

HYPOGEOUS FUNGI OCCURRENCE, DISTRIBUTION AND MYCORRHIZAL HOSTS IN  
GRAND TETON NATIONAL PARK AND  
JOHN D. ROCKEFELLER, JR. MEMORIAL PARKWAY

Steven L. Miller  
Botany Department  
University of Wyoming  
Laramie

Objectives

The research underway has two primary objectives. The first objective is to collect and identify the species of hypogeous fungi associated with ectomycorrhizal vascular plant hosts occurring in Grand Teton National Park and the John D. Rockefeller Memorial Parkway (GTNP) over a 3 year period. Upon completion of the inventory, distribution, host specificity, substrate preference, phenology of fruiting, and relative abundance and importance of each species will be determined.

The second objective is to document small mammal activity associated with sporocarps of the hypogeous fungi. The role that small mammals play in dispersal of hypogeous fungal spores into disturbed areas, and the relative dependence of the animals on different species of hypogeous fungi will be estimated. Upon collection of hypogeous fungi, hypotheses relating to their niche importance in natural, relatively undisturbed ecosystems in GTNP will be developed and tested, with emphasis on future research and management recommendations.

Methods

Both objectives are being addressed by collecting sporocarps of hypogeous fungi with a handheld truffle rake several times during the GTNP growing season. Collecting sites in pure or mixed stands of Pinus contorta, Pinus albicaulis, Picea engelmannii, Abies lasiocarpa, Pseudotsuga menziesii, Populus tremuloides, Alnus tenuifolia are located away from high visibility areas in GTNP so as not to spoil the aesthetic appeal of the Park. Litter duff and soil are carefully replaced after each collection in an attempt to minimize disturbance of the soil. Each collection is photographed, described in detail, and dried in the field with silica gel for additional study. Field data including: putative tree host or hosts, understory vegetation, slope, aspect, soil type, date of collection, elevation, association with animal activity, depth of collection, etc. are taken, and will be summarized for each fungal and tree species.

## Results

Although early spring precipitation and snow accumulation in the greater GTNP area was above normal for May, available moisture for fungal fruiting fell well below optimum levels by June, and continued to be extremely low for the remainder of the season. Consequently, few fungi were encountered. However, despite drought conditions several collections of hypogeous fungi were made in moist swales with Picea engelmanni, Pinus contorta and Pseudotsuga menziesii, and Leucophleps spinispora Fogal associated with Picea engelmanni and Abies lasiocarpa.

Late summer species collected included several new records for GTNP (McKnight 1982). Rhizopogon rubescens var. rileyi A. H. Smith, R. occidentalis Zeller and Dodge and Elaphomyces muricatus Fr. were common in association with Pinus contorta. Rhizopogon zemireticulatus A. H. Smith was found in association with Pseudotsuga menziesii. Dried sporocarps of Gautieria globospora were found in mixed stands of Picea engelmanni, Pinus contorta and Pseudotsuga, and were presumably remnants of the spring flora. Several dried collections of a potentially new Hysterangium sp. were also found under Picea engelmannii and Abies lasiocarpa, which attest to the dry spring and summer conditions.

Less than half of the hypogeous fungi encountered in the first collecting season were associated with small mammal digging activity. However, because the drought had such a devastating affect on fungal sporocarp production, this preliminary observation may not accurately reflect activity found during a year with more typical moisture and fungal fruiting patterns.

## Conclusions

The ability of hypogeous fungi to complete their life cycle under drought conditions, such as those encountered in GTNP during the 1988 summer field season, underscores their adaptation to extreme environmental conditions. It may also serve to explain their unique ability as early successional ectomycorrhizal fungal species in severely disturbed areas such as clearcuts or fires. Additional research over the next two years will more fully elucidate the role that the hypogeous fungus-small mammal interaction has in ecosystem functioning in GTNP.

## Literature Cited

McKnight, K. H. 1982. Checklist of mushrooms and other fungi of Grand Teton and Yellowstone National Parks. Univ. WY-NPS Res. Center, Laramie. 21 pp.