毛木耳

Auricularia polytricha (Mont.) Sacc.

Classification

木耳科,木耳目,擔子菌門

Auriculariaceae, Auriculariales, Basidiomycota

生境

在死枝、傷口、死樹或樹椿上 On dead branches, wound, dead trees or stump

此真菌最大的特徵為其堅韌及凝膠狀至膠質的子實 體,可以單生或叢生方式在腐木上出現。子實 體扁薄、捲曲、杯狀至耳殼狀或有時於中心 點幾個呈耳狀的子實體疊生。表面平滑 有時略有紋理或稜紋,微小柔滑或有纖 細絨毛,乾後轉為灰白色。內層平滑至 略有皺紋,新鮮時呈膠質,曬後呈黃褐 色、灰褐色、褐色、乾後轉黑且硬。 孢子無色,光滑,香腸形,大小為長 12-18 微米 × 闊 5-6 微米。

這是一種非常普遍和常見的真菌,在大自 然中負責降解已死的植物組織。因此,子實 體的存在並不會對活樹造成任何有害影響。然 而,已被分解的枯枝很容易折斷,因此建議為枯枝



This mushroom is characterized by its tough, gelatinous to rubbery fruiting bodies. It may occur singly or in clusters on dead wood. Fruiting body is thin, wavy, cup-shaped to ear-shaped or sometimes with several earlike lobes originating from a central point of attachment. Outer surface is sterile, often veined or ribbed, minute silky or with fine downy hairs, turning greyish white when dried. Inner surface is smooth to slightly wrinkled, gelatinous when wet, tan to yellow-brown, greyish brown, brown, turning blackish and hard when dried. Spores are colorless, smooth, allantoid, 12-18 μ m long × 5-6 μ m wide.

This is a very widespread and common mushroom which degrades dead plant materials. Presence of fruiting bodies will not cause any harmful effect on living trees. The partially degraded dead branches, however, are prone to snap and therefore pruning



裂褶菌

Schizophyllum commune (Fr.) Fr.

Classification

裂褶菌科, 傘菌目, 擔子菌門 Schizophyllaceae, Agaricales, Basidiomycota

生境 Habitat

在死樹幹、傷口、死樹及樹椿上 On dead trunk, wound, dead trees or stump

及乾燥時,子實體無柄、堅韌及革質。菌蓋近乎圓 形、扇形或腎形,乾身,上有密集的絨毛,白色 至灰白色或灰色, 邊緣通常是波浪形或內捲, 在 乾燥天氣下,邊緣甚至會縱裂。菌褶從中心點開始 幅射而出, 間隔均匀, 白色至灰白色, 邊緣 縱向裂開或形成縱向溝, 天氣乾燥 時,邊緣反捲。孢子無色,圓柱 形至橢圓形,表面光滑,長5.7

這種真菌主要是腐生的,但 它亦會在活樹的傷口上生 長,然後在樹皮下通過組織 蔓延,形成白腐病。如發現 枯枝上出現此真菌,應修剪枯 枝及維持定期監察

微米×寬2-3微米。

This is commonly known as split-gill mushroom and characterized by the small fan-shaped fruiting bodies growing in groups. Fruiting body is stemless, tough and leathery both fresh and dry. Cap is more or less round, fan-shaped or kidneyshaped, dry, densely hairy, white to greyish-white or grey, margin usually lobed, inrolled or even split in dry weather. Gills are radiating from point of attachment, evenly spaced, white to greyish, edges appearing split or grooved lengthwise, rolling back in dry weather. Spores are colorless, cylindrical to elliptical, smooth, $5.7\mu m \log \times 2-3 \mu m$ wide.

> This mushroom is primarily saprotrophic but it also develops on wounds of living trees and then spreads through the tissues under the bark causing white rot. Dead branches with this mushroom should be pruned and regular monitoring is recommended.



朱紅菌

Pycnoporus cinnabarinus (Jacq.) Fr.

Classification

Habitat

多孔菌科,多孔菌目,擔子菌門 Polyporaceae, Polyporales, Basidiomycota

> 在死枝、傷口、死樹或樹椿上 On dead branches, wound, dead trees or stump

這是一種香港常見的多孔菌,最鮮明 的特點是它橘紅色的擔子果。子實體 無柄,架狀,部分散佈在基質上,有時 數個子實體可聚合、接邊或瓦狀疊生; 新鮮時堅韌,乾後近乎堅硬。菌蓋半圓 形或扇形,乾身,光滑或有細毛,起皺或疣 狀,鮮橙至橙紅色或紅色,但會隨年齡增長而 褪色。管孔面與菌蓋同色,但一般不會褪色。孢子無 色,光滑,圓柱形,長5-6微米×寬2-2.5微米。

此真菌主要是腐生的,但偶爾會造成病害。它可能透過經修剪 的傷口或自然產生的傷口感染樹木。當樹木遭受壓力影響時 如乾旱、颱風、機械損傷、移植和營養不良下,便特別容易受 到傷害。這種真菌感染將導致白腐病,受影響的樹枝會容易折 斷。若有此情況發生,就可能須要進行密切的監察和作適量的

This is a common polypore in Hong Kong. The most distinctive feature is its orange red basidiocarp. Fruiting body is stemless, shelf-like, partially spreading

over the substrate, fused, attached sideways or in tiers, tough when fresh, nearly rigid when dry. Cap is semicircular or fan-shaped, dry, smooth or finely hairy, wrinkled or warty, bright orange to orange red or red, but fading in age. Pore surface is bright orange to orange-red or red, scarcely fading. Spores are colorless, smooth, cylindrical, 5-6 µm long × 2-2.5 µm

This mushroom is primarily saprotrophic but has been occasionally reported to be pathogenic. It may infect trees via pruning cuts or natural wounds. Trees that are suffered from stresses such as drought, typhoon, mechanical damage, transplanting and poor nutrition are particularly vulnerable. This fungal infection will cause white rot and the affected branches will be easily snapped. Frequent monitoring and mitigation measures such as pruning may be needed.



Hexagonia tenuis (Hook.) Fr.

Classification

多孔菌科,多孔菌目,擔子菌門 Polyporaceae, Polyporales, Basidiomycota

生境 Habitat

於活樹的死枝上或掉下的樹枝上 On dead branches of living trees or fallen branches

這種真菌的特色是其呈六角形的菌孔及薄邊的 菌蓋。子實體無柄或有短小扁型的菌腳,有 時平生只具狹小的菌蓋。菌蓋黃褐色至淡煙 褐色,半圓形,長闊皆2-10 厘米及厚1-3毫 米,新鮮時平伏貼生,乾旱時彎曲,具同心 環帶。管孔面榛子色至牛奶咖啡色, 菌孔六角 形,灰色,不規則排列,每厘米10-12個。孢 子無色,圓柱形,平滑,長11-13.5微米×寬 4-4.5 微米。

這種真菌在枯枝上非常普遍和常 見。它的出現並不會對活樹造成 任何有害影響。可是,被局部 分解的枯枝會較容易折斷, 因此建議為枯枝進行修剪。

This mushroom is distinguished by its hexagonal pores on the underside and thin edge of the cap. Fruiting body is stemless or with short resupinate foot, sometimes rather lying flat on substrate with narrow cap. Cap is yellowbrown, to pale snuff-brown, semi-circular, 2-10 cm broad and wide and 1-3 mm thick, flat when fresh, bent when dry, glabrous, concentrically zoned. Pore surface is hazel to milky-coffee with a greyish tint and irregularly arranged hexagonal pores, with 10-12 pores per cm. Spores are colorless, cylindrical, smooth, 11-13.5 µm long × 4-4.5 µm wide.

This is very widespread and common fungus on any dead branches. Its occurrence will not cause any harmful effect on living trees. The partially degraded dead branches, however, are prone to snap and therefore pruning is recommended.



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現。大多數真菌是腐生的,它們生長在落下的枝條、樹椿、葉片、腐殖質、

師、以及公眾認識它們的辨認特徵、生存策略及其出現對樹木評估的重要性。

泥土、糞便及其他碎屑上,但亦有些是寄生的,從生物中獲得營養。這單張將介紹 其中十種在香港最重要的木材腐朽真菌,並提供指引,幫助各樹木管理單位、樹藝



are neither plants nor animals but belong to a separate Fungi Kingdom on their own. They do not contain chlorophyll like green plants and they feed themselves by degrading other organic matter. A mushroom is the reproductive structure (fruiting body) of a fungus and a comparatively short-lived stage in the whole life cycle of a fungus. The main life-stage of a fungus comprises an extensive network of very fine threads, or hyphae, joining to form mycelium. Most fungi are saprotrophic which live on fallen branches, stumps, leaves, humus, soil, dung and other debris, but some are parasitic and feed on living things. In this leaflet, ten most important wood decay fungi in Hong Kong will be introduced and served as a guideline to help tree management units, arborists, as well as the public, to understand the identifying features, life strategies and the arboricultural significance.



Agriculture, Fisheries and

樹舌靈芝

Ganoderma applanatum (Pers.) Pat.

Classification

靈芝菌科, 多孔菌目, 擔子菌門 Ganodermataceae, Polyporales, Basidiomycota

生境 Habitat

於活木樹幹基部,通常在根脊接合處或舊傷 口上;或在死樹及樹椿上

At the trunk base of living trees, usually at the junction between root flare or associated with old wounds; on dead trees and stumps

這種真菌分佈範圍十分廣闊,常單生或簇生於多種的闊葉樹 和針葉樹上。它有一個有趣的特點,就是白色的菌孔表面被劃 傷後會迅速變成褐色。這創傷是永久性的,可以用於繪圖: 因此它有一個別稱 — 畫家的菌蓋。它的子實體無柄,木栓質 至木質,多年生。菌蓋表面褐色至灰褐色,無似漆樣光澤,常 具白色邊緣, 近平展和扇形, 寬闊地着生於樹上。它具同心 幼環帶,表面有時被有銹色孢子粉。管孔面白色,隨時間從泥 黄色或淡褐色轉變至橄欖色,受傷後變褐色,孔圓形,每毫米 4-5個。孢子褐色,闊卵圓形,雙層壁,內壁有小刺,長7.3-9.0 微米, 寬5.1-6.3 微米。

子實體的出現,可能表示心材的腐朽程度已經非常嚴重,且邊 材有部份腐爛的情況。樹木受樹舌靈芝感染後,在2-5年內, 健康狀況開始衰落,樹冠出現枯死現象。受感染的樹木須定期 檢查,尤其是如果該樹位於多車及行人眾多的地段,可能對生 命及財產構成威脅。如樹木已進入腐朽的後期,可建議將樹木



widespread and occurs singly or

in clusters on a very wide range of broadleaf and coniferous trees. An interesting feature of this mushroom is the rapid browning of the white pore surface when scratched. The bruising is permanent and can be used for drawing, hence having a name called Artist's conk. Fruiting body is stemless, corky to woody and perennial. Cap is brownish to grayish brown with a dull, unvarnished outer crust, often with white margin, more or less flattened and fan-shaped and broadly attached to tree. It usually has thin bands and concentric zones and the surface may be covered with dusty brown spores. Pore surface is white, becoming dirty yellowish or dingy brownish to olive in age, bruising brown, with 4-5 circular pores per mm. Spores are brown, broadly ellipsoid, double-walled, warty, 7.3-9.0 µm long and 5.1-6.3 µm wide.

Presence of fruiting bodies may indicate serious decay in heartwood and at least partial degradation in sapwood. Trees infected with G. applanatum could reach a declining stage with extensive crown dieback that could be evident in 2-5 years. Periodic monitoring of infected trees is desirable, particularly for trees located along high vehicular traffic and pedestrian area that may pose risk to people and property. Tree removal at the advanced stage of decay may also

熱帶靈芝

Ganoderma tropicum (Jungh.) Bres.

靈芝菌科, 多孔菌目, 擔子菌門 **Classification** Ganodermataceae, Polyporales, Basidiomycota

生境 Habitat 於活木樹幹基部或根部,通常見於根脊接合處; 或在死樹及樹椿上

At the trunk base or root of living trees, usually at the junction between root flare; dead trees and stumps



這是香港最常見的靈芝,特別常見於衰老、健康減弱或垂死的台灣 相思及鳳凰木。其子實體無柄或有柄,木栓質到木質,一年生。 菌蓋為黃褐色、紅褐色或紫褐色,表面具黯漆光澤,盾狀及腎 狀,不規則平面,通常有重疊的菌蓋。菌蓋邊緣扁薄,黃白色或 淡黄褐色。管孔面為污白或黄白色,管口圓形或不規則,每毫米 4-5個。孢子淡褐色,卵形,雙層壁,內壁有小刺,頂端稍微平截, 長8.4-11.4微米,寬5.2-6.9微米。

此品種和其他靈芝相似,都是可於樹幹基部或根脊找到未分化、細 小、白色和橡膠似的「按鈕」。白色的幼體最終會發展成扁平的菌 蓋。子實體的位置可顯示菌絲體在樹內的感染程度。如於樹幹基部 或根脊兩個方向以上找到子實體,應立即徵詢真菌專家的意見和使 用阻力儀器作進一步調查,確定該樹是否應該被移除或圍開,以防 止該樹在刮風和暴風雨季期間出現難以估計倒塌的可能。

This is the most common Ganoderma in Hong Kong, particularly on aged, weakened or dying Acacia confusa and Delonix regia. Fruiting body is stemless or stalked, corky to woody and annual. The cap is yellowish brown, reddish brown or purplish brown with a faintly varnished surface, shield-like, kidney-shaped, irregularly flattened and usually with overlapping caps. The cap margin is yellowish white or yellowish brown and thin. Pore surface is dirty white or vellowish white with 4-5 circular or irregular pores per mm. Spores are light brown, ovoid, double-walled, warty and slightly truncated at the apex, 8.4-11.4 µm long and 5.2-6.9 µm

Similar to other *Ganoderma*, this species can be first noticed at the trunk base or root flare by the undifferentiated, small, white and rubbery "buttons". The white primordia will eventually develop into well-defined and flattened conks. Position of the fruiting bodies will indicate the extent of mycelial infection inside the tree. If fruiting bodies are found on more than two directions of the root flare or trunk base, further investigation by a drill resistant equipment and fungal specialist should be conducted urgently to determine if the trees should be removed or fenced off to prevent the possibility of unexpected windthrow at the windy and stormy seasons

Trametes versicolor (L.) Lloyd



Classification

多孔菌科,多孔菌目,擔子菌門 Polyporaceae, Polyporales, Basidiomycota

Habitat

常一組、一列或覆瓦狀叢生於林木、樹椿及 掉落的枯枝上,有時亦會着生於活樹的傷

Typically in groups, rows or overlapping clusters on logs, stumps, and fallen branches of dead wood, sometimes also on wounds in living trees

這是一種具吸引力的菇類,它擁有顏色多變的環帶,菌蓋 覆瓦狀疊生,長成圓蓮座形。子實體革質,以一短幼幹 部連接至木上。菌蓋披細絨毛,具明顯對比色的窄同心 環帶。這些環帶可以是啞色相間的條紋,或是光潔平滑 的間隔環帶,顏色多變,由灰色、褐色至黑色,或是紅 色、紫色及赭色,有時甚至會因被寄生藻類覆蓋而呈現 綠色。邊緣為白色或奶黃色。底部由淺的菌管所覆蓋, 管口細小,每毫米3-5個。孢子白色或淡黄色,圓筒形或 香腸形,平滑,長4-6微米×寬1.5-2.5微米。

這是一種常見於倒木的腐朽真菌,但也能夠通過傷口或破損的 樹幹攻擊衰弱的樹木。它能夠產生強勁的脱木質素酶,侵害一 些已經缺水和嚴重受傷的樹木,引起海綿狀的白腐病。在一些 樹上,此真菌可能入侵樹木的形成層,造成潰瘍和枯死,此時 便須要進行定期監測和修剪等的緩減措施。

This is an attractive mushroom which has colorful bands and grows in circular rosettes with overlapping caps. Fruiting bodies are leathery and attached to the wood by a thin and short stem. The cap is covered with fine hairs, strongly zoned with narrow, concentric bands of contrasting colors. The alternating bands can be matt or shiny, ranging from gray, brown, and black, through red, violet, ocher, and sometimes enriched by green parasitic algae. The margin is white or yellow. The underside is covered by shallow tubes, ending in small pores of about 3-5 per mm. Spores are white or yellowish, cylindrical or sausage-shaped, smooth, 4-6µm long × 1.5-2.5µm wide.

This is a common rotting agent of fallen wood but is also capable of attacking weakened trees through wounds or broken trunk. It produces strong delignifying enzymes and may invade trees that are already

stressed by water shortage and severe wounding, and causes a spongy white rot. In some trees, the mushroom may invade areas of cambium, causing cankers and dieback. Mitigations such as periodic monitoring and pruning may be needed.

赤靈芝

Ganoderma lucidum (Curtis) P. Karst.

Classification

Ganodermataceae, Polyporales, Basidiomycota 靈芝菌科,多孔菌目,擔子菌門

生境 Habitat 於活木樹幹基部或根部,通常見於根脊接合處 或在死樹及樹椿上

At the trunk base or root of living trees, usually at the junction between root flare; dead trees and stumps

這是一種世界最著名的靈芝品種,它有時生於活樹基部,其紅 褐色和具油漆光澤的菌蓋最為容易辨認。在中國,它被用作傳 統醫藥已有超過2000年的歷史,視為健康和不朽的象徵。其子 實體有柄,木栓質和一年生。菌蓋為暗紅色至紅褐色,腎形, 邊緣淺裂和波浪形。上表面光滑,有光澤,具同心環帶。管孔 面早期為白色或黃白色,受傷後或老化時呈褐色,管口圓形, 每毫米4-5個。孢子褐色,卵形,雙層壁,內壁有小刺,長9-11 微米,寬6-7微米。

這種著名的靈芝一般攻擊健康減弱的活樹,並在死樹或殘餘的 樹椿上繼續他們的生命週期。子實體通常出現在有壓力、嚴重 受傷或垂死的樹木上。樹木受赤靈芝感染後,在2-5年內,健 康狀況開始衰落, 樹冠出現枯死現象。受感染樹木須要定期檢 查。如樹木已進入腐朽的後期,應建議將樹木移除。



This is the most famous mushroom in the world, widely known as Lingzhi (Chinese) or Reishi (Japanese). This mushroom occasionally occurs at the base of living trees and can be easily noticed by its red and varnished cap. It has been used as a traditional medicine in China for more than 2000 years and it symbolizes good health and immortality. Fruiting body is stalked, corky and annual. The cap is dark-red to reddish brown, kidney-shaped with lobed and wavy margin. Upper surface is smooth and shiny with concentric zones. Pore surface is white or yellowish-white when fresh, bruising or aging brown, with 4-5 circular pores per mm. Spores are brown, ovoid, double-walled, warty, 9-11 µm long and 6-7 µm wide.

This famous *Ganoderma* generally attacks weakened living trees and continues their life cycle on dead trees or stumps. Fruiting bodies usually emerges on stressed, seriously wounded or dying trees. Trees infected with G. lucidum could reach a declining stage with extensive crown dieback that could be evident in 2-5 years. Periodic monitoring of infected trees is recommended and tree removal at the advanced stage of decay may also be desirable.



Amauroderma rugosum (Blume & T. Nees) Torrend

Classification

靈芝菌科,多孔菌目,擔子菌門 Ganodermataceae, Polyporales, Basidiomycota

於樹幹或樹木基部或根部、在死樹、樹椿或泥土

At the base of living trees or roots, on dead trees, stumps or soil surface

這種真菌為暗黑色,有一獨特的腎形或半圓形, 狀。它的創傷反應比樹舌靈芝還要厲害 被劃傷後會出現明亮的血紅色。此品種 被認為是藥用「五色靈芝」中的「黑芝」。 子實體木栓質,具有一枝側生菌柄,一 年生。菌蓋具同心環,深黑褐色至暗黑 色,舊標本常整個呈暗黑色。管孔面污 白色,隨時間變成深褐色至黑色,受傷 後變紅色,管口圓形或稍不規則,每毫米 4-6個。孢子呈黄褐色或無色,近球形,長 9-11 微米, 寬7.5-10 微米。

由於此真菌在土壤和樹木上也可發現,因此其子實體的出 現並不一定代表樹木受到真菌感染。一般在死樹的樹幹或 樹旁的泥土上發現的子實體都是無害的。如發現樹根或基 部出現子實體,並有樹木腐爛相關的症狀,如樹冠枯死, 該受感染的樹木便須要接受定期檢查和實行一些緩減措施。

This mushroom has a characteristic kidney or semi-circular shaped with dull black color. The bruising reaction is even more intense than Ganoderma applanatum, giving bright bloodred color when scratched. This species is believed to be the "black Lingzhi" of the medicinal "Penta-color Lingzhi". Fruiting body is stalked and corky with a laterally-attached stem and annual. Cap has concentric rings with rich dark brown to dull black, while old specimen often turns dull black entirely. Pore surface is dirty white, becoming dark brown to black in age, bruising red, with 4-6 circular or slight irregular pores per mm. Spores are yellowish brown or colorless, subglobose, 9-11µm long and 7.5-10 µm wide.

Since this mushroom can be found on soil and tree, presence of fruiting bodies may or may not indicate fungal invasion. Fruiting bodies that grow on dead trunk or soil next to a tree are generally unharmful. If decay associated symptoms, such as crown dieback, are observed with the presence of fruiting bodies, periodic monitoring and associated mitigation of the infected tree is desirable.

有害木層孔菌(褐根病)

Phellinus noxius (Corner) G. H. Cunningham

刺革菌科,刺革菌目,擔子菌門 Classification Hymenochaetaceae, Hymenochaetales, Basidiomycota

生境 Habitat

樹幹或樹木基部或根部、在死樹或樹椿 At the base of living trees or roots, on dead trees or stumps

有害木層孔菌也稱「褐根病菌」,是一種具侵略 及破壞性的病原體。它生長於土壤中,並攻 擊敏感植物的根部。子實體無柄,木質 平坦,平伏狀,並緊貼在樹的表面。擔子 果是肉桂褐色,最後會轉變成褐灰色或深 灰色,無似漆樣光澤。管孔面灰褐至黑褐 色,每毫米6-8個圓形菌孔。孢子無色,光

滑,卵形,長3.5-5微米×闊3-4微米。子實體不常見,但可 透過觀察在受感染的根部有否形成其獨特的深褐色或黑色菌絲 面,及在莖基部周圍是否出現環狀特徵,以確認染病。朽木最 終變得蒼白,蜂巢狀,以及有褐色網紋。

受感染的樹木會出現生長緩慢、葉片 萎黄及小葉化、落葉、枝條枯死及 全株性衰弱。該樹可能於數月或 一至兩年內死亡。如發現以上特 徵,應小心分辨這些病徵是由褐 根腐病或是其它根部機能失調所 引起。受感染的樹木須由合資格 的真菌專家作進一步診斷及定期 檢查,尤其是位於多車流量及多 人行地段的樹木。如樹木已進入廢 朽的後期,應建議將樹木移除



Commonly known as brown root rot disease, Phellinus noxius is an aggressive and destructive pathogen that thrives in soils and attacks the roots of susceptible plants. Fruiting bodies are stemless, woody, flat, resupinate, and broadly attached to the tree surface. The basidiocarp is cinnamonbrown, eventually becoming brownish-grey

or dark grey, unvarnished. Pore surface is greyish to dark brown, with 6-8 circular pores per mm. Spores are colorless, smooth, ovoid, $3.5-5 \mu m \log \times 3-4 \mu m$ wide. Fruit bodies are not always seen, but infected trees are recognized by a characteristic dark brown or a black mycelial crust that forms on infected roots and develops collarlike feature around the base of the stem. Decayed wood eventually

becomes pale and honey-combed, with brown mycelial netting.

Tree infected by this pathogen exhibits slow plant growth with small and chlorotic leaves, defoliation, branch dieback and tree decline. The tree may die in months or one to two years. Cautions should be taken to distinguish symptoms of brown root rots from other malfunctions of roots. Further diagnosis by qualified fungal specialist is necessary and periodic monitoring is desirable, particularly on trees located along high vehicular traffic and pedestrian area. Tree removal at the advanced stage of decay may also be desirable.