

# Amanita sect. Phalloideae: Two Interesting Non-Lethal Species from West Africa

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## Research Article

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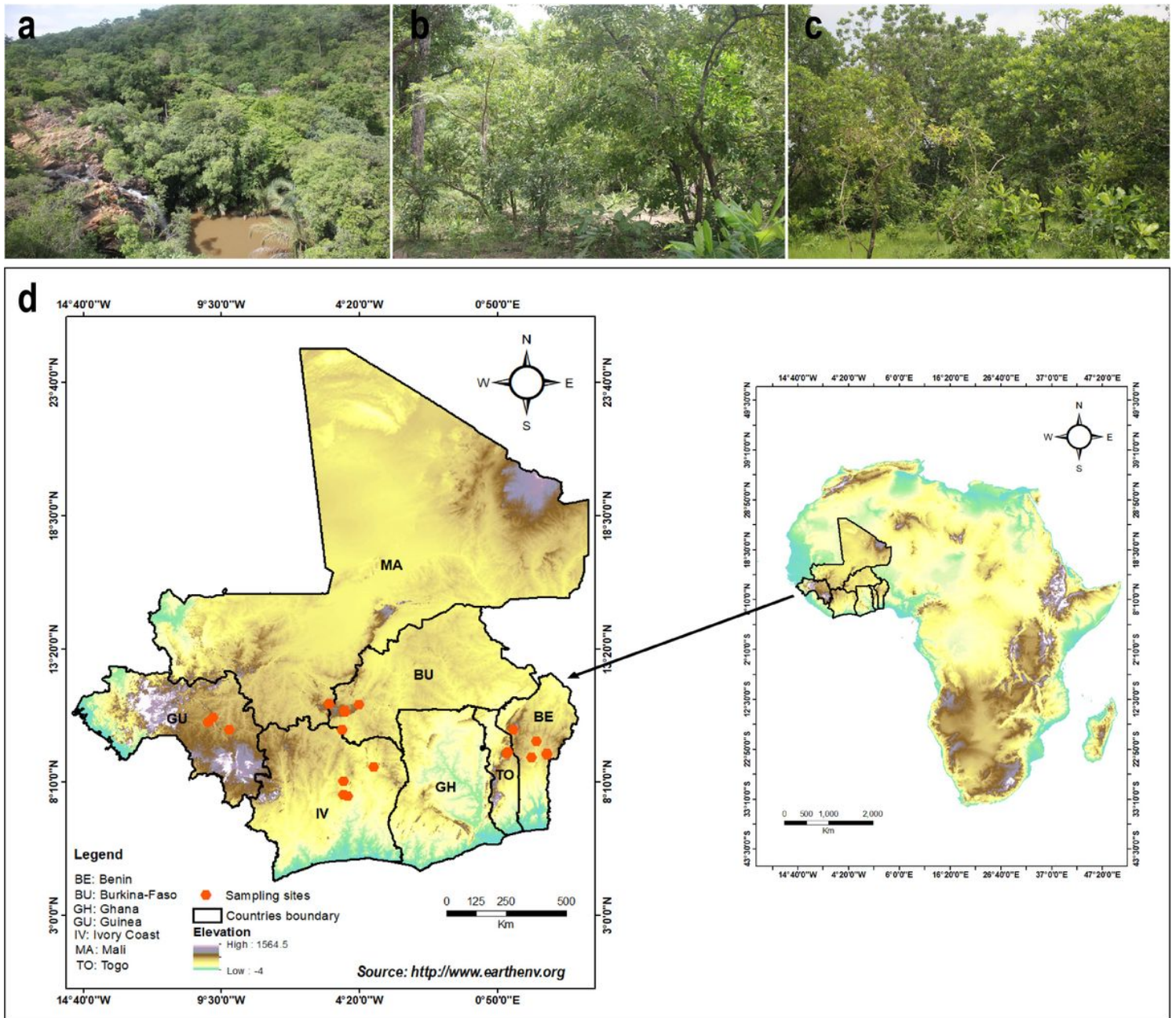
## Abstract

The members of *Amanita* sect. *Phalloideae* (Fr.) Quél. are responsible of a lot of fatalities worldwide. However, a limited number of species in this section were described as non-lethal because of the lack of deadly toxins. Sequences of species belonging to the section from tropical Africa, America, Asia, Australia, and Europe were involved in this study. Sequences of five genes (ITS, nrLSU, RPB2 , TEF1- $\alpha$  ,  $\beta$ -tubulin ) were used to elucidate the phylogenetic affinities among the species. The results indicated that the section has three subclades, one lethal subclade (subclade I) and two non-lethal subclades (subclade II and subclade III). Moreover, two non-lethal species from tropical Africa, namely *A. ballerinoidea* and *A. bulbulosa* were newly described based on both morphology and molecular approaches. Phylogenetically, they cluster in the same subclade (subclade III) with other known non-lethal amanitas, including *A. ballerina*, *A. chuformis*, *A. franzii*, *A. levistriata*, and *A. pseudogemmata* . Neither amatoxins nor phallotoxins were detected in *A. ballerinoidea* and *A. bulbulosa* by LC-HRMS, which agree with their placements in the non-lethal subclade III within *A. sect. Phalloideae* . Finally, a key to the West African species of *Amanita* sect. *Phalloideae* is provided.

## Full Text

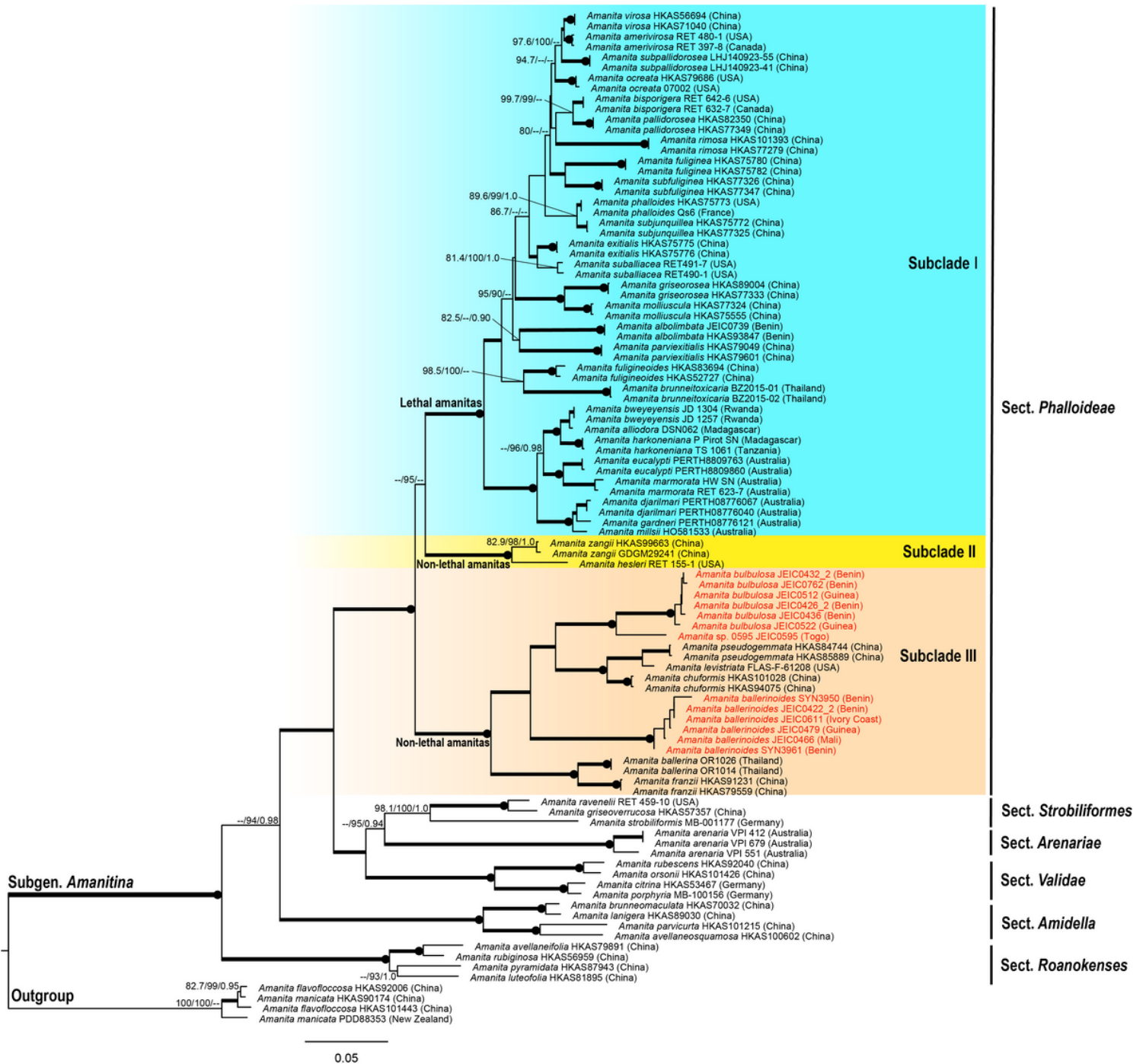
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## Figures



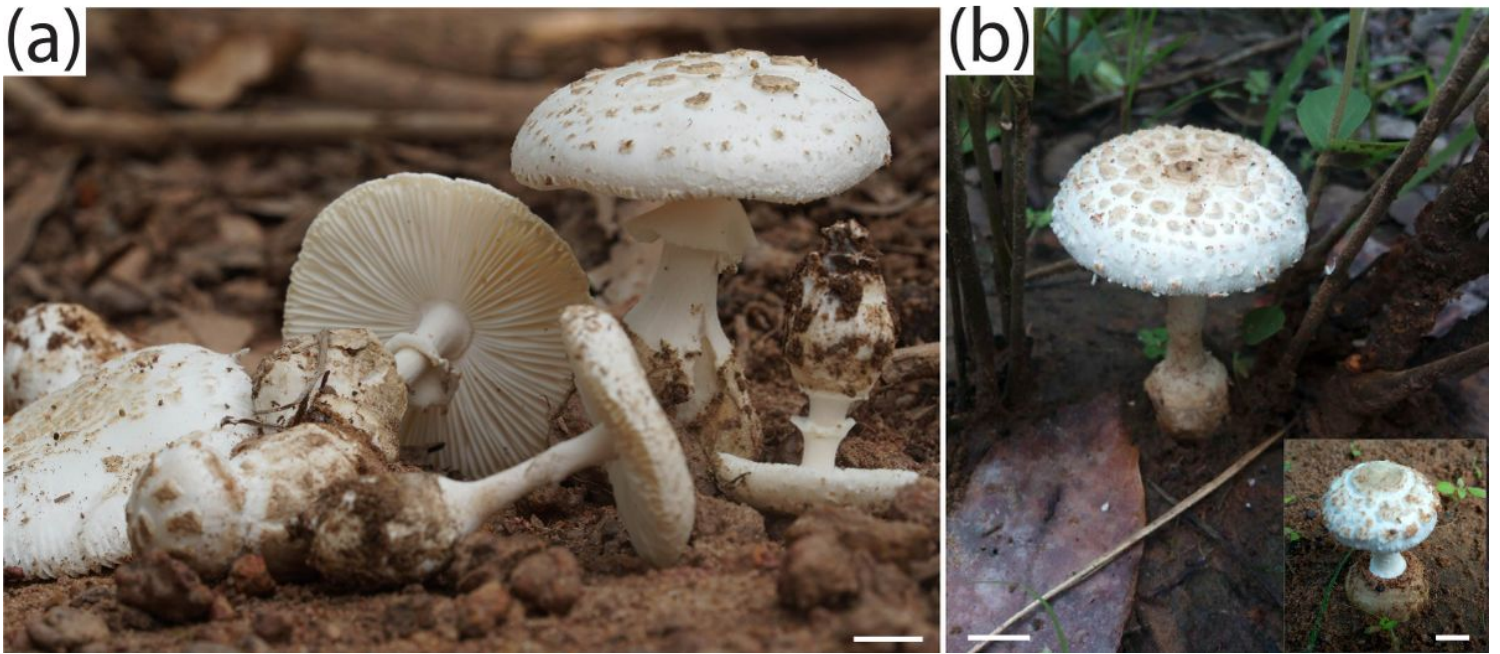
**Figure 1**

Distribution of *A. ballerinoides* J.E.I. Codjia, N.S. Yorou & Zhu L. Yang, and *A. bulbulosa* J.E.I. Codjia, N.S. Yorou & Zhu L. Yang: a. Gallery forest dominated by *Uapaca guineensis* and *Berlinia grandiflora*. b. Woodland dominated by *Isoberlinia doka*. c. Woodland composed of *Uapaca togoensis*. d. Location of the sampling sites.



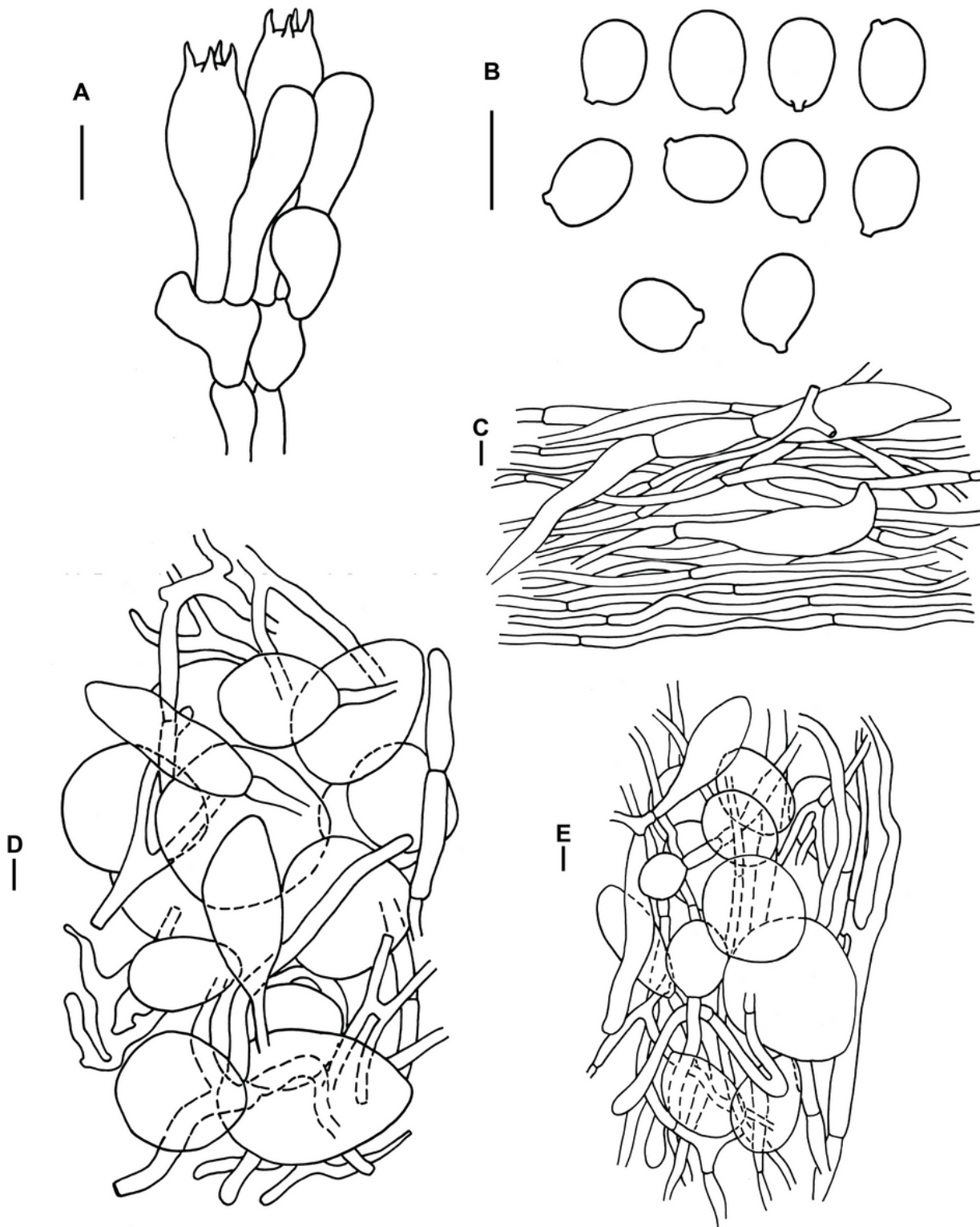
**Figure 2**

Phylogenetic tree of *Amanita* sect. *Phalloideae* inferred from the combined dataset (ITS, nrLSU, RPB2, TEF1-  $\alpha$  and  $\beta$ -tubulin) by using IQ-TREE and MrBayes. SH-aLRT values over 80 %, ML Ultrafast bootstrap values over 90%, and Bayesian posterior probabilities over 0.90 are reported on branches. Thickened branches indicate SH-aLRT, and ML Ultrafast bootstrap between 90%–100%, and Bayesian posterior probabilities between 0.90–1.0. Thickened branches with dots on the root nodes represent 100% SH-aLRT/ML Ultrafast bootstrap, and 1.0 Bayesian posterior probabilities values. Specimens for which sequences were generated in this study are highlighted in red.



**Figure 3**

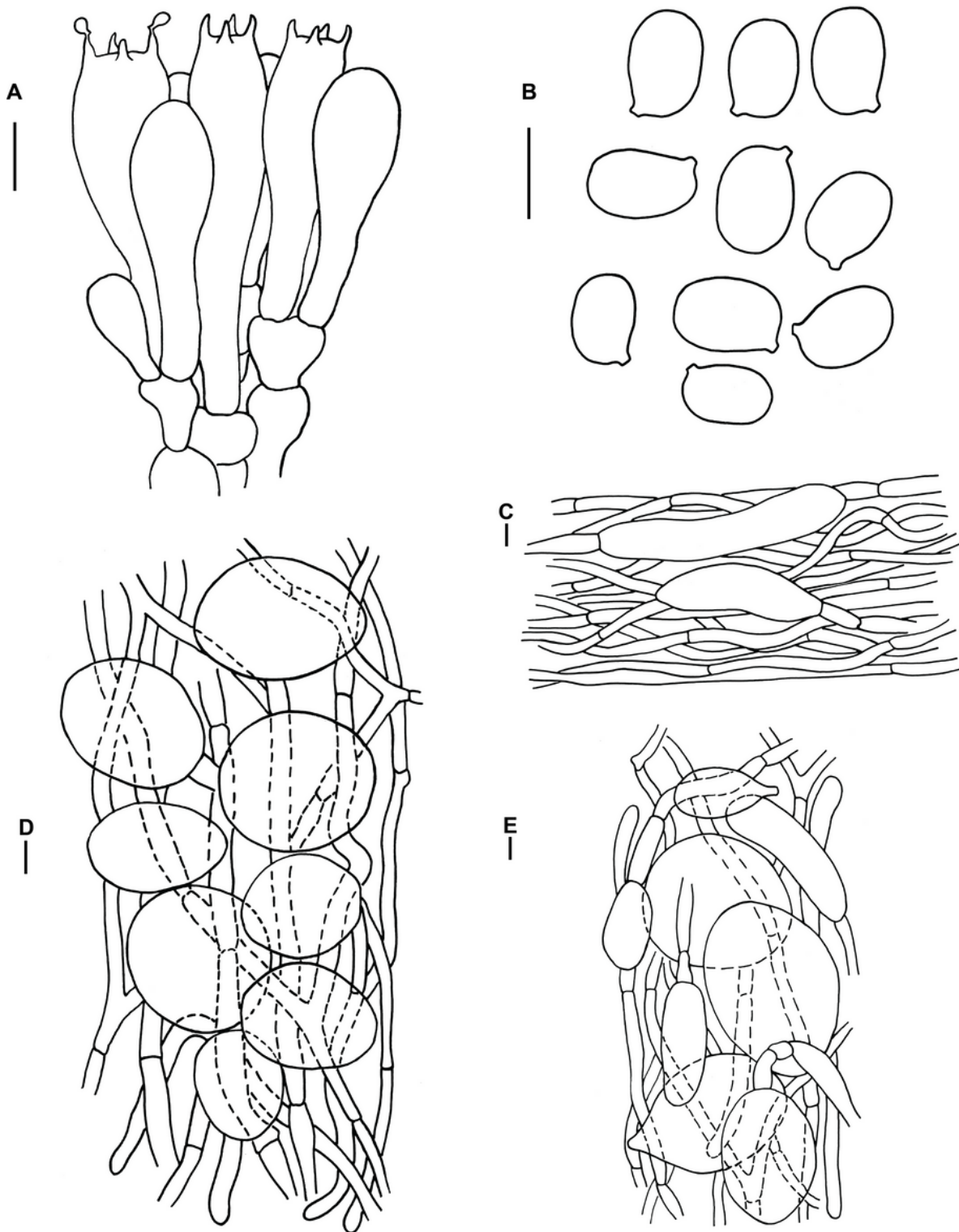
Basidiomata of the studied *Amanita* species. a *A. ballerinoidea* (holotype JEIC0611); b *A. bulbulosa* (holotype JEIC0762). Scale bars: 1 cm



**Figure 4**

Phylogenetic tree of *Amanita* sect. *Phalloideae* inferred from the combined dataset (ITS, nrLSU, RPB2, TEF1-  $\alpha$  and  $\beta$ -tubulin) by using IQ-TREE and MrBayes. SH-aLRT values over 80 %, ML Ultrafast bootstrap values over 90%, and Bayesian posterior probabilities over 0.90 are reported on branches. Thickened branches indicate SH-aLRT, and ML Ultrafast bootstrap between 90%–100%, and Bayesian posterior probabilities between 0.90–1.0. Thickened branches with dots on the root nodes represent 100% SH-

aLRT/ML Ultrafast bootstrap, and 1.0 Bayesian posterior probabilities values. Specimens for which sequences were generated in this study are highlighted in red.



**Figure 5**

Microscopic features of *A. bulbulosa* (holotype JEIC0762). A. Hymenium and subhymenium. B. Basidiospores. C. Pileipellis. D. Crushed tissue of volval remnants on pileus. E. Longitudinal section of outer layer of volval limb on stipe base. Scale bars: A, D = 10  $\mu$ m

## Supplementary Files

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