

Dear Reviewer,

Thank you very much for your detailed review of our manuscript and for the valuable comments you have provided. Your feedback is crucial for improving the quality of our paper. Below are our specific responses and planned revisions to each of your comments:

#### Content of the Paper

You mentioned that this paper describes the photosynthetic biofilms on the cultural heritage site of the Temple of Heaven in Beijing and points out the potential bio-weathering effects of these biofilms, i.e., the degradation and dissolution of marble and other rock structures. We fully agree with this assessment and appreciate your recognition.

#### Critical Comments

##### Terminology

You suggested avoiding the term “algae” and pointed out that cyanobacteria are prokaryotes, not eukaryotic algae. We fully agree with your view and have revised all mentions of “algae” in the manuscript to “cyanobacteria.”

##### Introduction

You recommended that the introduction should be more concise, especially regarding the historical aspects of the Temple of Heaven. Since the focus of our paper is on the bio-weathering caused by photosynthetic biofilms, we will streamline the historical section to make it more compact and targeted.

##### Citation of European Research

You acknowledged the work of Chinese researchers and also suggested citing more European studies, particularly those that began researching bio-weathering in the 1990s. We understand your suggestion and plan to include more references to European research.

##### Update of Chart Data

You pointed out that the dataset in Figure 2 is up to 2011 and recommended including more recent data. We fully agree and plan to collect updated data, especially considering the significant meteorological changes due to global warming over the past decade. These data will make the paper more timely and scientific.

##### Methodology and Species Identification

You expressed doubts about the accuracy of species identification in the research methods and noted that many of the cited references are outdated, and identification based solely on morphology is difficult for cyanobacteria. You suggested using molecular genetic data (such as 16S rDNA or other specific markers) to determine species identity. This is part of the research I plan to conduct in the future and intend to publish in subsequent articles. For this paper, I will follow your advice and mention only the genus level without specifying the species. Additionally, I will consult relevant databases (such as the Algae Database) before submission to ensure the accuracy of taxonomic classification (“species names”).

##### Unification of Biological Community Terminology

You suggested changing “population distribution” to “community distribution” because a population represents the genotype of the same species. We understand your point and will revise all mentions of “population distribution” in the manuscript to “community distribution.”

#### Separation of Results and Discussion

You recommended avoiding discussion of data in the results section. We will strictly separate the results and discussion sections, ensuring that the results section contains only observations and data presentation, while the discussion section analyzes the significance of these data and interprets the results.

#### Chart Processing

You noted that Figure 5a/b contains Chinese characters and suggested removing them. We will follow this suggestion to make the charts more concise and understandable for international readers.

#### Image Quality

You mentioned that the quality of Figure 7 e/f and Figure 9f is poor, making it difficult to identify taxonomic units. We will reassess these images and, if possible, retake or obtain higher-quality images to ensure clear identification of taxonomic units.

#### Supplement of Table Data

You pointed out that Tables 1 and 2 lack actual environmental data. We recognize the importance of environmental data and the missing details, such as the inability to inform readers about specific temperature information due to the lack of light intensity data. We will supplement actual environmental data, such as specific temperatures in sunlit and shaded areas.

#### Discussion Section

You noted that the discussion section lacks more European studies and recommended referencing Patrick Jung's paper on the bio-weathering mechanisms of cyanobacteria and cyanolichens on rocks in the Atacama Desert. We will review and cite these European studies to make the discussion more comprehensive and in-depth.

#### Overall Revision Suggestions

You recommended streamlining the entire paper, mentioning more historical aspects in the introduction, and reducing the number of charts. We will follow these guidelines to make the paper more concise, clear, and targeted.

Once again, thank you for your professional comments and suggestions.

Best regards,

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