



# New records of ectomycorrhizal basidiomycetes associated with *Alnus glutinosa* (priority habitat 91E0) from Andros island, Greece



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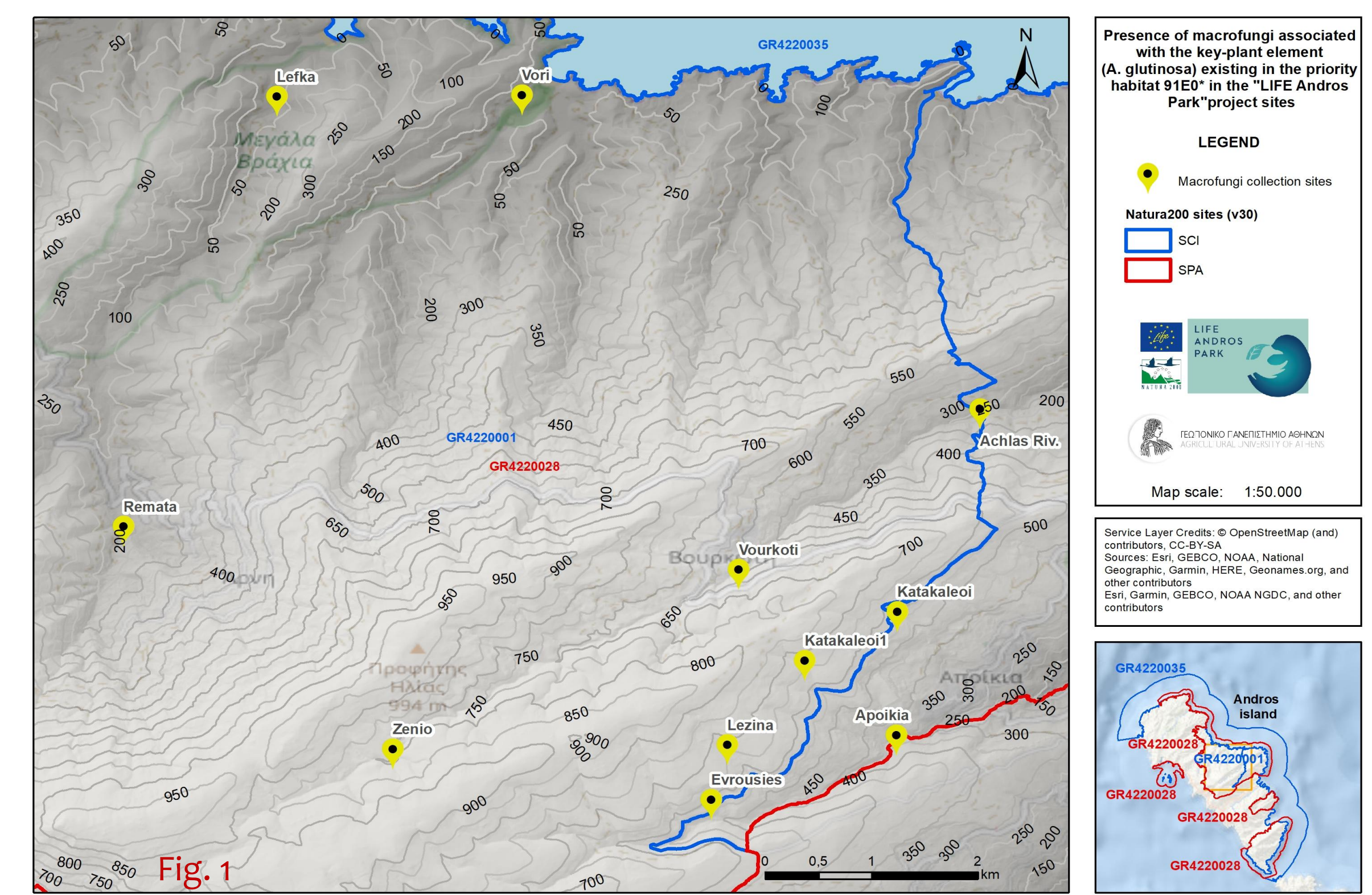
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## Introduction

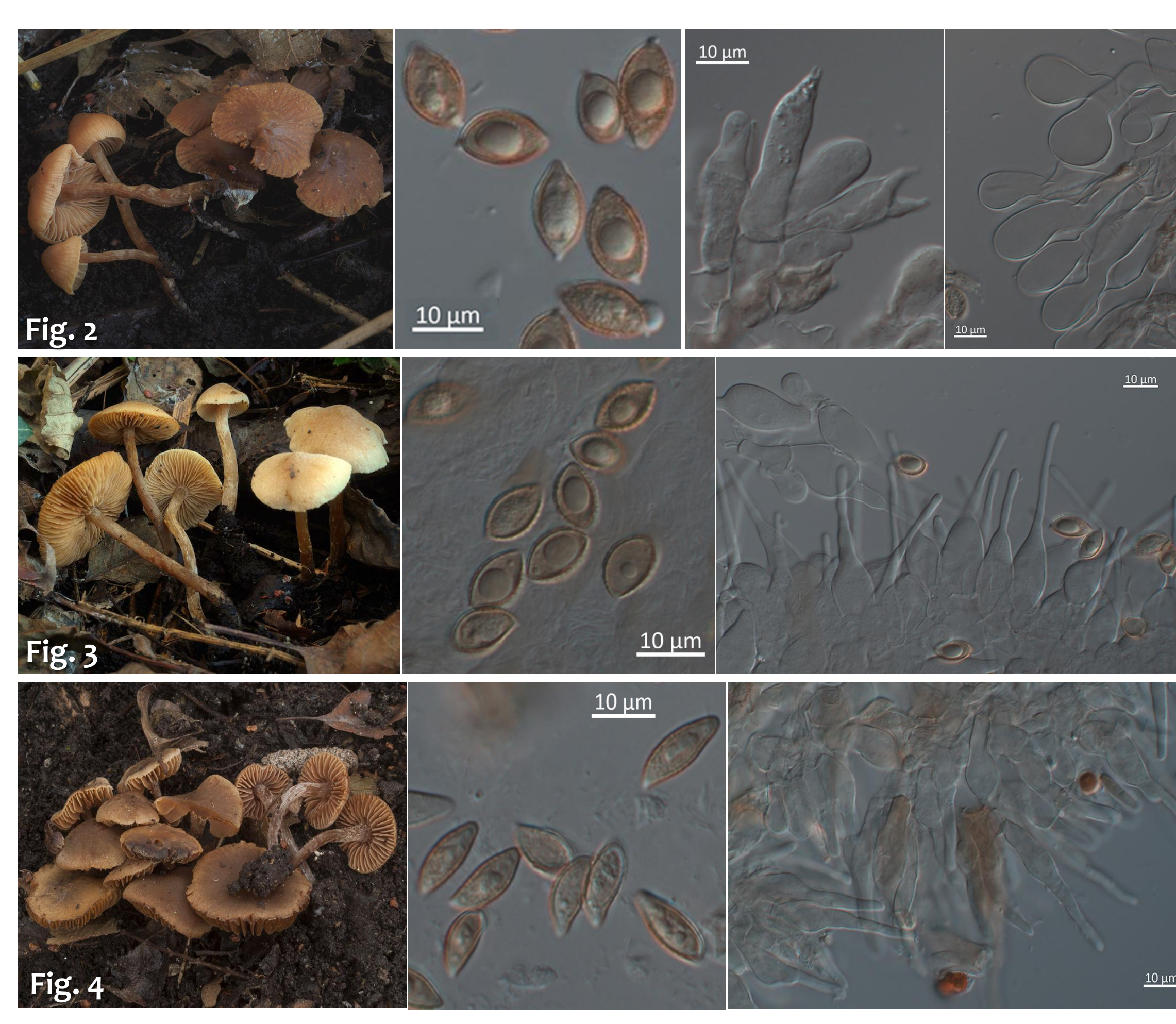
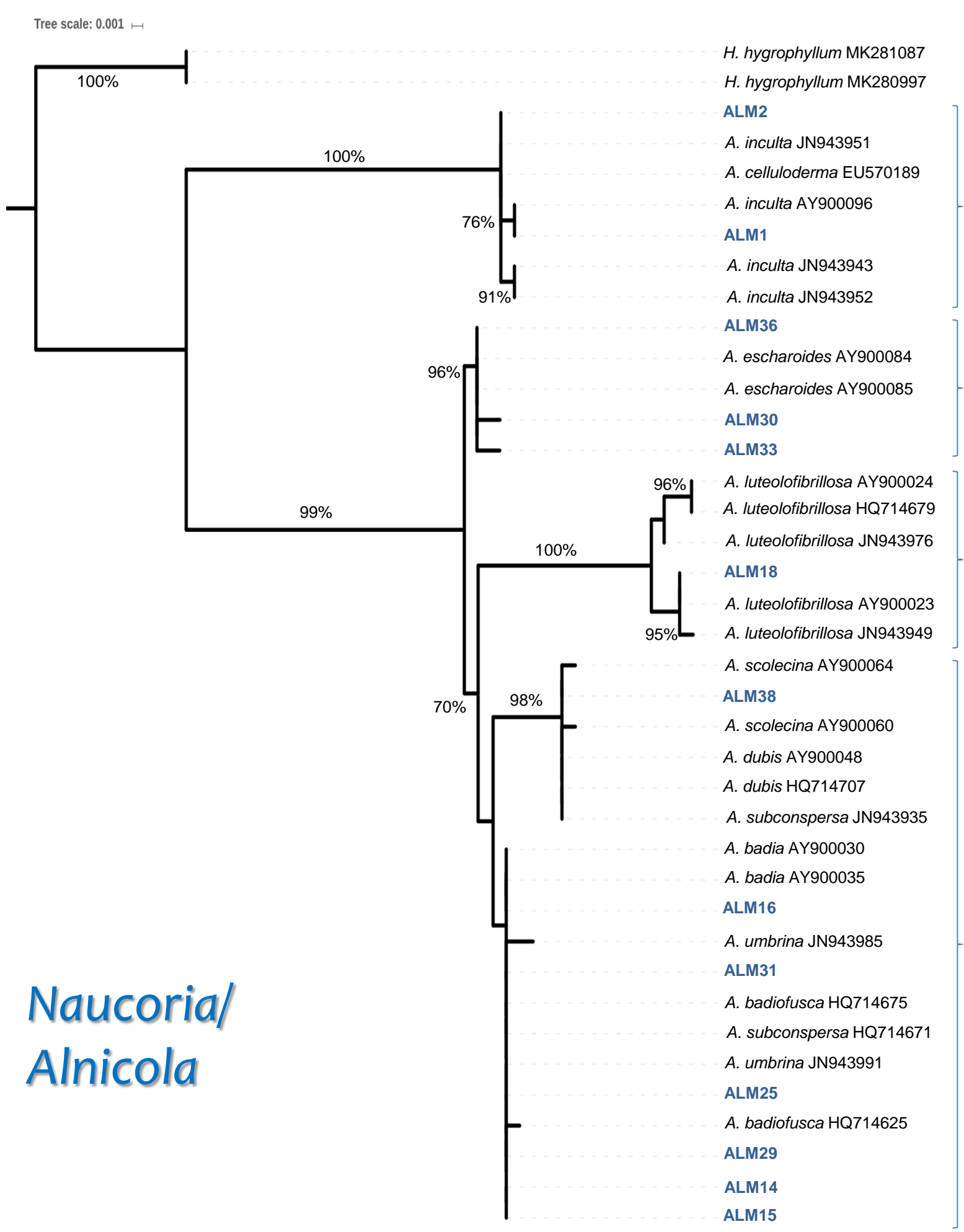
Alluvial forests/woods (priority habitat 91E0\*, Annex I Directive 92/43/EEC) consist of vegetation dominated by alder trees (genus *Alnus*) and occur along river banks and watercourses. Several *Alnus glutinosa* stands exist in streams and rivulets of permanent flow in Andros island (Central Aegean) and comprise the southernmost distributional limit of this habitat type in the Balkan Peninsula. Alders are involved in a tripartite symbiosis with ectomycorrhizal (ECM) fungi and nitrogen-fixing actinobacteria of the genus *Frankia*. As regards the ECM basidiomycetes, it is known that only few species form highly specialized symbiotic relationships with alder and play a crucial role for its growth and long-term survival; however, this type of fungal diversity remains largely unexplored in Greece. In the frame of an ongoing project (LIFE16 NAT/GR/000606), an extensive sampling of ECM fungi was performed aiming at the study and restoration of alluvial alder-stands of Andros.

## Methods

During 2017-2018 over 40 pertinent specimens were collected from various sites with alluvial deposits where *A. glutinosa* stands are formed, extending from the sea-level to an altitude of 800 m. a.s.l. (Fig. 1). Samples were subjected to detailed morphoanatomical examination following the methodology of Polemis et al. (2012). Moreover, the identity of the species was confirmed by DNA sequencing through the use of NITS marker. All exsiccatae are deposited in ACAM-AUA Fungarium.



## Results & Discussion

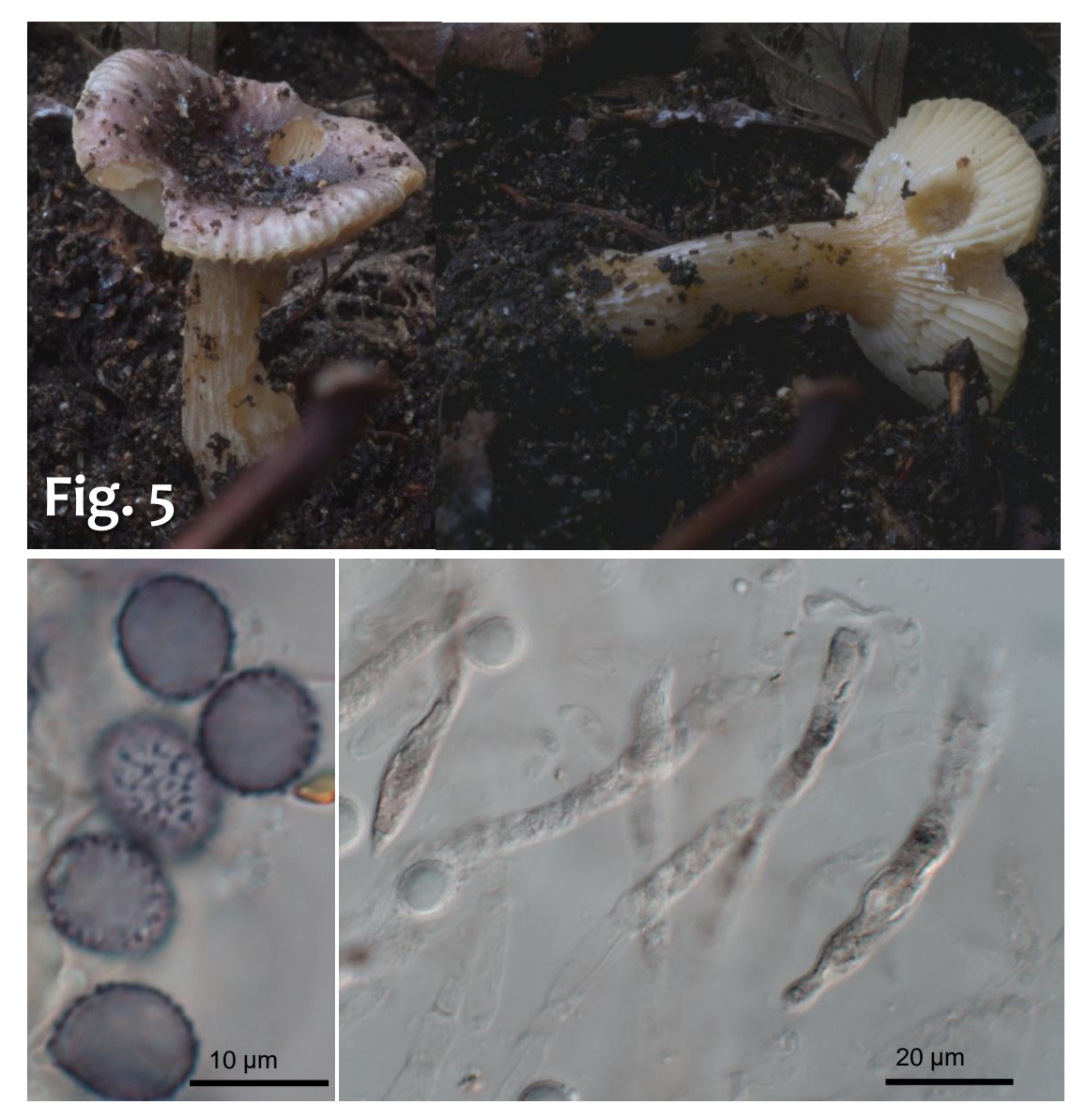
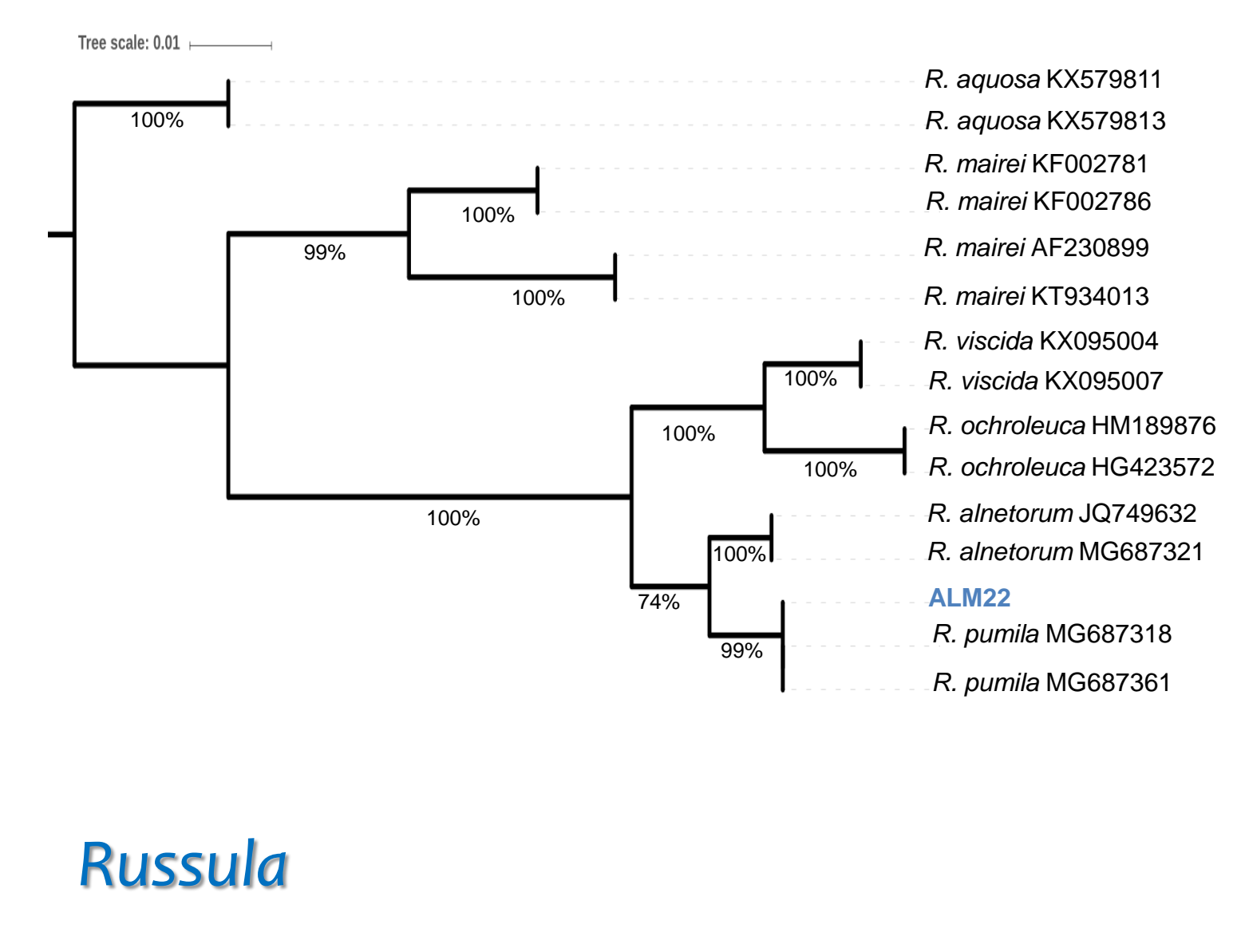


The genus *Naucoria* (acc. to I.F., or *Alnicola* sens. auct. pl.) includes several species known to be *Alnus*-specific ECM mycobionts. To date the two species recorded in Greece are known only from Andros (Polemis et al. 2012). In this work three more newly recorded species are added.

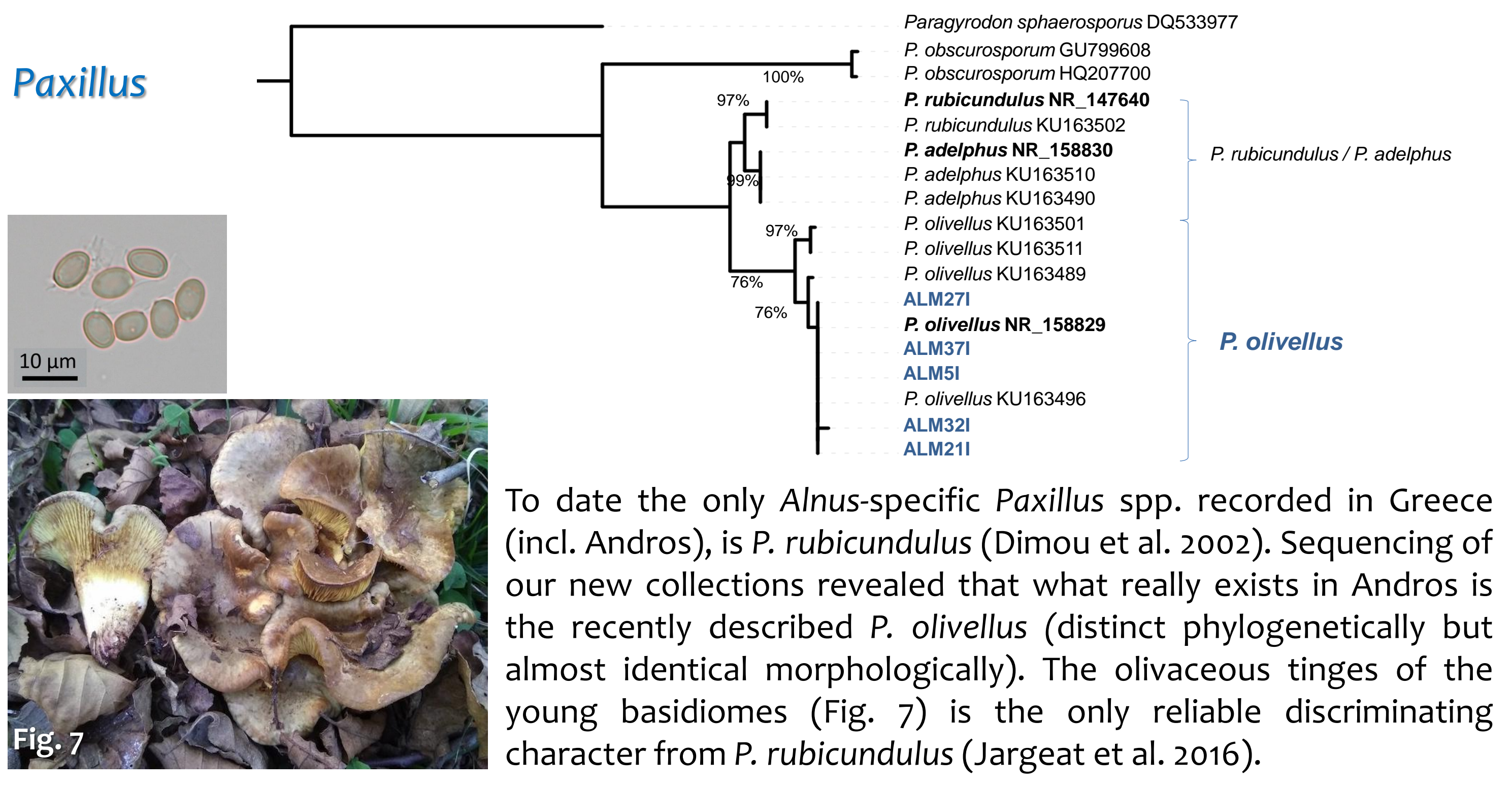
*N. celluloderma* (Fig. 2) is a member of a distinct clade which includes species with epithelioid pileipellis and capitate cheilocystidia; the striate pilei, 2-spored basidia and the shape/size of spores are characteristic of the species.

*N. escharoides* (Fig. 3) appeared to be the commonest species in Andros as well as elsewhere in Europe; the pale yellowish basidiomes with non-striate pilei, the long tibiiform cheilocystidia and the broadly amygdaliform spores are diagnostic.

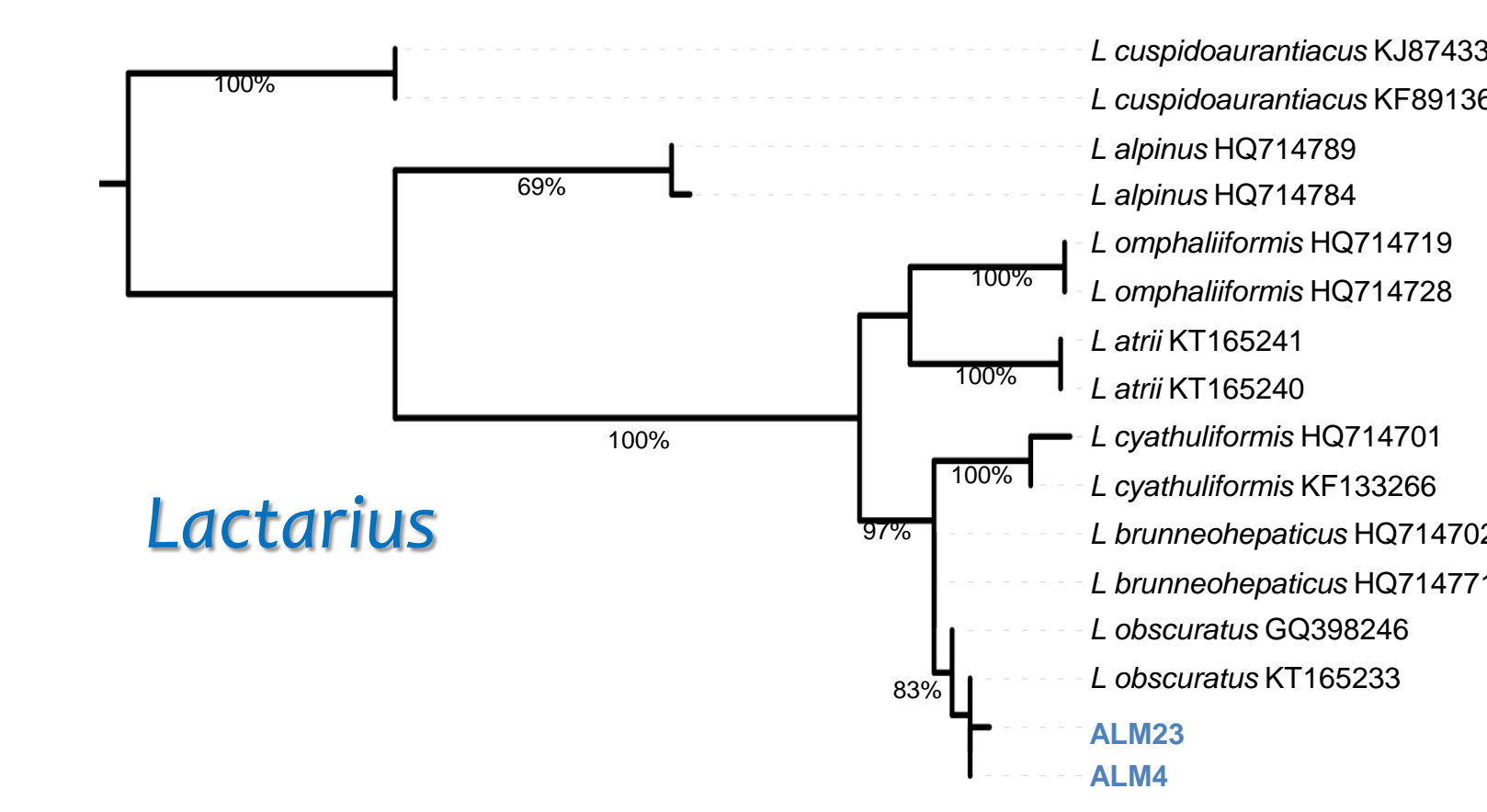
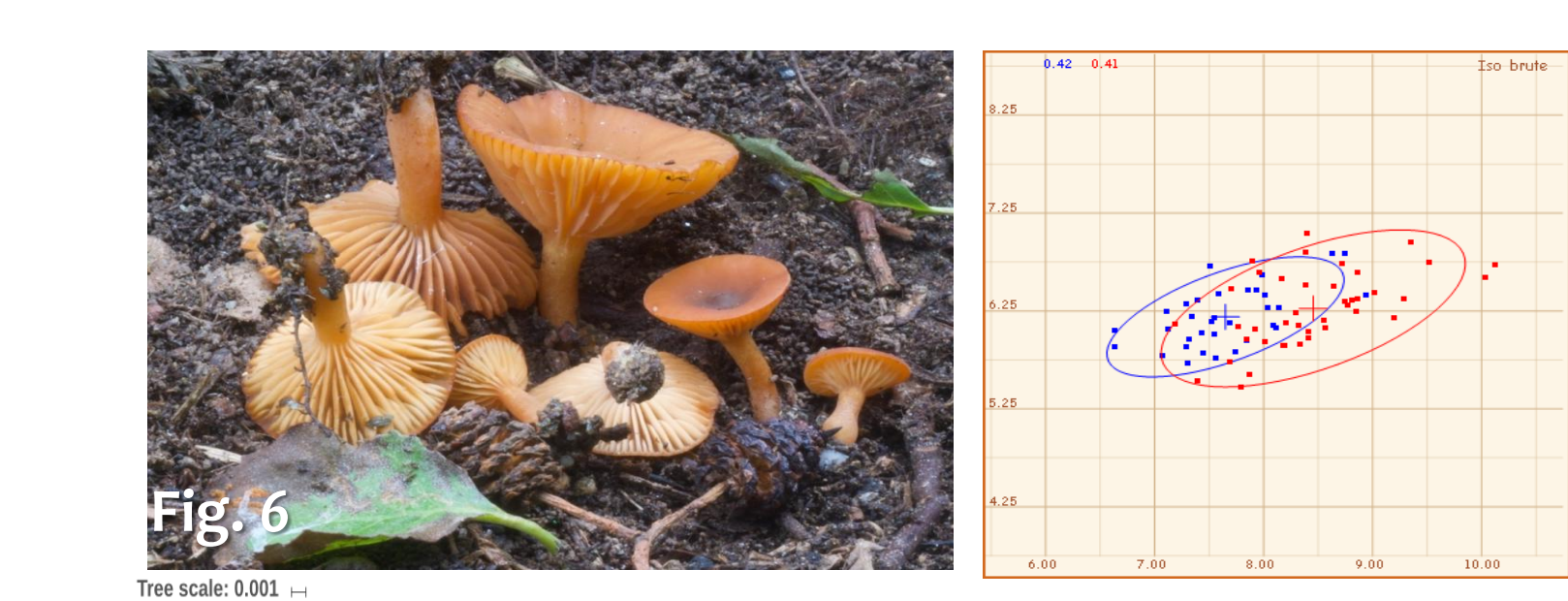
*N. subconspersa* (Fig. 4) possesses tibiiform cystidia as well and amygdaliform-fusoid spores. It belongs to a difficult species complex, which is need of taxonomic revision since the pertinent published results are often quite contradicting, as it is evidenced by our phylogenetic analysis.



*Russula pumila* (Fig. 5) is considered as synonymous of *R. alnetorum*, and is the only *Alnus*-specific species of this genus in Europe. However, it has been argued that the two taxa are different ecologically, since the first is mostly associated with *A. glutinosa* and the latter with *A. viridis*; the sequences deposited in Genbank, including ours, prove their distinct phylogenetic position.



To date the only *Alnus*-specific *Paxillus* spp. recorded in Greece (incl. Andros), is *P. rubicundulus* (Dimou et al. 2002). Sequencing of our new collections revealed that what really exists in Andros is the recently described *P. olivellus* (distinct phylogenetically but almost identical morphologically). The olivaceous tinges of the young basidiomes (Fig. 7) is the only reliable discriminating character from *P. rubicundulus* (Jargeat et al. 2016).



Among the three *Alnus*-specific *Lactarius* spp. existing in Europe only minute morphological differences can be observed, predominantly in spore-size (Heilmann-Clausen et al. 2000); *L. obscuratus* (possesses the smaller spores (av. length 7.1-8.1 µm), *L. omphaliiformis* slightly larger (av. length 8.1-8.6), matching our second collection's measurements (Fig. 6), and *L. cyathuliformis* the largest spores (av. length 8.3-9.9 µm). The outcome of our phylogenetic analysis revealed that both collections from Andros belong to the same species, i.e. *L. obscuratus*.

## References

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