

**TABLE 6.3.** Descriptions of the three major divisions of archaea and some of the phyla with cultured isolates

Division/Phylum	Biology, Physiology, and Evolution	Species and Genera
Euryarchaeota/Halobacteria	These species differ in many ways from halophilic bacteria and eukaryotes: They are the only extreme halophiles (able to grow and thrive in salt solutions >4 M), they cannot grow at low-salt concentrations, and their mechanisms of salt tolerance are very different from those of bacteria and eukaryotes. They also use the energy of light to operate proton pumps that are used for a specialized form of phototrophy. The extreme halophiles were the first archaea for which genetic tools became available.	<i>Haloferax volcanii</i> and <i>Halobacterium cutirubrum</i> are among the models for this group.
Euryarchaeota/Methanogens Methanococcales Archaeoglobi Thermococci Methanomicrobia Thermoplasmata	Most species of Euryarchaea are methanogens (species that produce methane as a by-product of metabolism) or thermophiles or both. The methanogens produce methane either by reduction of CO <sub>2</sub> or from methylated substrates such as methanol (CH <sub>3</sub> OH). All of these lineages are dominated by thermophilic species and all except the <i>Thermoplasmatales</i> contain methanogens. Many species within these lineages are not extreme thermophiles. These lineages do not correspond to a single monophyletic group. Instead, there are multiple methanogen and thermophile lineages that branch off separately from the base of the euryarchaeal tree.	<i>Methanococcus jannaschii</i> , the first archaeon to have its genome sequenced, was isolated from a hydrothermal vent in the deep sea.
Crenarchaeota/Thermoproteales	This group generally consists of hyperthermophiles (organisms that grow optimally at temperatures >85°C) and thermoacidophiles (thermophiles that thrive in low-pH environments).	<i>Sulfolobus sulfotaricus</i> was isolated from a hot acidic spring in Yellowstone National Park.
Korarchaeota	The Korarchaea are a very poorly understood group, represented only by rRNA sequences from uncultured species. They are a group defined solely on the basis of DNA samples that have been isolated from environmental samples.	