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Editorial

An Overview of *Archaea*

Monik Wlockh*

Department of Microbiology, Jagiellonian University Medical College, Kraków, Poland

EDITORIAL NOTE

Archaea are single-celled organisms that are members of the *Archaea* domain. Microorganisms without cell nuclei are known as prokaryotes. *Archaea* were once categorised as bacteria and given the name archaebacteria, but this nomenclature has now become obsolete. Archaeal cells are distinguished from Bacteria and *Eukaryota* by a number of traits. *Archaea* is further classified into various phyla. Because most have not been isolated in a laboratory and have only been found in ambient samples by their gene sequences, classification is difficult.

Despite their anatomical resemblance to bacteria, *archaea* have genes and metabolic pathways more closely comparable to those of eukaryotes, particularly for transcription and translation enzymes. Other features of archaeal biochemistry are unique, such as their reliance on ether lipids, including archaeols, in their cell membranes. *Archaea* employ a wider range of energy sources than eukaryotes, including organic substances like sugars, ammonia, metal ions, and even hydrogen gas.

The salt-tolerant Haloarchaea uses sunlight as an energy source, while other *archaea* species fix carbon, but no known *archaea* species performs both, unlike plants and *cyanobacteria* with the help of improved molecular detection technologies, archaea has been discovered in practically every habitat, including soil,oceans, and marshlands. Plankton *archaea* may be one of the most abundant types of creatures on the earth. *Archaea* are ubiquitous in the seas. *Archaea* are an important aspect of life on Earth. They are found in every organism's microbiome. They play a crucial role in the human microbiome in the stomach, mouth, and skin. Because of their morphological, metabolic, and geographic diversity, they can perform a variety of ecological roles.

The categorization of *archaea,* and prokaryotes in general, is a fast-paced and disputed field. *Archaea* are currently classified into groupings of creatures with structural similarities and shared ancestors, according to current categorization schemes. These classifications rely mainly on ribosomal RNA gene sequences to reveal relationships between organisms (molecular phylogenetics). The *Euryarchaeota* and *Crenarchaeota* phylas contain the majority of the culturable and well-studied *archaea* species.

Surface-layer proteins produce an S-layer on the surface of most *archaea's* walls. A stiff array of protein molecules that covers the outside of the cell is known as an S-layer (like chain mail). This layer protects the cell membrane both chemically and physically, and it can prevent macromolecules from accessing it. In contrary to bacteria, *archaea* lack peptidoglycan in their cell walls. Methanobacterial cell walls include pseudopeptidoglycan, which mimics eubacterial peptidoglycan in form, function, and physical structure, but is chemically unique; it lacks D-amino acids and N-acetylmuramic acid, substituting N-Acetyltalosaminuronic acid for the latter.

Archaella are archaeal flagella that work similarly to bacterial flagella in that their lengthy stalks are powered by rotatory motors at the base. A proton gradient across the membrane powers these motors; however archaella varies significantly in composition and growth. Different predecessors gave rise to the two forms of flagella. The bacterial flagellum and the type III secretion system have a common ancestry, whereas archaeal flagella appear to have developed from bacterial type IV pili. Unlike bacterial flagella, which are hollow and constructed by subunits travelling up the central pore to the tip of the flagella, archaeal flagella are made by adding subunits at the base.

Correspondence to: Monik Wlockh, Department of Microbiology, Jagiellonian University Medical College, Kraków, Poland, E-mail: mwlkh1a@yahoo.com

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