

# Archaeobacteria or Archaea

The scientific community was understandably shocked by the discovery of an entirely new group of organisms 'the Archaeobacteria or Archaea' in the late 1970s, when Dr. Carl Woese and his colleagues at the University of Illinois studied the relationships among the prokaryotes, using DNA sequences (nucleotide sequence in DNA) and found that there was a new group of organisms namely, Archaeobacteria. The Archaeobacteria (Archaea) were declared as single-celled microorganisms having no cell nucleus or any other membrane-bound organelles within their cells. They lived at high temperatures, produced methane, and clustered together as a group well away from the usual bacteria and the eukaryotes. Because of the vast difference in genetic makeup, as revealed by the molecular data, Carl Woese proposed that life be divided into three **domains**: *Eukaryota*, *Eubacteria* and *Archaeobacteria*. Eubacteria are composed of true bacteria or prokaryotic unicellular microorganisms. Archaeobacteria are not pathogenic in nature, but some of them belong to Eubacteria. Following are the common characteristics of Archaeobacteria known to date:

- (1) They have characteristic tRNAs and ribosomal RNAs
- (2) They do not have peptidoglycan cell walls; rather, they have largely proteinaceous coat
- (3) They have ether-linked lipids built from phytanyl chains.

These organisms contain a number of 'eukaryotic features' in addition to their many bacterial attributes. This is interpreted as a strong indication that the Archaeobacteria, which are not actually eukaryotic, but indeed represent a third separate line of descent, as originally proposed by Carl Woese. Archae (Archaeobacteria) reproduce asexually by the process of binary fission, budding and fragmentation. Eubacteria (the true bacteria) also reproduce asexually through binary fission, budding, fragmentation, but eubacteria have the unique ability to form spores to remain dormant over years, a trait that is not exhibited by Archae. There are about 100 species of Archaeobacteria which can be divided into three types.

- (1) **Methanogens** → Produce methane from  $\text{CO}_2$  and  $\text{H}_2$ .
- (2) **Thermoacidophiles** → Grow in hot acidic environment; use  $\text{H}_2\text{S}$  as energy source
- (3) **Halophiles** → Require a lot of salts to grow.

