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## Taxonomy and phylogeny of selected Boletales from northern Thailand, challenges and opportunities in drug discovery

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**Purpose:** The order Boletales consists of a large number of genera with more than 1000 species. Most Boletales have a stipe and a cap, with tubular hymenophore. However, some have a lamellate hymenophore (e.g. *Phylloporus*, *Gomphidius*) or completely different growth forms (gasteroid like in *Scleroderma*, or even crustose/polyporoid like in *Serpula*). Most Boletales species form ectomycorrhizae with the roots of forest trees, but others are saprobic or facultatively ectomycorrhizal (*Serpula*, *Phlebopus*), or mycoparasitic (e.g. *Pseudoboletus*, *Buchwaldoboletus*). To elucidate the species diversity of selected Boletales in Thailand, the investigation of *Phylloporus* and *Retiboletus* species were conducted using both morphological and molecular data. Aside from the various taxonomic novelties, new and unique secondary metabolites also interesting to study. *Phlebopus* is one of the most popular edible mushrooms in northern Thailand and possible to grow in culture media, which are key components for bioprospecting and value-addition.

**Methods:** Boletales have been collected in northern Thailand since 2014, focusing on taxonomy and multigene phylogeny. Maximum likelihood (ML) and Bayesian inference (BI) analysis were performed with the three-gene dataset (atp6, rpb2, tef1).

**Results and conclusions:** Morphological and molecular analyses seem to be useful for delimitation of species. Two species of *Phylloporus* were described as new: *P. pusillus* and *P. subrubeolus*. Three other species corresponded with previously described taxa: *P. brunneiceps*, *P. castanopsidis*, and *P. rubiginosus*. For *Retiboletus*, two taxa are similar to *R. fuscus* and *R. nigrogriseus*, with one new species. A preliminary study of extracts from *Phlebopus* basidiomata and cultured mycelium showed antimicrobial activity.