Amazing Stinkhorns

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In the kingdom of fungi, **Stinkhorns** are classified in the Division of Basidiomycetes and belong to the Family, Phallaceae within the Order, Phallales. Traditionally, two families of stinkhorns were recognized. The Phallaceae listed stinkhorns with unbranched stems, including species of *Mutinus, Phallus,* and veiled *Dictyophora* (now *Phallus*), among others. The Clathraceae included stinkhorns with branched stems and those with latticed structures - including *Clathrus, Lysurus, Colus, Laterna,* and others.

Although basidiospore maturation occurs within the enclosed fruiting bodies of the stinkhorn, the elevation of the mature spore-producing tissue represents an independent origin of the stipe among Basidiomycota.

Many members of the gomphoid-phalloid clade can be broadly classified as gastroid fungi (e.g. Hysterangium, Geastrum and Phallus). Gastroid fungi traditionally were assigned to Gasteromycetes, which are now known to be an artificial assemblage. They include earthstars, puffballs, stinkhorns, coral fungi, club fungi, resurpinate fungi, toothed fungi and others.

Based on the results of phylogenetic analyses, a new subclass Phallomycetidae, and two new orders, Hysterangiales and Geastrales, are proposed (1).

The fruiting body of Stinkhorns arises from an 'egg'. Attached is one or more rhizomorphs which are root or cord-like aggregation of mycelium. Stinkhorns are not only characterized by their peculiar eclosion or emergence of growth, but have in common, a number of chemical reactions that are initiated to soften the gleba and produce the malodour.

Stinkhorns that produce a spongy stem or lattice receptacle have high content of e.g., manganese, iron and potassium (2). These high levels are likely to have a role in the egg-gel and peridium acting as an osmotic pump to increase intake of water to pressurize the cells to begin the process of eclosion. Growth rate of the fruiting structure appears to be related to the levels of the minerals as well as potassium and calcium.

The growth of the fruiting body appears to result from the expansion from the gleba-head of the hollow spongy stipe in e.g., *Phallus rubicundus* and *Dictyophora multicolor* and not outward growth from the egg.

In most cases, the gleba is a gel and turns to liquid when vibrated by the proboscis of a fly or other insect attracted by the fetid odour. Once the feeding vibration ceases, often the gleba returns to a gel form to avoid the washing effect of rain. The gleba, or spore-bearing gel, is stabilized on a corrugated surface that functions to retain the gel and also provide 'footing-traction' for feeding insects.

The method the Stinkhorns use to disperse spores is quite ingenious. First the faecal odour released by the gleba attracts blow-flies, carrion-eating beetles as well as some species of wasps and butterflies. However, once the insect makes contact with the gleba, the insect detects sugar which is an eating stimulant. Thus the insect does not lay eggs but engorges on the sweet spore-containing malodorous gleba. Research has shown that spore dispersal is not by spores adhering to the insect but through excrement. Spore-germination is unaffected (3). The gleba being low in protein is of benefit to the development of fly ovaries and eggs if a lot is consumed - benefiting both the fly and the fungus (3).

Both the eggs and the fruiting structure of Stinkhorns have been used for food, medicinal and other purposes (4, 5).

1. http://users.iab.uaf.edu/~jozsef_geml/Hosaka_etal_2006.pdf
2. http://bugs.bio.usyd.edu.au/AustMycolSoc/Journal/1997/ISS16(1)_Mar97.pdf
3. http://www.faculty.ucr.edu/~insects/pages/teachingresources/stoffolano/4.pdf
4. http://waynesword.palomar.edu/ww0504.htm
5. http://zemestauki.info/indexeng.html