

Root (5089/3333501); Bacteria (5089/3070243); Nitrospirae (4451/8171); "Nitrospira" (4451/8171); "Nitrospirales" (4451/8171); "Nitrospiraceae" (4451/8171)

Hierarchy View:

▼ genus Nitrospira (2358/5378) (hits/total searched) [list results for this node]

S000000821 Nitrospira sp.; AJ224042
 S000001332 Nitrospira sp.; Y14640
 S000004359 Nitrospira sp.; Y14642
 S000005124 Nitrospira moscoviensis (T); X82558
 S000006640 Nitrospira sp.; Y14636
 S000007351 Nitrospira sp.; Y14641
 S000008534 Nitrospira sp.; AJ224041
 S000009675 Nitrospira sp.; Y14644
 S000010052 Nitrospira sp.; Y14637
 S000010421 Nitrospira sp.; AJ224038
 S000010844 Nitrospira sp.; Y14638
 S000012390 Nitrospira sp.; AJ224039
 S000015738 Nitrospira sp.; Y14643
 S000016078 Nitrospira sp.; AJ224040
 S000021615 Nitrospira sp.; Y14639
 S000024494 Nitrospira sp.; AJ224044
 S000024499 Nitrospira sp.; AJ224043
 S000024623 Nitrospira sp.; AJ224045
 S000024748 Nitrospira sp.; AJ224046
 S000025371 uncultured bacterium 1405-19; AJ007652
 S000040958 rhizosphere soil bacterium RSC-II-52; AJ252684
 S000100950 uncultured Nitrospira sp.; JG37-AG-131; AJ519405
 S000102350 uncultured bacterium; JG37-AG-70; AJ519620
 S000106404 uncultured Nitrospirae bacterium; JG36-TzT-13; AJ534638
 S000130382 uncultured bacterium; C4-K18; AJ421207
 S000131017 uncultured bacterium; C3-K5; AJ421201
 S000144745 uncultured Nitrospira sp.; JG36-G5-2; AJ582041
 S000249705 uncultured bacterium; EA1B1; AY186068
 S000261709 uncultured soil bacterium; 605; AY493909
 S000273128 uncultured bacterium; 1013-28-CG51; AY532586
 S000273576 uncultured bacterium; 1013-28-CG50; AY532585
 S000331342 uncultured bacterium; Kazan-1B-07/BC19-1B-07; AY592084
 S000336675 uncultured bacterium A-11; AF033558
 S000336676 uncultured bacterium A-4; AF033559
 S000338023 uncultured soil bacterium S004; AF128670
 S000338082 uncultured soil bacterium C059; AF128729
 S000341118 uncultured Green Bay ferromanganous micronodule bacterium MNC2; AF293010
 * S000341119 uncultured Green Bay ferromanganous micronodule bacterium MNB2; AF293011
 * S000341120 uncultured Green Bay ferromanganous micronodule bacterium MNB8; AF293012
 * S000341121 uncultured Green Bay ferromanganous micronodule bacterium MNA3; AF293013
 S000341501 uncultured bacterium PHOS-HE34; AF314422
 S000341784 unidentified bacterium wb1_D06; AF317756
 S000341786 unidentified bacterium wb1_C02; AF317758
 S000341792 unidentified bacterium wb1_F07; AF317764
 S000345624 uncultured bacterium; G19; AF407702
 * S000351038 uncultured bacterium; JCL9-22; AF499363
 * S000351107 uncultured bacterium; BL-59; AF499432
 S000351613 uncultured bacterium; C6-K31; AJ421160
 S000357855 uncultured bacterium; DSSD16; AY328715
 S000357883 uncultured bacterium; DSSD45; AY328743
 S000357900 uncultured bacterium; DSSD62; AY328760
 S000366366 uncultured Nitrospirae bacterium; DGGE gel band ESR BR 14; AF540049
 S000366371 uncultured Nitrospirae bacterium; DGGE gel band ESR BR 19; AF540054
 S000388268 Nitrospira cf. moscoviensis SBR1015; AF155152
 S000388269 Nitrospira cf. moscoviensis SBR1024; AF155153
 S000388270 Nitrospira cf. moscoviensis SBR2016; AF155154
 S000388271 Nitrospira cf. moscoviensis SBR2046; AF155155
 * S000397830 uncultured Nitrospirae bacterium; DGGE band RWA12; AY145869
 S000397857 Nitrospirales bacterium K21; AY146671
 S000398160 uncultured Nitrospira sp.; WYO26C; AY150907
 S000425892 uncultured Nitrospira sp.; AY741094
 S000427926 Nitrospira sp.; AF035813
 S000471701 uncultured bacterium; D023010; AJ617918
 S000471702 uncultured bacterium; D14423; AJ617919
 S000471703 uncultured bacterium; D023011; AJ617920
 S000476573 uncultured Nitrospira sp.; BDC1_F10; AY689544
 S000476652 uncultured Nitrospira sp.; BDC35G06; AY689623

Lineage (click node to return it to hierarchy view):

Root (1849/3333501); Bacteria (1849/3070243); Nitrospirae (1835/8171); "Nitrospira" (1835/8171); "Nitrospirales" (1835/8171); "Nitrospiraceae" (1835/8171)

Hierarchy View:

▼ genus Nitrospira (1835/5378) (hits/total searched) [list results for this node]

S000000821 Nitrospira sp.; AJ224042
 S000005124 Nitrospira moscoviensis (T); X82558
 S000009675 Nitrospira sp.; Y14644
 S000012390 Nitrospira sp.; AJ224039
 S000024494 Nitrospira sp.; AJ224044
 S000025371 uncultured bacterium 1405-19; AJ007652
 S000025716 uncultured bacterium 1404-16; AJ007648
 S000040958 rhizosphere soil bacterium RSC-II-52; AJ252684
 S000106404 uncultured Nitrospirae bacterium; JG36-TzT-13; AJ534638
 S000131017 uncultured bacterium; C3-K5; AJ421201
 S000140627 uncultured soil bacterium; 1164-1; AY326515
 S000140948 uncultured soil bacterium; 1163-1; AY326514
 S000144745 uncultured Nitrospira sp.; JG36-GS-2; AJ582041
 S000251489 unidentified bacterium; Neu4P3-38; AJ518433
 S000252064 unidentified bacterium; Neu4P1-67; AJ518386
 S000252632 unidentified bacterium; Mul2P1-48; AJ518201
 S000261709 uncultured soil bacterium; 605; AY493909
 S000262278 uncultured soil bacterium; 1183; AY493911
 S000262850 uncultured soil bacterium; 339; AY493910
 S000273576 uncultured bacterium; 1013-28-CG50; AY532585
 S000331342 uncultured bacterium; Kazan-1B-07/BC19-1B-07; AY592084
 S000338023 uncultured soil bacterium S004; AF128670
 S000341118 uncultured Green Bay ferromanganous micronodule bacterium MNC2; AF293010
 * S000341120 uncultured Green Bay ferromanganous micronodule bacterium MNF8; AF293012
 * S000341121 uncultured Green Bay ferromanganous micronodule bacterium MNA3; AF293013
 S000341786 unidentified bacterium wb1_C02; AF317758
 S000342310 uncultured bacterium; LCo23; AF337199
 S000342509 uncultured Nitrospira sp.; 4-11; AF351228
 * S000351038 uncultured bacterium; JCL9-22; AF499363
 * S000351107 uncultured bacterium; BL-59; AF499432
 S000351613 uncultured bacterium; C6-K31; AJ421160
 S000353360 uncultured soil bacterium; S085; AY037608
 S000353368 uncultured soil bacterium; S096; AY037616
 S000357855 uncultured bacterium; DSSD16; AY328715
 S000357883 uncultured bacterium; DSSD45; AY328743
 S000357900 uncultured bacterium; DSSD62; AY328760
 S000366366 uncultured Nitrospirae bacterium; DGGE gel band ESR BR 14; AF540049
 S000366371 uncultured Nitrospirae bacterium; DGGE gel band ESR BR 19; AF540054
 S000388268 Nitrospira cf. moscoviensis SBR1015; AF155152
 S000388269 Nitrospira cf. moscoviensis SBR1024; AF155153
 S000388271 Nitrospira cf. moscoviensis SBR2046; AF155155
 S000402935 uncultured bacterium; CCU23; AY221079
 S000471700 uncultured bacterium; D02307; AJ617917
 S000471701 uncultured bacterium; D023010; AJ617918
 S000471702 uncultured bacterium; D14423; AJ617919
 S000471703 uncultured bacterium; D023011; AJ617920
 S000492977 uncultured Nitrospirae bacterium; AKYG586; AY921743
 S000492978 uncultured Nitrospirae bacterium; AKYG1809; AY921744
 * S000514101 uncultured Arthrobacter sp.; 24; AY942952
 S000514160 uncultured bacterium; 37; AY943011
 * S000514190 uncultured Arthrobacter sp.; 24; AY943041
 S000535842 uncultured Nitrospira sp.; Nsp2; AY876618
 S000535843 uncultured Nitrospira sp.; Nsp9; AY876619
 S000535844 uncultured Nitrospira sp.; Nsp11; AY876620
 S000535845 uncultured Nitrospira sp.; Nsp1; AY876621
 S000535846 uncultured Nitrospira sp.; Nsp27; AY876622

Lineage (click node to return it to hierarchy view):

Root (119/3333501); Bacteria (119/3070243); Nitrospirae (107/8171); "Nitrospira" (107/8171); "Nitrospirales" (107/8171); "Nitrospiraceae" (107/8171)

Hierarchy View:

▼ genus Nitrospira (107/5378) (hits/total searched) [list results for this node]

S000001332 Nitrospira sp.; Y14640
 S000004359 Nitrospira sp.; Y14642
 S000006640 Nitrospira sp.; Y14636
 S000007351 Nitrospira sp.; Y14641
 S000008534 Nitrospira sp.; AJ224041
 S000010052 Nitrospira sp.; Y14637
 S000010421 Nitrospira sp.; AJ224038
 S000010844 Nitrospira sp.; Y14638
 S000015738 Nitrospira sp.; Y14643
 S000021615 Nitrospira sp.; Y14639
 S000024499 Nitrospira sp.; AJ224043
 S000024623 Nitrospira sp.; AJ224045
 S000024748 Nitrospira sp.; AJ224046
 S000336675 uncultured bacterium A-11; AF033558
 S000336676 uncultured bacterium A-4; AF033559
 S000341501 uncultured bacterium PHOS-HE34; AF314422
 S000348943 uncultured bacterium; POB; AF440288
 S000388270 Nitrospira cf. moscoviensis SBR2016; AF155154
 S000425892 uncultured Nitrospira sp.; AY741094
 S000537353 Candidatus Nitrospira defluvii; DQ059545
 S000607302 uncultured bacterium; P3-N36; AB239557
 S000607308 uncultured bacterium; Bu-N20; AB239563
 S000607310 uncultured bacterium; Bu-N36; AB239565
 S000656862 uncultured bacterium; AP19; AY921494
 S000662948 uncultured bacterium; 71; DQ413129
 S000668031 uncultured Nitrospira sp.; C4; DQ458783
 S000686334 uncultured bacterium; C4; DQ499976
 S000702219 uncultured Nitrospirae bacterium; 73; AB252941
 S000702220 uncultured Nitrospirae bacterium; 369; AB252942
 S000702221 uncultured Nitrospirae bacterium; 330; AB252943
 S000702222 uncultured Nitrospirae bacterium; 406; AB252944
 S000720826 uncultured Nitrospira sp.; BF9; DQ839324
 S000749462 uncultured bacterium; IS-3; EF095013
 S000862151 uncultured Nitrospirae bacterium; Skagenf5; DQ640657
 S001030603 Candidatus Nitrospira defluvii; Contig5882; EU559167
 S001158011 uncultured bacterium; N1903_93; EU104347
 S001224556 uncultured bacterium; FHINOA38/1-7682; FJ430192
 S001294794 uncultured bacterium; TSBAR001_C14; AB486070
 * S001318824 uncultured bacterium; B16; FJ660506
 S001318828 uncultured bacterium; B21; FJ660510
 S001318830 uncultured bacterium; B23; FJ660512
 * S001318832 uncultured bacterium; B25; FJ660514
 S001318833 uncultured bacterium; B26; FJ660515
 * S001318921 uncultured bacterium; A208; FJ660604
 S001353272 uncultured Nitrospira sp.; NSPI-2; AB500063
 S001585993 uncultured bacterium; Kis08_048; GQ385296
 S001614188 uncultured bacterium; K26C1-29; AB504576
 S001614233 uncultured bacterium; K29J2-18; AB504621
 S001614262 uncultured bacterium; K29C2-17; AB504650
 S001614275 uncultured bacterium; K29G2-3; AB504663
 S001614287 uncultured bacterium; K29G2-21; AB504675
 * S001683724 uncultured bacterium; T1-102; GQ487925
 * S001683728 uncultured bacterium; T1-126; GQ487929
 S001683795 uncultured bacterium; V8-58; GQ487996
 S001752975 uncultured bacterium; MFC_32E10; FJ624177
 S001938902 uncultured bacterium; ambient_uncontrolled-12; GU454873
 S001938972 uncultured bacterium; ambient_uncontrolled-82; GU454943
 S002222769 Candidatus Nitrospira defluvii; FP929003
 S002289961 Candidatus Nitrospira defluvii; FP929003
 S002303062 uncultured bacterium; 147; HQ538637
 S002337126 uncultured bacterium; F_SBR_72; HQ010847
 S002373993 uncultured bacterium; T35; HMQ07548
 S002437234 uncultured bacterium; Anxy8; HQ343213
 S002495762 uncultured Nitrospirae bacterium; LJ-B96; JF319184
 S002502514 uncultured bacterium; T1-28; JF502873

Lineage (click node to return it to hierarchy view):

Root (167/3333501) ; Bacteria (167/3070243) ; "Proteobacteria" (136/1031919) ; Alphaproteobacteria (136/254486) ; Rhizobiales (136/84204) ; Bradyrhizobiaceae (135/13197)

Hierarchy View:

▼ genus Nitrobacter (107/195) (hits/total searched) [list results for this node]

* S000265885 Nitrobacter sp. PBAB10; AY508475
 * S000269985 Nitrobacter sp. PBAB17; AY508476
 S000414380 Nitrobacter winogradskyi; W; L11661
 S000414381 Nitrobacter sp.; LL; L11662
 S000414382 Nitrobacter hamburgensis (T); X14; L11663
 S000414627 Nitrobacter hamburgensis; Nb14; L35502
 S000414631 Nitrobacter winogradskyi; L35506
 S000414636 Nitrobacter sp.; R6; L35511
 S000428396 Nitrobacter alkalicus (T); AN1; AF069956
 S000428397 Nitrobacter alkalicus; AN2; AF069957
 S000428398 Nitrobacter alkalicus; AN4; AF069958
 S000428549 Nitrobacter sp. TH21; AF080257
 * S000434952 Nitrobacter sp. KB215; AY055794
 S000434953 Nitrobacter sp. PJN1; AY055795
 S000434955 Nitrobacter sp. NRB5220; AY055797
 S000487444 uncultured Rhizobiales bacterium; JAB 5HC 117; AY694549
 S000492976 uncultured alpha proteobacterium; AKYH732; AY921742
 S000535828 uncultured Nitrobacter sp.; Nbac20; AY876604
 S000535829 uncultured Nitrobacter sp.; Nbac20-3-12s; AY876605
 S000535831 uncultured Nitrobacter sp.; Nbac20-4o14; AY876607
 S000535832 uncultured Nitrobacter sp.; Nbac3-2; AY876608
 S000535833 uncultured Nitrobacter sp.; Nbac3-2-4o12; AY876609
 S000535841 uncultured Nitrobacter sp.; Nbac21; AY876617
 S000568817 uncultured bacterium; UTF5_N_MP_RUN7_25; AB200974
 S000608915 Nitrobacter vulgaris (T); type strain: DSM 10236; AM114522
 S000770488 uncultured bacterium; PnDHS-18; AB290707
 S000858444 Nitrobacter winogradskyi; Engel; AM286374
 S000858446 Nitrobacter sp. Nato; AM286376
 S000858447 Nitrobacter winogradskyi; F83KO; AM286377
 S000858448 Nitrobacter vulgaris; 339; AM286378
 S000858449 Nitrobacter sp. GT oman; AM286379
 S000858450 Nitrobacter vulgaris; AB1; AM286380
 S000858451 Nitrobacter vulgaris; K48; AM286381
 S000858452 Nitrobacter vulgaris; K55; AM286382
 S000858454 Nitrobacter sp. 5F/3; AM286384
 S000858455 Nitrobacter sp. LIP; AM286385
 S000858456 Nitrobacter sp. 4111/1; AM286386
 S000858458 Nitrobacter sp. AB3; AM286388
 S000858459 Nitrobacter winogradskyi; R1.30; AM286389
 S000858460 Nitrobacter vulgaris; 329; AM286390
 S000858461 Nitrobacter sp. Termite2; AM286391
 S000858462 Nitrobacter sp. Yukatan; AM286392
 S000858463 Nitrobacter vulgaris; C2; AM286393
 S000858464 Nitrobacter sp. D6/13; AM286394
 S000858465 Nitrobacter sp. lo acid; AM286395
 S000858466 Nitrobacter hamburgensis; Y; AM286396
 S000858467 Nitrobacter sp. 311; AM286397
 S000858468 Nitrobacter vulgaris; BB3; AM286398
 S000901726 Nitrobacter winogradskyi; Engel; AM292277
 S000901728 Nitrobacter sp. Nato; AM292279

Lineage (click node to return it to hierarchy view):

Root (153/3333501) ; Bacteria (153/3070243) ; "Proteobacteria" (153/1031919) ; Alphaproteobacteria (151/254486) ; Rhizobiales (151/84204) ; Bradyrhizobiaceae (148/13197)

Hierarchy View:

▼ genus Nitrobacter (117/195) (hits/total searched) [[list results for this node]

* S000265885 Nitrobacter sp. PBAB10; AY508475
 * S000269985 Nitrobacter sp. PBAB17; AY508476
 * S000392359 Nitrobacter winogradskyi; IFO 14297; AF363288
 S000397176 nitrite-oxidizing bacterium MPN2; AY135357
 S000414380 Nitrobacter winogradskyi; W; L11661
 S000414381 Nitrobacter sp.; LL; L11662
 S000414382 Nitrobacter hamburgensis (T); X14; L11663
 S000414627 Nitrobacter hamburgensis; Nb14; L35502
 S000414631 Nitrobacter winogradskyi; L35506
 S000414632 Nitrobacter winogradskyi; L35507
 S000414636 Nitrobacter sp.; R6; L35511
 S000428396 Nitrobacter alkalicus (T); AN1; AF069956
 S000428397 Nitrobacter alkalicus; AN2; AF069957
 S000428398 Nitrobacter alkalicus; AN4; AF069958
 S000428549 Nitrobacter sp. TH21; AF080257
 S000434953 Nitrobacter sp. PJN1; AY055795
 S000434954 Nitrobacter winogradskyi; ATCC 14123; AY055796
 S000434955 Nitrobacter sp. NRB5220; AY055797
 S000487300 uncultured Nitrobacter sp.; 1; AY683484
 S000487444 uncultured Rhizobiales bacterium; JAB SHC 117; AY694549
 S000492976 uncultured alpha proteobacterium; AKYH732; AY921742
 S000535828 uncultured Nitrobacter sp.; Nbac20; AY876604
 S000535829 uncultured Nitrobacter sp.; Nbac20-3-12; AY876605
 S000535831 uncultured Nitrobacter sp.; Nbac20-4o14; AY876607
 S000535832 uncultured Nitrobacter sp.; Nbac3-2; AY876608
 S000535833 uncultured Nitrobacter sp.; Nbac3-2-4o12; AY876609
 S000535841 uncultured Nitrobacter sp.; Nbac21; AY876617
 S000568817 uncultured bacterium; UTF5_N_MP_RUN7_25; AB200974
 S000608915 Nitrobacter vulgaris (T); type strain: DSM 10236; AM114522
 S000770488 uncultured bacterium; PnDHS-18; AB290707
 S000858444 Nitrobacter winogradskyi; Engel; AM286374
 S000858446 Nitrobacter sp. Nato; AM286376
 S000858447 Nitrobacter winogradskyi; F83KO; AM286377
 S000858448 Nitrobacter vulgaris; 339; AM286378
 S000858449 Nitrobacter sp. GT oman; AM286379
 S000858450 Nitrobacter vulgaris; AB1; AM286380
 S000858451 Nitrobacter vulgaris; K48; AM286381
 S000858452 Nitrobacter vulgaris; K55; AM286382
 S000858454 Nitrobacter sp. 5F/3; AM286384
 S000858455 Nitrobacter sp. LIP; AM286385
 S000858456 Nitrobacter sp. 4111/1; AM286386
 S000858458 Nitrobacter sp. AB3; AM286388
 S000858459 Nitrobacter winogradskyi; R1.30; AM286389
 S000858460 Nitrobacter vulgaris; 329; AM286390
 S000858461 Nitrobacter sp. Termite2; AM286391
 S000858462 Nitrobacter sp. Yukatan; AM286392
 S000858463 Nitrobacter vulgaris; C2; AM286393
 S000858464 Nitrobacter sp. D6/13; AM286394
 S000858465 Nitrobacter sp. lo acid; AM286395
 S000858466 Nitrobacter hamburgensis; Y; AM286396

Lineage (*click node to return it to hierarchy view*):

Root (437/3333501) ; Bacteria (437/3070243) ; "Proteobacteria" (432/1031919) ; Betaproteobacteria (430/217518) ; Nitrosomonadales (379/7530)

Hierarchy View:

family Nitrosomonadaceae (379/7522) (hits/total searched) [[list results for this node](#)]

▶ genus *Nitrosomonas* (49/911)

▶ genus *Nitrosospira* (37/5714)

▶ unclassified_Nitrosomonadaceae (293/897)

Lineage (click node to return it to hierarchy view):

Root (198344/3333501); Bacteria (198344/3070243); "Proteobacteria" (184478/1031919); Betaproteobacteria (67027/217518)

Hierarchy View:

order Nitrosomonadales (1749/7530) (hits/total searched) [list results for this node]
 family Nitrosomonadaceae (1749/7522)
 ▶ genus Nitrosomonas (118/911)
 ▶ genus Nitrosospira (1058/5714)
 ▶ unclassified_Nitrosomonadaceae (573/897)
 family Spirillaceae (0/7)
 unclassified_Nitrosomonadales (0/1)

* NmoCL6b is not very specific and is likely to be targeting other non-AOB targets present in the wastewater ecosystem

Non-specific targets

Hierarchy View:

rootrank Root (198344/3333501) (hits/total searched) [list results for this node]
 domain Bacteria (198344/3070243)
 phylum "Actinobacteria" (154/349461)
 phylum "Aquificae" (5/2085)
 phylum "Bacteroidetes" (12050/388464)
 phylum "Caldiserica" (0/361)
 phylum "Chlamydiae" (0/1538)
 phylum "Chlorobi" (0/1556)
 phylum "Chloroflexi" (73/42562)
 phylum "Chrysiogenetes" (0/13)
 phylum "Deferribacteres" (0/1462)
 phylum "Deinococcus-Thermus" (0/5035)
 phylum "Dictyoglomi" (0/71)
 phylum "Elusimicrobia" (37/782)
 phylum "Fibrobacteres" (0/1863)
 phylum "Fusobacteria" (1/17964)
 phylum "Gemmatimonadetes" (1/5338)
 phylum "Lentisphaerae" (0/2628)
 phylum Nitrospirae (2/8171)
 phylum "Planctomycetes" (8/31651)
 phylum "Proteobacteria" (184478/1031919)
 phylum "Spirochaetes" (0/30375)
 phylum "Synergistetes" (2/2996)
 phylum "Tenericutes" (0/10618)
 phylum "Thermodesulfobacteria" (0/249)
 phylum "Thermotogae" (14/1199)
 phylum BRC1 (0/628)
 phylum Parcubacteria (0/942)
 phylum Microgenomates (0/322)
 phylum SR1 (6/1084)
 phylum Candidatus Saccharibacteria (1/7052)
 phylum Latescibacteria (0/1162)
 phylum "Armatimonadetes" (1/3243)
 phylum "Verrucomicrobia" (13/27439)
 phylum "Acidobacteria" (576/74631)
 phylum Firmicutes (99/811625)
 phylum Cyanobacteria/Chloroplast (11/70404)
 phylum Marinimicrobia (3/1637)
 phylum Aminicenantes (0/2296)
 phylum Omnitrophica (0/38)
 phylum Acetothermia (0/89)
 phylum Poribacteria (0/354)
 phylum Atribacteria (0/168)
 phylum Cloacimonetes (1/11224)
 phylum Candidatus Calesciantes (0/5)
 phylum candidate division WPS-1 (110/1224)
 phylum candidate division WPS-2 (0/376)
 phylum Hydrogenedentes (51/985)
 phylum candidate division ZB3 (0/95)
 phylum Ignavibacteriae (0/2130)
 phylum Nitrospinae (0/821)
 Archaea Outgroup (0/1)
 ▶ unclassified_Bacteria (647/111907)
 domain Archaea (0/154357)
 domain Fungi (0/108901)
 unclassified_Root (0/0)

Lineage (click node to return it to hierarchy view):

Root (1398/3333501) ; Bacteria (1398/3070243) ; "Proteobacteria" (1394/1031919) ; Betaproteobacteria (1387/217518)

Hierarchy View:

order Nitrosomonadales (1295/7530) (hits/total searched) [list results for this node]
 family Nitrosomonadaceae (1291/7522)
 ▶ genus Nitrosomonas (248/911)
 ▶ genus Nitrospira (993/5714)
 ▶ unclassified_Nitrosomonadaceae (50/897)
 family Spirillaceae (4/7)
 ▶ genus Spirillum (4/7)
 unclassified_Spirillaceae (0/0)
 unclassified_Nitrosomonadales (0/1)

Lineage (click node to return it to hierarchy view):

Root (1472/3333501); Bacteria (1472/3070243); "Proteobacteria" (1468/1031919); Betaproteobacteria (1465/217518); Nitrosomonadales (391/7530)

Hierarchy View:

family Nitrosomonadaceae (391/7522) (hits/total searched) [list results for this node]
 ▶ genus Nitrosomonas (17/911)
 ▶ genus Nitrosospira (53/5714)
 ▶ unclassified_Nitrosomonadaceae (321/897)

Non-specific targets

Lineage (click node to return it to hierarchy view):

Root (1472/3333501); Bacteria (1472/3070243)

Hierarchy View:

phylum "Proteobacteria" (1468/1031919) (hits/total searched) [list results for this node]
 class Alphaproteobacteria (0/254486)
 class **Betaproteobacteria** (1465/217518)
 order Burkholderiales (1004/143334)
 family Alcaligenaceae (0/10811)
 family Burkholderiaceae (0/30570)
 family Comamonadaceae (1/55256)
 family Oxalobacteraceae (996/22528)
 family Sutterellaceae (0/3312)
 family Burkholderiales_incertae_sedis (1/14036)
 ▶ unclassified_Burkholderiales (6/6821)
 order Hydrogenophilales (1/2527)
 family Hydrogenophilaceae (1/2527)
 unclassified_Hydrogenophilales (0/0)
 order Methylophilales (0/6132)
 order Neisseriales (0/20136)
 order Nitrosomonadales (391/7530)
 family Nitrosomonadaceae (391/7522)
 family Spirillaceae (0/7)
 unclassified_Nitrosomonadales (0/1)
 order "Procabacteriales" (0/15)
 order Rhodocyclales (1/14919)
 family Rhodocyclaceae (1/14919)
 unclassified_Rhodocyclales (0/0)
 order Gallionellales (0/2444)
 order Ferroales (0/1301)
 order Ferritrophicales (0/220)
 genus Chitinivorax (0/26)
 ▶ unclassified_Betaproteobacteria (68/18934)
 class Deltaproteobacteria (0/83856)
 class Epsilonproteobacteria (0/21128)
 class Gammaproteobacteria (0/440369)
 class "Zetaproteobacteria" (0/579)
 ▶ unclassified_"Proteobacteria" (3/13983)

* Nmo218 is not very specific but the undesired targets (e.g. Oxalobacteraceae) were not detected by amplicon sequencing to be present in the samples tested in this study.

Nse1472

5'-ACC CCA GTC ATG ACC CCC -3'

Lineage (click node to return it to hierarchy view):

Root (215/3333501); Bacteria (215/3070243); "Proteobacteria" (213/1031919); Betaproteobacteria (211/217518)

Hierarchy View:

order Nitrosomonadales (209/7530) (hits/total searched) [list results for this node]
family Nitrosomonadaceae (209/7522)
▶ genus Nitrosomonas (208/911)
genus Nitrospira (0/5714)
▶ unclassified_Nitrosomonadaceae (1/897)
family Spirillaceae (0/7)
unclassified_Nitrosomonadales (0/1)

Nsv443

5'-CCGTGACCGTTTCGTTCCGGC -3'

Lineage (click node to return it to hierarchy view):

Root (945/3333501); Bacteria (945/3070243); "Proteobacteria" (944/1031919); Betaproteobacteria (940/217518)

Hierarchy View:

order Nitrosomonadales (934/7530) (hits/total searched) [list results for this node]
family Nitrosomonadaceae (934/7522)
genus Nitrosomonas (0/911)
▶ genus Nitrospira (934/5714)
unclassified_Nitrosomonadaceae (0/897)
family Spirillaceae (0/7)
unclassified_Nitrosomonadales (0/1)

Primer coverage for universal primers used in HOPE to detect for total bacteria

27F	To be used as primer!
Accession no.	pB-03784
Name (Alm et al., 1996)*	S-D-Bact-0008-d-S-20
Specificity	Bacteria
Check specificity	   
Evaluate primer pair	Select 2nd primer <input type="text" value="S*-Univ-0517-a-A-15, Uni522R"/> <input type="button" value="Evaluate using SILVA TestPrime"/>
Probe category	► primer
Target molecule	16S rRNA
Position*	6 - 25
Direction	forward primer
Sequence*	5' - AGA GTT TGA TCM TGG CTC AG -3'
Length [nt]	20
MW [g/mol]	5854
G+C content [%]	45
Tm [°C]*	51
Coverage (full match)*	Archaea: 0 % Bacteria: 81.8 % Eukaryotes: 0 %
Coverage (1 mismatch)*	Archaea: 0 % Bacteria: 91.4 % Eukaryotes: 0 %
Reference	Hongoh Y, Ohkuma M, Kudo T. Molecular analysis of bacterial microbiota in the gut of the termite <i>reticulitermes speratus</i> (isoptera: rhinotermitidae). <i>FEMS Microbiol. Ecol.</i> 44, 231-242 (2003). ► Abstract (PUBMED)

EUB338 (Bact338) (bacterial)	Tested for in situ hybridization.
Accession no.	pB-00159
Name (Alm et al., 1996)*	S-D-Bact-0338-a-A-18
Specificity	most Bacteria Coverage/hits target group: 90% / 169389 (domain Bacteria) Hits non-target groups: 0
Check specificity	   
Probe category	► higher taxonomic levels
Target molecule	16S rRNA
Position*	338 - 355
Sequence*	5' - GCT GCC TCC CGT AGG AGT -3'
Length [nt]	18
MW [g/mol]	5487
G+C content [%]	66.7
Tm [°C]*	55
delta Gs [kcal/mol]*	ΔG_1 : -24.86; ΔG_2 : -1.59; ΔG_{12} : -23.22
Formamide [%]*	0-50
Reference	Amann R. I., Binder B. J., Olson R. J., Chisholm S. W., Devereux R. and Stahl D. A. (1990). Combination of 16S rRNA-targeted oligonucleotide probes with flow cytometry for analyzing mixed microbial populations. <i>Appl. Environ. Microbiol.</i> 56: 1919-1925. ► Abstract (PUBMED)

Primer coverage for universal primers used in amplicon sequencing to detect for total bacteria

U515F	To be used as primer!
Accession no.	pB-03751
Name (Alm et al., 1996)*	S-*-Univ-0515-a-S-19
Specificity	Bacteria, Archaea, Eukarya
Check specificity	   
Evaluate primer pair	Select 2nd primer <input type="text" value="S-*-Univ-0517-a-A-15, Uni522R"/> <input type="text" value="Evaluate using SILVA TestPrime"/>
Probe category	► primer
Target molecule	16S rRNA
Position*	515 - 533
Direction	forward primer
Sequence*	5' - GTG CCA GCM GCC GCG GTA A -3'
Length [nt]	19
MW [g/mol]	5520
G+C content [%]	68.4
Tm [°C]*	59
Coverage (full match)*	Archaea: 54.5 % Bacteria: 95.4 % Eukaryotes: 92.2 %
Coverage (1 mismatch)*	Archaea: 96.2 % Bacteria: 98.4 % Eukaryotes: 97 %
Reference	Walters WA, Caporaso JG, Lauber CL, Berg-Lyons D, Fierer N, Knight R. PrimerProspector: de novo design and taxonomic analysis of barcoded PCR primers. <i>Bioinformatics</i> . 10.1093/bioinformatics/btr087 (2011). ► Abstract (PUBMED)

907R	To be used as primer!
Accession no.	pB-03718
Name (Alm et al., 1996)*	S-D-Bact-0907-a-A-20
Specificity	Bacteria
Check specificity	   
Evaluate primer pair	Select 2nd primer <input type="text" value="S-*-Univ-0341-b-S-17, U341F"/> <input type="text" value="Evaluate using SILVA TestPrime"/>
Probe category	► primer
Target molecule	16S rRNA
Position*	907 - 926
Direction	reverse primer
Sequence*	5' - CCG TCA ATT CMT TTG AGT TT -3'
Length [nt]	20
MW [g/mol]	5758
G+C content [%]	35
Tm [°C]*	47
Coverage (full match)*	Archaea: 0 % Bacteria: 89.7 % Eukaryotes: 0 %
Coverage (1 mismatch)*	Archaea: 0.9 % Bacteria: 96.9 % Eukaryotes: 77 %
Reference	Muyzer G, A, Teske C.O, Wirsén J, Jannasch H.W Phylogenetic relationships of <i>Thiomicrospira</i> species and their identification in deep-sea hydrothermal vent samples by denaturing gradient gel electrophoresis of 16S rDNA fragments. <i>Arch. Microbiol.</i> 164, 165-172 (1995). ► Abstract (PUBMED)

Nitrifying bacterial populations detected by 515F and 907R primers

Probe Match Result

Display depth:

Auto ▼

Differences

Allowed: 0 ▼

Probe: 5'TTACCGCGGCKGCTGRCAC 3'

Target: 5'GTGYCAGCMGCCGCGGTAA 3'

Probe: 5'CCCCGYCAATTCMTTTRAGT 3'

Target: 5'ACTYAAAKGAATTGRCGGGG 3'

[\[start over | help | options \]](#)

Lineage (*click node to return it to hierarchy view*):

Root (1490490/3333501) ; Bacteria (1490490/3070243) ; "Proteobacteria" (483848/1031919) ; Betaproteobacteria (110367/217518)

Hierarchy View:

order Nitrosomonadales (4877/7530) (hits/total searched) [[list results for this node](#)]
 family Nitrosomonadaceae (4873/7522)
 ▶ genus Nitrosomonas (401/911)
 ▶ genus Nitrospira (4038/5714)
 ▶ unclassified_Nitrosomonadaceae (434/897)
 family Spirillaceae (3/7)
 ▶ genus Spirillum (3/7)
 unclassified_Spirillaceae (0/0)
 ▶ unclassified_Nitrosomonadales (1/1)

Lineage (*click node to return it to hierarchy view*):

Root (1490490/3333501) ; Bacteria (1490490/3070243)

Hierarchy View:

phylum Nitrospirae (2505/8171) (hits/total searched) [[list results for this node](#)]
 class "Nitrospira" (2505/8171)
 order "Nitrospirales" (2505/8171)
 family "Nitrospiraceae" (2505/8171)
 ▶ genus Leptospirillum (558/2520)
 ▶ genus Nitrospira (1832/5378)
 ▶ genus Thermodesulfobivrio (87/230)
 ▶ unclassified_"Nitrospiraceae" (28/43)
 unclassified_"Nitrospirales" (0/0)
 unclassified_"Nitrospira" (0/0)
 unclassified_Nitrospirae (0/0)

Nitrifying bacterial populations detected by 515F and 907R primers

Probe Match Result

Display depth:

Auto

Differences

Allowed: 0

Probe: 5'TTACCGGGCKGCTGRCAC 3'

Target: 5'GTGYCAGCMGCCGCGGTAA 3'

Probe: 5'CCCCGYCAATTCMTTTRAGT 3'

Target: 5'ACTYAAAKGAATTGRCGGGG 3'

[\[start over | help | options \]](#)

Lineage (click node to return it to hierarchy view):

[Root](#) (1490490/3333501) ; [Bacteria](#) (1490490/3070243) ; ["Proteobacteria"](#) (483848/1031919) ; [Alphaproteobacteria](#) (109223/254486) ; [Rhizobiales](#) (37023/84204) ; [Bradyrhizobiaceae](#) (6309/13197)

Hierarchy View:

▼ [genus Nitrobacter](#) (113/195) (hits/total searched) [[list results for this node](#)]

- * [S000269985](#) Nitrobacter sp. PBAB17; AY508476
- * [S000392359](#) Nitrobacter winogradskyi; IFO 14297; AF363288
 - [S000414380](#) Nitrobacter winogradskyi; W; L11661
 - [S000414381](#) Nitrobacter sp.; LL; L11662
 - [S000414382](#) Nitrobacter hamburgensis (T); X14; L11663
 - [S000414627](#) Nitrobacter hamburgensis; Nb14; L35502
 - [S000414631](#) Nitrobacter winogradskyi; L35506
 - [S000414632](#) Nitrobacter winogradskyi; L35507
 - [S000414636](#) Nitrobacter sp.; R6; L35511
 - [S000428396](#) Nitrobacter alkalicus (T); AN1; AF069956
 - [S000428397](#) Nitrobacter alkalicus; AN2; AF069957
 - [S000428398](#) Nitrobacter alkalicus; AN4; AF069958
 - [S000434954](#) Nitrobacter winogradskyi; ATCC 14123; AY055796
 - [S000434955](#) Nitrobacter sp. NRB5220; AY055797
 - [S000492976](#) uncultured alpha proteobacterium; AKYH732; AY921742
 - [S000535828](#) uncultured Nitrobacter sp.; Nbac20; AY876604
 - [S000535829](#) uncultured Nitrobacter sp.; Nbac20-3-12s; AY876605