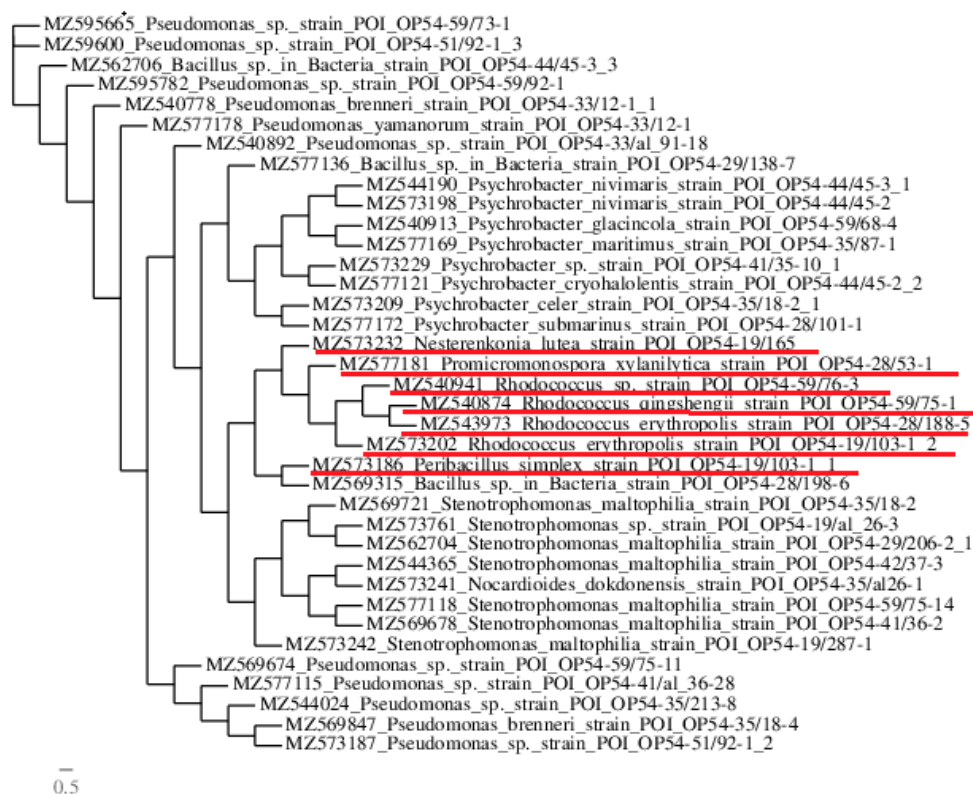
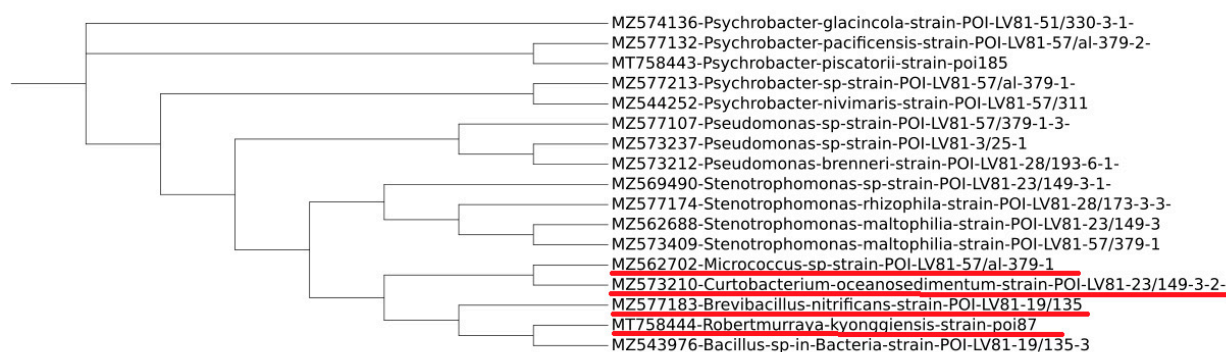


**Table S1.** Additional materials 1. Composition of media used.

| Microbiological Media                                       | Media composition (g/l)  |
|---|--|
| marine ammonium medium 1313 (Marine ammonium mineral salts) | NaCl - 20, (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> -1, CaCl <sub>2</sub> • 2H <sub>2</sub> O - 0.2, MgSO <sub>4</sub> • 7H <sub>2</sub> O - 1 , FeSO <sub>4</sub> • 7H <sub>2</sub> O - 0.002, Na <sub>2</sub> WO <sub>4</sub> • 2H <sub>2</sub> O - 0.003, Na <sub>2</sub> MoO <sub>4</sub> • 2H <sub>2</sub> O - 0.020, microelement solution SL-10 - 1, KH <sub>2</sub> PO <sub>4</sub> - 0.36, K <sub>2</sub> HPO <sub>4</sub> - 2.34, pH 7.2  |
| marine mineral medium (Marine salt medium)                  | KH <sub>2</sub> PO <sub>4</sub> - 0.5, NaH <sub>2</sub> PO <sub>4</sub> • H <sub>2</sub> O - 0.5, MgSO <sub>4</sub> • 7H <sub>2</sub> O - 0.5, NaCl - 4.0, NH <sub>4</sub> Cl - 0.5, microelement solution SL-10 - 1, pH 7.2   |
| a modified Voroshilova-Dianova medium                       | K <sub>2</sub> HPO <sub>4</sub> – 1.0; KH <sub>2</sub> PO <sub>4</sub> – 1.0; NH <sub>4</sub> NO <sub>3</sub> – 1.0; MgSO <sub>4</sub> • 7H <sub>2</sub> O – 0.2; CaCl <sub>2</sub> • 2H <sub>2</sub> O – 0.02, a solution of trace elements SL-10, a solution of vitamins according to Volin, FeCl <sub>2</sub> -2 drops of a concentrated solution. Artificial seawater (g/l) was used as the basis for the medium: NaCl – 27.5, MgCl <sub>2</sub> – 5.0, MgSO <sub>4</sub> •7H <sub>2</sub> O – 2.0, CaCl <sub>2</sub> – 0.5, KCl – 1.0, FeSO <sub>4</sub> – 0.001[30], pH 7.0-7.2. |



**Figure S1.** Phylogenetic tree built on the basis of sequence analysis of 16S rRNA gene fragments of bacteria isolated from bottom sediments of the northern part of the Sea of Japan (gas-hydrate area). Scale bar length: 1 substitution per 100 nucleotides. Evolutionary distances were computed according to Maximum-likelihood phylogenetic tree based on 16S rRNA gene. The reliability of each branch was valuated by bootstrap analysis based on 1000 replications.



**Figure S2.** Phylogenetic tree built on the basis of sequence analysis of 16S rRNA gene fragments of bacteria isolated from bottom sediments of the northern part of the Sea of Japan (Non-gas-hydrate area). Scale bar length: 1 substitution per 100 nucleotides. Evolutionary distances were computed according to Maximum-likelihood phylogenetic tree based on 16S rRNA gene. The reliability of each branch was valuated by bootstrap analysis based on 1000 replications.

**Table S2.** Degree of biodegradation of hydrocarbons by strains isolated from bottom sediments of gas-hydrate area under aerobic and anaerobic conditions.

| Strain code and NCBI number  | The degree of biodegradation of hydrocarbons |                            |
|--|--|----------------------------|
|  | under aerobic conditions                     | under anaerobic conditions |
| MZ573202 <i>Rhodococcus erythropolis</i> strain POI OP54-19/103-1(2)     | 78,71±1,94                                   |                            |
| MZ540874 <i>Rhodococcus qingshengii</i> strain POI OP54-59/75-1          | 84,50±3,29                                   | 97,13±2,90                 |
| MZ540941 <i>Rhodococcus</i> sp. strain POI OP54-59/76-3                  | 63,27±2,22                                   | 94,46±2,81                 |
| MZ543973 <i>Rhodococcus erythropolis</i> strain POI OP54-28/188-5        | 89,56±3,25                                   | 97,44±3,83                 |
| MZ577118 <i>Stenotrophomonas maltophilia</i> strain POI OP54-59/75-14    | 72,31±2,24                                   |                            |
| MZ544365 <i>Stenotrophomonas maltophilia</i> strain POI OP54-42/37-3     | 63,51±1,95                                   |                            |
| MZ573242 <i>Stenotrophomonas maltophilia</i> strain POI OP54-19/287-1    | 81,79±2,65                                   | 80,13±2,84                 |
| MZ573761 <i>Stenotrophomonas</i> sp. strain POI OP54-19/al 26-3          | 69,54±2,51                                   | 79,54±2,80                 |
| MZ562704 <i>Stenotrophomonas maltophilia</i> strain POI OP54-29/206-2(1) | 51,98±1,77                                   | 84,74±2,43                 |
| MZ569721 <i>Stenotrophomonas maltophilia</i> strain POI OP54-35/18-2     | 97,38±3,83                                   | 100,00±3,77                |
| MZ569678 <i>Stenotrophomonas maltophilia</i> strain POI OP54-41/36-1     | 84,02±2,61                                   | 94,64±3,33                 |
| MZ577121 <i>Psychrobacter cryohalolentis</i> strain POI OP54-44/45-2 (2) | 75,71±2,78                                   |                            |
| MZ573209 <i>Psychrobacter celer</i> strain POI OP54-35/18-2(1)           | 73,32±2,70                                   |                            |
| MZ577169 <i>Psychrobacter maritimus</i> strain POI OP54-35/87-1          | 96,24±3,69                                   |                            |
| MZ573198 <i>Psychrobacter nivimaris</i> strain POI OP54-44/45-2          | 78,18±2,69                                   | 92,30±3,60                 |
| MZ573229 <i>Psychrobacter</i> sp. strain POI OP54-41/35-10(1)            | 72,53±2,40                                   | 91,09±3,28                 |
| MZ540913 <i>Psychrobacter glacincola</i> strain POI OP54-59/68-4         | 79,98±2,85                                   | 98,73±3,10                 |
| MZ544190 <i>Psychrobacter nivimaris</i> strain POI OP54-44/45-3(1)       | 87,54±2,57                                   | 90,40±3,09                 |
| MZ577172 <i>Psychrobacter submarinus</i> strain POI OP54-28/101-1        | 86,89±3,40                                   | 97,28±3,33                 |
| MZ569847 <i>Pseudomonas brenneri</i> strain POI OP54-35/18-4             | 77,81±2,76                                   |                            |
| MZ540778 <i>Pseudomonas brenneri</i> strain POI OP54-33/12-1(1)          | 76,84±2,54                                   | 93,17±2,92                 |
| MZ540892 <i>Pseudomonas</i> sp. strain POI OP54-33/al 91-18              | 83,83±3,20                                   | 96,77±3,25                 |
| MZ544024 <i>Pseudomonas</i> sp. strain POI OP54-35/213-8                 | 56,07±1,71                                   | 89,33±2,58                 |
| MZ595665 <i>Pseudomonas</i> sp. strain POI OP54-59/73-1                  | 77,12±2,89                                   | 84,89±2,51                 |
| MZ595782 <i>Pseudomonas</i> sp. strain POI OP54-59/92-1                  | 70,53±2,16                                   | 97,22±3,62                 |
| MZ59600 <i>Pseudomonas</i> sp. strain POI OP54-51/92-1(3)                | 81,15±3,19                                   | 86,61±3,25                 |
| MZ577115 <i>Pseudomonas</i> sp. strain POI OP54-41/al 36-28              | 76,39±2,58                                   | 95,29±3,46                 |
| MZ569674 <i>Pseudomonas</i> sp. strain POI OP54-59/75-10                 | 73,25±3,13                                   | 94,77±2,97                 |
| MZ573187 <i>Pseudomonas</i> sp. strain POI OP54-51/92-1(2)               | 67,37±2,40                                   | 85,01±2,96                 |
| MZ577178 <i>Pseudomonas yamanorum</i> strain POI OP54-33/12-1            | 68,01±1,09                                   | 84,91±2,13                 |
| MZ595666 <i>Bacillus</i> sp. (in: Bacteria) strain POI LV81-57/379-1(1)  | 71,18±2,30                                   | 92,00±2,90                 |
| MZ562706 <i>Bacillus</i> sp. (in: Bacteria) strain POI OP54-44/45-3(3)   | 87,82±3,45                                   | 89,23±2,72                 |
| MZ577136 <i>Bacillus</i> sp. (in: Bacteria) strain POI OP54-29/138-6     | 68,21±2,46                                   | 86,01±2,60                 |
| MZ569315 <i>Bacillus</i> sp. (in: Bacteria) strain POI OP54-28/198-6     | 88,22±2,72                                   | 80,95±2,41                 |
| MZ573241 <i>Nocardioides dokdonensis</i> strain POI OP54-35/al26-1       | 79,98±2,52                                   |                            |
| MZ573232 <i>Nesterenkonia lutea</i> strain POI OP54-19/165               | 73,69±2,29                                   |                            |
| MZ573186 <i>Peribacillus simplex</i> strain POI OP54-19/103-1(1)         | 87,64±3,45                                   | 92,40±2,66                 |

**Table S3.** Degree of biodegradation of hydrocarbons by strains isolated from bottom sediments of non- gas-hydrate area under aerobic and anaerobic conditions.

| Strain code and NCBI number   | The degree of biodegradation of hydrocarbons |                            |
|---|--|----------------------------|
|   | under aer-obic conditions                    | under anaerobic conditions |
| MZ577132 <i>Psychrobacter pacificensis</i> strain POI LV81-57/al 379 (2)    | 80,21±2,75                                   |                            |
| MZ577174 <i>Stenotrophomonas rhizophila</i> strain POI LV81-28/173-3(3)     | 86,33±2,67                                   |                            |
| MZ573210 <i>Curtobacterium oceanosedimentum</i> strain POI LV81-23/149-3(2) | 75,56±2,31                                   |                            |
| MZ573212 <i>Pseudomonas brenneri</i> strain POI LV81-28/193-6(1)            | 70,33±2,72                                   | 92,35±3,27                 |
| MZ573237 <i>Pseudomonas sp.</i> strain POI LV81-3/25-1                      | 53,07±2,08                                   | 76,62±2,22                 |
| MZ543976 <i>Bacillus sp. (in: Bacteria)</i> strain POI LV81-19/135-3        | 85,06±2,59                                   | 83,58±3,09                 |
| MZ544252 <i>Psychrobacter nivimaris</i> strain POI LV81-57/311              | 69,49±2,13                                   | 77,22±2,34                 |
| MZ573409 <i>Stenotrophomonas maltophilia</i> strain POI LV81-57/379-1       | 81,81±2,58                                   | 100,00±3,83                |
| MZ562702 <i>Micrococcus sp.</i> strain POI LV81-57/al 379-1                 | 78,77±2,76                                   | 72,34±2,56                 |
| MZ574136 <i>Psychrobacter glacincola</i> strain POI LV81-51/330-3(1)        | 77,34±2,89                                   | 88,26±3,35                 |
| MZ577107 <i>Pseudomonas sp.</i> strain POI LV81-57/379-1(3)                 | 53,25±1,68                                   | 69,53±2,07                 |
| MZ569490 <i>Stenotrophomonas sp.</i> strain POI LV81-23/149-3(1)            | 72,56±2,59                                   | 88,03±2,57                 |
| MT758443 <i>Psychrobacter piscatorii</i> strain poi185                      | 75,3±2,11                                    | 91,1±1,09                  |
| MZ577213 <i>Psychrobacter sp.</i> strain POI LV81-57/al 379 (1)             | 72,3±1,98                                    | 84,1±3,27                  |
| MZ562688 <i>Stenotrophomonas maltophilia</i> strain POI LV81-23/149-3       | 63,2±1,37                                    | 86,9±2,07                  |
| MZ577183 <i>Brevibacillus nitrificans</i> strain POI LV81-19/135            | 54,6±3,16                                    | 87,3±1,91                  |
| MT758444 <i>Robertmurraya kyonggiensis</i> strain poi87                     | 75,1±2,09                                    | 94,2±2,01                  |