





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 200212 Report

This analysis was run 01/18/25 on database version 583.

Pham number 200212 has 77 members, 21 are drafts.

Phages represented in each track:

- Track 1 : Sashimi\_24
- Track 2 : EvePickles\_23
- Track 3 : Faja\_23
- Track 4 : P106L\_19, P106M\_19, P106C\_19
- Track 5 : P100D\_19
- Track 6 : Lauchelly\_19
- Track 7 : Attacne\_19
- Track 8 : Kubed\_19
- Track 9 : Leviosa\_19
- Track 10 : Procrass1\_19
- Track 11 : Keiki\_19, Pirate\_19
- Track 12 : P107A\_19
- Track 13 : PHL114L00\_19
- Track 14 : Moyashi\_19
- Track 15 : Cota\_19
- Track 16 : PHL071N05\_19
- Track 17 : PA6\_19
- Track 18 : P1.1\_19
- Track 19 : P101A\_19
- Track 20 : P9.1\_19
- Track 21 : LilBandit\_19
- Track 22 : ATCC29399BT\_19, ATCC29399BC\_19
- Track 23 : P104A\_19
- Track 24 : P106I\_19
- Track 25 : PHL113M01\_19, P105\_19
- Track 26 : P107C\_19
- Track 27 : MEAK\_19
- Track 28 : PAD20\_19
- Track 29 : P100A\_19
- Track 30 : SKKY\_19
- Track 31 : Solid\_19
- Track 32 : Supernova\_19
- Track 33 : PHL067M10\_19
- Track 34 : Rileysaurus\_19
- Track 35 : P100.1\_19
- Track 36 : Enoki\_19
- Track 37 : Stormborn\_19

- Track 38 : PHL060L00\_19
- Track 39 : Enochoraptor\_20
- Track 40 : PAS50\_19
- Track 41 : PHL037M02\_19
- Track 42 : PHL112N00\_19
- Track 43 : Ouroboros\_19
- Track 44 : BruceLethal\_19
- Track 45 : QueenBey\_19
- Track 46 : P106A\_19
- Track 47 : P108C\_19
- Track 48 : P104B\_19
- Track 49 : DrParker\_19
- Track 50 : PHL111M01\_19
- Track 51 : MrAK\_19
- Track 52 : Wizzo\_19
- Track 53 : Aquarius\_19
- Track 54 : PHL010M04\_19
- Track 55 : P14.4\_19
- Track 56 : Jera\_30
- Track 57 : Rasovi\_29
- Track 58 : Zanella\_29
- Track 59 : Htur\_29
- Track 60 : Elesar\_23
- Track 61 : Cole\_22
- Track 62 : AllBusiness\_23
- Track 63 : Halloweekend\_22, QuinnAvery\_24
- Track 64 : Julie\_24
- Track 65 : Ichiang\_22
- Track 66 : GUPitcher\_21
- Track 67 : Kukla\_21
- Track 68 : Maja\_21
- Track 69 : Hum25\_22
- Track 70 : Pitbull\_21
- Track 71 : ArV2\_20

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

The start number called the most often in the published annotations is 3, it was called in 41 of the 56 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- ATCC29399BC\_19, ATCC29399BT\_19, Aquarius\_19, Attacne\_19, BruceLethal\_19, Cota\_19, DrParker\_19, Enochoraptor\_20, Enoki\_19, Keiki\_19, Kubed\_19, Lauchelly\_19, Leviosa\_19, LilBandit\_19, MEAK\_19, Moyashi\_19, MrAK\_19, Ouroboros\_19, P1.1\_19, P100.1\_19, P100A\_19, P100D\_19, P101A\_19, P104A\_19, P104B\_19, P105\_19, P106A\_19, P106C\_19, P106I\_19, P106L\_19, P106M\_19, P108C\_19, P14.4\_19, P9.1\_19, PHL010M04\_19, PHL060L00\_19, PHL067M10\_19, PHL071N05\_19, PHL111M01\_19, PHL112N00\_19, PHL113M01\_19, PHL114L00\_19, Pirate\_19, Procrass1\_19, QueenBey\_19, Rileysaurus\_19, SKKY\_19, Solid\_19, Stormborn\_19, Supernova\_19, Wizzo\_19,

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

- P107A\_19, P107C\_19, PA6\_19, PAD20\_19, PAS50\_19, PHL037M02\_19,

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

- AllBusiness\_23, ArV2\_20, Cole\_22, Elesar\_23, EvePickles\_23, Faja\_23, GUPitcher\_21, Halloweekend\_22, Htur\_29, Hum25\_22, Ichiang\_22, Jera\_30, Julie\_24, Kukla\_21, Maja\_21, Pitbull\_21, QuinnAvery\_24, Rasovi\_29, Sashimi\_24, Zarella\_29,

### Summary by start number:

Start 2:

- Found in 15 of 77 ( 19.5% ) of genes in pham
- Manual Annotations of this start: 1 of 56
- Called 13.3% of time when present
- Phage (with cluster) where this start called: P107C\_19 (BU), PHL037M02\_19 (BU),

Start 3:

- Found in 57 of 77 ( 74.0% ) of genes in pham
- Manual Annotations of this start: 41 of 56
- Called 89.5% of time when present
- Phage (with cluster) where this start called: ATCC29399BC\_19 (BU), ATCC29399BT\_19 (BU), Aquarius\_19 (BU), Attacne\_19 (BU), BruceLethal\_19 (BU), Cota\_19 (BU), DrParker\_19 (BU), Enochoraptor\_20 (BU), Enoki\_19 (BU), Keiki\_19 (BU), Kubed\_19 (BU), Lauchelly\_19 (BU), Leviosa\_19 (BU), LilBandit\_19 (BU), MEAK\_19 (BU), Moyashi\_19 (BU), MrAK\_19 (BU), Ouroboros\_19 (BU), P1.1\_19 (BU), P100.1\_19 (BU), P100A\_19 (BU), P100D\_19 (BU), P101A\_19 (BU), P104A\_19 (BU), P104B\_19 (BU), P105\_19 (BU), P106A\_19 (BU), P106C\_19 (BU), P106I\_19 (BU), P106L\_19 (BU), P106M\_19 (BU), P108C\_19 (BU), P14.4\_19 (BU), P9.1\_19 (BU), PHL010M04\_19 (BU), PHL060L00\_19 (BU), PHL067M10\_19 (BU), PHL071N05\_19 (BU), PHL111M01\_19 (BU), PHL112N00\_19 (BU), PHL113M01\_19 (BU), PHL114L00\_19 (BU), Pirate\_19 (BU), Procrass1\_19 (BU), QueenBey\_19 (BU), Rileysaurus\_19 (BU), SKKY\_19 (BU), Solid\_19 (BU), Stormborn\_19 (BU), Supernova\_19 (BU), Wizzo\_19 (BU),

Start 4:

- Found in 57 of 77 ( 74.0% ) of genes in pham
- Manual Annotations of this start: 1 of 56
- Called 1.8% of time when present
- Phage (with cluster) where this start called: P107A\_19 (BU),

Start 5:

- Found in 2 of 77 ( 2.6% ) of genes in pham
- Manual Annotations of this start: 2 of 56
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Hum25\_22 (FQ), Pitbull\_21 (FQ),

Start 6:

- Found in 4 of 77 ( 5.2% ) of genes in pham
- Manual Annotations of this start: 1 of 56
- Called 100.0% of time when present

- Phage (with cluster) where this start called: AllBusiness\_23 (FF), Julie\_24 (FF), Kukla\_21 (FJ), Sashimi\_24 (AY),

#### Start 7:

- Found in 9 of 77 ( 11.7% ) of genes in pham
- Manual Annotations of this start: 6 of 56
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Cole\_22 (FF), Elesar\_23 (FF), EvePickles\_23 (AY), Faja\_23 (AY), GUPitcher\_21 (FJ), Halloweekend\_22 (FF), Ichiang\_22 (FF), Maja\_21 (FO), QuinnAvery\_24 (FF),

#### Start 8:

- Found in 1 of 77 ( 1.3% ) of genes in pham
- No Manual Annotations of this start.
- Called 100.0% of time when present
- Phage (with cluster) where this start called: ArV2\_20 (singleton),

#### Start 11:

- Found in 32 of 77 ( 41.6% ) of genes in pham
- No Manual Annotations of this start.
- Called 9.4% of time when present
- Phage (with cluster) where this start called: PA6\_19 (BU), PAD20\_19 (BU), PAS50\_19 (BU),

#### Start 14:

- Found in 52 of 77 ( 67.5% ) of genes in pham
- Manual Annotations of this start: 2 of 56
- Called 3.8% of time when present
- Phage (with cluster) where this start called: Jera\_30 (EJ), Zanella\_29 (EJ),

#### Start 15:

- Found in 2 of 77 ( 2.6% ) of genes in pham
- Manual Annotations of this start: 2 of 56
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Htur\_29 (EJ), Rasovi\_29 (EJ),

### **Summary by clusters:**

There are 8 clusters represented in this pham: FQ, singleton, EJ, BU, FF, AY, FJ, FO,

Info for manual annotations of cluster AY:

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

Info for manual annotations of cluster BU:

- Start number 2 was manually annotated 1 time for cluster BU.
- Start number 3 was manually annotated 41 times for cluster BU.
- Start number 4 was manually annotated 1 time for cluster BU.

Info for manual annotations of cluster EJ:

- Start number 14 was manually annotated 2 times for cluster EJ.
- Start number 15 was manually annotated 2 times for cluster EJ.

Info for manual annotations of cluster FF:

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

Info for manual annotations of cluster FJ:

- Start number 6 was manually annotated 1 time for cluster FJ.

Info for manual annotations of cluster FO:

- Start number 7 was manually annotated 1 time for cluster FO.

Info for manual annotations of cluster FQ:

- Start number 5 was manually annotated 2 times for cluster FQ.

### **Gene Information:**

Gene: ATCC29399BC\_19 Start: 14535, Stop: 15341, Start Num: 3

Candidate Starts for ATCC29399BC\_19:

(Start: 2 @14532 has 1 MA's), (Start: 3 @14535 has 41 MA's), (Start: 4 @14544 has 1 MA's), (10, 14589), (11, 14592), (12, 14595), (Start: 14 @14604 has 2 MA's), (18, 14619), (19, 14622), (20, 14625), (25, 14643), (29, 14658), (39, 14721), (45, 14742), (49, 14769), (51, 14790), (52, 14796), (53, 14805), (57, 14832), (69, 14895), (75, 14949), (76, 14958), (78, 14976), (91, 15039), (97, 15096), (109, 15207), (110, 15210), (112, 15216), (116, 15243), (120, 15261), (122, 15285), (123, 15300), (126, 15318),

Gene: ATCC29399BT\_19 Start: 14535, Stop: 15341, Start Num: 3

Candidate Starts for ATCC29399BT\_19:

(Start: 2 @14532 has 1 MA's), (Start: 3 @14535 has 41 MA's), (Start: 4 @14544 has 1 MA's), (10, 14589), (11, 14592), (12, 14595), (Start: 14 @14604 has 2 MA's), (18, 14619), (19, 14622), (20, 14625), (25, 14643), (29, 14658), (39, 14721), (45, 14742), (49, 14769), (51, 14790), (52, 14796), (53, 14805), (57, 14832), (69, 14895), (75, 14949), (76, 14958), (78, 14976), (91, 15039), (97, 15096), (109, 15207), (110, 15210), (112, 15216), (116, 15243), (120, 15261), (122, 15285), (123, 15300), (126, 15318),

Gene: AllBusiness\_23 Start: 18192, Stop: 18935, Start Num: 6

Candidate Starts for AllBusiness\_23:

(Start: 6 @18192 has 1 MA's), (46, 18366), (50, 18393), (67, 18510), (95, 18678), (112, 18831), (124, 18912),

Gene: Aquarius\_19 Start: 14558, Stop: 15319, Start Num: 3

Candidate Starts for Aquarius\_19:

(Start: 3 @14558 has 41 MA's), (Start: 4 @14567 has 1 MA's), (10, 14612), (11, 14615), (12, 14618), (13, 14621), (Start: 14 @14627 has 2 MA's), (16, 14636), (17, 14639), (18, 14642), (20, 14648), (25, 14666), (29, 14681), (39, 14744), (43, 14756), (48, 14783), (51, 14813), (52, 14819), (53, 14828), (56, 14846), (57, 14855), (60, 14873), (73, 14963), (76, 14981), (91, 15026), (97, 15074), (109, 15185), (110, 15188), (112, 15194), (116, 15221), (120, 15239), (122, 15263), (123, 15278), (126, 15296),

Gene: ArV2\_20 Start: 16169, Stop: 16945, Start Num: 8

Candidate Starts for ArV2\_20:

(8, 16169), (36, 16310), (44, 16343), (69, 16517), (86, 16625), (93, 16670), (100, 16763),

Gene: Attacne\_19 Start: 14541, Stop: 15347, Start Num: 3

Candidate Starts for Attacne\_19:

(Start: 3 @14541 has 41 MA's), (Start: 4 @14550 has 1 MA's), (13, 14604), (Start: 14 @14610 has 2 MA's), (16, 14619), (18, 14625), (20, 14631), (25, 14649), (29, 14664), (39, 14727), (43, 14739), (48, 14766), (51, 14796), (52, 14802), (53, 14811), (56, 14829), (57, 14838), (75, 14955), (76, 14964), (78, 14982), (91, 15045), (97, 15102), (110, 15216), (112, 15222), (115, 15246), (116, 15249), (120, 15267), (122, 15291), (123, 15306), (126, 15324),

Gene: BruceLethal\_19 Start: 14542, Stop: 15321, Start Num: 3

Candidate Starts for BruceLethal\_19:

(Start: 2 @14539 has 1 MA's), (Start: 3 @14542 has 41 MA's), (Start: 4 @14551 has 1 MA's), (10, 14596), (11, 14599), (12, 14602), (13, 14605), (Start: 14 @14611 has 2 MA's), (16, 14620), (17, 14623), (20, 14632), (25, 14650), (39, 14728), (43, 14740), (48, 14767), (49, 14776), (51, 14797), (52, 14803), (53, 14812), (75, 14956), (91, 15028), (97, 15085), (105, 15145), (109, 15187), (110, 15190), (112, 15196), (116, 15223), (120, 15241), (121, 15253), (123, 15280), (126, 15298),

Gene: Cole\_22 Start: 17696, Stop: 18433, Start Num: 7

Candidate Starts for Cole\_22:

(Start: 7 @17696 has 6 MA's), (Start: 14 @17741 has 2 MA's), (19, 17759), (24, 17777), (50, 17906), (88, 18146), (112, 18329), (123, 18410),

Gene: Cota\_19 Start: 14559, Stop: 15365, Start Num: 3

Candidate Starts for Cota\_19:

(Start: 3 @14559 has 41 MA's), (Start: 4 @14568 has 1 MA's), (11, 14616), (12, 14619), (13, 14622), (Start: 14 @14628 has 2 MA's), (16, 14637), (17, 14640), (18, 14643), (20, 14649), (25, 14667), (29, 14682), (39, 14745), (43, 14757), (49, 14793), (51, 14814), (52, 14820), (53, 14829), (57, 14856), (75, 14973), (76, 14982), (91, 15063), (97, 15120), (110, 15234), (112, 15240), (116, 15267), (120, 15285), (121, 15297), (123, 15324), (125, 15339), (127, 15348),

Gene: DrParker\_19 Start: 14592, Stop: 15398, Start Num: 3

Candidate Starts for DrParker\_19:

(Start: 3 @14592 has 41 MA's), (Start: 4 @14601 has 1 MA's), (12, 14652), (13, 14655), (Start: 14 @14661 has 2 MA's), (16, 14670), (17, 14673), (18, 14676), (20, 14682), (25, 14700), (29, 14715), (39, 14778), (43, 14790), (45, 14799), (49, 14826), (51, 14847), (52, 14853), (56, 14880), (57, 14889), (75, 15006), (76, 15015), (89, 15078), (91, 15087), (97, 15144), (105, 15213), (109, 15264), (110, 15267), (112, 15273), (116, 15300), (121, 15330), (123, 15357), (125, 15372),

Gene: Elesar\_23 Start: 18090, Stop: 18818, Start Num: 7

Candidate Starts for Elesar\_23:

(Start: 7 @18090 has 6 MA's), (Start: 14 @18135 has 2 MA's), (24, 18171), (46, 18273), (54, 18336),

Gene: Enochoraptor\_20 Start: 14537, Stop: 15343, Start Num: 3

Candidate Starts for Enochoraptor\_20:

(Start: 2 @14534 has 1 MA's), (Start: 3 @14537 has 41 MA's), (Start: 4 @14546 has 1 MA's), (11, 14594), (12, 14597), (16, 14615), (17, 14618), (18, 14621), (19, 14624), (25, 14645), (29, 14660), (39, 14723), (43, 14735), (45, 14744), (49, 14771), (51, 14792), (52, 14798), (56, 14825), (57, 14834), (60, 14852), (75, 14951), (76, 14960), (78, 14978), (97, 15089), (105, 15158), (109, 15209), (110, 15212), (112, 15218), (116, 15245), (120, 15263), (122, 15287), (123, 15302), (125, 15317), (127, 15326),

Gene: Enoki\_19 Start: 14535, Stop: 15341, Start Num: 3

Candidate Starts for Enoki\_19:

(Start: 3 @14535 has 41 MA's), (Start: 4 @14544 has 1 MA's), (12, 14595), (13, 14598), (Start: 14 @14604 has 2 MA's), (16, 14613), (18, 14619), (20, 14625), (43, 14733), (48, 14760), (49, 14769), (51, 14790), (52, 14796), (53, 14805), (56, 14823), (57, 14832), (60, 14850), (75, 14949), (76, 14958), (89, 15012), (93, 15039), (109, 15207), (110, 15210), (112, 15216), (116, 15243), (123, 15300), (125,



15315),

Gene: EvePickles\_23 Start: 17293, Stop: 18039, Start Num: 7

Candidate Starts for EvePickles\_23:

(Start: 7 @17293 has 6 MA's), (Start: 14 @17338 has 2 MA's), (19, 17356), (32, 17407), (50, 17503), (51, 17518), (67, 17617), (70, 17647), (75, 17680), (76, 17689), (98, 17842),

Gene: Faja\_23 Start: 17189, Stop: 17932, Start Num: 7

Candidate Starts for Faja\_23:

(Start: 7 @17189 has 6 MA's), (Start: 14 @17234 has 2 MA's), (19, 17252), (46, 17372), (50, 17399), (54, 17435), (62, 17504), (76, 17579), (80, 17606), (82, 17612),

Gene: GUPitcher\_21 Start: 17047, Stop: 17781, Start Num: 7

Candidate Starts for GUPitcher\_21:

(Start: 7 @17047 has 6 MA's), (Start: 14 @17092 has 2 MA's), (19, 17110), (23, 17125), (40, 17209), (46, 17230), (50, 17257), (54, 17293), (76, 17443), (123, 17758),

Gene: Halloweekend\_22 Start: 17660, Stop: 18397, Start Num: 7

Candidate Starts for Halloweekend\_22:

(Start: 7 @17660 has 6 MA's), (Start: 14 @17705 has 2 MA's), (19, 17723), (23, 17738), (46, 17843), (50, 17870), (79, 18071), (81, 18080), (101, 18224), (123, 18374),

Gene: Htur\_29 Start: 21999, Stop: 22724, Start Num: 15

Candidate Starts for Htur\_29:

(1, 21906), (Start: 15 @21999 has 2 MA's), (23, 22026), (26, 22032), (27, 22035), (32, 22062), (37, 22098), (41, 22116), (42, 22119), (47, 22143), (55, 22200), (68, 22287), (72, 22332), (95, 22473), (104, 22566), (107, 22605), (108, 22608), (111, 22623),

Gene: Hum25\_22 Start: 16282, Stop: 17019, Start Num: 5

Candidate Starts for Hum25\_22:

(Start: 5 @16282 has 2 MA's), (18, 16354), (20, 16360), (30, 16399), (50, 16504), (51, 16519), (63, 16612), (65, 16618), (75, 16690), (77, 16708), (83, 16735), (84, 16738),

Gene: Ichiang\_22 Start: 17677, Stop: 18414, Start Num: 7

Candidate Starts for Ichiang\_22:

(Start: 7 @17677 has 6 MA's), (Start: 14 @17722 has 2 MA's), (19, 17740), (23, 17755), (46, 17860), (50, 17887), (79, 18088), (81, 18097), (88, 18127), (112, 18310), (123, 18391),

Gene: Jera\_30 Start: 21056, Stop: 21766, Start Num: 14

Candidate Starts for Jera\_30:

(1, 20969), (Start: 14 @21056 has 2 MA's), (33, 21131), (37, 21158), (38, 21167), (42, 21179), (54, 21257), (55, 21260), (68, 21347), (72, 21392), (95, 21524), (107, 21647), (108, 21650), (111, 21665),

Gene: Julie\_24 Start: 18358, Stop: 19083, Start Num: 6

Candidate Starts for Julie\_24:

(Start: 6 @18358 has 1 MA's), (46, 18532), (50, 18559), (67, 18676), (95, 18844), (112, 18979), (117, 19009), (124, 19060),

Gene: Keiki\_19 Start: 14555, Stop: 15289, Start Num: 3

Candidate Starts for Keiki\_19:

(Start: 3 @14555 has 41 MA's), (Start: 4 @14564 has 1 MA's), (11, 14612), (12, 14615), (Start: 14 @14624 has 2 MA's), (16, 14633), (17, 14636), (18, 14639), (20, 14645), (43, 14753), (45, 14762), (48, 14780), (49, 14789), (51, 14810), (52, 14816), (56, 14843), (57, 14852), (60, 14870), (75, 14969), (76,

14978), (78, 14996), (97, 15035), (105, 15104), (109, 15155), (110, 15158), (112, 15164), (116, 15191), (120, 15209), (122, 15233), (123, 15248), (125, 15263),

Gene: Kubed\_19 Start: 14536, Stop: 15333, Start Num: 3

Candidate Starts for Kubed\_19:

(Start: 3 @14536 has 41 MA's), (Start: 4 @14545 has 1 MA's), (10, 14590), (11, 14593), (12, 14596), (13, 14599), (Start: 14 @14605 has 2 MA's), (16, 14614), (20, 14626), (25, 14644), (29, 14659), (43, 14734), (45, 14743), (49, 14770), (51, 14791), (52, 14797), (56, 14824), (57, 14833), (59, 14851), (64, 14896), (66, 14905), (69, 14923), (76, 14986), (78, 15004), (87, 15040), (109, 15199), (110, 15202), (112, 15208), (113, 15229), (116, 15235), (122, 15277), (123, 15292), (126, 15310), (127, 15316),

Gene: Kukla\_21 Start: 16686, Stop: 17423, Start Num: 6

Candidate Starts for Kukla\_21:

(Start: 6 @16686 has 1 MA's), (Start: 14 @16731 has 2 MA's), (20, 16752), (28, 16779), (31, 16785), (40, 16839), (46, 16860), (51, 16902), (54, 16923), (67, 17004), (74, 17055), (85, 17106), (88, 17121),

Gene: Lauchelly\_19 Start: 14562, Stop: 15368, Start Num: 3

Candidate Starts for Lauchelly\_19:

(Start: 3 @14562 has 41 MA's), (Start: 4 @14571 has 1 MA's), (11, 14619), (12, 14622), (Start: 14 @14631 has 2 MA's), (20, 14652), (25, 14670), (43, 14760), (45, 14769), (48, 14787), (49, 14796), (51, 14817), (52, 14823), (53, 14832), (56, 14850), (57, 14859), (75, 14976), (76, 14985), (78, 15003), (91, 15066), (97, 15123), (105, 15192), (109, 15234), (110, 15237), (112, 15243), (116, 15270), (120, 15288), (122, 15312), (123, 15327), (125, 15342),

Gene: Leviosa\_19 Start: 14567, Stop: 15382, Start Num: 3

Candidate Starts for Leviosa\_19:

(Start: 3 @14567 has 41 MA's), (Start: 4 @14576 has 1 MA's), (11, 14624), (12, 14627), (20, 14657), (43, 14765), (45, 14774), (49, 14801), (51, 14822), (52, 14828), (53, 14837), (56, 14855), (57, 14864), (75, 14981), (76, 14990), (78, 15008), (91, 15071), (97, 15137), (109, 15248), (110, 15251), (112, 15257), (116, 15284), (120, 15302), (122, 15326), (123, 15341), (126, 15359),

Gene: LilBandit\_19 Start: 14554, Stop: 15135, Start Num: 3

Candidate Starts for LilBandit\_19:

(Start: 3 @14554 has 41 MA's), (Start: 4 @14563 has 1 MA's), (12, 14614), (13, 14617), (Start: 14 @14623 has 2 MA's), (20, 14644), (43, 14752), (45, 14761), (48, 14779), (51, 14809), (52, 14815), (57, 14851), (60, 14869), (109, 15001), (110, 15004), (112, 15010), (116, 15037), (120, 15055), (122, 15079), (123, 15094), (125, 15109), (127, 15118),

Gene: MEAK\_19 Start: 14535, Stop: 15323, Start Num: 3

Candidate Starts for MEAK\_19:

(Start: 2 @14532 has 1 MA's), (Start: 3 @14535 has 41 MA's), (Start: 4 @14544 has 1 MA's), (13, 14598), (Start: 14 @14604 has 2 MA's), (18, 14619), (20, 14625), (25, 14643), (35, 14697), (43, 14733), (45, 14742), (48, 14760), (49, 14769), (51, 14790), (52, 14796), (53, 14805), (56, 14823), (57, 14832), (75, 14931), (76, 14940), (91, 15021), (97, 15069), (109, 15189), (110, 15192), (112, 15198), (116, 15225), (122, 15267), (123, 15282), (126, 15300),

Gene: Maja\_21 Start: 16955, Stop: 17737, Start Num: 7

Candidate Starts for Maja\_21:

(Start: 7 @16955 has 6 MA's), (Start: 14 @17000 has 2 MA's), (19, 17018), (46, 17138), (50, 17165), (54, 17201), (100, 17534),

Gene: Moyashi\_19 Start: 14593, Stop: 15417, Start Num: 3

Candidate Starts for Moyashi\_19:

(Start: 3 @14593 has 41 MA's), (Start: 4 @14602 has 1 MA's), (11, 14650), (12, 14653), (13, 14656), (16, 14671), (18, 14677), (20, 14683), (25, 14701), (29, 14716), (39, 14779), (45, 14800), (49, 14827), (51, 14848), (52, 14854), (53, 14863), (56, 14881), (57, 14890), (75, 15007), (76, 15016), (89, 15088), (91, 15097), (97, 15154), (105, 15223), (109, 15283), (112, 15292), (116, 15319), (121, 15349), (122, 15361), (123, 15376), (125, 15391),

Gene: MrAK\_19 Start: 14604, Stop: 15419, Start Num: 3

Candidate Starts for MrAK\_19:

(Start: 3 @14604 has 41 MA's), (Start: 4 @14613 has 1 MA's), (13, 14667), (20, 14694), (25, 14712), (29, 14727), (39, 14790), (43, 14802), (45, 14811), (49, 14838), (51, 14859), (52, 14865), (56, 14892), (57, 14901), (75, 15018), (76, 15027), (93, 15117), (102, 15210), (109, 15285), (112, 15294), (116, 15321), (122, 15363), (123, 15378), (125, 15393),

Gene: Ouroboros\_19 Start: 14536, Stop: 15342, Start Num: 3

Candidate Starts for Ouroboros\_19:

(Start: 2 @14533 has 1 MA's), (Start: 3 @14536 has 41 MA's), (Start: 4 @14545 has 1 MA's), (12, 14596), (13, 14599), (16, 14614), (17, 14617), (18, 14620), (19, 14623), (20, 14626), (25, 14644), (43, 14734), (45, 14743), (49, 14770), (51, 14791), (52, 14797), (53, 14806), (56, 14824), (57, 14833), (75, 14950), (76, 14959), (78, 14977), (91, 15040), (97, 15097), (109, 15208), (110, 15211), (112, 15217), (116, 15244), (120, 15262), (122, 15286), (123, 15301), (126, 15319),

Gene: P1.1\_19 Start: 14561, Stop: 15376, Start Num: 3

Candidate Starts for P1.1\_19:

(Start: 3 @14561 has 41 MA's), (Start: 4 @14570 has 1 MA's), (12, 14621), (13, 14624), (16, 14639), (18, 14645), (19, 14648), (21, 14654), (25, 14669), (29, 14684), (39, 14747), (43, 14759), (49, 14795), (51, 14816), (52, 14822), (56, 14849), (57, 14858), (60, 14876), (70, 14933), (75, 14966), (76, 14975), (91, 15056), (97, 15113), (109, 15242), (110, 15245), (112, 15251), (116, 15278), (122, 15320), (123, 15335), (126, 15353),

Gene: P100.1\_19 Start: 14565, Stop: 15389, Start Num: 3

Candidate Starts for P100.1\_19:

(Start: 3 @14565 has 41 MA's), (Start: 4 @14574 has 1 MA's), (12, 14625), (13, 14628), (Start: 14 @14634 has 2 MA's), (16, 14643), (17, 14646), (18, 14649), (20, 14655), (43, 14763), (45, 14772), (48, 14790), (51, 14820), (52, 14826), (56, 14853), (75, 14979), (76, 14988), (78, 15006), (89, 15060), (91, 15069), (97, 15126), (105, 15195), (109, 15255), (112, 15264), (116, 15291), (121, 15321), (122, 15333), (123, 15348), (125, 15363),

Gene: P100A\_19 Start: 14565, Stop: 15362, Start Num: 3

Candidate Starts for P100A\_19:

(Start: 3 @14565 has 41 MA's), (Start: 4 @14574 has 1 MA's), (12, 14625), (13, 14628), (16, 14643), (17, 14646), (18, 14649), (20, 14655), (25, 14673), (29, 14688), (45, 14772), (49, 14799), (51, 14820), (52, 14826), (53, 14835), (57, 14862), (75, 14979), (76, 14988), (78, 15006), (97, 15117), (109, 15228), (110, 15231), (112, 15237), (116, 15264), (122, 15306), (123, 15321), (125, 15336),

Gene: P100D\_19 Start: 14551, Stop: 15339, Start Num: 3

Candidate Starts for P100D\_19:

(Start: 3 @14551 has 41 MA's), (Start: 4 @14560 has 1 MA's), (11, 14608), (12, 14611), (Start: 14 @14620 has 2 MA's), (16, 14629), (18, 14635), (20, 14641), (34, 14704), (39, 14737), (43, 14749), (45, 14758), (48, 14776), (49, 14785), (51, 14806), (52, 14812), (53, 14821), (56, 14839), (57, 14848), (75, 14965), (76, 14974), (78, 14992), (91, 15055), (97, 15103), (103, 15163), (109, 15205), (110, 15208), (112, 15214), (116, 15241), (120, 15259), (123, 15298), (125, 15313), (126, 15316),

Gene: P101A\_19 Start: 14557, Stop: 15363, Start Num: 3

Candidate Starts for P101A\_19:

(Start: 3 @14557 has 41 MA's), (Start: 4 @14566 has 1 MA's), (11, 14614), (12, 14617), (Start: 14 @14626 has 2 MA's), (16, 14635), (20, 14647), (43, 14755), (45, 14764), (49, 14791), (51, 14812), (52, 14818), (56, 14845), (57, 14854), (75, 14971), (76, 14980), (78, 14998), (91, 15061), (97, 15118), (109, 15229), (110, 15232), (112, 15238), (116, 15265), (122, 15307), (123, 15322), (125, 15337),

Gene: P104A\_19 Start: 14538, Stop: 15128, Start Num: 3

Candidate Starts for P104A\_19:

(Start: 3 @14538 has 41 MA's), (Start: 4 @14547 has 1 MA's), (13, 14601), (Start: 14 @14607 has 2 MA's), (16, 14616), (17, 14619), (18, 14622), (20, 14628), (29, 14661), (43, 14736), (48, 14763), (51, 14793), (52, 14799), (53, 14808), (56, 14826), (75, 14916), (76, 14925), (78, 14943), (109, 14994), (110, 14997), (112, 15003), (116, 15030), (120, 15048), (122, 15072), (123, 15087), (125, 15102), (127, 15111),

Gene: P104B\_19 Start: 14554, Stop: 15360, Start Num: 3

Candidate Starts for P104B\_19:

(Start: 3 @14554 has 41 MA's), (Start: 4 @14563 has 1 MA's), (11, 14611), (12, 14614), (13, 14617), (Start: 14 @14623 has 2 MA's), (16, 14632), (17, 14635), (18, 14638), (20, 14644), (25, 14662), (29, 14677), (43, 14752), (45, 14761), (49, 14788), (52, 14815), (53, 14824), (56, 14842), (57, 14851), (75, 14968), (76, 14977), (91, 15058), (97, 15106), (109, 15226), (110, 15229), (112, 15235), (116, 15262), (120, 15280), (122, 15304), (123, 15319),

Gene: P105\_19 Start: 14475, Stop: 15299, Start Num: 3

Candidate Starts for P105\_19:

(Start: 3 @14475 has 41 MA's), (Start: 4 @14484 has 1 MA's), (13, 14538), (16, 14553), (18, 14559), (20, 14565), (29, 14598), (39, 14661), (43, 14673), (45, 14682), (49, 14709), (51, 14730), (52, 14736), (56, 14763), (57, 14772), (60, 14790), (75, 14889), (76, 14898), (89, 14952), (93, 14979), (109, 15165), (110, 15168), (112, 15174), (116, 15201), (122, 15243), (123, 15258), (125, 15273),

Gene: P106A\_19 Start: 14582, Stop: 15406, Start Num: 3

Candidate Starts for P106A\_19:

(Start: 3 @14582 has 41 MA's), (Start: 4 @14591 has 1 MA's), (12, 14642), (13, 14645), (Start: 14 @14651 has 2 MA's), (16, 14660), (17, 14663), (18, 14666), (20, 14672), (43, 14780), (45, 14789), (48, 14807), (51, 14837), (52, 14843), (56, 14870), (57, 14879), (60, 14897), (75, 14996), (76, 15005), (78, 15023), (97, 15116), (99, 15170), (109, 15272), (112, 15281), (116, 15308), (121, 15338), (123, 15365), (125, 15380),

Gene: P106C\_19 Start: 14576, Stop: 15382, Start Num: 3

Candidate Starts for P106C\_19:

(Start: 2 @14573 has 1 MA's), (Start: 3 @14576 has 41 MA's), (Start: 4 @14585 has 1 MA's), (11, 14633), (13, 14639), (Start: 14 @14645 has 2 MA's), (16, 14654), (17, 14657), (18, 14660), (20, 14666), (25, 14684), (29, 14699), (39, 14762), (43, 14774), (48, 14801), (51, 14831), (52, 14837), (53, 14846), (56, 14864), (57, 14873), (58, 14882), (75, 14999), (76, 15008), (78, 15026), (80, 15035), (91, 15089), (97, 15137), (109, 15248), (110, 15251), (112, 15257), (116, 15284), (120, 15302), (122, 15326), (123, 15341), (126, 15359),

Gene: P106I\_19 Start: 14576, Stop: 15211, Start Num: 3

Candidate Starts for P106I\_19:

(Start: 2 @14573 has 1 MA's), (Start: 3 @14576 has 41 MA's), (Start: 4 @14585 has 1 MA's), (11, 14633), (13, 14639), (Start: 14 @14645 has 2 MA's), (16, 14654), (17, 14657), (18, 14660), (20, 14666), (25, 14684), (29, 14699), (39, 14762), (43, 14774), (48, 14801), (51, 14831), (52, 14837), (53, 14846), (56, 14864), (57, 14873), (58, 14882), (75, 14999), (76, 15008), (78, 15026), (109, 15077), (110, 15080), (112, 15086), (116, 15113), (120, 15131), (122, 15155), (123, 15170), (126, 15188),

Gene: P106L\_19 Start: 14576, Stop: 15382, Start Num: 3

Candidate Starts for P106L\_19:

(Start: 2 @14573 has 1 MA's), (Start: 3 @14576 has 41 MA's), (Start: 4 @14585 has 1 MA's), (11, 14633), (13, 14639), (Start: 14 @14645 has 2 MA's), (16, 14654), (17, 14657), (18, 14660), (20, 14666), (25, 14684), (29, 14699), (39, 14762), (43, 14774), (48, 14801), (51, 14831), (52, 14837), (53, 14846), (56, 14864), (57, 14873), (58, 14882), (75, 14999), (76, 15008), (78, 15026), (80, 15035), (91, 15089), (97, 15137), (109, 15248), (110, 15251), (112, 15257), (116, 15284), (120, 15302), (122, 15326), (123, 15341), (126, 15359),

Gene: P106M\_19 Start: 14576, Stop: 15382, Start Num: 3

Candidate Starts for P106M\_19:

(Start: 2 @14573 has 1 MA's), (Start: 3 @14576 has 41 MA's), (Start: 4 @14585 has 1 MA's), (11, 14633), (13, 14639), (Start: 14 @14645 has 2 MA's), (16, 14654), (17, 14657), (18, 14660), (20, 14666), (25, 14684), (29, 14699), (39, 14762), (43, 14774), (48, 14801), (51, 14831), (52, 14837), (53, 14846), (56, 14864), (57, 14873), (58, 14882), (75, 14999), (76, 15008), (78, 15026), (80, 15035), (91, 15089), (97, 15137), (109, 15248), (110, 15251), (112, 15257), (116, 15284), (120, 15302), (122, 15326), (123, 15341), (126, 15359),

Gene: P107A\_19 Start: 14571, Stop: 15377, Start Num: 4

Candidate Starts for P107A\_19:

(Start: 3 @14562 has 41 MA's), (Start: 4 @14571 has 1 MA's), (11, 14619), (12, 14622), (13, 14625), (Start: 14 @14631 has 2 MA's), (16, 14640), (20, 14652), (25, 14670), (29, 14685), (43, 14760), (45, 14769), (49, 14796), (51, 14817), (52, 14823), (53, 14832), (56, 14850), (57, 14859), (75, 14976), (76, 14985), (97, 15132), (103, 15192), (109, 15243), (110, 15246), (112, 15252), (116, 15279), (120, 15297), (122, 15321), (123, 15336), (126, 15354),

Gene: P107C\_19 Start: 14532, Stop: 15341, Start Num: 2

Candidate Starts for P107C\_19:

(Start: 2 @14532 has 1 MA's), (Start: 3 @14535 has 41 MA's), (Start: 4 @14544 has 1 MA's), (10, 14589), (11, 14592), (12, 14595), (Start: 14 @14604 has 2 MA's), (18, 14619), (19, 14622), (20, 14625), (25, 14643), (29, 14658), (39, 14721), (45, 14742), (49, 14769), (51, 14790), (52, 14796), (53, 14805), (57, 14832), (69, 14895), (75, 14949), (76, 14958), (78, 14976), (91, 15039), (97, 15096), (109, 15207), (110, 15210), (112, 15216), (116, 15243), (120, 15261), (122, 15285), (123, 15300), (126, 15318),

Gene: P108C\_19 Start: 14559, Stop: 15365, Start Num: 3

Candidate Starts for P108C\_19:

(Start: 3 @14559 has 41 MA's), (Start: 4 @14568 has 1 MA's), (11, 14616), (12, 14619), (13, 14622), (Start: 14 @14628 has 2 MA's), (16, 14637), (18, 14643), (20, 14649), (25, 14667), (43, 14757), (45, 14766), (49, 14793), (51, 14814), (52, 14820), (56, 14847), (61, 14901), (75, 14973), (76, 14982), (89, 15054), (91, 15063), (97, 15120), (109, 15231), (110, 15234), (112, 15240), (116, 15267), (120, 15285), (122, 15309), (123, 15324), (126, 15342),

Gene: P14.4\_19 Start: 14550, Stop: 15338, Start Num: 3

Candidate Starts for P14.4\_19:

(Start: 3 @14550 has 41 MA's), (Start: 4 @14559 has 1 MA's), (13, 14613), (Start: 14 @14619 has 2 MA's), (16, 14628), (17, 14631), (18, 14634), (20, 14640), (25, 14658), (43, 14748), (48, 14775), (51, 14805), (52, 14811), (75, 14964), (76, 14973), (78, 14991), (80, 15000), (91, 15054), (97, 15102), (109, 15204), (110, 15207), (112, 15213), (116, 15240), (120, 15258), (122, 15282), (123, 15297), (126, 15315),

Gene: P9.1\_19 Start: 14545, Stop: 15351, Start Num: 3

Candidate Starts for P9.1\_19:

(Start: 3 @14545 has 41 MA's), (Start: 4 @14554 has 1 MA's), (13, 14608), (Start: 14 @14614 has 2 MA's), (16, 14623), (18, 14629), (19, 14632), (21, 14638), (25, 14653), (29, 14668), (39, 14731), (43, 14743), (48, 14770), (51, 14800), (52, 14806), (56, 14833), (57, 14842), (60, 14860), (61, 14887), (75, 14959), (76, 14968), (78, 14986), (80, 14995), (91, 15049), (97, 15115), (105, 15175), (109, 15217), (110, 15220), (112, 15226), (116, 15253), (120, 15271), (123, 15310), (125, 15325), (127, 15334),

Gene: PA6\_19 Start: 14630, Stop: 15319, Start Num: 11

Candidate Starts for PA6\_19:

(Start: 3 @14573 has 41 MA's), (Start: 4 @14582 has 1 MA's), (11, 14630), (12, 14633), (Start: 14 @14642 has 2 MA's), (16, 14651), (18, 14657), (20, 14663), (25, 14681), (43, 14771), (45, 14780), (49, 14807), (51, 14828), (52, 14834), (56, 14861), (57, 14870), (61, 14915), (71, 14963), (75, 14987), (76, 14996), (78, 15014), (87, 15050), (91, 15059), (97, 15116), (118, 15248), (119, 15254),

Gene: PAD20\_19 Start: 14599, Stop: 15339, Start Num: 11

Candidate Starts for PAD20\_19:

(Start: 3 @14542 has 41 MA's), (Start: 4 @14551 has 1 MA's), (11, 14599), (13, 14605), (Start: 14 @14611 has 2 MA's), (16, 14620), (17, 14623), (18, 14626), (20, 14632), (22, 14641), (25, 14650), (29, 14665), (39, 14728), (43, 14740), (49, 14776), (51, 14797), (52, 14803), (56, 14830), (57, 14839), (75, 14956), (76, 14965), (78, 14983), (80, 14992), (90, 15031), (92, 15052), (96, 15091), (106, 15163), (109, 15205), (112, 15214), (116, 15241), (120, 15259), (122, 15283), (123, 15298), (125, 15313), (127, 15322),

Gene: PAS50\_19 Start: 14607, Stop: 15269, Start Num: 11

Candidate Starts for PAS50\_19:

(Start: 3 @14550 has 41 MA's), (Start: 4 @14559 has 1 MA's), (9, 14589), (11, 14607), (13, 14613), (16, 14628), (18, 14634), (20, 14640), (29, 14673), (39, 14736), (43, 14748), (45, 14757), (49, 14784), (51, 14805), (52, 14811), (56, 14838), (57, 14847), (75, 14937), (76, 14946), (78, 14964), (91, 15027), (114, 15195), (118, 15198), (119, 15204),

Gene: PHL010M04\_19 Start: 14541, Stop: 15347, Start Num: 3

Candidate Starts for PHL010M04\_19:

(Start: 3 @14541 has 41 MA's), (Start: 4 @14550 has 1 MA's), (10, 14595), (11, 14598), (12, 14601), (13, 14604), (16, 14619), (18, 14625), (20, 14631), (25, 14649), (29, 14664), (39, 14727), (43, 14739), (45, 14748), (49, 14775), (52, 14802), (61, 14883), (75, 14955), (76, 14964), (78, 14982), (91, 15045), (97, 15093), (109, 15213), (110, 15216), (112, 15222), (116, 15249), (121, 15279), (123, 15306), (126, 15324), (127, 15330),

Gene: PHL037M02\_19 Start: 14540, Stop: 15331, Start Num: 2

Candidate Starts for PHL037M02\_19:

(Start: 2 @14540 has 1 MA's), (Start: 3 @14543 has 41 MA's), (Start: 4 @14552 has 1 MA's), (12, 14603), (13, 14606), (Start: 14 @14612 has 2 MA's), (16, 14621), (18, 14627), (20, 14633), (25, 14651), (43, 14741), (45, 14750), (48, 14768), (51, 14798), (52, 14804), (53, 14813), (57, 14840), (75, 14957), (76, 14966), (78, 14984), (97, 15086), (109, 15197), (110, 15200), (112, 15206), (116, 15233), (120, 15251), (122, 15275), (123, 15290), (125, 15305), (126, 15308),

Gene: PHL060L00\_19 Start: 14561, Stop: 15151, Start Num: 3

Candidate Starts for PHL060L00\_19:

(Start: 3 @14561 has 41 MA's), (Start: 4 @14570 has 1 MA's), (12, 14621), (13, 14624), (Start: 14 @14630 has 2 MA's), (16, 14639), (17, 14642), (18, 14645), (20, 14651), (43, 14759), (45, 14768), (48, 14786), (51, 14816), (52, 14822), (56, 14849), (97, 14888), (105, 14957), (109, 15017), (112, 15026), (116, 15053), (121, 15083), (122, 15095), (123, 15110), (125, 15125),

Gene: PHL067M10\_19 Start: 14524, Stop: 15339, Start Num: 3

Candidate Starts for PHL067M10\_19:

(Start: 3 @14524 has 41 MA's), (Start: 4 @14533 has 1 MA's), (11, 14581), (12, 14584), (13, 14587), (Start: 14 @14593 has 2 MA's), (16, 14602), (18, 14608), (20, 14614), (25, 14632), (29, 14647), (39, 14710), (43, 14722), (45, 14731), (49, 14758), (51, 14779), (52, 14785), (56, 14812), (57, 14821), (60, 14839), (75, 14938), (76, 14947), (78, 14965), (89, 15019), (91, 15028), (97, 15094), (109, 15205), (110, 15208), (112, 15214), (116, 15241), (120, 15259), (123, 15298), (125, 15313), (127, 15322),

Gene: PHL071N05\_19 Start: 14549, Stop: 15355, Start Num: 3

Candidate Starts for PHL071N05\_19:

(Start: 3 @14549 has 41 MA's), (Start: 4 @14558 has 1 MA's), (11, 14606), (12, 14609), (16, 14627), (18, 14633), (20, 14639), (25, 14657), (43, 14747), (45, 14756), (49, 14783), (51, 14804), (52, 14810), (53, 14819), (56, 14837), (57, 14846), (60, 14864), (75, 14963), (76, 14972), (78, 14990), (97, 15110), (109, 15221), (110, 15224), (112, 15230), (116, 15257), (120, 15275), (122, 15299), (123, 15314), (126, 15332),

Gene: PHL111M01\_19 Start: 14544, Stop: 15341, Start Num: 3

Candidate Starts for PHL111M01\_19:

(Start: 3 @14544 has 41 MA's), (Start: 4 @14553 has 1 MA's), (13, 14607), (16, 14622), (18, 14628), (20, 14634), (29, 14667), (39, 14730), (43, 14742), (45, 14751), (49, 14778), (51, 14799), (52, 14805), (56, 14832), (57, 14841), (75, 14958), (76, 14967), (89, 15030), (102, 15123), (110, 15210), (112, 15216), (116, 15243), (122, 15285), (123, 15300), (126, 15318),

Gene: PHL112N00\_19 Start: 14546, Stop: 15361, Start Num: 3

Candidate Starts for PHL112N00\_19:

(Start: 3 @14546 has 41 MA's), (Start: 4 @14555 has 1 MA's), (20, 14636), (25, 14654), (29, 14669), (39, 14732), (43, 14744), (45, 14753), (49, 14780), (51, 14801), (52, 14807), (56, 14834), (57, 14843), (75, 14960), (76, 14969), (78, 14987), (91, 15050), (97, 15107), (105, 15176), (109, 15227), (110, 15230), (112, 15236), (116, 15263), (121, 15293), (122, 15305), (123, 15320), (125, 15335), (127, 15344),

Gene: PHL113M01\_19 Start: 14579, Stop: 15385, Start Num: 3

Candidate Starts for PHL113M01\_19:

(Start: 3 @14579 has 41 MA's), (Start: 4 @14588 has 1 MA's), (13, 14642), (16, 14657), (18, 14663), (20, 14669), (29, 14702), (39, 14765), (43, 14777), (45, 14786), (49, 14813), (51, 14834), (52, 14840), (56, 14867), (57, 14876), (60, 14894), (75, 14993), (76, 15002), (89, 15056), (93, 15083), (109, 15251), (110, 15254), (112, 15260), (116, 15287), (122, 15329), (123, 15344), (125, 15359),

Gene: PHL114L00\_19 Start: 14540, Stop: 15355, Start Num: 3

Candidate Starts for PHL114L00\_19:

(Start: 2 @14537 has 1 MA's), (Start: 3 @14540 has 41 MA's), (Start: 4 @14549 has 1 MA's), (12, 14600), (13, 14603), (20, 14630), (25, 14648), (29, 14663), (45, 14747), (48, 14765), (51, 14795), (52, 14801), (57, 14837), (61, 14882), (75, 14954), (76, 14963), (78, 14981), (93, 15053), (105, 15170), (109, 15221), (110, 15224), (112, 15230), (116, 15257), (120, 15275), (122, 15299), (123, 15314), (125, 15329), (127, 15338),

Gene: Pirate\_19 Start: 14540, Stop: 15274, Start Num: 3

Candidate Starts for Pirate\_19:

(Start: 3 @14540 has 41 MA's), (Start: 4 @14549 has 1 MA's), (11, 14597), (12, 14600), (Start: 14 @14609 has 2 MA's), (16, 14618), (17, 14621), (18, 14624), (20, 14630), (43, 14738), (45, 14747), (48, 14765), (49, 14774), (51, 14795), (52, 14801), (56, 14828), (57, 14837), (60, 14855), (75, 14954), (76, 14963), (78, 14981), (97, 15020), (105, 15089), (109, 15140), (110, 15143), (112, 15149), (116, 15176), (120, 15194), (122, 15218), (123, 15233), (125, 15248),

Gene: Pitbull\_21 Start: 15912, Stop: 16649, Start Num: 5

Candidate Starts for Pitbull\_21:

(Start: 5 @15912 has 2 MA's), (18, 15984), (20, 15990), (30, 16029), (50, 16134), (51, 16149), (63, 16242), (65, 16248), (75, 16320), (76, 16329), (83, 16365), (84, 16368),

Gene: Procrass1\_19 Start: 14547, Stop: 15344, Start Num: 3

Candidate Starts for Procrass1\_19:

(Start: 3 @14547 has 41 MA's), (Start: 4 @14556 has 1 MA's), (11, 14604), (12, 14607), (Start: 14 @14616 has 2 MA's), (16, 14625), (20, 14637), (25, 14655), (39, 14733), (43, 14745), (49, 14781), (51, 14802), (52, 14808), (56, 14835), (57, 14844), (60, 14862), (71, 14937), (75, 14961), (76, 14970), (78, 14988), (91, 15051), (97, 15099), (105, 15168), (109, 15210), (110, 15213), (112, 15219), (116, 15246), (122, 15288), (123, 15303), (126, 15321),

Gene: QueenBey\_19 Start: 14541, Stop: 15347, Start Num: 3

Candidate Starts for QueenBey\_19:

(Start: 2 @14538 has 1 MA's), (Start: 3 @14541 has 41 MA's), (Start: 4 @14550 has 1 MA's), (13, 14604), (Start: 14 @14610 has 2 MA's), (16, 14619), (18, 14625), (21, 14634), (25, 14649), (29, 14664), (43, 14739), (45, 14748), (49, 14775), (51, 14796), (52, 14802), (56, 14829), (57, 14838), (75, 14955), (76, 14964), (78, 14982), (91, 15045), (97, 15102), (109, 15213), (110, 15216), (112, 15222), (116, 15249), (120, 15267), (122, 15291), (123, 15306), (125, 15321), (127, 15330),

Gene: QuinnAvery\_24 Start: 18034, Stop: 18780, Start Num: 7

Candidate Starts for QuinnAvery\_24:

(Start: 7 @18034 has 6 MA's), (Start: 14 @18079 has 2 MA's), (19, 18097), (23, 18112), (46, 18217), (50, 18244), (79, 18445), (81, 18454), (101, 18607), (123, 18757),

Gene: Rasovi\_29 Start: 21999, Stop: 22724, Start Num: 15

Candidate Starts for Rasovi\_29:

(1, 21906), (Start: 15 @21999 has 2 MA's), (23, 22026), (26, 22032), (32, 22062), (37, 22098), (41, 22116), (42, 22119), (47, 22143), (55, 22200), (68, 22287), (72, 22332), (95, 22473), (104, 22566), (107, 22605), (108, 22608), (111, 22623),

Gene: Rileysaurus\_19 Start: 14544, Stop: 15359, Start Num: 3

Candidate Starts for Rileysaurus\_19:

(Start: 3 @14544 has 41 MA's), (Start: 4 @14553 has 1 MA's), (12, 14604), (13, 14607), (Start: 14 @14613 has 2 MA's), (20, 14634), (25, 14652), (43, 14742), (45, 14751), (48, 14769), (51, 14799), (52, 14805), (53, 14814), (56, 14832), (57, 14841), (75, 14958), (76, 14967), (78, 14985), (97, 15114), (109, 15225), (110, 15228), (112, 15234), (116, 15261), (120, 15279), (122, 15303), (123, 15318), (126, 15336),

Gene: SKKY\_19 Start: 14598, Stop: 15227, Start Num: 3

Candidate Starts for SKKY\_19:

(Start: 3 @14598 has 41 MA's), (Start: 4 @14607 has 1 MA's), (10, 14652), (11, 14655), (12, 14658), (13, 14661), (16, 14676), (18, 14682), (20, 14688), (25, 14706), (39, 14784), (43, 14796), (45, 14805), (51, 14853), (52, 14859), (53, 14868), (57, 14895), (75, 15012), (76, 15021), (78, 15039), (97, 15150),

Gene: Sashimi\_24 Start: 17313, Stop: 18059, Start Num: 6

Candidate Starts for Sashimi\_24:

(Start: 6 @17313 has 1 MA's), (Start: 14 @17358 has 2 MA's), (19, 17376), (20, 17379), (28, 17406), (40, 17466), (46, 17487), (51, 17529), (54, 17550), (74, 17682), (85, 17733), (88, 17748), (94, 17787),

Gene: Solid\_19 Start: 14535, Stop: 15341, Start Num: 3



Candidate Starts for Solid\_19:

(Start: 3 @14535 has 41 MA's), (Start: 4 @14544 has 1 MA's), (11, 14592), (12, 14595), (13, 14598), (Start: 14 @14604 has 2 MA's), (16, 14613), (17, 14616), (18, 14619), (20, 14625), (25, 14643), (39, 14721), (43, 14733), (51, 14790), (52, 14796), (56, 14823), (57, 14832), (75, 14949), (76, 14958), (78, 14976), (80, 14985), (91, 15039), (97, 15096), (109, 15207), (110, 15210), (112, 15216), (116, 15243), (120, 15261), (122, 15285), (123, 15300),

Gene: Stormborn\_19 Start: 14562, Stop: 15086, Start Num: 3

Candidate Starts for Stormborn\_19:

(Start: 2 @14559 has 1 MA's), (Start: 3 @14562 has 41 MA's), (Start: 4 @14571 has 1 MA's), (11, 14619), (12, 14622), (13, 14625), (16, 14640), (18, 14646), (20, 14652), (25, 14670), (29, 14685), (43, 14760), (45, 14769), (48, 14787), (51, 14817), (52, 14823), (53, 14832), (56, 14850), (76, 14985), (78, 15003),

Gene: Supernova\_19 Start: 14570, Stop: 15376, Start Num: 3

Candidate Starts for Supernova\_19:

(Start: 3 @14570 has 41 MA's), (Start: 4 @14579 has 1 MA's), (13, 14633), (16, 14648), (18, 14654), (20, 14660), (29, 14693), (39, 14756), (43, 14768), (45, 14777), (49, 14804), (51, 14825), (52, 14831), (56, 14858), (57, 14867), (75, 14984), (76, 14993), (89, 15047), (93, 15074), (109, 15242), (110, 15245), (112, 15251), (116, 15278), (122, 15320), (123, 15335), (125, 15350),

Gene: Wizzo\_19 Start: 14571, Stop: 15386, Start Num: 3

Candidate Starts for Wizzo\_19:

(Start: 3 @14571 has 41 MA's), (Start: 4 @14580 has 1 MA's), (12, 14631), (13, 14634), (Start: 14 @14640 has 2 MA's), (16, 14649), (17, 14652), (18, 14655), (20, 14661), (25, 14679), (29, 14694), (39, 14757), (43, 14769), (49, 14805), (51, 14826), (52, 14832), (56, 14859), (57, 14868), (75, 14976), (76, 14985), (78, 15003), (91, 15066), (97, 15114), (109, 15252), (110, 15255), (112, 15261), (116, 15288), (121, 15318), (122, 15330), (123, 15345), (126, 15363),

Gene: Zanella\_29 Start: 21811, Stop: 22521, Start Num: 14

Candidate Starts for Zanella\_29:

(1, 21724), (Start: 14 @21811 has 2 MA's), (37, 21913), (38, 21922), (42, 21934), (54, 22012), (55, 22015), (68, 22102), (72, 22147), (95, 22279), (107, 22402), (108, 22405), (111, 22420),