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Mushrooms: The Extent of the Unexplored Potential

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There has been considerable speculation as to the numbers of mushrooms on Earth. Recent published estimates range from 500,000 to 9.9 million species, of which 75- 100,000 are named. A working figure of 1.5 million has been generally accepted by mycologists, and new data suggest that is not unreasonable.

Most newly discovered mushrooms occur in the tropics. Many are ascomycetes and related conidial fungi, especially in little explored ecological niches, but numerous new mushrooms are still being found. Most new mushrooms are found in tropical areas, the richness of which was proved by the late E. J. H. Corner's work in Malaysia, which showed 66% to be previously undescribed, that figure rising to 86% in some genera. Shorter term studies in Cameroon and Puerto Rico have also resulted in the discovery of many unnamed mushrooms, but novel species are not restricted to the tropics. Even in Europe, and particularly North America, mushrooms new to science are found every year.

Ascertaining what mushrooms are present in a site is difficult, as many fruit only rarely. A study in Switzerland involving weekly visits over 21 years still yielded additional mushrooms throughout the study—19 species fruited only in the survey's last year. Comparable long-term studies are lacking in the tropics, and short visits by specialists can provide only a snapshot of the true extent of the range of mushrooms in a site.

Studies of compatability and molecular sequences between mushrooms previously considered the same species on morphological grounds revealed "cryptic species," populations functioning as separate biological species but covered by a single scientific name. A single morphologically defined species may consist of 20 or more biological species. This remarkable realization not only means diversity has been underestimated, but some of these cryptic species have different distributions, ecologies, and perhaps other attributes.

About 15,000 mushroom species are known worldwide, which is about 20% of all known fungi. If that proportion held for the estimated 1.5 million fungal species worldwide, that would imply a staggering 300,000 mushrooms. Such a high figure cannot be justified, as most undiscovered mushrooms are not macroscopic, but even if the number of cryptic species eventually meriting recognition were five per known species and the number of morphospecies still to be found double that known, that yields 150,000 species—a figure not too far from the roughly 118,000 macromycetes estimated by A. Y. Rossman in 1994.

The number of mushrooms to be discovered and assessed for their medicinal and nutritional value is clearly enormous. Although most will not prove to be of value, if the proportion that do were only 5%, that would imply 75,000 species that were. To unlock the potential benefits to humankind within those mainly still unknown species will require much more intense studies of the mushrooms on Earth, involving collaboration between collectors, systematists, ethnomycologists, and local peoples working in concert with pharmaceutical and horticultural companies. It is to be hoped that the opportunities around us will be seized and not missed.

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