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Editor-in-Chief
JOURNAL

Dear Editor,

We are pleased to submit our manuscript, **"MANUSCRIPT TITLE"**, for consideration at ***JOURNAL***.

Among all algal-derived taste-and-odor compounds, 2-methylisoborneol (MIB) stands out as the most notorious and widespread offender. Since its initial identification, nearly 300 documented MIB-related odor outbreaks have been reported globally. With an exceptionally low odor threshold (10 ng L^{-1}), MIB imparts a distinct earthy-musty smell that is immediately detectable in drinking water—transforming it from a mere water quality parameter into a critical public concern capable of triggering widespread complaints during outbreaks.

The partitioning of MIB between intracellular and extracellular compartments critically determines treatment strategy selection. When MIB is primarily intracellular, conventional treatment processes such as coagulation-sedimentation can achieve cost-effective removal. However, when MIB becomes predominantly extracellular, utilities must implement advanced treatment options like ozone-activated carbon - a significantly more expensive approach that remains unavailable at many facilities. This fundamental distinction creates a critical decision point for water treatment optimization, where accurate prediction of MIB partitioning directly impacts both operational efficiency and treatment costs.

Yet, current research and monitoring practices overlook a key limitation: most studies and water treatment plants measure only total MIB concentrations, assuming a fixed intracellular/extracellular ratio. This oversimplification leads to suboptimal process selection, unstable removal efficiency, and, in some cases, exacerbates MIB release through inappropriate treatment.

Our study systematically investigates the dynamic partitioning of MIB between intracellular and extracellular compartments through controlled experiments with two major MIB-producing cyanobacteria (*Pseudanabaena* and *Planktothricoides*). We demonstrate that the extracellular fraction exhibits distinct growth phase-dependent patterns, where crowding effects during rapid growth phases trigger substantial MIB release. Building on these observations, we developed a **mechanistic model** based on logistic growth dynamics that quantitatively predicts MIB release patterns across the complete cyanobacterial life cycle.

Our model's application to Lake Taihu's MIB outbreaks uncovered novel spatiotemporal patterns in cyanobacterial populations responsible for odorant production. More significantly, we established a predictive risk assessment framework that pinpoints key environmental drivers controlling both MIB occurrence and its release dynamics. This framework enables proactive identification of high-risk conditions preceding major release events.

Key Findings of this study include:

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1. Crowding effects during cellular growth govern MIB partitioning.
2. The model successfully forecasts large-scale MIB release events.
3. It provides actionable guidance for optimizing water treatment processes.

To our knowledge, this is the first mechanistic framework explaining growth-dependent MIB release dynamics. Importantly, our approach shows promise for modeling other algal metabolites (e.g., geosmin, cyanotoxins), offering broader implications for water quality management.

We believe this study will interest researchers working on algal metabolites, water treatment engineers, and resource managers addressing cyanobacterial blooms. The combination of fundamental insights and practical applications aligns well with ***JOURNAL***'s mission to bridge scientific discovery and environmental technology.

To ensure a thorough and expert evaluation of our manuscript, we suggest the following potential reviewers with specialized expertise in algal metabolites, water treatment technologies, and cyanobacterial ecology. Additional information about each candidate reviewer is available via the *Web link* provided.

Potential Reviewers:

1. **Tsair-Fuh Lin**: National Cheng Kung University. Email: tflin@mail.ncku.edu.tw; *Web Link*
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Thank you for considering our work. We would be pleased to address any questions or suggestions during the review process.

Yours Sincerely,

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