



## ゲノム決定された細菌

### Archaea (18)

- Crenarchaeota**
  - Thermoprotei**
    - Desulfurococcales
      - Aeropyrum pernix K1
    - Sulfolobales
      - Sulfolobus solfataricus P2
      - Sulfolobus tokodaii strain 7
    - Thermoproteales
      - Pyrobaculum aerophilum IM2
  - Euryarchaeota**
    - Archaeoglobi**
      - Archaeoglobales
        - Archaeoglobus fulgidus DSM4304
    - Haloarchaea**
      - Haloquadrates
        - Haloquadratum walsbyi NRC-1
      - Haloferales
        - Methanohalobium thermoautotrophicum delta H
    - Methanococci**
      - Methanococcales
        - Methanococcus jannaschii DSM2661
        - Methanococcus marisnigri S2
      - Methanohalobiales
        - Methanosarcina mazei Goe1
        - Methanosarcina acetivorans C2A
    - Methanopyri**
      - Methanopyrales
        - Methanopyrus kandleri AV19
    - Thermococci**
      - Thermococcales
        - Pyrococcus horikoshii shinkai OT3
        - Pyrococcus abyssi GE5
        - Pyrococcus furiosus DSM 3638
      - Thermoplasma**
        - Thermoplasmatales
          - Thermoplasma acidophilum DSM 1728
          - Thermoplasma volcanium GSS1

### Bacteria (149)

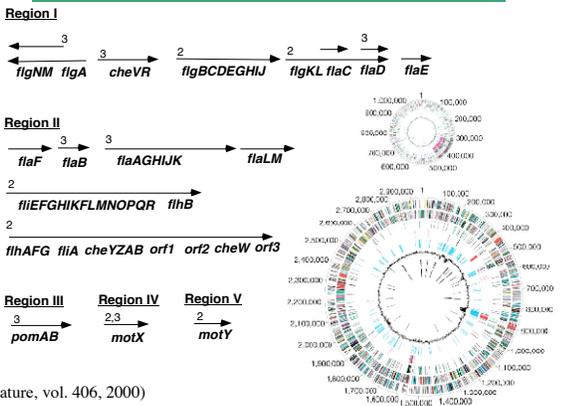
- Actinobacteria**
  - Actinobacteriales**
    - Actinomycetales
      - Corneliobacterium glutamicum ATCC 13032
      - Corneliobacterium efficiens YS-314
      - Corneliobacterium diphtheriae NCTC 13129
      - Mycobacterium tuberculosis H37Rv (lab. strain)
      - Mycobacterium tuberculosis CDC1551
      - Mycobacterium ligaria TM
      - Mycobacterium bovis subsp. bovis AF2122<sup>1</sup>
      - Mycobacterium avium paratuberculosis
      - Mycobacterium smegmatis MC2
      - Tropheryma whippelii str. T101
      - Tropheryma whippelii TW92/21
      - Streptomyces coelicolor A3(2)
      - Streptomyces avermitilis TM-1680
  - Bifidobacteriales**
    - Bifidobacterium longum NCC2705
- Aquificae**
  - Aquificales
    - Aquificaceae
      - Aquifex aeolicus VF5
- Bacteroidetes**
  - Bacteroidales
    - Bacteroides
      - Bacteroides thetaaomicronn VPK5482
      - Porphyromonas gingivalis W83
    - Bacteroides (class)
      - Prevotella intermedia 17
  - Chlamydiales**
    - Chlamydiales
      - Chlamydia trachomatis serovar D
      - Chlamydia muridarum strain Hgg
      - Chlamydia pneumoniae CWL024
      - Chlamydia pneumoniae AR39
      - Chlamydia pneumoniae J138
      - Chlamydia caviae GPC
      - Chlamydia pneumoniae MVIC
      - Parachlamydia sp. UWE25
  - Chlorobi**
    - Chlorobiales
      - Chlorobium limicola TLS
  - Cyanobacteria**

- Chroococcales**
  - Gloeobacter
    - Gloeobacter violaceus PCC7421
  - Synechococcus
    - Synechococcus sp. WH8102
    - Synechocystis
      - Synechocystis sp. PCC6803
    - Thermosynechococcus
      - Thermosynechococcus elongatus BP-1
  - Nostocales**
    - Nostocaceae
      - Nostoc sp. PCC 7120
  - Prochlorophytes**
    - Prochlorococcales
      - Prochlorococcus marinus CCMP1378 MED4
      - Prochlorococcus marinus MT9313
      - Prochlorococcus marinus CCMP1375
  - Deinococcus-Thermus**
    - Deinococci**
      - Deinococcales
        - Deinococcus radiodurans R1
      - Thermales
        - Thermus thermophilus HB27
    - Firmicutes**
      - Bacillales**
        - Bacillaceae
          - Bacillus subtilis 168
          - Bacillus halodurans C-125
          - Bacillus anthracis Ames
          - Bacillus cereus 10287
          - Bacillus anthracis strain AQ212
          - Oceanobacillus ihpensys HTE831
        - Listeriaceae
          - Listeria innocua CLIP 11262
          - Listeria monocytogenes EGD-e
        - Staphylococcaceae
          - Staphylococcus aureus COL
          - Staphylococcus aureus N315
          - Staphylococcus aureus Mu50
          - Staphylococcus aureus MVIC
          - Staphylococcus epidermidis ATCC 12228
          - Staphylococcus aureus Michigan VRGA
      - Clostridia**
        - Clostridiales
          - Clostridium acetobutylicum ATCC824
          - Clostridium perfringens 13
          - Clostridium tetani E88
          - Thermoanaerobacteriales

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- Thermoanaerobacter tengcongensis MB4(T)
- Lactobacillales**
  - Enterococcales
    - Enterococcus faecalis VS83
  - Lactobacillaceae
    - Lactobacillus plantarum WCFS1
    - Lactobacillus johnsonii NCC 533
  - Streptococcales**
    - Lactococcus lactis subsp. lactis IL 1403
    - Streptococcus pneumoniae TIGR4
    - Streptococcus pneumoniae FG
    - Streptococcus pyogenes MCA50232
    - Streptococcus pyogenes SF 370 serotype M1
    - Streptococcus agalactiae 26303VR
    - Streptococcus pyogenes MSA315
    - Streptococcus mutans UA 159
    - Streptococcus agalactiae NEM316
    - Streptococcus pyogenes SSI 1
    - Streptococcus mitis NCTC 12291
- Mollicutes**
  - Archaeplastales
    - Phytoplasma asteris Orion Yellow's strain
  - Mycoplasmatales
    - Mycoplasma genitalium G-37
    - Mycoplasma pneumoniae M129
    - Ureaplasma urealyticum parvum biovar serovar 3
    - Mycoplasma penetrans HF-2
    - Mycoplasma pallidum strain R
    - Mycoplasma mycoides SC PG1
- Fusobacteria**
  - Fusobacteriales
    - Fusobacterium nucleatum ATCC 25586
- Planctomycetes**
  - Planctomycetaceae
    - Planctomyces
      - Planctomyces sp. strain 1
- Protozoa**
  - Alphaproteobacteria**
    - Calobacteriales
      - Calobacter crescentus CB15
    - Rhizobiales
      - Bradyrhizobium japonicum USDA 110
      - Rhizoglyphus mucosus CGA009
      - Brucella suis 1330
      - Brucella melitensis 16M
      - Mesorhizobium loti MAFF303099
      - Sinorhizobium meliloti 1021
  - Betaproteobacteria**
    - Bordebacteriales
      - Bordetella bronchiseptica RB50
      - Bordetella pertussis Tolama 1
      - Bordetella parapertussis 12822
      - Burkholderia mallei ATCC 23344
    - Nesstiiales
      - Nesstia meningitidis serogroup A Z2491
      - Nesstia meningitidis serogroup ATCC 12472
    - Nitrospirales
      - Nitrosomonas europaea ATCC 19718
    - Riftvaliaceae
      - Riftalstonia solanacearum GM1000
  - Deltaaproteobacteria**
    - Bdellovibrionales
      - Bdellovibrio bacteriovorus HD100
  - Epsilonproteobacteria**
    - Campylobacteriales
      - Campylobacter jejuni NCTC 11168
      - Helicobacter hepaticus ATCC 51449
      - Helicobacter pylori 26695
      - Helicobacter pylori J99
      - Wollastonia sacrocygens DSMZ 1740
  - Gammaproteobacteria**
    - Alteromonadales
      - Shewanella oneidensis MR-1
    - Enterobacteriales
      - Bacteroides agdistica (Bacteroides pistaciaceae)
      - Bacteroides edwardsiae
      - Escherichia coli K12 MG1655
      - Escherichia coli O157:H7 EDL933
      - Escherichia coli CT 1073
      - Escherichia coli CT 1073
    - Phyllobacteriales
      - Salmonella typhimurium LT2 SCSC1412
      - Salmonella enterica serovar Typhi CT 18
      - Shigella flexneri 2a str. 301
      - Shigella flexneri 2a 2457T
      - Wigglesworthia glossinidia brevipalpis
      - Yersinia pestis CO/2
      - Yersinia pestis KM
  - delta subdivision**
    - Desulfobacteriales
      - Desulfobacterium vulgare Hildenborough
    - Desulfotomaculum group
      - Coccoloba sulfimidocans PCA
    - magnum class**
      - Magnitococcus sp. MC-1
  - Spirochaetes**
    - Leptospirales
      - Leptospira interrogans serovar ia str. 56601
      - Leptospira interrogans Copenhagen Fiscoe L1-13
    - Spirochaetaceae
      - Borrelia burgdorferi B31
      - Treponema pallidum Nichols
      - Treponema denticola ATCC 35405
  - Thermotogales**
    - Thermotogaceae
      - Thermotoga maritima MS8

## Flagellar genes of *Vibrio cholerae* (More than 50 genes)



## バクテリオファージの分子生物学

### 9. Electron micrograph of bacteriophage T4

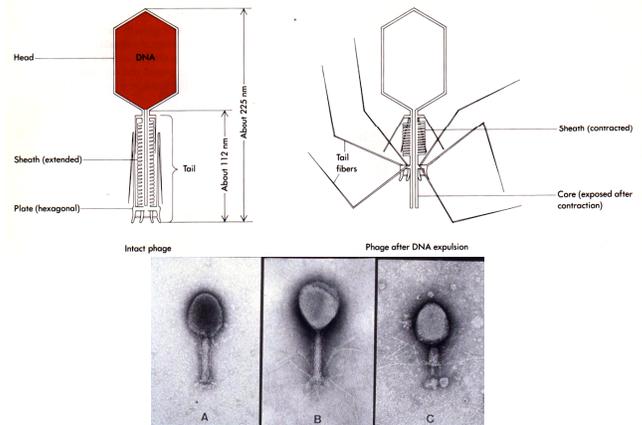
1915年：  
ツオート (F. W. Twort) がある種の細菌 (ミクロコッカス, *Micrococcus*) のコロニーを溶かして透明にする感染性の物質があることを発見。

1917年：  
デレル (F. d' Herelle) が、赤痢患者の便から、赤痢菌を特異的に殺し、しかも、赤痢菌のある時に限って自己増殖を行う目に見えない微生物を報告。

この微生物がバクテリアをむさぼり食うという意味からバクテリオファージと命名した。

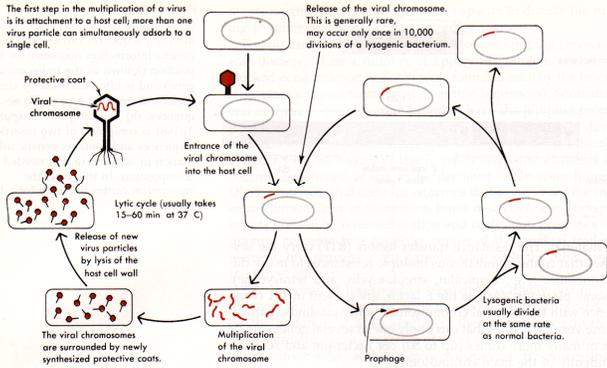


### 9. Diagrammatic representation of bacteriophage T4



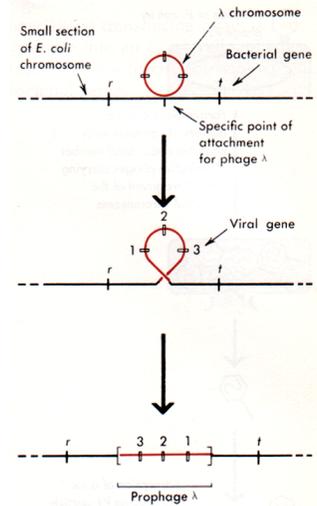


### 29. The life cycle of a lysogenic bacterial virus

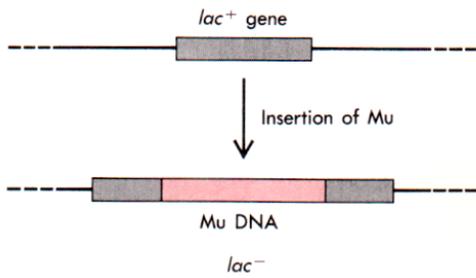


溶原化ファージ⇒入ファージ⇒プロファージ

### 30. Insertion of the chromosome of phage λ into E. coli chromosome

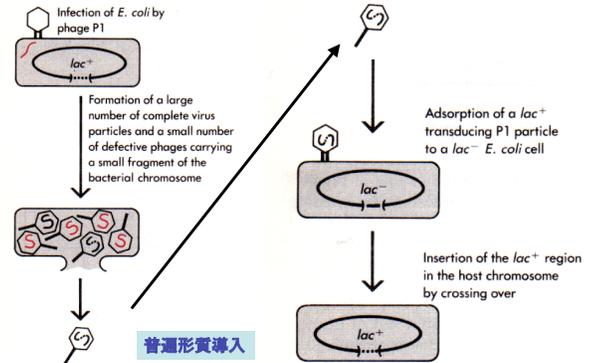


### 31. Insertion of Mu DNA



Muは入ファージと異なり、挿入が起こる場所はランダムである

### 32. Transduction, the passive transfer of genetic material from one bacterium to another by means of carrier phage particles



### 33. Specialized transducing phage

