

METHANOGENIC ARCHAEA

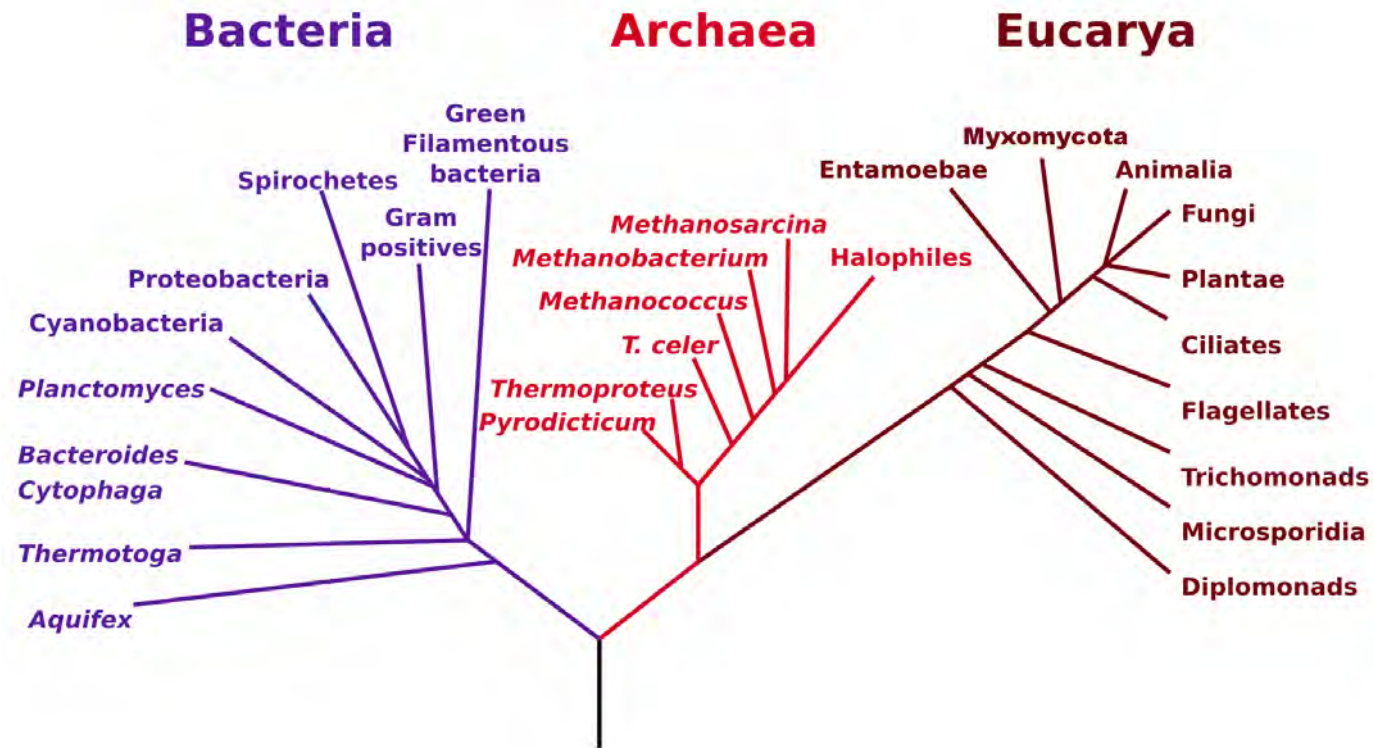
METHANOCOCCUS MARIPALUDIS

Methanogenic

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- microorganism that produces **methane**
- can reduce CO_2 with H_2 to methane
- both archaeans and obligate anaerobes
- methane can be found in the form of
 - ▣ marsh gas
 - ▣ in the guts of animals (ruminants and humans)

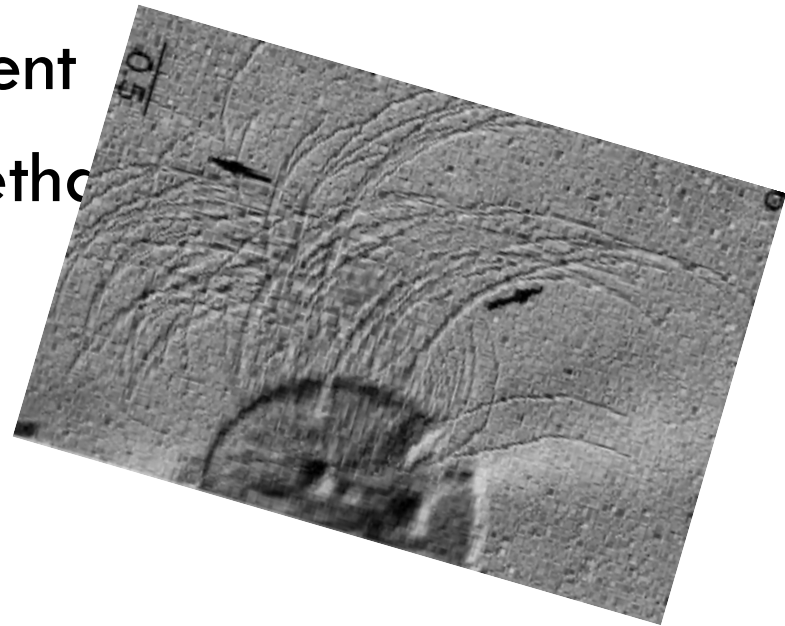
Phylogenetic Tree of Life



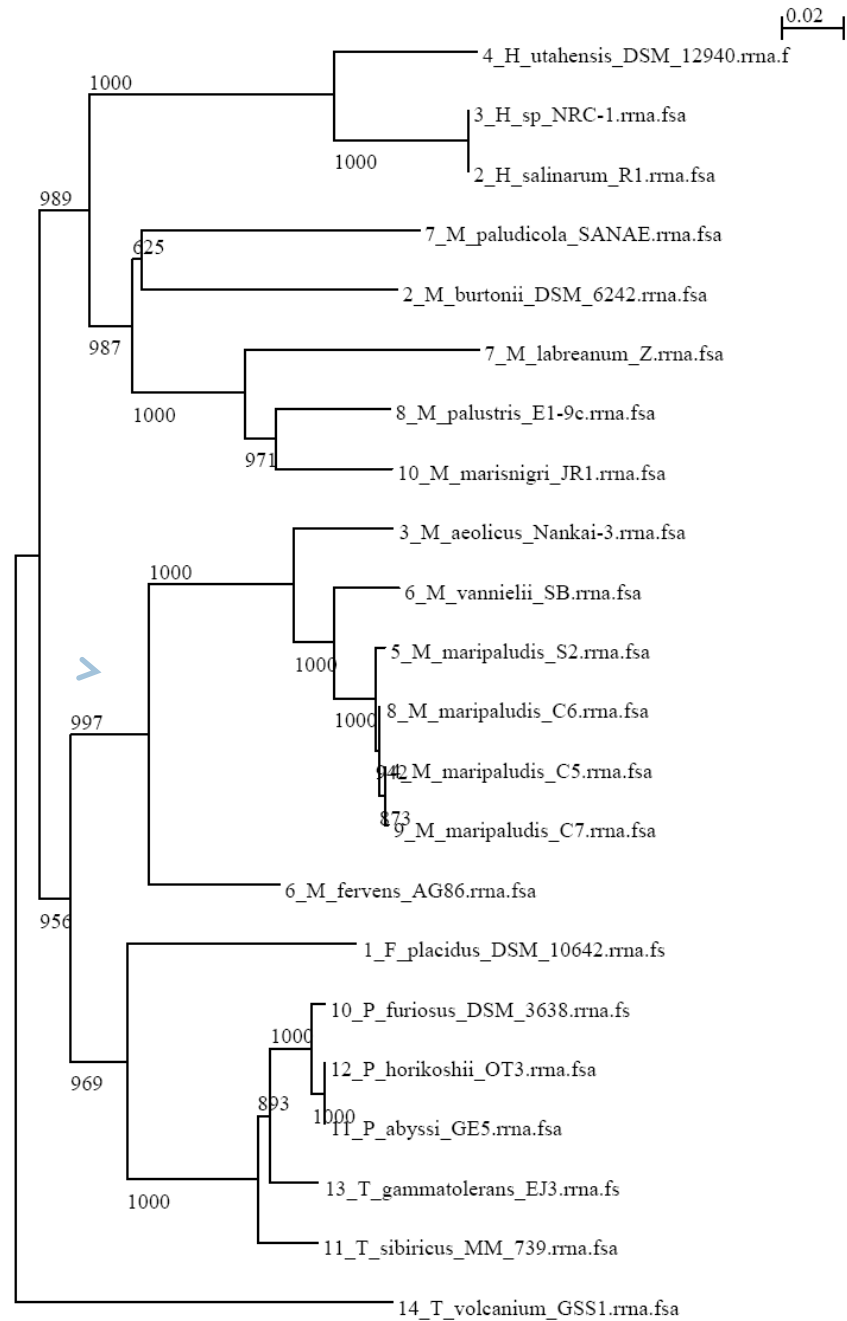
Methanococcus maripaludis

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- was isolated from Black sea
- was strictly anaerobic, hydrogenotrophic and nitrogen-fixing
- irregular cocci shaped
- uses flagella for movement
- is a model species of methanococcus
 - ▣ fast reproducible growth



Methanococcus



16S rRNA
Tree



| | Length (Mbp) | GC content | % Coding | Proteins | RNAs |
|------------------------------------|----------------|--------------|------------|-------------|-----------|
| <i>M. maripaludis</i> C5 | 1.78076 | 33.0% | 86% | 1813 | 47 |
| <i>M. maripaludis</i> C6 | 1.74419 | 33.0% | 87% | 1826 | 48 |
| <i>M. maripaludis</i> C7 | 1.77269 | 33.0% | 86% | 1788 | 47 |
| <i>M. maripaludis</i> S2 | 1.66113 | 33.0% | 88% | 1722 | 50 |
| <i>M. aeolicus</i> Nankai-3 | 1.56950 | 30.0% | 84% | 1490 | 46 |
| <i>M. vannielii</i> SB | 1.72004 | 31.0% | 85% | 1678 | 51 |

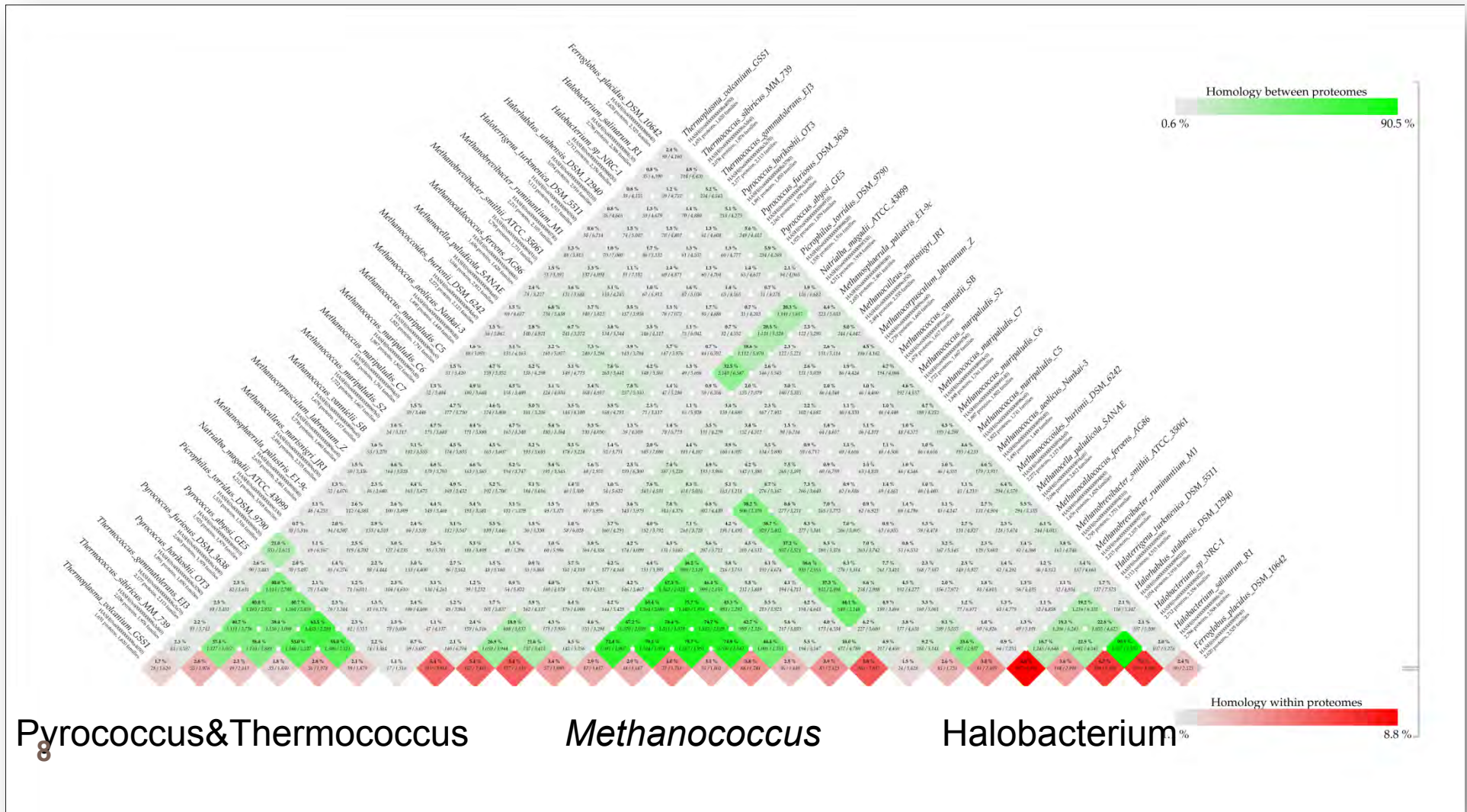
Protein statistics

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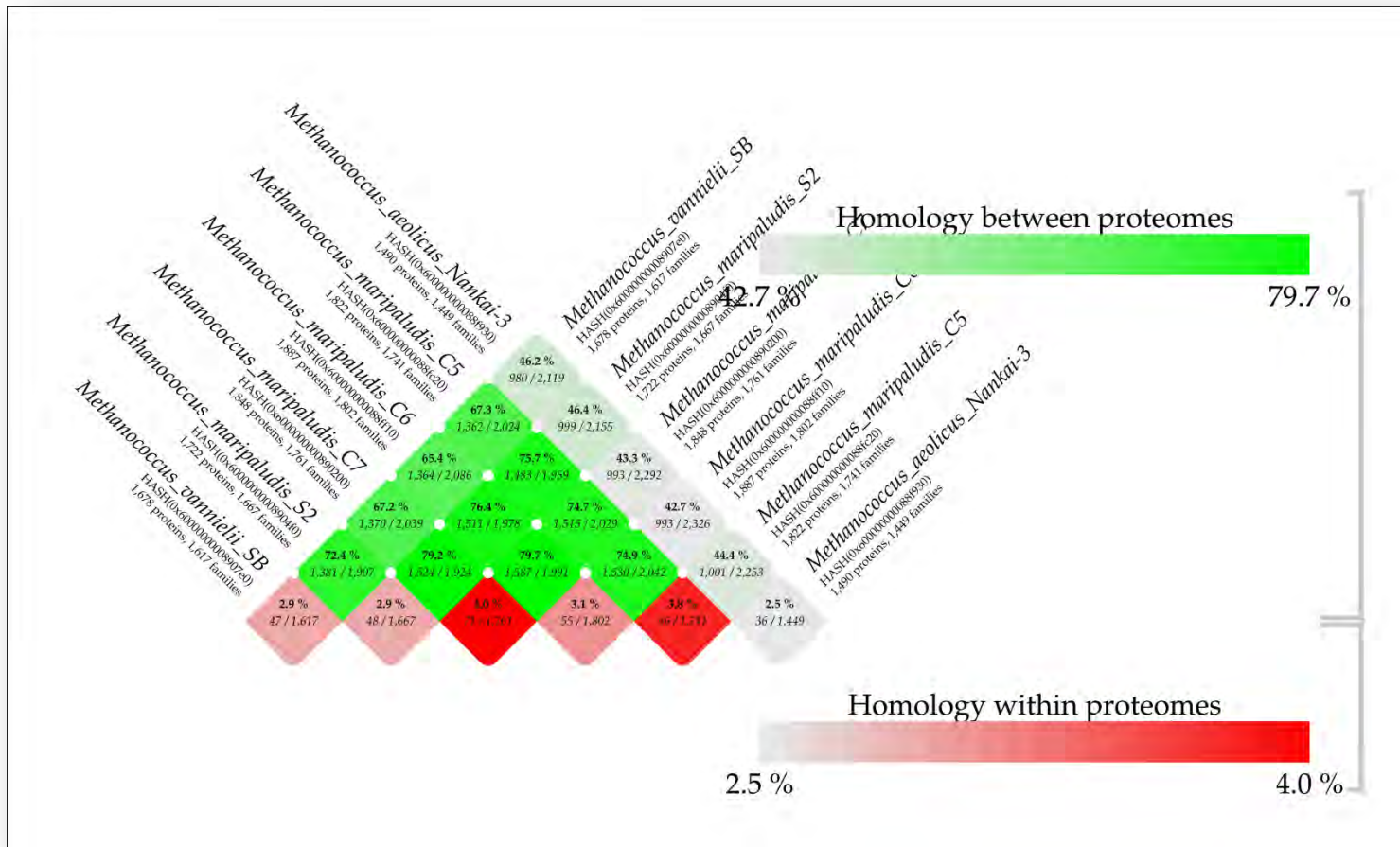
- *Methanococcus maripaludis* C5 Mean: 191 StdDev: 109.53
- *Methanococcus maripaludis* C6 Mean: 247 StdDev: 160.43
- *Methanococcus maripaludis* C7 Mean: 285 StdDev: 99.14
- *Methanococcus maripaludis* S2 Mean: 359 StdDev: 171.03

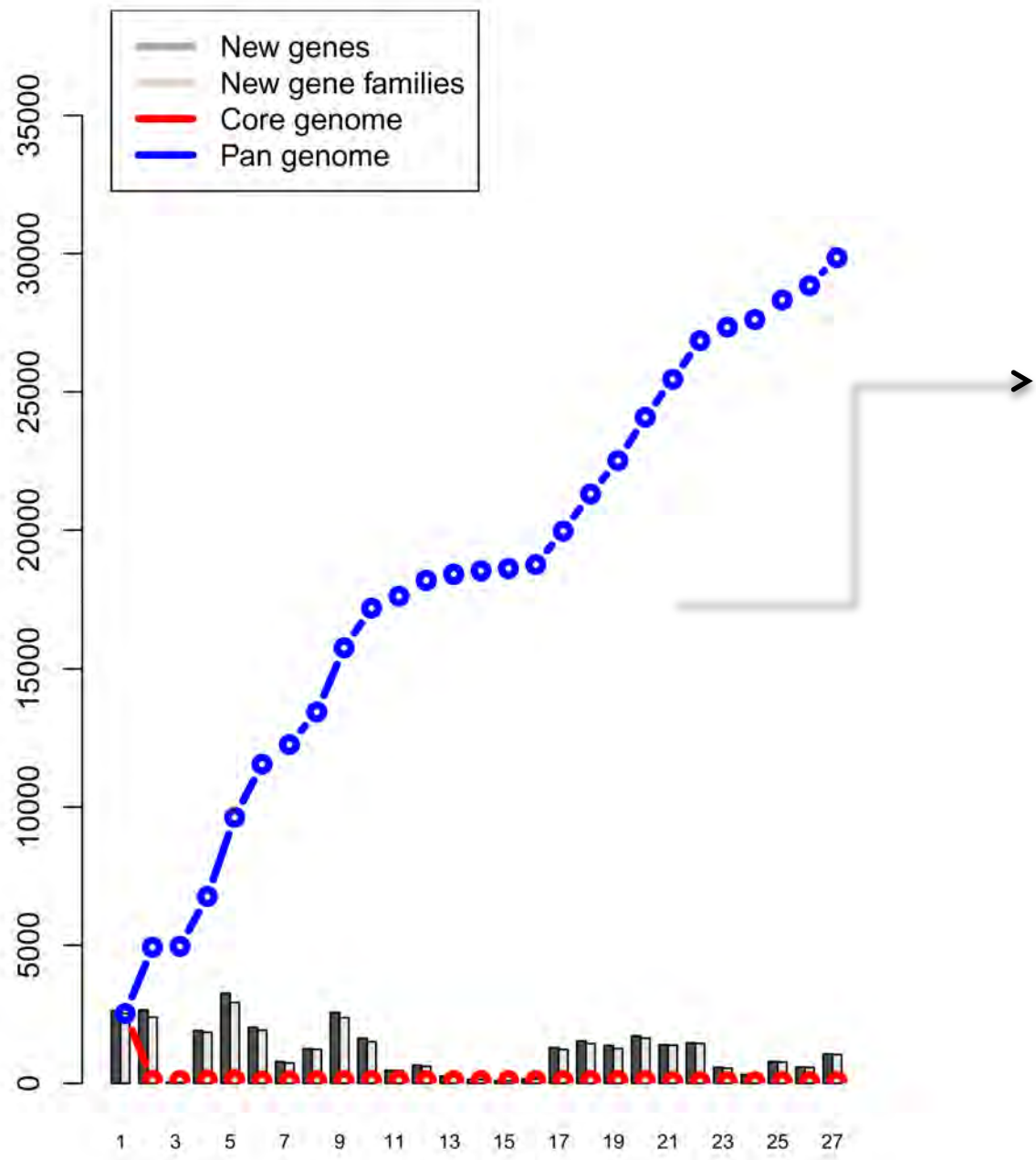
- *Methanococcus vanniellii* SB Mean: 416 StdDev: 417.39
- *Methanococcus aeolicus* Nankai-3 Mean: 263 StdDev: 124.97

Blast matrices : 27 Genomes



Blast matrices : *Methanococcus*

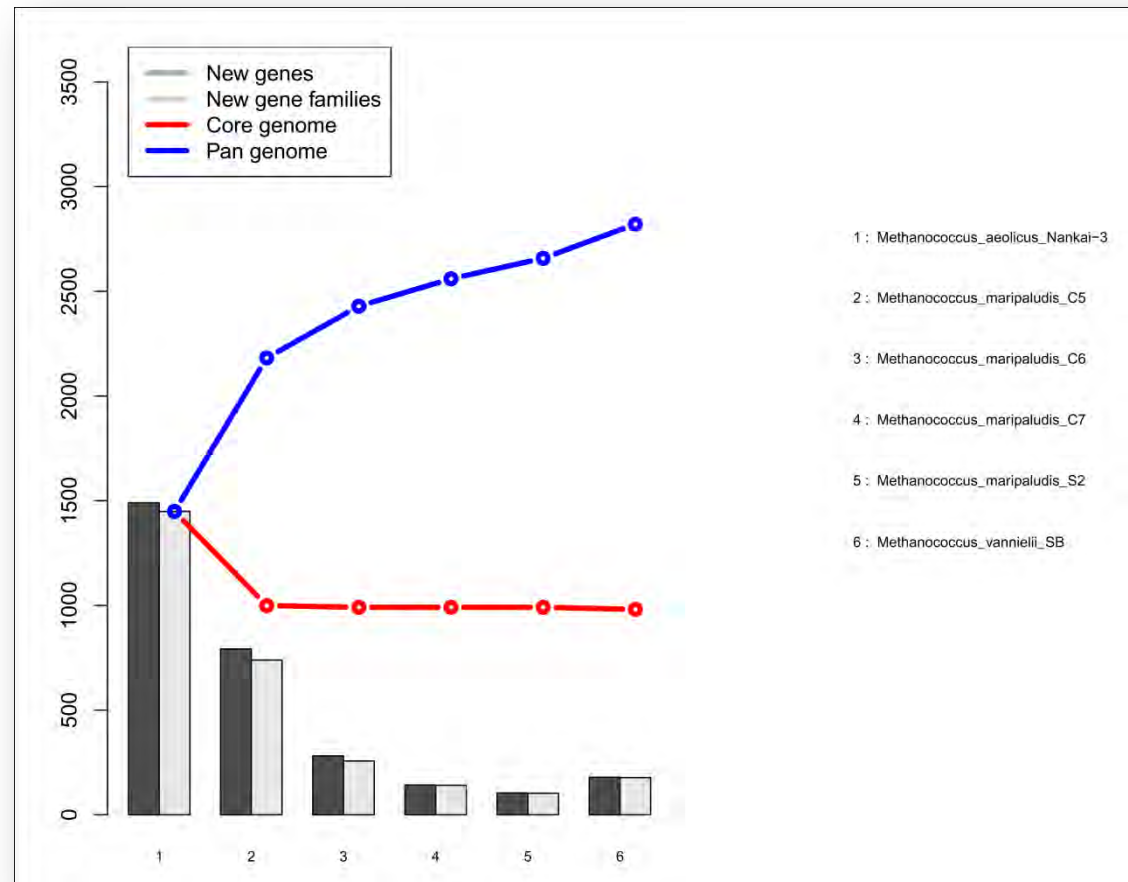




- 1: *Ferroglobus placidus*_DSM_10642
- 2: *Halobacterium salinarum*_R1
- 3: *Halobacterium*_sp._NRC-1
- 4: *Halorhabdus utahensis*_DSM_12940
- 5: *Haloterrigena turkmenica*_DSM_5511
- 6: *Methanobrevibacter ruminantium*_M1
- 7: *Methanobrevibacter smithii*_ATCC_35061
- 8: *Methanocaldococcus fervens*_AG86
- 9: *Methanocella paludicola*_SANA E
- 10: *Methanococcoides burtonii*_DSM_6242
- 11: *Methanococcus aeolicus*_Nankai-3
- 12: *Methanococcus maripaludis*_C5
- 13: *Methanococcus maripaludis*_C6
- 14: *Methanococcus maripaludis*_C7
- 15: *Methanococcus maripaludis*_S2
- 16: *Methanococcus vannielii*_SB
- 17: *Methanocorpusculum labreanum*_Z
- 18: *Methanoculleus marisnigri*_JR1
- 19: *Methanosphaerula palustris*_E1-9c
- 20: *Natrialba magadii*_ATCC_43099
- 21: *Picrophilus torridus*_DSM_9790
- 22: *Pyrococcus abyssi*_GE5
- 23: *Pyrococcus furiosus*_DSM_3638
- 24: *Pyrococcus horikoshii*_OT3
- 25: *Thermococcus gammatolerans*_EJ3
- 26: *Thermococcus sibiricus*_MM_739
- 27: *Thermoplasma volcanium*_GSS1

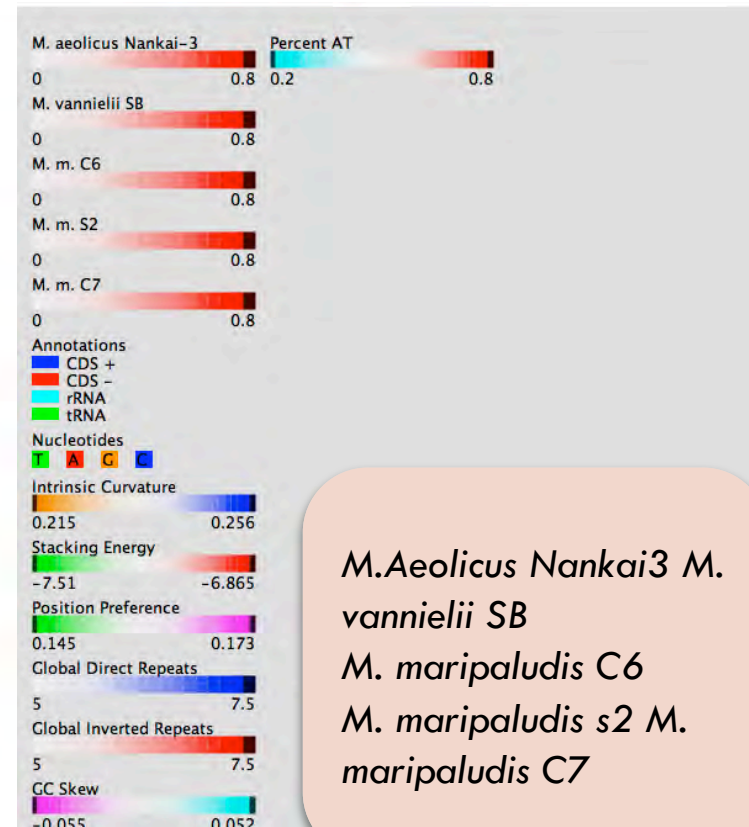
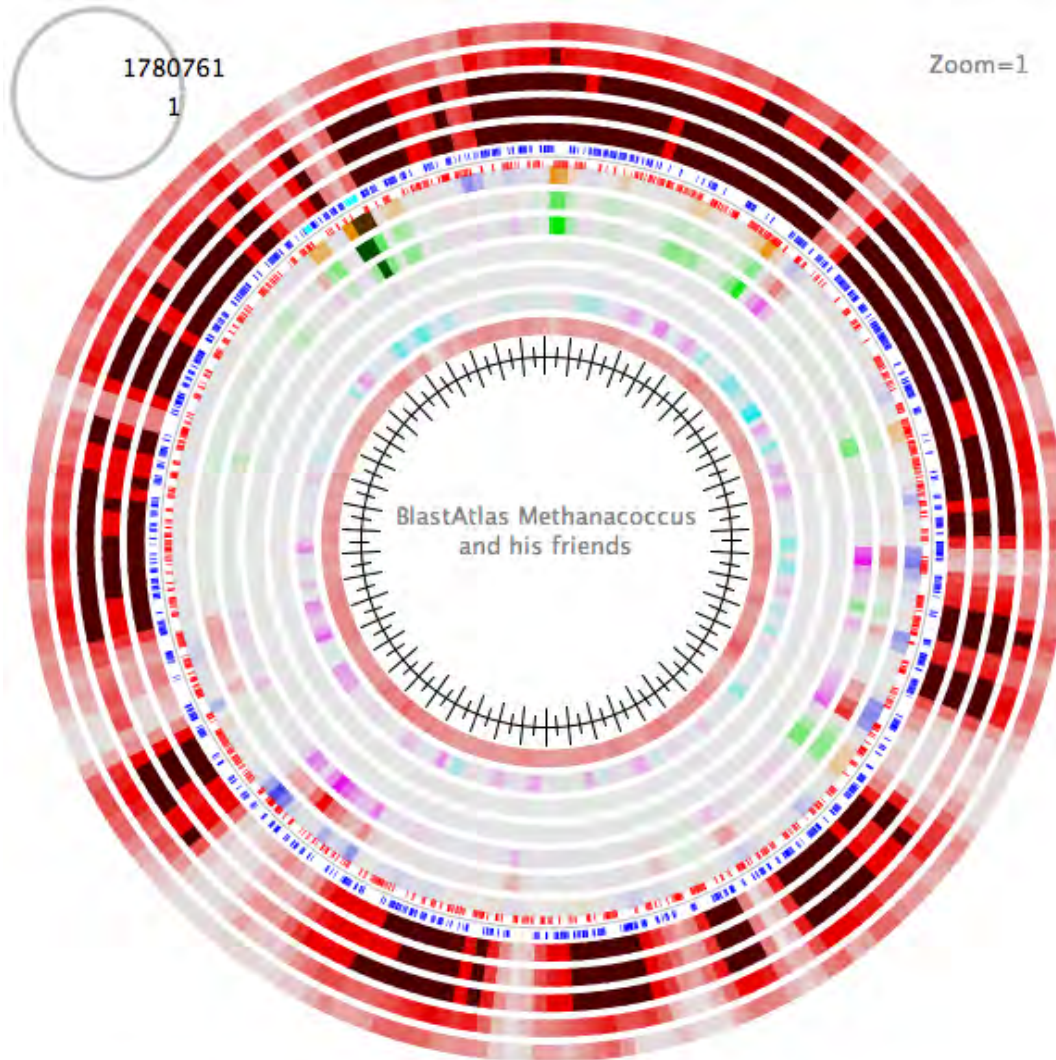
Pan core genome : *Methanococcus*

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Atlas : *Methanococcus*

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M. Aeolicus Nankai3 *M. vannielii SB*
M. maripaludis C6
M. maripaludis s2 *M. maripaludis C7*

□ Summary

- From **Blast matrices** and **Blast Atlas** between *M. maripaludis* and *M. aeolicus* Nankai3 and *M. vanniellii* SB can be distinguished.

□ *Future prospective*

- Methane production capability of *M. maripaludis* should be further investigated.