



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 194002 Report

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

Pham number 194002 has 65 members, 12 are drafts.

Phages represented in each track:

- Track 1 : Peregrin\_29
- Track 2 : Weasels2\_31
- Track 3 : Grayson\_31
- Track 4 : Dorin\_11
- Track 5 : Francesca\_10
- Track 6 : Amore2\_52, Austin\_52
- Track 7 : GTE7\_40, GMA7\_41, HayZem\_51
- Track 8 : Dakiti\_51, Chelms\_50
- Track 9 : Adgers\_51
- Track 10 : Hotorobo\_49
- Track 11 : SteveFrench\_49, Diabla\_53, RoyalG\_50
- Track 12 : CinnamonToast\_55
- Track 13 : Sombrero\_50, Boneham\_53, FelixAlejandro\_54, Butterball\_53
- Track 14 : BirksAndSocks\_54, Lizzo\_49, John316\_53, CathyBurgh\_49, Ekhein\_50, Gorko\_49, Sam12\_49, Exiguo\_49, RemRem\_50
- Track 15 : Jellybones\_52
- Track 16 : Monty\_48, Squibbles\_49
- Track 17 : BigShaq\_50
- Track 18 : BenoitCattle\_51, PierreThree\_50
- Track 19 : Poland\_54, Msay19\_54
- Track 20 : Barbochs\_50
- Track 21 : Beaver\_53
- Track 22 : PokyPuppy\_49
- Track 23 : Eggsie\_49
- Track 24 : GourdThymes\_49
- Track 25 : Flakey\_49
- Track 26 : Breezic\_49
- Track 27 : Linetti\_51
- Track 28 : Teech\_45, Katyusha\_44, Benczkowski14\_44, Kvothe\_44
- Track 29 : Demosthenes\_43
- Track 30 : Hollow\_45, Niagara\_44
- Track 31 : Teatealatte\_45, Tredge\_45
- Track 32 : ASerpRocky\_44
- Track 33 : Philon9\_45
- Track 34 : Phishy\_50
- Track 35 : Ewald\_46
- Track 36 : Dogfish\_46

- Track 37 : Nyceirae\_51
- Track 38 : Vordorf\_47
- Track 39 : Meyran\_46
- Track 40 : DocB7\_038

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

The start number called the most often in the published annotations is 9, it was called in 42 of the 53 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- ASerpRocky\_44, Adgers\_51, Amore2\_52, Austin\_52, Beaver\_53, Benczkowski14\_44, BenoitCattle\_51, BirksAndSocks\_54, Boneham\_53, Breezic\_49, Butterball\_53, CathyBurgh\_49, Chelms\_50, Dakiti\_51, Demosthenes\_43, Diabla\_53, Eggsie\_49, Ekhein\_50, Exiguo\_49, FelixAlejandro\_54, Flakey\_49, GMA7\_41, GTE7\_40, Gorko\_49, GourdThymes\_49, HayZem\_51, Hollow\_45, Hotorobo\_49, Jellybones\_52, John316\_53, Katyusha\_44, Kvothe\_44, Linetti\_51, Lizzo\_49, Msay19\_54, Niagara\_44, Philon9\_45, PierreThree\_50, PokyPuppy\_49, Poland\_54, RemRem\_50, RoyalG\_50, Sam12\_49, Sombrero\_50, SteveFrench\_49, Teatealatte\_45, Teech\_45, Tredge\_45,

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

- Barbochs\_50, BigShaq\_50, CinnamonToast\_55, Monty\_48, Squibbles\_49, Vordorf\_47,

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

- DocB7\_038, Dogfish\_46, Dorin\_11, Ewald\_46, Francesca\_10, Grayson\_31, Meyran\_46, Nyceirae\_51, Peregrin\_29, Phishy\_50, Weasels2\_31,

### **Summary by start number:**

Start 9:

- Found in 54 of 65 ( 83.1% ) of genes in pham
- Manual Annotations of this start: 42 of 53
- Called 88.9% of time when present
- Phage (with cluster) where this start called: ASerpRocky\_44 (CS4), Adgers\_51 (CS2), Amore2\_52 (CS1), Austin\_52 (CS1), Beaver\_53 (CS2), Benczkowski14\_44 (CS4), BenoitCattle\_51 (CS2), BirksAndSocks\_54 (CS2), Boneham\_53 (CS2), Breezic\_49 (CS2), Butterball\_53 (CS2), CathyBurgh\_49 (CS2), Chelms\_50 (CS2), Dakiti\_51 (CS2), Demosthenes\_43 (CS4), Diabla\_53 (CS2), Eggsie\_49 (CS2), Ekhein\_50 (CS2), Exiguo\_49 (CS2), FelixAlejandro\_54 (CS2), Flakey\_49 (CS2), GMA7\_41 (CS1), GTE7\_40 (CS1), Gorko\_49 (CS2), GourdThymes\_49 (CS2), HayZem\_51 (CS1), Hollow\_45 (CS4), Hotorobo\_49 (CS2), Jellybones\_52 (CS2), John316\_53 (CS2), Katyusha\_44 (CS4), Kvothe\_44 (CS4), Linetti\_51 (CS2), Lizzo\_49 (CS2), Msay19\_54 (CS2), Niagara\_44 (CS4), Philon9\_45 (CS4), PierreThree\_50 (CS2), PokyPuppy\_49 (CS2), Poland\_54 (CS2), RemRem\_50 (CS2), RoyalG\_50 (CS2), Sam12\_49 (CS2), Sombrero\_50 (CS2), SteveFrench\_49 (CS2), Teatealatte\_45 (CS4), Teech\_45 (CS4), Tredge\_45 (CS4),

Start 13:

- Found in 51 of 65 ( 78.5% ) of genes in pham
- No Manual Annotations of this start.
- Called 3.9% of time when present
- Phage (with cluster) where this start called: BigShaq\_50 (CS2), CinnamonToast\_55 (CS2),

#### Start 15:

- Found in 6 of 65 ( 9.2% ) of genes in pham
- Manual Annotations of this start: 5 of 53
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Dogfish\_46 (DT), Ewald\_46 (DT), Meyran\_46 (DT), Nyceirae\_51 (DT), Phishy\_50 (DT), Vordorf\_47 (DT),

#### Start 16:

- Found in 2 of 65 ( 3.1% ) of genes in pham
- Manual Annotations of this start: 2 of 53
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Dorin\_11 (CG), Francesca\_10 (CG),

#### Start 17:

- Found in 5 of 65 ( 7.7% ) of genes in pham
- Manual Annotations of this start: 3 of 53
- Called 60.0% of time when present
- Phage (with cluster) where this start called: Grayson\_31 (CB), Peregrin\_29 (CB), Weasels2\_31 (CB),

#### Start 21:

- Found in 37 of 65 ( 56.9% ) of genes in pham
- Manual Annotations of this start: 1 of 53
- Called 8.1% of time when present
- Phage (with cluster) where this start called: Barbochs\_50 (CS2), Monty\_48 (CS2), Squibbles\_49 (CS2),

#### Start 23:

- Found in 1 of 65 ( 1.5% ) of genes in pham
- No Manual Annotations of this start.
- Called 100.0% of time when present
- Phage (with cluster) where this start called: DocB7\_038 (singleton),

### **Summary by clusters:**

There are 7 clusters represented in this pham: singleton, CB, CG, CS4, DT, CS1, CS2,

Info for manual annotations of cluster CB:

- Start number 17 was manually annotated 3 times for cluster CB.

Info for manual annotations of cluster CG:

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

Info for manual annotations of cluster CS1:

- Start number 9 was manually annotated 3 times for cluster CS1.

Info for manual annotations of cluster CS2:

- Start number 9 was manually annotated 30 times for cluster CS2.
- Start number 21 was manually annotated 1 time for cluster CS2.

Info for manual annotations of cluster CS4:

- Start number 9 was manually annotated 9 times for cluster CS4.

Info for manual annotations of cluster DT:

- Start number 15 was manually annotated 5 times for cluster DT.

### **Gene Information:**

Gene: ASerpRocky\_44 Start: 46453, Stop: 45620, Start Num: 9

Candidate Starts for ASerpRocky\_44:

(Start: 9 @46453 has 42 MA's), (13, 46426), (24, 46360), (34, 46267), (77, 45925), (87, 45868), (104, 45745), (107, 45706), (111, 45682), (112, 45676),

Gene: Adgers\_51 Start: 46251, Stop: 45394, Start Num: 9

Candidate Starts for Adgers\_51:

(Start: 9 @46251 has 42 MA's), (13, 46227), (Start: 21 @46173 has 1 MA's), (31, 46098), (37, 46038), (39, 46020), (46, 45981), (48, 45945), (50, 45939), (72, 45768), (80, 45693), (85, 45663), (99, 45576), (106, 45501), (109, 45474), (116, 45414),

Gene: Amore2\_52 Start: 46682, Stop: 45783, Start Num: 9

Candidate Starts for Amore2\_52:

(5, 46889), (6, 46823), (Start: 9 @46682 has 42 MA's), (13, 46655), (29, 46541), (31, 46535), (44, 46418), (45, 46412), (49, 46370), (61, 46310), (72, 46190), (78, 46127), (87, 46073), (91, 46052), (105, 45941),

Gene: Austin\_52 Start: 46682, Stop: 45783, Start Num: 9

Candidate Starts for Austin\_52:

(5, 46889), (6, 46823), (Start: 9 @46682 has 42 MA's), (13, 46655), (29, 46541), (31, 46535), (44, 46418), (45, 46412), (49, 46370), (61, 46310), (72, 46190), (78, 46127), (87, 46073), (91, 46052), (105, 45941),

Gene: Barbochs\_50 Start: 45917, Stop: 45138, Start Num: 21

Candidate Starts for Barbochs\_50:

(Start: 9 @45995 has 42 MA's), (13, 45971), (19, 45932), (Start: 21 @45917 has 1 MA's), (26, 45881), (31, 45842), (37, 45782), (39, 45764), (46, 45725), (48, 45689), (50, 45683), (72, 45512), (80, 45437), (85, 45407), (99, 45320), (106, 45245), (109, 45218), (116, 45158),

Gene: Beaver\_53 Start: 47765, Stop: 46908, Start Num: 9

Candidate Starts for Beaver\_53:

(Start: 9 @47765 has 42 MA's), (13, 47741), (19, 47702), (Start: 21 @47687 has 1 MA's), (26, 47651), (31, 47612), (37, 47552), (39, 47534), (46, 47495), (48, 47459), (50, 47453), (72, 47282), (80, 47207), (85, 47177), (99, 47090), (106, 47015), (109, 46988), (116, 46928),

Gene: Benczkowski14\_44 Start: 46742, Stop: 45915, Start Num: 9

Candidate Starts for Benczkowski14\_44:

(Start: 9 @46742 has 42 MA's), (13, 46715), (24, 46649), (34, 46556), (65, 46343), (77, 46214), (87, 46157), (104, 46034), (107, 45995), (111, 45971), (112, 45965),

Gene: BenoitCattle\_51 Start: 46512, Stop: 45652, Start Num: 9

Candidate Starts for BenoitCattle\_51:

(Start: 9 @46512 has 42 MA's), (13, 46488), (Start: 21 @46434 has 1 MA's), (26, 46398), (31, 46359), (37, 46299), (39, 46281), (46, 46242), (48, 46206), (50, 46200), (72, 46029), (80, 45954), (85, 45924), (99, 45837), (106, 45762), (109, 45735), (115, 45681), (116, 45675),

Gene: BigShaq\_50 Start: 46493, Stop: 45657, Start Num: 13

Candidate Starts for BigShaq\_50:

(Start: 9 @46517 has 42 MA's), (13, 46493), (Start: 21 @46439 has 1 MA's), (26, 46403), (31, 46364), (37, 46304), (39, 46286), (46, 46247), (48, 46211), (50, 46205), (72, 46034), (80, 45959), (85, 45929), (99, 45842), (106, 45767), (109, 45740), (115, 45686), (116, 45680),

Gene: BirksAndSocks\_54 Start: 48115, Stop: 47258, Start Num: 9

Candidate Starts for BirksAndSocks\_54:

(Start: 9 @48115 has 42 MA's), (13, 48091), (19, 48052), (Start: 21 @48037 has 1 MA's), (26, 48001), (31, 47962), (37, 47902), (39, 47884), (46, 47845), (48, 47809), (50, 47803), (72, 47632), (80, 47557), (85, 47527), (99, 47440), (106, 47365), (109, 47338), (116, 47278),

Gene: Boneham\_53 Start: 48016, Stop: 47162, Start Num: 9

Candidate Starts for Boneham\_53:

(1, 48283), (3, 48259), (Start: 9 @48016 has 42 MA's), (13, 47992), (Start: 21 @47938 has 1 MA's), (31, 47863), (37, 47803), (39, 47785), (42, 47761), (46, 47746), (48, 47710), (50, 47704), (72, 47536), (75, 47485), (76, 47479), (80, 47461), (99, 47344), (106, 47269), (109, 47242), (110, 47233), (116, 47182),

Gene: Breezic\_49 Start: 46008, Stop: 45151, Start Num: 9

Candidate Starts for Breezic\_49:

(Start: 9 @46008 has 42 MA's), (13, 45984), (19, 45945), (Start: 21 @45930 has 1 MA's), (26, 45894), (31, 45855), (34, 45816), (37, 45795), (39, 45777), (46, 45738), (48, 45702), (50, 45696), (72, 45525), (80, 45450), (85, 45420), (99, 45333), (106, 45258), (109, 45231), (116, 45171),

Gene: Butterball\_53 Start: 48021, Stop: 47167, Start Num: 9

Candidate Starts for Butterball\_53:

(1, 48288), (3, 48264), (Start: 9 @48021 has 42 MA's), (13, 47997), (Start: 21 @47943 has 1 MA's), (31, 47868), (37, 47808), (39, 47790), (42, 47766), (46, 47751), (48, 47715), (50, 47709), (72, 47541), (75, 47490), (76, 47484), (80, 47466), (99, 47349), (106, 47274), (109, 47247), (110, 47238), (116, 47187),

Gene: CathyBurgh\_49 Start: 46585, Stop: 45728, Start Num: 9

Candidate Starts for CathyBurgh\_49:

(Start: 9 @46585 has 42 MA's), (13, 46561), (19, 46522), (Start: 21 @46507 has 1 MA's), (26, 46471), (31, 46432), (37, 46372), (39, 46354), (46, 46315), (48, 46279), (50, 46273), (72, 46102), (80, 46027), (85, 45997), (99, 45910), (106, 45835), (109, 45808), (116, 45748),

Gene: Chelms\_50 Start: 46517, Stop: 45657, Start Num: 9

Candidate Starts for Chelms\_50:

(Start: 9 @46517 has 42 MA's), (13, 46493), (Start: 21 @46439 has 1 MA's), (26, 46403), (31, 46364), (37, 46304), (39, 46286), (46, 46247), (48, 46211), (50, 46205), (72, 46034), (80, 45959), (85, 45929), (99, 45842), (106, 45767), (109, 45740), (115, 45686), (116, 45680),

Gene: CinnamonToast\_55 Start: 48051, Stop: 47221, Start Num: 13

Candidate Starts for CinnamonToast\_55:

(1, 48342), (3, 48318), (Start: 9 @48075 has 42 MA's), (13, 48051), (Start: 21 @47997 has 1 MA's), (31, 47922), (37, 47862), (39, 47844), (42, 47820), (46, 47805), (48, 47769), (50, 47763), (72, 47595), (75, 47544), (76, 47538), (80, 47520), (99, 47403), (106, 47328), (109, 47301), (110, 47292), (116, 47241),

Gene: Dakiti\_51 Start: 47385, Stop: 46525, Start Num: 9

Candidate Starts for Dakiti\_51:

(Start: 9 @47385 has 42 MA's), (13, 47361), (Start: 21 @47307 has 1 MA's), (26, 47271), (31, 47232), (37, 47172), (39, 47154), (46, 47115), (48, 47079), (50, 47073), (72, 46902), (80, 46827), (85, 46797), (99, 46710), (106, 46635), (109, 46608), (115, 46554), (116, 46548),

Gene: Demosthenes\_43 Start: 46429, Stop: 45593, Start Num: 9

Candidate Starts for Demosthenes\_43:

(Start: 9 @46429 has 42 MA's), (13, 46399), (24, 46333), (34, 46240), (77, 45898), (87, 45841), (89, 45829), (104, 45718), (107, 45679), (111, 45655), (112, 45649),

Gene: Diabla\_53 Start: 47946, Stop: 47092, Start Num: 9

Candidate Starts for Diabla\_53:

(Start: 9 @47946 has 42 MA's), (13, 47922), (Start: 21 @47868 has 1 MA's), (31, 47790), (39, 47712), (40, 47700), (48, 47637), (50, 47631), (57, 47607), (58, 47601), (72, 47466), (80, 47391), (89, 47337),

Gene: DocB7\_038 Start: 38440, Stop: 37679, Start Num: 23

Candidate Starts for DocB7\_038:

(7, 38557), (8, 38545), (10, 38518), (23, 38440), (32, 38365), (35, 38329), (37, 38320), (53, 38203), (56, 38182), (60, 38167), (63, 38143), (76, 37975), (81, 37951), (82, 37945), (84, 37936), (88, 37906), (95, 37870), (100, 37834), (112, 37729), (113, 37720), (115, 37690),

Gene: Dogfish\_46 Start: 35376, Stop: 36182, Start Num: 15

Candidate Starts for Dogfish\_46:

(Start: 15 @35376 has 5 MA's), (25, 35439), (38, 35562), (70, 35817), (77, 35898), (79, 35907), (83, 35928), (84, 35934), (93, 35985), (101, 36039), (106, 36096), (107, 36111), (114, 36159),

Gene: Dorin\_11 Start: 5894, Stop: 5211, Start Num: 16

Candidate Starts for Dorin\_11:

(Start: 16 @5894 has 2 MA's), (Start: 17 @5888 has 3 MA's), (18, 5876), (25, 5840), (26, 5825), (27, 5816), (59, 5615), (62, 5597), (65, 5561), (67, 5531), (83, 5417), (86, 5399), (97, 5348), (98, 5339), (100, 5318), (102, 5306), (103, 5297), (108, 5237),

Gene: Eggsie\_49 Start: 45908, Stop: 45054, Start Num: 9

Candidate Starts for Eggsie\_49:

(Start: 9 @45908 has 42 MA's), (13, 45884), (Start: 21 @45830 has 1 MA's), (24, 45818), (31, 45752), (39, 45674), (46, 45635), (48, 45599), (50, 45593), (52, 45584), (72, 45428), (80, 45353), (85, 45323), (89, 45299), (96, 45263),

Gene: Ekhein\_50 Start: 45713, Stop: 44856, Start Num: 9

Candidate Starts for Ekhein\_50:

(Start: 9 @45713 has 42 MA's), (13, 45689), (19, 45650), (Start: 21 @45635 has 1 MA's), (26, 45599), (31, 45560), (37, 45500), (39, 45482), (46, 45443), (48, 45407), (50, 45401), (72, 45230), (80, 45155), (85, 45125), (99, 45038), (106, 44963), (109, 44936), (116, 44876),

Gene: Ewald\_46 Start: 35188, Stop: 35994, Start Num: 15

Candidate Starts for Ewald\_46:

(Start: 15 @35188 has 5 MA's), (25, 35251), (34, 35341), (41, 35401), (51, 35473), (54, 35479), (55, 35482), (70, 35629), (76, 35707), (77, 35710), (83, 35740), (84, 35746), (93, 35797), (107, 35923), (114, 35971),

Gene: Exiguo\_49 Start: 45725, Stop: 44868, Start Num: 9

Candidate Starts for Exiguo\_49:

(Start: 9 @45725 has 42 MA's), (13, 45701), (19, 45662), (Start: 21 @45647 has 1 MA's), (26, 45611), (31, 45572), (37, 45512), (39, 45494), (46, 45455), (48, 45419), (50, 45413), (72, 45242), (80, 45167), (85, 45137), (99, 45050), (106, 44975), (109, 44948), (116, 44888),

Gene: FelixAlejandro\_54 Start: 48219, Stop: 47365, Start Num: 9

Candidate Starts for FelixAlejandro\_54:

(1, 48486), (3, 48462), (Start: 9 @48219 has 42 MA's), (13, 48195), (Start: 21 @48141 has 1 MA's), (31, 48066), (37, 48006), (39, 47988), (42, 47964), (46, 47949), (48, 47913), (50, 47907), (72, 47739), (75, 47688), (76, 47682), (80, 47664), (99, 47547), (106, 47472), (109, 47445), (110, 47436), (116, 47385),

Gene: Flakey\_49 Start: 46589, Stop: 45732, Start Num: 9

Candidate Starts for Flakey\_49:

(Start: 9 @46589 has 42 MA's), (13, 46565), (19, 46526), (Start: 21 @46511 has 1 MA's), (26, 46475), (31, 46436), (37, 46376), (39, 46358), (46, 46319), (48, 46283), (50, 46277), (72, 46106), (80, 46031), (85, 46001), (99, 45914), (106, 45839), (109, 45812), (116, 45752),

Gene: Francesca\_10 Start: 6016, Stop: 5336, Start Num: 16

Candidate Starts for Francesca\_10:

(Start: 16 @6016 has 2 MA's), (Start: 17 @6010 has 3 MA's), (18, 5998), (25, 5962), (26, 5947), (27, 5938), (59, 5737), (62, 5719), (65, 5683), (67, 5653), (83, 5539), (86, 5521), (87, 5512), (98, 5461), (100, 5440), (102, 5428), (103, 5419),

Gene: GMA7\_41 Start: 40896, Stop: 39997, Start Num: 9

Candidate Starts for GMA7\_41:

(5, 41103), (6, 41037), (Start: 9 @40896 has 42 MA's), (13, 40869), (20, 40821), (29, 40755), (31, 40749), (44, 40632), (45, 40626), (49, 40584), (61, 40524), (72, 40404), (78, 40341), (87, 40287), (91, 40266), (105, 40155),

Gene: GTE7\_40 Start: 40927, Stop: 40028, Start Num: 9

Candidate Starts for GTE7\_40:

(5, 41134), (6, 41068), (Start: 9 @40927 has 42 MA's), (13, 40900), (20, 40852), (29, 40786), (31, 40780), (44, 40663), (45, 40657), (49, 40615), (61, 40555), (72, 40435), (78, 40372), (87, 40318), (91, 40297), (105, 40186),

Gene: Gorko\_49 Start: 45717, Stop: 44860, Start Num: 9

Candidate Starts for Gorko\_49:

(Start: 9 @45717 has 42 MA's), (13, 45693), (19, 45654), (Start: 21 @45639 has 1 MA's), (26, 45603), (31, 45564), (37, 45504), (39, 45486), (46, 45447), (48, 45411), (50, 45405), (72, 45234), (80, 45159), (85, 45129), (99, 45042), (106, 44967), (109, 44940), (116, 44880),

Gene: GourdThymes\_49 Start: 46591, Stop: 45734, Start Num: 9

Candidate Starts for GourdThymes\_49:

(Start: 9 @46591 has 42 MA's), (13, 46567), (19, 46528), (Start: 21 @46513 has 1 MA's), (26, 46477), (37, 46378), (39, 46360), (46, 46321), (50, 46279), (72, 46108), (80, 46033), (85, 46003), (99, 45916), (106, 45841), (109, 45814), (116, 45754),



Gene: Grayson\_31 Start: 9328, Stop: 8654, Start Num: 17

Candidate Starts for Grayson\_31:

(11, 9352), (14, 9343), (Start: 17 @9328 has 3 MA's), (27, 9262), (28, 9259), (30, 9238), (33, 9205), (46, 9124), (64, 9031), (68, 8977), (73, 8938), (83, 8866), (90, 8824), (91, 8818),

Gene: HayZem\_51 Start: 46679, Stop: 45780, Start Num: 9

Candidate Starts for HayZem\_51:

(5, 46886), (6, 46820), (Start: 9 @46679 has 42 MA's), (13, 46652), (20, 46604), (29, 46538), (31, 46532), (44, 46415), (45, 46409), (49, 46367), (61, 46307), (72, 46187), (78, 46124), (87, 46070), (91, 46049), (105, 45938),

Gene: Hollow\_45 Start: 47078, Stop: 46251, Start Num: 9

Candidate Starts for Hollow\_45:

(Start: 9 @47078 has 42 MA's), (13, 47051), (24, 46985), (34, 46892), (65, 46679), (87, 46493), (89, 46481), (104, 46370), (107, 46331), (111, 46307), (112, 46301),

Gene: Hotorobo\_49 Start: 46596, Stop: 45739, Start Num: 9

Candidate Starts for Hotorobo\_49:

(Start: 9 @46596 has 42 MA's), (13, 46572), (19, 46533), (Start: 21 @46518 has 1 MA's), (26, 46482), (31, 46443), (37, 46383), (39, 46365), (46, 46326), (48, 46290), (50, 46284), (72, 46113), (80, 46038), (85, 46008), (99, 45921), (106, 45846), (109, 45819), (116, 45759),

Gene: Jellybones\_52 Start: 47697, Stop: 46843, Start Num: 9

Candidate Starts for Jellybones\_52:

(1, 47964), (3, 47940), (Start: 9 @47697 has 42 MA's), (13, 47673), (Start: 21 @47619 has 1 MA's), (31, 47544), (37, 47484), (39, 47466), (42, 47442), (46, 47427), (48, 47391), (50, 47385), (72, 47217), (80, 47142), (99, 47025), (106, 46950), (109, 46923), (116, 46863),

Gene: John316\_53 Start: 47754, Stop: 46897, Start Num: 9

Candidate Starts for John316\_53:

(Start: 9 @47754 has 42 MA's), (13, 47730), (19, 47691), (Start: 21 @47676 has 1 MA's), (26, 47640), (31, 47601), (37, 47541), (39, 47523), (46, 47484), (48, 47448), (50, 47442), (72, 47271), (80, 47196), (85, 47166), (99, 47079), (106, 47004), (109, 46977), (116, 46917),

Gene: Katyusha\_44 Start: 46742, Stop: 45915, Start Num: 9

Candidate Starts for Katyusha\_44:

(Start: 9 @46742 has 42 MA's), (13, 46715), (24, 46649), (34, 46556), (65, 46343), (77, 46214), (87, 46157), (104, 46034), (107, 45995), (111, 45971), (112, 45965),

Gene: Kvothe\_44 Start: 46641, Stop: 45814, Start Num: 9

Candidate Starts for Kvothe\_44:

(Start: 9 @46641 has 42 MA's), (13, 46614), (24, 46548), (34, 46455), (65, 46242), (77, 46113), (87, 46056), (104, 45933), (107, 45894), (111, 45870), (112, 45864),

Gene: Linetti\_51 Start: 47526, Stop: 46666, Start Num: 9

Candidate Starts for Linetti\_51:

(Start: 9 @47526 has 42 MA's), (13, 47502), (Start: 21 @47448 has 1 MA's), (26, 47412), (31, 47373), (37, 47313), (39, 47295), (46, 47256), (48, 47220), (50, 47214), (72, 47043), (80, 46968), (85, 46938), (99, 46851), (109, 46749), (115, 46695), (116, 46689),

Gene: Lizzo\_49 Start: 46585, Stop: 45728, Start Num: 9

Candidate Starts for Lizzo\_49:

(Start: 9 @46585 has 42 MA's), (13, 46561), (19, 46522), (Start: 21 @46507 has 1 MA's), (26, 46471), (31, 46432), (37, 46372), (39, 46354), (46, 46315), (48, 46279), (50, 46273), (72, 46102), (80, 46027), (85, 45997), (99, 45910), (106, 45835), (109, 45808), (116, 45748),

Gene: Meyran\_46 Start: 36292, Stop: 37098, Start Num: 15

Candidate Starts for Meyran\_46:

(Start: 15 @36292 has 5 MA's), (25, 36355), (36, 36460), (37, 36466), (70, 36733), (77, 36814), (83, 36844), (84, 36850), (93, 36901), (107, 37027), (114, 37075),

Gene: Monty\_48 Start: 45657, Stop: 44878, Start Num: 21

Candidate Starts for Monty\_48:

(Start: 9 @45735 has 42 MA's), (13, 45711), (19, 45672), (Start: 21 @45657 has 1 MA's), (26, 45621), (31, 45582), (37, 45522), (39, 45504), (46, 45465), (48, 45429), (50, 45423), (72, 45252), (80, 45177), (85, 45147), (99, 45060), (106, 44985), (109, 44958), (116, 44898),

Gene: Msay19\_54 Start: 48208, Stop: 47351, Start Num: 9

Candidate Starts for Msay19\_54:

(1, 48475), (3, 48451), (Start: 9 @48208 has 42 MA's), (13, 48184), (Start: 21 @48130 has 1 MA's), (31, 48055), (37, 47995), (39, 47977), (42, 47953), (46, 47938), (48, 47902), (50, 47896), (72, 47725), (80, 47650), (85, 47620), (99, 47533), (106, 47458), (109, 47431), (116, 47371),

Gene: Niagara\_44 Start: 46720, Stop: 45893, Start Num: 9

Candidate Starts for Niagara\_44:

(Start: 9 @46720 has 42 MA's), (13, 46693), (24, 46627), (34, 46534), (65, 46321), (87, 46135), (89, 46123), (104, 46012), (107, 45973), (111, 45949), (112, 45943),

Gene: Nyceirae\_51 Start: 36282, Stop: 37091, Start Num: 15

Candidate Starts for Nyceirae\_51:

(Start: 15 @36282 has 5 MA's), (25, 36345), (37, 36456), (47, 36546), (66, 36669), (70, 36726), (76, 36804), (77, 36807), (83, 36837), (84, 36843), (93, 36894), (94, 36903), (101, 36948), (107, 37020), (114, 37068),

Gene: Peregrin\_29 Start: 8642, Stop: 7968, Start Num: 17

Candidate Starts for Peregrin\_29:

(11, 8666), (14, 8657), (Start: 17 @8642 has 3 MA's), (27, 8576), (28, 8573), (30, 8552), (33, 8519), (46, 8438), (64, 8345), (68, 8291), (73, 8252), (79, 8201), (83, 8180), (91, 8132), (102, 8060),

Gene: Philon9\_45 Start: 47751, Stop: 46924, Start Num: 9

Candidate Starts for Philon9\_45:

(Start: 9 @47751 has 42 MA's), (12, 47727), (40, 47514), (69, 47307), (71, 47295), (74, 47256), (81, 47202), (92, 47139), (111, 46980),

Gene: Phishy\_50 Start: 37259, Stop: 38065, Start Num: 15

Candidate Starts for Phishy\_50:

(Start: 15 @37259 has 5 MA's), (25, 37322), (34, 37412), (51, 37544), (54, 37550), (55, 37553), (70, 37700), (77, 37781), (83, 37811), (84, 37817), (93, 37868), (107, 37994), (114, 38042),

Gene: PierreThree\_50 Start: 47263, Stop: 46403, Start Num: 9

Candidate Starts for PierreThree\_50:

(Start: 9 @47263 has 42 MA's), (13, 47239), (Start: 21 @47185 has 1 MA's), (26, 47149), (31, 47110), (37, 47050), (39, 47032), (46, 46993), (48, 46957), (50, 46951), (72, 46780), (80, 46705), (85, 46675), (99, 46588), (106, 46513), (109, 46486), (115, 46432), (116, 46426),

Gene: PokyPuppy\_49 Start: 47212, Stop: 46361, Start Num: 9

Candidate Starts for PokyPuppy\_49:

(2, 47464), (4, 47440), (Start: 9 @47212 has 42 MA's), (19, 47149), (Start: 21 @47134 has 1 MA's), (26, 47098), (31, 47056), (39, 46978), (43, 46951), (48, 46903), (58, 46864), (72, 46729), (80, 46654), (85, 46624), (106, 46462), (109, 46435), (116, 46375),

Gene: Poland\_54 Start: 48187, Stop: 47330, Start Num: 9

Candidate Starts for Poland\_54:

(1, 48454), (3, 48430), (Start: 9 @48187 has 42 MA's), (13, 48163), (Start: 21 @48109 has 1 MA's), (31, 48034), (37, 47974), (39, 47956), (42, 47932), (46, 47917), (48, 47881), (50, 47875), (72, 47704), (80, 47629), (85, 47599), (99, 47512), (106, 47437), (109, 47410), (116, 47350),

Gene: RemRem\_50 Start: 45725, Stop: 44868, Start Num: 9

Candidate Starts for RemRem\_50:

(Start: 9 @45725 has 42 MA's), (13, 45701), (19, 45662), (Start: 21 @45647 has 1 MA's), (26, 45611), (31, 45572), (37, 45512), (39, 45494), (46, 45455), (48, 45419), (50, 45413), (72, 45242), (80, 45167), (85, 45137), (99, 45050), (106, 44975), (109, 44948), (116, 44888),

Gene: RoyalG\_50 Start: 46557, Stop: 45703, Start Num: 9

Candidate Starts for RoyalG\_50:

(Start: 9 @46557 has 42 MA's), (13, 46533), (Start: 21 @46479 has 1 MA's), (31, 46401), (39, 46323), (40, 46311), (48, 46248), (50, 46242), (57, 46218), (58, 46212), (72, 46077), (80, 46002), (89, 45948),

Gene: Sam12\_49 Start: 45725, Stop: 44868, Start Num: 9

Candidate Starts for Sam12\_49:

(Start: 9 @45725 has 42 MA's), (13, 45701), (19, 45662), (Start: 21 @45647 has 1 MA's), (26, 45611), (31, 45572), (37, 45512), (39, 45494), (46, 45455), (48, 45419), (50, 45413), (72, 45242), (80, 45167), (85, 45137), (99, 45050), (106, 44975), (109, 44948), (116, 44888),

Gene: Sombrero\_50 Start: 46098, Stop: 45244, Start Num: 9

Candidate Starts for Sombrero\_50:

(1, 46365), (3, 46341), (Start: 9 @46098 has 42 MA's), (13, 46074), (Start: 21 @46020 has 1 MA's), (31, 45945), (37, 45885), (39, 45867), (42, 45843), (46, 45828), (48, 45792), (50, 45786), (72, 45618), (75, 45567), (76, 45561), (80, 45543), (99, 45426), (106, 45351), (109, 45324), (110, 45315), (116, 45264),

Gene: Squibbles\_49 Start: 46510, Stop: 45731, Start Num: 21

Candidate Starts for Squibbles\_49:

(Start: 9 @46588 has 42 MA's), (13, 46564), (19, 46525), (Start: 21 @46510 has 1 MA's), (26, 46474), (31, 46435), (37, 46375), (39, 46357), (46, 46318), (48, 46282), (50, 46276), (72, 46105), (80, 46030), (85, 46000), (99, 45913), (106, 45838), (109, 45811), (116, 45751),

Gene: SteveFrench\_49 Start: 46797, Stop: 45943, Start Num: 9

Candidate Starts for SteveFrench\_49:

(Start: 9 @46797 has 42 MA's), (13, 46773), (Start: 21 @46719 has 1 MA's), (31, 46641), (39, 46563), (40, 46551), (48, 46488), (50, 46482), (57, 46458), (58, 46452), (72, 46317), (80, 46242), (89, 46188),

Gene: Teatealatte\_45 Start: 46644, Stop: 45817, Start Num: 9

Candidate Starts for Teatealatte\_45:

(Start: 9 @46644 has 42 MA's), (13, 46617), (24, 46551), (34, 46458), (65, 46245), (77, 46116), (87, 46059), (104, 45936), (106, 45912), (107, 45897), (112, 45867),

Gene: Teech\_45 Start: 46445, Stop: 45618, Start Num: 9

Candidate Starts for Teech\_45:

(Start: 9 @46445 has 42 MA's), (13, 46418), (24, 46352), (34, 46259), (65, 46046), (77, 45917), (87, 45860), (104, 45737), (107, 45698), (111, 45674), (112, 45668),

Gene: Tredge\_45 Start: 46644, Stop: 45817, Start Num: 9

Candidate Starts for Tredge\_45:

(Start: 9 @46644 has 42 MA's), (13, 46617), (24, 46551), (34, 46458), (65, 46245), (77, 46116), (87, 46059), (104, 45936), (106, 45912), (107, 45897), (112, 45867),

Gene: Vordorf\_47 Start: 35552, Stop: 36358, Start Num: 15

Candidate Starts for Vordorf\_47:

(Start: 9 @35519 has 42 MA's), (Start: 15 @35552 has 5 MA's), (25, 35615), (34, 35705), (51, 35837), (54, 35843), (55, 35846), (70, 35993), (77, 36074), (83, 36104), (84, 36110), (93, 36161), (107, 36287), (114, 36335),

Gene: Weasels2\_31 Start: 9643, Stop: 8966, Start Num: 17

Candidate Starts for Weasels2\_31:

(Start: 17 @9643 has 3 MA's), (22, 9604), (28, 9574), (30, 9553), (33, 9520), (64, 9346), (68, 9292), (83, 9181),