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Phenotypic and Genotypic Identification of *Curvularia lunata*

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The identification of *Curvularia* species entails a combination of rigorous scientific methodology and sustained experimental perseverance. The primary technical challenge encountered during this study is the extremely low sporulation efficiency of the strain, which necessitates the use of low-nutrient culture media (e.g., tap water agar) to mimic oligotrophic natural habitats and effectively induce spore production.

Daily direct observation of the culture plate was performed under a low-power objective lens using the agar block smear method [1]. Continuous incubation and careful monitoring were conducted for a maximum duration of 30 days, until distinct sporulating structures gradually formed on the fungal colonies. Microscopic examination revealed that the reproductive structures exhibited characteristic morphological features consistent with the taxonomic traits of *Curvularia* species. Morphological characterization based on phenotypic traits tentatively identified the fungal strain as *Curvularia lunata* [2]. As shown in Panels A and B of Figure 1, short, erect, and unbranched conidiophores [Panel A, solid arrow] produce dark brown, obovoidal macroconidia in sympodial order. Curved due to swollen subterminal cells [Panel B, empty arrow], they possess smooth surfaces and typically have three true septa.

Subsequent molecular identification was implemented to validate the phenotypic classification results. Fungal genomic DNA was successfully extracted via bead-beating-assisted lysis, and the species identity was definitively confirmed through molecular identification [3,4]. This integrated approach combining morphological phenotyping and molecular identification ensures the accuracy and reliability of the fungal species identification. The entire identification workflow embodies both standardized technical procedures and in-depth exploration of fungal morphological characteristics under microscopic conditions.

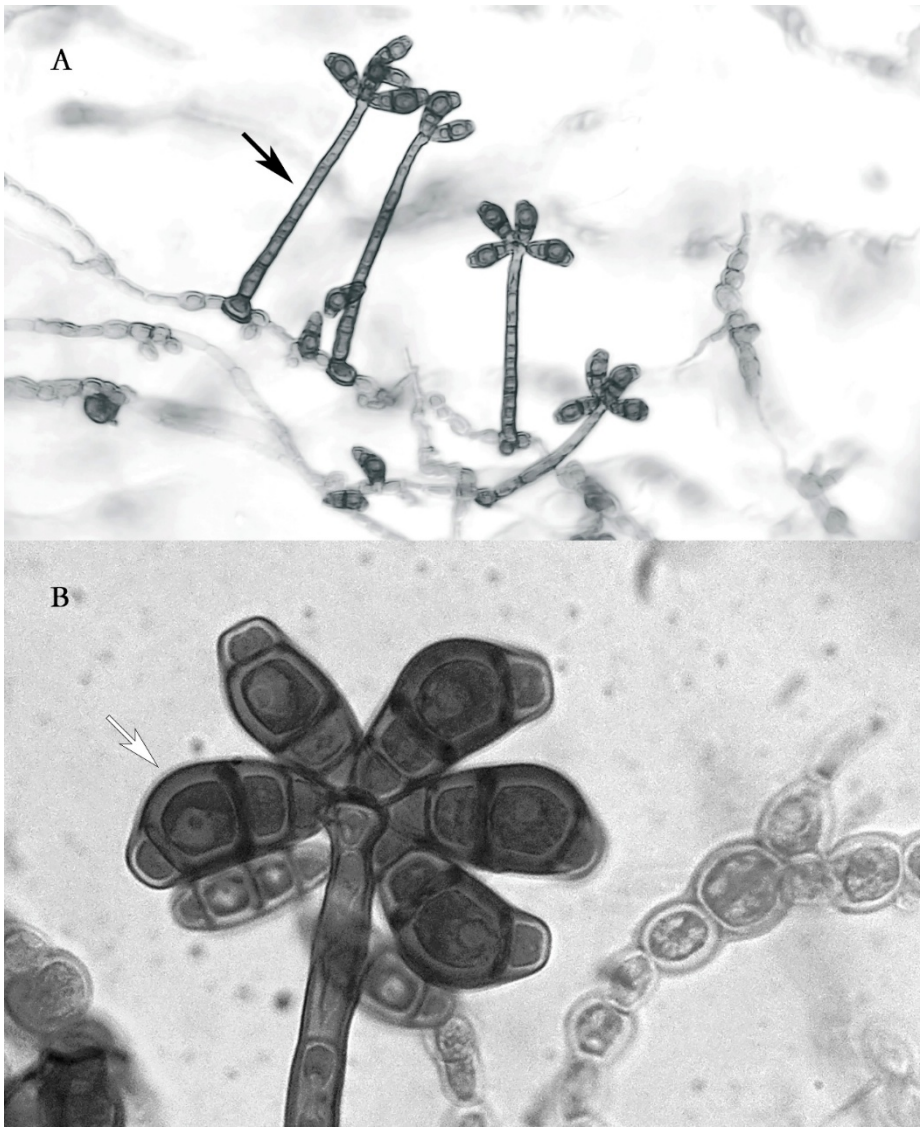

Figure 1. Morphological characteristics of *Curvularia lunata.* (**A**) Short, erect, and unbranched conidiophores (solid arrow) produce dark brown, obovoid macroconidia in sympodial order. (**B**) Curved due to swollen subterminal cells (empty arrow), the macroconidia possess smooth surfaces and typically have three true septa.

Author Contributions

H.L.: conceptualization, methodology, investigation, data curation, and writing—original draft preparation. A.H.Y.N.: conceptualization, validation, visualization, supervision, and writing—review and editing. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

Not applicable. This study involved only the phenotypic and genotypic identification of a fungal isolate and did not involve human participants, animals, or identifiable personal data.

Informed Consent Statement

Not applicable. This study did not involve human participants or identifiable patient information.

Data Availability Statement

The data supporting the findings of this study are contained within the article. Additional raw data are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

Use of AI and AI-Assisted Technologies

No AI tools were utilized in the preparation of this manuscript.

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