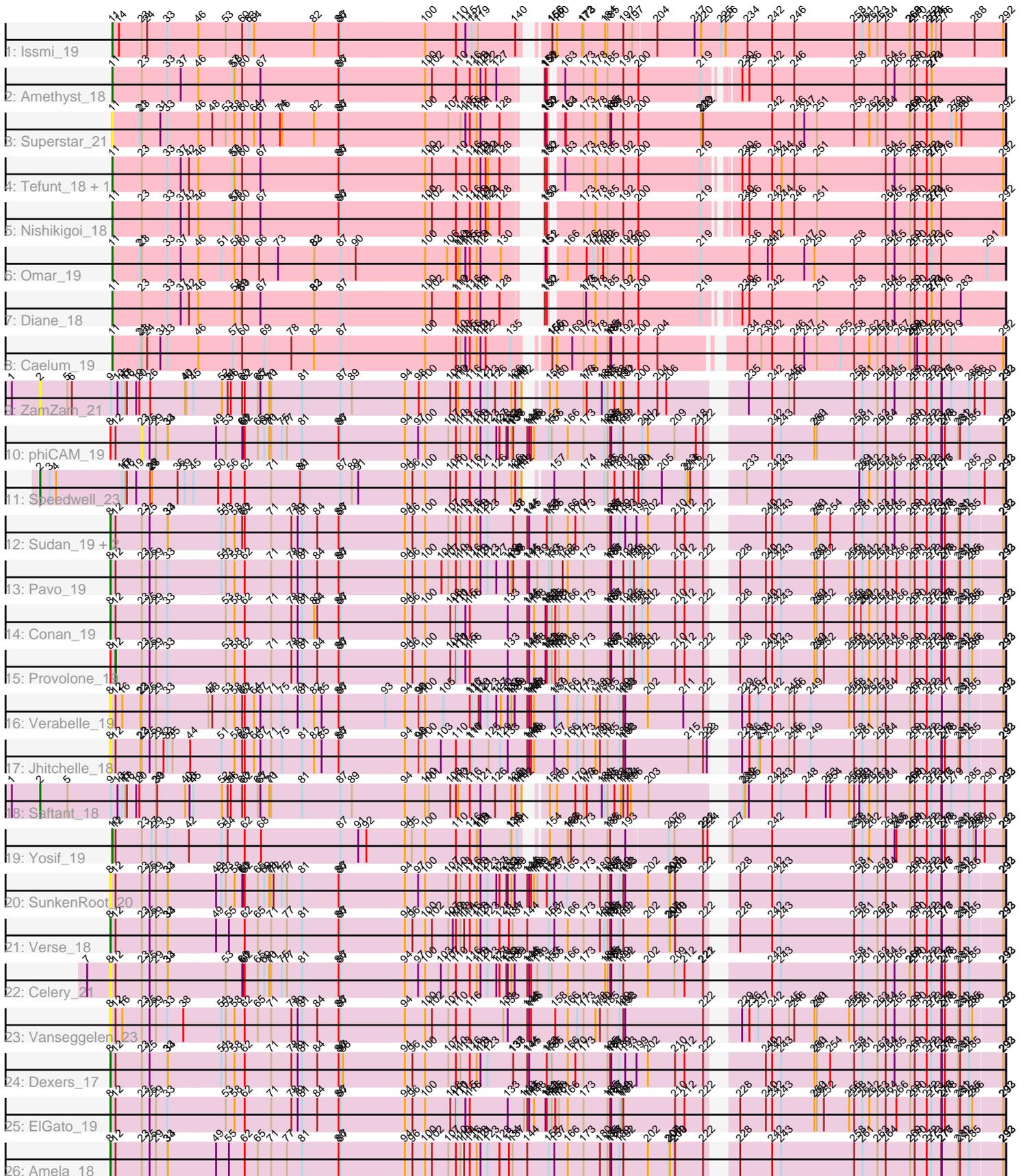


Pham 289648



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 289648 Report

This analysis was run 03/28/26 on database version 641.

Pham number 289648 has 29 members, 9 are drafts.

Phages represented in each track:

- Track 1 : Issmi\_19
- Track 2 : Amethyst\_18
- Track 3 : Superstar\_21
- Track 4 : Tefunt\_18, Haizum\_18
- Track 5 : Nishikigoi\_18
- Track 6 : Omar\_19
- Track 7 : Diane\_18
- Track 8 : Caelum\_19
- Track 9 : ZamZam\_21
- Track 10 : phiCAM\_19
- Track 11 : Speedwell\_23
- Track 12 : Sudan\_19, Kaine\_18, Alsaber\_19
- Track 13 : Pavo\_19
- Track 14 : Conan\_19
- Track 15 : Provolone\_19
- Track 16 : Verabelle\_19
- Track 17 : Jhitchelle\_18
- Track 18 : Saftant\_18
- Track 19 : Yosif\_19
- Track 20 : SunkenRoot\_20
- Track 21 : Verse\_18
- Track 22 : Celery\_21
- Track 23 : Vanseggelen\_23
- Track 24 : Dexers\_17
- Track 25 : ElGato\_19
- Track 26 : Amela\_18

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

The start number called the most often in the published annotations is 8, it was called in 8 of the 20 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

- Alsaber\_19, Amela\_18, Celery\_21, Conan\_19, Dexers\_17, ElGato\_19, Jhitchelle\_18, Kaine\_18, Pavo\_19, Sudan\_19, SunkenRoot\_20, Vanseggelen\_23, Verabelle\_19, Verse\_18,

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

- Provolone\_19, phiCAM\_19,

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

- Amethyst\_18, Caelum\_19, Diane\_18, Haizum\_18, Issmi\_19, Nishikigoi\_18, Omar\_19, Saftant\_18, Speedwell\_23, Superstar\_21, Tefunt\_18, Yosif\_19, ZamZam\_21,

### Summary by start number:

Start 2:

- Found in 3 of 29 ( 10.3% ) of genes in pham
- Manual Annotations of this start: 2 of 20
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Saftant\_18 (BD3), Speedwell\_23 (BD3), ZamZam\_21 (BD3),

Start 8:

- Found in 16 of 29 ( 55.2% ) of genes in pham
- Manual Annotations of this start: 8 of 20
- Called 87.5% of time when present
- Phage (with cluster) where this start called: Alsaber\_19 (BD3), Amela\_18 (BD3), Celery\_21 (BD3), Conan\_19 (BD3), Dexers\_17 (BD3), ElGato\_19 (BD3), Jhitchelle\_18 (BD3), Kaine\_18 (BD3), Pavo\_19 (BD3), Sudan\_19 (BD3), SunkenRoot\_20 (BD3), Vanseggelen\_23 (BD3), Verabelle\_19 (BD3), Verse\_18 (BD3),

Start 10:

- Found in 1 of 29 ( 3.4% ) of genes in pham
- Manual Annotations of this start: 1 of 20
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Yosif\_19 (BD3),

Start 11:

- Found in 9 of 29 ( 31.0% ) of genes in pham
- Manual Annotations of this start: 8 of 20
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Amethyst\_18 (BD2), Caelum\_19 (BD2), Diane\_18 (BD2), Haizum\_18 (BD2), Issmi\_19 (BD2), Nishikigoi\_18 (BD2), Omar\_19 (BD2), Superstar\_21 (BD2), Tefunt\_18 (BD2),

Start 12:

- Found in 17 of 29 ( 58.6% ) of genes in pham
- Manual Annotations of this start: 1 of 20
- Called 5.9% of time when present
- Phage (with cluster) where this start called: Provolone\_19 (BD3),

Start 23:

- Found in 26 of 29 ( 89.7% ) of genes in pham

- No Manual Annotations of this start.
- Called 3.8% of time when present
- Phage (with cluster) where this start called: phiCAM\_19 (BD3),

### Summary by clusters:

There are 2 clusters represented in this pham: BD3, BD2,

Info for manual annotations of cluster BD2:

- Start number 11 was manually annotated 8 times for cluster BD2.

Info for manual annotations of cluster BD3:

- Start number 2 was manually annotated 2 times for cluster BD3.
- Start number 8 was manually annotated 8 times for cluster BD3.
- Start number 10 was manually annotated 1 time for cluster BD3.
- Start number 12 was manually annotated 1 time for cluster BD3.

### Gene Information:

Gene: Alsaber\_19 Start: 11562, Stop: 15674, Start Num: 8

Candidate Starts for Alsaber\_19:

(Start: 8 @11562 has 8 MA's), (Start: 12 @11586 has 1 MA's), (23, 11706), (25, 11739), (33, 11817), (34, 11820), (51, 12060), (53, 12081), (58, 12123), (60, 12159), (62, 12171), (71, 12297), (78, 12393), (79, 12423), (81, 12444), (84, 12516), (86, 12615), (87, 12624), (94, 12930), (96, 12966), (100, 13026), (107, 13137), (110, 13173), (113, 13194), (116, 13239), (118, 13272), (121, 13290), (123, 13323), (137, 13443), (138, 13446), (144, 13512), (145, 13521), (152, 13605), (153, 13614), (155, 13629), (166, 13704), (170, 13740), (173, 13779), (185, 13893), (186, 13905), (187, 13911), (189, 13950), (193, 13977), (199, 14031), (202, 14085), (210, 14214), (212, 14259), (222, 14346), (240, 14544), (242, 14574), (243, 14616), (250, 14775), (251, 14787), (254, 14850), (258, 14964), (261, 15003), (263, 15075), (264, 15114), (265, 15156), (269, 15231), (270, 15252), (272, 15309), (273, 15330), (276, 15378), (277, 15381), (278, 15396), (281, 15459), (282, 15468), (285, 15510), (292, 15660), (293, 15663),

Gene: Amela\_18 Start: 11854, Stop: 15966, Start Num: 8

Candidate Starts for Amela\_18:

(Start: 8 @11854 has 8 MA's), (Start: 12 @11878 has 1 MA's), (23, 11998), (25, 12031), (29, 12061), (33, 12109), (34, 12112), (49, 12328), (55, 12388), (62, 12463), (65, 12526), (71, 12589), (77, 12664), (81, 12736), (86, 12907), (87, 12916), (94, 13222), (96, 13258), (100, 13318), (102, 13351), (107, 13429), (110, 13465), (113, 13486), (114, 13504), (116, 13531), (118, 13564), (121, 13582), (123, 13615), (128, 13672), (134, 13717), (137, 13735), (144, 13804), (153, 13906), (157, 13933), (166, 13996), (173, 14071), (180, 14149), (185, 14185), (186, 14197), (187, 14203), (189, 14242), (192, 14260), (202, 14377), (207, 14476), (208, 14482), (209, 14503), (210, 14506), (222, 14638), (228, 14716), (242, 14866), (243, 14908), (258, 15256), (261, 15295), (263, 15367), (264, 15406), (269, 15523), (270, 15544), (272, 15601), (273, 15622), (276, 15670), (277, 15673), (281, 15751), (282, 15760), (285, 15802), (292, 15952), (293, 15955),

Gene: Amethyst\_18 Start: 11541, Stop: 15449, Start Num: 11

Candidate Starts for Amethyst\_18:

(Start: 11 @11541 has 8 MA's), (23, 11676), (33, 11787), (37, 11850), (46, 11919), (57, 12081), (58, 12090), (60, 12126), (67, 12213), (86, 12582), (87, 12591), (100, 12990), (102, 13023), (110, 13137), (116, 13203), (118, 13236), (121, 13254), (122, 13278), (127, 13329), (150, 13428), (151, 13431),

(152, 13437), (163, 13482), (173, 13569), (178, 13626), (185, 13683), (192, 13758), (200, 13830), (219, 14124), (230, 14223), (236, 14256), (242, 14364), (246, 14469), (258, 14754), (264, 14904), (265, 14946), (269, 15021), (270, 15042), (272, 15099), (273, 15120), (274, 15123),

Gene: Caelum\_19 Start: 11485, Stop: 15480, Start Num: 11

Candidate Starts for Caelum\_19:

(Start: 11 @11485 has 8 MA's), (21, 11611), (23, 11620), (24, 11641), (31, 11698), (33, 11731), (46, 11863), (57, 12025), (60, 12070), (69, 12175), (78, 12304), (82, 12412), (87, 12535), (100, 12934), (110, 13081), (113, 13102), (115, 13126), (116, 13147), (118, 13180), (121, 13198), (122, 13222), (135, 13339), (155, 13450), (156, 13453), (160, 13474), (169, 13546), (173, 13600), (178, 13657), (185, 13714), (186, 13726), (187, 13732), (192, 13789), (200, 13861), (204, 13951), (234, 14278), (239, 14344), (242, 14395), (246, 14500), (247, 14548), (251, 14608), (255, 14719), (258, 14785), (262, 14857), (263, 14896), (264, 14935), (267, 14995), (268, 15049), (269, 15052), (270, 15073), (271, 15085), (272, 15130), (273, 15151), (276, 15199), (279, 15247), (292, 15469),

Gene: Celery\_21 Start: 11512, Stop: 15627, Start Num: 8

Candidate Starts for Celery\_21:

(7, 11401), (Start: 8 @11512 has 8 MA's), (Start: 12 @11536 has 1 MA's), (23, 11656), (25, 11689), (29, 11719), (33, 11767), (34, 11770), (53, 12031), (60, 12109), (61, 12112), (62, 12121), (65, 12184), (69, 12214), (70, 12238), (71, 12247), (75, 12298), (77, 12322), (81, 12394), (86, 12565), (87, 12574), (94, 12880), (97, 12943), (100, 12976), (103, 13051), (107, 13087), (110, 13123), (116, 13189), (118, 13222), (121, 13240), (123, 13273), (127, 13315), (128, 13330), (132, 13363), (133, 13369), (136, 13387), (139, 13402), (144, 13462), (145, 13471), (146, 13480), (149, 13510), (153, 13564), (155, 13579), (166, 13654), (173, 13729), (184, 13831), (185, 13843), (186, 13855), (187, 13861), (189, 13900), (192, 13918), (202, 14035), (209, 14161), (212, 14209), (221, 14293), (222, 14296), (242, 14524), (243, 14566), (258, 14914), (261, 14953), (263, 15025), (264, 15064), (265, 15106), (268, 15178), (269, 15181), (270, 15202), (272, 15259), (273, 15280), (276, 15328), (277, 15331), (278, 15346), (281, 15409), (282, 15418), (285, 15460), (292, 15613), (293, 15616),

Gene: Conan\_19 Start: 11284, Stop: 15396, Start Num: 8

Candidate Starts for Conan\_19:

(Start: 8 @11284 has 8 MA's), (Start: 12 @11308 has 1 MA's), (23, 11428), (25, 11461), (29, 11491), (33, 11539), (53, 11803), (58, 11845), (62, 11893), (71, 12019), (78, 12115), (79, 12145), (81, 12166), (82, 12223), (84, 12238), (86, 12337), (87, 12346), (94, 12652), (96, 12688), (100, 12748), (108, 12868), (110, 12895), (111, 12898), (115, 12940), (116, 12961), (133, 13141), (144, 13234), (145, 13243), (148, 13267), (151, 13321), (152, 13327), (153, 13336), (155, 13351), (158, 13366), (161, 13384), (166, 13426), (173, 13501), (185, 13615), (186, 13627), (187, 13633), (192, 13690), (195, 13723), (198, 13741), (201, 13780), (202, 13807), (210, 13936), (212, 13981), (222, 14068), (228, 14146), (240, 14266), (242, 14296), (243, 14338), (250, 14497), (251, 14509), (252, 14542), (256, 14662), (258, 14686), (260, 14719), (261, 14725), (262, 14758), (263, 14797), (264, 14836), (266, 14887), (269, 14953), (270, 14974), (272, 15031), (273, 15052), (276, 15100), (277, 15103), (278, 15118), (281, 15181), (282, 15190), (285, 15232), (286, 15247), (292, 15382), (293, 15385),

Gene: Dexers\_17 Start: 11265, Stop: 15377, Start Num: 8

Candidate Starts for Dexers\_17:

(Start: 8 @11265 has 8 MA's), (Start: 12 @11289 has 1 MA's), (23, 11409), (25, 11442), (33, 11520), (34, 11523), (51, 11763), (53, 11784), (58, 11826), (62, 11874), (71, 12000), (78, 12096), (79, 12126), (81, 12147), (84, 12219), (86, 12318), (87, 12327), (88, 12339), (94, 12633), (96, 12669), (100, 12729), (107, 12840), (110, 12876), (113, 12897), (116, 12942), (118, 12975), (121, 12993), (123, 13026), (137, 13146), (138, 13149), (144, 13215), (145, 13224), (152, 13308), (153, 13317), (155, 13332), (166, 13407), (170, 13443), (173, 13482), (185, 13596), (186, 13608), (187, 13614), (189, 13653), (193, 13680), (199, 13734), (202, 13788), (210, 13917), (212, 13962), (222, 14049), (240, 14247), (242, 14277), (243, 14319), (250, 14478), (251, 14490), (254, 14553), (258, 14667), (261, 14706),

(263, 14778), (264, 14817), (265, 14859), (269, 14934), (270, 14955), (272, 15012), (273, 15033), (276, 15081), (277, 15084), (278, 15099), (281, 15162), (282, 15171), (285, 15213), (292, 15363), (293, 15366),

Gene: Diane\_18 Start: 11534, Stop: 15442, Start Num: 11

Candidate Starts for Diane\_18:

(Start: 11 @11534 has 8 MA's), (23, 11669), (33, 11780), (37, 11843), (42, 11876), (46, 11912), (58, 12083), (59, 12113), (60, 12119), (67, 12206), (82, 12461), (83, 12464), (87, 12584), (100, 12983), (102, 13016), (110, 13130), (112, 13142), (116, 13196), (118, 13229), (121, 13247), (128, 13337), (150, 13421), (152, 13430), (173, 13562), (175, 13574), (178, 13619), (185, 13676), (192, 13751), (200, 13823), (219, 14117), (230, 14216), (236, 14249), (242, 14357), (251, 14570), (258, 14747), (264, 14897), (265, 14939), (269, 15014), (270, 15035), (272, 15092), (273, 15113), (274, 15116), (276, 15161), (283, 15254),

Gene: ElGato\_19 Start: 11287, Stop: 15399, Start Num: 8

Candidate Starts for ElGato\_19:

(Start: 8 @11287 has 8 MA's), (Start: 12 @11311 has 1 MA's), (23, 11431), (25, 11464), (29, 11494), (33, 11542), (53, 11806), (58, 11848), (62, 11896), (71, 12022), (78, 12118), (79, 12148), (81, 12169), (84, 12241), (86, 12340), (87, 12349), (94, 12655), (96, 12691), (100, 12751), (108, 12871), (110, 12898), (111, 12901), (115, 12943), (116, 12964), (133, 13144), (143, 13222), (144, 13237), (145, 13246), (148, 13270), (151, 13324), (152, 13330), (153, 13339), (155, 13354), (158, 13369), (161, 13387), (166, 13429), (173, 13504), (185, 13618), (186, 13630), (187, 13636), (189, 13675), (191, 13684), (192, 13693), (210, 13939), (212, 13984), (222, 14071), (228, 14149), (240, 14269), (242, 14299), (243, 14341), (250, 14500), (251, 14512), (252, 14545), (256, 14665), (258, 14689), (261, 14728), (262, 14761), (263, 14800), (264, 14839), (266, 14890), (269, 14956), (270, 14977), (272, 15034), (273, 15055), (276, 15103), (277, 15106), (278, 15121), (281, 15184), (282, 15193), (285, 15235), (286, 15250), (292, 15385), (293, 15388),

Gene: Haizum\_18 Start: 11570, Stop: 15475, Start Num: 11

Candidate Starts for Haizum\_18:

(Start: 11 @11570 has 8 MA's), (23, 11705), (33, 11816), (37, 11879), (42, 11912), (46, 11948), (57, 12110), (58, 12119), (60, 12155), (67, 12242), (86, 12611), (87, 12620), (100, 13019), (102, 13052), (110, 13166), (116, 13232), (118, 13265), (121, 13283), (122, 13307), (124, 13319), (128, 13373), (150, 13457), (152, 13466), (163, 13511), (173, 13598), (178, 13655), (185, 13712), (192, 13787), (200, 13859), (219, 14153), (230, 14252), (236, 14285), (242, 14393), (244, 14438), (246, 14498), (251, 14606), (264, 14933), (265, 14975), (269, 15050), (270, 15071), (272, 15128), (273, 15149), (274, 15152), (276, 15197), (292, 15464),

Gene: Issmi\_19 Start: 11823, Stop: 15905, Start Num: 11

Candidate Starts for Issmi\_19:

(Start: 11 @11823 has 8 MA's), (14, 11850), (23, 11958), (24, 11979), (33, 12069), (46, 12201), (53, 12330), (60, 12408), (63, 12441), (64, 12465), (82, 12750), (86, 12864), (87, 12873), (100, 13272), (110, 13419), (115, 13464), (117, 13494), (119, 13524), (140, 13701), (155, 13788), (156, 13791), (160, 13812), (172, 13932), (173, 13938), (184, 14040), (185, 14052), (192, 14127), (197, 14169), (204, 14277), (217, 14454), (220, 14484), (225, 14580), (226, 14601), (234, 14703), (242, 14820), (246, 14925), (258, 15210), (261, 15249), (262, 15282), (263, 15321), (264, 15360), (268, 15474), (269, 15477), (270, 15498), (272, 15555), (273, 15576), (274, 15579), (275, 15600), (276, 15624), (288, 15768), (292, 15894),

Gene: Jhitchelle\_18 Start: 11193, Stop: 15305, Start Num: 8

Candidate Starts for Jhitchelle\_18:

(Start: 8 @11193 has 8 MA's), (Start: 12 @11217 has 1 MA's), (22, 11331), (23, 11337), (25, 11370), (29, 11400), (32, 11430), (33, 11448), (35, 11472), (44, 11553), (51, 11691), (58, 11754), (60, 11790),

(62, 11802), (64, 11847), (67, 11877), (71, 11928), (75, 11979), (81, 12075), (82, 12132), (85, 12168), (86, 12246), (87, 12255), (94, 12561), (98, 12627), (99, 12633), (100, 12657), (103, 12732), (110, 12804), (116, 12870), (117, 12879), (125, 12960), (129, 13014), (133, 13050), (144, 13143), (145, 13152), (146, 13161), (148, 13176), (157, 13272), (166, 13335), (171, 13380), (173, 13410), (178, 13467), (180, 13488), (185, 13524), (189, 13581), (192, 13599), (193, 13608), (215, 13908), (222, 13977), (223, 13995), (229, 14064), (236, 14097), (237, 14139), (238, 14148), (242, 14205), (245, 14286), (246, 14310), (249, 14388), (258, 14595), (261, 14634), (263, 14706), (264, 14745), (269, 14862), (270, 14883), (272, 14940), (273, 14961), (276, 15009), (277, 15012), (278, 15027), (281, 15090), (282, 15099), (285, 15141), (292, 15291), (293, 15294),

Gene: Kaine\_18 Start: 11265, Stop: 15377, Start Num: 8

Candidate Starts for Kaine\_18:

(Start: 8 @11265 has 8 MA's), (Start: 12 @11289 has 1 MA's), (23, 11409), (25, 11442), (33, 11520), (34, 11523), (51, 11763), (53, 11784), (58, 11826), (60, 11862), (62, 11874), (71, 12000), (78, 12096), (79, 12126), (81, 12147), (84, 12219), (86, 12318), (87, 12327), (94, 12633), (96, 12669), (100, 12729), (107, 12840), (110, 12876), (113, 12897), (116, 12942), (118, 12975), (121, 12993), (123, 13026), (137, 13146), (138, 13149), (144, 13215), (145, 13224), (152, 13308), (153, 13317), (155, 13332), (166, 13407), (170, 13443), (173, 13482), (185, 13596), (186, 13608), (187, 13614), (189, 13653), (193, 13680), (199, 13734), (202, 13788), (210, 13917), (212, 13962), (222, 14049), (240, 14247), (242, 14277), (243, 14319), (250, 14478), (251, 14490), (254, 14553), (258, 14667), (261, 14706), (263, 14778), (264, 14817), (265, 14859), (269, 14934), (270, 14955), (272, 15012), (273, 15033), (276, 15081), (277, 15084), (278, 15099), (281, 15162), (282, 15171), (285, 15213), (292, 15363), (293, 15366),

Gene: Nishikigoi\_18 Start: 11570, Stop: 15475, Start Num: 11

Candidate Starts for Nishikigoi\_18:

(Start: 11 @11570 has 8 MA's), (23, 11705), (33, 11816), (37, 11879), (42, 11912), (46, 11948), (57, 12110), (58, 12119), (60, 12155), (67, 12242), (86, 12611), (87, 12620), (100, 13019), (102, 13052), (110, 13166), (116, 13232), (118, 13265), (121, 13283), (122, 13307), (124, 13319), (128, 13373), (150, 13457), (152, 13466), (173, 13598), (178, 13655), (185, 13712), (192, 13787), (200, 13859), (219, 14153), (230, 14252), (236, 14285), (242, 14393), (244, 14438), (246, 14498), (251, 14606), (264, 14933), (265, 14975), (269, 15050), (270, 15071), (272, 15128), (273, 15149), (274, 15152), (276, 15197), (292, 15464),

Gene: Omar\_19 Start: 11800, Stop: 15807, Start Num: 11

Candidate Starts for Omar\_19:

(Start: 11 @11800 has 8 MA's), (21, 11926), (23, 11935), (33, 12046), (37, 12109), (46, 12178), (51, 12286), (58, 12349), (60, 12385), (66, 12466), (73, 12556), (82, 12727), (83, 12730), (87, 12850), (90, 12922), (100, 13249), (106, 13354), (110, 13396), (112, 13408), (113, 13417), (115, 13441), (116, 13462), (118, 13495), (121, 13513), (130, 13609), (151, 13690), (152, 13696), (166, 13753), (176, 13843), (177, 13873), (179, 13897), (182, 13921), (185, 13942), (192, 14017), (196, 14053), (200, 14089), (219, 14383), (236, 14614), (241, 14701), (242, 14722), (247, 14875), (250, 14923), (258, 15112), (264, 15262), (265, 15304), (269, 15379), (270, 15400), (272, 15457), (273, 15478), (276, 15526), (291, 15721),

Gene: Pavo\_19 Start: 11557, Stop: 15669, Start Num: 8

Candidate Starts for Pavo\_19:

(Start: 8 @11557 has 8 MA's), (Start: 12 @11581 has 1 MA's), (23, 11701), (25, 11734), (29, 11764), (33, 11812), (51, 12055), (53, 12076), (58, 12118), (62, 12166), (71, 12292), (78, 12388), (79, 12418), (81, 12439), (84, 12511), (86, 12610), (87, 12619), (94, 12925), (96, 12961), (100, 13021), (104, 13099), (107, 13132), (110, 13168), (113, 13189), (116, 13234), (118, 13267), (121, 13285), (123, 13318), (127, 13360), (133, 13414), (136, 13432), (137, 13438), (138, 13441), (144, 13507), (145, 13516), (149, 13555), (153, 13609), (155, 13624), (162, 13675), (166, 13699), (173, 13774), (185,

13888), (186, 13900), (187, 13906), (192, 13963), (195, 13996), (198, 14014), (201, 14053), (202, 14080), (210, 14209), (212, 14254), (222, 14341), (228, 14419), (240, 14539), (242, 14569), (243, 14611), (250, 14770), (251, 14782), (252, 14815), (256, 14935), (258, 14959), (261, 14998), (262, 15031), (263, 15070), (264, 15109), (266, 15160), (269, 15226), (270, 15247), (272, 15304), (273, 15325), (276, 15373), (277, 15376), (278, 15391), (281, 15454), (282, 15463), (285, 15505), (286, 15520), (292, 15655), (293, 15658),

Gene: Provolone\_19 Start: 11311, Stop: 15399, Start Num: 12

Candidate Starts for Provolone\_19:

(Start: 8 @11287 has 8 MA's), (Start: 12 @11311 has 1 MA's), (23, 11431), (25, 11464), (29, 11494), (33, 11542), (53, 11806), (58, 11848), (62, 11896), (71, 12022), (78, 12118), (79, 12148), (81, 12169), (84, 12241), (86, 12340), (87, 12349), (94, 12655), (96, 12691), (100, 12751), (108, 12871), (110, 12898), (111, 12901), (115, 12943), (116, 12964), (133, 13144), (144, 13237), (145, 13246), (148, 13270), (151, 13324), (152, 13330), (153, 13339), (155, 13354), (158, 13369), (161, 13387), (166, 13429), (173, 13504), (185, 13618), (186, 13630), (187, 13636), (192, 13693), (195, 13726), (198, 13744), (201, 13783), (202, 13810), (210, 13939), (212, 13984), (222, 14071), (228, 14149), (240, 14269), (242, 14299), (243, 14341), (250, 14500), (251, 14512), (252, 14545), (256, 14665), (258, 14689), (261, 14728), (262, 14761), (263, 14800), (264, 14839), (266, 14890), (269, 14956), (270, 14977), (272, 15034), (273, 15055), (276, 15103), (277, 15106), (278, 15121), (281, 15184), (282, 15193), (285, 15235), (286, 15250), (292, 15385), (293, 15388),

Gene: Saftant\_18 Start: 11565, Stop: 15947, Start Num: 2

Candidate Starts for Saftant\_18:

(1, 11433), (Start: 2 @11565 has 2 MA's), (5, 11694), (9, 11901), (13, 11931), (15, 11952), (17, 11967), (18, 11976), (19, 12018), (20, 12033), (29, 12111), (30, 12117), (40, 12249), (43, 12270), (45, 12288), (52, 12423), (54, 12450), (56, 12465), (60, 12519), (62, 12531), (65, 12594), (67, 12606), (70, 12648), (71, 12657), (81, 12804), (87, 12984), (89, 13038), (94, 13290), (100, 13386), (101, 13404), (108, 13506), (110, 13533), (112, 13545), (116, 13599), (121, 13650), (126, 13719), (136, 13797), (140, 13815), (141, 13824), (142, 13845), (154, 13893), (160, 13926), (170, 14013), (173, 14052), (176, 14067), (181, 14139), (183, 14151), (185, 14166), (188, 14199), (190, 14229), (192, 14241), (194, 14262), (196, 14277), (203, 14349), (231, 14697), (232, 14706), (235, 14724), (242, 14835), (243, 14877), (248, 14997), (253, 15090), (254, 15111), (256, 15201), (258, 15225), (259, 15249), (261, 15264), (262, 15297), (263, 15336), (264, 15375), (268, 15489), (269, 15492), (270, 15513), (272, 15570), (273, 15591), (276, 15639), (277, 15642), (279, 15687), (285, 15771), (290, 15846), (292, 15933), (293, 15936),

Gene: Speedwell\_23 Start: 13301, Stop: 17692, Start Num: 2

Candidate Starts for Speedwell\_23:

(Start: 2 @13301 has 2 MA's), (3, 13346), (4, 13376), (15, 13688), (17, 13703), (18, 13712), (19, 13754), (26, 13820), (27, 13826), (28, 13829), (36, 13949), (39, 13982), (45, 14024), (50, 14141), (56, 14201), (62, 14267), (71, 14393), (80, 14531), (81, 14540), (87, 14720), (89, 14774), (91, 14804), (94, 15026), (96, 15062), (100, 15122), (108, 15242), (110, 15269), (116, 15335), (121, 15386), (126, 15455), (136, 15533), (140, 15551), (141, 15560), (142, 15581), (157, 15650), (174, 15791), (183, 15887), (185, 15902), (188, 15935), (192, 15977), (198, 16028), (200, 16049), (201, 16067), (205, 16160), (213, 16271), (214, 16283), (216, 16295), (222, 16355), (233, 16463), (242, 16583), (243, 16625), (259, 16997), (261, 17012), (262, 17045), (263, 17084), (264, 17123), (265, 17165), (269, 17240), (270, 17261), (272, 17318), (273, 17339), (276, 17387), (277, 17390), (285, 17519), (290, 17591), (292, 17678), (293, 17681),

Gene: Sudan\_19 Start: 11552, Stop: 15664, Start Num: 8

Candidate Starts for Sudan\_19:

(Start: 8 @11552 has 8 MA's), (Start: 12 @11576 has 1 MA's), (23, 11696), (25, 11729), (33, 11807), (34, 11810), (51, 12050), (53, 12071), (58, 12113), (60, 12149), (62, 12161), (71, 12287), (78, 12383),

(79, 12413), (81, 12434), (84, 12506), (86, 12605), (87, 12614), (94, 12920), (96, 12956), (100, 13016), (107, 13127), (110, 13163), (113, 13184), (116, 13229), (118, 13262), (121, 13280), (123, 13313), (137, 13433), (138, 13436), (144, 13502), (145, 13511), (152, 13595), (153, 13604), (155, 13619), (166, 13694), (170, 13730), (173, 13769), (185, 13883), (186, 13895), (187, 13901), (189, 13940), (193, 13967), (199, 14021), (202, 14075), (210, 14204), (212, 14249), (222, 14336), (240, 14534), (242, 14564), (243, 14606), (250, 14765), (251, 14777), (254, 14840), (258, 14954), (261, 14993), (263, 15065), (264, 15104), (265, 15146), (269, 15221), (270, 15242), (272, 15299), (273, 15320), (276, 15368), (277, 15371), (278, 15386), (281, 15449), (282, 15458), (285, 15500), (292, 15650), (293, 15653),

Gene: SunkenRoot\_20 Start: 11847, Stop: 15959, Start Num: 8

Candidate Starts for SunkenRoot\_20:

(Start: 8 @11847 has 8 MA's), (Start: 12 @11871 has 1 MA's), (23, 11991), (25, 12024), (29, 12054), (33, 12102), (34, 12105), (49, 12321), (51, 12345), (53, 12366), (58, 12408), (60, 12444), (61, 12447), (62, 12456), (65, 12519), (69, 12549), (70, 12573), (71, 12582), (72, 12594), (75, 12633), (77, 12657), (81, 12729), (86, 12900), (87, 12909), (94, 13215), (97, 13278), (100, 13311), (107, 13422), (110, 13458), (113, 13479), (116, 13524), (118, 13557), (121, 13575), (123, 13608), (127, 13650), (128, 13665), (132, 13698), (133, 13704), (136, 13722), (139, 13737), (144, 13797), (145, 13806), (146, 13815), (148, 13830), (149, 13845), (152, 13890), (153, 13899), (157, 13926), (165, 13986), (173, 14064), (180, 14142), (185, 14178), (186, 14190), (187, 14196), (189, 14235), (192, 14253), (193, 14262), (202, 14370), (207, 14469), (208, 14475), (209, 14496), (210, 14499), (222, 14631), (228, 14709), (242, 14859), (243, 14901), (258, 15249), (261, 15288), (263, 15360), (264, 15399), (269, 15516), (270, 15537), (272, 15594), (273, 15615), (276, 15663), (277, 15666), (281, 15744), (282, 15753), (285, 15795), (292, 15945), (293, 15948),

Gene: Superstar\_21 Start: 12671, Stop: 16678, Start Num: 11

Candidate Starts for Superstar\_21:

(Start: 11 @12671 has 8 MA's), (21, 12797), (23, 12806), (31, 12884), (33, 12917), (46, 13049), (48, 13115), (53, 13178), (58, 13220), (60, 13256), (64, 13313), (67, 13343), (74, 13436), (76, 13448), (82, 13598), (86, 13712), (87, 13721), (100, 14120), (107, 14231), (113, 14288), (115, 14312), (116, 14333), (118, 14366), (121, 14384), (128, 14474), (150, 14558), (151, 14561), (152, 14567), (163, 14612), (164, 14615), (173, 14699), (178, 14756), (185, 14813), (186, 14825), (187, 14831), (192, 14888), (200, 14960), (219, 15254), (220, 15257), (222, 15266), (242, 15593), (246, 15698), (247, 15746), (251, 15806), (258, 15983), (262, 16055), (263, 16094), (264, 16133), (268, 16247), (269, 16250), (270, 16271), (272, 16328), (273, 16349), (274, 16352), (279, 16445), (280, 16469), (284, 16493), (292, 16667),

Gene: Tefunt\_18 Start: 11570, Stop: 15475, Start Num: 11

Candidate Starts for Tefunt\_18:

(Start: 11 @11570 has 8 MA's), (23, 11705), (33, 11816), (37, 11879), (42, 11912), (46, 11948), (57, 12110), (58, 12119), (60, 12155), (67, 12242), (86, 12611), (87, 12620), (100, 13019), (102, 13052), (110, 13166), (116, 13232), (118, 13265), (121, 13283), (122, 13307), (124, 13319), (128, 13373), (150, 13457), (152, 13466), (163, 13511), (173, 13598), (178, 13655), (185, 13712), (192, 13787), (200, 13859), (219, 14153), (230, 14252), (236, 14285), (242, 14393), (244, 14438), (246, 14498), (251, 14606), (264, 14933), (265, 14975), (269, 15050), (270, 15071), (272, 15128), (273, 15149), (274, 15152), (276, 15197), (292, 15464),

Gene: Vanseggelen\_23 Start: 11218, Stop: 15330, Start Num: 8

Candidate Starts for Vanseggelen\_23:

(Start: 8 @11218 has 8 MA's), (Start: 12 @11242 has 1 MA's), (16, 11269), (23, 11362), (25, 11395), (29, 11425), (33, 11473), (38, 11545), (51, 11716), (53, 11737), (58, 11779), (62, 11827), (65, 11890), (71, 11953), (78, 12049), (79, 12079), (81, 12100), (84, 12172), (86, 12271), (87, 12280), (94, 12586), (100, 12682), (102, 12715), (107, 12793), (110, 12829), (116, 12895), (131, 13054), (133, 13075),

(144, 13168), (145, 13177), (146, 13186), (158, 13300), (166, 13360), (171, 13405), (173, 13435), (178, 13492), (180, 13513), (185, 13549), (189, 13606), (192, 13624), (193, 13633), (222, 14002), (229, 14089), (236, 14122), (237, 14164), (242, 14230), (245, 14311), (246, 14335), (250, 14431), (251, 14443), (256, 14596), (258, 14620), (261, 14659), (263, 14731), (264, 14770), (265, 14812), (269, 14887), (270, 14908), (272, 14965), (273, 14986), (276, 15034), (277, 15037), (278, 15052), (281, 15115), (282, 15124), (285, 15166), (286, 15181), (292, 15316), (293, 15319),

Gene: Verabelle\_19 Start: 11549, Stop: 15661, Start Num: 8

Candidate Starts for Verabelle\_19:

(Start: 8 @11549 has 8 MA's), (Start: 12 @11573 has 1 MA's), (16, 11600), (22, 11687), (23, 11693), (25, 11726), (29, 11756), (33, 11804), (47, 11987), (48, 12005), (53, 12068), (58, 12110), (60, 12146), (62, 12158), (64, 12203), (67, 12233), (71, 12284), (75, 12335), (79, 12410), (81, 12431), (82, 12488), (85, 12524), (86, 12602), (87, 12611), (93, 12824), (94, 12917), (98, 12983), (99, 12989), (100, 13013), (105, 13100), (116, 13226), (117, 13235), (120, 13268), (121, 13277), (123, 13310), (127, 13352), (130, 13373), (133, 13406), (135, 13418), (136, 13424), (139, 13439), (144, 13499), (145, 13508), (146, 13517), (147, 13529), (148, 13532), (157, 13628), (159, 13637), (166, 13691), (171, 13736), (173, 13766), (178, 13823), (180, 13844), (185, 13880), (189, 13937), (192, 13955), (193, 13964), (202, 14072), (211, 14240), (222, 14333), (229, 14420), (236, 14453), (237, 14495), (242, 14561), (245, 14642), (246, 14666), (249, 14744), (256, 14927), (258, 14951), (261, 14990), (262, 15023), (263, 15062), (264, 15101), (269, 15218), (270, 15239), (272, 15296), (273, 15317), (277, 15368), (281, 15446), (282, 15455), (285, 15497), (292, 15647), (293, 15650),

Gene: Verse\_18 Start: 11848, Stop: 15960, Start Num: 8

Candidate Starts for Verse\_18:

(Start: 8 @11848 has 8 MA's), (Start: 12 @11872 has 1 MA's), (23, 11992), (25, 12025), (29, 12055), (33, 12103), (34, 12106), (49, 12322), (55, 12382), (62, 12457), (65, 12520), (71, 12583), (77, 12658), (81, 12730), (86, 12901), (87, 12910), (94, 13216), (96, 13252), (100, 13312), (102, 13345), (107, 13423), (109, 13444), (110, 13459), (113, 13480), (114, 13498), (116, 13525), (118, 13558), (121, 13576), (123, 13609), (128, 13666), (134, 13711), (137, 13729), (144, 13798), (153, 13900), (157, 13927), (166, 13990), (173, 14065), (180, 14143), (183, 14164), (185, 14179), (186, 14191), (187, 14197), (189, 14236), (192, 14254), (202, 14371), (207, 14470), (208, 14476), (209, 14497), (210, 14500), (222, 14632), (228, 14710), (242, 14860), (243, 14902), (258, 15250), (261, 15289), (263, 15361), (264, 15400), (269, 15517), (270, 15538), (272, 15595), (273, 15616), (276, 15664), (277, 15667), (281, 15745), (282, 15754), (285, 15796), (292, 15946), (293, 15949),

Gene: Yosif\_19 Start: 11936, Stop: 15949, Start Num: 10

Candidate Starts for Yosif\_19:

(Start: 10 @11936 has 1 MA's), (Start: 12 @11951 has 1 MA's), (23, 12071), (27, 12113), (29, 12134), (33, 12182), (42, 12281), (51, 12425), (54, 12455), (62, 12536), (68, 12614), (87, 12992), (91, 13076), (92, 13115), (94, 13295), (95, 13328), (100, 13391), (110, 13538), (116, 13604), (118, 13637), (119, 13643), (121, 13655), (135, 13796), (136, 13802), (141, 13829), (154, 13898), (166, 13982), (167, 13985), (168, 13997), (173, 14057), (185, 14171), (186, 14183), (193, 14255), (207, 14450), (209, 14477), (221, 14609), (222, 14612), (224, 14633), (227, 14654), (242, 14840), (257, 15218), (258, 15227), (261, 15266), (262, 15299), (264, 15377), (265, 15419), (266, 15428), (268, 15491), (269, 15494), (270, 15515), (272, 15572), (273, 15593), (276, 15641), (277, 15644), (278, 15659), (281, 15722), (282, 15731), (285, 15773), (287, 15794), (289, 15806), (290, 15848), (292, 15935), (293, 15938),

Gene: ZamZam\_21 Start: 11560, Stop: 15954, Start Num: 2

Candidate Starts for ZamZam\_21:

(1, 11434), (Start: 2 @11560 has 2 MA's), (5, 11689), (6, 11710), (9, 11896), (13, 11926), (15, 11947), (17, 11962), (18, 11971), (19, 12013), (20, 12028), (26, 12079), (40, 12244), (41, 12250), (45, 12283), (52, 12418), (54, 12445), (56, 12460), (60, 12514), (62, 12526), (65, 12589), (67, 12601), (70, 12643),

(71, 12652), (81, 12799), (87, 12979), (89, 13033), (94, 13285), (98, 13351), (100, 13381), (108, 13501), (110, 13528), (112, 13540), (116, 13594), (121, 13645), (123, 13678), (126, 13714), (136, 13792), (140, 13810), (141, 13819), (142, 13840), (154, 13888), (160, 13921), (173, 14047), (176, 14062), (181, 14134), (183, 14146), (185, 14161), (188, 14194), (190, 14224), (192, 14236), (200, 14308), (204, 14398), (206, 14440), (235, 14731), (242, 14842), (245, 14923), (246, 14947), (258, 15232), (261, 15271), (263, 15343), (264, 15382), (265, 15424), (269, 15499), (270, 15520), (272, 15577), (273, 15598), (276, 15646), (277, 15649), (279, 15694), (285, 15778), (288, 15805), (290, 15853), (292, 15940), (293, 15943),

Gene: phiCAM\_19 Start: 13655, Stop: 17626, Start Num: 23

Candidate Starts for phiCAM\_19:

(Start: 8 @13511 has 8 MA's), (Start: 12 @13535 has 1 MA's), (23, 13655), (25, 13688), (29, 13718), (33, 13766), (34, 13769), (49, 13985), (53, 14030), (60, 14108), (61, 14111), (62, 14120), (65, 14183), (69, 14213), (70, 14237), (71, 14246), (75, 14297), (77, 14321), (81, 14393), (86, 14564), (87, 14573), (94, 14879), (97, 14942), (100, 14975), (107, 15086), (110, 15122), (113, 15143), (116, 15188), (118, 15221), (121, 15239), (123, 15272), (127, 15314), (128, 15329), (132, 15362), (133, 15368), (136, 15386), (137, 15392), (138, 15395), (144, 15461), (145, 15470), (146, 15479), (148, 15494), (153, 15563), (155, 15578), (166, 15653), (173, 15728), (183, 15827), (185, 15842), (186, 15854), (187, 15860), (189, 15899), (192, 15917), (201, 16007), (202, 16034), (209, 16160), (218, 16262), (222, 16295), (242, 16523), (243, 16565), (250, 16724), (251, 16736), (258, 16913), (261, 16952), (263, 17024), (264, 17063), (269, 17180), (270, 17201), (272, 17258), (273, 17279), (276, 17327), (277, 17330), (278, 17345), (281, 17408), (282, 17417), (285, 17459), (292, 17612), (293, 17615),