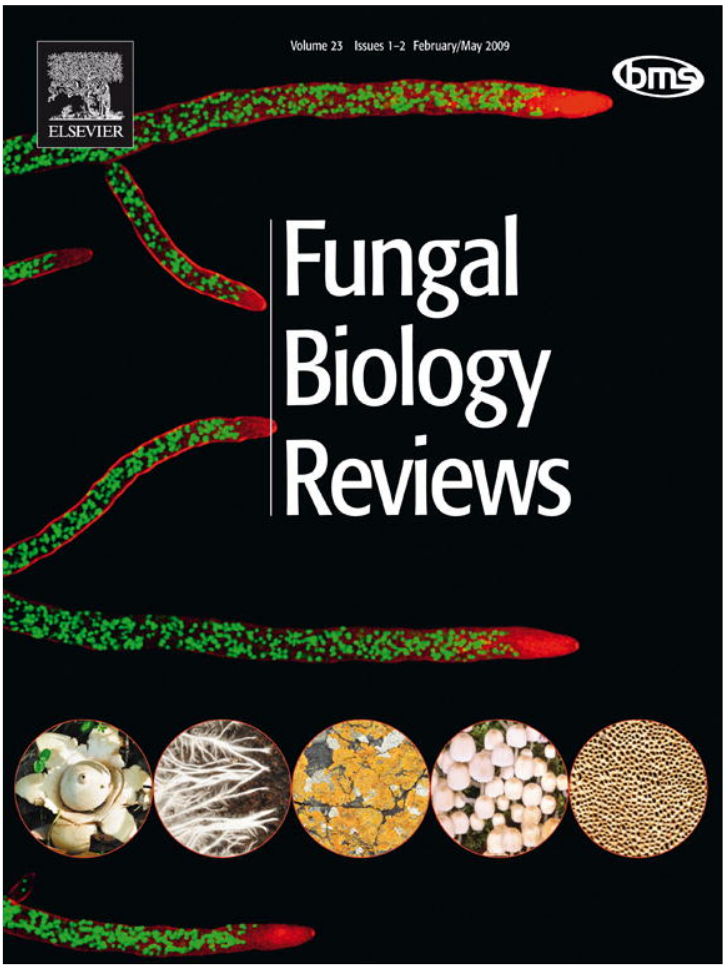

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Review

Fungal endophytes and bioprospecting

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ABSTRACT

Horizontally transmitted fungal endophytes are an ecological group of fungi, mostly belonging to the Ascomycota, that reside in the aerial tissues and roots of plants without inducing any visual symptoms of their presence. These fungi appear to have a capacity to produce an array of secondary metabolites exhibiting a variety of biological activity. Although the ability of fungi to produce unique bioactive metabolites is well known, endophytes have not been exploited, perhaps because we are only beginning to understand their distribution and biology. This review emphasizes the need to routinely include endophytic fungi in the screening of organisms for bioactive metabolites and novel drugs; it also underscores the need to use information obtained concerning fungal secondary metabolite production from other groups of fungi for a targeted screening approach.

1. Introduction

For several years, natural products have been used directly as drugs or have provided the basic chemical architecture for deriving such drugs. There are at least 200,000 natural metabolites with bioactive properties (Bérdy, 2005). For instance, about 52 % of the new chemicals introduced into the market worldwide between 1981 and 2002 were natural products or their derivatives (Chin *et al.*, 2006). Besides plants, microorganisms constitute a major source of natural products with desirable bioactive properties. More than 20,000 bioactive metabolites of microbial origin were known by the end of 2002 (Bérdy, 2005). Fungi are among the most important groups of eukaryotic organisms that are being explored for metabolites for clinical applications. Existing drugs of fungal origin include β-lactam antibiotics, griseofulvin, cyclosporine A, taxol, ergot alkaloids, and lovastatin. More new natural products of varied chemical structures are continually being reported from fungi (Grabley and Sattler, 2003; Mitchell *et al.*, 2008; Stadler and Keller, 2008). The versatile synthetic capability of fungi reflects their heterotrophic and absorptive mode of nutrition and the ability to exploit a variety of substrates and habitats (Hyde, 2005; Suryanarayanan and Hawksworth, 2005). We know only about 7 % of the estimated 1.5 million species of fungi (Hawksworth, 2004), and only very few of these have been cultivated and screened for drug production. It is therefore logical to postulate that we have only discovered a small

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