

***Chloracidobacterium*, anoxygenic phototrophic bacteria
belongs to phylum *Acidobacteriota*.**

Mohit Kumar Saini, PhD.

Laboratory of Anoxygenic Phototrophs, Institute of Microbiology, CAS, Centre Algatech

Chloracidobacterium is the first and until now the sole genus in the phylum *Acidobacteriota* (formerly *Acidobacteria*) whose members perform chlorophyll-dependent phototrophy (i.e., chlorophototrophy). An axenic isolate of *Chloracidobacterium thermophilum* (strain B^T) was obtained by using the inferred genome sequence from an enrichment culture and diel metatranscriptomic profiling analyses in situ to direct adjustments to the growth medium and incubation conditions, and thereby a defined growth medium for *Chloracidobacterium thermophilum* was developed. These advances allowed eight additional strains of *Chloracidobacterium* spp. to be isolated from microbial mat samples collected from Mushroom Spring, Yellowstone National Park, United States, at temperatures of 41, 52, and 60 °C; an axenic strain was also isolated from Rupite hot spring in Bulgaria. All isolates are obligately photoheterotrophic, microaerophilic, non-motile, thermophilic, rod-shaped bacteria. *Chloracidobacterium* spp. synthesize multiple types of (bacterio-)chlorophylls and have type-1 reaction centers like those of green sulfur bacteria. Light harvesting is accomplished by the bacteriochlorophyll a-binding, Fenna-Matthews-Olson protein and chlorosomes containing bacteriochlorophyll c. Their genomes are approximately 3.7 Mbp in size and comprise two circular chromosomes with sizes of approximately 2.7 Mbp and 1.0 Mbp. Comparative genomic studies and phenotypic properties indicate that the nine isolates represent three species within the genus *Chloracidobacterium*. In addition to *C. thermophilum*, the microbial mats at Mushroom Spring contain a second species, tentatively named *Chloracidobacterium aggregatum*, which rows as aggregates in liquid cultures. The Bulgarian isolate, tentatively named *Chloracidobacterium validum*, will be proposed as the type species of the genus, *Chloracidobacterium*.