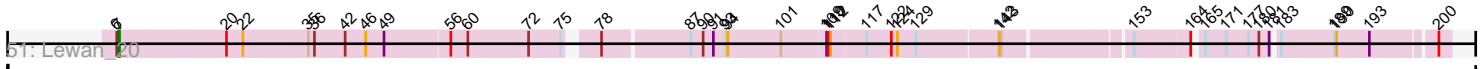




Pham 193937



Lined writing area with horizontal lines and a dashed right margin.

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 193937 Report

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

Pham number 193937 has 82 members, 9 are drafts.

Phages represented in each track:

- Track 1 : Herbertwm\_29
- Track 2 : Anthony\_30
- Track 3 : PP\_40
- Track 4 : Phillis\_28
- Track 5 : Astro\_28
- Track 6 : Dixon\_28
- Track 7 : Roary\_28
- Track 8 : Smeadley\_28, Groundhog\_27
- Track 9 : Expelliarmus\_27
- Track 10 : Danforth\_27
- Track 11 : NearlyHeadless\_28
- Track 12 : Stephig9\_28
- Track 13 : Saintus\_28
- Track 14 : Angelicage\_36, Affeca\_36
- Track 15 : Vivi2\_40, McKinley\_40, Tangent\_38
- Track 16 : Kewpiedoll\_36, ChadMasterC\_37, Stultus\_35
- Track 17 : Barsten\_37
- Track 18 : Kamashten\_36, Thing3\_36, Bibwit\_37, Galadriel\_38
- Track 19 : Sanjuju\_35, Geodirt\_35
- Track 20 : Fitzgerald\_35
- Track 21 : Paries\_40
- Track 22 : Keitabear\_38
- Track 23 : Ailee\_35
- Track 24 : Love\_41, Nordenberg\_32
- Track 25 : Shivanishola\_38
- Track 26 : Fosterous\_36
- Track 27 : Brandonk123\_39
- Track 28 : Lennon\_38, Sitar\_38
- Track 29 : MoontowerMania\_36
- Track 30 : Sedona\_38
- Track 31 : Rofo\_38, BobBob\_35
- Track 32 : Charming\_38
- Track 33 : Jabberwocky\_35
- Track 34 : Crossroads\_20, Finemlucis\_20, MkaliMitinis3\_20, Zakai\_20
- Track 35 : Winky\_20, Faith1\_20, Itos\_20, Breezona\_20
- Track 36 : Claus\_20
- Track 37 : DHan\_20

- Track 38 : GuuelaD\_20
- Track 39 : Vetrix\_20
- Track 40 : Miley16\_20, Gabriela\_20, BobsGarage\_20, DrSeegs\_20, Netyap\_20
- Track 41 : Rumpelstiltskin\_20
- Track 42 : LilDestine\_20, Wilder\_20, Gardann\_20, Kahlid\_20, Nicholasp3\_20
- Track 43 : Baoshan\_19, ZhongYanYuan\_19
- Track 44 : Soap141\_20, Sarshaun\_20, Wigglewiggle\_20, Hafay\_20
- Track 45 : Loadrie\_20
- Track 46 : DanBing\_19
- Track 47 : Archie\_20
- Track 48 : Bazzle\_20
- Track 49 : BigCheese\_20
- Track 50 : Tourach\_20
- Track 51 : Lewan\_20

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

The start number called the most often in the published annotations is 4, it was called in 31 of the 73 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- Affeca\_36, Ailee\_35, Angelicage\_36, Barsten\_37, Bibwit\_37, BobBob\_35, Brandonk123\_39, ChadMasterC\_37, Charming\_38, Fitzgerald\_35, Fosterous\_36, Galadriel\_38, Geodirt\_35, Jabberwocky\_35, Kamashten\_36, Keitabear\_38, Kewpiedoll\_36, Lennon\_38, Love\_41, McKinley\_40, MoontowerMania\_36, Nordenberg\_32, Paries\_40, Rofo\_38, Sanjuju\_35, Sedona\_38, Shivanishola\_38, Sitar\_38, Stultus\_35, Tangent\_38, Thing3\_36, Vivi2\_40,

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

- PP\_40,

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

- Anthony\_30, Archie\_20, Astro\_28, Baoshan\_19, Bazzle\_20, BigCheese\_20, BobsGarage\_20, Breezona\_20, Claus\_20, Crossroads\_20, DHan\_20, DanBing\_19, Danforth\_27, Dixon\_28, DrSeegs\_20, Expelliarmus\_27, Faith1\_20, Finemlucis\_20, Gabriela\_20, Gardann\_20, Groundhog\_27, GuuelaD\_20, Hafay\_20, Herbertwm\_29, Itos\_20, Kahlid\_20, Lewan\_20, LilDestine\_20, Loadrie\_20, Miley16\_20, MkaliMitinis3\_20, NearlyHeadless\_28, Netyap\_20, Nicholasp3\_20, Phillis\_28, Roary\_28, Rumpelstiltskin\_20, Saintus\_28, Sarshaun\_20, Smeadley\_28, Soap141\_20, Stepfig9\_28, Tourach\_20, Vetrix\_20, Wigglewiggle\_20, Wilder\_20, Winky\_20, Zakai\_20, ZhongYanYuan\_19,

**Summary by start number:**

Start 1:

- Found in 2 of 82 ( 2.4% ) of genes in pham
- Manual Annotations of this start: 2 of 73
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Herbertwm\_29 (A2), PP\_40 (A7),

#### Start 4:

- Found in 33 of 82 ( 40.2% ) of genes in pham
- Manual Annotations of this start: 31 of 73
- Called 97.0% of time when present
- Phage (with cluster) where this start called: Affeca\_36 (DE1), Ailee\_35 (DE1), Angelicage\_36 (DE1), Barsten\_37 (DE1), Bibwit\_37 (DE1), BobBob\_35 (DE1), Brandonk123\_39 (DE1), ChadMasterC\_37 (DE1), Charming\_38 (DE1), Fitzgerald\_35 (DE1), Fosterous\_36 (DE1), Galadriel\_38 (DE1), Geodirt\_35 (DE1), Jabberwocky\_35 (DE1), Kamashten\_36 (DE1), Keitabear\_38 (DE1), Kewpiedoll\_36 (DE1), Lennon\_38 (DE1), Love\_41 (DE1), McKinley\_40 (DE1), MoontowerMania\_36 (DE1), Nordenberg\_32 (DE1), Paries\_40 (DE1), Rofo\_38 (DE1), Sanjuju\_35 (DE1), Sedona\_38 (DE1), Shivanishola\_38 (DE1), Sitar\_38 (DE1), Stultus\_35 (DE1), Tangent\_38 (DE1), Thing3\_36 (DE1), Vivi2\_40 (DE1),

#### Start 6:

- Found in 30 of 82 ( 36.6% ) of genes in pham
- Manual Annotations of this start: 5 of 73
- Called 16.7% of time when present
- Phage (with cluster) where this start called: Breezona\_20 (L2), Faith1\_20 (L2), Itos\_20 (L2), Rumpelstiltskin\_20 (L2), Winky\_20 (L2),

#### Start 7:

- Found in 36 of 82 ( 43.9% ) of genes in pham
- Manual Annotations of this start: 23 of 73
- Called 86.1% of time when present
- Phage (with cluster) where this start called: Archie\_20 (L2), Baoshan\_19 (L2), Bazzle\_20 (L2), BigCheese\_20 (L2), BobsGarage\_20 (L2), Claus\_20 (L2), Crossroads\_20 (L2), DHan\_20 (L2), DanBing\_19 (L2), DrSeegs\_20 (L2), Finemlucis\_20 (L2), Gabriela\_20 (L2), Gardann\_20 (L2), GuuelaD\_20 (L2), Hafay\_20 (L2), Kahlid\_20 (L2), Lewan\_20 (L2), LilDestine\_20 (L2), Loadrie\_20 (L2), Miley16\_20 (L2), MkaliMitinis3\_20 (L2), Netyap\_20 (L2), Nicholasp3\_20 (L2), Sarshaun\_20 (L2), Soap141\_20 (L2), Tourach\_20 (L2), Vetrix\_20 (L2), Wigglewiggles\_20 (L2), Wilder\_20 (L2), Zakai\_20 (L2), ZhongYanYuan\_19 (L2),

#### Start 10:

- Found in 11 of 82 ( 13.4% ) of genes in pham
- Manual Annotations of this start: 11 of 73
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Astro\_28 (A8), Danforth\_27 (A8), Dixon\_28 (A8), Expelliarmus\_27 (A8), Groundhog\_27 (A8), NearlyHeadless\_28 (A8), Phillis\_28 (A8), Roary\_28 (A8), Saintus\_28 (A8), Smeadley\_28 (A8), Stephig9\_28 (A8),

#### Start 11:

- Found in 1 of 82 ( 1.2% ) of genes in pham
- Manual Annotations of this start: 1 of 73
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Anthony\_30 (A20),

### Summary by clusters:

There are 6 clusters represented in this pham: A20, DE1, A2, L2, A7, A8,

Info for manual annotations of cluster A2:

- Start number 1 was manually annotated 1 time for cluster A2.

Info for manual annotations of cluster A20:

- Start number 11 was manually annotated 1 time for cluster A20.

Info for manual annotations of cluster A7:

- Start number 1 was manually annotated 1 time for cluster A7.

Info for manual annotations of cluster A8:

- Start number 10 was manually annotated 11 times for cluster A8.

Info for manual annotations of cluster DE1:

- Start number 4 was manually annotated 31 times for cluster DE1.

Info for manual annotations of cluster L2:

- Start number 6 was manually annotated 5 times for cluster L2.
- Start number 7 was manually annotated 23 times for cluster L2.

### ***Gene Information:***

Gene: Affeca\_36 Start: 33574, Stop: 35496, Start Num: 4

Candidate Starts for Affeca\_36:

(Start: 4 @33574 has 31 MA's), (13, 33709), (15, 33718), (18, 33751), (21, 33775), (29, 33844), (38, 33919), (59, 34111), (60, 34117), (61, 34138), (64, 34156), (69, 34168), (73, 34228), (76, 34282), (85, 34396), (93, 34483), (99, 34537), (106, 34603), (111, 34633), (113, 34645), (118, 34690), (119, 34702), (121, 34720), (127, 34747), (134, 34825), (137, 34852), (141, 34876), (149, 34999), (152, 35041), (162, 35125), (166, 35155), (181, 35236), (185, 35266), (191, 35338), (192, 35347),

Gene: Ailee\_35 Start: 33459, Stop: 35381, Start Num: 4

Candidate Starts for Ailee\_35:

(Start: 4 @33459 has 31 MA's), (13, 33594), (18, 33636), (21, 33660), (38, 33804), (59, 33996), (60, 34002), (61, 34023), (64, 34041), (69, 34053), (73, 34113), (76, 34167), (85, 34281), (93, 34368), (99, 34422), (104, 34476), (106, 34488), (111, 34518), (113, 34530), (118, 34575), (119, 34587), (121, 34605), (127, 34632), (134, 34710), (137, 34737), (141, 34761), (149, 34884), (152, 34926), (162, 35010), (166, 35040), (181, 35121), (185, 35151), (191, 35223), (192, 35232),

Gene: Angelicage\_36 Start: 33992, Stop: 35914, Start Num: 4

Candidate Starts for Angelicage\_36:

(Start: 4 @33992 has 31 MA's), (13, 34127), (15, 34136), (18, 34169), (21, 34193), (29, 34262), (38, 34337), (59, 34529), (60, 34535), (61, 34556), (64, 34574), (69, 34586), (73, 34646), (76, 34700), (85, 34814), (93, 34901), (99, 34955), (106, 35021), (111, 35051), (113, 35063), (118, 35108), (119, 35120), (121, 35138), (127, 35165), (134, 35243), (137, 35270), (141, 35294), (149, 35417), (152, 35459), (162, 35543), (166, 35573), (181, 35654), (185, 35684), (191, 35756), (192, 35765),

Gene: Anthony\_30 Start: 21219, Stop: 22928, Start Num: 11

Candidate Starts for Anthony\_30:

(Start: 11 @21219 has 1 MA's), (24, 21366), (28, 21381), (31, 21408), (38, 21456), (47, 21513), (82, 21867), (88, 21930), (92, 21966), (105, 22080), (118, 22158), (123, 22197), (130, 22224), (133, 22242), (142, 22332), (143, 22335), (144, 22350), (159, 22536), (167, 22596), (173, 22623), (176, 22638), (182, 22683), (184, 22701), (188, 22764), (190, 22770), (197, 22872),

Gene: Archie\_20 Start: 19444, Stop: 21240, Start Num: 7

Candidate Starts for Archie\_20:

(Start: 6 @19441 has 5 MA's), (Start: 7 @19444 has 23 MA's), (14, 19540), (20, 19597), (22, 19621), (26, 19657), (35, 19717), (36, 19726), (38, 19750), (42, 19771), (49, 19828), (56, 19921), (60, 19945), (62, 19975), (72, 20029), (75, 20074), (79, 20125), (87, 20230), (94, 20284), (101, 20362), (103, 20371), (109, 20419), (110, 20422), (112, 20425), (115, 20449), (122, 20509), (124, 20518), (142, 20656), (143, 20659), (151, 20788), (153, 20827), (155, 20842), (164, 20902), (165, 20911), (171, 20938), (177, 20971), (180, 20986), (192, 21112), (193, 21136), (200, 21223),

Gene: Astro\_28 Start: 21515, Stop: 23236, Start Num: 10

Candidate Starts for Astro\_28:

(Start: 10 @21515 has 11 MA's), (24, 21659), (43, 21773), (53, 21863), (54, 21899), (57, 21920), (68, 21992), (71, 22016), (75, 22070), (77, 22088), (84, 22172), (94, 22268), (100, 22322), (104, 22370), (124, 22499), (128, 22517), (143, 22643), (159, 22847), (160, 22856), (174, 22937), (186, 23033), (194, 23132), (201, 23219),

Gene: Baoshan\_19 Start: 19053, Stop: 20849, Start Num: 7

Candidate Starts for Baoshan\_19:

(Start: 7 @19053 has 23 MA's), (17, 19173), (19, 19194), (20, 19206), (22, 19230), (24, 19257), (35, 19326), (36, 19335), (39, 19368), (42, 19380), (46, 19410), (49, 19437), (60, 19554), (67, 19602), (72, 19638), (75, 19683), (79, 19734), (87, 19839), (90, 19857), (93, 19890), (94, 19893), (97, 19932), (101, 19971), (110, 20031), (112, 20034), (122, 20118), (142, 20265), (148, 20343), (153, 20436), (155, 20451), (164, 20511), (165, 20520), (171, 20547), (180, 20595), (181, 20610), (189, 20694), (190, 20697), (193, 20745), (195, 20760), (200, 20832),

Gene: Barsten\_37 Start: 32600, Stop: 34321, Start Num: 4

Candidate Starts for Barsten\_37:

(Start: 4 @32600 has 31 MA's), (13, 32735), (15, 32744), (18, 32777), (21, 32801), (29, 32870), (33, 32900), (38, 32945), (58, 33131), (63, 33170), (65, 33179), (74, 33251), (85, 33275), (93, 33347), (102, 33434), (107, 33470), (108, 33476), (114, 33518), (116, 33533), (118, 33542), (136, 33689), (145, 33773), (147, 33806), (150, 33854), (154, 33920), (156, 33926), (158, 33938), (161, 33968), (163, 33974), (168, 34010), (169, 34019), (179, 34064),

Gene: Bazzle\_20 Start: 19193, Stop: 20989, Start Num: 7

Candidate Starts for Bazzle\_20:

(Start: 6 @19190 has 5 MA's), (Start: 7 @19193 has 23 MA's), (20, 19346), (22, 19370), (26, 19406), (35, 19466), (36, 19475), (38, 19499), (42, 19520), (49, 19577), (56, 19670), (60, 19694), (62, 19724), (72, 19778), (75, 19823), (79, 19874), (87, 19979), (94, 20033), (101, 20111), (103, 20120), (109, 20168), (110, 20171), (112, 20174), (115, 20198), (122, 20258), (124, 20267), (142, 20405), (143, 20408), (151, 20537), (153, 20576), (155, 20591), (164, 20651), (165, 20660), (171, 20687), (177, 20720), (180, 20735), (192, 20861), (193, 20885), (200, 20972),

Gene: Bibwit\_37 Start: 33393, Stop: 35315, Start Num: 4

Candidate Starts for Bibwit\_37:

(Start: 4 @33393 has 31 MA's), (13, 33528), (15, 33537), (18, 33570), (21, 33594), (29, 33663), (38, 33738), (59, 33930), (60, 33936), (61, 33957), (64, 33975), (69, 33987), (73, 34047), (76, 34101), (85, 34215), (93, 34302), (99, 34356), (104, 34410), (106, 34422), (111, 34452), (113, 34464), (118, 34509), (119, 34521), (121, 34539), (127, 34566), (134, 34644), (137, 34671), (141, 34695), (149, 34818), (152, 34860), (162, 34944), (166, 34974), (172, 35001), (181, 35055), (185, 35085), (191, 35157), (192, 35166),

Gene: BigCheese\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for BigCheese\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: BobBob\_35 Start: 32673, Stop: 34526, Start Num: 4

Candidate Starts for BobBob\_35:

(Start: 4 @32673 has 31 MA's), (13, 32808), (15, 32817), (18, 32850), (21, 32874), (29, 32943), (33, 32973), (38, 33018), (59, 33210), (60, 33216), (61, 33237), (64, 33255), (69, 33267), (73, 33327), (80, 33393), (93, 33513), (96, 33546), (106, 33633), (111, 33663), (113, 33675), (118, 33720), (119, 33732), (121, 33750), (125, 33765), (129, 33789), (134, 33855), (137, 33882), (141, 33906), (149, 34029), (152, 34071), (162, 34155), (166, 34185), (172, 34212), (181, 34266), (185, 34296), (191, 34368), (192, 34377),

Gene: BobsGarage\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for BobsGarage\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: Brandonk123\_39 Start: 33739, Stop: 35661, Start Num: 4

Candidate Starts for Brandonk123\_39:

(Start: 4 @33739 has 31 MA's), (13, 33874), (15, 33883), (18, 33916), (21, 33940), (29, 34009), (33, 34039), (38, 34084), (59, 34276), (60, 34282), (61, 34303), (64, 34321), (69, 34333), (73, 34393), (76, 34447), (85, 34561), (93, 34648), (99, 34702), (104, 34756), (106, 34768), (111, 34798), (113, 34810), (118, 34855), (119, 34867), (121, 34885), (127, 34912), (134, 34990), (137, 35017), (141, 35041), (149, 35164), (152, 35206), (162, 35290), (166, 35320), (172, 35347), (181, 35401), (185, 35431), (191, 35503), (192, 35512),

Gene: Breezona\_20 Start: 19225, Stop: 21024, Start Num: 6

Candidate Starts for Breezona\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: ChadMasterC\_37 Start: 33999, Stop: 35720, Start Num: 4

Candidate Starts for ChadMasterC\_37:

(Start: 4 @33999 has 31 MA's), (13, 34134), (15, 34143), (18, 34176), (21, 34200), (29, 34269), (38, 34344), (58, 34530), (63, 34569), (65, 34578), (70, 34593), (74, 34650), (85, 34674), (93, 34746), (102, 34833), (107, 34869), (108, 34875), (114, 34917), (116, 34932), (118, 34941), (136, 35088), (145, 35172), (147, 35205), (150, 35253), (154, 35319), (156, 35325), (158, 35337), (161, 35367), (163, 35373), (168, 35409), (169, 35418), (179, 35463),

Gene: Charming\_38 Start: 33240, Stop: 35162, Start Num: 4



Candidate Starts for Charming\_38:

(Start: 4 @33240 has 31 MA's), (13, 33375), (18, 33417), (21, 33441), (29, 33510), (33, 33540), (38, 33585), (59, 33777), (60, 33783), (61, 33804), (64, 33822), (69, 33834), (73, 33894), (76, 33948), (85, 34062), (93, 34149), (99, 34203), (106, 34269), (111, 34299), (113, 34311), (118, 34356), (119, 34368), (121, 34386), (127, 34413), (134, 34491), (137, 34518), (141, 34542), (149, 34665), (152, 34707), (162, 34791), (166, 34821), (172, 34848), (181, 34902), (185, 34932), (191, 35004), (192, 35013),

Gene: Claus\_20 Start: 19209, Stop: 21005, Start Num: 7

Candidate Starts for Claus\_20:

(Start: 7 @19209 has 23 MA's), (17, 19329), (19, 19350), (20, 19362), (22, 19386), (24, 19413), (35, 19482), (36, 19491), (39, 19524), (42, 19536), (46, 19566), (49, 19593), (60, 19710), (67, 19758), (72, 19794), (75, 19839), (79, 19890), (87, 19995), (90, 20013), (93, 20046), (94, 20049), (97, 20088), (101, 20127), (110, 20187), (112, 20190), (122, 20274), (142, 20421), (148, 20499), (153, 20592), (155, 20607), (164, 20667), (165, 20676), (180, 20751), (181, 20766), (189, 20850), (190, 20853), (192, 20877), (193, 20901), (195, 20916), (200, 20988),

Gene: Crossroads\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for Crossroads\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (110, 20206), (112, 20209), (122, 20293), (124, 20302), (129, 20329), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: DHan\_20 Start: 19145, Stop: 20941, Start Num: 7

Candidate Starts for DHan\_20:

(Start: 7 @19145 has 23 MA's), (17, 19265), (22, 19322), (24, 19349), (34, 19406), (35, 19418), (36, 19427), (42, 19472), (46, 19502), (49, 19529), (60, 19646), (67, 19694), (72, 19730), (75, 19775), (79, 19826), (87, 19931), (90, 19949), (93, 19982), (94, 19985), (97, 20024), (101, 20063), (110, 20123), (112, 20126), (122, 20210), (142, 20357), (148, 20435), (153, 20528), (155, 20543), (164, 20603), (165, 20612), (171, 20639), (180, 20687), (181, 20702), (189, 20786), (192, 20813), (193, 20837), (195, 20852), (200, 20924),

Gene: DanBing\_19 Start: 19049, Stop: 20845, Start Num: 7

Candidate Starts for DanBing\_19:

(Start: 7 @19049 has 23 MA's), (17, 19169), (19, 19190), (20, 19202), (22, 19226), (24, 19253), (35, 19322), (36, 19331), (39, 19364), (42, 19376), (46, 19406), (49, 19433), (60, 19550), (67, 19598), (72, 19634), (75, 19679), (79, 19730), (87, 19835), (90, 19853), (93, 19886), (94, 19889), (97, 19928), (101, 19967), (110, 20027), (112, 20030), (122, 20114), (142, 20261), (148, 20339), (153, 20432), (155, 20447), (164, 20507), (165, 20516), (171, 20543), (180, 20591), (181, 20606), (189, 20690), (190, 20693), (192, 20717), (193, 20741), (195, 20756), (200, 20828),

Gene: Danforth\_27 Start: 21490, Stop: 23211, Start Num: 10

Candidate Starts for Danforth\_27:

(Start: 10 @21490 has 11 MA's), (24, 21634), (43, 21748), (53, 21838), (54, 21874), (57, 21895), (68, 21967), (71, 21991), (75, 22045), (84, 22147), (94, 22243), (100, 22297), (104, 22345), (124, 22474), (128, 22492), (143, 22618), (159, 22822), (160, 22831), (174, 22912), (194, 23107),

Gene: Dixon\_28 Start: 21509, Stop: 23230, Start Num: 10

Candidate Starts for Dixon\_28:

(Start: 10 @21509 has 11 MA's), (24, 21653), (28, 21668), (43, 21767), (54, 21893), (57, 21914), (68, 21986), (71, 22010), (75, 22064), (84, 22166), (94, 22262), (100, 22316), (104, 22364), (120, 22475), (128, 22511), (139, 22622), (143, 22637), (159, 22841), (160, 22850), (174, 22931), (186, 23027), (194, 23126),

Gene: DrSeegs\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for DrSeegs\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: Expelliarmus\_27 Start: 21476, Stop: 23197, Start Num: 10

Candidate Starts for Expelliarmus\_27:

(Start: 10 @21476 has 11 MA's), (24, 21620), (28, 21635), (43, 21734), (53, 21824), (54, 21860), (68, 21953), (71, 21977), (75, 22031), (84, 22133), (94, 22229), (100, 22283), (104, 22331), (124, 22460), (128, 22478), (143, 22604), (159, 22808), (160, 22817), (174, 22898), (186, 22994), (194, 23093), (201, 23180),

Gene: Faith1\_20 Start: 19225, Stop: 21024, Start Num: 6

Candidate Starts for Faith1\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: Finemlucis\_20 Start: 19236, Stop: 21032, Start Num: 7

Candidate Starts for Finemlucis\_20:

(Start: 6 @19233 has 5 MA's), (Start: 7 @19236 has 23 MA's), (20, 19389), (22, 19413), (35, 19509), (36, 19518), (42, 19563), (46, 19593), (49, 19620), (56, 19713), (60, 19737), (72, 19821), (75, 19866), (87, 20022), (90, 20040), (91, 20055), (93, 20073), (94, 20076), (101, 20154), (109, 20211), (110, 20214), (112, 20217), (122, 20301), (124, 20310), (129, 20337), (142, 20448), (143, 20451), (153, 20619), (164, 20694), (165, 20703), (171, 20730), (177, 20763), (180, 20778), (181, 20793), (183, 20799), (189, 20877), (190, 20880), (193, 20928), (200, 21015),

Gene: Fitzgerald\_35 Start: 33217, Stop: 34938, Start Num: 4

Candidate Starts for Fitzgerald\_35:

(Start: 4 @33217 has 31 MA's), (13, 33352), (15, 33361), (18, 33394), (21, 33418), (29, 33487), (58, 33748), (63, 33787), (65, 33796), (70, 33811), (74, 33868), (85, 33892), (93, 33964), (102, 34051), (107, 34087), (108, 34093), (114, 34135), (116, 34150), (118, 34159), (136, 34306), (145, 34390), (147, 34423), (150, 34471), (154, 34537), (156, 34543), (158, 34555), (161, 34585), (163, 34591), (168, 34627), (169, 34636), (179, 34681),

Gene: Fosterous\_36 Start: 33665, Stop: 35518, Start Num: 4

Candidate Starts for Fosterous\_36:

(Start: 4 @33665 has 31 MA's), (13, 33800), (15, 33809), (18, 33842), (21, 33866), (29, 33935), (38, 34010), (59, 34202), (60, 34208), (61, 34229), (64, 34247), (69, 34259), (73, 34319), (81, 34400), (93, 34505), (94, 34508), (96, 34538), (104, 34613), (106, 34625), (111, 34655), (113, 34667), (118, 34712), (119, 34724), (121, 34742), (127, 34769), (134, 34847), (137, 34874), (141, 34898), (149,

35021), (152, 35063), (162, 35147), (166, 35177), (172, 35204), (181, 35258), (185, 35288), (191, 35360), (192, 35369),

Gene: Gabriela\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for Gabriela\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: Galadriel\_38 Start: 34154, Stop: 36079, Start Num: 4

Candidate Starts for Galadriel\_38:

(Start: 4 @34154 has 31 MA's), (13, 34289), (15, 34298), (18, 34331), (21, 34355), (29, 34424), (38, 34499), (59, 34691), (60, 34697), (61, 34718), (64, 34736), (69, 34748), (73, 34808), (76, 34862), (85, 34979), (93, 35066), (99, 35120), (104, 35174), (106, 35186), (111, 35216), (113, 35228), (118, 35273), (119, 35285), (121, 35303), (127, 35330), (134, 35408), (137, 35435), (141, 35459), (149, 35582), (152, 35624), (162, 35708), (166, 35738), (172, 35765), (181, 35819), (185, 35849), (191, 35921), (192, 35930),

Gene: Gardann\_20 Start: 19233, Stop: 21029, Start Num: 7

Candidate Starts for Gardann\_20:

(Start: 6 @19230 has 5 MA's), (Start: 7 @19233 has 23 MA's), (20, 19386), (22, 19410), (35, 19506), (36, 19515), (41, 19557), (42, 19560), (46, 19590), (49, 19617), (56, 19710), (60, 19734), (72, 19818), (75, 19863), (78, 19899), (87, 20019), (90, 20037), (91, 20052), (93, 20070), (94, 20073), (101, 20151), (109, 20208), (110, 20211), (112, 20214), (122, 20298), (124, 20307), (129, 20334), (142, 20445), (143, 20448), (153, 20616), (164, 20691), (165, 20700), (171, 20727), (177, 20760), (180, 20775), (181, 20790), (183, 20796), (189, 20874), (190, 20877), (193, 20925), (200, 21012),

Gene: Geodirt\_35 Start: 33142, Stop: 34863, Start Num: 4

Candidate Starts for Geodirt\_35:

(Start: 4 @33142 has 31 MA's), (13, 33277), (15, 33286), (18, 33319), (21, 33343), (29, 33412), (38, 33487), (58, 33673), (63, 33712), (65, 33721), (74, 33793), (85, 33817), (93, 33889), (102, 33976), (107, 34012), (108, 34018), (114, 34060), (116, 34075), (118, 34084), (136, 34231), (145, 34315), (147, 34348), (150, 34396), (154, 34462), (156, 34468), (158, 34480), (161, 34510), (163, 34516), (168, 34552), (169, 34561), (179, 34606),

Gene: Groundhog\_27 Start: 21477, Stop: 23198, Start Num: 10

Candidate Starts for Groundhog\_27:

(Start: 10 @21477 has 11 MA's), (24, 21621), (28, 21636), (43, 21735), (53, 21825), (54, 21861), (57, 21882), (68, 21954), (71, 21978), (75, 22032), (84, 22134), (94, 22230), (100, 22284), (104, 22332), (124, 22461), (128, 22479), (143, 22605), (159, 22809), (160, 22818), (174, 22899), (186, 22995), (194, 23094), (201, 23181),

Gene: GuuelaD\_20 Start: 19262, Stop: 21058, Start Num: 7

Candidate Starts for GuuelaD\_20:

(Start: 6 @19259 has 5 MA's), (Start: 7 @19262 has 23 MA's), (20, 19415), (22, 19439), (32, 19514), (35, 19535), (36, 19544), (49, 19646), (56, 19739), (60, 19763), (72, 19847), (75, 19892), (78, 19928), (79, 19943), (87, 20048), (91, 20081), (93, 20099), (94, 20102), (97, 20141), (101, 20180), (110, 20240), (112, 20243), (122, 20327), (124, 20336), (129, 20363), (142, 20474), (153, 20645), (164, 20720), (165, 20729), (171, 20756), (177, 20789), (180, 20804), (181, 20819), (183, 20825), (189, 20903), (190, 20906), (193, 20954), (200, 21041),

Gene: Hafay\_20 Start: 19261, Stop: 21057, Start Num: 7

Candidate Starts for Hafay\_20:

(Start: 6 @19258 has 5 MA's), (Start: 7 @19261 has 23 MA's), (20, 19414), (22, 19438), (35, 19534), (36, 19543), (41, 19585), (42, 19588), (46, 19618), (49, 19645), (56, 19738), (60, 19762), (72, 19846), (75, 19891), (78, 19927), (87, 20047), (90, 20065), (91, 20080), (93, 20098), (94, 20101), (101, 20179), (109, 20236), (110, 20239), (112, 20242), (122, 20326), (124, 20335), (129, 20362), (142, 20473), (143, 20476), (153, 20644), (164, 20719), (165, 20728), (171, 20755), (177, 20788), (180, 20803), (181, 20818), (183, 20824), (189, 20902), (190, 20905), (200, 21040),

Gene: Herbertwm\_29 Start: 21904, Stop: 23925, Start Num: 1

Candidate Starts for Herbertwm\_29:

(Start: 1 @21904 has 2 MA's), (3, 22018), (8, 22090), (18, 22192), (27, 22273), (35, 22330), (40, 22378), (52, 22480), (57, 22540), (75, 22690), (77, 22708), (78, 22726), (83, 22783), (86, 22822), (92, 22885), (94, 22891), (95, 22894), (98, 22936), (125, 23122), (126, 23128), (129, 23146), (138, 23239), (146, 23323), (157, 23467), (167, 23557), (178, 23614), (182, 23650), (187, 23698), (188, 23728), (189, 23731), (196, 23818), (202, 23893),

Gene: Itos\_20 Start: 19225, Stop: 21024, Start Num: 6

Candidate Starts for Itos\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: Jabberwocky\_35 Start: 33678, Stop: 35399, Start Num: 4

Candidate Starts for Jabberwocky\_35:

(Start: 4 @33678 has 31 MA's), (13, 33813), (18, 33855), (21, 33879), (38, 34023), (58, 34209), (63, 34248), (65, 34257), (74, 34329), (85, 34353), (93, 34425), (102, 34512), (107, 34548), (108, 34554), (114, 34596), (116, 34611), (118, 34620), (136, 34767), (145, 34851), (147, 34884), (150, 34932), (154, 34998), (156, 35004), (158, 35016), (161, 35046), (163, 35052), (168, 35088), (169, 35097), (179, 35142),

Gene: Kahlid\_20 Start: 19233, Stop: 21029, Start Num: 7

Candidate Starts for Kahlid\_20:

(Start: 6 @19230 has 5 MA's), (Start: 7 @19233 has 23 MA's), (20, 19386), (22, 19410), (35, 19506), (36, 19515), (41, 19557), (42, 19560), (46, 19590), (49, 19617), (56, 19710), (60, 19734), (72, 19818), (75, 19863), (78, 19899), (87, 20019), (90, 20037), (91, 20052), (93, 20070), (94, 20073), (101, 20151), (109, 20208), (110, 20211), (112, 20214), (122, 20298), (124, 20307), (129, 20334), (142, 20445), (143, 20448), (153, 20616), (164, 20691), (165, 20700), (171, 20727), (177, 20760), (180, 20775), (181, 20790), (183, 20796), (189, 20874), (190, 20877), (193, 20925), (200, 21012),

Gene: Kamashten\_36 Start: 33130, Stop: 35052, Start Num: 4

Candidate Starts for Kamashten\_36:

(Start: 4 @33130 has 31 MA's), (13, 33265), (15, 33274), (18, 33307), (21, 33331), (29, 33400), (38, 33475), (59, 33667), (60, 33673), (61, 33694), (64, 33712), (69, 33724), (73, 33784), (76, 33838), (85, 33952), (93, 34039), (99, 34093), (104, 34147), (106, 34159), (111, 34189), (113, 34201), (118, 34246), (119, 34258), (121, 34276), (127, 34303), (134, 34381), (137, 34408), (141, 34432), (149, 34555), (152, 34597), (162, 34681), (166, 34711), (172, 34738), (181, 34792), (185, 34822), (191, 34894), (192, 34903),

Gene: Keitabear\_38 Start: 35100, Stop: 37022, Start Num: 4

Candidate Starts for Keitabear\_38:

(Start: 4 @35100 has 31 MA's), (13, 35235), (18, 35277), (21, 35301), (29, 35370), (38, 35445), (59, 35637), (60, 35643), (61, 35664), (64, 35682), (69, 35694), (73, 35754), (76, 35808), (85, 35922), (93, 36009), (99, 36063), (106, 36129), (111, 36159), (113, 36171), (118, 36216), (119, 36228), (121, 36246), (127, 36273), (134, 36351), (137, 36378), (141, 36402), (149, 36525), (152, 36567), (162, 36651), (166, 36681), (181, 36762), (185, 36792), (191, 36864), (192, 36873),

Gene: Kewpiedoll\_36 Start: 32537, Stop: 34258, Start Num: 4

Candidate Starts for Kewpiedoll\_36:

(Start: 4 @32537 has 31 MA's), (13, 32672), (15, 32681), (18, 32714), (21, 32738), (29, 32807), (38, 32882), (58, 33068), (63, 33107), (65, 33116), (70, 33131), (74, 33188), (85, 33212), (93, 33284), (102, 33371), (107, 33407), (108, 33413), (114, 33455), (116, 33470), (118, 33479), (136, 33626), (145, 33710), (147, 33743), (150, 33791), (154, 33857), (156, 33863), (158, 33875), (161, 33905), (163, 33911), (168, 33947), (169, 33956), (179, 34001),

Gene: Lennon\_38 Start: 34887, Stop: 36809, Start Num: 4

Candidate Starts for Lennon\_38:

(Start: 4 @34887 has 31 MA's), (13, 35022), (15, 35031), (18, 35064), (21, 35088), (29, 35157), (38, 35232), (59, 35424), (60, 35430), (61, 35451), (64, 35469), (69, 35481), (73, 35541), (76, 35595), (85, 35709), (93, 35796), (99, 35850), (104, 35904), (106, 35916), (111, 35946), (113, 35958), (118, 36003), (119, 36015), (121, 36033), (127, 36060), (134, 36138), (137, 36165), (141, 36189), (149, 36312), (152, 36354), (162, 36438), (166, 36468), (181, 36549), (185, 36579), (191, 36651), (192, 36660),

Gene: Lewan\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for Lewan\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (78, 19894), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (110, 20206), (112, 20209), (117, 20257), (122, 20293), (124, 20302), (129, 20329), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: LilDestine\_20 Start: 19227, Stop: 21023, Start Num: 7

Candidate Starts for LilDestine\_20:

(Start: 6 @19224 has 5 MA's), (Start: 7 @19227 has 23 MA's), (20, 19380), (22, 19404), (35, 19500), (36, 19509), (41, 19551), (42, 19554), (46, 19584), (49, 19611), (56, 19704), (60, 19728), (72, 19812), (75, 19857), (78, 19893), (87, 20013), (90, 20031), (91, 20046), (93, 20064), (94, 20067), (101, 20145), (109, 20202), (110, 20205), (112, 20208), (122, 20292), (124, 20301), (129, 20328), (142, 20439), (143, 20442), (153, 20610), (164, 20685), (165, 20694), (171, 20721), (177, 20754), (180, 20769), (181, 20784), (183, 20790), (189, 20868), (190, 20871), (193, 20919), (200, 21006),

Gene: Loadrie\_20 Start: 19260, Stop: 21056, Start Num: 7

Candidate Starts for Loadrie\_20:

(Start: 6 @19257 has 5 MA's), (Start: 7 @19260 has 23 MA's), (20, 19413), (22, 19437), (35, 19533), (36, 19542), (42, 19587), (46, 19617), (49, 19644), (56, 19737), (60, 19761), (72, 19845), (75, 19890), (90, 20064), (91, 20079), (93, 20097), (94, 20100), (101, 20178), (109, 20235), (112, 20241), (122, 20325), (124, 20334), (142, 20472), (143, 20475), (153, 20643), (164, 20718), (165, 20727), (171, 20754), (177, 20787), (180, 20802), (181, 20817), (183, 20823), (189, 20901), (190, 20904), (200, 21039),

Gene: Love\_41 Start: 34670, Stop: 36595, Start Num: 4

Candidate Starts for Love\_41:

(Start: 4 @34670 has 31 MA's), (13, 34805), (15, 34814), (18, 34847), (21, 34871), (29, 34940), (38, 35015), (59, 35207), (60, 35213), (61, 35234), (64, 35252), (69, 35264), (73, 35324), (76, 35378), (85, 35495), (93, 35582), (99, 35636), (106, 35702), (111, 35732), (113, 35744), (118, 35789), (119, 35801), (121, 35819), (127, 35846), (134, 35924), (137, 35951), (141, 35975), (149, 36098), (152, 36140), (162, 36224), (166, 36254), (172, 36281), (181, 36335), (185, 36365), (191, 36437), (192, 36446),

Gene: McKinley\_40 Start: 34696, Stop: 36618, Start Num: 4

Candidate Starts for McKinley\_40:

(Start: 4 @34696 has 31 MA's), (13, 34831), (15, 34840), (18, 34873), (21, 34897), (29, 34966), (33, 34996), (38, 35041), (59, 35233), (60, 35239), (61, 35260), (64, 35278), (69, 35290), (73, 35350), (76, 35404), (85, 35518), (93, 35605), (99, 35659), (106, 35725), (111, 35755), (113, 35767), (118, 35812), (119, 35824), (121, 35842), (127, 35869), (134, 35947), (137, 35974), (141, 35998), (149, 36121), (152, 36163), (162, 36247), (166, 36277), (172, 36304), (181, 36358), (185, 36388), (191, 36460), (192, 36469),

Gene: Miley16\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for Miley16\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: MkaliMitinis3\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for MkaliMitinis3\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (110, 20206), (112, 20209), (122, 20293), (124, 20302), (129, 20329), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: MoontowerMania\_36 Start: 32904, Stop: 34625, Start Num: 4

Candidate Starts for MoontowerMania\_36:

(Start: 4 @32904 has 31 MA's), (13, 33039), (15, 33048), (18, 33081), (21, 33105), (29, 33174), (33, 33204), (38, 33249), (58, 33435), (63, 33474), (65, 33483), (70, 33498), (74, 33555), (85, 33579), (93, 33651), (102, 33738), (107, 33774), (108, 33780), (114, 33822), (116, 33837), (135, 33990), (136, 33993), (140, 34020), (145, 34077), (147, 34110), (150, 34158), (154, 34224), (156, 34230), (158, 34242), (161, 34272), (163, 34278), (168, 34314), (169, 34323), (179, 34368), (192, 34497),

Gene: NearlyHeadless\_28 Start: 21529, Stop: 23250, Start Num: 10

Candidate Starts for NearlyHeadless\_28:

(Start: 10 @21529 has 11 MA's), (24, 21673), (28, 21688), (43, 21787), (53, 21877), (54, 21913), (57, 21934), (68, 22006), (71, 22030), (75, 22084), (84, 22186), (94, 22282), (100, 22336), (104, 22384), (124, 22513), (128, 22531), (143, 22657), (159, 22861), (160, 22870), (173, 22948), (174, 22951), (186, 23047), (194, 23146), (201, 23233),

Gene: Netyap\_20 Start: 19228, Stop: 21024, Start Num: 7

Candidate Starts for Netyap\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: Nicholasp3\_20 Start: 19233, Stop: 21029, Start Num: 7

Candidate Starts for Nicholasp3\_20:

(Start: 6 @19230 has 5 MA's), (Start: 7 @19233 has 23 MA's), (20, 19386), (22, 19410), (35, 19506), (36, 19515), (41, 19557), (42, 19560), (46, 19590), (49, 19617), (56, 19710), (60, 19734), (72, 19818), (75, 19863), (78, 19899), (87, 20019), (90, 20037), (91, 20052), (93, 20070), (94, 20073), (101, 20151), (109, 20208), (110, 20211), (112, 20214), (122, 20298), (124, 20307), (129, 20334), (142, 20445), (143, 20448), (153, 20616), (164, 20691), (165, 20700), (171, 20727), (177, 20760), (180, 20775), (181, 20790), (183, 20796), (189, 20874), (190, 20877), (193, 20925), (200, 21012),

Gene: Nordenberg\_32 Start: 32866, Stop: 34788, Start Num: 4

Candidate Starts for Nordenberg\_32:

(Start: 4 @32866 has 31 MA's), (13, 33001), (15, 33010), (18, 33043), (21, 33067), (29, 33136), (38, 33211), (59, 33403), (60, 33409), (61, 33430), (64, 33448), (69, 33460), (73, 33520), (76, 33574), (85, 33688), (93, 33775), (99, 33829), (106, 33895), (111, 33925), (113, 33937), (118, 33982), (119, 33994), (121, 34012), (127, 34039), (134, 34117), (137, 34144), (141, 34168), (149, 34291), (152, 34333), (162, 34417), (166, 34447), (172, 34474), (181, 34528), (185, 34558), (191, 34630), (192, 34639),

Gene: PP\_40 Start: 28396, Stop: 30327, Start Num: 1

Candidate Starts for PP\_40:

(Start: 1 @28396 has 2 MA's), (2, 28447), (Start: 4 @28516 has 31 MA's), (5, 28543), (9, 28585), (12, 28618), (16, 28666), (25, 28756), (27, 28765), (30, 28792), (35, 28813), (45, 28864), (48, 28885), (50, 28906), (51, 28909), (57, 28972), (66, 29038), (75, 29122), (89, 29281), (91, 29305), (95, 29326), (97, 29359), (101, 29398), (103, 29407), (128, 29569), (131, 29581), (132, 29593), (142, 29689), (159, 29893), (167, 29956), (170, 29971), (180, 30022), (182, 30043), (187, 30091), (194, 30178), (197, 30232), (198, 30238), (199, 30265),

Gene: Paries\_40 Start: 34332, Stop: 36257, Start Num: 4

Candidate Starts for Paries\_40:

(Start: 4 @34332 has 31 MA's), (13, 34467), (15, 34476), (18, 34509), (21, 34533), (29, 34602), (38, 34677), (59, 34869), (60, 34875), (61, 34896), (64, 34914), (69, 34926), (73, 34986), (76, 35040), (85, 35157), (93, 35244), (99, 35298), (104, 35352), (106, 35364), (111, 35394), (113, 35406), (118, 35451), (119, 35463), (121, 35481), (127, 35508), (134, 35586), (137, 35613), (141, 35637), (149, 35760), (152, 35802), (162, 35886), (166, 35916), (172, 35943), (181, 35997), (185, 36027), (191, 36099), (192, 36108),

Gene: Phillis\_28 Start: 21576, Stop: 23297, Start Num: 10

Candidate Starts for Phillis\_28:

(Start: 10 @21576 has 11 MA's), (23, 21711), (24, 21720), (28, 21735), (43, 21834), (53, 21924), (54, 21960), (57, 21981), (68, 22053), (71, 22077), (75, 22131), (77, 22149), (78, 22167), (84, 22233), (94, 22329), (100, 22383), (120, 22542), (128, 22578), (143, 22704), (159, 22908), (160, 22917), (174, 22998), (186, 23094), (194, 23193),

Gene: Roary\_28 Start: 21475, Stop: 23196, Start Num: 10

Candidate Starts for Roary\_28:

(Start: 10 @21475 has 11 MA's), (24, 21619), (28, 21634), (43, 21733), (54, 21859), (57, 21880), (68, 21952), (71, 21976), (75, 22030), (84, 22132), (94, 22228), (100, 22282), (104, 22330), (128, 22477), (143, 22603), (159, 22807), (160, 22816), (174, 22897), (186, 22993), (194, 23092), (201, 23179),

Gene: Rofo\_38 Start: 33730, Stop: 35583, Start Num: 4

Candidate Starts for Rofo\_38:

(Start: 4 @33730 has 31 MA's), (13, 33865), (15, 33874), (18, 33907), (21, 33931), (29, 34000), (33, 34030), (38, 34075), (59, 34267), (60, 34273), (61, 34294), (64, 34312), (69, 34324), (73, 34384), (80, 34450), (93, 34570), (96, 34603), (106, 34690), (111, 34720), (113, 34732), (118, 34777), (119, 34789), (121, 34807), (125, 34822), (129, 34846), (134, 34912), (137, 34939), (141, 34963), (149, 35086), (152, 35128), (162, 35212), (166, 35242), (172, 35269), (181, 35323), (185, 35353), (191, 35425), (192, 35434),

Gene: Rumpelstiltskin\_20 Start: 19231, Stop: 21030, Start Num: 6

Candidate Starts for Rumpelstiltskin\_20:

(Start: 6 @19231 has 5 MA's), (Start: 7 @19234 has 23 MA's), (20, 19387), (22, 19411), (35, 19507), (36, 19516), (42, 19561), (46, 19591), (49, 19618), (56, 19711), (60, 19735), (72, 19819), (75, 19864), (87, 20020), (90, 20038), (91, 20053), (93, 20071), (94, 20074), (101, 20152), (109, 20209), (110, 20212), (112, 20215), (122, 20299), (124, 20308), (129, 20335), (142, 20446), (143, 20449), (153, 20617), (164, 20692), (165, 20701), (171, 20728), (177, 20761), (180, 20776), (181, 20791), (183, 20797), (189, 20875), (190, 20878), (193, 20926), (200, 21013),

Gene: Saintus\_28 Start: 21494, Stop: 23215, Start Num: 10

Candidate Starts for Saintus\_28:

(Start: 10 @21494 has 11 MA's), (24, 21638), (28, 21653), (43, 21752), (53, 21842), (54, 21878), (57, 21899), (68, 21971), (71, 21995), (75, 22049), (84, 22151), (94, 22247), (100, 22301), (104, 22349), (124, 22478), (128, 22496), (143, 22622), (159, 22826), (160, 22835), (174, 22916), (186, 23012), (194, 23111), (201, 23198),

Gene: Sanjuju\_35 Start: 33293, Stop: 35014, Start Num: 4

Candidate Starts for Sanjuju\_35:

(Start: 4 @33293 has 31 MA's), (13, 33428), (15, 33437), (18, 33470), (21, 33494), (29, 33563), (38, 33638), (58, 33824), (63, 33863), (65, 33872), (74, 33944), (85, 33968), (93, 34040), (102, 34127), (107, 34163), (108, 34169), (114, 34211), (116, 34226), (118, 34235), (136, 34382), (145, 34466), (147, 34499), (150, 34547), (154, 34613), (156, 34619), (158, 34631), (161, 34661), (163, 34667), (168, 34703), (169, 34712), (179, 34757),

Gene: Sarshaun\_20 Start: 19261, Stop: 21057, Start Num: 7

Candidate Starts for Sarshaun\_20:

(Start: 6 @19258 has 5 MA's), (Start: 7 @19261 has 23 MA's), (20, 19414), (22, 19438), (35, 19534), (36, 19543), (41, 19585), (42, 19588), (46, 19618), (49, 19645), (56, 19738), (60, 19762), (72, 19846), (75, 19891), (78, 19927), (87, 20047), (90, 20065), (91, 20080), (93, 20098), (94, 20101), (101, 20179), (109, 20236), (110, 20239), (112, 20242), (122, 20326), (124, 20335), (129, 20362), (142, 20473), (143, 20476), (153, 20644), (164, 20719), (165, 20728), (171, 20755), (177, 20788), (180, 20803), (181, 20818), (183, 20824), (189, 20902), (190, 20905), (200, 21040),

Gene: Sedona\_38 Start: 34836, Stop: 36758, Start Num: 4

Candidate Starts for Sedona\_38:

(Start: 4 @34836 has 31 MA's), (13, 34971), (15, 34980), (18, 35013), (21, 35037), (29, 35106), (38, 35181), (59, 35373), (60, 35379), (61, 35400), (64, 35418), (69, 35430), (73, 35490), (76, 35544), (85, 35658), (93, 35745), (99, 35799), (106, 35865), (111, 35895), (113, 35907), (118, 35952), (119, 35964), (121, 35982), (127, 36009), (134, 36087), (137, 36114), (141, 36138), (149, 36261), (152, 36303), (162, 36387), (166, 36417), (172, 36444), (181, 36498), (185, 36528), (191, 36600), (192,



36609),

Gene: Shivanishola\_38 Start: 33192, Stop: 35114, Start Num: 4

Candidate Starts for Shivanishola\_38:

(Start: 4 @33192 has 31 MA's), (13, 33327), (15, 33336), (18, 33369), (21, 33393), (29, 33462), (33, 33492), (38, 33537), (59, 33729), (60, 33735), (61, 33756), (64, 33774), (69, 33786), (73, 33846), (76, 33900), (85, 34014), (93, 34101), (99, 34155), (106, 34221), (111, 34251), (113, 34263), (118, 34308), (119, 34320), (121, 34338), (127, 34365), (134, 34443), (137, 34470), (141, 34494), (149, 34617), (152, 34659), (162, 34743), (166, 34773), (181, 34854), (185, 34884), (191, 34956), (192, 34965),

Gene: Sitar\_38 Start: 34887, Stop: 36809, Start Num: 4

Candidate Starts for Sitar\_38:

(Start: 4 @34887 has 31 MA's), (13, 35022), (15, 35031), (18, 35064), (21, 35088), (29, 35157), (38, 35232), (59, 35424), (60, 35430), (61, 35451), (64, 35469), (69, 35481), (73, 35541), (76, 35595), (85, 35709), (93, 35796), (99, 35850), (104, 35904), (106, 35916), (111, 35946), (113, 35958), (118, 36003), (119, 36015), (121, 36033), (127, 36060), (134, 36138), (137, 36165), (141, 36189), (149, 36312), (152, 36354), (162, 36438), (166, 36468), (181, 36549), (185, 36579), (191, 36651), (192, 36660),

Gene: Smeadley\_28 Start: 21508, Stop: 23229, Start Num: 10

Candidate Starts for Smeadley\_28:

(Start: 10 @21508 has 11 MA's), (24, 21652), (28, 21667), (43, 21766), (53, 21856), (54, 21892), (57, 21913), (68, 21985), (71, 22009), (75, 22063), (84, 22165), (94, 22261), (100, 22315), (104, 22363), (124, 22492), (128, 22510), (143, 22636), (159, 22840), (160, 22849), (174, 22930), (186, 23026), (194, 23125), (201, 23212),

Gene: Soap141\_20 Start: 19261, Stop: 21057, Start Num: 7

Candidate Starts for Soap141\_20:

(Start: 6 @19258 has 5 MA's), (Start: 7 @19261 has 23 MA's), (20, 19414), (22, 19438), (35, 19534), (36, 19543), (41, 19585), (42, 19588), (46, 19618), (49, 19645), (56, 19738), (60, 19762), (72, 19846), (75, 19891), (78, 19927), (87, 20047), (90, 20065), (91, 20080), (93, 20098), (94, 20101), (101, 20179), (109, 20236), (110, 20239), (112, 20242), (122, 20326), (124, 20335), (129, 20362), (142, 20473), (143, 20476), (153, 20644), (164, 20719), (165, 20728), (171, 20755), (177, 20788), (180, 20803), (181, 20818), (183, 20824), (189, 20902), (190, 20905), (200, 21040),

Gene: Stephig9\_28 Start: 21490, Stop: 23211, Start Num: 10

Candidate Starts for Stephig9\_28:

(Start: 10 @21490 has 11 MA's), (24, 21634), (43, 21748), (54, 21874), (57, 21895), (68, 21967), (71, 21991), (75, 22045), (84, 22147), (94, 22243), (100, 22297), (104, 22345), (124, 22474), (128, 22492), (143, 22618), (159, 22822), (160, 22831), (174, 22912), (186, 23008), (194, 23107),

Gene: Stultus\_35 Start: 32209, Stop: 33930, Start Num: 4

Candidate Starts for Stultus\_35:

(Start: 4 @32209 has 31 MA's), (13, 32344), (15, 32353), (18, 32386), (21, 32410), (29, 32479), (38, 32554), (58, 32740), (63, 32779), (65, 32788), (70, 32803), (74, 32860), (85, 32884), (93, 32956), (102, 33043), (107, 33079), (108, 33085), (114, 33127), (116, 33142), (118, 33151), (136, 33298), (145, 33382), (147, 33415), (150, 33463), (154, 33529), (156, 33535), (158, 33547), (161, 33577), (163, 33583), (168, 33619), (169, 33628), (179, 33673),

Gene: Tangent\_38 Start: 33252, Stop: 35174, Start Num: 4

Candidate Starts for Tangent\_38:

(Start: 4 @33252 has 31 MA's), (13, 33387), (15, 33396), (18, 33429), (21, 33453), (29, 33522), (33, 33552), (38, 33597), (59, 33789), (60, 33795), (61, 33816), (64, 33834), (69, 33846), (73, 33906), (76,

33960), (85, 34074), (93, 34161), (99, 34215), (106, 34281), (111, 34311), (113, 34323), (118, 34368), (119, 34380), (121, 34398), (127, 34425), (134, 34503), (137, 34530), (141, 34554), (149, 34677), (152, 34719), (162, 34803), (166, 34833), (172, 34860), (181, 34914), (185, 34944), (191, 35016), (192, 35025),

Gene: Thing3\_36 Start: 33130, Stop: 35052, Start Num: 4

Candidate Starts for Thing3\_36:

(Start: 4 @33130 has 31 MA's), (13, 33265), (15, 33274), (18, 33307), (21, 33331), (29, 33400), (38, 33475), (59, 33667), (60, 33673), (61, 33694), (64, 33712), (69, 33724), (73, 33784), (76, 33838), (85, 33952), (93, 34039), (99, 34093), (104, 34147), (106, 34159), (111, 34189), (113, 34201), (118, 34246), (119, 34258), (121, 34276), (127, 34303), (134, 34381), (137, 34408), (141, 34432), (149, 34555), (152, 34597), (162, 34681), (166, 34711), (172, 34738), (181, 34792), (185, 34822), (191, 34894), (192, 34903),

Gene: Tourach\_20 Start: 19226, Stop: 21022, Start Num: 7

Candidate Starts for Tourach\_20:

(Start: 7 @19226 has 23 MA's), (20, 19379), (22, 19403), (37, 19511), (42, 19553), (46, 19583), (49, 19610), (55, 19700), (56, 19703), (60, 19727), (72, 19811), (75, 19856), (79, 19907), (87, 20012), (91, 20045), (94, 20066), (101, 20144), (112, 20207), (122, 20291), (124, 20300), (142, 20438), (148, 20516), (153, 20609), (155, 20624), (164, 20684), (165, 20693), (171, 20720), (173, 20729), (177, 20753), (180, 20768), (181, 20783), (183, 20789), (184, 20801), (193, 20918), (199, 20993), (200, 21005),

Gene: Vetrax\_20 Start: 19234, Stop: 21030, Start Num: 7

Candidate Starts for Vetrax\_20:

(Start: 6 @19231 has 5 MA's), (Start: 7 @19234 has 23 MA's), (20, 19387), (22, 19411), (35, 19507), (36, 19516), (42, 19561), (44, 19570), (46, 19591), (49, 19618), (56, 19711), (60, 19735), (72, 19819), (75, 19864), (87, 20020), (90, 20038), (91, 20053), (93, 20071), (94, 20074), (101, 20152), (109, 20209), (110, 20212), (112, 20215), (122, 20299), (124, 20308), (129, 20335), (142, 20446), (143, 20449), (153, 20617), (155, 20632), (164, 20692), (165, 20701), (171, 20728), (177, 20761), (180, 20776), (181, 20791), (183, 20797), (189, 20875), (190, 20878), (193, 20926), (200, 21013),

Gene: Vivi2\_40 Start: 34410, Stop: 36332, Start Num: 4

Candidate Starts for Vivi2\_40:

(Start: 4 @34410 has 31 MA's), (13, 34545), (15, 34554), (18, 34587), (21, 34611), (29, 34680), (33, 34710), (38, 34755), (59, 34947), (60, 34953), (61, 34974), (64, 34992), (69, 35004), (73, 35064), (76, 35118), (85, 35232), (93, 35319), (99, 35373), (106, 35439), (111, 35469), (113, 35481), (118, 35526), (119, 35538), (121, 35556), (127, 35583), (134, 35661), (137, 35688), (141, 35712), (149, 35835), (152, 35877), (162, 35961), (166, 35991), (172, 36018), (181, 36072), (185, 36102), (191, 36174), (192, 36183),

Gene: Wigglewigggle\_20 Start: 19260, Stop: 21056, Start Num: 7

Candidate Starts for Wigglewigggle\_20:

(Start: 6 @19257 has 5 MA's), (Start: 7 @19260 has 23 MA's), (20, 19413), (22, 19437), (35, 19533), (36, 19542), (41, 19584), (42, 19587), (46, 19617), (49, 19644), (56, 19737), (60, 19761), (72, 19845), (75, 19890), (78, 19926), (87, 20046), (90, 20064), (91, 20079), (93, 20097), (94, 20100), (101, 20178), (109, 20235), (110, 20238), (112, 20241), (122, 20325), (124, 20334), (129, 20361), (142, 20472), (143, 20475), (153, 20643), (164, 20718), (165, 20727), (171, 20754), (177, 20787), (180, 20802), (181, 20817), (183, 20823), (189, 20901), (190, 20904), (200, 21039),

Gene: Wilder\_20 Start: 19233, Stop: 21029, Start Num: 7

Candidate Starts for Wilder\_20:

(Start: 6 @19230 has 5 MA's), (Start: 7 @19233 has 23 MA's), (20, 19386), (22, 19410), (35, 19506), (36, 19515), (41, 19557), (42, 19560), (46, 19590), (49, 19617), (56, 19710), (60, 19734), (72, 19818), (75, 19863), (78, 19899), (87, 20019), (90, 20037), (91, 20052), (93, 20070), (94, 20073), (101, 20151), (109, 20208), (110, 20211), (112, 20214), (122, 20298), (124, 20307), (129, 20334), (142, 20445), (143, 20448), (153, 20616), (164, 20691), (165, 20700), (171, 20727), (177, 20760), (180, 20775), (181, 20790), (183, 20796), (189, 20874), (190, 20877), (193, 20925), (200, 21012),

Gene: Winky\_20 Start: 19225, Stop: 21024, Start Num: 6

Candidate Starts for Winky\_20:

(Start: 6 @19225 has 5 MA's), (Start: 7 @19228 has 23 MA's), (20, 19381), (22, 19405), (35, 19501), (36, 19510), (42, 19555), (46, 19585), (49, 19612), (56, 19705), (60, 19729), (72, 19813), (75, 19858), (87, 20014), (90, 20032), (91, 20047), (93, 20065), (94, 20068), (101, 20146), (109, 20203), (112, 20209), (122, 20293), (124, 20302), (142, 20440), (143, 20443), (153, 20611), (164, 20686), (165, 20695), (171, 20722), (175, 20740), (177, 20755), (180, 20770), (181, 20785), (183, 20791), (189, 20869), (190, 20872), (193, 20920), (200, 21007),

Gene: Zakai\_20 Start: 19222, Stop: 21018, Start Num: 7

Candidate Starts for Zakai\_20:

(Start: 6 @19219 has 5 MA's), (Start: 7 @19222 has 23 MA's), (20, 19375), (22, 19399), (35, 19495), (36, 19504), (42, 19549), (46, 19579), (49, 19606), (56, 19699), (60, 19723), (72, 19807), (75, 19852), (87, 20008), (90, 20026), (91, 20041), (93, 20059), (94, 20062), (101, 20140), (109, 20197), (110, 20200), (112, 20203), (122, 20287), (124, 20296), (129, 20323), (142, 20434), (143, 20437), (153, 20605), (164, 20680), (165, 20689), (171, 20716), (177, 20749), (180, 20764), (181, 20779), (183, 20785), (189, 20863), (190, 20866), (193, 20914), (200, 21001),

Gene: ZhongYanYuan\_19 Start: 19053, Stop: 20849, Start Num: 7

Candidate Starts for ZhongYanYuan\_19:

(Start: 7 @19053 has 23 MA's), (17, 19173), (19, 19194), (20, 19206), (22, 19230), (24, 19257), (35, 19326), (36, 19335), (39, 19368), (42, 19380), (46, 19410), (49, 19437), (60, 19554), (67, 19602), (72, 19638), (75, 19683), (79, 19734), (87, 19839), (90, 19857), (93, 19890), (94, 19893), (97, 19932), (101, 19971), (110, 20031), (112, 20034), (122, 20118), (142, 20265), (148, 20343), (153, 20436), (155, 20451), (164, 20511), (165, 20520), (171, 20547), (180, 20595), (181, 20610), (189, 20694), (190, 20697), (193, 20745), (195, 20760), (200, 20832),