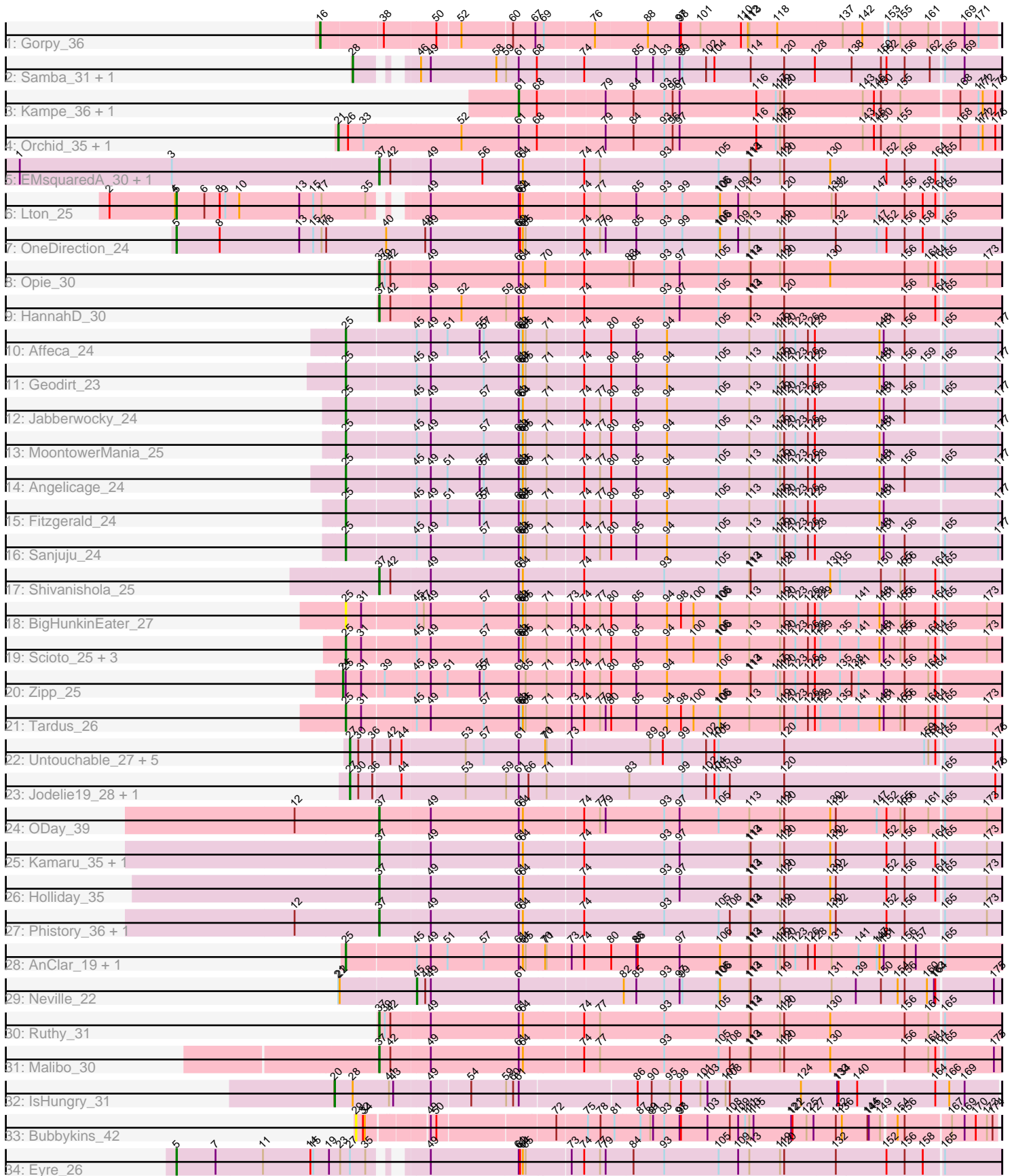


Pham 292902



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 292902 Report

This analysis was run 04/18/26 on database version 643.

Pham number 292902 has 50 members, 8 are drafts.

Phages represented in each track:

- Track 1 : Gorpy\_36
- Track 2 : Samba\_31, ZiggyZoo\_31
- Track 3 : Kampe\_36, PatrickStar\_36
- Track 4 : Orchid\_35, RobinSparkles\_38
- Track 5 : EMSquaredA\_30, Marteenaa\_30
- Track 6 : Lton\_25
- Track 7 : OneDirection\_24
- Track 8 : Opie\_30
- Track 9 : HannahD\_30
- Track 10 : Affeca\_24
- Track 11 : Geodirt\_23
- Track 12 : Jabberwocky\_24
- Track 13 : MoontowerMania\_25
- Track 14 : Angelicage\_24
- Track 15 : Fitzgerald\_24
- Track 16 : Sanjuju\_24
- Track 17 : Shivanishola\_25
- Track 18 : BigHunkinEater\_27
- Track 19 : Scioto\_25, Sampson\_25, Abblin\_25, Natkenzie\_25
- Track 20 : Zipp\_25
- Track 21 : Tardus\_26
- Track 22 : Untouchable\_27, Crocheter\_27, Kenosha\_27, Nadmeg\_28, Dialga\_28, ArtetaBall\_28
- Track 23 : Jodelie19\_28, TenaciousP\_28
- Track 24 : ODay\_39
- Track 25 : Kamaru\_35, LitninMcQueen\_34
- Track 26 : Holliday\_35
- Track 27 : Phistory\_36, ShawBrad\_35
- Track 28 : AnClar\_19, LittleMunchkin\_20
- Track 29 : Neville\_22
- Track 30 : Ruthy\_31
- Track 31 : Malibo\_30
- Track 32 : IsHungry\_31
- Track 33 : Bubbykins\_42
- Track 34 : Eyre\_26

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

The start number called the most often in the published annotations is 37, it was called in 12 of the 42 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- EMSquaredA\_30, HannahD\_30, Holliday\_35, Kamaru\_35, LitninMcQueen\_34, Malibo\_30, Marteena\_30, ODay\_39, Opie\_30, Phistory\_36, Ruthy\_31, ShawBrad\_35, Shivanishola\_25,

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

- 

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

- Abblin\_25, Affeca\_24, AnClar\_19, Angelicage\_24, ArtetaBall\_28, BigHunkinEater\_27, Bubbykins\_42, Crocheter\_27, Dialga\_28, Eyre\_26, Fitzgerald\_24, Geodirt\_23, Gorpy\_36, IsHungry\_31, Jabberwocky\_24, Jodelie19\_28, Kampe\_36, Kenosha\_27, LittleMunchkin\_20, Lton\_25, MoontowerMania\_25, Nadmeg\_28, Natkenzie\_25, Neville\_22, OneDirection\_24, Orchid\_35, PatrickStar\_36, RobinSparkles\_38, Samba\_31, Sampson\_25, Sanjuju\_24, Scioto\_25, Tardus\_26, TenaciousP\_28, Untouchable\_27, ZiggyZoo\_31, Zipp\_25,

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

Start 5:

- Found in 3 of 50 ( 6.0% ) of genes in pham
- Manual Annotations of this start: 3 of 42
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Eyre\_26 (singleton), Lton\_25 (CZ), OneDirection\_24 (CZ6),

Start 16:

- Found in 1 of 50 ( 2.0% ) of genes in pham
- Manual Annotations of this start: 1 of 42
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Gorpy\_36 (AY),

Start 20:

- Found in 1 of 50 ( 2.0% ) of genes in pham
- Manual Annotations of this start: 1 of 42
- Called 100.0% of time when present
- Phage (with cluster) where this start called: IsHungry\_31 (FF),

Start 21:

- Found in 3 of 50 ( 6.0% ) of genes in pham
- Manual Annotations of this start: 2 of 42
- Called 66.7% of time when present
- Phage (with cluster) where this start called: Orchid\_35 (CX), RobinSparkles\_38 (CX),

Start 24:

- Found in 1 of 50 ( 2.0% ) of genes in pham

- Manual Annotations of this start: 1 of 42
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Zipp\_25 (DE4),

#### Start 25:

- Found in 16 of 50 ( 32.0% ) of genes in pham
- Manual Annotations of this start: 11 of 42
- Called 93.8% of time when present
- Phage (with cluster) where this start called: Abblin\_25 (DE4), Affeca\_24 (DE1), AnClar\_19 (DR), Angelicage\_24 (DE1), BigHunkinEater\_27 (DE4), Fitzgerald\_24 (DE1), Geodirt\_23 (DE1), Jabberwocky\_24 (DE1), LittleMunchkin\_20 (DR), MoontowerMania\_25 (DE1), Natkenzie\_25 (DE4), Sampson\_25 (DE4), Sanjuju\_24 (DE1), Scioto\_25 (DE4), Tardus\_26 (DE4),

#### Start 27:

- Found in 9 of 50 ( 18.0% ) of genes in pham
- Manual Annotations of this start: 6 of 42
- Called 88.9% of time when present
- Phage (with cluster) where this start called: ArtetaBall\_28 (DJ), Crocheter\_27 (DJ), Dialga\_28 (DJ), Jodelie19\_28 (DJ), Kenosha\_27 (DJ), Nadmeg\_28 (DJ), TenaciousP\_28 (DJ), Untouchable\_27 (DJ),

#### Start 28:

- Found in 3 of 50 ( 6.0% ) of genes in pham
- Manual Annotations of this start: 2 of 42
- Called 66.7% of time when present
- Phage (with cluster) where this start called: Samba\_31 (CV), ZiggyZoo\_31 (CV),

#### Start 29:

- Found in 1 of 50 ( 2.0% ) of genes in pham
- No Manual Annotations of this start.
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Bubbykins\_42 (UNK),

#### Start 37:

- Found in 13 of 50 ( 26.0% ) of genes in pham
- Manual Annotations of this start: 12 of 42
- Called 100.0% of time when present
- Phage (with cluster) where this start called: EMSquaredA\_30 (CY1), HannahD\_30 (DB), Holliday\_35 (DN1), Kamaru\_35 (DN1), LitninMcQueen\_34 (DN1), Malibo\_30 (DW), Marteenaa\_30 (CY1), ODay\_39 (DN), Opie\_30 (DB), Phistory\_36 (DN1), Ruthy\_31 (DW), ShawBrad\_35 (DN1), Shivanishola\_25 (DE1),

#### Start 45:

- Found in 17 of 50 ( 34.0% ) of genes in pham
- Manual Annotations of this start: 1 of 42
- Called 5.9% of time when present
- Phage (with cluster) where this start called: Neville\_22 (DU2),

#### Start 61:

- Found in 48 of 50 ( 96.0% ) of genes in pham
- Manual Annotations of this start: 2 of 42
- Called 4.2% of time when present

- Phage (with cluster) where this start called: Kampe\_36 (CX), PatrickStar\_36 (CX),

### **Summary by clusters:**

There are 18 clusters represented in this pham: DN, CY1, DJ, DE4, DE1, DB, CZ6, singleton, CZ, CX, DN1, FF, AY, DW, DU2, UNK, DR, CV,

Info for manual annotations of cluster AY:

- Start number 16 was manually annotated 1 time for cluster AY.

Info for manual annotations of cluster CV:

- Start number 28 was manually annotated 2 times for cluster CV.

Info for manual annotations of cluster CX:

- Start number 21 was manually annotated 2 times for cluster CX.
- Start number 61 was manually annotated 2 times for cluster CX.

Info for manual annotations of cluster CY1:

- Start number 37 was manually annotated 2 times for cluster CY1.

Info for manual annotations of cluster CZ:

- Start number 5 was manually annotated 1 time for cluster CZ.

Info for manual annotations of cluster CZ6:

- Start number 5 was manually annotated 1 time for cluster CZ6.

Info for manual annotations of cluster DB:

- Start number 37 was manually annotated 2 times for cluster DB.

Info for manual annotations of cluster DE1:

- Start number 25 was manually annotated 7 times for cluster DE1.
- Start number 37 was manually annotated 1 time for cluster DE1.

Info for manual annotations of cluster DE4:

- Start number 24 was manually annotated 1 time for cluster DE4.
- Start number 25 was manually annotated 2 times for cluster DE4.

Info for manual annotations of cluster DJ:

- Start number 27 was manually annotated 6 times for cluster DJ.

Info for manual annotations of cluster DN:

- Start number 37 was manually annotated 1 time for cluster DN.

Info for manual annotations of cluster DN1:

- Start number 37 was manually annotated 4 times for cluster DN1.

Info for manual annotations of cluster DR:

- Start number 25 was manually annotated 2 times for cluster DR.

Info for manual annotations of cluster DU2:

- Start number 45 was manually annotated 1 time for cluster DU2.

Info for manual annotations of cluster DW:

- Start number 37 was manually annotated 2 times for cluster DW.

Info for manual annotations of cluster FF:

- Start number 20 was manually annotated 1 time for cluster FF.

### **Gene Information:**

Gene: Abblin\_25 Start: 19737, Stop: 21101, Start Num: 25

Candidate Starts for Abblin\_25:

(Start: 25 @19737 has 11 MA's), (31, 19770), (Start: 45 @19878 has 1 MA's), (49, 19908), (57, 20022), (Start: 61 @20094 has 2 MA's), (63, 20100), (64, 20103), (65, 20109), (71, 20151), (73, 20199), (74, 20226), (77, 20256), (80, 20280), (85, 20331), (94, 20397), (100, 20451), (105, 20505), (106, 20508), (113, 20571), (119, 20637), (120, 20646), (123, 20670), (126, 20697), (128, 20712), (129, 20721), (135, 20763), (141, 20802), (148, 20847), (151, 20856), (155, 20892), (156, 20901), (161, 20952), (164, 20967), (165, 20979), (173, 21069),

Gene: Affeca\_24 Start: 19645, Stop: 21006, Start Num: 25

Candidate Starts for Affeca\_24:

(Start: 25 @19645 has 11 MA's), (Start: 45 @19786 has 1 MA's), (49, 19816), (51, 19852), (55, 19921), (57, 19930), (Start: 61 @20002 has 2 MA's), (63, 20008), (64, 20011), (65, 20017), (71, 20059), (74, 20134), (80, 20188), (85, 20239), (94, 20305), (105, 20413), (113, 20479), (117, 20536), (119, 20545), (120, 20554), (123, 20578), (126, 20605), (128, 20620), (148, 20755), (151, 20764), (156, 20809), (165, 20887), (177, 21001),

Gene: AnClar\_19 Start: 16411, Stop: 17775, Start Num: 25

Candidate Starts for AnClar\_19:

(Start: 25 @16411 has 11 MA's), (Start: 45 @16552 has 1 MA's), (49, 16582), (51, 16618), (57, 16696), (Start: 61 @16768 has 2 MA's), (64, 16777), (65, 16783), (70, 16822), (71, 16825), (73, 16873), (74, 16900), (80, 16954), (85, 17005), (86, 17008), (97, 17095), (106, 17182), (113, 17245), (114, 17248), (117, 17302), (119, 17311), (120, 17320), (123, 17344), (126, 17371), (128, 17386), (131, 17419), (141, 17476), (147, 17515), (148, 17521), (151, 17530), (156, 17575), (157, 17599), (165, 17653),

Gene: Angelicage\_24 Start: 20068, Stop: 21429, Start Num: 25

Candidate Starts for Angelicage\_24:

(Start: 25 @20068 has 11 MA's), (Start: 45 @20209 has 1 MA's), (49, 20239), (51, 20275), (55, 20344), (57, 20353), (Start: 61 @20425 has 2 MA's), (63, 20431), (64, 20434), (65, 20440), (71, 20482), (74, 20557), (77, 20587), (80, 20611), (85, 20662), (94, 20728), (105, 20836), (113, 20902), (117, 20959), (119, 20968), (120, 20977), (123, 21001), (126, 21028), (128, 21043), (148, 21178), (151, 21187), (156, 21232), (165, 21310), (177, 21424),

Gene: ArtetaBall\_28 Start: 19527, Stop: 20882, Start Num: 27

Candidate Starts for ArtetaBall\_28:

(Start: 27 @19527 has 6 MA's), (30, 19545), (36, 19575), (42, 19608), (44, 19632), (53, 19764), (57, 19803), (Start: 61 @19875 has 2 MA's), (70, 19929), (71, 19932), (73, 19980), (89, 20142), (92, 20169), (99, 20211), (102, 20262), (104, 20280), (105, 20289), (120, 20430), (159, 20727), (161, 20736), (164, 20751), (165, 20763), (176, 20871),

Gene: BigHunkinEater\_27 Start: 18907, Stop: 20271, Start Num: 25

Candidate Starts for BigHunkinEater\_27:

(Start: 25 @18907 has 11 MA's), (31, 18940), (Start: 45 @19048 has 1 MA's), (47, 19063), (49, 19078), (57, 19192), (Start: 61 @19264 has 2 MA's), (63, 19270), (64, 19273), (65, 19279), (71, 19321), (73, 19369), (74, 19396), (77, 19426), (80, 19450), (85, 19501), (94, 19567), (98, 19594), (100, 19621), (105, 19675), (106, 19678), (113, 19741), (119, 19807), (120, 19816), (123, 19840), (126, 19867), (128, 19882), (129, 19891), (141, 19972), (148, 20017), (151, 20026), (155, 20062), (156, 20071), (164, 20137), (165, 20149), (173, 20239),

Gene: Bubbykins\_42 Start: 32858, Stop: 34141, Start Num: 29

Candidate Starts for Bubbykins\_42:

(29, 32858), (32, 32873), (34, 32876), (49, 32984), (50, 32996), (72, 33236), (75, 33299), (78, 33326), (81, 33356), (87, 33407), (89, 33428), (91, 33434), (93, 33458), (97, 33488), (98, 33491), (103, 33548), (108, 33596), (109, 33614), (111, 33629), (113, 33638), (115, 33647), (121, 33728), (122, 33731), (125, 33761), (127, 33776), (132, 33821), (136, 33833), (144, 33887), (145, 33890), (149, 33914), (154, 33938), (156, 33953), (167, 34046), (169, 34073), (170, 34097), (173, 34121), (174, 34133),

Gene: Crocheter\_27 Start: 19527, Stop: 20882, Start Num: 27

Candidate Starts for Crocheter\_27:

(Start: 27 @19527 has 6 MA's), (30, 19545), (36, 19575), (42, 19608), (44, 19632), (53, 19764), (57, 19803), (Start: 61 @19875 has 2 MA's), (70, 19929), (71, 19932), (73, 19980), (89, 20142), (92, 20169), (99, 20211), (102, 20262), (104, 20280), (105, 20289), (120, 20430), (159, 20727), (161, 20736), (164, 20751), (165, 20763), (176, 20871),

Gene: Dialga\_28 Start: 19549, Stop: 20904, Start Num: 27

Candidate Starts for Dialga\_28:

(Start: 27 @19549 has 6 MA's), (30, 19567), (36, 19597), (42, 19630), (44, 19654), (53, 19786), (57, 19825), (Start: 61 @19897 has 2 MA's), (70, 19951), (71, 19954), (73, 20002), (89, 20164), (92, 20191), (99, 20233), (102, 20284), (104, 20302), (105, 20311), (120, 20452), (159, 20749), (161, 20758), (164, 20773), (165, 20785), (176, 20893),

Gene: EMsquaredA\_30 Start: 25192, Stop: 26484, Start Num: 37

Candidate Starts for EMsquaredA\_30:

(1, 24430), (3, 24757), (Start: 37 @25192 has 12 MA's), (42, 25213), (49, 25294), (56, 25405), (Start: 61 @25480 has 2 MA's), (64, 25489), (74, 25612), (77, 25642), (93, 25777), (105, 25891), (113, 25957), (114, 25960), (119, 26023), (120, 26032), (130, 26128), (152, 26248), (156, 26287), (164, 26353), (165, 26365),

Gene: Eyre\_26 Start: 22144, Stop: 23817, Start Num: 5

Candidate Starts for Eyre\_26:

(Start: 5 @22144 has 3 MA's), (7, 22228), (11, 22327), (14, 22429), (15, 22435), (19, 22468), (23, 22492), (Start: 27 @22513 has 6 MA's), (35, 22546), (49, 22624), (Start: 61 @22810 has 2 MA's), (62, 22813), (64, 22819), (65, 22825), (73, 22915), (74, 22942), (77, 22972), (79, 22984), (84, 23041), (93, 23107), (105, 23224), (109, 23266), (113, 23290), (119, 23356), (120, 23365), (132, 23473), (152, 23581), (156, 23620), (158, 23659), (165, 23698),

Gene: Fitzgerald\_24 Start: 20115, Stop: 21476, Start Num: 25

Candidate Starts for Fitzgerald\_24:

(Start: 25 @20115 has 11 MA's), (Start: 45 @20256 has 1 MA's), (49, 20286), (51, 20322), (55, 20391), (57, 20400), (Start: 61 @20472 has 2 MA's), (63, 20478), (64, 20481), (65, 20487), (71, 20529), (74, 20604), (77, 20634), (80, 20658), (85, 20709), (94, 20775), (105, 20883), (113, 20949), (117, 21006), (119, 21015), (120, 21024), (123, 21048), (126, 21075), (128, 21090), (148, 21225), (151, 21234), (177, 21471),

Gene: Geodirt\_23 Start: 19423, Stop: 20784, Start Num: 25

Candidate Starts for Geodirt\_23:

(Start: 25 @19423 has 11 MA's), (Start: 45 @19564 has 1 MA's), (49, 19594), (57, 19708), (Start: 61 @19780 has 2 MA's), (63, 19786), (64, 19789), (65, 19795), (71, 19837), (74, 19912), (80, 19966), (85, 20017), (94, 20083), (105, 20191), (113, 20257), (117, 20314), (119, 20323), (120, 20332), (123, 20356), (126, 20383), (128, 20398), (148, 20533), (151, 20542), (156, 20587), (159, 20629), (165, 20665), (177, 20779),

Gene: Gorpy\_36 Start: 24267, Stop: 25628, Start Num: 16

Candidate Starts for Gorpy\_36:

(Start: 16 @24267 has 1 MA's), (38, 24393), (50, 24495), (52, 24543), (60, 24648), (67, 24696), (69, 24714), (76, 24810), (88, 24915), (97, 24978), (98, 24981), (101, 25023), (110, 25110), (112, 25125), (113, 25128), (118, 25185), (137, 25323), (142, 25362), (153, 25407), (155, 25431), (161, 25491), (169, 25560), (171, 25590),

Gene: HannahD\_30 Start: 24895, Stop: 26187, Start Num: 37

Candidate Starts for HannahD\_30:

(Start: 37 @24895 has 12 MA's), (42, 24916), (49, 24997), (52, 25063), (59, 25156), (Start: 61 @25183 has 2 MA's), (64, 25192), (74, 25315), (93, 25480), (97, 25510), (105, 25594), (113, 25660), (114, 25663), (120, 25735), (156, 25990), (164, 26056), (165, 26068),

Gene: Holliday\_35 Start: 27235, Stop: 28530, Start Num: 37

Candidate Starts for Holliday\_35:

(Start: 37 @27235 has 12 MA's), (49, 27340), (Start: 61 @27526 has 2 MA's), (64, 27535), (74, 27658), (93, 27823), (97, 27853), (113, 28003), (114, 28006), (119, 28069), (120, 28078), (130, 28174), (132, 28186), (152, 28294), (156, 28333), (164, 28399), (165, 28411), (173, 28501),

Gene: IsHungry\_31 Start: 23474, Stop: 24847, Start Num: 20

Candidate Starts for IsHungry\_31:

(Start: 20 @23474 has 1 MA's), (Start: 28 @23513 has 2 MA's), (41, 23588), (43, 23597), (49, 23672), (54, 23753), (59, 23828), (60, 23843), (Start: 61 @23855 has 2 MA's), (86, 24092), (90, 24122), (95, 24158), (98, 24179), (101, 24221), (103, 24236), (107, 24275), (108, 24284), (124, 24437), (133, 24515), (134, 24518), (140, 24557), (164, 24713), (166, 24743), (169, 24776),

Gene: Jabberwocky\_24 Start: 20582, Stop: 21943, Start Num: 25

Candidate Starts for Jabberwocky\_24:

(Start: 25 @20582 has 11 MA's), (Start: 45 @20723 has 1 MA's), (49, 20753), (57, 20867), (Start: 61 @20939 has 2 MA's), (63, 20945), (64, 20948), (71, 20996), (74, 21071), (77, 21101), (80, 21125), (85, 21176), (94, 21242), (105, 21350), (113, 21416), (117, 21473), (119, 21482), (120, 21491), (123, 21515), (126, 21542), (128, 21557), (148, 21692), (151, 21701), (156, 21746), (165, 21824), (177, 21938),

Gene: Jodelie19\_28 Start: 20820, Stop: 22175, Start Num: 27

Candidate Starts for Jodelie19\_28:

(Start: 27 @20820 has 6 MA's), (30, 20838), (36, 20868), (44, 20925), (53, 21057), (59, 21141), (Start: 61 @21168 has 2 MA's), (66, 21189), (71, 21225), (83, 21390), (99, 21504), (102, 21555), (104, 21573), (105, 21582), (108, 21606), (120, 21723), (165, 22056), (176, 22164),

Gene: Kamaru\_35 Start: 27235, Stop: 28530, Start Num: 37

Candidate Starts for Kamaru\_35:

(Start: 37 @27235 has 12 MA's), (49, 27340), (Start: 61 @27526 has 2 MA's), (64, 27535), (74, 27658), (93, 27823), (97, 27853), (113, 28003), (114, 28006), (119, 28069), (120, 28078), (130, 28174), (132, 28186), (152, 28294), (156, 28333), (164, 28399), (165, 28411), (173, 28501),

Gene: Kampe\_36 Start: 37364, Stop: 38371, Start Num: 61

Candidate Starts for Kampe\_36:

(Start: 61 @37364 has 2 MA's), (68, 37403), (79, 37538), (84, 37598), (93, 37664), (96, 37682), (97, 37697), (116, 37862), (117, 37904), (119, 37913), (120, 37922), (143, 38087), (146, 38111), (150, 38126), (155, 38168), (168, 38288), (171, 38327), (172, 38336), (176, 38360),

Gene: Kenosha\_27 Start: 19938, Stop: 21293, Start Num: 27

Candidate Starts for Kenosha\_27:

(Start: 27 @19938 has 6 MA's), (30, 19956), (36, 19986), (42, 20019), (44, 20043), (53, 20175), (57, 20214), (Start: 61 @20286 has 2 MA's), (70, 20340), (71, 20343), (73, 20391), (89, 20553), (92, 20580), (99, 20622), (102, 20673), (104, 20691), (105, 20700), (120, 20841), (159, 21138), (161, 21147), (164, 21162), (165, 21174), (176, 21282),

Gene: LitninMcQueen\_34 Start: 26978, Stop: 28273, Start Num: 37

Candidate Starts for LitninMcQueen\_34:

(Start: 37 @26978 has 12 MA's), (49, 27083), (Start: 61 @27269 has 2 MA's), (64, 27278), (74, 27401), (93, 27566), (97, 27596), (113, 27746), (114, 27749), (119, 27812), (120, 27821), (130, 27917), (132, 27929), (152, 28037), (156, 28076), (164, 28142), (165, 28154), (173, 28244),

Gene: LittleMunchkin\_20 Start: 17045, Stop: 18409, Start Num: 25

Candidate Starts for LittleMunchkin\_20:

(Start: 25 @17045 has 11 MA's), (Start: 45 @17186 has 1 MA's), (49, 17216), (51, 17252), (57, 17330), (Start: 61 @17402 has 2 MA's), (64, 17411), (65, 17417), (70, 17456), (71, 17459), (73, 17507), (74, 17534), (80, 17588), (85, 17639), (86, 17642), (97, 17729), (106, 17816), (113, 17879), (114, 17882), (117, 17936), (119, 17945), (120, 17954), (123, 17978), (126, 18005), (128, 18020), (131, 18053), (141, 18110), (147, 18149), (148, 18155), (151, 18164), (156, 18209), (157, 18233), (165, 18287),

Gene: Lton\_25 Start: 21029, Stop: 22702, Start Num: 5

Candidate Starts for Lton\_25:

(2, 20885), (4, 21026), (Start: 5 @21029 has 3 MA's), (6, 21089), (8, 21119), (9, 21131), (10, 21161), (13, 21290), (15, 21320), (17, 21338), (35, 21431), (49, 21509), (Start: 61 @21695 has 2 MA's), (62, 21698), (64, 21704), (74, 21827), (77, 21857), (85, 21932), (93, 21992), (99, 22031), (105, 22109), (106, 22112), (109, 22151), (113, 22175), (120, 22250), (131, 22349), (132, 22358), (147, 22445), (156, 22505), (158, 22544), (164, 22571), (165, 22583),

Gene: Malibo\_30 Start: 24379, Stop: 25671, Start Num: 37

Candidate Starts for Malibo\_30:

(Start: 37 @24379 has 12 MA's), (42, 24400), (49, 24481), (Start: 61 @24667 has 2 MA's), (64, 24676), (74, 24799), (77, 24829), (93, 24964), (105, 25078), (108, 25102), (113, 25144), (114, 25147), (119, 25210), (120, 25219), (130, 25315), (156, 25474), (161, 25525), (164, 25540), (165, 25552), (175, 25657),

Gene: Marteena\_30 Start: 25192, Stop: 26484, Start Num: 37

Candidate Starts for Marteena\_30:

(1, 24430), (3, 24757), (Start: 37 @25192 has 12 MA's), (42, 25213), (49, 25294), (56, 25405), (Start: 61 @25480 has 2 MA's), (64, 25489), (74, 25612), (77, 25642), (93, 25777), (105, 25891), (113, 25957), (114, 25960), (119, 26023), (120, 26032), (130, 26128), (152, 26248), (156, 26287), (164, 26353), (165, 26365),

Gene: MoontowerMania\_25 Start: 19790, Stop: 21151, Start Num: 25

Candidate Starts for MoontowerMania\_25:

(Start: 25 @19790 has 11 MA's), (Start: 45 @19931 has 1 MA's), (49, 19961), (57, 20075), (Start: 61 @20147 has 2 MA's), (63, 20153), (64, 20156), (65, 20162), (71, 20204), (74, 20279), (77, 20309), (80,

20333), (85, 20384), (94, 20450), (105, 20558), (113, 20624), (117, 20681), (119, 20690), (120, 20699), (123, 20723), (126, 20750), (128, 20765), (148, 20900), (151, 20909), (177, 21146),

Gene: Nadmeg\_28 Start: 20601, Stop: 21956, Start Num: 27

Candidate Starts for Nadmeg\_28:

(Start: 27 @20601 has 6 MA's), (30, 20619), (36, 20649), (42, 20682), (44, 20706), (53, 20838), (57, 20877), (Start: 61 @20949 has 2 MA's), (70, 21003), (71, 21006), (73, 21054), (89, 21216), (92, 21243), (99, 21285), (102, 21336), (104, 21354), (105, 21363), (120, 21504), (159, 21801), (161, 21810), (164, 21825), (165, 21837), (176, 21945),

Gene: Natkenzie\_25 Start: 19737, Stop: 21101, Start Num: 25

Candidate Starts for Natkenzie\_25:

(Start: 25 @19737 has 11 MA's), (31, 19770), (Start: 45 @19878 has 1 MA's), (49, 19908), (57, 20022), (Start: 61 @20094 has 2 MA's), (63, 20100), (64, 20103), (65, 20109), (71, 20151), (73, 20199), (74, 20226), (77, 20256), (80, 20280), (85, 20331), (94, 20397), (100, 20451), (105, 20505), (106, 20508), (113, 20571), (119, 20637), (120, 20646), (123, 20670), (126, 20697), (128, 20712), (129, 20721), (135, 20763), (141, 20802), (148, 20847), (151, 20856), (155, 20892), (156, 20901), (161, 20952), (164, 20967), (165, 20979), (173, 21069),

Gene: Neville\_22 Start: 13040, Stop: 14260, Start Num: 45

Candidate Starts for Neville\_22:

(Start: 21 @12884 has 2 MA's), (22, 12887), (Start: 45 @13040 has 1 MA's), (48, 13058), (49, 13070), (Start: 61 @13256 has 2 MA's), (82, 13469), (85, 13493), (93, 13553), (97, 13583), (99, 13589), (105, 13667), (106, 13670), (113, 13733), (114, 13736), (119, 13799), (131, 13907), (139, 13958), (150, 14012), (154, 14048), (156, 14063), (160, 14111), (163, 14126), (164, 14129), (175, 14246),

Gene: ODay\_39 Start: 29045, Stop: 30340, Start Num: 37

Candidate Starts for ODay\_39:

(12, 28868), (Start: 37 @29045 has 12 MA's), (49, 29150), (Start: 61 @29336 has 2 MA's), (64, 29345), (74, 29468), (77, 29498), (79, 29510), (93, 29633), (97, 29663), (105, 29747), (113, 29813), (119, 29879), (120, 29888), (130, 29984), (132, 29996), (147, 30083), (152, 30104), (155, 30134), (156, 30143), (161, 30194), (165, 30221), (173, 30311),

Gene: OneDirection\_24 Start: 20984, Stop: 22720, Start Num: 5

Candidate Starts for OneDirection\_24:

(Start: 5 @20984 has 3 MA's), (8, 21074), (13, 21245), (15, 21275), (17, 21293), (18, 21302), (40, 21431), (48, 21515), (49, 21527), (Start: 61 @21713 has 2 MA's), (62, 21716), (64, 21722), (65, 21728), (74, 21845), (77, 21875), (79, 21887), (85, 21950), (93, 22010), (99, 22049), (105, 22127), (106, 22130), (109, 22169), (113, 22193), (119, 22259), (120, 22268), (132, 22376), (147, 22463), (152, 22484), (156, 22523), (158, 22562), (165, 22601),

Gene: Opie\_30 Start: 25229, Stop: 26521, Start Num: 37

Candidate Starts for Opie\_30:

(Start: 37 @25229 has 12 MA's), (39, 25238), (42, 25250), (49, 25331), (Start: 61 @25517 has 2 MA's), (64, 25526), (70, 25571), (74, 25649), (83, 25739), (84, 25748), (93, 25814), (97, 25844), (105, 25928), (113, 25994), (114, 25997), (119, 26060), (120, 26069), (130, 26165), (156, 26324), (161, 26375), (164, 26390), (165, 26402), (173, 26492),

Gene: Orchid\_35 Start: 36987, Stop: 38372, Start Num: 21

Candidate Starts for Orchid\_35:

(Start: 21 @36987 has 2 MA's), (26, 37008), (33, 37041), (52, 37248), (Start: 61 @37365 has 2 MA's), (68, 37404), (79, 37539), (84, 37599), (93, 37665), (96, 37683), (97, 37698), (116, 37863), (117, 37905), (119, 37914), (120, 37923), (143, 38088), (146, 38112), (150, 38127), (155, 38169), (168,

38289), (171, 38328), (172, 38337), (176, 38361),

Gene: PatrickStar\_36 Start: 37364, Stop: 38371, Start Num: 61

Candidate Starts for PatrickStar\_36:

(Start: 61 @37364 has 2 MA's), (68, 37403), (79, 37538), (84, 37598), (93, 37664), (96, 37682), (97, 37697), (116, 37862), (117, 37904), (119, 37913), (120, 37922), (143, 38087), (146, 38111), (150, 38126), (155, 38168), (168, 38288), (171, 38327), (172, 38336), (176, 38360),

Gene: Phistory\_36 Start: 27923, Stop: 29218, Start Num: 37

Candidate Starts for Phistory\_36:

(12, 27746), (Start: 37 @27923 has 12 MA's), (49, 28028), (Start: 61 @28214 has 2 MA's), (64, 28223), (74, 28346), (93, 28511), (105, 28625), (108, 28649), (113, 28691), (114, 28694), (119, 28757), (120, 28766), (130, 28862), (132, 28874), (152, 28982), (156, 29021), (165, 29099), (173, 29189),

Gene: RobinSparkles\_38 Start: 37904, Stop: 39289, Start Num: 21

Candidate Starts for RobinSparkles\_38:

(Start: 21 @37904 has 2 MA's), (26, 37925), (33, 37958), (52, 38165), (Start: 61 @38282 has 2 MA's), (68, 38321), (79, 38456), (84, 38516), (93, 38582), (96, 38600), (97, 38615), (116, 38780), (117, 38822), (119, 38831), (120, 38840), (143, 39005), (146, 39029), (150, 39044), (155, 39086), (168, 39206), (171, 39245), (172, 39254), (176, 39278),

Gene: Ruthy\_31 Start: 25882, Stop: 27174, Start Num: 37

Candidate Starts for Ruthy\_31:

(Start: 37 @25882 has 12 MA's), (39, 25891), (42, 25903), (49, 25984), (Start: 61 @26170 has 2 MA's), (64, 26179), (74, 26302), (77, 26332), (93, 26467), (105, 26581), (113, 26647), (114, 26650), (119, 26713), (120, 26722), (130, 26818), (156, 26977), (161, 27028), (165, 27055),

Gene: Samba\_31 Start: 26209, Stop: 27507, Start Num: 28

Candidate Starts for Samba\_31:

(Start: 28 @26209 has 2 MA's), (46, 26293), (49, 26314), (58, 26455), (59, 26473), (Start: 61 @26500 has 2 MA's), (68, 26539), (74, 26632), (85, 26737), (91, 26773), (93, 26797), (97, 26830), (99, 26836), (102, 26887), (104, 26905), (114, 26983), (120, 27055), (128, 27121), (138, 27196), (150, 27259), (152, 27271), (156, 27310), (162, 27364), (165, 27388), (169, 27430),

Gene: Sampson\_25 Start: 19682, Stop: 21046, Start Num: 25

Candidate Starts for Sampson\_25:

(Start: 25 @19682 has 11 MA's), (31, 19715), (Start: 45 @19823 has 1 MA's), (49, 19853), (57, 19967), (Start: 61 @20039 has 2 MA's), (63, 20045), (64, 20048), (65, 20054), (71, 20096), (73, 20144), (74, 20171), (77, 20201), (80, 20225), (85, 20276), (94, 20342), (100, 20396), (105, 20450), (106, 20453), (113, 20516), (119, 20582), (120, 20591), (123, 20615), (126, 20642), (128, 20657), (129, 20666), (135, 20708), (141, 20747), (148, 20792), (151, 20801), (155, 20837), (156, 20846), (161, 20897), (164, 20912), (165, 20924), (173, 21014),

Gene: Sanjuju\_24 Start: 20194, Stop: 21555, Start Num: 25

Candidate Starts for Sanjuju\_24:

(Start: 25 @20194 has 11 MA's), (Start: 45 @20335 has 1 MA's), (49, 20365), (57, 20479), (Start: 61 @20551 has 2 MA's), (63, 20557), (64, 20560), (65, 20566), (71, 20608), (74, 20683), (77, 20713), (80, 20737), (85, 20788), (94, 20854), (105, 20962), (113, 21028), (117, 21085), (119, 21094), (120, 21103), (123, 21127), (126, 21154), (128, 21169), (148, 21304), (151, 21313), (156, 21358), (165, 21436), (177, 21550),

Gene: Scioto\_25 Start: 19737, Stop: 21101, Start Num: 25

Candidate Starts for Scioto\_25:

(Start: 25 @19737 has 11 MA's), (31, 19770), (Start: 45 @19878 has 1 MA's), (49, 19908), (57, 20022), (Start: 61 @20094 has 2 MA's), (63, 20100), (64, 20103), (65, 20109), (71, 20151), (73, 20199), (74, 20226), (77, 20256), (80, 20280), (85, 20331), (94, 20397), (100, 20451), (105, 20505), (106, 20508), (113, 20571), (119, 20637), (120, 20646), (123, 20670), (126, 20697), (128, 20712), (129, 20721), (135, 20763), (141, 20802), (148, 20847), (151, 20856), (155, 20892), (156, 20901), (161, 20952), (164, 20967), (165, 20979), (173, 21069),

Gene: ShawBrad\_35 Start: 27145, Stop: 28440, Start Num: 37

Candidate Starts for ShawBrad\_35:

(12, 26968), (Start: 37 @27145 has 12 MA's), (49, 27250), (Start: 61 @27436 has 2 MA's), (64, 27445), (74, 27568), (93, 27733), (105, 27847), (108, 27871), (113, 27913), (114, 27916), (119, 27979), (120, 27988), (130, 28084), (132, 28096), (152, 28204), (156, 28243), (165, 28321), (173, 28411),

Gene: Shivanishola\_25 Start: 19590, Stop: 20882, Start Num: 37

Candidate Starts for Shivanishola\_25:

(Start: 37 @19590 has 12 MA's), (42, 19611), (49, 19692), (Start: 61 @19878 has 2 MA's), (64, 19887), (74, 20010), (93, 20175), (105, 20289), (113, 20355), (114, 20358), (119, 20421), (120, 20430), (130, 20526), (135, 20547), (150, 20634), (155, 20676), (156, 20685), (164, 20751), (165, 20763),

Gene: Tardus\_26 Start: 19018, Stop: 20382, Start Num: 25

Candidate Starts for Tardus\_26:

(Start: 25 @19018 has 11 MA's), (31, 19051), (Start: 45 @19159 has 1 MA's), (49, 19189), (57, 19303), (Start: 61 @19375 has 2 MA's), (63, 19381), (64, 19384), (65, 19390), (71, 19432), (73, 19480), (74, 19507), (77, 19537), (79, 19549), (80, 19561), (85, 19612), (94, 19678), (98, 19705), (100, 19732), (105, 19786), (106, 19789), (113, 19852), (119, 19918), (120, 19927), (123, 19951), (126, 19978), (128, 19993), (129, 20002), (135, 20044), (141, 20083), (148, 20128), (151, 20137), (155, 20173), (156, 20182), (161, 20233), (164, 20248), (165, 20260), (173, 20350),

Gene: TenaciousP\_28 Start: 20820, Stop: 22175, Start Num: 27

Candidate Starts for TenaciousP\_28:

(Start: 27 @20820 has 6 MA's), (30, 20838), (36, 20868), (44, 20925), (53, 21057), (59, 21141), (Start: 61 @21168 has 2 MA's), (66, 21189), (71, 21225), (83, 21390), (99, 21504), (102, 21555), (104, 21573), (105, 21582), (108, 21606), (120, 21723), (165, 22056), (176, 22164),

Gene: Untouchable\_27 Start: 19526, Stop: 20881, Start Num: 27

Candidate Starts for Untouchable\_27:

(Start: 27 @19526 has 6 MA's), (30, 19544), (36, 19574), (42, 19607), (44, 19631), (53, 19763), (57, 19802), (Start: 61 @19874 has 2 MA's), (70, 19928), (71, 19931), (73, 19979), (89, 20141), (92, 20168), (99, 20210), (102, 20261), (104, 20279), (105, 20288), (120, 20429), (159, 20726), (161, 20735), (164, 20750), (165, 20762), (176, 20870),

Gene: ZiggyZoo\_31 Start: 26050, Stop: 27348, Start Num: 28

Candidate Starts for ZiggyZoo\_31:

(Start: 28 @26050 has 2 MA's), (46, 26134), (49, 26155), (58, 26296), (59, 26314), (Start: 61 @26341 has 2 MA's), (68, 26380), (74, 26473), (85, 26578), (91, 26614), (93, 26638), (97, 26671), (99, 26677), (102, 26728), (104, 26746), (114, 26824), (120, 26896), (128, 26962), (138, 27037), (150, 27100), (152, 27112), (156, 27151), (162, 27205), (165, 27229), (169, 27271),

Gene: Zipp\_25 Start: 19842, Stop: 21212, Start Num: 24

Candidate Starts for Zipp\_25:

(Start: 24 @19842 has 1 MA's), (Start: 25 @19848 has 11 MA's), (31, 19881), (39, 19926), (Start: 45 @19989 has 1 MA's), (49, 20019), (51, 20055), (55, 20124), (57, 20133), (Start: 61 @20205 has 2 MA's), (65, 20220), (71, 20262), (73, 20310), (74, 20337), (77, 20367), (80, 20391), (85, 20442), (94,

20508), (106, 20619), (113, 20682), (114, 20685), (117, 20739), (119, 20748), (120, 20757), (123, 20781), (126, 20808), (128, 20823), (135, 20874), (138, 20898), (141, 20913), (151, 20967), (156, 21012), (161, 21063), (164, 21078),