



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 171521 Report

This analysis was run 07/10/24 on database version 566.

Pham number 171521 has 51 members, 3 are drafts.

Phages represented in each track:

- Track 1 : Onika\_36, Cranjjs\_38, CrazyRich\_36
- Track 2 : Scumberland\_38, Selwyn23\_38, LittleFortune\_38
- Track 3 : Yeti\_37, Honeyfin\_38, Phrancesco\_37, Ganandorf\_36, Jefe\_37, Phorgeous\_36, Busephilis\_36
- Track 4 : Antares\_37
- Track 5 : Piperis\_37
- Track 6 : Pulchra\_38, Jollipop\_37, Hermeonysus\_36, BrazzalePHS\_36
- Track 7 : Kowalski\_36, Ramiel05\_36, Savannah\_36
- Track 8 : PiperSansNom\_37
- Track 9 : EarickHC\_37, KaiHaiDragon\_37
- Track 10 : Quhwah\_40
- Track 11 : NoodlelyBoi\_37
- Track 12 : Paschalis\_36
- Track 13 : Crisis\_38
- Track 14 : PierreOrion\_37
- Track 15 : Shotgun\_36
- Track 16 : Tempo\_36, Fregley\_37, CandC\_35
- Track 17 : Phinky\_43
- Track 18 : OneinaGillian\_36
- Track 19 : BabyDotz\_36
- Track 20 : Romm\_38, Kelcole\_35, RobinRose\_38
- Track 21 : Marcie\_41
- Track 22 : RubyRalph\_39, SadLad\_41, Fransoyer\_39
- Track 23 : Cinna\_32
- Track 24 : Matzah\_33
- Track 25 : Cressida\_34
- Track 26 : MementoMori\_33
- Track 27 : Margaery\_32
- Track 28 : Hendrix\_71
- Track 29 : Rasputia\_72

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

The start number called the most often in the published annotations is 15, it was called in 34 of the 48 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- Antares\_37, BrazzalePHS\_36, Busephilis\_36, Cinna\_32, Cranjis\_38, CrazyRich\_36, Cressida\_34, Crisis\_38, EarickHC\_37, Ganandorf\_36, Hermeonysus\_36, Honeyfin\_38, Jefe\_37, Jollipop\_37, KaiHaiDragon\_37, Kowalski\_36, LittleFortune\_38, Margaery\_32, Matzah\_33, MementoMori\_33, NoodlelyBoi\_37, Onika\_36, Paschalis\_36, Phorgeous\_36, Phrancesco\_37, PierreOrion\_37, PiperSansNom\_37, Piperis\_37, Pulchra\_38, Quhwah\_40, Ramiel05\_36, Savannah\_36, Scumberland\_38, Selwyn23\_38, Shotgun\_36, Yeti\_37,

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

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

- BabyDotz\_36, CandC\_35, Fransoyer\_39, Fregley\_37, Hendrix\_71, Kelcole\_35, Marcie\_41, OneinaGillian\_36, Phinky\_43, Rasputia\_72, RobinRose\_38, Romm\_38, RubyRalph\_39, SadLad\_41, Tempo\_36,

### Summary by start number:

Start 1:

- Found in 3 of 51 ( 5.9% ) of genes in pham
- Manual Annotations of this start: 3 of 48
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Fransoyer\_39 (EG), RubyRalph\_39 (EG), SadLad\_41 (EG),

Start 15:

- Found in 36 of 51 ( 70.6% ) of genes in pham
- Manual Annotations of this start: 34 of 48
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Antares\_37 (EC), BrazzalePHS\_36 (EC), Busephilis\_36 (EC), Cinna\_32 (EI), Cranjis\_38 (EC), CrazyRich\_36 (EC), Cressida\_34 (EI), Crisis\_38 (EC), EarickHC\_37 (EC), Ganandorf\_36 (EC), Hermeonysus\_36 (EC), Honeyfin\_38 (EC), Jefe\_37 (EC), Jollipop\_37 (EC), KaiHaiDragon\_37 (EC), Kowalski\_36 (EC), LittleFortune\_38 (EC), Margaery\_32 (EI), Matzah\_33 (EI), MementoMori\_33 (EI), NoodlelyBoi\_37 (EC), Onika\_36 (EC), Paschalis\_36 (EC), Phorgeous\_36 (EC), Phrancesco\_37 (EC), PierreOrion\_37 (EC), PiperSansNom\_37 (EC), Piperis\_37 (EC), Pulchra\_38 (EC), Quhwah\_40 (EC), Ramiel05\_36 (EC), Savannah\_36 (EC), Scumberland\_38 (EC), Selwyn23\_38 (EC), Shotgun\_36 (EC), Yeti\_37 (EC),

Start 16:

- Found in 12 of 51 ( 23.5% ) of genes in pham
- Manual Annotations of this start: 11 of 48
- Called 100.0% of time when present
- Phage (with cluster) where this start called: BabyDotz\_36 (EG), CandC\_35 (EG), Fregley\_37 (EG), Hendrix\_71 (GC), Kelcole\_35 (EG), Marcie\_41 (EG), OneinaGillian\_36 (EG), Phinky\_43 (EG), Rasputia\_72 (GC), RobinRose\_38 (EG), Romm\_38 (EG), Tempo\_36 (EG),

## Summary by clusters:

There are 4 clusters represented in this pham: EI, EG, GC, EC,

Info for manual annotations of cluster EC:

- Start number 15 was manually annotated 29 times for cluster EC.

Info for manual annotations of cluster EG:

- Start number 1 was manually annotated 3 times for cluster EG.
- Start number 16 was manually annotated 9 times for cluster EG.

Info for manual annotations of cluster EI:

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

Info for manual annotations of cluster GC:

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

## Gene Information:

Gene: Antares\_37 Start: 23711, Stop: 25657, Start Num: 15

Candidate Starts for Antares\_37:

(Start: 15 @23711 has 34 MA's), (22, 23756), (23, 23780), (24, 23807), (26, 23828), (42, 23984), (49, 24020), (53, 24053), (54, 24059), (56, 24074), (72, 24218), (76, 24260), (82, 24305), (99, 24338), (123, 24446), (126, 24473), (127, 24476), (133, 24521), (136, 24548), (137, 24551), (155, 24641), (163, 24680), (164, 24689), (166, 24704), (185, 24851), (188, 24890), (189, 24902), (202, 24992), (203, 24995), (204, 25019), (205, 25028), (207, 25058), (212, 25133), (213, 25166), (217, 25196), (239, 25403), (243, 25442), (246, 25472), (263, 25589),

Gene: BabyDotz\_36 Start: 26482, Stop: 28446, Start Num: 16

Candidate Starts for BabyDotz\_36:

(Start: 16 @26482 has 11 MA's), (20, 26506), (25, 26578), (27, 26593), (52, 26809), (54, 26824), (59, 26881), (64, 26932), (109, 27151), (111, 27166), (140, 27319), (146, 27361), (165, 27451), (167, 27460), (188, 27640), (190, 27661), (195, 27694), (197, 27703), (204, 27769), (208, 27817), (209, 27820), (212, 27883), (228, 28018), (237, 28147), (243, 28204), (247, 28252), (258, 28345), (260, 28354), (269, 28432),

Gene: BrazzalePHS\_36 Start: 23506, Stop: 25452, Start Num: 15

Candidate Starts for BrazzalePHS\_36:

(Start: 15 @23506 has 34 MA's), (22, 23551), (23, 23575), (24, 23602), (26, 23623), (42, 23779), (49, 23815), (53, 23848), (54, 23854), (56, 23869), (72, 24013), (76, 24055), (99, 24133), (126, 24268), (127, 24271), (133, 24316), (136, 24343), (137, 24346), (155, 24436), (163, 24475), (164, 24484), (166, 24499), (185, 24646), (188, 24685), (189, 24697), (202, 24787), (203, 24790), (204, 24814), (205, 24823), (212, 24928), (213, 24961), (217, 24991), (239, 25198), (243, 25237), (246, 25267), (263, 25384),

Gene: Busephilis\_36 Start: 23441, Stop: 25393, Start Num: 15

Candidate Starts for Busephilis\_36:

(Start: 15 @23441 has 34 MA's), (22, 23486), (23, 23510), (24, 23537), (26, 23558), (42, 23714), (49, 23750), (53, 23783), (54, 23789), (56, 23804), (72, 23948), (76, 23990), (77, 23993), (99, 24074), (127, 24212), (128, 24218), (133, 24257), (136, 24284), (141, 24305), (143, 24314), (152, 24368), (155, 24377), (160, 24392), (163, 24416), (164, 24425), (166, 24440), (183, 24566), (185, 24587),

(188, 24626), (189, 24638), (202, 24728), (203, 24731), (204, 24755), (205, 24764), (207, 24794), (211, 24866), (212, 24869), (213, 24902), (217, 24932), (239, 25139), (243, 25178), (246, 25208), (263, 25325),

Gene: CandC\_35 Start: 24614, Stop: 26587, Start Num: 16

Candidate Starts for CandC\_35:

(Start: 16 @24614 has 11 MA's), (17, 24617), (31, 24752), (52, 24944), (54, 24959), (59, 25016), (65, 25070), (67, 25082), (72, 25115), (88, 25220), (140, 25454), (150, 25511), (165, 25586), (190, 25796), (192, 25811), (204, 25910), (205, 25919), (209, 25961), (214, 26063), (228, 26159), (237, 26288), (247, 26393), (258, 26486), (260, 26495), (269, 26573),

Gene: Cinna\_32 Start: 22859, Stop: 25375, Start Num: 15

Candidate Starts for Cinna\_32:

(11, 22466), (Start: 15 @22859 has 34 MA's), (24, 22952), (28, 22985), (33, 23009), (35, 23027), (40, 23111), (45, 23141), (47, 23150), (50, 23168), (51, 23177), (53, 23198), (54, 23204), (56, 23219), (58, 23252), (59, 23261), (68, 23336), (72, 23363), (87, 23570), (92, 23630), (94, 23663), (97, 23735), (98, 23738), (103, 23771), (104, 23774), (105, 23786), (112, 23825), (117, 23870), (119, 23876), (120, 23885), (123, 23942), (135, 24053), (145, 24101), (152, 24140), (159, 24194), (169, 24296), (173, 24407), (180, 24476), (184, 24512), (188, 24569), (193, 24608), (199, 24641), (201, 24665), (203, 24674), (205, 24707), (209, 24749), (211, 24809), (218, 24884), (232, 25019), (236, 25076), (261, 25289), (265, 25334),

Gene: Cranjis\_38 Start: 23666, Stop: 25612, Start Num: 15

Candidate Starts for Cranjis\_38:

(Start: 15 @23666 has 34 MA's), (22, 23711), (23, 23735), (24, 23762), (26, 23783), (42, 23939), (49, 23975), (53, 24008), (54, 24014), (56, 24029), (72, 24173), (76, 24215), (82, 24260), (99, 24293), (126, 24428), (127, 24431), (133, 24476), (136, 24503), (137, 24506), (155, 24596), (163, 24635), (164, 24644), (166, 24659), (185, 24806), (188, 24845), (189, 24857), (202, 24947), (203, 24950), (204, 24974), (205, 24983), (212, 25088), (213, 25121), (217, 25151), (239, 25358), (243, 25397), (246, 25427), (263, 25544),

Gene: CrazyRich\_36 Start: 23475, Stop: 25421, Start Num: 15

Candidate Starts for CrazyRich\_36:

(Start: 15 @23475 has 34 MA's), (22, 23520), (23, 23544), (24, 23571), (26, 23592), (42, 23748), (49, 23784), (53, 23817), (54, 23823), (56, 23838), (72, 23982), (76, 24024), (82, 24069), (99, 24102), (126, 24237), (127, 24240), (133, 24285), (136, 24312), (137, 24315), (155, 24405), (163, 24444), (164, 24453), (166, 24468), (185, 24615), (188, 24654), (189, 24666), (202, 24756), (203, 24759), (204, 24783), (205, 24792), (212, 24897), (213, 24930), (217, 24960), (239, 25167), (243, 25206), (246, 25236), (263, 25353),

Gene: Cressida\_34 Start: 22922, Stop: 24850, Start Num: 15

Candidate Starts for Cressida\_34:

(Start: 15 @22922 has 34 MA's), (28, 23048), (39, 23165), (45, 23204), (47, 23213), (50, 23231), (51, 23240), (54, 23267), (58, 23315), (68, 23399), (72, 23426), (80, 23495), (86, 23522), (102, 23558), (104, 23564), (114, 23615), (122, 23651), (125, 23678), (127, 23684), (139, 23738), (144, 23765), (159, 23816), (162, 23837), (166, 23867), (171, 23900), (184, 23990), (188, 24047), (193, 24086), (194, 24101), (196, 24107), (203, 24152), (204, 24176), (205, 24185), (206, 24197), (209, 24227), (219, 24362), (225, 24401), (230, 24473), (232, 24494), (234, 24512), (236, 24551), (238, 24569), (242, 24602), (244, 24617), (245, 24620), (253, 24704), (259, 24758), (261, 24764),

Gene: Crisis\_38 Start: 23460, Stop: 25412, Start Num: 15

Candidate Starts for Crisis\_38:

(Start: 15 @23460 has 34 MA's), (22, 23505), (23, 23529), (24, 23556), (26, 23577), (42, 23733), (49, 23769), (53, 23802), (54, 23808), (56, 23823), (72, 23967), (76, 24009), (77, 24012), (99, 24093), (127, 24231), (128, 24237), (133, 24276), (136, 24303), (141, 24324), (143, 24333), (152, 24387), (155, 24396), (160, 24411), (163, 24435), (164, 24444), (166, 24459), (183, 24585), (185, 24606), (188, 24645), (189, 24657), (202, 24747), (203, 24750), (204, 24774), (205, 24783), (207, 24813), (211, 24885), (212, 24888), (213, 24921), (217, 24951), (243, 25197), (246, 25227), (263, 25344),

Gene: EarickHC\_37 Start: 23386, Stop: 25338, Start Num: 15

Candidate Starts for EarickHC\_37:

(Start: 15 @23386 has 34 MA's), (22, 23431), (23, 23455), (24, 23482), (26, 23503), (49, 23695), (53, 23728), (54, 23734), (56, 23749), (72, 23893), (76, 23935), (77, 23938), (78, 23956), (99, 24019), (127, 24157), (128, 24163), (133, 24202), (136, 24229), (152, 24313), (155, 24322), (160, 24337), (163, 24361), (164, 24370), (166, 24385), (183, 24511), (185, 24532), (188, 24571), (189, 24583), (202, 24673), (203, 24676), (204, 24700), (205, 24709), (211, 24811), (212, 24814), (213, 24847), (217, 24877), (239, 25084), (243, 25123), (246, 25153), (263, 25270),

Gene: Fransoyer\_39 Start: 25911, Stop: 28880, Start Num: 1

Candidate Starts for Fransoyer\_39:

(Start: 1 @25911 has 3 MA's), (2, 25941), (3, 26073), (4, 26112), (5, 26157), (6, 26235), (7, 26337), (8, 26361), (9, 26367), (10, 26463), (12, 26559), (13, 26643), (14, 26841), (18, 26916), (21, 26943), (29, 27033), (30, 27036), (32, 27045), (34, 27057), (36, 27090), (38, 27117), (46, 27183), (48, 27189), (53, 27234), (55, 27255), (69, 27384), (74, 27429), (79, 27471), (81, 27486), (83, 27495), (90, 27528), (124, 27660), (132, 27720), (147, 27816), (149, 27834), (155, 27858), (156, 27861), (183, 28047), (187, 28107), (190, 28128), (192, 28143), (198, 28176), (200, 28194), (201, 28209), (206, 28263), (209, 28293), (211, 28353), (212, 28356), (215, 28413), (222, 28443), (226, 28461), (233, 28545), (237, 28602), (243, 28656), (258, 28788), (264, 28836), (265, 28839),

Gene: Fregley\_37 Start: 25184, Stop: 27157, Start Num: 16

Candidate Starts for Fregley\_37:

(Start: 16 @25184 has 11 MA's), (17, 25187), (31, 25322), (52, 25514), (54, 25529), (59, 25586), (65, 25640), (67, 25652), (72, 25685), (88, 25790), (140, 26024), (150, 26081), (165, 26156), (190, 26366), (192, 26381), (204, 26480), (205, 26489), (209, 26531), (214, 26633), (228, 26729), (237, 26858), (247, 26963), (258, 27056), (260, 27065), (269, 27143),

Gene: Ganandorf\_36 Start: 23522, Stop: 25474, Start Num: 15

Candidate Starts for Ganandorf\_36:

(Start: 15 @23522 has 34 MA's), (22, 23567), (23, 23591), (24, 23618), (26, 23639), (42, 23795), (49, 23831), (53, 23864), (54, 23870), (56, 23885), (72, 24029), (76, 24071), (77, 24074), (99, 24155), (127, 24293), (128, 24299), (133, 24338), (136, 24365), (141, 24386), (143, 24395), (152, 24449), (155, 24458), (160, 24473), (163, 24497), (164, 24506), (166, 24521), (183, 24647), (185, 24668), (188, 24707), (189, 24719), (202, 24809), (203, 24812), (204, 24836), (205, 24845), (207, 24875), (211, 24947), (212, 24950), (213, 24983), (217, 25013), (239, 25220), (243, 25259), (246, 25289), (263, 25406),

Gene: Hendrix\_71 Start: 44066, Stop: 46000, Start Num: 16

Candidate Starts for Hendrix\_71:

(Start: 16 @44066 has 11 MA's), (22, 44108), (24, 44156), (44, 44342), (53, 44402), (54, 44408), (58, 44456), (59, 44465), (60, 44471), (66, 44528), (70, 44555), (91, 44684), (100, 44690), (101, 44696), (107, 44726), (108, 44729), (124, 44792), (125, 44813), (128, 44825), (134, 44876), (151, 44951), (154, 44963), (168, 45026), (190, 45209), (192, 45224), (201, 45284), (203, 45293), (205, 45323), (208, 45362), (209, 45365), (212, 45428), (213, 45461), (227, 45554), (229, 45584), (230, 45614), (232, 45638), (234, 45656), (235, 45686), (252, 45848), (257, 45872), (258, 45899), (262, 45917), (268, 45983), (269, 45986), (270, 45992),

Gene: Hermeonysus\_36 Start: 23395, Stop: 25341, Start Num: 15

Candidate Starts for Hermeonysus\_36:

(Start: 15 @23395 has 34 MA's), (22, 23440), (23, 23464), (24, 23491), (26, 23512), (42, 23668), (49, 23704), (53, 23737), (54, 23743), (56, 23758), (72, 23902), (76, 23944), (99, 24022), (126, 24157), (127, 24160), (133, 24205), (136, 24232), (137, 24235), (155, 24325), (163, 24364), (164, 24373), (166, 24388), (185, 24535), (188, 24574), (189, 24586), (202, 24676), (203, 24679), (204, 24703), (205, 24712), (212, 24817), (213, 24850), (217, 24880), (239, 25087), (243, 25126), (246, 25156), (263, 25273),

Gene: Honeyfin\_38 Start: 23710, Stop: 25662, Start Num: 15

Candidate Starts for Honeyfin\_38:

(Start: 15 @23710 has 34 MA's), (22, 23755), (23, 23779), (24, 23806), (26, 23827), (42, 23983), (49, 24019), (53, 24052), (54, 24058), (56, 24073), (72, 24217), (76, 24259), (77, 24262), (99, 24343), (127, 24481), (128, 24487), (133, 24526), (136, 24553), (141, 24574), (143, 24583), (152, 24637), (155, 24646), (160, 24661), (163, 24685), (164, 24694), (166, 24709), (183, 24835), (185, 24856), (188, 24895), (189, 24907), (202, 24997), (203, 25000), (204, 25024), (205, 25033), (207, 25063), (211, 25135), (212, 25138), (213, 25171), (217, 25201), (239, 25408), (243, 25447), (246, 25477), (263, 25594),

Gene: Jefe\_37 Start: 23447, Stop: 25399, Start Num: 15

Candidate Starts for Jefe\_37:

(Start: 15 @23447 has 34 MA's), (22, 23492), (23, 23516), (24, 23543), (26, 23564), (42, 23720), (49, 23756), (53, 23789), (54, 23795), (56, 23810), (72, 23954), (76, 23996), (77, 23999), (99, 24080), (127, 24218), (128, 24224), (133, 24263), (136, 24290), (141, 24311), (143, 24320), (152, 24374), (155, 24383), (160, 24398), (163, 24422), (164, 24431), (166, 24446), (183, 24572), (185, 24593), (188, 24632), (189, 24644), (202, 24734), (203, 24737), (204, 24761), (205, 24770), (207, 24800), (211, 24872), (212, 24875), (213, 24908), (217, 24938), (239, 25145), (243, 25184), (246, 25214), (263, 25331),

Gene: Jollipop\_37 Start: 23792, Stop: 25738, Start Num: 15

Candidate Starts for Jollipop\_37:

(Start: 15 @23792 has 34 MA's), (22, 23837), (23, 23861), (24, 23888), (26, 23909), (42, 24065), (49, 24101), (53, 24134), (54, 24140), (56, 24155), (72, 24299), (76, 24341), (99, 24419), (126, 24554), (127, 24557), (133, 24602), (136, 24629), (137, 24632), (155, 24722), (163, 24761), (164, 24770), (166, 24785), (185, 24932), (188, 24971), (189, 24983), (202, 25073), (203, 25076), (204, 25100), (205, 25109), (212, 25214), (213, 25247), (217, 25277), (239, 25484), (243, 25523), (246, 25553), (263, 25670),

Gene: KaiHaiDragon\_37 Start: 23386, Stop: 25338, Start Num: 15

Candidate Starts for KaiHaiDragon\_37:

(Start: 15 @23386 has 34 MA's), (22, 23431), (23, 23455), (24, 23482), (26, 23503), (49, 23695), (53, 23728), (54, 23734), (56, 23749), (72, 23893), (76, 23935), (77, 23938), (78, 23956), (99, 24019), (127, 24157), (128, 24163), (133, 24202), (136, 24229), (152, 24313), (155, 24322), (160, 24337), (163, 24361), (164, 24370), (166, 24385), (183, 24511), (185, 24532), (188, 24571), (189, 24583), (202, 24673), (203, 24676), (204, 24700), (205, 24709), (211, 24811), (212, 24814), (213, 24847), (217, 24877), (239, 25084), (243, 25123), (246, 25153), (263, 25270),

Gene: Kelcole\_35 Start: 25066, Stop: 27039, Start Num: 16

Candidate Starts for Kelcole\_35:

(Start: 16 @25066 has 11 MA's), (17, 25069), (31, 25204), (52, 25396), (54, 25411), (59, 25468), (65, 25522), (67, 25534), (88, 25672), (140, 25906), (150, 25963), (165, 26038), (190, 26248), (192, 26263), (204, 26362), (205, 26371), (209, 26413), (214, 26515), (228, 26611), (237, 26740), (247,

26845), (258, 26938), (260, 26947), (269, 27025),

Gene: Kowalski\_36 Start: 23502, Stop: 25448, Start Num: 15

Candidate Starts for Kowalski\_36:

(Start: 15 @23502 has 34 MA's), (22, 23547), (23, 23571), (24, 23598), (26, 23619), (42, 23775), (49, 23811), (53, 23844), (54, 23850), (56, 23865), (72, 24009), (76, 24051), (99, 24129), (126, 24264), (127, 24267), (133, 24312), (136, 24339), (137, 24342), (155, 24432), (163, 24471), (164, 24480), (166, 24495), (185, 24642), (188, 24681), (189, 24693), (202, 24783), (203, 24786), (204, 24810), (205, 24819), (211, 24921), (212, 24924), (213, 24957), (217, 24987), (239, 25194), (243, 25233), (246, 25263), (263, 25380),

Gene: LittleFortune\_38 Start: 23752, Stop: 25704, Start Num: 15

Candidate Starts for LittleFortune\_38:

(Start: 15 @23752 has 34 MA's), (22, 23797), (23, 23821), (24, 23848), (26, 23869), (42, 24025), (49, 24061), (53, 24094), (54, 24100), (56, 24115), (72, 24259), (76, 24301), (77, 24304), (99, 24385), (127, 24523), (128, 24529), (133, 24568), (136, 24595), (141, 24616), (143, 24625), (152, 24679), (155, 24688), (160, 24703), (163, 24727), (164, 24736), (166, 24751), (183, 24877), (185, 24898), (188, 24937), (189, 24949), (202, 25039), (203, 25042), (204, 25066), (205, 25075), (207, 25105), (211, 25177), (212, 25180), (213, 25213), (217, 25243), (239, 25450), (241, 25471), (243, 25489), (246, 25519), (263, 25636),

Gene: Marcie\_41 Start: 25722, Stop: 27695, Start Num: 16

Candidate Starts for Marcie\_41:

(Start: 16 @25722 has 11 MA's), (17, 25725), (31, 25860), (52, 26052), (54, 26067), (59, 26124), (65, 26178), (72, 26223), (91, 26340), (100, 26349), (127, 26484), (150, 26619), (190, 26904), (192, 26919), (195, 26940), (201, 26985), (204, 27018), (208, 27066), (209, 27069), (214, 27171), (237, 27396), (241, 27438), (243, 27456), (256, 27561), (257, 27567), (258, 27594), (269, 27681),

Gene: Margaery\_32 Start: 22803, Stop: 24701, Start Num: 15

Candidate Starts for Margaery\_32:

(11, 22407), (Start: 15 @22803 has 34 MA's), (24, 22899), (25, 22908), (37, 23007), (41, 23061), (43, 23079), (49, 23112), (53, 23145), (54, 23151), (56, 23166), (62, 23220), (66, 23271), (71, 23307), (72, 23310), (85, 23406), (106, 23466), (121, 23529), (122, 23535), (125, 23562), (136, 23625), (144, 23649), (148, 23673), (165, 23751), (177, 23820), (178, 23841), (181, 23859), (182, 23868), (191, 23976), (202, 24048), (203, 24051), (204, 24075), (206, 24096), (210, 24150), (211, 24186), (216, 24249), (217, 24252), (221, 24273), (228, 24315), (237, 24432), (241, 24468), (266, 24666), (269, 24687),

Gene: Matzah\_33 Start: 22835, Stop: 25315, Start Num: 15

Candidate Starts for Matzah\_33:

(Start: 15 @22835 has 34 MA's), (24, 22928), (28, 22961), (33, 22985), (35, 23003), (40, 23087), (45, 23117), (47, 23126), (50, 23144), (51, 23153), (53, 23174), (54, 23180), (56, 23195), (58, 23228), (59, 23237), (68, 23312), (72, 23339), (75, 23396), (84, 23495), (87, 23543), (89, 23558), (93, 23600), (95, 23645), (96, 23651), (110, 23747), (113, 23777), (133, 23963), (134, 23978), (138, 23993), (146, 24041), (153, 24080), (159, 24131), (161, 24188), (162, 24206), (163, 24212), (172, 24314), (174, 24362), (175, 24371), (179, 24419), (193, 24560), (199, 24593), (201, 24617), (203, 24626), (205, 24659), (209, 24701), (211, 24761), (220, 24839), (225, 24875), (236, 25025), (241, 25070), (250, 25154), (251, 25157),

Gene: MementoMori\_33 Start: 22559, Stop: 25063, Start Num: 15

Candidate Starts for MementoMori\_33:

(Start: 15 @22559 has 34 MA's), (24, 22652), (28, 22685), (33, 22709), (35, 22727), (40, 22811), (45, 22841), (47, 22850), (50, 22868), (51, 22877), (53, 22898), (54, 22904), (56, 22919), (58, 22952), (59,



22961), (72, 23063), (80, 23186), (87, 23270), (94, 23363), (98, 23438), (104, 23474), (112, 23525), (119, 23576), (120, 23585), (123, 23642), (135, 23753), (145, 23801), (152, 23840), (159, 23894), (173, 24107), (180, 24176), (184, 24212), (188, 24269), (193, 24308), (199, 24341), (201, 24365), (203, 24374), (205, 24407), (209, 24449), (211, 24509), (220, 24587), (225, 24623), (236, 24773), (241, 24818), (248, 24884), (250, 24902), (251, 24905),

Gene: NoodlelyBoi\_37 Start: 23832, Stop: 25775, Start Num: 15

Candidate Starts for NoodlelyBoi\_37:

(Start: 15 @23832 has 34 MA's), (22, 23877), (24, 23928), (26, 23949), (37, 24036), (41, 24090), (49, 24141), (53, 24174), (54, 24180), (56, 24195), (72, 24339), (73, 24348), (76, 24381), (99, 24459), (115, 24522), (116, 24537), (121, 24558), (127, 24597), (128, 24603), (136, 24669), (152, 24750), (158, 24765), (160, 24774), (162, 24792), (163, 24798), (164, 24807), (166, 24822), (176, 24882), (183, 24948), (185, 24969), (189, 25020), (190, 25029), (191, 25038), (201, 25104), (202, 25110), (203, 25113), (204, 25137), (211, 25248), (212, 25251), (213, 25284), (217, 25314), (239, 25521), (249, 25617), (255, 25647), (258, 25683), (259, 25689), (270, 25767),

Gene: OneinaGillian\_36 Start: 24713, Stop: 26689, Start Num: 16

Candidate Starts for OneinaGillian\_36:

(Start: 16 @24713 has 11 MA's), (17, 24716), (31, 24851), (52, 25043), (54, 25058), (59, 25115), (65, 25169), (67, 25181), (88, 25319), (140, 25553), (150, 25610), (165, 25685), (190, 25895), (192, 25910), (204, 26009), (205, 26018), (209, 26060), (214, 26162), (228, 26258), (237, 26387), (243, 26447), (247, 26495), (258, 26588), (260, 26597), (269, 26675),

Gene: Onika\_36 Start: 23477, Stop: 25423, Start Num: 15

Candidate Starts for Onika\_36:

(Start: 15 @23477 has 34 MA's), (22, 23522), (23, 23546), (24, 23573), (26, 23594), (42, 23750), (49, 23786), (53, 23819), (54, 23825), (56, 23840), (72, 23984), (76, 24026), (82, 24071), (99, 24104), (126, 24239), (127, 24242), (133, 24287), (136, 24314), (137, 24317), (155, 24407), (163, 24446), (164, 24455), (166, 24470), (185, 24617), (188, 24656), (189, 24668), (202, 24758), (203, 24761), (204, 24785), (205, 24794), (212, 24899), (213, 24932), (217, 24962), (239, 25169), (243, 25208), (246, 25238), (263, 25355),

Gene: Paschalis\_36 Start: 23490, Stop: 25430, Start Num: 15

Candidate Starts for Paschalis\_36:

(Start: 15 @23490 has 34 MA's), (22, 23535), (23, 23559), (24, 23586), (26, 23607), (42, 23763), (49, 23799), (53, 23832), (54, 23838), (56, 23853), (72, 23997), (76, 24039), (82, 24084), (99, 24117), (123, 24225), (126, 24252), (127, 24255), (133, 24300), (136, 24327), (137, 24330), (155, 24420), (163, 24459), (164, 24468), (166, 24483), (185, 24630), (188, 24669), (189, 24681), (202, 24771), (203, 24774), (204, 24798), (205, 24807), (207, 24837), (212, 24912), (228, 25041), (233, 25110), (234, 25122), (240, 25191), (255, 25302), (258, 25338), (270, 25422),

Gene: Phinky\_43 Start: 27523, Stop: 29499, Start Num: 16

Candidate Starts for Phinky\_43:

(Start: 16 @27523 has 11 MA's), (20, 27547), (52, 27850), (57, 27901), (61, 27931), (64, 27973), (118, 28234), (127, 28285), (142, 28378), (146, 28405), (165, 28495), (181, 28597), (191, 28714), (204, 28813), (209, 28864), (215, 28984), (223, 29029), (231, 29128), (241, 29242), (243, 29260), (269, 29485),

Gene: Phorgeous\_36 Start: 23344, Stop: 25296, Start Num: 15

Candidate Starts for Phorgeous\_36:

(Start: 15 @23344 has 34 MA's), (22, 23389), (23, 23413), (24, 23440), (26, 23461), (42, 23617), (49, 23653), (53, 23686), (54, 23692), (56, 23707), (72, 23851), (76, 23893), (77, 23896), (99, 23977), (127, 24115), (128, 24121), (133, 24160), (136, 24187), (141, 24208), (143, 24217), (152, 24271),

(155, 24280), (160, 24295), (163, 24319), (164, 24328), (166, 24343), (183, 24469), (185, 24490), (188, 24529), (189, 24541), (202, 24631), (203, 24634), (204, 24658), (205, 24667), (207, 24697), (211, 24769), (212, 24772), (213, 24805), (217, 24835), (239, 25042), (243, 25081), (246, 25111), (263, 25228),

Gene: Phrancesco\_37 Start: 23622, Stop: 25574, Start Num: 15

Candidate Starts for Phrancesco\_37:

(Start: 15 @23622 has 34 MA's), (22, 23667), (23, 23691), (24, 23718), (26, 23739), (42, 23895), (49, 23931), (53, 23964), (54, 23970), (56, 23985), (72, 24129), (76, 24171), (77, 24174), (99, 24255), (127, 24393), (128, 24399), (133, 24438), (136, 24465), (141, 24486), (143, 24495), (152, 24549), (155, 24558), (160, 24573), (163, 24597), (164, 24606), (166, 24621), (183, 24747), (185, 24768), (188, 24807), (189, 24819), (202, 24909), (203, 24912), (204, 24936), (205, 24945), (207, 24975), (211, 25047), (212, 25050), (213, 25083), (217, 25113), (239, 25320), (243, 25359), (246, 25389), (263, 25506),

Gene: PierreOrion\_37 Start: 23645, Stop: 25597, Start Num: 15

Candidate Starts for PierreOrion\_37:

(Start: 15 @23645 has 34 MA's), (22, 23690), (23, 23714), (24, 23741), (26, 23762), (42, 23918), (49, 23954), (53, 23987), (54, 23993), (56, 24008), (72, 24152), (76, 24194), (77, 24197), (99, 24278), (127, 24416), (128, 24422), (133, 24461), (141, 24509), (143, 24518), (152, 24572), (155, 24581), (160, 24596), (163, 24620), (164, 24629), (166, 24644), (183, 24770), (185, 24791), (188, 24830), (189, 24842), (202, 24932), (203, 24935), (204, 24959), (205, 24968), (207, 24998), (211, 25070), (212, 25073), (213, 25106), (217, 25136), (239, 25343), (243, 25382), (246, 25412), (263, 25529),

Gene: PiperSansNom\_37 Start: 23797, Stop: 25737, Start Num: 15

Candidate Starts for PiperSansNom\_37:

(Start: 15 @23797 has 34 MA's), (22, 23842), (23, 23866), (24, 23893), (26, 23914), (42, 24070), (49, 24106), (53, 24139), (54, 24145), (56, 24160), (72, 24304), (76, 24346), (82, 24391), (99, 24424), (123, 24532), (126, 24559), (127, 24562), (133, 24607), (136, 24634), (137, 24637), (155, 24727), (163, 24766), (164, 24775), (166, 24790), (188, 24976), (202, 25078), (203, 25081), (204, 25105), (205, 25114), (207, 25144), (212, 25219), (228, 25348), (233, 25417), (234, 25429), (240, 25498), (255, 25609), (258, 25645), (270, 25729),

Gene: Piperis\_37 Start: 23467, Stop: 25419, Start Num: 15

Candidate Starts for Piperis\_37:

(Start: 15 @23467 has 34 MA's), (22, 23512), (23, 23536), (24, 23563), (26, 23584), (42, 23740), (49, 23776), (53, 23809), (54, 23815), (56, 23830), (72, 23974), (76, 24016), (77, 24019), (99, 24100), (127, 24238), (128, 24244), (133, 24283), (136, 24310), (152, 24394), (155, 24403), (160, 24418), (163, 24442), (164, 24451), (166, 24466), (183, 24592), (185, 24613), (188, 24652), (189, 24664), (202, 24754), (203, 24757), (204, 24781), (205, 24790), (207, 24820), (211, 24892), (212, 24895), (213, 24928), (217, 24958), (224, 24994), (239, 25165), (241, 25186), (246, 25234), (263, 25351),

Gene: Pulchra\_38 Start: 23867, Stop: 25813, Start Num: 15

Candidate Starts for Pulchra\_38:

(Start: 15 @23867 has 34 MA's), (22, 23912), (23, 23936), (24, 23963), (26, 23984), (42, 24140), (49, 24176), (53, 24209), (54, 24215), (56, 24230), (72, 24374), (76, 24416), (99, 24494), (126, 24629), (127, 24632), (133, 24677), (136, 24704), (137, 24707), (155, 24797), (163, 24836), (164, 24845), (166, 24860), (185, 25007), (188, 25046), (189, 25058), (202, 25148), (203, 25151), (204, 25175), (205, 25184), (212, 25289), (213, 25322), (217, 25352), (239, 25559), (243, 25598), (246, 25628), (263, 25745),

Gene: Quhwah\_40 Start: 24093, Stop: 26045, Start Num: 15

Candidate Starts for Quhwah\_40:

(Start: 15 @24093 has 34 MA's), (22, 24138), (23, 24162), (24, 24189), (26, 24210), (42, 24366), (49, 24402), (53, 24435), (54, 24441), (56, 24456), (72, 24600), (76, 24642), (77, 24645), (78, 24663), (99, 24726), (127, 24864), (128, 24870), (133, 24909), (136, 24936), (141, 24957), (143, 24966), (152, 25020), (155, 25029), (160, 25044), (163, 25068), (164, 25077), (166, 25092), (183, 25218), (185, 25239), (188, 25278), (189, 25290), (202, 25380), (203, 25383), (204, 25407), (205, 25416), (207, 25446), (211, 25518), (212, 25521), (213, 25554), (243, 25830), (246, 25860), (263, 25977),

Gene: Ramiel05\_36 Start: 23502, Stop: 25448, Start Num: 15

Candidate Starts for Ramiel05\_36:

(Start: 15 @23502 has 34 MA's), (22, 23547), (23, 23571), (24, 23598), (26, 23619), (42, 23775), (49, 23811), (53, 23844), (54, 23850), (56, 23865), (72, 24009), (76, 24051), (99, 24129), (126, 24264), (127, 24267), (133, 24312), (136, 24339), (137, 24342), (155, 24432), (163, 24471), (164, 24480), (166, 24495), (185, 24642), (188, 24681), (189, 24693), (202, 24783), (203, 24786), (204, 24810), (205, 24819), (211, 24921), (212, 24924), (213, 24957), (217, 24987), (239, 25194), (243, 25233), (246, 25263), (263, 25380),

Gene: Rasputia\_72 Start: 44029, Stop: 45960, Start Num: 16

Candidate Starts for Rasputia\_72:

(Start: 16 @44029 has 11 MA's), (19, 44047), (22, 44071), (24, 44119), (44, 44305), (49, 44332), (53, 44365), (54, 44371), (58, 44419), (59, 44428), (60, 44434), (63, 44464), (66, 44491), (101, 44659), (107, 44692), (124, 44758), (127, 44785), (129, 44794), (130, 44797), (131, 44800), (134, 44842), (157, 44935), (170, 45007), (186, 45118), (190, 45175), (192, 45190), (201, 45250), (203, 45259), (208, 45328), (209, 45331), (220, 45469), (234, 45616), (235, 45646), (236, 45652), (237, 45658), (243, 45718), (247, 45766), (254, 45817), (257, 45832), (258, 45859), (262, 45877), (267, 45940), (269, 45946), (270, 45952),

Gene: RobinRose\_38 Start: 25217, Stop: 27190, Start Num: 16

Candidate Starts for RobinRose\_38:

(Start: 16 @25217 has 11 MA's), (17, 25220), (31, 25355), (52, 25547), (54, 25562), (59, 25619), (65, 25673), (67, 25685), (88, 25823), (140, 26057), (150, 26114), (165, 26189), (190, 26399), (192, 26414), (204, 26513), (205, 26522), (209, 26564), (214, 26666), (228, 26762), (237, 26891), (247, 26996), (258, 27089), (260, 27098), (269, 27176),

Gene: Romm\_38 Start: 25217, Stop: 27190, Start Num: 16

Candidate Starts for Romm\_38:

(Start: 16 @25217 has 11 MA's), (17, 25220), (31, 25355), (52, 25547), (54, 25562), (59, 25619), (65, 25673), (67, 25685), (88, 25823), (140, 26057), (150, 26114), (165, 26189), (190, 26399), (192, 26414), (204, 26513), (205, 26522), (209, 26564), (214, 26666), (228, 26762), (237, 26891), (247, 26996), (258, 27089), (260, 27098), (269, 27176),

Gene: RubyRalph\_39 Start: 25839, Stop: 28808, Start Num: 1

Candidate Starts for RubyRalph\_39:

(Start: 1 @25839 has 3 MA's), (2, 25869), (3, 26001), (4, 26040), (5, 26085), (6, 26163), (7, 26265), (8, 26289), (9, 26295), (10, 26391), (12, 26487), (13, 26571), (14, 26769), (18, 26844), (21, 26871), (29, 26961), (30, 26964), (32, 26973), (34, 26985), (36, 27018), (38, 27045), (46, 27111), (48, 27117), (53, 27162), (55, 27183), (69, 27312), (74, 27357), (79, 27399), (81, 27414), (83, 27423), (90, 27456), (124, 27588), (132, 27648), (147, 27744), (149, 27762), (155, 27786), (156, 27789), (183, 27975), (187, 28035), (190, 28056), (192, 28071), (198, 28104), (200, 28122), (201, 28137), (206, 28191), (209, 28221), (211, 28281), (212, 28284), (215, 28341), (222, 28371), (226, 28389), (233, 28473), (237, 28530), (243, 28584), (258, 28716), (264, 28764), (265, 28767),

Gene: SadLad\_41 Start: 26782, Stop: 29751, Start Num: 1

Candidate Starts for SadLad\_41:

(Start: 1 @26782 has 3 MA's), (2, 26812), (3, 26944), (4, 26983), (5, 27028), (6, 27106), (7, 27208), (8, 27232), (9, 27238), (10, 27334), (12, 27430), (13, 27514), (14, 27712), (18, 27787), (21, 27814), (29, 27904), (30, 27907), (32, 27916), (34, 27928), (36, 27961), (38, 27988), (46, 28054), (48, 28060), (53, 28105), (55, 28126), (69, 28255), (74, 28300), (79, 28342), (81, 28357), (83, 28366), (90, 28399), (124, 28531), (132, 28591), (147, 28687), (149, 28705), (155, 28729), (156, 28732), (183, 28918), (187, 28978), (190, 28999), (192, 29014), (198, 29047), (200, 29065), (201, 29080), (206, 29134), (209, 29164), (211, 29224), (212, 29227), (215, 29284), (222, 29314), (226, 29332), (233, 29416), (237, 29473), (243, 29527), (258, 29659), (264, 29707), (265, 29710),

Gene: Savannah\_36 Start: 23529, Stop: 25475, Start Num: 15

Candidate Starts for Savannah\_36:

(Start: 15 @23529 has 34 MA's), (22, 23574), (23, 23598), (24, 23625), (26, 23646), (42, 23802), (49, 23838), (53, 23871), (54, 23877), (56, 23892), (72, 24036), (76, 24078), (99, 24156), (126, 24291), (127, 24294), (133, 24339), (136, 24366), (137, 24369), (155, 24459), (163, 24498), (164, 24507), (166, 24522), (185, 24669), (188, 24708), (189, 24720), (202, 24810), (203, 24813), (204, 24837), (205, 24846), (211, 24948), (212, 24951), (213, 24984), (217, 25014), (239, 25221), (243, 25260), (246, 25290), (263, 25407),

Gene: Scumberland\_38 Start: 23718, Stop: 25670, Start Num: 15

Candidate Starts for Scumberland\_38:

(Start: 15 @23718 has 34 MA's), (22, 23763), (23, 23787), (24, 23814), (26, 23835), (42, 23991), (49, 24027), (53, 24060), (54, 24066), (56, 24081), (72, 24225), (76, 24267), (77, 24270), (99, 24351), (127, 24489), (128, 24495), (133, 24534), (136, 24561), (141, 24582), (143, 24591), (152, 24645), (155, 24654), (160, 24669), (163, 24693), (164, 24702), (166, 24717), (183, 24843), (185, 24864), (188, 24903), (189, 24915), (202, 25005), (203, 25008), (204, 25032), (205, 25041), (207, 25071), (211, 25143), (212, 25146), (213, 25179), (217, 25209), (239, 25416), (241, 25437), (243, 25455), (246, 25485), (263, 25602),

Gene: Selwyn23\_38 Start: 23695, Stop: 25647, Start Num: 15

Candidate Starts for Selwyn23\_38:

(Start: 15 @23695 has 34 MA's), (22, 23740), (23, 23764), (24, 23791), (26, 23812), (42, 23968), (49, 24004), (53, 24037), (54, 24043), (56, 24058), (72, 24202), (76, 24244), (77, 24247), (99, 24328), (127, 24466), (128, 24472), (133, 24511), (136, 24538), (141, 24559), (143, 24568), (152, 24622), (155, 24631), (160, 24646), (163, 24670), (164, 24679), (166, 24694), (183, 24820), (185, 24841), (188, 24880), (189, 24892), (202, 24982), (203, 24985), (204, 25009), (205, 25018), (207, 25048), (211, 25120), (212, 25123), (213, 25156), (217, 25186), (239, 25393), (241, 25414), (243, 25432), (246, 25462), (263, 25579),

Gene: Shotgun\_36 Start: 23328, Stop: 25274, Start Num: 15

Candidate Starts for Shotgun\_36:

(Start: 15 @23328 has 34 MA's), (22, 23373), (23, 23397), (24, 23424), (26, 23445), (42, 23601), (49, 23637), (53, 23670), (54, 23676), (56, 23691), (72, 23835), (76, 23877), (82, 23922), (99, 23955), (123, 24063), (126, 24090), (127, 24093), (133, 24138), (136, 24165), (137, 24168), (155, 24258), (163, 24297), (164, 24306), (166, 24321), (188, 24507), (202, 24609), (203, 24612), (204, 24636), (205, 24645), (207, 24675), (212, 24750), (213, 24783), (217, 24813), (239, 25020), (243, 25059), (246, 25089), (263, 25206),

Gene: Tempo\_36 Start: 25093, Stop: 27066, Start Num: 16

Candidate Starts for Tempo\_36:

(Start: 16 @25093 has 11 MA's), (17, 25096), (31, 25231), (52, 25423), (54, 25438), (59, 25495), (65, 25549), (67, 25561), (72, 25594), (88, 25699), (140, 25933), (150, 25990), (165, 26065), (190, 26275), (192, 26290), (204, 26389), (205, 26398), (209, 26440), (214, 26542), (228, 26638), (237, 26767), (247, 26872), (258, 26965), (260, 26974), (269, 27052),

Gene: Yeti\_37 Start: 23497, Stop: 25449, Start Num: 15

Candidate Starts for Yeti\_37:

(Start: 15 @23497 has 34 MA's), (22, 23542), (23, 23566), (24, 23593), (26, 23614), (42, 23770), (49, 23806), (53, 23839), (54, 23845), (56, 23860), (72, 24004), (76, 24046), (77, 24049), (99, 24130), (127, 24268), (128, 24274), (133, 24313), (136, 24340), (141, 24361), (143, 24370), (152, 24424), (155, 24433), (160, 24448), (163, 24472), (164, 24481), (166, 24496), (183, 24622), (185, 24643), (188, 24682), (189, 24694), (202, 24784), (203, 24787), (204, 24811), (205, 24820), (207, 24850), (211, 24922), (212, 24925), (213, 24958), (217, 24988), (239, 25195), (243, 25234), (246, 25264), (263, 25381),