**Table S1: Complete list of Gram-positive organisms with *pel*-like operons.**

|  |  |  |
| --- | --- | --- |
| **Species\*** | **PelG Protein Accession** | **Genome Accession** |
| *Bacillus cereus* AH1271 | WP\_000907287.1 | NZ\_CM000739.1 |
| *Bacillus cereus* AH1272 | WP\_000907285.1 | NZ\_CM000740.1 |
| *Bacillus cereus* AH1273 | WP\_000907285.1 | NZ\_CM000741.1 |
| *Bacillus cereus* AH187 | WP\_000907295.1 | NC\_011658.1 |
| ***Bacillus cereus* ATCC 10987** | **WP\_000907294.1** | **NC\_003909.8** |
| *Bacillus cereus* BDRD-ST196 | WP\_033709612.1 | NZ\_CM000725.1 |
| *Bacillus cereus* BDRD-ST26 | EEK97794.1 | CM000724.1 |
| *Bacillus cereus* F | WP\_016719067.1 | NZ\_CM001787.1 |
| *Bacillus cereus* FRI-35 | WP\_014893388.1 | NC\_018491.1 |
| *Bacillus cereus* m1293 | WP\_000907291.1 | NZ\_CM000714.1 |
| *Bacillus cereus* M3 | WP\_016719067.1 | NZ\_CP016316.1 |
| *Bacillus cereus* NC7401 | WP\_000907295.1 | NC\_016771.1 |
| *Bacillus cereus* Q1 | WP\_000907290.1 | NC\_011969.1 |
| *Bacillus cereus* R309803 | EEK76039.1 | CM000720.1 |
| ***Bacillus litoralis* Bac94** | **WP\_121663553.1** | **NZ\_CP033043.1** |
| ***Bacillus mobilis* ML-A2C4** | **WP\_000907287.1** | **NZ\_CP031443.1** |
| ***Bacillus mycoides* AH603** | **WP\_033707410.1** | **NZ\_CM000737.1** |
| *Bacillus mycoides* Gnyt1 | WP\_002167287.1 | NZ\_CP020743.1 |
| ***Bacillus* sp. ABP14** | **WP\_070807265.1** | **NZ\_CP017016.1** |
| ***Bacillus* sp. FDAARGOS\_527** | **WP\_063246657.1** | **NZ\_CP033795.1** |
| ***Bacillus* sp. FJAT-42376** | **WP\_123918462.1** | **NZ\_CP033906.1** |
| ***Bacillus thuringiensis* serovar finitimus YBT-020** | **WP\_000907289.1** | **NC\_017200.1** |
| ***Bacillus weihenstephanensis* WSBC 10204** | **WP\_033709612.1** | **NZ\_CP009746.1** |
| *Bifidobacterium adolescentis* 22L | WP\_038444142.1 | NZ\_CP007443.1 |
| *Bifidobacterium adolescentis* 6 | WP\_039774842.1 | NZ\_CP023005.1 |
| ***Bifidobacterium adolescentis* ATCC 15703** | **WP\_011742867.1** | **NC\_008618.1** |
| *Bifidobacterium adolescentis* BBMN23 | WP\_039774842.1 | NZ\_CP010437.1 |
| *Bifidobacterium adolescentis* P2P3 | WP\_039774842.1 | NZ\_CP024959.1 |
| *Bifidobacterium breve* 017W439 | WP\_052822180.1 | NZ\_CP021554.1 |
| *Bifidobacterium breve* 082W48 | WP\_106622134.1 | NZ\_CP021555.1 |
| *Bifidobacterium breve* 12L | WP\_019727643.1 | NZ\_CP006711.1 |
| *Bifidobacterium breve* 139W423 | WP\_021648898.1 | NZ\_CP021556.1 |
| *Bifidobacterium breve* 180W83 | WP\_106630814.1 | NZ\_CP021557.1 |
| *Bifidobacterium breve* 215W447a | WP\_106641225.1 | NZ\_CP021558.1 |
| *Bifidobacterium breve* 689b | WP\_025331928.1 | NZ\_CP006715.1 |
| *Bifidobacterium breve* ACS-071-V-Sch8b | WP\_014483227.1 | NC\_017218.1 |
| *Bifidobacterium breve* BR3 | WP\_052789711.1 | NZ\_CP010413.1 |
| *Bifidobacterium breve* CNCM I-4321 | WP\_106642177.1 | NZ\_CP021559.1 |
| *Bifidobacterium breve* DRBB26 | WP\_003833139.1 | NZ\_CP021390.1 |
| *Bifidobacterium breve* DRBB27 | WP\_106621239.1 | NZ\_CP021552.1 |
| *Bifidobacterium breve* DRBB28 | WP\_003833139.1 | NZ\_CP021553.1 |
| *Bifidobacterium breve* DRBB29 | WP\_106621239.1 | NZ\_CP023198.1 |
| *Bifidobacterium breve* DRBB30 | WP\_106642177.1 | NZ\_CP023199.1 |
| ***Bifidobacterium breve* DSM 20213 = JCM 1192** | **WP\_003827899.1** | **NZ\_AP012324.1** |
| *Bifidobacterium breve* FDAARGOS\_561 | WP\_003827899.1 | NZ\_CP033841.1 |
| *Bifidobacterium breve* lw01 | WP\_016462023.1 | NZ\_CP034192.1 |
| *Bifidobacterium breve* JCM 7017 | WP\_025300916.1 | NZ\_CP006712.1 |
| *Bifidobacterium breve* JCM 7019 | WP\_025220954.1 | NZ\_CP006713.1 |
| *Bifidobacterium breve* LMC520 | WP\_077149301.1 | NZ\_CP019596.1 |
| *Bifidobacterium breve* NCFB 2258 | WP\_015438200.1 | NZ\_CP006714.1 |
| *Bifidobacterium breve* NCTC 11815 | WP\_003827899.1 | NZ\_LR134348.1 |
| *Bifidobacterium breve* NRBB01 | WP\_003827899.1 | NZ\_CP021384.1 |
| *Bifidobacterium breve* NRBB02 | WP\_106622507.1 | NZ\_CP021385.1 |
| *Bifidobacterium breve* NRBB04 | WP\_015438200.1 | NZ\_CP021386.1 |
| *Bifidobacterium breve* NRBB08 | WP\_106622507.1 | NZ\_CP023192.1 |
| *Bifidobacterium breve* NRBB09 | WP\_106629152.1 | NZ\_CP021387.1 |
| *Bifidobacterium breve* NRBB11 | WP\_106628600.1 | NZ\_CP021388.1 |
| *Bifidobacterium breve* NRBB18 | WP\_106622507.1 | NZ\_CP023193.1 |
| *Bifidobacterium breve* NRBB19 | WP\_106622507.1 | NZ\_CP023194.1 |
| *Bifidobacterium breve* NRBB20 | WP\_106622507.1 | NZ\_CP023195.1 |
| *Bifidobacterium breve* NRBB27 | WP\_106622507.1 | NZ\_CP023196.1 |
| *Bifidobacterium breve* NRBB49 | WP\_106622507.1 | NZ\_CP023197.1 |
| *Bifidobacterium breve* NRBB50 | WP\_106628600.1 | NZ\_CP021391.1 |
| *Bifidobacterium breve* NRBB51 | WP\_019727643.1 | NZ\_CP021392.1 |
| *Bifidobacterium breve* NRBB52 | WP\_080867748.1 | NZ\_CP021393.1 |
| *Bifidobacterium breve* NRBB56 | WP\_016462023.1 | NZ\_CP021394.1 |
| *Bifidobacterium breve* NRBB57 | WP\_052822180.1 | NZ\_CP021389.1 |
| *Bifidobacterium breve* S27 | WP\_025341481.1 | NZ\_CP006716.1 |
| *Bifidobacterium breve* UCC2003 | WP\_015438200.1 | NC\_020517.1 |
| ***Bifidobacterium kashiwanohense* JCM 15439 = DSM 21854** | **WP\_033500884.1** | **NZ\_AP012327.1** |
| *Bifidobacterium kashiwanohense* PV20-2 | WP\_039197257.1 | NZ\_CP007456.1 |
| *Bifidobacterium longum* BXY01 | WP\_013141166.1 | NZ\_CP008885.1 |
| ***Bifidobacterium longum* subsp. infantis ATCC 15697 = JCM 1222 = DSM 20088** | **WP\_014484651.1** | **NC\_017219.1** |
| *Bifidobacterium longum* subsp. infantis BT1 | WP\_060620711.1 | NZ\_CP010411.1 |
| *Bifidobacterium longum* subsp. longum JDM301 | WP\_013141166.1 | NC\_014169.1 |
| ***Bifidobacterium pseudocatenulatum* DSM 20438 = JCM 1200 = LMG 10505** | **WP\_004219882.1** | **NZ\_AP012330.1** |
| *Brevibacillus brevis* DZQ7 | WP\_048031022.1 | NZ\_CP030117.1 |
| *Brevibacillus brevis* NBRC 100599 | WP\_012684303.1 | NC\_012491.1 |
| ***Brevibacillus brevis* NCTC 2611** | **WP\_106652439.1** | **NZ\_LR134338.1** |
| *Brevibacillus brevis* X23 | WP\_017249674.1 | NZ\_CP023474.1 |
| ***Brevibacillus formosus* NF2** | **WP\_088910547.1** | **NZ\_CP018145.1** |
| ***Butyrivibrio fibrisolvens* INBov1** | **WP\_110073161.1** | **NZ\_CM009896.1** |
| ***Butyrivibrio proteoclasticus* B316** | **WP\_013281180.1** | **NC\_014387.1** |
| *Clostridium botulinum* AM1195 | WP\_061328351.1 | NZ\_CP013701.1 |
| *Clostridium botulinum* CDC\_67071 | WP\_096043970.1 | NZ\_CP013242.1 |
| *Clostridium botulinum* MAP 5 | WP\_106899782.1 | NZ\_CP027781.1 |
| *Clostridium botulinum* Mfbjulcb8 | WP\_061328351.1 | NZ\_CP027780.1 |
| ***Clostridium botulinum* Prevot\_594** | **WP\_040108159.1** | **NZ\_CP006902.1** |
| *Clostridium perfringens* F262 | WP\_003481250.1 | NZ\_CM001477.1 |
| *Clostridium perfringens* FORC\_003 | WP\_003466749.1 | NZ\_CP009557.1 |
| *Clostridium perfringens* FORC\_025 | WP\_070956832.1 | NZ\_CP013101.1 |
| *Clostridium perfringens* JP838 | WP\_061427915.1 | NZ\_CP010994.1 |
| *Clostridium perfringens* JXJA17 | WP\_003452556.1 | NZ\_CP028149.1 |
| ***Clostridium perfringens* NCTC 2837** | **WP\_003473144.1** | **NZ\_LS483461.1** |
| ***Clostridium sporogenes* DSM 795** | **WP\_003491425.1** | **NZ\_CP011663.1** |
| *Clostridium sporogenes* NCIMB 10696 | WP\_003491425.1 | NZ\_CP009225.1 |
| ***Collinsella aerofaciens* C11** | **WP\_117798150.1** | **NZ\_CP024960.1** |
| *Collinsella aerofaciens* indica | WP\_099431625.1 | NZ\_CP024160.1 |
| ***Exiguobacterium oxidotolerans* N4-1P** | **WP\_088837913.1** | **NZ\_CP022236.1** |
| ***Exiguobacterium* sp. AT1b** | **WP\_012727256.1** | **NC\_012673.1** |
| ***Exiguobacterium* sp. MH3** | **WP\_023469423.1** | **NC\_022794.1** |
| ***Fictibacillus phosphorivorans* G25-29** | **WP\_066398125.1** | **NZ\_CP015378.1** |
| ***Halobacillus halophilus* DSM 2266** | **WP\_014644340.1** | **NC\_017668.1** |
| *Halobacillus halophilus* HL2HP6 | WP\_014644340.1 | NZ\_CP022106.1 |
| *Paenibacillus mucilaginosus* 3016 | WP\_013920028.1 | NC\_016935.1 |
| *Paenibacillus mucilaginosus* K02 | WP\_013920028.1 | NC\_017672.3 |
| ***Paenibacillus mucilaginosus* KNP414** | **WP\_013920028.1** | **NC\_015690.1** |
| ***Paenibacillu*s sp. BD3526** | **WP\_060531382.1** | **NZ\_CP013023.1** |
| ***Romboutsia* sp. Frifi** | **CEI72691.1** | **LN650648.1** |
| ***Roseburia hominis* A2-183** | **WP\_014079902.1** | **NC\_015977.1** |
| ***Roseburia intestinalis* M50/1** | **CBL09539.1** | **FP929049.1** |
| ***Rubrobacter xylanophilus* DSM 9941** | **WP\_011565595.1** | **NC\_008148.1** |
| ***Salimicrobium jeotgali* MJ3** | **WP\_008592356.1** | **NZ\_CP011361.2** |
| ***Selenomonas* sp. oral taxon 126 strain W7667** | **WP\_066844117.1** | **NZ\_CP016201.1** |
| ***Selenomona*s sp. oral taxon 478** | **WP\_050342638.1** | **NZ\_CP012071.1** |
| ***Selenomonas sputigena* ATCC 35185** | **WP\_006193285.1** | **NC\_015437.1** |
| *Streptococcus anginosus* C238 | WP\_003035167.1 | NC\_022239.1 |
| ***Streptococcus anginosus* NCTC 11169** | **WP\_126407817.1** | **NZ\_LR134288.1** |
| *Streptococcus anginosus* SA1 | WP\_004224623.1 | NZ\_CP007573.1 |
| ***Streptococcus equinus* FDAARGOS\_251** | **WP\_107373002.1** | **NZ\_CP020438.1** |
| ***Streptococcus ferus* NCTC 12278** | **WP\_018030127.1** | **NZ\_LS483343.1** |
| *Streptococcus gallolyticus* NCTC 13773 | WP\_077496569.1 | NZ\_LS483409.1 |
| *Streptococcus gallolyticus* subsp. gallolyticus ATCC 43143 | WP\_012961717.1 | NC\_017576.1 |
| *Streptococcus gallolyticus* subsp. gallolyticus ATCC BAA-2069 | WP\_013642905.1 | NC\_015215.1 |
| ***Streptococcus gallolyticus* subsp. gallolyticus DSM 16831** | **WP\_077496569.1** | **NZ\_CP018822.1** |
| *Streptococcus gallolyticus* UCN34 | WP\_012961717.1 | NC\_013798.1 |
| *Streptococcus gordonii* FDAARGOS\_371 | WP\_061595675.1 | NZ\_CP023511.1 |
| *Streptococcus gordonii* IE35 | WP\_046165000.1 | NZ\_CP017295.1 |
| *Streptococcus gordonii* KCOM 1506 (= ChDC B679) | WP\_053794170.1 | NZ\_CP012648.1 |
| *Streptococcus gordonii* NCTC 3165 | WP\_111723252.1 | NZ\_LS483375.1 |
| ***Streptococcus gordonii* NCTC 7865** | **WP\_060553094.1** | **NZ\_LS483341.1** |
| *Streptococcus gordonii* NCTC 7868 | WP\_011999856.1 | NZ\_LR134291.1 |
| *Streptococcus gordonii* str. Challis substr. CH1 | WP\_011999856.1 | NC\_009785.1 |
| *Streptococcus intermedius* B196 | WP\_021003212.1 | NC\_022246.1 |
| *Streptococcus intermedius* C270 | WP\_003076142.1 | NC\_022237.1 |
| *Streptococcus intermedius* FDAARGOS\_233 | WP\_082312092.1 | NZ\_CP020433.2 |
| ***Streptococcus intermedius* JTH08** | **WP\_003076142.1** | **NC\_018073.1** |
| *Streptococcus intermedius* NCTC 11324 | WP\_003076142.1 | NZ\_LS483436.1 |
| *Streptococcus intermedius* TYG1620 | WP\_003076142.1 | NZ\_AP014880.1 |
| ***Streptococcus pantholopis* TA 26** | **WP\_067060972.1** | **NZ\_CP014699.1** |
| ***Streptococcus pasteurianus* ATCC 43144** | **WP\_003063947.1** | **NC\_015600.1** |
| *Streptococcus pasteurianus* NCTC 13784 | WP\_111718197.1 | NZ\_LS483462.1 |
| *Streptococcus salivarius* ATCC 27945 | WP\_084914613.1 | NZ\_CP015282.1 |
| *Streptococcus salivarius* HSISS4 | WP\_021144275.1 | NZ\_CP013216.1 |
| *Streptococcus salivarius* JF | WP\_022496455.1 | NZ\_CP014144.1 |
| ***Streptococcus salivarius* JIM8777** | **WP\_014634402.1** | **NC\_017595.1** |
| *Streptococcus salivarius* NCTC 8618 | WP\_022496455.1 | NZ\_CP009913.1 |
| *Streptococcus* sp. FDAARGOS\_192 | WP\_080610467.1 | NZ\_CP020431.2 |
| ***Streptococcus* sp. HSISS1** | **EQC64892.1** | **CM002132.1** |
| ***Streptococcus* sp. Z15** | **WP\_116877779.1** | **NZ\_CP031733.1** |
| *Streptococcus thermophilus* APC151 | WP\_014608381.1 | NZ\_CP019935.1 |
| ***Streptococcus thermophilus* JIM 8232** | **WP\_014621674.1** | **NC\_017581.1** |
| *Streptococcus thermophilus* LMD-9 | ABJ66323.1 | CP000419.1 |
| *Streptococcus thermophilus* MN-BM-A01 | WP\_014727436.1 | NZ\_CP012588.1 |
| *Streptococcus thermophilus* MN-ZLW-002 | WP\_014727436.1 | NC\_017927.1 |
| *Streptococcus thermophilus* MTH17CL396 | ETW89989.1 | CM002371.1 |
| *Streptococcus thermophilus* ND03 | WP\_014608381.1 | NC\_017563.1 |
| *Streptococcus thermophilus* SMQ-301 | WP\_046206469.1 | NZ\_CP011217.1 |
| *Streptococcus thermophilus* TH1477 | WP\_071417354.1 | NZ\_CM003135.1 |
| ***Tumebacillus algifaecis* THMBR28** | **WP\_094236481.1** | **NZ\_CP022657.1** |
| ***Tumebacillus avium* AR23208** | **WP\_087458314.1** | **NZ\_CP021434.1** |

\* Species listed in bold are represented in Fig. 1.