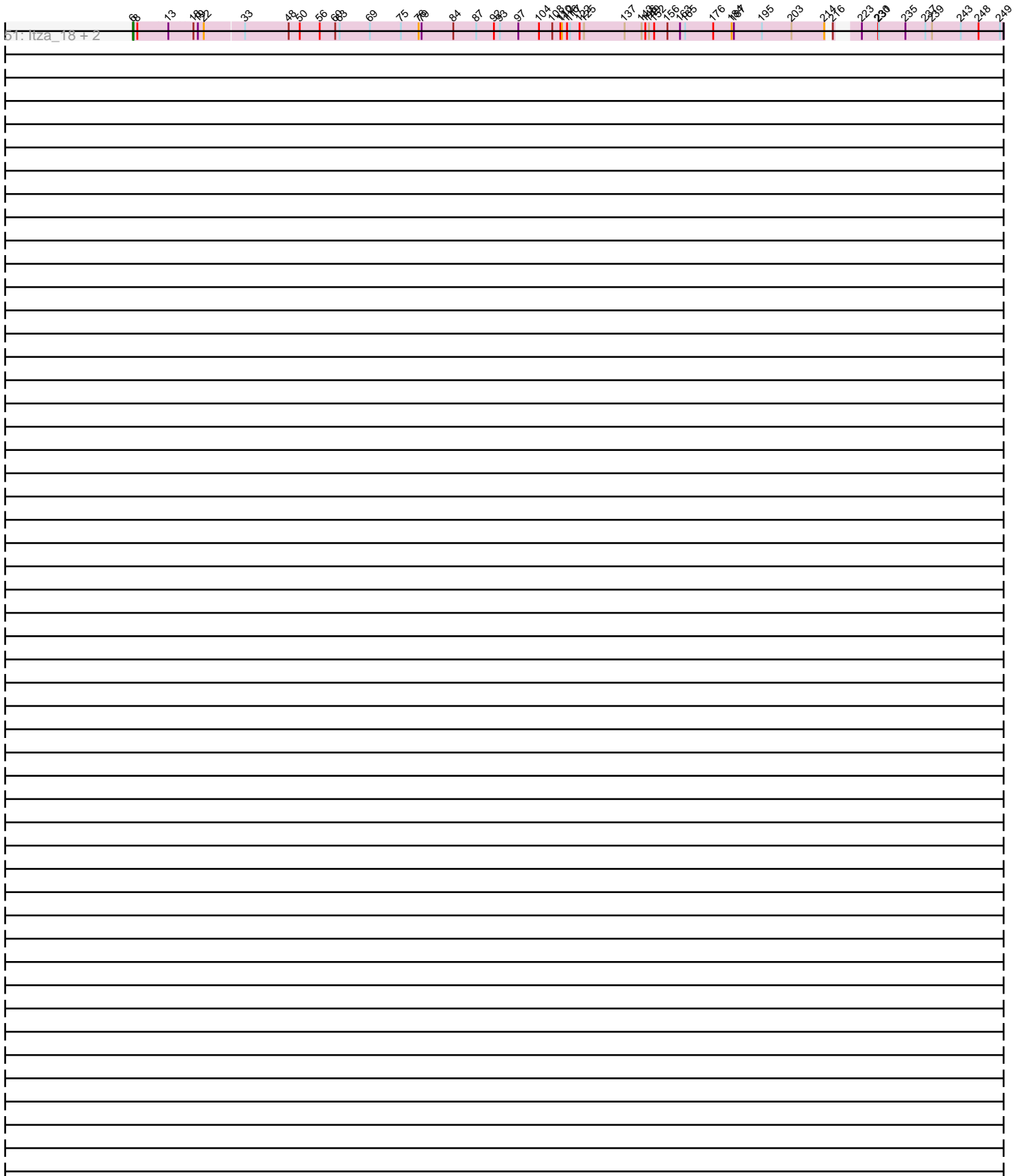




Pham 216069



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 216069 Report

This analysis was run 02/22/25 on database version 588.

Pham number 216069 has 88 members, 2 are drafts.

Phages represented in each track:

- Track 1 : Bovely\_18, Esperer\_18, SunsetPointe\_18, Leviticus\_18, Indigo\_18, Ozzie\_18, Caliburn\_18, Unstoppable\_18, Hydra\_20, BeardedLady\_19, Legacy\_18, Phettuccine\_18, Nerdos\_18
- Track 2 : Yasdni1\_18, TuanPN\_18, Ejemplo\_18
- Track 3 : Danzina\_19, Brataylor\_19, Zemlya\_19
- Track 4 : Whatever\_18
- Track 5 : Lannister\_19
- Track 6 : Werner\_18, Snorlax\_18, SarahRose\_18, BarryBee\_20, Asten\_18, Emaanora\_20
- Track 7 : Chucky\_18
- Track 8 : Dattran\_19, Celeste\_18
- Track 9 : OzzyJ\_19
- Track 10 : Oliyinyk\_19, BryanRecycles\_19, Rusticus\_19, Eddasa\_19, Izzy\_19, Jash\_19
- Track 11 : Goby\_18, Sujidade\_19
- Track 12 : Hippo\_18
- Track 13 : Triste\_18
- Track 14 : Godpower\_19
- Track 15 : Nabi\_18
- Track 16 : RedBear\_20, Katalie\_19, South40\_19
- Track 17 : EnochSoames\_20
- Track 18 : TagePhighter\_19
- Track 19 : Lorelei\_18, Rana\_18
- Track 20 : Nanodon\_20
- Track 21 : Aaronocolus\_18
- Track 22 : Lika\_18
- Track 23 : Dwayne\_18
- Track 24 : Toma\_18
- Track 25 : Maneekul\_18
- Track 26 : TrvxScott\_17
- Track 27 : Janus\_19
- Track 28 : Hank144\_19
- Track 29 : GirlDinner\_18
- Track 30 : Puginator\_20
- Track 31 : Paolo\_20
- Track 32 : Daudau\_18
- Track 33 : Animus\_19

- Track 34 : ELB20\_17, R4\_18
- Track 35 : Marav\_21
- Track 36 : Alvy\_20, BartholomewSD\_20
- Track 37 : Axiom\_20
- Track 38 : Zainub\_20
- Track 39 : Paedore\_18
- Track 40 : Jevington\_20
- Track 41 : Triumph\_20
- Track 42 : Thestral\_19
- Track 43 : Bowden\_19, TinaBelcher\_18
- Track 44 : Pablito\_18
- Track 45 : Andris\_18
- Track 46 : Loofah\_19
- Track 47 : SqueakyClean\_19
- Track 48 : BroPlease\_19, GreenWeasel\_20
- Track 49 : phiHau3\_20
- Track 50 : VieEnRose\_18
- Track 51 : Itza\_18, Celia\_18, Urza\_18

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

The start number called the most often in the published annotations is 5, it was called in 51 of the 86 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- Aaronocolus\_18, Asten\_18, BarryBee\_20, BeardedLady\_19, Bovely\_18, Brataylor\_19, BryanRecycles\_19, Caliburn\_18, Chucky\_18, Danzina\_19, Dwayne\_18, Eddasa\_19, Ejemplo\_18, Emaanora\_20, EnochSoames\_20, Esperer\_18, Goby\_18, Godpower\_19, Hippo\_18, Hydra\_20, Indigo\_18, Izzy\_19, Jash\_19, Katalie\_19, Lannister\_19, Legacy\_18, Leviticus\_18, Lika\_18, Maneekul\_18, Nabi\_18, Nanodon\_20, Nerdos\_18, Oliynyk\_19, Ozzie\_18, OzzyJ\_19, Phettuccine\_18, RedBear\_20, Rusticus\_19, SarahRose\_18, Snorlax\_18, South40\_19, Sujidade\_19, SunsetPointe\_18, TagePhighter\_19, Toma\_18, Triste\_18, TuanPN\_18, Unstoppable\_18, Werner\_18, Whatever\_18, Yasdnil\_18, Zemlya\_19,

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

- Celeste\_18, Dattran\_19, Lorelei\_18, Rana\_18,

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

- Alvy\_20, Andris\_18, Animus\_19, Axiom\_20, BartholomewSD\_20, Bowden\_19, BroPlease\_19, Celia\_18, Daudau\_18, ELB20\_17, GirlDinner\_18, GreenWeasel\_20, Hank144\_19, Itza\_18, Janus\_19, Jevington\_20, Loofah\_19, Marav\_21, Pablito\_18, Paedore\_18, Paolo\_20, Puginator\_20, R4\_18, SqueakyClean\_19, Thestral\_19, TinaBelcher\_18, Triumph\_20, TrvxScott\_17, Urza\_18, VieEnRose\_18, Zainub\_20, phiHau3\_20,

**Summary by start number:**

Start 1:

- Found in 3 of 88 ( 3.4% ) of genes in pham

- Manual Annotations of this start: 3 of 86
- Called 100.0% of time when present
- Phage (with cluster) where this start called: BroPlease\_19 (BD4), GreenWeasel\_20 (BD4), phiHau3\_20 (BD4),

#### Start 5:

- Found in 56 of 88 ( 63.6% ) of genes in pham
- Manual Annotations of this start: 51 of 86
- Called 92.9% of time when present
- Phage (with cluster) where this start called: Aaronocolus\_18 (BD1), Asten\_18 (BD1), BarryBee\_20 (BD1), BeardedLady\_19 (BD1), Bovely\_18 (BD1), Brataylor\_19 (BD1), BryanRecycles\_19 (BD1), Caliburn\_18 (BD1), Chucky\_18 (BD1), Danzina\_19 (BD1), Dwayne\_18 (BD1), Eddasa\_19 (BD1), Ejemplo\_18 (BD1), Emaanora\_20 (BD1), EnochSoames\_20 (BD1), Esperer\_18 (BD1), Goby\_18 (BD1), Godpower\_19 (BD1), Hippo\_18 (BD1), Hydra\_20 (BD1), Indigo\_18 (BD1), Izzy\_19 (BD1), Jash\_19 (BD1), Katalie\_19 (BD1), Lannister\_19 (BD1), Legacy\_18 (BD1), Leviticus\_18 (BD1), Lika\_18 (BD1), Maneekul\_18 (BD1), Nabi\_18 (BD1), Nanodon\_20 (BD1), Nerdos\_18 (BD1), Oliynyk\_19 (BD1), Ozzie\_18 (BD1), OzzyJ\_19 (BD1), Phettuccine\_18 (BD1), RedBear\_20 (BD1), Rusticus\_19 (BD1), SarahRose\_18 (BD1), Snorlax\_18 (BD1), South40\_19 (BD1), Sujidade\_19 (BD1), SunsetPointe\_18 (BD1), TagePhighter\_19 (BD1), Toma\_18 (BD1), Triste\_18 (BD1), TuanPN\_18 (BD1), Unstoppable\_18 (BD1), Werner\_18 (BD1), Whatever\_18 (BD1), Yasdnil\_18 (BD1), Zemlya\_19 (BD1),

#### Start 6:

- Found in 29 of 88 ( 33.0% ) of genes in pham
- Manual Annotations of this start: 24 of 86
- Called 86.2% of time when present
- Phage (with cluster) where this start called: Alvy\_20 (BD2), Andris\_18 (BD2), Axiom\_20 (BD2), BartholomewSD\_20 (BD2), Celia\_18 (BD6), Daudau\_18 (BD2), ELB20\_17 (BD2), GirlDinner\_18 (BD2), Hank144\_19 (BD2), Itza\_18 (BD6), Janus\_19 (BD2), Jevington\_20 (BD2), Loofah\_19 (BD2), Marav\_21 (BD2), Pablito\_18 (BD2), Paolo\_20 (BD2), Puginator\_20 (BD2), R4\_18 (BD2), SqueakyClean\_19 (BD2), Thestral\_19 (BD2), Triumph\_20 (BD2), TrvxScott\_17 (BD2), Urza\_18 (BD6), VieEnRose\_18 (BD6), Zainub\_20 (BD2),

#### Start 9:

- Found in 14 of 88 ( 15.9% ) of genes in pham
- Manual Annotations of this start: 4 of 86
- Called 28.6% of time when present
- Phage (with cluster) where this start called: Celeste\_18 (BD1), Dattran\_19 (BD1), Lorelei\_18 (BD1), Rana\_18 (BD1),

#### Start 10:

- Found in 23 of 88 ( 26.1% ) of genes in pham
- Manual Annotations of this start: 3 of 86
- Called 13.0% of time when present
- Phage (with cluster) where this start called: Animus\_19 (BD2), Bowden\_19 (BD2), TinaBelcher\_18 (BD2),

#### Start 11:

- Found in 4 of 88 ( 4.5% ) of genes in pham
- Manual Annotations of this start: 1 of 86
- Called 25.0% of time when present

- Phage (with cluster) where this start called: Paedore\_18 (BD2),

### **Summary by clusters:**

There are 4 clusters represented in this pham: BD4, BD6, BD1, BD2,

Info for manual annotations of cluster BD1:

- Start number 5 was manually annotated 51 times for cluster BD1.
- Start number 9 was manually annotated 4 times for cluster BD1.

Info for manual annotations of cluster BD2:

- Start number 6 was manually annotated 20 times for cluster BD2.
- Start number 10 was manually annotated 3 times for cluster BD2.
- Start number 11 was manually annotated 1 time for cluster BD2.

Info for manual annotations of cluster BD4:

- Start number 1 was manually annotated 3 times for cluster BD4.

Info for manual annotations of cluster BD6:

- Start number 6 was manually annotated 4 times for cluster BD6.

### **Gene Information:**

Gene: Aaronocolus\_18 Start: 11669, Stop: 14989, Start Num: 5

Candidate Starts for Aaronocolus\_18:

(Start: 5 @11669 has 51 MA's), (13, 11813), (19, 11924), (21, 11936), (24, 12005), (26, 12011), (30, 12032), (37, 12167), (42, 12230), (46, 12266), (47, 12269), (57, 12434), (61, 12473), (66, 12530), (75, 12734), (87, 13037), (88, 13070), (93, 13133), (95, 13166), (99, 13244), (102, 13280), (103, 13283), (105, 13301), (106, 13325), (108, 13346), (110, 13379), (115, 13397), (118, 13433), (127, 13487), (129, 13526), (133, 13550), (142, 13616), (149, 13652), (155, 13724), (160, 13748), (161, 13754), (163, 13778), (165, 13799), (173, 13889), (175, 13901), (176, 13913), (180, 13949), (184, 13988), (190, 14021), (200, 14192), (203, 14231), (210, 14333), (212, 14354), (216, 14366), (233, 14543), (235, 14594), (236, 14606), (241, 14780), (246, 14849), (248, 14888), (249, 14975), (250, 14978),

Gene: Alvy\_20 Start: 11699, Stop: 14998, Start Num: 6

Candidate Starts for Alvy\_20:

(Start: 6 @11699 has 24 MA's), (13, 11834), (14, 11855), (15, 11897), (31, 12074), (42, 12245), (46, 12281), (56, 12419), (61, 12488), (68, 12566), (75, 12749), (87, 13052), (93, 13148), (95, 13181), (98, 13253), (99, 13259), (106, 13340), (107, 13358), (108, 13361), (110, 13394), (115, 13412), (136, 13586), (145, 13649), (147, 13655), (159, 13760), (165, 13814), (167, 13826), (170, 13871), (176, 13928), (184, 14003), (193, 14075), (226, 14468), (229, 14492), (235, 14609), (236, 14621), (237, 14690), (238, 14699), (240, 14762), (244, 14840), (245, 14852), (246, 14864),

Gene: Andris\_18 Start: 11508, Stop: 14702, Start Num: 6

Candidate Starts for Andris\_18:

(Start: 6 @11508 has 24 MA's), (Start: 10 @11547 has 3 MA's), (13, 11643), (19, 11754), (28, 11850), (31, 11886), (41, 12048), (42, 12057), (45, 12087), (46, 12093), (50, 12150), (56, 12231), (66, 12357), (71, 12447), (75, 12561), (86, 12795), (87, 12864), (90, 12927), (93, 12960), (95, 12993), (105, 13128), (106, 13152), (108, 13173), (110, 13206), (115, 13224), (121, 13281), (122, 13284), (141, 13371), (157, 13476), (158, 13479), (163, 13518), (176, 13653), (183, 13713), (188, 13749), (189, 13758), (191, 13764), (207, 13995), (228, 14193), (231, 14205), (235, 14313), (237, 14394), (247, 14580),

(249, 14691),

Gene: Animus\_19 Start: 11880, Stop: 15038, Start Num: 10

Candidate Starts for Animus\_19:

(Start: 6 @11841 has 24 MA's), (Start: 10 @11880 has 3 MA's), (13, 11979), (14, 12000), (18, 12072), (19, 12090), (31, 12222), (32, 12234), (41, 12384), (45, 12423), (46, 12429), (47, 12432), (50, 12486), (59, 12621), (66, 12693), (75, 12897), (81, 13005), (87, 13200), (93, 13296), (95, 13329), (99, 13407), (102, 13443), (105, 13464), (106, 13488), (108, 13509), (109, 13512), (110, 13542), (115, 13560), (119, 13599), (122, 13620), (123, 13626), (125, 13638), (141, 13707), (153, 13770), (156, 13803), (158, 13815), (176, 13989), (183, 14049), (189, 14094), (191, 14100), (205, 14298), (219, 14430), (227, 14520), (231, 14541), (235, 14649), (244, 14880), (247, 14916),

Gene: Asten\_18 Start: 11636, Stop: 14959, Start Num: 5

Candidate Starts for Asten\_18:

(Start: 5 @11636 has 51 MA's), (13, 11783), (19, 11894), (21, 11906), (22, 11918), (28, 11993), (31, 12029), (38, 12158), (42, 12200), (45, 12230), (46, 12236), (50, 12293), (68, 12521), (70, 12581), (75, 12704), (87, 13007), (93, 13103), (95, 13136), (103, 13253), (105, 13271), (108, 13316), (110, 13349), (115, 13367), (124, 13442), (133, 13520), (136, 13541), (145, 13604), (149, 13622), (165, 13769), (172, 13847), (175, 13871), (176, 13883), (178, 13895), (179, 13901), (182, 13940), (184, 13958), (203, 14201), (210, 14303), (219, 14345), (233, 14513), (235, 14564), (236, 14576), (241, 14750), (246, 14819), (249, 14945), (250, 14948),

Gene: Axiom\_20 Start: 11546, Stop: 14851, Start Num: 6

Candidate Starts for Axiom\_20:

(Start: 6 @11546 has 24 MA's), (Start: 10 @11585 has 3 MA's), (13, 11684), (14, 11705), (18, 11777), (19, 11795), (31, 11927), (41, 12089), (45, 12128), (46, 12134), (47, 12137), (50, 12191), (75, 12602), (87, 12905), (90, 12968), (93, 13001), (95, 13034), (105, 13169), (108, 13214), (109, 13217), (110, 13247), (115, 13265), (118, 13301), (133, 13418), (135, 13430), (142, 13484), (149, 13520), (163, 13646), (165, 13667), (172, 13745), (175, 13769), (176, 13781), (182, 13838), (189, 13886), (193, 13928), (197, 14018), (216, 14234), (233, 14411), (235, 14462), (236, 14474), (240, 14615), (241, 14648), (244, 14693), (247, 14729),

Gene: BarryBee\_20 Start: 11646, Stop: 14969, Start Num: 5

Candidate Starts for BarryBee\_20:

(Start: 5 @11646 has 51 MA's), (13, 11793), (19, 11904), (21, 11916), (22, 11928), (28, 12003), (31, 12039), (38, 12168), (42, 12210), (45, 12240), (46, 12246), (50, 12303), (68, 12531), (70, 12591), (75, 12714), (87, 13017), (93, 13113), (95, 13146), (103, 13263), (105, 13281), (108, 13326), (110, 13359), (115, 13377), (124, 13452), (133, 13530), (136, 13551), (145, 13614), (149, 13632), (165, 13779), (172, 13857), (175, 13881), (176, 13893), (178, 13905), (179, 13911), (182, 13950), (184, 13968), (203, 14211), (210, 14313), (219, 14355), (233, 14523), (235, 14574), (236, 14586), (241, 14760), (246, 14829), (249, 14955), (250, 14958),

Gene: BartholomewSD\_20 Start: 11699, Stop: 14998, Start Num: 6

Candidate Starts for BartholomewSD\_20:

(Start: 6 @11699 has 24 MA's), (13, 11834), (14, 11855), (15, 11897), (31, 12074), (42, 12245), (46, 12281), (56, 12419), (61, 12488), (68, 12566), (75, 12749), (87, 13052), (93, 13148), (95, 13181), (98, 13253), (99, 13259), (106, 13340), (107, 13358), (108, 13361), (110, 13394), (115, 13412), (136, 13586), (145, 13649), (147, 13655), (159, 13760), (165, 13814), (167, 13826), (170, 13871), (176, 13928), (184, 14003), (193, 14075), (226, 14468), (229, 14492), (235, 14609), (236, 14621), (237, 14690), (238, 14699), (240, 14762), (244, 14840), (245, 14852), (246, 14864),

Gene: BeardedLady\_19 Start: 11916, Stop: 15236, Start Num: 5

Candidate Starts for BeardedLady\_19:

(Start: 5 @11916 has 51 MA's), (13, 12060), (19, 12171), (21, 12183), (24, 12252), (26, 12258), (30, 12279), (37, 12414), (42, 12477), (46, 12513), (47, 12516), (57, 12681), (61, 12720), (66, 12777), (75, 12981), (87, 13284), (88, 13317), (93, 13380), (95, 13413), (99, 13491), (102, 13527), (103, 13530), (105, 13548), (106, 13572), (108, 13593), (110, 13626), (115, 13644), (118, 13680), (127, 13734), (129, 13773), (133, 13797), (142, 13863), (149, 13899), (155, 13971), (160, 13995), (161, 14001), (163, 14025), (165, 14046), (175, 14148), (176, 14160), (180, 14196), (184, 14235), (190, 14268), (200, 14439), (203, 14478), (210, 14580), (212, 14601), (216, 14613), (233, 14790), (235, 14841), (236, 14853), (241, 15027), (246, 15096), (248, 15135), (249, 15222), (250, 15225),

Gene: Bovely\_18 Start: 11675, Stop: 14995, Start Num: 5

Candidate Starts for Bovely\_18:

(Start: 5 @11675 has 51 MA's), (13, 11819), (19, 11930), (21, 11942), (24, 12011), (26, 12017), (30, 12038), (37, 12173), (42, 12236), (46, 12272), (47, 12275), (57, 12440), (61, 12479), (66, 12536), (75, 12740), (87, 13043), (88, 13076), (93, 13139), (95, 13172), (99, 13250), (102, 13286), (103, 13289), (105, 13307), (106, 13331), (108, 13352), (110, 13385), (115, 13403), (118, 13439), (127, 13493), (129, 13532), (133, 13556), (142, 13622), (149, 13658), (155, 13730), (160, 13754), (161, 13760), (163, 13784), (165, 13805), (175, 13907), (176, 13919), (180, 13955), (184, 13994), (190, 14027), (200, 14198), (203, 14237), (210, 14339), (212, 14360), (216, 14372), (233, 14549), (235, 14600), (236, 14612), (241, 14786), (246, 14855), (248, 14894), (249, 14981), (250, 14984),

Gene: Bowden\_19 Start: 11670, Stop: 14930, Start Num: 10

Candidate Starts for Bowden\_19:

(Start: 6 @11631 has 24 MA's), (Start: 10 @11670 has 3 MA's), (13, 11766), (14, 11787), (15, 11829), (17, 11844), (31, 12006), (42, 12177), (46, 12213), (63, 12432), (65, 12438), (68, 12498), (75, 12681), (87, 12984), (93, 13080), (95, 13113), (98, 13185), (99, 13191), (104, 13239), (106, 13272), (107, 13290), (108, 13293), (110, 13326), (115, 13344), (129, 13473), (136, 13518), (145, 13581), (147, 13587), (165, 13746), (167, 13758), (176, 13860), (181, 13914), (184, 13935), (193, 14007), (209, 14274), (226, 14400), (229, 14424), (235, 14541), (236, 14553), (237, 14622), (238, 14631), (240, 14694), (244, 14772), (245, 14784), (246, 14796),

Gene: Brataylor\_19 Start: 11658, Stop: 14981, Start Num: 5

Candidate Starts for Brataylor\_19:

(Start: 5 @11658 has 51 MA's), (Start: 9 @11694 has 4 MA's), (13, 11805), (19, 11916), (21, 11928), (22, 11940), (28, 12015), (31, 12051), (38, 12180), (42, 12222), (45, 12252), (46, 12258), (48, 12270), (50, 12315), (65, 12483), (68, 12543), (74, 12717), (75, 12726), (87, 13029), (89, 13065), (92, 13101), (93, 13125), (95, 13158), (103, 13275), (105, 13293), (108, 13338), (110, 13371), (115, 13389), (124, 13464), (133, 13542), (136, 13563), (140, 13584), (145, 13626), (149, 13644), (165, 13791), (172, 13869), (175, 13893), (176, 13905), (178, 13917), (179, 13923), (182, 13962), (184, 13980), (203, 14223), (210, 14325), (235, 14586), (236, 14598), (238, 14676), (239, 14694), (241, 14772), (246, 14841), (249, 14967), (250, 14970),

Gene: BroPlease\_19 Start: 11860, Stop: 15681, Start Num: 1

Candidate Starts for BroPlease\_19:

(Start: 1 @11860 has 3 MA's), (2, 12196), (3, 12241), (4, 12334), (7, 12358), (8, 12367), (13, 12493), (16, 12577), (20, 12616), (27, 12703), (31, 12760), (35, 12853), (36, 12862), (38, 12889), (40, 12907), (43, 12940), (46, 12967), (50, 13024), (51, 13033), (62, 13180), (63, 13186), (64, 13189), (72, 13408), (73, 13423), (75, 13435), (78, 13516), (85, 13654), (87, 13738), (93, 13834), (94, 13843), (101, 13978), (102, 13981), (104, 13993), (110, 14080), (111, 14083), (113, 14089), (134, 14254), (139, 14281), (158, 14440), (160, 14449), (165, 14500), (166, 14503), (168, 14524), (171, 14572), (174, 14599), (176, 14614), (177, 14620), (184, 14689), (192, 14740), (213, 15058), (222, 15112), (224, 15142), (235, 15295), (237, 15376), (239, 15403), (249, 15670),

Gene: BryanRecycles\_19 Start: 11832, Stop: 15152, Start Num: 5



Candidate Starts for BryanRecycles\_19:

(Start: 5 @11832 has 51 MA's), (13, 11976), (19, 12087), (21, 12099), (24, 12168), (26, 12174), (30, 12195), (37, 12330), (42, 12393), (46, 12429), (47, 12432), (57, 12597), (61, 12636), (66, 12693), (74, 12888), (75, 12897), (87, 13200), (88, 13233), (93, 13296), (95, 13329), (99, 13407), (105, 13464), (106, 13488), (108, 13509), (110, 13542), (115, 13560), (118, 13596), (127, 13650), (129, 13689), (133, 13713), (142, 13779), (149, 13815), (155, 13887), (160, 13911), (161, 13917), (163, 13941), (165, 13962), (175, 14064), (176, 14076), (180, 14112), (184, 14151), (190, 14184), (200, 14355), (203, 14394), (204, 14397), (210, 14496), (212, 14517), (216, 14529), (235, 14757), (236, 14769), (241, 14943), (246, 15012), (248, 15051), (249, 15138), (250, 15141),

Gene: Caliburn\_18 Start: 11649, Stop: 14969, Start Num: 5

Candidate Starts for Caliburn\_18:

(Start: 5 @11649 has 51 MA's), (13, 11793), (19, 11904), (21, 11916), (24, 11985), (26, 11991), (30, 12012), (37, 12147), (42, 12210), (46, 12246), (47, 12249), (57, 12414), (61, 12453), (66, 12510), (75, 12714), (87, 13017), (88, 13050), (93, 13113), (95, 13146), (99, 13224), (102, 13260), (103, 13263), (105, 13281), (106, 13305), (108, 13326), (110, 13359), (115, 13377), (118, 13413), (127, 13467), (129, 13506), (133, 13530), (142, 13596), (149, 13632), (155, 13704), (160, 13728), (161, 13734), (163, 13758), (165, 13779), (175, 13881), (176, 13893), (180, 13929), (184, 13968), (190, 14001), (200, 14172), (203, 14211), (210, 14313), (212, 14334), (216, 14346), (233, 14523), (235, 14574), (236, 14586), (241, 14760), (246, 14829), (248, 14868), (249, 14955), (250, 14958),

Gene: Celeste\_18 Start: 11686, Stop: 14973, Start Num: 9

Candidate Starts for Celeste\_18:

(Start: 5 @11650 has 51 MA's), (Start: 9 @11686 has 4 MA's), (13, 11797), (19, 11908), (21, 11920), (22, 11932), (28, 12007), (31, 12043), (38, 12172), (42, 12214), (45, 12244), (46, 12250), (48, 12262), (50, 12307), (68, 12535), (75, 12718), (89, 13057), (93, 13117), (95, 13150), (103, 13267), (105, 13285), (108, 13330), (110, 13363), (115, 13381), (124, 13456), (133, 13534), (136, 13555), (140, 13576), (145, 13618), (149, 13636), (165, 13783), (172, 13861), (175, 13885), (176, 13897), (178, 13909), (179, 13915), (182, 13954), (184, 13972), (203, 14215), (210, 14317), (235, 14578), (236, 14590), (238, 14668), (239, 14686), (241, 14764), (246, 14833), (249, 14959), (250, 14962),

Gene: Celia\_18 Start: 12007, Stop: 15408, Start Num: 6

Candidate Starts for Celia\_18:

(Start: 6 @12007 has 24 MA's), (8, 12022), (13, 12142), (18, 12235), (19, 12253), (22, 12277), (33, 12433), (48, 12610), (50, 12655), (56, 12736), (60, 12799), (63, 12817), (69, 12940), (75, 13063), (76, 13135), (79, 13147), (84, 13276), (87, 13369), (92, 13441), (93, 13465), (97, 13540), (104, 13624), (108, 13678), (110, 13711), (112, 13717), (116, 13738), (117, 13750), (122, 13789), (125, 13807), (137, 13972), (143, 14041), (146, 14056), (149, 14071), (152, 14092), (156, 14146), (163, 14197), (165, 14218), (176, 14332), (184, 14407), (187, 14416), (195, 14530), (203, 14650), (214, 14782), (216, 14785), (223, 14836), (230, 14902), (231, 14905), (235, 15013), (237, 15094), (239, 15121), (243, 15238), (248, 15310), (249, 15397),

Gene: Chucky\_18 Start: 11647, Stop: 14970, Start Num: 5

Candidate Starts for Chucky\_18:

(Start: 5 @11647 has 51 MA's), (13, 11794), (19, 11905), (21, 11917), (22, 11929), (28, 12004), (31, 12040), (38, 12169), (42, 12211), (45, 12241), (46, 12247), (50, 12304), (68, 12532), (70, 12592), (75, 12715), (87, 13018), (93, 13114), (95, 13147), (103, 13264), (105, 13282), (108, 13327), (110, 13360), (115, 13378), (124, 13453), (133, 13531), (136, 13552), (145, 13615), (149, 13633), (165, 13780), (172, 13858), (175, 13882), (176, 13894), (178, 13906), (179, 13912), (182, 13951), (184, 13969), (203, 14212), (210, 14314), (219, 14356), (233, 14524), (235, 14575), (236, 14587), (246, 14830), (249, 14956), (250, 14959),

Gene: Danzina\_19 Start: 11860, Stop: 15183, Start Num: 5

Candidate Starts for Danzina\_19:

(Start: 5 @11860 has 51 MA's), (Start: 9 @11896 has 4 MA's), (13, 12007), (19, 12118), (21, 12130), (22, 12142), (28, 12217), (31, 12253), (38, 12382), (42, 12424), (45, 12454), (46, 12460), (48, 12472), (50, 12517), (65, 12685), (68, 12745), (74, 12919), (75, 12928), (87, 13231), (89, 13267), (92, 13303), (93, 13327), (95, 13360), (103, 13477), (105, 13495), (108, 13540), (110, 13573), (115, 13591), (124, 13666), (133, 13744), (136, 13765), (140, 13786), (145, 13828), (149, 13846), (165, 13993), (172, 14071), (175, 14095), (176, 14107), (178, 14119), (179, 14125), (182, 14164), (184, 14182), (203, 14425), (210, 14527), (235, 14788), (236, 14800), (238, 14878), (239, 14896), (241, 14974), (246, 15043), (249, 15169), (250, 15172),

Gene: Dattran\_19 Start: 11685, Stop: 14972, Start Num: 9

Candidate Starts for Dattran\_19:

(Start: 5 @11649 has 51 MA's), (Start: 9 @11685 has 4 MA's), (13, 11796), (19, 11907), (21, 11919), (22, 11931), (28, 12006), (31, 12042), (38, 12171), (42, 12213), (45, 12243), (46, 12249), (48, 12261), (50, 12306), (68, 12534), (75, 12717), (89, 13056), (93, 13116), (95, 13149), (103, 13266), (105, 13284), (108, 13329), (110, 13362), (115, 13380), (124, 13455), (133, 13533), (136, 13554), (140, 13575), (145, 13617), (149, 13635), (165, 13782), (172, 13860), (175, 13884), (176, 13896), (178, 13908), (179, 13914), (182, 13953), (184, 13971), (203, 14214), (210, 14316), (235, 14577), (236, 14589), (238, 14667), (239, 14685), (241, 14763), (246, 14832), (249, 14958), (250, 14961),

Gene: Daudau\_18 Start: 11605, Stop: 14904, Start Num: 6

Candidate Starts for Daudau\_18:

(Start: 6 @11605 has 24 MA's), (Start: 10 @11644 has 3 MA's), (Start: 11 @11722 has 1 MA's), (13, 11740), (14, 11761), (19, 11851), (31, 11983), (44, 12172), (46, 12190), (49, 12229), (69, 12532), (75, 12655), (77, 12730), (90, 13021), (93, 13054), (102, 13201), (135, 13483), (149, 13573), (151, 13588), (165, 13720), (170, 13777), (175, 13822), (176, 13834), (182, 13891), (184, 13909), (212, 14275), (226, 14374), (229, 14398), (235, 14515), (236, 14527), (237, 14596), (238, 14605), (242, 14722),

Gene: Dwayne\_18 Start: 11643, Stop: 14966, Start Num: 5

Candidate Starts for Dwayne\_18:

(Start: 5 @11643 has 51 MA's), (13, 11790), (19, 11901), (21, 11913), (22, 11925), (28, 12000), (31, 12036), (38, 12165), (42, 12207), (45, 12237), (46, 12243), (50, 12300), (68, 12528), (70, 12588), (75, 12711), (87, 13014), (93, 13110), (95, 13143), (103, 13260), (105, 13278), (108, 13323), (110, 13356), (115, 13374), (124, 13449), (133, 13527), (136, 13548), (145, 13611), (149, 13629), (155, 13701), (165, 13776), (172, 13854), (175, 13878), (176, 13890), (178, 13902), (179, 13908), (182, 13947), (184, 13965), (203, 14208), (210, 14310), (219, 14352), (233, 14520), (235, 14571), (236, 14583), (241, 14757), (246, 14826), (249, 14952), (250, 14955),

Gene: ELB20\_17 Start: 11627, Stop: 15028, Start Num: 6

Candidate Starts for ELB20\_17:

(Start: 6 @11627 has 24 MA's), (Start: 10 @11666 has 3 MA's), (12, 11753), (13, 11762), (14, 11783), (17, 11840), (19, 11873), (23, 11936), (25, 11954), (29, 11975), (31, 12005), (42, 12176), (46, 12212), (50, 12269), (52, 12299), (54, 12317), (57, 12380), (68, 12497), (75, 12680), (87, 12983), (90, 13046), (93, 13079), (95, 13112), (98, 13184), (99, 13190), (105, 13247), (106, 13271), (108, 13292), (110, 13325), (115, 13343), (124, 13418), (129, 13472), (130, 13484), (134, 13499), (136, 13517), (145, 13580), (176, 13859), (184, 13934), (193, 14006), (194, 14030), (209, 14273), (213, 14303), (217, 14390), (218, 14399), (229, 14522), (234, 14600), (235, 14639), (236, 14651), (238, 14729), (246, 14894),

Gene: Eddasa\_19 Start: 11832, Stop: 15152, Start Num: 5

Candidate Starts for Eddasa\_19:

(Start: 5 @11832 has 51 MA's), (13, 11976), (19, 12087), (21, 12099), (24, 12168), (26, 12174), (30, 12195), (37, 12330), (42, 12393), (46, 12429), (47, 12432), (57, 12597), (61, 12636), (66, 12693), (74,

12888), (75, 12897), (87, 13200), (88, 13233), (93, 13296), (95, 13329), (99, 13407), (105, 13464), (106, 13488), (108, 13509), (110, 13542), (115, 13560), (118, 13596), (127, 13650), (129, 13689), (133, 13713), (142, 13779), (149, 13815), (155, 13887), (160, 13911), (161, 13917), (163, 13941), (165, 13962), (175, 14064), (176, 14076), (180, 14112), (184, 14151), (190, 14184), (200, 14355), (203, 14394), (204, 14397), (210, 14496), (212, 14517), (216, 14529), (235, 14757), (236, 14769), (241, 14943), (246, 15012), (248, 15051), (249, 15138), (250, 15141),

Gene: Ejemplo\_18 Start: 11643, Stop: 14966, Start Num: 5

Candidate Starts for Ejemplo\_18:

(Start: 5 @11643 has 51 MA's), (13, 11790), (19, 11901), (21, 11913), (22, 11925), (28, 12000), (31, 12036), (42, 12207), (45, 12237), (46, 12243), (48, 12255), (50, 12300), (55, 12354), (65, 12468), (68, 12528), (74, 12702), (75, 12711), (87, 13014), (89, 13050), (93, 13110), (95, 13143), (99, 13221), (103, 13260), (105, 13278), (108, 13323), (110, 13356), (115, 13374), (124, 13449), (133, 13527), (136, 13548), (140, 13569), (145, 13611), (149, 13629), (155, 13701), (165, 13776), (172, 13854), (175, 13878), (176, 13890), (178, 13902), (179, 13908), (182, 13947), (184, 13965), (203, 14208), (205, 14253), (210, 14310), (233, 14520), (235, 14571), (246, 14826), (249, 14952), (250, 14955),

Gene: Emaanora\_20 Start: 11646, Stop: 14969, Start Num: 5

Candidate Starts for Emaanora\_20:

(Start: 5 @11646 has 51 MA's), (13, 11793), (19, 11904), (21, 11916), (22, 11928), (28, 12003), (31, 12039), (38, 12168), (42, 12210), (45, 12240), (46, 12246), (50, 12303), (68, 12531), (70, 12591), (75, 12714), (87, 13017), (93, 13113), (95, 13146), (103, 13263), (105, 13281), (108, 13326), (110, 13359), (115, 13377), (124, 13452), (133, 13530), (136, 13551), (145, 13614), (149, 13632), (165, 13779), (172, 13857), (175, 13881), (176, 13893), (178, 13905), (179, 13911), (182, 13950), (184, 13968), (203, 14211), (210, 14313), (219, 14355), (233, 14523), (235, 14574), (236, 14586), (241, 14760), (246, 14829), (249, 14955), (250, 14958),

Gene: EnochSoames\_20 Start: 11828, Stop: 15148, Start Num: 5

Candidate Starts for EnochSoames\_20:

(Start: 5 @11828 has 51 MA's), (13, 11972), (19, 12083), (21, 12095), (22, 12107), (26, 12170), (28, 12182), (37, 12326), (42, 12389), (46, 12425), (47, 12428), (57, 12593), (61, 12632), (66, 12689), (74, 12884), (75, 12893), (87, 13196), (88, 13229), (93, 13292), (95, 13325), (99, 13403), (105, 13460), (106, 13484), (108, 13505), (110, 13538), (115, 13556), (118, 13592), (127, 13646), (129, 13685), (133, 13709), (142, 13775), (149, 13811), (155, 13883), (160, 13907), (161, 13913), (163, 13937), (165, 13958), (175, 14060), (176, 14072), (180, 14108), (184, 14147), (190, 14180), (200, 14351), (203, 14390), (204, 14393), (210, 14492), (212, 14513), (216, 14525), (235, 14753), (236, 14765), (241, 14939), (246, 15008), (248, 15047), (249, 15134), (250, 15137),

Gene: Esperer\_18 Start: 11669, Stop: 14989, Start Num: 5

Candidate Starts for Esperer\_18:

(Start: 5 @11669 has 51 MA's), (13, 11813), (19, 11924), (21, 11936), (24, 12005), (26, 12011), (30, 12032), (37, 12167), (42, 12230), (46, 12266), (47, 12269), (57, 12434), (61, 12473), (66, 12530), (75, 12734), (87, 13037), (88, 13070), (93, 13133), (95, 13166), (99, 13244), (102, 13280), (103, 13283), (105, 13301), (106, 13325), (108, 13346), (110, 13379), (115, 13397), (118, 13433), (127, 13487), (129, 13526), (133, 13550), (142, 13616), (149, 13652), (155, 13724), (160, 13748), (161, 13754), (163, 13778), (165, 13799), (175, 13901), (176, 13913), (180, 13949), (184, 13988), (190, 14021), (200, 14192), (203, 14231), (210, 14333), (212, 14354), (216, 14366), (233, 14543), (235, 14594), (236, 14606), (241, 14780), (246, 14849), (248, 14888), (249, 14975), (250, 14978),

Gene: GirlDinner\_18 Start: 11503, Stop: 14700, Start Num: 6

Candidate Starts for GirlDinner\_18:

(Start: 6 @11503 has 24 MA's), (Start: 10 @11542 has 3 MA's), (13, 11641), (14, 11662), (18, 11734), (19, 11752), (31, 11884), (32, 11896), (41, 12046), (45, 12085), (46, 12091), (47, 12094), (50, 12148),

(59, 12283), (66, 12355), (75, 12559), (81, 12667), (87, 12862), (93, 12958), (95, 12991), (99, 13069), (102, 13105), (105, 13126), (106, 13150), (108, 13171), (109, 13174), (110, 13204), (115, 13222), (119, 13261), (122, 13282), (123, 13288), (125, 13300), (141, 13369), (153, 13432), (156, 13465), (158, 13477), (163, 13516), (176, 13651), (183, 13711), (189, 13756), (191, 13762), (201, 13879), (208, 14005), (219, 14092), (234, 14272), (235, 14311), (244, 14542), (247, 14578),

Gene: Goby\_18 Start: 11655, Stop: 14978, Start Num: 5

Candidate Starts for Goby\_18:

(Start: 5 @11655 has 51 MA's), (Start: 9 @11691 has 4 MA's), (13, 11802), (19, 11913), (21, 11925), (22, 11937), (28, 12012), (31, 12048), (38, 12177), (42, 12219), (45, 12249), (46, 12255), (48, 12267), (50, 12312), (68, 12540), (75, 12723), (89, 13062), (93, 13122), (95, 13155), (96, 13188), (102, 13269), (105, 13290), (108, 13335), (110, 13368), (115, 13386), (116, 13395), (124, 13461), (133, 13539), (136, 13560), (140, 13581), (145, 13623), (149, 13641), (165, 13788), (172, 13866), (175, 13890), (176, 13902), (178, 13914), (179, 13920), (182, 13959), (184, 13977), (203, 14220), (210, 14322), (234, 14544), (235, 14583), (236, 14595), (241, 14769), (246, 14838), (249, 14964), (250, 14967),

Gene: Godpower\_19 Start: 11667, Stop: 14990, Start Num: 5

Candidate Starts for Godpower\_19:

(Start: 5 @11667 has 51 MA's), (Start: 9 @11703 has 4 MA's), (13, 11814), (19, 11925), (21, 11937), (22, 11949), (28, 12024), (31, 12060), (34, 12114), (38, 12189), (42, 12231), (45, 12261), (46, 12267), (48, 12279), (50, 12324), (68, 12552), (74, 12726), (75, 12735), (89, 13074), (93, 13134), (95, 13167), (96, 13200), (102, 13281), (105, 13302), (108, 13347), (110, 13380), (115, 13398), (116, 13407), (124, 13473), (133, 13551), (136, 13572), (140, 13593), (145, 13635), (149, 13653), (165, 13800), (172, 13878), (175, 13902), (176, 13914), (178, 13926), (179, 13932), (182, 13971), (184, 13989), (203, 14232), (210, 14334), (234, 14556), (235, 14595), (236, 14607), (241, 14781), (246, 14850), (249, 14976), (250, 14979),

Gene: GreenWeasel\_20 Start: 11869, Stop: 15690, Start Num: 1

Candidate Starts for GreenWeasel\_20:

(Start: 1 @11869 has 3 MA's), (2, 12205), (3, 12250), (4, 12343), (7, 12367), (8, 12376), (13, 12502), (16, 12586), (20, 12625), (27, 12712), (31, 12769), (35, 12862), (36, 12871), (38, 12898), (40, 12916), (43, 12949), (46, 12976), (50, 13033), (51, 13042), (62, 13189), (63, 13195), (64, 13198), (72, 13417), (73, 13432), (75, 13444), (78, 13525), (85, 13663), (87, 13747), (93, 13843), (94, 13852), (101, 13987), (102, 13990), (104, 14002), (110, 14089), (111, 14092), (113, 14098), (134, 14263), (139, 14290), (158, 14449), (160, 14458), (165, 14509), (166, 14512), (168, 14533), (171, 14581), (174, 14608), (176, 14623), (177, 14629), (184, 14698), (192, 14749), (213, 15067), (222, 15121), (224, 15151), (235, 15304), (237, 15385), (239, 15412), (249, 15679),

Gene: Hank144\_19 Start: 11796, Stop: 15098, Start Num: 6

Candidate Starts for Hank144\_19:

(Start: 6 @11796 has 24 MA's), (Start: 11 @11913 has 1 MA's), (13, 11931), (14, 11952), (19, 12042), (31, 12174), (38, 12303), (42, 12345), (46, 12381), (50, 12438), (75, 12849), (83, 13002), (87, 13152), (93, 13248), (95, 13281), (105, 13416), (106, 13440), (108, 13461), (110, 13494), (115, 13512), (133, 13665), (140, 13707), (144, 13746), (145, 13749), (163, 13893), (165, 13914), (172, 13992), (176, 14028), (178, 14040), (180, 14064), (182, 14085), (184, 14103), (193, 14175), (198, 14268), (199, 14286), (203, 14346), (205, 14391), (214, 14478), (216, 14481), (235, 14709), (237, 14790), (238, 14799), (247, 14976), (249, 15087),

Gene: Hippo\_18 Start: 11646, Stop: 14969, Start Num: 5

Candidate Starts for Hippo\_18:

(Start: 5 @11646 has 51 MA's), (13, 11793), (19, 11904), (21, 11916), (22, 11928), (28, 12003), (31, 12039), (38, 12168), (42, 12210), (45, 12240), (46, 12246), (50, 12303), (68, 12531), (70, 12591), (75, 12714), (87, 13017), (93, 13113), (95, 13146), (103, 13263), (105, 13281), (108, 13326), (110, 13359),

(115, 13377), (124, 13452), (133, 13530), (136, 13551), (145, 13614), (149, 13632), (165, 13779), (172, 13857), (175, 13881), (176, 13893), (178, 13905), (179, 13911), (182, 13950), (184, 13968), (203, 14211), (205, 14256), (210, 14313), (233, 14523), (235, 14574), (236, 14586), (241, 14760), (246, 14829), (249, 14955), (250, 14958),

Gene: Hydra\_20 Start: 12197, Stop: 15517, Start Num: 5

Candidate Starts for Hydra\_20:

(Start: 5 @12197 has 51 MA's), (13, 12341), (19, 12452), (21, 12464), (24, 12533), (26, 12539), (30, 12560), (37, 12695), (42, 12758), (46, 12794), (47, 12797), (57, 12962), (61, 13001), (66, 13058), (75, 13262), (87, 13565), (88, 13598), (93, 13661), (95, 13694), (99, 13772), (102, 13808), (103, 13811), (105, 13829), (106, 13853), (108, 13874), (110, 13907), (115, 13925), (118, 13961), (127, 14015), (129, 14054), (133, 14078), (142, 14144), (149, 14180), (155, 14252), (160, 14276), (161, 14282), (163, 14306), (165, 14327), (175, 14429), (176, 14441), (180, 14477), (184, 14516), (190, 14549), (200, 14720), (203, 14759), (210, 14861), (212, 14882), (216, 14894), (233, 15071), (235, 15122), (236, 15134), (241, 15308), (246, 15377), (248, 15416), (249, 15503), (250, 15506),

Gene: Indigo\_18 Start: 11669, Stop: 14989, Start Num: 5

Candidate Starts for Indigo\_18:

(Start: 5 @11669 has 51 MA's), (13, 11813), (19, 11924), (21, 11936), (24, 12005), (26, 12011), (30, 12032), (37, 12167), (42, 12230), (46, 12266), (47, 12269), (57, 12434), (61, 12473), (66, 12530), (75, 12734), (87, 13037), (88, 13070), (93, 13133), (95, 13166), (99, 13244), (102, 13280), (103, 13283), (105, 13301), (106, 13325), (108, 13346), (110, 13379), (115, 13397), (118, 13433), (127, 13487), (129, 13526), (133, 13550), (142, 13616), (149, 13652), (155, 13724), (160, 13748), (161, 13754), (163, 13778), (165, 13799), (175, 13901), (176, 13913), (180, 13949), (184, 13988), (190, 14021), (200, 14192), (203, 14231), (210, 14333), (212, 14354), (216, 14366), (233, 14543), (235, 14594), (236, 14606), (241, 14780), (246, 14849), (248, 14888), (249, 14975), (250, 14978),

Gene: Itza\_18 Start: 11930, Stop: 15331, Start Num: 6

Candidate Starts for Itza\_18:

(Start: 6 @11930 has 24 MA's), (8, 11945), (13, 12065), (18, 12158), (19, 12176), (22, 12200), (33, 12356), (48, 12533), (50, 12578), (56, 12659), (60, 12722), (63, 12740), (69, 12863), (75, 12986), (76, 13058), (79, 13070), (84, 13199), (87, 13292), (92, 13364), (93, 13388), (97, 13463), (104, 13547), (108, 13601), (110, 13634), (112, 13640), (116, 13661), (117, 13673), (122, 13712), (125, 13730), (137, 13895), (143, 13964), (146, 13979), (149, 13994), (152, 14015), (156, 14069), (163, 14120), (165, 14141), (176, 14255), (184, 14330), (187, 14339), (195, 14453), (203, 14573), (214, 14705), (216, 14708), (223, 14759), (230, 14825), (231, 14828), (235, 14936), (237, 15017), (239, 15044), (243, 15161), (248, 15233), (249, 15320),

Gene: Izzy\_19 Start: 11879, Stop: 15199, Start Num: 5

Candidate Starts for Izzy\_19:

(Start: 5 @11879 has 51 MA's), (13, 12023), (19, 12134), (21, 12146), (24, 12215), (26, 12221), (30, 12242), (37, 12377), (42, 12440), (46, 12476), (47, 12479), (57, 12644), (61, 12683), (66, 12740), (74, 12935), (75, 12944), (87, 13247), (88, 13280), (93, 13343), (95, 13376), (99, 13454), (105, 13511), (106, 13535), (108, 13556), (110, 13589), (115, 13607), (118, 13643), (127, 13697), (129, 13736), (133, 13760), (142, 13826), (149, 13862), (155, 13934), (160, 13958), (161, 13964), (163, 13988), (165, 14009), (175, 14111), (176, 14123), (180, 14159), (184, 14198), (190, 14231), (200, 14402), (203, 14441), (204, 14444), (210, 14543), (212, 14564), (216, 14576), (235, 14804), (236, 14816), (241, 14990), (246, 15059), (248, 15098), (249, 15185), (250, 15188),

Gene: Janus\_19 Start: 11841, Stop: 15038, Start Num: 6

Candidate Starts for Janus\_19:

(Start: 6 @11841 has 24 MA's), (Start: 10 @11880 has 3 MA's), (13, 11979), (14, 12000), (18, 12072), (19, 12090), (31, 12222), (32, 12234), (41, 12384), (45, 12423), (46, 12429), (47, 12432), (50, 12486),

(59, 12621), (66, 12693), (75, 12897), (81, 13005), (87, 13200), (93, 13296), (95, 13329), (99, 13407), (102, 13443), (105, 13464), (106, 13488), (108, 13509), (109, 13512), (110, 13542), (115, 13560), (119, 13599), (122, 13620), (123, 13626), (125, 13638), (141, 13707), (153, 13770), (156, 13803), (158, 13815), (163, 13854), (176, 13989), (183, 14049), (189, 14094), (191, 14100), (201, 14217), (219, 14430), (234, 14610), (235, 14649), (244, 14880), (247, 14916),

Gene: Jash\_19 Start: 11832, Stop: 15152, Start Num: 5

Candidate Starts for Jash\_19:

(Start: 5 @11832 has 51 MA's), (13, 11976), (19, 12087), (21, 12099), (24, 12168), (26, 12174), (30, 12195), (37, 12330), (42, 12393), (46, 12429), (47, 12432), (57, 12597), (61, 12636), (66, 12693), (74, 12888), (75, 12897), (87, 13200), (88, 13233), (93, 13296), (95, 13329), (99, 13407), (105, 13464), (106, 13488), (108, 13509), (110, 13542), (115, 13560), (118, 13596), (127, 13650), (129, 13689), (133, 13713), (142, 13779), (149, 13815), (155, 13887), (160, 13911), (161, 13917), (163, 13941), (165, 13962), (175, 14064), (176, 14076), (180, 14112), (184, 14151), (190, 14184), (200, 14355), (203, 14394), (204, 14397), (210, 14496), (212, 14517), (216, 14529), (235, 14757), (236, 14769), (241, 14943), (246, 15012), (248, 15051), (249, 15138), (250, 15141),

Gene: Jevington\_20 Start: 12149, Stop: 15340, Start Num: 6

Candidate Starts for Jevington\_20:

(Start: 6 @12149 has 24 MA's), (Start: 10 @12188 has 3 MA's), (12, 12275), (13, 12284), (14, 12305), (15, 12347), (31, 12524), (39, 12662), (41, 12686), (46, 12731), (47, 12734), (50, 12788), (57, 12899), (75, 13199), (82, 13322), (85, 13418), (87, 13502), (90, 13565), (91, 13571), (93, 13598), (102, 13745), (105, 13766), (106, 13790), (108, 13811), (109, 13814), (110, 13844), (115, 13862), (121, 13919), (141, 14009), (159, 14123), (160, 14126), (169, 14204), (170, 14234), (175, 14279), (176, 14291), (182, 14348), (183, 14351), (189, 14396), (191, 14402), (196, 14465), (204, 14558), (207, 14633), (219, 14732), (235, 14951), (241, 15137), (242, 15158), (244, 15182),

Gene: Katalie\_19 Start: 11907, Stop: 15230, Start Num: 5

Candidate Starts for Katalie\_19:

(Start: 5 @11907 has 51 MA's), (13, 12054), (19, 12165), (21, 12177), (22, 12189), (28, 12264), (31, 12300), (42, 12471), (45, 12501), (46, 12507), (48, 12519), (74, 12966), (75, 12975), (87, 13278), (89, 13314), (93, 13374), (95, 13407), (96, 13440), (102, 13521), (105, 13542), (106, 13566), (108, 13587), (110, 13620), (115, 13638), (122, 13698), (133, 13791), (136, 13812), (145, 13875), (149, 13893), (163, 14019), (165, 14040), (172, 14118), (176, 14154), (178, 14166), (179, 14172), (182, 14211), (184, 14229), (199, 14412), (203, 14472), (205, 14517), (235, 14835), (236, 14847), (241, 15021), (246, 15090), (249, 15216), (250, 15219),

Gene: Lannister\_19 Start: 11670, Stop: 14996, Start Num: 5

Candidate Starts for Lannister\_19:

(Start: 5 @11670 has 51 MA's), (13, 11817), (19, 11928), (21, 11940), (22, 11952), (26, 12015), (31, 12063), (39, 12201), (42, 12234), (45, 12264), (46, 12270), (74, 12729), (75, 12738), (86, 12972), (87, 13041), (89, 13077), (93, 13137), (95, 13170), (99, 13248), (102, 13284), (103, 13287), (105, 13305), (106, 13329), (108, 13350), (110, 13383), (115, 13401), (124, 13476), (126, 13488), (133, 13554), (136, 13575), (140, 13596), (145, 13638), (149, 13656), (165, 13803), (172, 13881), (176, 13917), (178, 13929), (179, 13935), (182, 13974), (184, 13992), (203, 14235), (210, 14337), (233, 14547), (235, 14598), (236, 14610), (246, 14853), (249, 14982), (250, 14985),

Gene: Legacy\_18 Start: 11640, Stop: 14960, Start Num: 5

Candidate Starts for Legacy\_18:

(Start: 5 @11640 has 51 MA's), (13, 11784), (19, 11895), (21, 11907), (24, 11976), (26, 11982), (30, 12003), (37, 12138), (42, 12201), (46, 12237), (47, 12240), (57, 12405), (61, 12444), (66, 12501), (75, 12705), (87, 13008), (88, 13041), (93, 13104), (95, 13137), (99, 13215), (102, 13251), (103, 13254), (105, 13272), (106, 13296), (108, 13317), (110, 13350), (115, 13368), (118, 13404), (127, 13458),

(129, 13497), (133, 13521), (142, 13587), (149, 13623), (155, 13695), (160, 13719), (161, 13725), (163, 13749), (165, 13770), (175, 13872), (176, 13884), (180, 13920), (184, 13959), (190, 13992), (200, 14163), (203, 14202), (210, 14304), (212, 14325), (216, 14337), (233, 14514), (235, 14565), (236, 14577), (241, 14751), (246, 14820), (248, 14859), (249, 14946), (250, 14949),

Gene: Leviticus\_18 Start: 11669, Stop: 14989, Start Num: 5

Candidate Starts for Leviticus\_18:

(Start: 5 @11669 has 51 MA's), (13, 11813), (19, 11924), (21, 11936), (24, 12005), (26, 12011), (30, 12032), (37, 12167), (42, 12230), (46, 12266), (47, 12269), (57, 12434), (61, 12473), (66, 12530), (75, 12734), (87, 13037), (88, 13070), (93, 13133), (95, 13166), (99, 13244), (102, 13280), (103, 13283), (105, 13301), (106, 13325), (108, 13346), (110, 13379), (115, 13397), (118, 13433), (127, 13487), (129, 13526), (133, 13550), (142, 13616), (149, 13652), (155, 13724), (160, 13748), (161, 13754), (163, 13778), (165, 13799), (175, 13901), (176, 13913), (180, 13949), (184, 13988), (190, 14021), (200, 14192), (203, 14231), (210, 14333), (212, 14354), (216, 14366), (233, 14543), (235, 14594), (236, 14606), (241, 14780), (246, 14849), (248, 14888), (249, 14975), (250, 14978),

Gene: Lika\_18 Start: 11671, Stop: 14994, Start Num: 5

Candidate Starts for Lika\_18:

(Start: 5 @11671 has 51 MA's), (Start: 9 @11707 has 4 MA's), (13, 11818), (19, 11929), (21, 11941), (22, 11953), (26, 12016), (28, 12028), (31, 12064), (38, 12193), (42, 12235), (45, 12265), (46, 12271), (48, 12283), (50, 12328), (68, 12556), (75, 12739), (86, 12973), (89, 13078), (93, 13138), (95, 13171), (96, 13204), (102, 13285), (105, 13306), (108, 13351), (110, 13384), (115, 13402), (116, 13411), (124, 13477), (133, 13555), (136, 13576), (140, 13597), (145, 13639), (149, 13657), (165, 13804), (172, 13882), (175, 13906), (176, 13918), (178, 13930), (179, 13936), (182, 13975), (184, 13993), (188, 14014), (203, 14236), (210, 14338), (234, 14560), (235, 14599), (236, 14611), (241, 14785), (246, 14854), (249, 14980), (250, 14983),

Gene: Loofah\_19 Start: 11655, Stop: 14957, Start Num: 6

Candidate Starts for Loofah\_19:

(Start: 6 @11655 has 24 MA's), (Start: 10 @11694 has 3 MA's), (Start: 11 @11772 has 1 MA's), (12, 11781), (13, 11790), (14, 11811), (17, 11868), (19, 11901), (25, 11982), (29, 12003), (31, 12033), (42, 12204), (46, 12240), (50, 12297), (52, 12327), (54, 12345), (57, 12408), (58, 12420), (68, 12525), (69, 12582), (75, 12708), (87, 13011), (90, 13074), (93, 13107), (95, 13140), (99, 13218), (105, 13275), (106, 13299), (108, 13320), (110, 13353), (115, 13371), (124, 13446), (129, 13500), (130, 13512), (136, 13545), (145, 13608), (176, 13887), (184, 13962), (193, 14034), (226, 14427), (234, 14529), (235, 14568), (237, 14649), (240, 14721), (246, 14823),

Gene: Lorelei\_18 Start: 11676, Stop: 14963, Start Num: 9

Candidate Starts for Lorelei\_18:

(Start: 5 @11640 has 51 MA's), (Start: 9 @11676 has 4 MA's), (13, 11787), (19, 11898), (21, 11910), (22, 11922), (28, 11997), (31, 12033), (38, 12162), (42, 12204), (45, 12234), (46, 12240), (48, 12252), (65, 12465), (68, 12525), (74, 12699), (75, 12708), (87, 13011), (89, 13047), (93, 13107), (95, 13140), (98, 13212), (103, 13257), (105, 13275), (108, 13320), (110, 13353), (115, 13371), (124, 13446), (133, 13524), (136, 13545), (140, 13566), (145, 13608), (149, 13626), (165, 13773), (172, 13851), (175, 13875), (176, 13887), (178, 13899), (179, 13905), (182, 13944), (184, 13962), (203, 14205), (206, 14253), (210, 14307), (233, 14517), (235, 14568), (236, 14580), (241, 14754), (246, 14823), (249, 14949), (250, 14952),

Gene: Maneekul\_18 Start: 11642, Stop: 14965, Start Num: 5

Candidate Starts for Maneekul\_18:

(Start: 5 @11642 has 51 MA's), (13, 11789), (19, 11900), (21, 11912), (22, 11924), (28, 11999), (31, 12035), (42, 12206), (45, 12236), (46, 12242), (48, 12254), (50, 12299), (55, 12353), (65, 12467), (68, 12527), (74, 12701), (75, 12710), (87, 13013), (89, 13049), (93, 13109), (95, 13142), (99, 13220), (103,

13259), (105, 13277), (108, 13322), (110, 13355), (115, 13373), (124, 13448), (133, 13526), (136, 13547), (140, 13568), (145, 13610), (149, 13628), (155, 13700), (165, 13775), (172, 13853), (175, 13877), (176, 13889), (178, 13901), (179, 13907), (182, 13946), (184, 13964), (203, 14207), (205, 14252), (210, 14309), (231, 14462), (233, 14519), (235, 14570), (246, 14825), (249, 14951), (250, 14954),

Gene: Marav\_21 Start: 12499, Stop: 15690, Start Num: 6

Candidate Starts for Marav\_21:

(Start: 6 @12499 has 24 MA's), (Start: 10 @12538 has 3 MA's), (12, 12625), (13, 12634), (14, 12655), (15, 12697), (31, 12874), (41, 13036), (46, 13081), (47, 13084), (50, 13138), (75, 13549), (79, 13633), (85, 13768), (87, 13852), (93, 13948), (102, 14095), (105, 14116), (106, 14140), (108, 14161), (109, 14164), (110, 14194), (115, 14212), (121, 14269), (141, 14359), (150, 14389), (159, 14473), (160, 14476), (169, 14554), (170, 14584), (175, 14629), (176, 14641), (182, 14698), (183, 14701), (189, 14746), (191, 14752), (196, 14815), (204, 14908), (207, 14983), (224, 15148), (227, 15172), (228, 15181), (235, 15301), (240, 15454), (241, 15487), (242, 15508), (244, 15532), (245, 15544),

Gene: Nabi\_18 Start: 11640, Stop: 14963, Start Num: 5

Candidate Starts for Nabi\_18:

(Start: 5 @11640 has 51 MA's), (Start: 9 @11676 has 4 MA's), (13, 11787), (19, 11898), (21, 11910), (22, 11922), (28, 11997), (31, 12033), (38, 12162), (42, 12204), (45, 12234), (46, 12240), (48, 12252), (65, 12465), (68, 12525), (74, 12699), (75, 12708), (87, 13011), (89, 13047), (93, 13107), (95, 13140), (98, 13212), (103, 13257), (105, 13275), (108, 13320), (110, 13353), (115, 13371), (124, 13446), (133, 13524), (136, 13545), (140, 13566), (145, 13608), (149, 13626), (165, 13773), (172, 13851), (175, 13875), (176, 13887), (178, 13899), (179, 13905), (182, 13944), (184, 13962), (203, 14205), (206, 14253), (210, 14307), (233, 14517), (235, 14568), (236, 14580), (241, 14754), (246, 14823), (249, 14949), (250, 14952),

Gene: Nanodon\_20 Start: 11848, Stop: 15171, Start Num: 5

Candidate Starts for Nanodon\_20:

(Start: 5 @11848 has 51 MA's), (Start: 9 @11884 has 4 MA's), (Start: 10 @11896 has 3 MA's), (13, 11995), (19, 12106), (21, 12118), (22, 12130), (26, 12193), (28, 12205), (31, 12241), (42, 12412), (45, 12442), (46, 12448), (48, 12460), (50, 12505), (53, 12544), (67, 12724), (68, 12733), (70, 12793), (74, 12907), (75, 12916), (80, 13015), (89, 13255), (93, 13315), (95, 13348), (102, 13462), (105, 13483), (106, 13507), (108, 13528), (110, 13561), (114, 13576), (115, 13579), (124, 13654), (133, 13732), (136, 13753), (140, 13774), (145, 13816), (149, 13834), (155, 13906), (165, 13981), (172, 14059), (176, 14095), (178, 14107), (179, 14113), (182, 14152), (184, 14170), (203, 14413), (210, 14515), (233, 14725), (235, 14776), (236, 14788), (241, 14962), (246, 15031), (249, 15157), (250, 15160),

Gene: Nerdos\_18 Start: 11669, Stop: 14989, Start Num: 5

Candidate Starts for Nerdos\_18:

(Start: 5 @11669 has 51 MA's), (13, 11813), (19, 11924), (21, 11936), (24, 12005), (26, 12011), (30, 12032), (37, 12167), (42, 12230), (46, 12266), (47, 12269), (57, 12434), (61, 12473), (66, 12530), (75, 12734), (87, 13037), (88, 13070), (93, 13133), (95, 13166), (99, 13244), (102, 13280), (103, 13283), (105, 13301), (106, 13325), (108, 13346), (110, 13379), (115, 13397), (118, 13433), (127, 13487), (129, 13526), (133, 13550), (142, 13616), (149, 13652), (155, 13724), (160, 13748), (161, 13754), (163, 13778), (165, 13799), (175, 13901), (176, 13913), (180, 13949), (184, 13988), (190, 14021), (200, 14192), (203, 14231), (210, 14333), (212, 14354), (216, 14366), (233, 14543), (235, 14594), (236, 14606), (241, 14780), (246, 14849), (248, 14888), (249, 14975), (250, 14978),

Gene: Oliynyk\_19 Start: 11832, Stop: 15152, Start Num: 5

Candidate Starts for Oliynyk\_19:

(Start: 5 @11832 has 51 MA's), (13, 11976), (19, 12087), (21, 12099), (24, 12168), (26, 12174), (30, 12195), (37, 12330), (42, 12393), (46, 12429), (47, 12432), (57, 12597), (61, 12636), (66, 12693), (74,



12888), (75, 12897), (87, 13200), (88, 13233), (93, 13296), (95, 13329), (99, 13407), (105, 13464), (106, 13488), (108, 13509), (110, 13542), (115, 13560), (118, 13596), (127, 13650), (129, 13689), (133, 13713), (142, 13779), (149, 13815), (155, 13887), (160, 13911), (161, 13917), (163, 13941), (165, 13962), (175, 14064), (176, 14076), (180, 14112), (184, 14151), (190, 14184), (200, 14355), (203, 14394), (204, 14397), (210, 14496), (212, 14517), (216, 14529), (235, 14757), (236, 14769), (241, 14943), (246, 15012), (248, 15051), (249, 15138), (250, 15141),

Gene: Ozzie\_18 Start: 11649, Stop: 14969, Start Num: 5

Candidate Starts for Ozzie\_18:

(Start: 5 @11649 has 51 MA's), (13, 11793), (19, 11904), (21, 11916), (24, 11985), (26, 11991), (30, 12012), (37, 12147), (42, 12210), (46, 12246), (47, 12249), (57, 12414), (61, 12453), (66, 12510), (75, 12714), (87, 13017), (88, 13050), (93, 13113), (95, 13146), (99, 13224), (102, 13260), (103, 13263), (105, 13281), (106, 13305), (108, 13326), (110, 13359), (115, 13377), (118, 13413), (127, 13467), (129, 13506), (133, 13530), (142, 13596), (149, 13632), (155, 13704), (160, 13728), (161, 13734), (163, 13758), (165, 13779), (175, 13881), (176, 13893), (180, 13929), (184, 13968), (190, 14001), (200, 14172), (203, 14211), (210, 14313), (212, 14334), (216, 14346), (233, 14523), (235, 14574), (236, 14586), (241, 14760), (246, 14829), (248, 14868), (249, 14955), (250, 14958),

Gene: OzzyJ\_19 Start: 11637, Stop: 14960, Start Num: 5

Candidate Starts for OzzyJ\_19:

(Start: 5 @11637 has 51 MA's), (13, 11784), (19, 11895), (21, 11907), (22, 11919), (28, 11994), (31, 12030), (38, 12159), (42, 12201), (45, 12231), (46, 12237), (50, 12294), (68, 12522), (70, 12582), (75, 12705), (87, 13008), (93, 13104), (95, 13137), (98, 13209), (103, 13254), (105, 13272), (108, 13317), (110, 13350), (115, 13368), (124, 13443), (133, 13521), (136, 13542), (145, 13605), (149, 13623), (155, 13695), (165, 13770), (172, 13848), (176, 13884), (178, 13896), (179, 13902), (182, 13941), (184, 13959), (203, 14202), (205, 14247), (210, 14304), (233, 14514), (235, 14565), (236, 14577), (241, 14751), (246, 14820), (249, 14946), (250, 14949),

Gene: Pablito\_18 Start: 11494, Stop: 14799, Start Num: 6

Candidate Starts for Pablito\_18:

(Start: 6 @11494 has 24 MA's), (Start: 10 @11533 has 3 MA's), (13, 11632), (14, 11653), (18, 11725), (19, 11743), (31, 11875), (32, 11887), (38, 12004), (39, 12013), (42, 12046), (46, 12082), (50, 12139), (52, 12169), (54, 12187), (58, 12262), (66, 12346), (68, 12367), (69, 12424), (75, 12550), (87, 12853), (90, 12916), (93, 12949), (95, 12982), (99, 13060), (100, 13081), (102, 13096), (104, 13108), (105, 13117), (106, 13141), (108, 13162), (110, 13195), (115, 13213), (118, 13249), (133, 13366), (149, 13468), (160, 13564), (165, 13615), (172, 13693), (175, 13717), (176, 13729), (178, 13741), (179, 13747), (182, 13786), (184, 13804), (198, 13969), (203, 14047), (225, 14260), (229, 14293), (235, 14410), (236, 14422), (244, 14641), (247, 14677),

Gene: Paedore\_18 Start: 11772, Stop: 14957, Start Num: 11

Candidate Starts for Paedore\_18:

(Start: 6 @11655 has 24 MA's), (Start: 10 @11694 has 3 MA's), (Start: 11 @11772 has 1 MA's), (12, 11781), (13, 11790), (14, 11811), (17, 11868), (19, 11901), (25, 11982), (29, 12003), (31, 12033), (42, 12204), (46, 12240), (50, 12297), (52, 12327), (54, 12345), (57, 12408), (58, 12420), (68, 12525), (69, 12582), (75, 12708), (87, 13011), (90, 13074), (93, 13107), (95, 13140), (99, 13218), (105, 13275), (106, 13299), (108, 13320), (110, 13353), (115, 13371), (124, 13446), (129, 13500), (130, 13512), (136, 13545), (145, 13608), (176, 13887), (184, 13962), (193, 14034), (226, 14427), (234, 14529), (235, 14568), (237, 14649), (240, 14721), (246, 14823),

Gene: Paolo\_20 Start: 12162, Stop: 15353, Start Num: 6

Candidate Starts for Paolo\_20:

(Start: 6 @12162 has 24 MA's), (Start: 10 @12201 has 3 MA's), (12, 12288), (13, 12297), (14, 12318), (15, 12360), (31, 12537), (37, 12645), (39, 12675), (41, 12699), (46, 12744), (47, 12747), (50, 12801),

(75, 13212), (82, 13335), (85, 13431), (87, 13515), (93, 13611), (102, 13758), (105, 13779), (106, 13803), (108, 13824), (109, 13827), (110, 13857), (115, 13875), (141, 14022), (159, 14136), (160, 14139), (169, 14217), (170, 14247), (175, 14292), (176, 14304), (182, 14361), (183, 14364), (189, 14409), (191, 14415), (196, 14478), (202, 14559), (204, 14571), (207, 14646), (219, 14745), (224, 14811), (232, 14865), (235, 14964), (241, 15150), (242, 15171), (244, 15195), (245, 15207),

Gene: Phettuccine\_18 Start: 11669, Stop: 14989, Start Num: 5

Candidate Starts for Phettuccine\_18:

(Start: 5 @11669 has 51 MA's), (13, 11813), (19, 11924), (21, 11936), (24, 12005), (26, 12011), (30, 12032), (37, 12167), (42, 12230), (46, 12266), (47, 12269), (57, 12434), (61, 12473), (66, 12530), (75, 12734), (87, 13037), (88, 13070), (93, 13133), (95, 13166), (99, 13244), (102, 13280), (103, 13283), (105, 13301), (106, 13325), (108, 13346), (110, 13379), (115, 13397), (118, 13433), (127, 13487), (129, 13526), (133, 13550), (142, 13616), (149, 13652), (155, 13724), (160, 13748), (161, 13754), (163, 13778), (165, 13799), (175, 13901), (176, 13913), (180, 13949), (184, 13988), (190, 14021), (200, 14192), (203, 14231), (210, 14333), (212, 14354), (216, 14366), (233, 14543), (235, 14594), (236, 14606), (241, 14780), (246, 14849), (248, 14888), (249, 14975), (250, 14978),

Gene: Puginator\_20 Start: 12120, Stop: 15398, Start Num: 6

Candidate Starts for Puginator\_20:

(Start: 6 @12120 has 24 MA's), (Start: 10 @12159 has 3 MA's), (12, 12246), (13, 12255), (14, 12276), (15, 12318), (31, 12495), (37, 12603), (39, 12633), (41, 12657), (46, 12702), (47, 12705), (50, 12759), (75, 13170), (82, 13293), (87, 13473), (90, 13536), (91, 13542), (93, 13569), (102, 13716), (105, 13737), (106, 13761), (108, 13782), (109, 13785), (110, 13815), (115, 13833), (128, 13932), (142, 14052), (145, 14070), (148, 14082), (154, 14139), (156, 14163), (157, 14172), (158, 14175), (160, 14184), (162, 14208), (163, 14214), (164, 14229), (170, 14292), (175, 14337), (176, 14349), (182, 14406), (183, 14409), (185, 14427), (189, 14454), (191, 14460), (196, 14523), (202, 14604), (204, 14616), (211, 14727), (215, 14757), (219, 14790), (226, 14868), (231, 14901), (235, 15009), (241, 15195), (242, 15216), (244, 15240), (245, 15252),

Gene: R4\_18 Start: 11638, Stop: 15039, Start Num: 6

Candidate Starts for R4\_18:

(Start: 6 @11638 has 24 MA's), (Start: 10 @11677 has 3 MA's), (12, 11764), (13, 11773), (14, 11794), (17, 11851), (19, 11884), (23, 11947), (25, 11965), (29, 11986), (31, 12016), (42, 12187), (46, 12223), (50, 12280), (52, 12310), (54, 12328), (57, 12391), (68, 12508), (75, 12691), (87, 12994), (90, 13057), (93, 13090), (95, 13123), (98, 13195), (99, 13201), (105, 13258), (106, 13282), (108, 13303), (110, 13336), (115, 13354), (124, 13429), (129, 13483), (130, 13495), (134, 13510), (136, 13528), (145, 13591), (176, 13870), (184, 13945), (193, 14017), (194, 14041), (209, 14284), (213, 14314), (217, 14401), (218, 14410), (229, 14533), (234, 14611), (235, 14650), (236, 14662), (238, 14740), (246, 14905),

Gene: Rana\_18 Start: 11676, Stop: 14963, Start Num: 9

Candidate Starts for Rana\_18:

(Start: 5 @11640 has 51 MA's), (Start: 9 @11676 has 4 MA's), (13, 11787), (19, 11898), (21, 11910), (22, 11922), (28, 11997), (31, 12033), (38, 12162), (42, 12204), (45, 12234), (46, 12240), (48, 12252), (65, 12465), (68, 12525), (74, 12699), (75, 12708), (87, 13011), (89, 13047), (93, 13107), (95, 13140), (98, 13212), (103, 13257), (105, 13275), (108, 13320), (110, 13353), (115, 13371), (124, 13446), (133, 13524), (136, 13545), (140, 13566), (145, 13608), (149, 13626), (165, 13773), (172, 13851), (175, 13875), (176, 13887), (178, 13899), (179, 13905), (182, 13944), (184, 13962), (203, 14205), (206, 14253), (210, 14307), (233, 14517), (235, 14568), (236, 14580), (241, 14754), (246, 14823), (249, 14949), (250, 14952),

Gene: RedBear\_20 Start: 11907, Stop: 15230, Start Num: 5

Candidate Starts for RedBear\_20:

(Start: 5 @11907 has 51 MA's), (13, 12054), (19, 12165), (21, 12177), (22, 12189), (28, 12264), (31, 12300), (42, 12471), (45, 12501), (46, 12507), (48, 12519), (74, 12966), (75, 12975), (87, 13278), (89, 13314), (93, 13374), (95, 13407), (96, 13440), (102, 13521), (105, 13542), (106, 13566), (108, 13587), (110, 13620), (115, 13638), (122, 13698), (133, 13791), (136, 13812), (145, 13875), (149, 13893), (163, 14019), (165, 14040), (172, 14118), (176, 14154), (178, 14166), (179, 14172), (182, 14211), (184, 14229), (199, 14412), (203, 14472), (205, 14517), (235, 14835), (236, 14847), (241, 15021), (246, 15090), (249, 15216), (250, 15219),

Gene: Rusticus\_19 Start: 11832, Stop: 15152, Start Num: 5

Candidate Starts for Rusticus\_19:

(Start: 5 @11832 has 51 MA's), (13, 11976), (19, 12087), (21, 12099), (24, 12168), (26, 12174), (30, 12195), (37, 12330), (42, 12393), (46, 12429), (47, 12432), (57, 12597), (61, 12636), (66, 12693), (74, 12888), (75, 12897), (87, 13200), (88, 13233), (93, 13296), (95, 13329), (99, 13407), (105, 13464), (106, 13488), (108, 13509), (110, 13542), (115, 13560), (118, 13596), (127, 13650), (129, 13689), (133, 13713), (142, 13779), (149, 13815), (155, 13887), (160, 13911), (161, 13917), (163, 13941), (165, 13962), (175, 14064), (176, 14076), (180, 14112), (184, 14151), (190, 14184), (200, 14355), (203, 14394), (204, 14397), (210, 14496), (212, 14517), (216, 14529), (235, 14757), (236, 14769), (241, 14943), (246, 15012), (248, 15051), (249, 15138), (250, 15141),

Gene: SarahRose\_18 Start: 11643, Stop: 14966, Start Num: 5

Candidate Starts for SarahRose\_18:

(Start: 5 @11643 has 51 MA's), (13, 11790), (19, 11901), (21, 11913), (22, 11925), (28, 12000), (31, 12036), (38, 12165), (42, 12207), (45, 12237), (46, 12243), (50, 12300), (68, 12528), (70, 12588), (75, 12711), (87, 13014), (93, 13110), (95, 13143), (103, 13260), (105, 13278), (108, 13323), (110, 13356), (115, 13374), (124, 13449), (133, 13527), (136, 13548), (145, 13611), (149, 13629), (165, 13776), (172, 13854), (175, 13878), (176, 13890), (178, 13902), (179, 13908), (182, 13947), (184, 13965), (203, 14208), (210, 14310), (219, 14352), (233, 14520), (235, 14571), (236, 14583), (241, 14757), (246, 14826), (249, 14952), (250, 14955),

Gene: Snorlax\_18 Start: 11646, Stop: 14969, Start Num: 5

Candidate Starts for Snorlax\_18:

(Start: 5 @11646 has 51 MA's), (13, 11793), (19, 11904), (21, 11916), (22, 11928), (28, 12003), (31, 12039), (38, 12168), (42, 12210), (45, 12240), (46, 12246), (50, 12303), (68, 12531), (70, 12591), (75, 12714), (87, 13017), (93, 13113), (95, 13146), (103, 13263), (105, 13281), (108, 13326), (110, 13359), (115, 13377), (124, 13452), (133, 13530), (136, 13551), (145, 13614), (149, 13632), (165, 13779), (172, 13857), (175, 13881), (176, 13893), (178, 13905), (179, 13911), (182, 13950), (184, 13968), (203, 14211), (210, 14313), (219, 14355), (233, 14523), (235, 14574), (236, 14586), (241, 14760), (246, 14829), (249, 14955), (250, 14958),

Gene: South40\_19 Start: 11907, Stop: 15230, Start Num: 5

Candidate Starts for South40\_19:

(Start: 5 @11907 has 51 MA's), (13, 12054), (19, 12165), (21, 12177), (22, 12189), (28, 12264), (31, 12300), (42, 12471), (45, 12501), (46, 12507), (48, 12519), (74, 12966), (75, 12975), (87, 13278), (89, 13314), (93, 13374), (95, 13407), (96, 13440), (102, 13521), (105, 13542), (106, 13566), (108, 13587), (110, 13620), (115, 13638), (122, 13698), (133, 13791), (136, 13812), (145, 13875), (149, 13893), (163, 14019), (165, 14040), (172, 14118), (176, 14154), (178, 14166), (179, 14172), (182, 14211), (184, 14229), (199, 14412), (203, 14472), (205, 14517), (235, 14835), (236, 14847), (241, 15021), (246, 15090), (249, 15216), (250, 15219),

Gene: SqueakyClean\_19 Start: 11767, Stop: 14964, Start Num: 6

Candidate Starts for SqueakyClean\_19:

(Start: 6 @11767 has 24 MA's), (Start: 10 @11806 has 3 MA's), (13, 11905), (14, 11926), (18, 11998), (19, 12016), (31, 12148), (32, 12160), (41, 12310), (45, 12349), (46, 12355), (47, 12358), (50, 12412),

(59, 12547), (66, 12619), (75, 12823), (81, 12931), (87, 13126), (93, 13222), (95, 13255), (99, 13333), (102, 13369), (105, 13390), (106, 13414), (108, 13435), (109, 13438), (110, 13468), (115, 13486), (119, 13525), (122, 13546), (123, 13552), (125, 13564), (141, 13633), (153, 13696), (156, 13729), (158, 13741), (176, 13915), (183, 13975), (189, 14020), (191, 14026), (205, 14224), (219, 14356), (227, 14446), (231, 14467), (235, 14575), (244, 14806), (247, 14842),

Gene: Sujidade\_19 Start: 11947, Stop: 15270, Start Num: 5

Candidate Starts for Sujidade\_19:

(Start: 5 @11947 has 51 MA's), (Start: 9 @11983 has 4 MA's), (13, 12094), (19, 12205), (21, 12217), (22, 12229), (28, 12304), (31, 12340), (38, 12469), (42, 12511), (45, 12541), (46, 12547), (48, 12559), (50, 12604), (68, 12832), (75, 13015), (89, 13354), (93, 13414), (95, 13447), (96, 13480), (102, 13561), (105, 13582), (108, 13627), (110, 13660), (115, 13678), (116, 13687), (124, 13753), (133, 13831), (136, 13852), (140, 13873), (145, 13915), (149, 13933), (165, 14080), (172, 14158), (175, 14182), (176, 14194), (178, 14206), (179, 14212), (182, 14251), (184, 14269), (203, 14512), (210, 14614), (234, 14836), (235, 14875), (236, 14887), (241, 15061), (246, 15130), (249, 15256), (250, 15259),

Gene: SunsetPointe\_18 Start: 11659, Stop: 14979, Start Num: 5

Candidate Starts for SunsetPointe\_18:

(Start: 5 @11659 has 51 MA's), (13, 11803), (19, 11914), (21, 11926), (24, 11995), (26, 12001), (30, 12022), (37, 12157), (42, 12220), (46, 12256), (47, 12259), (57, 12424), (61, 12463), (66, 12520), (75, 12724), (87, 13027), (88, 13060), (93, 13123), (95, 13156), (99, 13234), (102, 13270), (103, 13273), (105, 13291), (106, 13315), (108, 13336), (110, 13369), (115, 13387), (118, 13423), (127, 13477), (129, 13516), (133, 13540), (142, 13606), (149, 13642), (155, 13714), (160, 13738), (161, 13744), (163, 13768), (165, 13789), (175, 13891), (176, 13903), (180, 13939), (184, 13978), (190, 14011), (200, 14182), (203, 14221), (210, 14323), (212, 14344), (216, 14356), (233, 14533), (235, 14584), (236, 14596), (241, 14770), (246, 14839), (248, 14878), (249, 14965), (250, 14968),

Gene: TagePhighter\_19 Start: 11646, Stop: 14969, Start Num: 5

Candidate Starts for TagePhighter\_19:

(Start: 5 @11646 has 51 MA's), (13, 11793), (19, 11904), (21, 11916), (22, 11928), (28, 12003), (38, 12168), (42, 12210), (45, 12240), (46, 12246), (50, 12303), (68, 12531), (70, 12591), (75, 12714), (87, 13017), (93, 13113), (95, 13146), (103, 13263), (105, 13281), (108, 13326), (110, 13359), (115, 13377), (124, 13452), (133, 13530), (136, 13551), (145, 13614), (149, 13632), (165, 13779), (172, 13857), (175, 13881), (176, 13893), (178, 13905), (179, 13911), (182, 13950), (184, 13968), (203, 14211), (210, 14313), (219, 14355), (233, 14523), (235, 14574), (236, 14586), (246, 14829), (249, 14955), (250, 14958),

Gene: Thestral\_19 Start: 11634, Stop: 14933, Start Num: 6

Candidate Starts for Thestral\_19:

(Start: 6 @11634 has 24 MA's), (Start: 10 @11673 has 3 MA's), (13, 11769), (14, 11790), (15, 11832), (17, 11847), (31, 12009), (42, 12180), (46, 12216), (56, 12354), (61, 12423), (73, 12672), (75, 12684), (87, 12987), (93, 13083), (95, 13116), (98, 13188), (99, 13194), (102, 13230), (105, 13251), (106, 13275), (107, 13293), (108, 13296), (110, 13329), (115, 13347), (129, 13476), (136, 13521), (145, 13584), (147, 13590), (165, 13749), (167, 13761), (176, 13863), (184, 13938), (193, 14010), (209, 14277), (226, 14403), (229, 14427), (235, 14544), (236, 14556), (237, 14625), (238, 14634), (240, 14697), (244, 14775), (245, 14787), (246, 14799),

Gene: TinaBelcher\_18 Start: 11621, Stop: 14881, Start Num: 10

Candidate Starts for TinaBelcher\_18:

(Start: 6 @11582 has 24 MA's), (Start: 10 @11621 has 3 MA's), (13, 11717), (14, 11738), (15, 11780), (17, 11795), (31, 11957), (42, 12128), (46, 12164), (63, 12383), (65, 12389), (68, 12449), (75, 12632), (87, 12935), (93, 13031), (95, 13064), (98, 13136), (99, 13142), (104, 13190), (106, 13223), (107, 13241), (108, 13244), (110, 13277), (115, 13295), (129, 13424), (136, 13469), (145, 13532), (147,

13538), (165, 13697), (167, 13709), (176, 13811), (181, 13865), (184, 13886), (193, 13958), (209, 14225), (226, 14351), (229, 14375), (235, 14492), (236, 14504), (237, 14573), (238, 14582), (240, 14645), (244, 14723), (245, 14735), (246, 14747),

Gene: Toma\_18 Start: 11655, Stop: 14978, Start Num: 5

Candidate Starts for Toma\_18:

(Start: 5 @11655 has 51 MA's), (Start: 9 @11691 has 4 MA's), (13, 11802), (19, 11913), (21, 11925), (22, 11937), (28, 12012), (31, 12048), (38, 12177), (42, 12219), (45, 12249), (46, 12255), (48, 12267), (50, 12312), (68, 12540), (75, 12723), (89, 13062), (93, 13122), (95, 13155), (103, 13272), (105, 13290), (108, 13335), (110, 13368), (115, 13386), (124, 13461), (133, 13539), (136, 13560), (140, 13581), (145, 13623), (149, 13641), (165, 13788), (172, 13866), (175, 13890), (176, 13902), (178, 13914), (179, 13920), (182, 13959), (184, 13977), (203, 14220), (210, 14322), (234, 14544), (235, 14583), (236, 14595), (241, 14769), (246, 14838), (249, 14964), (250, 14967),

Gene: Triste\_18 Start: 11637, Stop: 14960, Start Num: 5

Candidate Starts for Triste\_18:

(Start: 5 @11637 has 51 MA's), (13, 11784), (19, 11895), (21, 11907), (22, 11919), (28, 11994), (31, 12030), (42, 12201), (45, 12231), (46, 12237), (50, 12294), (68, 12522), (70, 12582), (75, 12705), (87, 13008), (93, 13104), (95, 13137), (103, 13254), (105, 13272), (108, 13317), (110, 13350), (115, 13368), (124, 13443), (133, 13521), (136, 13542), (145, 13605), (149, 13623), (165, 13770), (172, 13848), (175, 13872), (176, 13884), (178, 13896), (179, 13902), (182, 13941), (184, 13959), (203, 14202), (210, 14304), (219, 14346), (233, 14514), (235, 14565), (236, 14577), (241, 14751), (246, 14820), (249, 14946), (250, 14949),

Gene: Triumph\_20 Start: 11576, Stop: 14881, Start Num: 6

Candidate Starts for Triumph\_20:

(Start: 6 @11576 has 24 MA's), (Start: 10 @11615 has 3 MA's), (13, 11714), (14, 11735), (18, 11807), (19, 11825), (31, 11957), (32, 11969), (41, 12119), (45, 12158), (46, 12164), (47, 12167), (50, 12221), (75, 12632), (87, 12935), (93, 13031), (95, 13064), (105, 13199), (106, 13223), (108, 13244), (109, 13247), (110, 13277), (115, 13295), (118, 13331), (133, 13448), (135, 13460), (142, 13514), (149, 13550), (165, 13697), (172, 13775), (175, 13799), (176, 13811), (182, 13868), (189, 13916), (193, 13958), (197, 14048), (216, 14264), (233, 14441), (235, 14492), (236, 14504), (240, 14645), (241, 14678), (244, 14723), (247, 14759),

Gene: TrvxScott\_17 Start: 11584, Stop: 14883, Start Num: 6

Candidate Starts for TrvxScott\_17:

(Start: 6 @11584 has 24 MA's), (Start: 10 @11623 has 3 MA's), (13, 11719), (14, 11740), (15, 11782), (17, 11797), (31, 11959), (42, 12130), (46, 12166), (75, 12634), (87, 12937), (93, 13033), (95, 13066), (98, 13138), (99, 13144), (106, 13225), (107, 13243), (108, 13246), (110, 13279), (115, 13297), (129, 13426), (136, 13471), (145, 13534), (147, 13540), (165, 13699), (167, 13711), (170, 13756), (176, 13813), (184, 13888), (186, 13894), (193, 13960), (209, 14227), (226, 14353), (229, 14377), (235, 14494), (236, 14506), (237, 14575), (238, 14584), (240, 14647), (242, 14701), (244, 14725), (246, 14749),

Gene: TuanPN\_18 Start: 11643, Stop: 14966, Start Num: 5

Candidate Starts for TuanPN\_18:

(Start: 5 @11643 has 51 MA's), (13, 11790), (19, 11901), (21, 11913), (22, 11925), (28, 12000), (31, 12036), (42, 12207), (45, 12237), (46, 12243), (48, 12255), (50, 12300), (55, 12354), (65, 12468), (68, 12528), (74, 12702), (75, 12711), (87, 13014), (89, 13050), (93, 13110), (95, 13143), (99, 13221), (103, 13260), (105, 13278), (108, 13323), (110, 13356), (115, 13374), (124, 13449), (133, 13527), (136, 13548), (140, 13569), (145, 13611), (149, 13629), (155, 13701), (165, 13776), (172, 13854), (175, 13878), (176, 13890), (178, 13902), (179, 13908), (182, 13947), (184, 13965), (203, 14208), (205, 14253), (210, 14310), (233, 14520), (235, 14571), (246, 14826), (249, 14952), (250, 14955),

Gene: Unstoppable\_18 Start: 11660, Stop: 14980, Start Num: 5

Candidate Starts for Unstoppable\_18:

(Start: 5 @11660 has 51 MA's), (13, 11804), (19, 11915), (21, 11927), (24, 11996), (26, 12002), (30, 12023), (37, 12158), (42, 12221), (46, 12257), (47, 12260), (57, 12425), (61, 12464), (66, 12521), (75, 12725), (87, 13028), (88, 13061), (93, 13124), (95, 13157), (99, 13235), (102, 13271), (103, 13274), (105, 13292), (106, 13316), (108, 13337), (110, 13370), (115, 13388), (118, 13424), (127, 13478), (129, 13517), (133, 13541), (142, 13607), (149, 13643), (155, 13715), (160, 13739), (161, 13745), (163, 13769), (165, 13790), (175, 13892), (176, 13904), (180, 13940), (184, 13979), (190, 14012), (200, 14183), (203, 14222), (210, 14324), (212, 14345), (216, 14357), (233, 14534), (235, 14585), (236, 14597), (241, 14771), (246, 14840), (248, 14879), (249, 14966), (250, 14969),

Gene: Urza\_18 Start: 11942, Stop: 15343, Start Num: 6

Candidate Starts for Urza\_18:

(Start: 6 @11942 has 24 MA's), (8, 11957), (13, 12077), (18, 12170), (19, 12188), (22, 12212), (33, 12368), (48, 12545), (50, 12590), (56, 12671), (60, 12734), (63, 12752), (69, 12875), (75, 12998), (76, 13070), (79, 13082), (84, 13211), (87, 13304), (92, 13376), (93, 13400), (97, 13475), (104, 13559), (108, 13613), (110, 13646), (112, 13652), (116, 13673), (117, 13685), (122, 13724), (125, 13742), (137, 13907), (143, 13976), (146, 13991), (149, 14006), (152, 14027), (156, 14081), (163, 14132), (165, 14153), (176, 14267), (184, 14342), (187, 14351), (195, 14465), (203, 14585), (214, 14717), (216, 14720), (223, 14771), (230, 14837), (231, 14840), (235, 14948), (237, 15029), (239, 15056), (243, 15173), (248, 15245), (249, 15332),

Gene: VieEnRose\_18 Start: 12008, Stop: 15409, Start Num: 6

Candidate Starts for VieEnRose\_18:

(Start: 6 @12008 has 24 MA's), (8, 12023), (13, 12143), (18, 12236), (19, 12254), (22, 12278), (33, 12434), (42, 12563), (48, 12611), (50, 12656), (56, 12737), (60, 12800), (63, 12818), (69, 12941), (75, 13064), (76, 13136), (79, 13148), (84, 13277), (87, 13370), (92, 13442), (93, 13466), (104, 13625), (108, 13679), (110, 13712), (112, 13718), (116, 13739), (120, 13784), (125, 13808), (131, 13874), (132, 13919), (138, 13994), (143, 14042), (146, 14057), (149, 14072), (150, 14081), (156, 14147), (163, 14198), (165, 14219), (176, 14333), (184, 14408), (187, 14417), (193, 14480), (203, 14651), (214, 14783), (216, 14786), (220, 14807), (221, 14828), (235, 15014), (236, 15026), (237, 15095), (238, 15104), (239, 15122), (243, 15239), (248, 15311), (249, 15398),

Gene: Werner\_18 Start: 11647, Stop: 14970, Start Num: 5

Candidate Starts for Werner\_18:

(Start: 5 @11647 has 51 MA's), (13, 11794), (19, 11905), (21, 11917), (22, 11929), (28, 12004), (31, 12040), (38, 12169), (42, 12211), (45, 12241), (46, 12247), (50, 12304), (68, 12532), (70, 12592), (75, 12715), (87, 13018), (93, 13114), (95, 13147), (103, 13264), (105, 13282), (108, 13327), (110, 13360), (115, 13378), (124, 13453), (133, 13531), (136, 13552), (145, 13615), (149, 13633), (165, 13780), (172, 13858), (175, 13882), (176, 13894), (178, 13906), (179, 13912), (182, 13951), (184, 13969), (203, 14212), (210, 14314), (219, 14356), (233, 14524), (235, 14575), (236, 14587), (241, 14761), (246, 14830), (249, 14956), (250, 14959),

Gene: Whatever\_18 Start: 11647, Stop: 14970, Start Num: 5

Candidate Starts for Whatever\_18:

(Start: 5 @11647 has 51 MA's), (13, 11794), (14, 11815), (19, 11905), (21, 11917), (22, 11929), (28, 12004), (31, 12040), (38, 12169), (42, 12211), (45, 12241), (46, 12247), (50, 12304), (68, 12532), (70, 12592), (75, 12715), (87, 13018), (93, 13114), (95, 13147), (103, 13264), (105, 13282), (108, 13327), (110, 13360), (115, 13378), (124, 13453), (133, 13531), (136, 13552), (145, 13615), (149, 13633), (165, 13780), (172, 13858), (175, 13882), (176, 13894), (178, 13906), (179, 13912), (182, 13951), (184, 13969), (203, 14212), (210, 14314), (219, 14356), (233, 14524), (235, 14575), (236, 14587), (241, 14761), (246, 14830), (249, 14956), (250, 14959),

Gene: Yasdni1\_18 Start: 11639, Stop: 14962, Start Num: 5

Candidate Starts for Yasdni1\_18:

(Start: 5 @11639 has 51 MA's), (13, 11786), (19, 11897), (21, 11909), (22, 11921), (28, 11996), (31, 12032), (42, 12203), (45, 12233), (46, 12239), (48, 12251), (50, 12296), (55, 12350), (65, 12464), (68, 12524), (74, 12698), (75, 12707), (87, 13010), (89, 13046), (93, 13106), (95, 13139), (99, 13217), (103, 13256), (105, 13274), (108, 13319), (110, 13352), (115, 13370), (124, 13445), (133, 13523), (136, 13544), (140, 13565), (145, 13607), (149, 13625), (155, 13697), (165, 13772), (172, 13850), (175, 13874), (176, 13886), (178, 13898), (179, 13904), (182, 13943), (184, 13961), (203, 14204), (205, 14249), (210, 14306), (233, 14516), (235, 14567), (246, 14822), (249, 14948), (250, 14951),

Gene: Zainub\_20 Start: 12120, Stop: 15311, Start Num: 6

Candidate Starts for Zainub\_20:

(Start: 6 @12120 has 24 MA's), (Start: 10 @12159 has 3 MA's), (12, 12246), (13, 12255), (14, 12276), (15, 12318), (31, 12495), (37, 12603), (39, 12633), (41, 12657), (46, 12702), (47, 12705), (50, 12759), (75, 13170), (82, 13293), (87, 13473), (90, 13536), (91, 13542), (93, 13569), (102, 13716), (105, 13737), (106, 13761), (108, 13782), (109, 13785), (110, 13815), (115, 13833), (141, 13980), (159, 14094), (160, 14097), (169, 14175), (170, 14205), (175, 14250), (176, 14262), (182, 14319), (183, 14322), (189, 14367), (191, 14373), (204, 14529), (207, 14604), (219, 14703), (224, 14769), (232, 14823), (235, 14922), (241, 15108), (242, 15129), (244, 15153), (245, 15165),

Gene: Zemlya\_19 Start: 11666, Stop: 14989, Start Num: 5

Candidate Starts for Zemlya\_19:

(Start: 5 @11666 has 51 MA's), (Start: 9 @11702 has 4 MA's), (13, 11813), (19, 11924), (21, 11936), (22, 11948), (28, 12023), (31, 12059), (38, 12188), (42, 12230), (45, 12260), (46, 12266), (48, 12278), (50, 12323), (65, 12491), (68, 12551), (74, 12725), (75, 12734), (87, 13037), (89, 13073), (92, 13109), (93, 13133), (95, 13166), (103, 13283), (105, 13301), (108, 13346), (110, 13379), (115, 13397), (124, 13472), (133, 13550), (136, 13571), (140, 13592), (145, 13634), (149, 13652), (165, 13799), (172, 13877), (175, 13901), (176, 13913), (178, 13925), (179, 13931), (182, 13970), (184, 13988), (203, 14231), (210, 14333), (235, 14594), (236, 14606), (238, 14684), (239, 14702), (241, 14780), (246, 14849), (249, 14975), (250, 14978),

Gene: phiHau3\_20 Start: 11837, Stop: 15658, Start Num: 1

Candidate Starts for phiHau3\_20:

(Start: 1 @11837 has 3 MA's), (2, 12173), (3, 12218), (4, 12311), (7, 12335), (8, 12344), (13, 12470), (16, 12554), (20, 12593), (27, 12680), (31, 12737), (35, 12830), (36, 12839), (38, 12866), (40, 12884), (43, 12917), (46, 12944), (50, 13001), (51, 13010), (62, 13157), (63, 13163), (64, 13166), (72, 13385), (75, 13412), (78, 13493), (85, 13631), (87, 13715), (93, 13811), (94, 13820), (101, 13955), (102, 13958), (104, 13970), (110, 14057), (111, 14060), (113, 14066), (134, 14231), (139, 14258), (158, 14417), (160, 14426), (165, 14477), (168, 14501), (171, 14549), (174, 14576), (176, 14591), (184, 14666), (192, 14717), (213, 15035), (222, 15089), (224, 15119), (235, 15272), (237, 15353), (238, 15362), (239, 15380), (249, 15647),