

BIODIVERSITY INVENTORIES: Boletineae (Fungi) in Queensland, Australia

The Boletineae (Fungi: Basidiomycetes) is a large suborder (~32 genera) of putrescent mushrooms with pores. Members of this well-recognized suborder of macrofungi form the largest fungal component of obligate, symbiotic mycorrhizal communities throughout the temperate and tropical forest ecosystems of the world. They are intimately involved with basic ecosystem processes such as nutrient cycling, nutrient uptake, and decomposition of organic matter. Some boletes have been documented as rearing sites and food sources for insects, while others are highly prized by people as food (e.g., *Boletus edulis*, known also as Porcini or Cèpe). Although they are conspicuous and widely recognized for their ecological and economic importance, no major or modern survey for boletes has ever been systematically compiled for any region of Australia, one of the most megadiverse countries in the world. The work outlined in this proposal will provide a first biodiversity inventory of this group of macrofungi for Queensland, Australia; a region known to encompass three of Australia's Biodiversity Hotspots as well as World Heritage listed sites. This project continues a productive collaboration between the PI at the New York Botanical Garden, who has acquired a global perspective on the genera of Boletineae from over 30 years of field observations in both temperate and tropical forests, and Co-PIs at Clark University, who have developed a broad phylogenetic database of molecular sequences from Boletales. Through this partnership, it will be possible to thoroughly inventory the Boletineae of the rich and varied forests in Queensland, including the northern tropical wet forests and the subtropical and temperate forests of the southeast, and to place the new collections in a global phylogenetic context.

Scientific Merit: Field work is planned to gather new material of Boletineae from Queensland, Australia, an area predicted to have high diversity based on prior field observations by the PI and collaborators. Fieldwork in this under-collected and under-explored area has been initiated with recent funding from the National Geographic Society. The NGS-funded project adds value to the proposed research, and will add to the database of known boletes and will provide baseline data for future projects. Data gathered from this survey will prove valuable for understanding the systematics, biogeography, and ecology of macrofungi and will provide important information for understanding the formation, maintenance and conservation of a portion of Australia's unique forest communities that largely exist on nutrient poor, impoverished soils. Based on prior results, the project will also promote the continuation of discovery and detection of novel taxa and new biogeographic distributions of Boletineae to be documented in technical publications that integrate morphological and molecular data.

Broader Impacts: Collaboration is established with the Queensland Herbarium and two resident Queensland mycologists knowledgeable in the local mycota and associated flora. These individuals will be actively involved with the field work and much of the data management. This survey will further the knowledge base of Australia's Fungimap project since fungi are listed under National Priorities of Australia as a group for which greater knowledge of biodiversity is essential. The inventory will encompass traditional systematic sampling methods as well as manipulation and analysis for data output as a primary product. One graduate student in New York will aid in field explorations and in extractions from taxa of highest priority. One Queensland student-collaborator will receive further training. One student in Massachusetts will aid in molecular phylogenetic analyses guided by two co-PIs. Workshops will enhance future studies by local students, mycologists, conservation planners, and the local public. Immediate online access of the resulting specimen database and an interactive identification system will make further studies of Queensland boletes sustainable and expandable by in-country specialists. A web site dedicated to Boletineae will be expanded and upgraded to provide a more comprehensive synthesis of the biodiversity and ecology of the group. This includes images, taxon synopses, literature guides, identification aids, and access to other resources for researchers and educators. These data will add significantly to our knowledge of austral mycology and will be available for subsequent studies on ecology and systematics of macrofungi by the collaborators and the rest of the mycological community. Public outreach will continue in the form of exhibits, contributions to citizen science websites, and workshops/lectures to amateur audiences. Finally, because of the intimate relationship between boletes and forest trees, these data will fill a gap in the knowledge base on Australian forest communities.