



# Annotation of the *Bacillus anthracis* Genome from DNA Coordinates 62380-63694

George Ghanatios, Becky Shust, Tyler Groves and Richard Salton

Gates Chili Central School and the Western New York Genetics in Research and Health Care Partnership



## Abstract

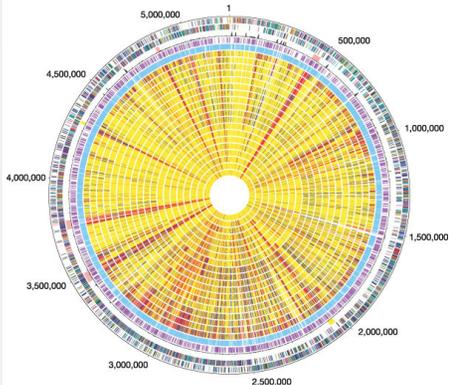
A group of three consecutive genes from the *Bacillus anthracis* genome, Ba-0057, Ba\_0058 and Ba\_0059, were subjected to manual annotation using the Genomics Education National Initiative- Genome Annotation Toolkit (GENI-ACT). While using the Genomics Education National Initiative- Genome Annotation Toolkit, the database searches that we performed were able to explain a plethora of general genomic information. This information included the amino acid sequence-based similarity data as well as potential alternative open reading frames and others. By using all of the information found by the databases, we were able to conclude that the protein spans all across the cytoplasmic membrane and that the protein is a sporulation protein. Using these tests results, as well as all the others, we determined if the gene product name was identical to that proposed for each gene by automated computer pipeline annotation.

## Introduction

*Bacillus anthracis* is a rod shaped bacterium that is the infectious agent of anthrax, a deadly human and live stock disease. It is identified using a gram-stain and it is gram positive. It is commonly found in soil and affects animal's domestic and wild. *Bacillus anthracis* is being studied for a multitude of reasons. One reason is due to its relatively short gene sequence. Furthermore, there is currently only one vaccine which scientists want to increase. Coming up with a new vaccine will help stop the spread of the deadly disease.

*Bacillus anthracis* has been studied throughout history. Many studies have led to the conclusion that it can be used as a biological weapon. Scientists were able to figure this out because they found out that it contains an environmentally resistant endospore. The reasons for marked differences in susceptibility to anthrax among different animal species are not known.

Figure 1. A genetic map of *Bacillus anthracis*



## Methods and Materials

Modules of the GENI-ACT (<http://www.geni-act.org>) were used to complete *Kyococcus sedentarius* genome annotation. The modules are described below:

Modules	Activities	Questions Answered
<b>Module 1-Basic Information</b>	DNA Coordinates and Sequence, Protein Sequence	What is the sequence of my gene and protein? Where is it located in the genome?
<b>Module 2-Sequence-Based Similarity Data</b>	Blast, CDD, T-Coffee, WebLogo	Is my sequence similar to other sequences in Genbank?
<b>Module 3- Cellular Localization Data</b>	Gram Stain, TMHMM, Signal P, PSORT, Phobius	Is my protein in the cytoplasm, secreted or embedded in the membrane?
<b>Module 5-Structure-Based Evidence</b>	TIGRFam, Pfam, PDB	Are there any functional domains in my protein?
<b>Module 6-Enzymatic Function</b>	KEGG, MetaCyc, E.C. Number	In what process does my protein take part?

## Results

### BA 0057

The proposed product of this gene was a YabP sporulation protein. This protein produces a single endospore that is resistant to environmental factors such as heat, radiation and chemical insult. This gene product proposal is supported by a multitude of gene programs. One of these is WebLogo, which determined that our protein was well-conserved. Sporulation is a well-conserved evolutionary trait among the *Bacillus* species. The conclusion that this protein is a sporulation protein is further supported through the pairwise alignment and HMM logo. Last but not least, the conclusion that our protein was not an enzyme in accordance to MetaCyc, also proves the validity of our protein.



Figure 2. WebLogo generated from the BA\_0057 T-COFFEE alignment. There are tall and wide letters throughout, meaning BA\_0057 is a well conserved protein.

### BA 0058

The proposed product of this gene was a spore cortex biosynthesis protein. This protein is only found in organisms that perform sporulation. It is also predicted to span the membrane several times. This information is supported through the Phobius graph, which states that the protein is found all around the cytoplasmic membrane. Furthermore, the TMHMM logo concluded that the protein has six transmembrane helices, meaning that it spans all across the membrane. As fully seen through the long location on the membrane, it can once again be concluded that this protein is in fact a spore cortex biosynthesis protein.

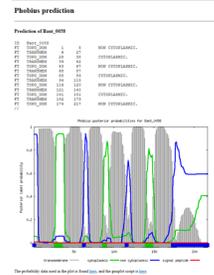


Figure 3. Phobius graph predicting BA\_0058 is found in the cytoplasmic membrane.

### TMHMM result

TMHMM result  
HLLP with output format

```

# BA_0058 tmhmm_1
# BA_0058 tmhmm_2
# BA_0058 tmhmm_3
# BA_0058 tmhmm_4
# BA_0058 tmhmm_5
# BA_0058 tmhmm_6
# BA_0058 tmhmm_7
# BA_0058 tmhmm_8
# BA_0058 tmhmm_9
# BA_0058 tmhmm_10
# BA_0058 tmhmm_11
# BA_0058 tmhmm_12
# BA_0058 tmhmm_13
# BA_0058 tmhmm_14
# BA_0058 tmhmm_15
# BA_0058 tmhmm_16
# BA_0058 tmhmm_17
# BA_0058 tmhmm_18
# BA_0058 tmhmm_19
# BA_0058 tmhmm_20
# BA_0058 tmhmm_21
# BA_0058 tmhmm_22
# BA_0058 tmhmm_23
# BA_0058 tmhmm_24
# BA_0058 tmhmm_25
# BA_0058 tmhmm_26
# BA_0058 tmhmm_27
# BA_0058 tmhmm_28
# BA_0058 tmhmm_29
# BA_0058 tmhmm_30
# BA_0058 tmhmm_31
# BA_0058 tmhmm_32
# BA_0058 tmhmm_33
# BA_0058 tmhmm_34
# BA_0058 tmhmm_35
# BA_0058 tmhmm_36
# BA_0058 tmhmm_37
# BA_0058 tmhmm_38
# BA_0058 tmhmm_39
# BA_0058 tmhmm_40
# BA_0058 tmhmm_41
# BA_0058 tmhmm_42
# BA_0058 tmhmm_43
# BA_0058 tmhmm_44
# BA_0058 tmhmm_45
# BA_0058 tmhmm_46
# BA_0058 tmhmm_47
# BA_0058 tmhmm_48
# BA_0058 tmhmm_49
# BA_0058 tmhmm_50
# BA_0058 tmhmm_51
# BA_0058 tmhmm_52
# BA_0058 tmhmm_53
# BA_0058 tmhmm_54
# BA_0058 tmhmm_55
# BA_0058 tmhmm_56
# BA_0058 tmhmm_57
# BA_0058 tmhmm_58
# BA_0058 tmhmm_59
# BA_0058 tmhmm_60
# BA_0058 tmhmm_61
# BA_0058 tmhmm_62
# BA_0058 tmhmm_63
# BA_0058 tmhmm_64
# BA_0058 tmhmm_65
# BA_0058 tmhmm_66
# BA_0058 tmhmm_67
# BA_0058 tmhmm_68
# BA_0058 tmhmm_69
# BA_0058 tmhmm_70
# BA_0058 tmhmm_71
# BA_0058 tmhmm_72
# BA_0058 tmhmm_73
# BA_0058 tmhmm_74
# BA_0058 tmhmm_75
# BA_0058 tmhmm_76
# BA_0058 tmhmm_77
# BA_0058 tmhmm_78
# BA_0058 tmhmm_79
# BA_0058 tmhmm_80
# BA_0058 tmhmm_81
# BA_0058 tmhmm_82
# BA_0058 tmhmm_83
# BA_0058 tmhmm_84
# BA_0058 tmhmm_85
# BA_0058 tmhmm_86
# BA_0058 tmhmm_87
# BA_0058 tmhmm_88
# BA_0058 tmhmm_89
# BA_0058 tmhmm_90
# BA_0058 tmhmm_91
# BA_0058 tmhmm_92
# BA_0058 tmhmm_93
# BA_0058 tmhmm_94
# BA_0058 tmhmm_95
# BA_0058 tmhmm_96
# BA_0058 tmhmm_97
# BA_0058 tmhmm_98
# BA_0058 tmhmm_99
# BA_0058 tmhmm_100
# BA_0058 tmhmm_101
# BA_0058 tmhmm_102
# BA_0058 tmhmm_103
# BA_0058 tmhmm_104
# BA_0058 tmhmm_105
# BA_0058 tmhmm_106
# BA_0058 tmhmm_107
# BA_0058 tmhmm_108
# BA_0058 tmhmm_109
# BA_0058 tmhmm_110
# BA_0058 tmhmm_111
# BA_0058 tmhmm_112
# BA_0058 tmhmm_113
# BA_0058 tmhmm_114
# BA_0058 tmhmm_115
# BA_0058 tmhmm_116
# BA_0058 tmhmm_117
# BA_0058 tmhmm_118
# BA_0058 tmhmm_119
# BA_0058 tmhmm_120
# BA_0058 tmhmm_121
# BA_0058 tmhmm_122
# BA_0058 tmhmm_123
# BA_0058 tmhmm_124
# BA_0058 tmhmm_125
# BA_0058 tmhmm_126
# BA_0058 tmhmm_127
# BA_0058 tmhmm_128
# BA_0058 tmhmm_129
# BA_0058 tmhmm_130
# BA_0058 tmhmm_131
# BA_0058 tmhmm_132
# BA_0058 tmhmm_133
# BA_0058 tmhmm_134
# BA_0058 tmhmm_135
# BA_0058 tmhmm_136
# BA_0058 tmhmm_137
# BA_0058 tmhmm_138
# BA_0058 tmhmm_139
# BA_0058 tmhmm_140
# BA_0058 tmhmm_141
# BA_0058 tmhmm_142
# BA_0058 tmhmm_143
# BA_0058 tmhmm_144
# BA_0058 tmhmm_145
# BA_0058 tmhmm_146
# BA_0058 tmhmm_147
# BA_0058 tmhmm_148
# BA_0058 tmhmm_149
# BA_0058 tmhmm_150
# BA_0058 tmhmm_151
# BA_0058 tmhmm_152
# BA_0058 tmhmm_153
# BA_0058 tmhmm_154
# BA_0058 tmhmm_155
# BA_0058 tmhmm_156
# BA_0058 tmhmm_157
# BA_0058 tmhmm_158
# BA_0058 tmhmm_159
# BA_0058 tmhmm_160
# BA_0058 tmhmm_161
# BA_0058 tmhmm_162
# BA_0058 tmhmm_163
# BA_0058 tmhmm_164
# BA_0058 tmhmm_165
# BA_0058 tmhmm_166
# BA_0058 tmhmm_167
# BA_0058 tmhmm_168
# BA_0058 tmhmm_169
# BA_0058 tmhmm_170
# BA_0058 tmhmm_171
# BA_0058 tmhmm_172
# BA_0058 tmhmm_173
# BA_0058 tmhmm_174
# BA_0058 tmhmm_175
# BA_0058 tmhmm_176
# BA_0058 tmhmm_177
# BA_0058 tmhmm_178
# BA_0058 tmhmm_179
# BA_0058 tmhmm_180
# BA_0058 tmhmm_181
# BA_0058 tmhmm_182
# BA_0058 tmhmm_183
# BA_0058 tmhmm_184
# BA_0058 tmhmm_185
# BA_0058 tmhmm_186
# BA_0058 tmhmm_187
# BA_0058 tmhmm_188
# BA_0058 tmhmm_189
# BA_0058 tmhmm_190
# BA_0058 tmhmm_191
# BA_0058 tmhmm_192
# BA_0058 tmhmm_193
# BA_0058 tmhmm_194
# BA_0058 tmhmm_195
# BA_0058 tmhmm_196
# BA_0058 tmhmm_197
# BA_0058 tmhmm_198
# BA_0058 tmhmm_199
# BA_0058 tmhmm_200
# BA_0058 tmhmm_201
# BA_0058 tmhmm_202
# BA_0058 tmhmm_203
# BA_0058 tmhmm_204
# BA_0058 tmhmm_205
# BA_0058 tmhmm_206
# BA_0058 tmhmm_207
# BA_0058 tmhmm_208
# BA_0058 tmhmm_209
# BA_0058 tmhmm_210
# BA_0058 tmhmm_211
# BA_0058 tmhmm_212
# BA_0058 tmhmm_213
# BA_0058 tmhmm_214
# BA_0058 tmhmm_215
# BA_0058 tmhmm_216
# BA_0058 tmhmm_217
# BA_0058 tmhmm_218
# BA_0058 tmhmm_219
# BA_0058 tmhmm_220
# BA_0058 tmhmm_221
# BA_0058 tmhmm_222
# BA_0058 tmhmm_223
# BA_0058 tmhmm_224
# BA_0058 tmhmm_225
# BA_0058 tmhmm_226
# BA_0058 tmhmm_227
# BA_0058 tmhmm_228
# BA_0058 tmhmm_229
# BA_0058 tmhmm_230
# BA_0058 tmhmm_231
# BA_0058 tmhmm_232
# BA_0058 tmhmm_233
# BA_0058 tmhmm_234
# BA_0058 tmhmm_235
# BA_0058 tmhmm_236
# BA_0058 tmhmm_237
# BA_0058 tmhmm_238
# BA_0058 tmhmm_239
# BA_0058 tmhmm_240
# BA_0058 tmhmm_241
# BA_0058 tmhmm_242
# BA_0058 tmhmm_243
# BA_0058 tmhmm_244
# BA_0058 tmhmm_245
# BA_0058 tmhmm_246
# BA_0058 tmhmm_247
# BA_0058 tmhmm_248
# BA_0058 tmhmm_249
# BA_0058 tmhmm_250
# BA_0058 tmhmm_251
# BA_0058 tmhmm_252
# BA_0058 tmhmm_253
# BA_0058 tmhmm_254
# BA_0058 tmhmm_255
# BA_0058 tmhmm_256
# BA_0058 tmhmm_257
# BA_0058 tmhmm_258
# BA_0058 tmhmm_259
# BA_0058 tmhmm_260
# BA_0058 tmhmm_261
# BA_0058 tmhmm_262
# BA_0058 tmhmm_263
# BA_0058 tmhmm_264
# BA_0058 tmhmm_265
# BA_0058 tmhmm_266
# BA_0058 tmhmm_267
# BA_0058 tmhmm_268
# BA_0058 tmhmm_269
# BA_0058 tmhmm_270
# BA_0058 tmhmm_271
# BA_0058 tmhmm_272
# BA_0058 tmhmm_273
# BA_0058 tmhmm_274
# BA_0058 tmhmm_275
# BA_0058 tmhmm_276
# BA_0058 tmhmm_277
# BA_0058 tmhmm_278
# BA_0058 tmhmm_279
# BA_0058 tmhmm_280
# BA_0058 tmhmm_281
# BA_0058 tmhmm_282
# BA_0058 tmhmm_283
# BA_0058 tmhmm_284
# BA_0058 tmhmm_285
# BA_0058 tmhmm_286
# BA_0058 tmhmm_287
# BA_0058 tmhmm_288
# BA_0058 tmhmm_289
# BA_0058 tmhmm_290
# BA_0058 tmhmm_291
# BA_0058 tmhmm_292
# BA_0058 tmhmm_293
# BA_0058 tmhmm_294
# BA_0058 tmhmm_295
# BA_0058 tmhmm_296
# BA_0058 tmhmm_297
# BA_0058 tmhmm_298
# BA_0058 tmhmm_299
# BA_0058 tmhmm_300
# BA_0058 tmhmm_301
# BA_0058 tmhmm_302
# BA_0058 tmhmm_303
# BA_0058 tmhmm_304
# BA_0058 tmhmm_305
# BA_0058 tmhmm_306
# BA_0058 tmhmm_307
# BA_0058 tmhmm_308
# BA_0058 tmhmm_309
# BA_0058 tmhmm_310
# BA_0058 tmhmm_311
# BA_0058 tmhmm_312
# BA_0058 tmhmm_313
# BA_0058 tmhmm_314
# BA_0058 tmhmm_315
# BA_0058 tmhmm_316
# BA_0058 tmhmm_317
# BA_0058 tmhmm_318
# BA_0058 tmhmm_319
# BA_0058 tmhmm_320
# BA_0058 tmhmm_321
# BA_0058 tmhmm_322
# BA_0058 tmhmm_323
# BA_0058 tmhmm_324
# BA_0058 tmhmm_325
# BA_0058 tmhmm_326
# BA_0058 tmhmm_327
# BA_0058 tmhmm_328
# BA_0058 tmhmm_329
# BA_0058 tmhmm_330
# BA_0058 tmhmm_331
# BA_0058 tmhmm_332
# BA_0058 tmhmm_333
# BA_0058 tmhmm_334
# BA_0058 tmhmm_335
# BA_0058 tmhmm_336
# BA_0058 tmhmm_337
# BA_0058 tmhmm_338
# BA_0058 tmhmm_339
# BA_0058 tmhmm_340
# BA_0058 tmhmm_341
# BA_0058 tmhmm_342
# BA_0058 tmhmm_343
# BA_0058 tmhmm_344
# BA_0058 tmhmm_345
# BA_0058 tmhmm_346
# BA_0058 tmhmm_347
# BA_0058 tmhmm_348
# BA_0058 tmhmm_349
# BA_0058 tmhmm_350
# BA_0058 tmhmm_351
# BA_0058 tmhmm_352
# BA_0058 tmhmm_353
# BA_0058 tmhmm_354
# BA_0058 tmhmm_355
# BA_0058 tmhmm_356
# BA_0058 tmhmm_357
# BA_0058 tmhmm_358
# BA_0058 tmhmm_359
# BA_0058 tmhmm_360
# BA_0058 tmhmm_361
# BA_0058 tmhmm_362
# BA_0058 tmhmm_363
# BA_0058 tmhmm_364
# BA_0058 tmhmm_365
# BA_0058 tmhmm_366
# BA_0058 tmhmm_367
# BA_0058 tmhmm_368
# BA_0058 tmhmm_369
# BA_0058 tmhmm_370
# BA_0058 tmhmm_371
# BA_0058 tmhmm_372
# BA_0058 tmhmm_373
# BA_0058 tmhmm_374
# BA_0058 tmhmm_375
# BA_0058 tmhmm_376
# BA_0058 tmhmm_377
# BA_0058 tmhmm_378
# BA_0058 tmhmm_379
# BA_0058 tmhmm_380
# BA_0058 tmhmm_381
# BA_0058 tmhmm_382
# BA_0058 tmhmm_383
# BA_0058 tmhmm_384
# BA_0058 tmhmm_385
# BA_0058 tmhmm_386
# BA_0058 tmhmm_387
# BA_0058 tmhmm_388
# BA_0058 tmhmm_389
# BA_0058 tmhmm_390
# BA_0058 tmhmm_391
# BA_0058 tmhmm_392
# BA_0058 tmhmm_393
# BA_0058 tmhmm_394
# BA_0058 tmhmm_395
# BA_0058 tmhmm_396
# BA_0058 tmhmm_397
# BA_0058 tmhmm_398
# BA_0058 tmhmm_399
# BA_0058 tmhmm_400
# BA_0058 tmhmm_401
# BA_0058 tmhmm_402
# BA_0058 tmhmm_403
# BA_0058 tmhmm_404
# BA_0058 tmhmm_405
# BA_0058 tmhmm_406
# BA_0058 tmhmm_407
# BA_0058 tmhmm_408
# BA_0058 tmhmm_409
# BA_0058 tmhmm_410
# BA_0058 tmhmm_411
# BA_0058 tmhmm_412
# BA_0058 tmhmm_413
# BA_0058 tmhmm_414
# BA_0058 tmhmm_415
# BA_0058 tmhmm_416
# BA_0058 tmhmm_417
# BA_0058 tmhmm_418
# BA_0058 tmhmm_419
# BA_0058 tmhmm_420
# BA_0058 tmhmm_421
# BA_0058 tmhmm_422
# BA_0058 tmhmm_423
# BA_0058 tmhmm_424
# BA_0058 tmhmm_425
# BA_0058 tmhmm_426
# BA_0058 tmhmm_427
# BA_0058 tmhmm_428
# BA_0058 tmhmm_429
# BA_0058 tmhmm_430
# BA_0058 tmhmm_431
# BA_0058 tmhmm_432
# BA_0058 tmhmm_433
# BA_0058 tmhmm_434
# BA_0058 tmhmm_435
# BA_0058 tmhmm_436
# BA_0058 tmhmm_437
# BA_0058 tmhmm_438
# BA_0058 tmhmm_439
# BA_0058 tmhmm_440
# BA_0058 tmhmm_441
# BA_0058 tmhmm_442
# BA_0058 tmhmm_443
# BA_0058 tmhmm_444
# BA_0058 tmhmm_445
# BA_0058 tmhmm_446
# BA_0058 tmhmm_447
# BA_0058 tmhmm_448
# BA_0058 tmhmm_449
# BA_0058 tmhmm_450
# BA_0058 tmhmm_451
# BA_0058 tmhmm_452
# BA_0058 tmhmm_453
# BA_0058 tmhmm_454
# BA_0058 tmhmm_455
# BA_0058 tmhmm_456
# BA_0058 tmhmm_457
# BA_0058 tmhmm_458
# BA_0058 tmhmm_459
# BA_0058 tmhmm_460
# BA_0058 tmhmm_461
# BA_0058 tmhmm_462
# BA_0058 tmhmm_463
# BA_0058 tmhmm_464
# BA_0058 tmhmm_465
# BA_0058 tmhmm_466
# BA_0058 tmhmm_467
# BA_0058 tmhmm_468
# BA_0058 tmhmm_469
# BA_0058 tmhmm_470
# BA_0058 tmhmm_471
# BA_0058 tmhmm_472
# BA_0058 tmhmm_473
# BA_0058 tmhmm_474
# BA_0058 tmhmm_475
# BA_0058 tmhmm_476
# BA_0058 tmhmm_477
# BA_0058 tmhmm_478
# BA_0058 tmhmm_479
# BA_0058 tmhmm_480
# BA_0058 tmhmm_481
# BA_0058 tmhmm_482
# BA_0058 tmhmm_483
# BA_0058 tmhmm_484
# BA_0058 tmhmm_485
# BA_0058 tmhmm_486
# BA_0058 tmhmm_487
# BA_0058 tmhmm_488
# BA_0058 tmhmm_489
# BA_0058 tmhmm_490
# BA_0058 tmhmm_491
# BA_0058 tmhmm_492
# BA_0058 tmhmm_493
# BA_0058 tmhmm_494
# BA_0058 tmhmm_495
# BA_0058 tmhmm_496
# BA_0058 tmhmm_497
# BA_0058 tmhmm_498
# BA_0058 tmhmm_499
# BA_0058 tmhmm_500
# BA_0058 tmhmm_501
# BA_0058 tmhmm_502
# BA_0058 tmhmm_503
# BA_0058 tmhmm_504
# BA_0058 tmhmm_505
# BA_0058 tmhmm_506
# BA_0058 tmhmm_507
# BA_0058 tmhmm_508
# BA_0058 tmhmm_509
# BA_0058 tmhmm_510
# BA_0058 tmhmm_511
# BA_0058 tmhmm_512
# BA_0058 tmhmm_513
# BA_0058 tmhmm_514
# BA_0058 tmhmm_515
# BA_0058 tmhmm_516
# BA_0058 tmhmm_517
# BA_0058 tmhmm_518
# BA_0058 tmhmm_519
# BA_0058 tmhmm_520
# BA_0058 tmhmm_521
# BA_0058 tmhmm_522
# BA_0058 tmhmm_523
# BA_0058 tmhmm_524
# BA_0058 tmhmm_525
# BA_0058 tmhmm_526
# BA_0058 tmhmm_527
# BA_0058 tmhmm_528
# BA_0058 tmhmm_529
# BA_0058 tmhmm_530
# BA_0058 tmhmm_531
# BA_0058 tmhmm_532
# BA_0058 tmhmm_533
# BA_0058 tmhmm_534
# BA_0058 tmhmm_535
# BA_0058 tmhmm_536
# BA_0058 tmhmm_537
# BA_0058 tmhmm_538
# BA_0058 tmhmm_539
# BA_0058 tmhmm_540
# BA_0058 tmhmm_541
# BA_0058 tmhmm_542
# BA_0058 tmhmm_543
# BA_0058 tmhmm_544
# BA_0058 tmhmm_545
# BA_0058 tmhmm_546
# BA_0058 tmhmm_547
# BA_0058 tmhmm_548
# BA_0058 tmhmm_549
# BA_0058 tmhmm_550
# BA_0058 tmhmm_551
# BA_0058 tmhmm_552
# BA_0058 tmhmm_553
# BA_0058 tmhmm_554
# BA_0058 tmhmm_555
# BA_0058 tmhmm_556
# BA_0058 tmhmm_557
# BA_0058 tmhmm_558
# BA_0058 tmhmm_559
# BA_0058 tmhmm_560
# BA_0058 tmhmm_561
# BA_0058 tmhmm_562
# BA_0058 tmhmm_563
# BA_0058 tmhmm_564
# BA_0058 tmhmm_565
# BA_0058 tmhmm_566
# BA_0058 tmhmm_567
# BA_0058 tmhmm_568
# BA_0058 tmhmm_569
# BA_0058 tmhmm_570
# BA_0058 tmhmm_571
# BA_0058 tmhmm_572
# BA_0058 tmhmm_573
# BA_0058 tmhmm_574
# BA_0058 tmhmm_575
# BA_0058 tmhmm_576
# BA_0058 tmhmm_577
# BA_0058 tmhmm_578
# BA_0058 tmhmm_579
# BA_0058 tmhmm_580
# BA_0058 tmhmm_581
# BA_0058 tmhmm_582
# BA_0058 tmhmm_583
# BA_0058 tmhmm_584
# BA_0058 tmhmm_585
# BA_0058 tmhmm_586
# BA_0058 tmhmm_587
# BA_0058 tmhmm_588
# BA_0058 tmhmm_589
# BA_0058 tmhmm_590
# BA_0058 tmhmm_591
# BA_0058 tmhmm_592
# BA_0058 tmhmm_593
# BA_0058 tmhmm_594
# BA_0058 tmhmm_595
# BA_0058 tmhmm_596
# BA_0058 tmhmm_597
# BA_0058 tmhmm_598
# BA_0058 tmhmm_599
# BA_0058 tmhmm_600
# BA_0058 tmhmm_601
# BA_0058 tmhmm_602
# BA_0058 tmhmm_603
# BA_0058 tmhmm_604
# BA_0058 tmhmm_605
# BA_0058 tmhmm_606
# BA_0058 tmhmm_607
# BA_0058 tmhmm_608
# BA_0058 tmhmm_609
# BA_0058 tmhmm_610
# BA_0058 tmhmm_611
# BA_0058 tmhmm_612
# BA_0058 tmhmm_613
# BA_0058 tmhmm_614
# BA_0058 tmhmm_615
# BA_0058 tmhmm_616
# BA_0058 tmhmm_617
# BA_0058 tmhmm_618
# BA_0058 tmhmm_619
# BA_0058 tmhmm_620
# BA_0058 tmhmm_621
# BA_0058 tmhmm_622
# BA_0058 tmhmm_623
# BA_0058 tmhmm_624
# BA_0058 tmhmm_625
# BA_0058 tmhmm_626
# BA_0058 tmhmm_627
# BA_0058 tmhmm_628
# BA_0058 tmhmm_629
# BA_0058 tmhmm_630
# BA_0058 tmhmm_631
# BA_0058 tmhmm_632
# BA_0058 tmhmm_633
# BA_0058 tmhmm_634
# BA_0058 tmhmm_635
# BA_0058 tmhmm_636
# BA_0058 tmhmm_637
# BA_0058 tmhmm_638
# BA_0058 tmhmm_639
# BA_0058 tmhmm_640
# BA_0058 tmhmm_641
# BA_0058 tmhmm_642
# BA_0058 tmhmm_643
# BA_0058 tmhmm_644
# BA_0058 tmhmm_645
# BA_0058 tmhmm_646
# BA_0058 tmhmm_647
# BA_0058 tmhmm_648
# BA_0058 tmhmm_649
# BA_0058 tmhmm_650
# BA_0058 tmhmm_651
# BA_0058 tmhmm_652
# BA_0058 tmhmm_653
# BA_0058 tmhmm_654
# BA_0058 tmhmm_655
# BA_0058 tmhmm_656
# BA_0058 tmhmm_657
# BA_0058 tmhmm_658
# BA_0058 tmhmm_659
# BA_0058 tmhmm_660
# BA_0058 tmhmm_661
# BA_0058 tmhmm_662
# BA_0058 tmhmm_663
# BA_0058 tmhmm_664
# BA_0058 tmhmm_665
# BA_0058 tmhmm_666
#
```