

Highlights on some different Wild Mushrooms Xeromphalina, Cookeina, Gyromitra, Xylaria, Phellodon, Marasmius and Parasola, Description and Ecology

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Received Date: 28 July 2021 | **Accepted Date:** 04 September 2021 | **Published Date:** 09 September 2021

Citation: Waill A. Elkhateeb, Ghoson M. Daba. (2021) Highlights on some different Wild Mushrooms Xeromphalina, Cookeina, Gyromitra, Xylaria, Phellodon, Marasmius and Parasola, Description and Ecology. *Biomedical Research and Clinical Reviews*. 4(5); DOI: [10.31579/2692-9406/079](https://doi.org/10.31579/2692-9406/079)

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Abstract

This review provides detailed morphological descriptions of some wild mushrooms of the genus Xeromphalina, Cookeina, Gyromitra, Xylaria, Phellodon, Marasmius and Parasola, including common species for each genus.

Keyword: xeromphalina; cookeina; gyromitra; xylaria; phellodon; marasmius; parasola; wild mushrooms

Introduction

Nature is considered an important source for the discovery of new medicines. A vast diversity of important biologically active compounds have arisen in the natural world, shaped by evolution and spanning a large diversity of species across different kingdoms [1]. In the fungi kingdom, edible mushrooms have long been used for the treatment of pathogens and disease. Furthermore, mushrooms show great potential as sources of antibacterial, antifungal, antiviral, anti-inflammatory as well as immunostimulant and antitumor agents [1–4]. Mushrooms have a rich history of use as food and medicine. As a group of macrofungi categorized as either ascomycetes or basidiomycetes, they may obtain their nutrition through saprotrophism, parasitism, symbiosis, or a combination of approaches. Mushrooms have a reproductive phase (fruiting bodies) and a vegetative phase (mycelia) [5, 6]. Currently, mushrooms are regarded as functional foods and exist as over-the-counter health supplements used in complementary and alternative medicines [7, 8].

Mushrooms that have existed for centuries have spread all over the world. Mushrooms were originally defined as macro fungi with a distinctive fruiting body. While mushrooms differ as poisonous and non-poisonous, it is possible to classify them as edible and nonedible mushrooms. Recently, many researches have been conducted on the benefits and importance of many species of mushrooms [9–15]. Mushrooms are widely used as food and herb medicine in China, Japan and other Asian countries. Medicinal mushrooms are a source of polysaccharide with antiinflammatory and immune system stimulating properties and have antioxidant, antiinflammatory and anti-diabetic effect [16, 20]. A lot of

research has been done on medically edible fungi. In addition, non-edible mushrooms have been found to be of medical importance in recent years. Today, it is important to investigate alternative drugs and natural therapeutics for cancer treatment [21, 30]. Mushrooms need to produce antibacterial and antifungal compounds to survive in their natural environment. Antimicrobial compounds could be isolated from many mushroom species and some proved to be of benefit for humans. Edible mushrooms are our important food source. With its easily digestible and nutritious feature, it is widely used in today's tables. Because of their taste and flavour, the edible mushrooms are consumed as meals in addition to their consumption. Mushrooms are a rich source of protein, lipids, amino acids, glycogen, vitamins and minerals [31–33].

Xeromphalina sp.

Xeromphalina sp. belonging to Basidiomycota; Class: Agaricomycetes; Order: Agaricales; Family: Mycenaceae. The most common species Xeromphalina campanella mushroom is tiny yellowish to orange cap with a central depression, the gills running down the stem, the white spore print, and the growth pattern. The common names of the species include the golden trumpet. The spores of Xeromphalina campanella are wider and more ellipsoid. Ecology: Saprobic on the deadwood of conifers; typically growing in dense clusters on stumps and logs, but occasionally growing alone or gregariously; found nearly year-round, especially in warmer climates, but most common in summer and fall; apparently widely distributed in North America. The illustrated and described collections are from Michigan, Colorado, and Texas. Xeromphalina campanella has a small umbrella-shaped cap. Cap: 5–20 mm across;

convex, becoming broadly convex with a central depression and an arched margin; bald; dry; widely lined on the margin when wet; brownish yellow, rusty, yellowish, or orange; usually darker towards the center; fading. Gills: Running down the stem; fairly distant; usually with many cross-veins; pale yellow or orangish; short-gills present near the cap margin. Stem: 1.5–3 cm long; 1–2 mm thick; more or less equal; yellowish above, darker below; bald above, finely hairy at the base with orange to

yellow basal mycelium; rather wiry and tough; often curved. Odor and Taste: Not distinctive. Spore Print: White. Microscopic Features: Spores 5.5–7 x 3–4.5 μm ; smooth; ellipsoid; weakly to moderately amyloid. Pleuro- and cheilocystidia fusiform; up to about 55 x 15 μm . Caulocystidia clavate to fusiform; up to 75 x 15 μm ; thin-walled. Clamp connections present (Figure 1, 2) [34-36].



Figure 1: *Xeromphalina* sp., (Photo was taken by: Gómez Reyes. Locality: Mexico, Michoacán, Uruapan, Mich, México. (Cited in: <https://mycoportal.org>).



Figure 2: *Xeromphalina campanella*, (Photo was taken by Patricia R. Miller. Locality: USA, Mississippi, Lafayette, Puskus Lake (Cited in: <https://mycoportal.org>).

Cookeina Sp.

Cookeina Mushroom belonging to Ascomycetes; Class: Pezizomycetes; Order: Pezizales; Family: Sarcoscyphaceae. Cookeina mushroom (Sarcoscyphaceae) is characterized by large, brightly coloured, stipitate apothecia and eccentrically, operculate asci. This genus are the large, brightly coloured, stipitate apothecia and fasciculate excipular hairs.

Paraphyses are branched and anastomose freely at the apex to develop excipulum, asci are cylindrical with tapering bases and an eccentrically placed operculum at the apex, and ascospores are ellipsoid to fusiform and hyaline to subhyaline with longitudinal ribs [37]. Species of Cookeina are widespread, especially in tropical and subtropical regions [38]. They are saprobes on dead plant material or on soil (Figure 3, 4) [39].



Figure 3: *Cookeina* sp., (Photo was taken by: geomanuel, Locality: Mexico, Oaxaca, Oaxaca, MX, (Cited in: <https://mycoportal.org>).



Figure 4: *Cookeina* sp., (Photo was taken by Patricia R. Miller, Locality: Costa Rica, Heredia, Costa Rica (Cited in: <https://mycoportal.org>).

Gyromitra sp. (The False Morels Mushroom)

Species in the genus *Gyromitra* vary widely in appearance. Some species are cup-shaped and have rudimentary stems. Other species are more familiar and are often collectively referred to as the false morels mushroom. They have well developed stems, and their oddly shaped caps

are generally reddish brown to yellowish brown. When sliced open, they are not completely hollow and this is a good way to distinguish them from the true morels, which are hollow. The spores of *Gyromitra* species reddish to orangish or yellowish granular contents. Identification of *Gyromitra* species can usually be accomplished through careful observation of macroscopic physical features (Figure 5, 6) [40, 41].



Figure 5: *Gyromitra* sp., (Photo was taken by Patricia R. Miller. Locality: United States Wyoming Grand Teton National Park Moose, WY (Cited in: <https://mycoportal.org>).



Figure 6: *Gyromitra* sp., (Photo was taken by: Giuliana Furci. Locality: Chile, Araucanía, Curacautín (Cited in: <https://mycoportal.org>).

Xylaria sp.

The genus *Xylaria* belonging to Ascomycota; Class: Sordariomycetes; Order: Xylariales; Family: Xylariaceae. The genus *Xylaria* consists of funky, club-like decomposers of wood or plant debris that become black and hard by maturity, reminiscent of carbon or charcoal. The mushrooms are Pyrenomycetes, which means they produce spores in asci that are embedded in tiny pockets called perithecia; the asci take turns growing into the narrow opening of the pocket so that they can shoot spores away

from the fungus and into the air currents. The *Xylaria* life cycle gets a little complicated, and the complications can make precise identification of one's *Xylaria* collections difficult. Like many fungi, *Xylaria* species hedge their reproductive bets by engaging in both sexual and asexual reproduction. The spores, asci, and perithecia mentioned above occur when the fungus is mature, and reproducing sexually. In its immature, asexual stage, a *Xylaria* produces asexual spores, officially called "conidia," in a powdery coating (Figure 7, 8) [42-46].



Figure 7: *Xylaria sp.*, (Photo was taken by: annetanne. Locality: Belgium, Vlaanderen, Olmen - Belgium (Cited in: <https://mycoportal.org>).



Figure 8: *Xylaria sp.* (Photo was taken by Rusty Niknax. Locality: United States, Washington, evergreen state college Olympia (Cited in: <https://mycoportal.org>).

Phellodon sp.

Phellodon is a genus of tooth fungi in the family Bankeraceae belonging to Basidiomycota. Species have small- to medium-sized fruit bodies with white spines on the underside from which spores are released. All Phellodon have a short stalk or stipe, and so the genus falls into the group known as stipitate hydroid fungi. The tough and leathery flesh usually has a pleasant, fragrant odor, and develops a cork-like texture when dry. Neighboring fruit bodies can fuse together, sometimes producing large mats of joined caps. Phellodon species produce a white spore print, while the individual spores are roughly spherical to ellipsoid in shape, with spiny surfaces. The genus, with about

20 described species, has a distribution that includes to Asia, Europe, North America, South America, Australia, and New Zealand. About half of the species are found in the southeastern United States. Several Phellodon species were placed on a preliminary Red List of threatened British fungi because of a general decline of the genus in Europe. Species grow in a symbiotic mycorrhizal association with trees from the families Fagaceae (beeches and oaks) and Pinaceae (pines). Accurate DNA-based methods have been developed to determine the presence of Phellodon species in the soil, even in the extended absence of visible fruit bodies. Although Phellodon fruit bodies are considered inedible due to their fibrous flesh, the type species, *Phellodon niger*, is used in mushroom dyeing (Figure, 9) [47, 48].



Figure 9: *Phellodon niger* (Cited in: <https://ultimate-mushroom.com/poisonous/329-phellodon-niger.html>).

Marasmius sp.

Marasmius is a genus of mushroom-forming fungi in the family Marasmiaceae belonging to Basidiomycota. It contains about 500 species of agarics, of which a few, such as *Marasmius oreades*, are edible. However, most members of this genus are small, unimpressive brown mushrooms. Their humble appearance contributes to their not being readily distinguishable to non-specialists, and they are therefore seldom collected by mushroom hunters. Several of the species are known to grow in the characteristic fairy ring pattern. The name *Marasmius* itself comes from the Greek word *marasmos*, meaning drying out. Modern mycologists no longer consider the marcescence/putrescence distinction a reliable criterion for taxonomy. The most common species is

Marasmius tageticolor, smooth, convex cap is 10–17 mm (0.4–0.7 in) in diameter. Its surface colouration features alternating radial rays of red and light buff. The gills are distantly spaced, with about 8–10 gills per fruit body. Red on the upper half near the cap and white on the lower half, they are free from attachment to the stipe. There are short gills (lamellulae) interspersed between some, but not all, of the long gills. The smooth stipe measures 3–4 cm (1.2–1.6 in) long by 1 mm wide, and has a beet red to dull brown colour. There is buff-coloured cottony mycelium at the stipe base. Spores of *Marasmius tageticolor* measure 17–19 by 3.5–4 μm . They are smooth, thin-walled, and inamyloid. The basidia (spore-bearing cells) are club-shaped, four-spored, and hyaline (translucent), with dimensions of 26–30 by 7–8 μm (Figure, 10) [49-51].



Figure 10: *Marasmius tageticolor* (Photo was taken by Teodoro Chivata Bedoya. Locality: Colombia, Casanare, Yopal (Cited in: <https://mycoportal.org>).

Parasola sp.

The genus *Parasola* belonging to Basidiomycota; Class: Agaricomycetes; Order: Agaricales; Family: Psathyrellaceae. These small frail fungi have translucent caps where the radiating gills look like the spokes of a parasol. In the past these mushrooms were classified under *Coprinus*, but unlike that genus there is no veil and the caps do not really turn to ink, but curl up and wither [52]. The most common species is *Parasola plicatilis*, grows in grassy areas, usually in direct sunlight, and is typically found alone,

scattered, or in small groups. Morphologically, *Parasola plicatilis* is very small and its cap is a tiny little umbrella. It has no universal veil, which means it lacks the dust-like or granulated coating of similar species in *Coprinopsis* and *Coprinellus*, but tiny, veil-covered species often look to the naked eye as though they have lost all traces of veil material by the time they are mature. The spores of *Parasola plicatilis* are its most distinctive feature: they are fat, angular, and large (measuring about 10-13 x 8-11 μ), and feature an unusual pore (Figure 11, 12) [53-55].



Figure 11: *Parasola* sp. (Photo was taken by Vera S. Evenson. Locality: USA, Colorado, Denver County, Denver Botanic Gardens (Cited in: <https://mycoportal.org>).



Figure 12: *Parasola plicatilis* (Photo was taken by Noor Abuhajah. Locality: United States, Louisiana, Coliseum Avenue Baton Rouge (Cited in: <https://mycoportal.org>).

Conclusion

Mushrooms are keeping surprising us by their capabilities and existence worldwide. The number of identified and isolated mushroom species was increased in the last decade. In this review, the distribution, description of some wild mushroom genera of interest were reported. These wild mushrooms are *Xeromphalina*, *Cookeina*, *Gyromitra*, *Xylaria*, *Phellodon*, *Marasmius* and *Parasola*. Aiming to understand the infrequent distribution, identification and ecological characteristics, of these genera

and common species from each, as well as trying to encourage investigate and evaluate possible biologically active compounds originated from such genera is very important.

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DOI: [10.31579/2692-9406/079](https://doi.org/10.31579/2692-9406/079)

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