Phallus indusiatus - Bridal veil stinkhorn

Bridal veil stinkhorn (*Phallus indusiatus*)

Vent. (1798)

also commonly known as:

- bridal veil stinkhorn
- bamboo fungus
- bamboo pith
- long net stinkhorn
- veiled lady

Have you ever seen such a unique looking mushroom and wondered what it is? Or maybe you have eaten bamboo fungi in stir-fry or soups? Either way, it is likely that you have come into contact with this stinkhorn species at least once in your life, whether you knew it or not!

This species has such a rich cultural and historical significance, and can even be spotted in Singapore. Read on if you would like to learn more about it!

- Bridal veil stinkhorn (*Phallus indusiatus*)
  - Appearance
  - Biology & Ecology
    - Growth habitat
    - Distribution
    - Spore dispersal
  - Cultivation
  - Edibility
  - Culture & folklore
  - Similar stinkhorns
  - Medicinal properties
  - Taxonomy
    - Taxonavigation
    - Description
    - Type specimen
    - Diagnosis
    - Etymology
  - Systemics
  - Phylogeny
  - Glossary
  - References

**Appearance**

This unique fungus is hard to miss! The fruiting body can grow up to 25cm in height, allowing it to literally stand out amongst the crowd. It usually emerges as a round sack from the ground, before the bell-shaped brown cap pushes up and out, extending a long white stalk before finally lowering its signature lace white ‘skirt’, known as an indusium. The indusium hangs from the cap, almost reaching the ground!

Fresh indusiums are puffy and white, before yellowing in a day or less. They are also known to give off a strong pungent scent.

[Video showing time lapse of emerging stinkhorn](#)

This time lapse was taken over the period of only a couple of hours! Fungi tend to be ephemeral in nature, which means they are short-lived and wilt quickly. Spotting one usually requires you to be in the right place at the right time, so if you manage to spot this fungi, consider yourself lucky!

![Diagram of basic parts of the stinkhorn](image by Tan Xing Zhi)
Fungi are natural decomposers that help to break down dead and rotting organisms. The stinkhorn is saprobic, gaining nutrition through breaking down wood and plant matter. In Asia, they can be spotted in large bamboo forests, earning them the common name bamboo fungus. Fungi require a lot of moisture to grow, and hence their fruiting bodies can often be spotted after heavy rain! Stinkhorns can even be found in urban habitats, and are known to grow all year round.

Distribution

The stinkhorn is a tropical species, and can be found in locations including Africa, South and Central America, Mexico, Indonesia, Malaysia, Singapore, India, Southern China, Japan, Taiwan, and Australia. However, some sightings have been uploaded to iNaturalist, a database for the collection of flora and fauna sightings.
From the iNaturalist database, this stinkhorn has been spotted at the following locations in Singapore:

- Bukit Batok Nature Park
- Central Catchment Nature Reserve
- Holland Village
- Kallang
- Kheng Cheng School (Toa Payoh)
- MacRitchie Reservoir Park
- Singapore Botanic Gardens

There has even been a sighting on the **NUS Campus**!
There is a good mix of natural and urban habitats on the list, indicating that this stinkhorn can survive under different conditions. Keep a look out for them in your neighbourhood, you never know when they will appear 😊

**Spore dispersal**

Most fungi species disperse their spores via ejection from the fruiting body, allowing them to travel by air to new locations. The stinkhorn, however, relies on insects for spore dispersal!
Upon closer inspection, you might discover the ridged surface of the cap covered in brown slime, giving off the stench of rotting flesh. This scent is to attract insects and flies to the fungus. They consume the slime and disperse the spores via defecation, allowing the fungus to grow and colonize different areas. Usually, by the time the fruiting body begins to wilt, all the slime has been consumed, leaving a white, exposed cap. The indusium has even been theorized to be a 'ladder' of sorts, allowing ground-dwelling insects to better access the cap!

Cultivation

Once a scarce and treasured food item, this species of stinkhorn is now easily cultivated. They are grown on agricultural wastes such as bamboo-trash sawdust covered with a thin layer of non-sterilized soil. Other substrates also include bamboo leaves and small stems, soybean pods or stems, corn stems, and willow leaves. For optimal growth of fruiting bodies, a temperature of 24 °C with a relative humidity of 90–95% is required.

Edibility
The fungus is commonly dried and sold in Asian markets. Food preparation usually involves soaking or simmering in water to re-hydrate the fungus, until tender. While traditionally served as a component of chicken stews, it can also be stir-fried. An alternate form of cooking would be to stuff the rehydrated mushroom with various ingredients.

**Culture & folklore**
The stinkhorn has long been considered a delicacy in Asian countries, especially so in China. It was previously only harvested in the wild with great difficulty, where its lack of abundance led to it being a well-known and treasured food item. Due to its scarcity, the stinkhorn was reserved for feasts during special occasions. It is one of the main ingredients for "The Soup of the Eight Immortals" ( ), which also includes other delicacies such as bird’s nest, shark’s fin, and fish maw. Empress Dowager Cixi even considered it as a source for immortality, requesting many servants to go out in search of this fungus!!

If you have ever looked up this species on Google, you might have come across some articles regarding the supposedly orgasmic powers of the stinkhorn. These claims are most likely untrue! While recognised as a aphrodisiac in many cultures, the main source for these claims originated from a study reporting on the ability of the stinkhorn’s scent to induce mild orgasms in women. However, this study has been highly criticised due to its suspicious scientific methods, and no one has ever been able to replicate their findings.

**Similar stinkhorns**

While the bridal veil stinkhorn is the most likely stinkhorn to be spotted in Singapore, there are a few other closely-related species that it could be confused with. To aid in the recognition of various stinkhorn species, this is a quick guide to distinguishing the bridal veil stinkhorn from four other stinkhorn species.

<table>
<thead>
<tr>
<th>Name</th>
<th>Distinguishing Features</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridal Veil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elephant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hartmanii</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Siccus</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phallus cinnabarinus</strong></td>
<td>Indusium and cap appears reddish to orange</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Phallus duplicatus</strong></td>
<td>Both fruiting body and indusium greatly shortened. Usually found in North America.</td>
<td></td>
</tr>
<tr>
<td><strong>Phallus luteus</strong></td>
<td>Indusium appears a bright yellow instead of white.</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>

*Image by Daniel J. Silvia, CC BY-SA 3.0*

<table>
<thead>
<tr>
<th><strong>Phallus multicolor</strong></th>
<th>Indusium is shortened, sometimes appears more brightly coloured. Cap is yellow when spore slime removed.</th>
</tr>
</thead>
</table>

*Left: Image by Tatiana Gerus, CC BY 2.0. Right: Image by Tim Adams, CC BY-SA 2.0*

**Medicinal properties**
Other than being a delicacy, the stinkhorn was also well known in ancient China for its medicinal benefits. Meng Xian (621-713 AD) recorded in the Chinese Pharmacopoeia that the stinkhorn helps to 'detoxify kidneys, aids the stomach and cleanses the intestines, contains anti-aging benefits, reduces inflammation and relieves pain, and helps in weight loss'. In modern scientific investigations, the stinkhorn has been found to contain biologically active polysaccharides with tumour-suppressing activity, antioxidants and immune-enhancing properties. The fungus also contains a tyrosinase inhibitor, which helps to prevent the browning of fruits, as well as antibacterial properties. Analysis on the nutritional value of the stinkhorn found that the egg stage (immature fruiting body) of the fungus contains 33.6 g of crude protein, 1.66 g of fat, and 3.98 g of carbohydrates, based on the dry weight of 100 g of fungus. Additionally, the stalk was found to have the most sugar content (6.50%), while the veil had a high amount of protein (42.63%) per % dry weight. For context, the daily recommended nutrient values for adults between the age of 30 to 60 are 58g for women and 68g for men. Alongside its other beneficial components, the stinkhorn really makes for a super health food.

**Taxonomy**

**Taxonavigation**

**Kingdom**: Fungi  
**Division**: Basidiomycota  
**Class**: Agaricomycetes  
**Order**: Phallales  
**Family**: Phallaceae  
**Genus**: Phallus

**Description**

*P. indusiatus*. Stipite tereti, celluloso, indusiato; pileo brevi, reticulato. *Fig. 3*.  

*Top: Diagram of Phallus indusiatus (middle). Bottom: Original French description of Phallus indusiatus.*
Phallus indusiatus was initially described by French naturalist Étienne Pierre Ventenat in 1798. In 1809, Nicaise Auguste Desvaux placed the species in genus Dictyophora, earning it the synonym Dictyophora indusiata (Desvaux, 1809). The separate genus Dictyophora was used to indicate the presence of an indusium on the stinkhorn. Recent publications, however, suggest that Phallus species with and without an indusium share close morphological similarities and evolutionary pathways. Hence the genus Dictyophora was merged back into Phallus. The species was also placed in Hymenophallus in 1817 by Christian Gottfried Daniel Nees von Esenbeck, giving it yet another synonym Hymenophallus indusiatus (Nees von Esenbeck, 1817). This genera was also subsequently returned to synonyms of Phallus and the species is now known again by P. indusiatus.

Type specimen

Mycobank does not contain any type specimen information pertaining to Phallus indusiatus. The type specimens listed belong to that of Phallus luteus, a species once recognised as a subspecies of P. indusiatus before being recognised as a species in 2008.

Diagnosis

Immature

Initially enclosed in an egg-shaped structure encased in a peridium, the immature fruiting body appears from whitish to reddish-brown in colour, measuring up to 6 cm in diameter. When sliced, the immature stinkhorn structure will be revealed as encased in a gelatinous substance. As the mushroom matures, hydrostatic pressure from expansion of the internal structures tears the peridium, allowing the mature fruiting body to erupt and grow upwards rapidly.

Mature

Fruiting body appears spike-like; to 25 cm high. Cap appears pitted and ridged by maturity, covered with a slimy, olive-brown substance. Underneath substance, cap is a whitish to light brown surface; usually developing a perforation at the top. Stem is white, arises from a white, sack-like volva; with a laced, white to slightly pinkish 'skirt' hanging up to 15 cm from the bottom edge of the cap; odour unpleasant or strongly sweet.

Spores

Spores appear smooth, elliptical or slightly curved, slightly translucent with thin walls, and measure 2–3 by 1–1.5 m.

Etymology

The genus name Phallus is thought to refer to the phallic appearance of stinkhorns, while the Latin adjective indstus means "wearing an undergarment", a reference to the lace indusium found on the fruiting body. The former generic name Dictyophora is derived from Ancient Greek words (diktyon, "net"), and (pher, "to bear"), hence "bearing a net". In China, this species is also known as 'bamboo mushroom'. In Japan, they are known as Kingugasatake (or ), referring to the wide-brimmed hats that featured a hanging silk veil to hide and protect the wearer's face.

Systemics

Phylogeny
While a full phylogenetic tree for all the species in genus *Phallus* has yet to be done, a phylogenetic study for order Phallales was carried out in 2014. Sequencing data was obtained from three independent gene loci, with analyses conducted under maximum parsimony (MP), Bayesian inference (BI) and maximum likelihood (ML). No major topological conflicts were found and the data was combined into a single matrix for analysis due to high bootstrap values across all loci. Overly ambiguous regions were removed from the data and the minimal remaining single-gaps were treated as missing data.

![Section of the majority-rule consensus tree representing genus *Phallus*. Thickened branches in boldface indicate nodes fully or strongly supported (more than or equals to 80).](image)

The six families in the order Phallales were found to be monophyletic, including that of Phallaceae, for which *P. indusiatus* belongs. While the node representing *P. indusiatus* was not found to be strongly supported, it was not merged with any other species. More research could be done to construct a full phylogeny of the genus *Phallus* to investigate the various evolutionary relationships of the species in the genus.

### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aphrodisiac</td>
<td>a substance that increases one's libido when consumed</td>
</tr>
<tr>
<td>Cap</td>
<td>(mycology) round, cap-like structure of the fungal fruiting body that supports a spore-bearing surface also known as a pileus</td>
</tr>
<tr>
<td>Indusium</td>
<td>(mycology) a net-like 'skirt' that descends from the cap of certain stinkhorn species</td>
</tr>
<tr>
<td>Peridium</td>
<td>(mycology) protective layer that encloses a mass of spores in fungi</td>
</tr>
<tr>
<td>Saprobic</td>
<td>organism that feeds on dead or decaying organic matter</td>
</tr>
<tr>
<td>Volva</td>
<td>(mycology) cup-like structure at the base of a fungal fruiting body the remains of the peridium that encloses the immature fruiting bodies</td>
</tr>
</tbody>
</table>

### References