11\_74 (H1), Chill\_61 (D1), Damien\_72 (H1), Delton\_60 (D1), Erk16\_58 (D1), Giuseppe\_60 (D1), Gumball\_59 (D1), Helpful\_62 (D1), KandZ\_58 (D1), Konstantine\_76 (H1), Megatron06\_75 (H1), Mopey\_60 (D1), Nova\_58 (D1), Oaker\_72 (H1), PBI1\_56 (D1), PLOT\_59 (D1), Penelope2018\_59 (D1), Phreeze\_71 (H1), Prager\_59 (D1), Predator\_71 (H1), Puissant\_73 (H1), SirHarley\_61 (D1), Thoth\_59 (D1), Thumb\_73 (H1), Troll4\_59 (D1), Visconti\_60 (D1), WaldoWhy\_61 (D1),

#### Start 16:

- Found in 2 of 69 ( 2.9% ) of genes in pham
- Manual Annotations of this start: 2 of 63
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Barnyard\_75 (H2), DrLupo\_79 (H2),

#### Start 17:

- Found in 5 of 69 ( 7.2% ) of genes in pham
- Manual Annotations of this start: 2 of 63
- Called 40.0% of time when present
- Phage (with cluster) where this start called: Hawkeye\_66 (D2), Onyinye\_76 (AE),

### Summary by clusters:

There are 11 clusters represented in this pham: AC, AE, H2, H1, DG2, R, U, CR, DG1, D2, D1,

#### Info for manual annotations of cluster AC:

- Start number 3 was manually annotated 2 times for cluster AC.
- Start number 7 was manually annotated 2 times for cluster AC.

Info for manual annotations of cluster AE:

- Start number 9 was manually annotated 2 times for cluster AE.
- Start number 17 was manually annotated 1 time for cluster AE.

Info for manual annotations of cluster CR:

- Start number 13 was manually annotated 5 times for cluster CR.

Info for manual annotations of cluster D1:

- Start number 15 was manually annotated 20 times for cluster D1.

Info for manual annotations of cluster D2:

- Start number 17 was manually annotated 1 time for cluster D2.

Info for manual annotations of cluster DG1:

- Start number 10 was manually annotated 8 times for cluster DG1.

Info for manual annotations of cluster DG2:

- Start number 10 was manually annotated 1 time for cluster DG2.

Info for manual annotations of cluster H1:

- Start number 15 was manually annotated 8 times for cluster H1.

Info for manual annotations of cluster H2:

- Start number 16 was manually annotated 2 times for cluster H2.

Info for manual annotations of cluster R:

- Start number 8 was manually annotated 8 times for cluster R.

Info for manual annotations of cluster U:

- Start number 12 was manually annotated 3 times for cluster U.

**Gene Information:**

Gene: Adjutor\_58 Start: 44429, Stop: 45289, Start Num: 15

Candidate Starts for Adjutor\_58:

(2, 44357), (Start: 15 @44429 has 28 MA's), (21, 44474), (24, 44486), (25, 44504), (26, 44516), (27, 44540), (28, 44543), (46, 44696), (49, 44717), (50, 44726), (52, 44732), (65, 44822), (66, 44825), (68, 44834), (72, 44855), (86, 44966), (89, 44978), (90, 44996), (103, 45047), (105, 45056), (109, 45086), (110, 45089),

Gene: Aikoy\_76 Start: 51990, Stop: 52910, Start Num: 9

Candidate Starts for Aikoy\_76:

(Start: 9 @51990 has 2 MA's), (Start: 17 @52005 has 2 MA's), (25, 52077), (26, 52089), (27, 52113), (28, 52116), (32, 52146), (39, 52209), (47, 52266), (49, 52284), (50, 52293), (52, 52299), (58, 52329), (80, 52488), (82, 52497), (83, 52500), (89, 52545), (90, 52563), (103, 52611), (111, 52659), (117, 52698), (127, 52803),

Gene: Apiary\_64 Start: 48400, Stop: 47549, Start Num: 13

Candidate Starts for Apiary\_64:

(Start: 13 @48400 has 5 MA's), (22, 48340), (35, 48220), (37, 48208), (49, 48106), (50, 48097), (54, 48079), (56, 48067), (65, 47995), (89, 47839), (90, 47821), (92, 47815), (115, 47692), (121, 47656), (124, 47635),

Gene: Barnyard\_75 Start: 51526, Stop: 52548, Start Num: 16

Candidate Starts for Barnyard\_75:

(Start: 16 @51526 has 2 MA's), (29, 51652), (30, 51658), (32, 51682), (38, 51742), (39, 51745), (43, 51790), (49, 51835), (50, 51844), (52, 51850), (55, 51868), (66, 51949), (71, 51970), (81, 52048), (85, 52093), (89, 52111), (90, 52129), (106, 52204), (116, 52273), (119, 52294), (128, 52387), (130, 52423),

Gene: Beckerton\_71 Start: 53060, Stop: 54136, Start Num: 15

Candidate Starts for Beckerton\_71:

(Start: 15 @53060 has 28 MA's), (18, 53066), (22, 53114), (28, 53177), (34, 53222), (39, 53270), (42, 53300), (49, 53357), (50, 53366), (52, 53372), (68, 53474), (74, 53507), (76, 53522), (80, 53561), (85, 53600), (89, 53618), (90, 53636), (91, 53639), (93, 53648), (106, 53714), (109, 53738), (132, 53927), (138, 54074), (139, 54077), (140, 54116), (141, 54125),

Gene: Beyoncage\_56 Start: 41805, Stop: 42734, Start Num: 10

Candidate Starts for Beyoncage\_56:

(Start: 10 @41805 has 9 MA's), (23, 41862), (26, 41895), (42, 42045), (43, 42054), (46, 42078), (49, 42099), (52, 42114), (54, 42126), (57, 42138), (61, 42177), (62, 42192), (70, 42225), (84, 42336), (85, 42342), (89, 42360), (92, 42384), (94, 42390), (101, 42420), (103, 42444), (118, 42537), (131, 42705),

Gene: BigMama\_57 Start: 44505, Stop: 45365, Start Num: 15

Candidate Starts for BigMama\_57:

(2, 44433), (Start: 15 @44505 has 28 MA's), (21, 44550), (24, 44562), (25, 44580), (26, 44592), (27, 44616), (28, 44619), (46, 44772), (49, 44793), (50, 44802), (52, 44808), (65, 44898), (66, 44901), (68, 44910), (72, 44931), (86, 45042), (89, 45054), (90, 45072), (103, 45123), (105, 45132), (109, 45162), (110, 45165),

Gene: BiteSize\_56 Start: 41891, Stop: 42820, Start Num: 10

Candidate Starts for BiteSize\_56:

(Start: 10 @41891 has 9 MA's), (23, 41948), (26, 41981), (42, 42131), (43, 42140), (46, 42164), (49, 42185), (52, 42200), (54, 42212), (57, 42224), (61, 42263), (62, 42278), (70, 42311), (84, 42422), (85, 42428), (89, 42446), (92, 42470), (94, 42476), (101, 42506), (103, 42530), (118, 42623), (131, 42791),

Gene: Braxoaddie\_64 Start: 48389, Stop: 47538, Start Num: 13

Candidate Starts for Braxoaddie\_64:

(Start: 13 @48389 has 5 MA's), (22, 48329), (35, 48209), (37, 48197), (49, 48095), (50, 48086), (54, 48068), (56, 48056), (65, 47984), (89, 47828), (90, 47810), (92, 47804), (115, 47681), (121, 47645), (124, 47624),

Gene: Butterscotch\_58 Start: 44489, Stop: 45349, Start Num: 15

Candidate Starts for Butterscotch\_58:

(2, 44417), (Start: 15 @44489 has 28 MA's), (21, 44534), (24, 44546), (25, 44564), (26, 44576), (27, 44600), (28, 44603), (46, 44756), (49, 44777), (50, 44786), (52, 44792), (65, 44882), (66, 44885), (68, 44894), (72, 44915), (86, 45026), (89, 45038), (90, 45056), (103, 45107), (105, 45116), (109, 45146), (110, 45149),

Gene: Candle\_68 Start: 52987, Stop: 53817, Start Num: 8

Candidate Starts for Candle\_68:

(Start: 8 @52987 has 8 MA's), (20, 53032), (23, 53062), (26, 53095), (27, 53119), (34, 53167), (36, 53188), (46, 53281), (50, 53311), (51, 53314), (53, 53326), (71, 53410), (75, 53440), (85, 53524), (86, 53530), (89, 53542), (90, 53560), (97, 53587), (98, 53590), (110, 53686), (112, 53707), (118, 53734),

Gene: Cborch11\_74 Start: 52603, Stop: 53682, Start Num: 15

Candidate Starts for Cborch11\_74:

(1, 52492), (Start: 15 @52603 has 28 MA's), (18, 52609), (19, 52621), (22, 52657), (34, 52765), (39, 52813), (40, 52834), (41, 52840), (49, 52900), (50, 52909), (52, 52915), (68, 53017), (74, 53050), (76, 53065), (80, 53104), (85, 53143), (89, 53161), (90, 53179), (91, 53182), (93, 53191), (106, 53257), (109, 53281), (132, 53473), (138, 53620), (139, 53623), (140, 53662), (141, 53671),

Gene: Chill\_61 Start: 44552, Stop: 45412, Start Num: 15

Candidate Starts for Chill\_61:

(2, 44480), (Start: 15 @44552 has 28 MA's), (21, 44597), (24, 44609), (25, 44627), (26, 44639), (27, 44663), (28, 44666), (46, 44819), (49, 44840), (50, 44849), (52, 44855), (65, 44945), (66, 44948), (68, 44957), (72, 44978), (86, 45089), (89, 45101), (90, 45119), (103, 45170), (105, 45179), (109, 45209), (110, 45212),

Gene: CoffeeBean\_65 Start: 48347, Stop: 47496, Start Num: 13

Candidate Starts for CoffeeBean\_65:

(Start: 13 @48347 has 5 MA's), (22, 48287), (35, 48167), (37, 48155), (49, 48053), (50, 48044), (54, 48026), (56, 48014), (65, 47942), (89, 47786), (90, 47768), (92, 47762), (115, 47639), (121, 47603), (124, 47582),

Gene: Cuke\_77 Start: 46278, Stop: 47102, Start Num: 7

Candidate Starts for Cuke\_77:

(Start: 7 @46278 has 2 MA's), (Start: 12 @46290 has 3 MA's), (Start: 17 @46302 has 2 MA's), (18, 46305), (26, 46389), (27, 46413), (33, 46458), (34, 46461), (42, 46539), (47, 46578), (52, 46611), (56, 46632), (57, 46635), (65, 46701), (67, 46707), (74, 46746), (76, 46761), (87, 46848), (89, 46857), (90, 46875), (102, 46914), (104, 46941), (108, 46971), (110, 46980), (113, 47004), (122, 47055),

Gene: Damien\_72 Start: 52565, Stop: 53644, Start Num: 15

Candidate Starts for Damien\_72:

(Start: 15 @52565 has 28 MA's), (18, 52571), (19, 52583), (22, 52619), (34, 52727), (39, 52775), (40, 52796), (41, 52802), (49, 52862), (50, 52871), (52, 52877), (68, 52979), (74, 53012), (76, 53027), (80, 53066), (85, 53105), (89, 53123), (90, 53141), (91, 53144), (93, 53153), (106, 53219), (109, 53243), (132, 53435), (138, 53582), (139, 53585), (140, 53624), (141, 53633),

Gene: Delton\_60 Start: 44887, Stop: 45747, Start Num: 15

Candidate Starts for Delton\_60:

(2, 44815), (Start: 15 @44887 has 28 MA's), (21, 44932), (24, 44944), (25, 44962), (26, 44974), (27, 44998), (28, 45001), (46, 45154), (49, 45175), (50, 45184), (52, 45190), (65, 45280), (66, 45283), (68, 45292), (72, 45313), (86, 45424), (89, 45436), (90, 45454), (103, 45505), (105, 45514), (109, 45544), (110, 45547),

Gene: Djokovic\_56 Start: 41804, Stop: 42733, Start Num: 10

Candidate Starts for Djokovic\_56:

(Start: 10 @41804 has 9 MA's), (23, 41861), (26, 41894), (42, 42044), (43, 42053), (46, 42077), (49, 42098), (52, 42113), (54, 42125), (57, 42137), (61, 42176), (62, 42191), (70, 42224), (84, 42335), (85, 42341), (89, 42359), (92, 42383), (94, 42389), (101, 42419), (103, 42443), (118, 42536), (131, 42704),

Gene: DrLupo\_79 Start: 52740, Stop: 53756, Start Num: 16

Candidate Starts for DrLupo\_79:

(Start: 16 @52740 has 2 MA's), (29, 52866), (30, 52872), (32, 52896), (38, 52956), (39, 52959), (42, 52995), (43, 53004), (49, 53049), (50, 53058), (52, 53064), (55, 53082), (59, 53100), (66, 53163), (71, 53184), (81, 53262), (85, 53307), (89, 53325), (90, 53343), (92, 53349), (106, 53418), (119, 53508), (126, 53577), (135, 53739),

Gene: Erk16\_58 Start: 44591, Stop: 45451, Start Num: 15

Candidate Starts for Erk16\_58:

(Start: 15 @44591 has 28 MA's), (21, 44636), (24, 44648), (25, 44666), (26, 44678), (27, 44702), (28, 44705), (46, 44858), (49, 44879), (50, 44888), (52, 44894), (65, 44984), (66, 44987), (68, 44996), (72, 45017), (86, 45128), (89, 45140), (90, 45158), (103, 45209), (105, 45218), (109, 45248), (110, 45251),

Gene: Fowlmouth\_78 Start: 48807, Stop: 49670, Start Num: 3

Candidate Starts for Fowlmouth\_78:

(Start: 3 @48807 has 2 MA's), (28, 48993), (33, 49035), (34, 49038), (42, 49116), (44, 49146), (52, 49188), (54, 49200), (57, 49212), (64, 49275), (67, 49284), (74, 49323), (87, 49425), (89, 49434), (102, 49491), (108, 49548), (110, 49557), (113, 49581), (122, 49632),

Gene: Giuseppe\_60 Start: 44457, Stop: 45317, Start Num: 15

Candidate Starts for Giuseppe\_60:

(2, 44385), (Start: 15 @44457 has 28 MA's), (21, 44502), (24, 44514), (25, 44532), (26, 44544), (27, 44568), (28, 44571), (46, 44724), (49, 44745), (50, 44754), (52, 44760), (65, 44850), (66, 44853), (68, 44862), (72, 44883), (86, 44994), (89, 45006), (90, 45024), (103, 45075), (105, 45084), (109, 45114), (110, 45117),

Gene: Gumball\_59 Start: 44949, Stop: 45809, Start Num: 15

Candidate Starts for Gumball\_59:

(2, 44877), (Start: 15 @44949 has 28 MA's), (21, 44994), (24, 45006), (25, 45024), (26, 45036), (27, 45060), (28, 45063), (46, 45216), (49, 45237), (50, 45246), (52, 45252), (65, 45342), (66, 45345), (68, 45354), (72, 45375), (86, 45486), (89, 45498), (90, 45516), (103, 45567), (105, 45576), (109, 45606), (110, 45609),

Gene: GuyFagieri\_63 Start: 48427, Stop: 47585, Start Num: 13

Candidate Starts for GuyFagieri\_63:

(5, 48457), (6, 48454), (Start: 13 @48427 has 5 MA's), (22, 48367), (35, 48247), (36, 48244), (45, 48157), (49, 48133), (50, 48124), (54, 48106), (59, 48082), (65, 48022), (69, 48007), (83, 47911), (89, 47866), (90, 47848), (95, 47833), (115, 47719), (121, 47683), (124, 47662),

Gene: Hawkeye\_66 Start: 44818, Stop: 45684, Start Num: 17

Candidate Starts for Hawkeye\_66:

(4, 44773), (11, 44806), (Start: 15 @44815 has 28 MA's), (Start: 17 @44818 has 2 MA's), (28, 44929), (31, 44962), (46, 45082), (48, 45094), (49, 45103), (50, 45112), (52, 45118), (65, 45208), (66, 45211), (68, 45220), (76, 45268), (89, 45364), (90, 45382), (103, 45436), (105, 45445), (123, 45556),

Gene: Helpful\_62 Start: 44818, Stop: 45678, Start Num: 15

Candidate Starts for Helpful\_62:

(2, 44746), (Start: 15 @44818 has 28 MA's), (21, 44863), (24, 44875), (25, 44893), (26, 44905), (27, 44929), (28, 44932), (46, 45085), (49, 45106), (50, 45115), (52, 45121), (65, 45211), (66, 45214), (68, 45223), (72, 45244), (86, 45355), (89, 45367), (90, 45385), (103, 45436), (105, 45445), (109, 45475), (110, 45478),

Gene: Indlulamithi\_69 Start: 49597, Stop: 50433, Start Num: 7

Candidate Starts for Indlulamithi\_69:



(Start: 7 @49597 has 2 MA's), (18, 49612), (47, 49894), (52, 49930), (54, 49942), (56, 49951), (57, 49954), (66, 50023), (67, 50026), (73, 50059), (74, 50065), (78, 50086), (79, 50089), (84, 50152), (88, 50173), (89, 50176), (90, 50194), (96, 50212), (107, 50281), (110, 50302), (114, 50329), (122, 50377), (125, 50398),

Gene: KandZ\_58 Start: 44615, Stop: 45475, Start Num: 15

Candidate Starts for KandZ\_58:

(2, 44543), (Start: 15 @44615 has 28 MA's), (21, 44660), (24, 44672), (25, 44690), (26, 44702), (27, 44726), (28, 44729), (46, 44882), (49, 44903), (50, 44912), (52, 44918), (65, 45008), (66, 45011), (68, 45020), (72, 45041), (86, 45152), (89, 45164), (90, 45182), (103, 45233), (105, 45242), (109, 45272), (110, 45275),

Gene: Konstantine\_76 Start: 53396, Stop: 54475, Start Num: 15

Candidate Starts for Konstantine\_76:

(Start: 15 @53396 has 28 MA's), (19, 53414), (22, 53450), (34, 53558), (39, 53606), (40, 53627), (41, 53633), (49, 53693), (50, 53702), (52, 53708), (68, 53810), (74, 53843), (76, 53858), (80, 53897), (85, 53936), (89, 53954), (90, 53972), (91, 53975), (93, 53984), (106, 54050), (109, 54074), (132, 54266), (138, 54413), (139, 54416), (140, 54455), (141, 54464),

Gene: Labelle\_84 Start: 54626, Stop: 55684, Start Num: 12

Candidate Starts for Labelle\_84:

(Start: 12 @54626 has 3 MA's), (23, 54683), (24, 54686), (26, 54716), (32, 54773), (34, 54788), (49, 54917), (53, 54941), (60, 54995), (63, 55019), (84, 55163), (85, 55169), (86, 55175), (88, 55184), (89, 55187), (90, 55205), (99, 55232), (106, 55292), (112, 55340), (120, 55388), (123, 55406), (126, 55466), (128, 55487), (133, 55595), (134, 55610),

Gene: Leopard\_75 Start: 52296, Stop: 53216, Start Num: 9

Candidate Starts for Leopard\_75:

(Start: 9 @52296 has 2 MA's), (Start: 17 @52311 has 2 MA's), (25, 52383), (26, 52395), (27, 52419), (28, 52422), (32, 52452), (39, 52515), (47, 52572), (49, 52590), (50, 52599), (52, 52605), (58, 52635), (80, 52794), (82, 52803), (83, 52806), (89, 52851), (90, 52869), (103, 52917), (111, 52965), (117, 53004), (127, 53109),

Gene: LilyPad\_58 Start: 43001, Stop: 43912, Start Num: 10

Candidate Starts for LilyPad\_58:

(Start: 10 @43001 has 9 MA's), (23, 43058), (24, 43061), (26, 43091), (42, 43241), (43, 43250), (49, 43295), (52, 43310), (54, 43322), (57, 43334), (61, 43373), (62, 43388), (67, 43406), (70, 43421), (84, 43532), (85, 43538), (89, 43556), (92, 43580), (94, 43586), (101, 43616), (113, 43709), (118, 43733), (131, 43883),

Gene: LittleFella\_63 Start: 44521, Stop: 45468, Start Num: 10

Candidate Starts for LittleFella\_63:

(Start: 10 @44521 has 9 MA's), (14, 44527), (27, 44644), (49, 44824), (52, 44839), (54, 44851), (77, 44992), (80, 45028), (89, 45085),

Gene: Madi\_56 Start: 41882, Stop: 42811, Start Num: 10

Candidate Starts for Madi\_56:

(Start: 10 @41882 has 9 MA's), (23, 41939), (26, 41972), (42, 42122), (43, 42131), (46, 42155), (49, 42176), (52, 42191), (54, 42203), (57, 42215), (61, 42254), (62, 42269), (70, 42302), (84, 42413), (85, 42419), (89, 42437), (92, 42461), (94, 42467), (101, 42497), (103, 42521), (118, 42614), (131, 42782),

Gene: Madruga\_83 Start: 54580, Stop: 55638, Start Num: 12

Candidate Starts for Madruga\_83:

(Start: 12 @54580 has 3 MA's), (23, 54637), (24, 54640), (26, 54670), (32, 54727), (34, 54742), (49, 54871), (53, 54895), (60, 54949), (63, 54973), (84, 55117), (85, 55123), (86, 55129), (88, 55138), (89, 55141), (90, 55159), (99, 55186), (106, 55246), (112, 55294), (120, 55342), (123, 55360), (126, 55420), (128, 55441), (133, 55549), (134, 55564),

Gene: Maselop\_64 Start: 48423, Stop: 47572, Start Num: 13

Candidate Starts for Maselop\_64:

(Start: 13 @48423 has 5 MA's), (22, 48363), (35, 48243), (37, 48231), (49, 48129), (50, 48120), (54, 48102), (56, 48090), (65, 48018), (89, 47862), (90, 47844), (92, 47838), (115, 47715), (121, 47679), (124, 47658),

Gene: Megatron06\_75 Start: 53142, Stop: 54218, Start Num: 15

Candidate Starts for Megatron06\_75:

(Start: 15 @53142 has 28 MA's), (18, 53148), (19, 53160), (22, 53196), (34, 53304), (39, 53352), (42, 53382), (49, 53439), (50, 53448), (52, 53454), (68, 53556), (74, 53589), (76, 53604), (80, 53643), (85, 53682), (89, 53700), (90, 53718), (91, 53721), (93, 53730), (106, 53796), (109, 53820), (132, 54009), (138, 54156), (139, 54159), (140, 54198), (141, 54207),

Gene: MontyDev\_70 Start: 52628, Stop: 53458, Start Num: 8

Candidate Starts for MontyDev\_70:

(Start: 8 @52628 has 8 MA's), (20, 52673), (23, 52703), (26, 52736), (27, 52760), (34, 52808), (36, 52829), (46, 52922), (50, 52952), (51, 52955), (53, 52967), (71, 53051), (75, 53081), (85, 53165), (86, 53171), (89, 53183), (90, 53201), (97, 53228), (98, 53231), (110, 53327), (112, 53348), (118, 53375),

Gene: Mopey\_60 Start: 44493, Stop: 45353, Start Num: 15

Candidate Starts for Mopey\_60:

(2, 44421), (Start: 15 @44493 has 28 MA's), (21, 44538), (24, 44550), (25, 44568), (26, 44580), (27, 44604), (28, 44607), (46, 44760), (49, 44781), (50, 44790), (52, 44796), (65, 44886), (66, 44889), (68, 44898), (72, 44919), (86, 45030), (89, 45042), (90, 45060), (103, 45111), (105, 45120), (109, 45150), (110, 45153),

Gene: MrMiyagi\_77 Start: 49209, Stop: 50072, Start Num: 3

Candidate Starts for MrMiyagi\_77:

(Start: 3 @49209 has 2 MA's), (28, 49395), (33, 49437), (34, 49440), (42, 49518), (44, 49548), (52, 49590), (57, 49614), (64, 49677), (67, 49686), (71, 49704), (74, 49725), (87, 49827), (89, 49836), (92, 49860), (102, 49893), (104, 49920), (108, 49950), (110, 49959), (113, 49983), (122, 50034),

Gene: Nilo\_72 Start: 52985, Stop: 53815, Start Num: 8

Candidate Starts for Nilo\_72:

(Start: 8 @52985 has 8 MA's), (20, 53030), (23, 53060), (26, 53093), (27, 53117), (34, 53165), (36, 53186), (46, 53279), (50, 53309), (51, 53312), (53, 53324), (71, 53408), (75, 53438), (85, 53522), (86, 53528), (89, 53540), (90, 53558), (97, 53585), (98, 53588), (110, 53684), (112, 53705), (118, 53732),

Gene: Nova\_58 Start: 44945, Stop: 45805, Start Num: 15

Candidate Starts for Nova\_58:

(2, 44873), (Start: 15 @44945 has 28 MA's), (21, 44990), (24, 45002), (25, 45020), (26, 45032), (27, 45056), (28, 45059), (46, 45212), (49, 45233), (50, 45242), (52, 45248), (65, 45338), (66, 45341), (68, 45350), (72, 45371), (86, 45482), (89, 45494), (90, 45512), (103, 45563), (105, 45572), (109, 45602), (110, 45605),

Gene: Oaker\_72 Start: 53171, Stop: 54247, Start Num: 15

Candidate Starts for Oaker\_72:

(Start: 15 @53171 has 28 MA's), (18, 53177), (22, 53225), (34, 53333), (39, 53381), (42, 53411), (49, 53468), (50, 53477), (52, 53483), (68, 53585), (74, 53618), (76, 53633), (80, 53672), (85, 53711), (89, 53729), (90, 53747), (91, 53750), (93, 53759), (106, 53825), (109, 53849), (132, 54038), (138, 54185), (139, 54188), (140, 54227), (141, 54236),

Gene: Onyinye\_76 Start: 52178, Stop: 53083, Start Num: 17

Candidate Starts for Onyinye\_76:

(Start: 9 @52163 has 2 MA's), (Start: 17 @52178 has 2 MA's), (25, 52250), (26, 52262), (27, 52286), (28, 52289), (32, 52319), (39, 52382), (47, 52439), (49, 52457), (50, 52466), (52, 52472), (58, 52502), (80, 52661), (82, 52670), (83, 52673), (89, 52718), (90, 52736), (103, 52784), (111, 52832), (117, 52871), (127, 52976), (129, 53024),

Gene: PBI1\_56 Start: 44420, Stop: 45280, Start Num: 15

Candidate Starts for PBI1\_56:

(2, 44348), (Start: 15 @44420 has 28 MA's), (21, 44465), (24, 44477), (25, 44495), (26, 44507), (27, 44531), (28, 44534), (46, 44687), (49, 44708), (50, 44717), (52, 44723), (65, 44813), (66, 44816), (68, 44825), (72, 44846), (86, 44957), (89, 44969), (90, 44987), (103, 45038), (105, 45047), (109, 45077), (110, 45080),

Gene: PLOT\_59 Start: 44472, Stop: 45332, Start Num: 15

Candidate Starts for PLOT\_59:

(2, 44400), (Start: 15 @44472 has 28 MA's), (21, 44517), (24, 44529), (25, 44547), (26, 44559), (27, 44583), (28, 44586), (46, 44739), (49, 44760), (50, 44769), (52, 44775), (65, 44865), (66, 44868), (68, 44877), (72, 44898), (86, 45009), (89, 45021), (90, 45039), (103, 45090), (105, 45099), (109, 45129), (110, 45132),

Gene: Papyrus\_70 Start: 52595, Stop: 53425, Start Num: 8

Candidate Starts for Papyrus\_70:

(Start: 8 @52595 has 8 MA's), (20, 52640), (23, 52670), (26, 52703), (27, 52727), (34, 52775), (36, 52796), (46, 52889), (50, 52919), (51, 52922), (53, 52934), (71, 53018), (75, 53048), (85, 53132), (86, 53138), (89, 53150), (90, 53168), (97, 53195), (98, 53198), (110, 53294), (112, 53315), (118, 53342),

Gene: Patience\_85 Start: 55493, Stop: 56551, Start Num: 12

Candidate Starts for Patience\_85:

(Start: 12 @55493 has 3 MA's), (23, 55550), (24, 55553), (26, 55583), (32, 55640), (34, 55655), (49, 55784), (53, 55808), (60, 55862), (63, 55886), (84, 56030), (85, 56036), (86, 56042), (88, 56051), (89, 56054), (90, 56072), (99, 56099), (106, 56159), (112, 56207), (120, 56255), (123, 56273), (126, 56333), (128, 56354), (133, 56462), (134, 56477),

Gene: Penelope2018\_59 Start: 44490, Stop: 45350, Start Num: 15

Candidate Starts for Penelope2018\_59:

(2, 44418), (Start: 15 @44490 has 28 MA's), (21, 44535), (24, 44547), (25, 44565), (26, 44577), (27, 44601), (28, 44604), (46, 44757), (49, 44778), (50, 44787), (52, 44793), (65, 44883), (66, 44886), (68, 44895), (72, 44916), (86, 45027), (89, 45039), (90, 45057), (103, 45108), (105, 45117), (109, 45147), (110, 45150),

Gene: Phreeze\_71 Start: 52138, Stop: 53217, Start Num: 15

Candidate Starts for Phreeze\_71:

(Start: 15 @52138 has 28 MA's), (18, 52144), (22, 52192), (34, 52300), (39, 52348), (42, 52378), (49, 52435), (50, 52444), (52, 52450), (68, 52552), (74, 52585), (76, 52600), (80, 52639), (85, 52678), (89, 52696), (90, 52714), (91, 52717), (93, 52726), (106, 52792), (109, 52816), (132, 53008), (138, 53155), (139, 53158), (140, 53197), (141, 53206),

Gene: Polyuyki\_64 Start: 48412, Stop: 47561, Start Num: 13

Candidate Starts for Polyuyki\_64:

(Start: 13 @48412 has 5 MA's), (22, 48352), (35, 48232), (37, 48220), (49, 48118), (50, 48109), (54, 48091), (56, 48079), (65, 48007), (89, 47851), (90, 47833), (92, 47827), (115, 47704), (121, 47668), (124, 47647),

Gene: Prager\_59 Start: 44509, Stop: 45369, Start Num: 15

Candidate Starts for Prager\_59:

(2, 44437), (Start: 15 @44509 has 28 MA's), (21, 44554), (24, 44566), (25, 44584), (26, 44596), (27, 44620), (28, 44623), (46, 44776), (49, 44797), (50, 44806), (52, 44812), (65, 44902), (66, 44905), (68, 44914), (72, 44935), (86, 45046), (89, 45058), (90, 45076), (103, 45127), (105, 45136), (109, 45166), (110, 45169),

Gene: Predator\_71 Start: 51699, Stop: 52709, Start Num: 15

Candidate Starts for Predator\_71:

(Start: 15 @51699 has 28 MA's), (18, 51705), (22, 51753), (24, 51759), (34, 51861), (39, 51909), (49, 51996), (50, 52005), (52, 52011), (56, 52032), (65, 52101), (68, 52113), (73, 52140), (74, 52146), (76, 52161), (80, 52200), (85, 52239), (89, 52257), (90, 52275), (91, 52278), (104, 52350), (106, 52362), (137, 52683),

Gene: Puissant\_73 Start: 52254, Stop: 53387, Start Num: 15

Candidate Starts for Puissant\_73:

(Start: 15 @52254 has 28 MA's), (18, 52260), (22, 52308), (34, 52416), (39, 52464), (42, 52494), (49, 52551), (50, 52560), (52, 52566), (68, 52668), (74, 52701), (76, 52716), (80, 52755), (85, 52794), (89, 52812), (90, 52830), (91, 52833), (93, 52842), (106, 52908), (109, 52932), (136, 53289), (140, 53367),

Gene: Riparian\_72 Start: 52432, Stop: 53262, Start Num: 8

Candidate Starts for Riparian\_72:

(Start: 8 @52432 has 8 MA's), (20, 52477), (23, 52507), (26, 52540), (27, 52564), (34, 52612), (36, 52633), (46, 52726), (50, 52756), (51, 52759), (53, 52771), (71, 52855), (75, 52885), (85, 52969), (86, 52975), (89, 52987), (90, 53005), (97, 53032), (98, 53035), (110, 53131), (112, 53152), (118, 53179),

Gene: Rope\_70 Start: 52588, Stop: 53418, Start Num: 8

Candidate Starts for Rope\_70:

(Start: 8 @52588 has 8 MA's), (20, 52633), (23, 52663), (26, 52696), (27, 52720), (34, 52768), (36, 52789), (46, 52882), (50, 52912), (51, 52915), (53, 52927), (71, 53011), (75, 53041), (85, 53125), (86, 53131), (89, 53143), (90, 53161), (97, 53188), (98, 53191), (110, 53287), (112, 53308), (118, 53335),

Gene: Send513\_70 Start: 52966, Stop: 53796, Start Num: 8

Candidate Starts for Send513\_70:

(Start: 8 @52966 has 8 MA's), (20, 53011), (23, 53041), (26, 53074), (27, 53098), (34, 53146), (36, 53167), (46, 53260), (50, 53290), (51, 53293), (71, 53389), (75, 53419), (85, 53503), (86, 53509), (89, 53521), (90, 53539), (97, 53566), (98, 53569), (110, 53665), (112, 53686), (118, 53713),

Gene: Sienna\_56 Start: 41882, Stop: 42811, Start Num: 10

Candidate Starts for Sienna\_56:

(Start: 10 @41882 has 9 MA's), (23, 41939), (26, 41972), (42, 42122), (43, 42131), (46, 42155), (49, 42176), (52, 42191), (54, 42203), (57, 42215), (61, 42254), (62, 42269), (70, 42302), (84, 42413), (85, 42419), (89, 42437), (92, 42461), (94, 42467), (101, 42497), (103, 42521), (118, 42614), (131, 42782),

Gene: SirHarley\_61 Start: 44932, Stop: 45792, Start Num: 15

Candidate Starts for SirHarley\_61:

(2, 44860), (Start: 15 @44932 has 28 MA's), (21, 44977), (24, 44989), (25, 45007), (26, 45019), (27, 45043), (28, 45046), (46, 45199), (49, 45220), (50, 45229), (52, 45235), (65, 45325), (66, 45328), (68, 45337), (72, 45358), (86, 45469), (89, 45481), (90, 45499), (103, 45550), (105, 45559), (109, 45589), (110, 45592),

Gene: Suzy\_56 Start: 43075, Stop: 44001, Start Num: 10

Candidate Starts for Suzy\_56:

(Start: 10 @43075 has 9 MA's), (23, 43132), (26, 43165), (42, 43315), (43, 43324), (49, 43369), (52, 43384), (54, 43396), (57, 43408), (61, 43447), (62, 43462), (70, 43495), (84, 43606), (85, 43612), (89, 43630), (92, 43654), (94, 43660), (100, 43684), (101, 43690), (103, 43714), (113, 43783), (118, 43807), (131, 43972),

Gene: Terapin\_57 Start: 41806, Stop: 42735, Start Num: 10

Candidate Starts for Terapin\_57:

(Start: 10 @41806 has 9 MA's), (23, 41863), (26, 41896), (42, 42046), (43, 42055), (46, 42079), (49, 42100), (52, 42115), (54, 42127), (57, 42139), (61, 42178), (62, 42193), (70, 42226), (84, 42337), (85, 42343), (89, 42361), (92, 42385), (94, 42391), (101, 42421), (103, 42445), (118, 42538), (131, 42706),

Gene: Thoth\_59 Start: 44488, Stop: 45348, Start Num: 15

Candidate Starts for Thoth\_59:

(2, 44416), (Start: 15 @44488 has 28 MA's), (21, 44533), (24, 44545), (25, 44563), (26, 44575), (27, 44599), (28, 44602), (46, 44755), (49, 44776), (50, 44785), (52, 44791), (65, 44881), (66, 44884), (68, 44893), (72, 44914), (86, 45025), (89, 45037), (90, 45055), (103, 45106), (105, 45115), (109, 45145), (110, 45148),

Gene: Thumb\_73 Start: 52573, Stop: 53652, Start Num: 15

Candidate Starts for Thumb\_73:

(Start: 15 @52573 has 28 MA's), (18, 52579), (22, 52627), (34, 52735), (39, 52783), (42, 52813), (49, 52870), (50, 52879), (52, 52885), (68, 52987), (74, 53020), (76, 53035), (80, 53074), (85, 53113), (89, 53131), (90, 53149), (91, 53152), (93, 53161), (106, 53227), (109, 53251), (132, 53443), (138, 53590), (139, 53593), (140, 53632), (141, 53641),

Gene: Troll4\_59 Start: 44619, Stop: 45479, Start Num: 15

Candidate Starts for Troll4\_59:

(2, 44547), (Start: 15 @44619 has 28 MA's), (21, 44664), (24, 44676), (25, 44694), (26, 44706), (27, 44730), (28, 44733), (46, 44886), (49, 44907), (50, 44916), (52, 44922), (65, 45012), (66, 45015), (68, 45024), (72, 45045), (86, 45156), (89, 45168), (90, 45186), (103, 45237), (105, 45246), (109, 45276), (110, 45279),

Gene: Visconti\_60 Start: 44499, Stop: 45359, Start Num: 15

Candidate Starts for Visconti\_60:

(2, 44427), (Start: 15 @44499 has 28 MA's), (21, 44544), (24, 44556), (25, 44574), (26, 44586), (27, 44610), (28, 44613), (46, 44766), (49, 44787), (50, 44796), (52, 44802), (65, 44892), (66, 44895), (68, 44904), (72, 44925), (86, 45036), (89, 45048), (90, 45066), (103, 45117), (105, 45126), (109, 45156), (110, 45159),

Gene: WaldoWhy\_61 Start: 44552, Stop: 45412, Start Num: 15

Candidate Starts for WaldoWhy\_61:

(2, 44480), (Start: 15 @44552 has 28 MA's), (21, 44597), (24, 44609), (25, 44627), (26, 44639), (27, 44663), (28, 44666), (46, 44819), (49, 44840), (50, 44849), (52, 44855), (65, 44945), (66, 44948), (68, 44957), (72, 44978), (86, 45089), (89, 45101), (90, 45119), (103, 45170), (105, 45179), (109, 45209), (110, 45212),

Gene: Weiss13\_70 Start: 52669, Stop: 53499, Start Num: 8

Candidate Starts for Weiss13\_70:

(Start: 8 @52669 has 8 MA's), (20, 52714), (23, 52744), (26, 52777), (27, 52801), (34, 52849), (36, 52870), (46, 52963), (50, 52993), (51, 52996), (53, 53008), (71, 53092), (75, 53122), (85, 53206), (86, 53212), (89, 53224), (90, 53242), (97, 53269), (98, 53272), (110, 53368), (112, 53389), (118, 53416),

Gene: Yelo\_69 Start: 53048, Stop: 53878, Start Num: 8

Candidate Starts for Yelo\_69:

(Start: 8 @53048 has 8 MA's), (20, 53093), (23, 53123), (26, 53156), (27, 53180), (34, 53228), (36, 53249), (46, 53342), (50, 53372), (51, 53375), (53, 53387), (71, 53471), (75, 53501), (85, 53585), (86, 53591), (89, 53603), (90, 53621), (97, 53648), (98, 53651), (110, 53747), (112, 53768), (118, 53795),

Gene: Zenon\_72 Start: 52992, Stop: 53822, Start Num: 8

Candidate Starts for Zenon\_72:

(Start: 8 @52992 has 8 MA's), (20, 53037), (23, 53067), (26, 53100), (27, 53124), (34, 53172), (36, 53193), (46, 53286), (50, 53316), (51, 53319), (71, 53415), (75, 53445), (85, 53529), (86, 53535), (89, 53547), (90, 53565), (97, 53592), (98, 53595), (110, 53691), (112, 53712), (118, 53739),