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沖縄の人工物上で生育する異質細胞性シアノバクテリアの多様性と系統分類に関する研究

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Studies on the diversity and phylogenetic classification of heterocystous cyanobacteria growing on Okinawan man-made structures

沖縄の人工物上で生育する異質細胞性シアノバクテリアの多様性と系統分類に関する研究

ABSTRACT

Man-made structures such as buildings and guardrails in Okinawa are often stained black or brown, and the main cause is known to be the growth of aerobic cyanobacteria. Previous studies have isolated and cultured aerobic cyanobacteria from the walls of the school buildings on the campus of the University of the Ryukyus, and have found that they are composed of extremely diverse taxa via morphological observations and molecular phylogenetic analyses based on 16S rRNA gene sequences. The current study focuses on these diverse aerobic cyanobacteria, and especially Nostocales cyanobacteria, which are known to have nitrogen-fixing ability via heterocytes, and their diversity and phylogenetic classification have already been established. In addition to already isolated strains, new isolates were found during the course of this study. This thesis is divided into five chapters. Chapter I summarizes the current classification of cyanobacteria and outlines the latest polyphasic taxonomy research methods. The current classification of cyanobacteria is based on 16S rRNA sequences based on Komárek et al. (2014) combined with accurate morphological classification. Chapter II shows the classification of filamentous cyanobacteria involved in black band disease, which is one of the coral diseases in Okinawa, as an example of research using the polyphasic taxonomy method. As a result, we succeeded in analyzing the 16S rRNA gene sequences of cyanobacteria collected from the Okinawajima and Miyakojima islands by the single filament PCR method, and there were almost no differences among samples, which were identified as *Roseofilum reptotaenium*. Culture strains were also successfully established. In Chapter III, in addition to the culture strains established in previous research from the campus of the University of the Ryukyus, we newly established isolated strains from artificial objects such as guardrails and building walls in Okinawa, containing diversified heterocystous aerobic cyanobacteria. The strains were analyzed by molecular phylogenetic analyses based on 16S rRNA sequences and light microscopic observations. This study found 12 groups that were difficult to morphologically distinguish, and was highly possible that undescribed taxa were included among these groups. Chapter IV examined the genus *Brasilonema* among the various heterocystous cyanobacteria clarified in the previous chapter, and showed phylogenetic classification by morphological observations and 16S rRNA and 16S-23S ITS analyses. Finally, Chapter V gives a summary of this study and discusses future prospects.

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