

中国多孔菌属分类研究兼论本属分类位置

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作者对本属的研究历史和各学派间不同的见解进行了全面而系统的研究。对本属的概念总结为广义、狭义和中间三种。确定了本属的分类根据与界限, 并详细阐明了对本属分类位置的观点。

作者认为 *Lentinus*、*Panus* 和 *Pleurotus* 等三属与 *Polyporus** (狭义) 有亲缘关系, 但不主张把后者转移到伞菌目中。认为多孔菌科是一个大的自然类群, 来源虽不相同, 但有共同的菌管和形态一致的担子把它们联系在一起。对这两个类群还需要进行大量的研究, 掌握丰富的论据后, 再进一步划分新的自然类群是适当的。处理中间类型种类要谨慎。分类工作者必须认识到物种时时处在又变又不变, 又连续又间断的状态中。抓着一点概括全面是违背客观实际的, 达不到认识自然的目的。

本文共确认了本属中国已知种类 36 种。其中有 3 个新记录和 2 个新种。新种是 *Polyporus xinjiangensis* Zhao et Zhang 和 *Polyporus rosulatus* Zhao et Xu。

历史回顾与本属界限

Polyporus 是 Micheli (1729)^[1] 建立的。Fries (1821, 1836—1838, 1874)^[2-4] 都承认了这个属, 它的含义是广义的。在后一著作中共记载 227 种。Patouillard (1900)^[5] 记载本属限于菌肉白色种类, 孢子球形或卵形, 柄单生或分枝, 地生或木生。Murrill (1907)^[6] 对本属的范围也限于菌肉白色的种类, 有柄, 木生。Donk (1933, 1964)^[7, 8] 对本属的概念是菌肉白色, 并包括 *Favolus* 革肉质的种类。Pilat (1936)^[9] 把本属的大部分种类包括于 *Polyporellus* 属中。Bondarcev 和 Singer (1941)^[10] 以及 Bondarcev (1953)^[11] 都是应用 Donk 的概念。Imazeki (1943)^[12] 和伊藤诚哉 (1955)^[13] 对本属的概念是菌肉白色, 肉质, 单茎和地生。Overholts (1953)^[14] 对于本属的概念是广义的, 菌肉白色和褐色, 有柄, 无柄和平伏反卷的种类, 接受了 Fries 的广义概

念。Cunningham (1965)^[15] 对本属的概念是比较广义的, 有柄, 但不包括菌肉褐色种类。Domanski (1973)^[16] 对本属概念与 Donk 一致。除 Murrill 以 *Polyporus ulmi* Paulet (= *Polyporus squamosus* Huds. ex Fr.) 作为本属模式外, 其他学者都是以 *Polyporus suberaster* Jacq. ex Fr. 作为本属的模式。

从以上资料可以看出, 自 Fries 以后对本属的概念有了很多修订, 包括的种类范围变动是很大的。广义的概念今天已不适用。另一情况是把本属的范围划小, 划出最小的自然类群。这种努力是好的。但是, 如果划的过小, 在对本属了解还很不全面的时候, 有倾向繁琐之弊。很不方便使用。Overholts (1953, p. 163) 指出从 *Polyporus* 中已分出的 37 个属他未采用。

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* 本属与 *Polyporaceae* 其他属的亲缘关系已有另文阐述。

Pegler (1973)^[17] 在英国多孔菌检索表里使用了 63 个属, 只包括 140 种, 平均每属只有 2.2 个种。这样做太繁琐了, 是不合适的。

第三种情况是倾向于中间, 既要求自然系统, 又不过分繁琐, 也便于使用。作者认为这样考虑是适当的。Cunningham (1965) 可作为这方面的代表。

对于本属的分类依据, 自从 Corner (1932, 1953)^[18, 19] 研究了多孔菌的菌丝体型以来, 经过几十年的实践证明, 不同菌丝体型作为分属分种的依据是可靠的。Cunningham (1965) 利用不同菌丝体型作为分族 (Tribe) 和分种的条件, 不作为分属的唯一条件。一个属里可以有一种菌丝体型, 也可有两种菌丝体型。Pegler (1973) 应用综合性特征, 其中包括菌丝体型作为分属的条件。Domanski (1973) 把菌丝体型作为分属的唯一标准, 突出了菌丝体型的作用。尽管它是多孔菌分类中的重要依据, 著者尚难接受这种观点。同时因子实体的生长发育时期不同, 菌丝体型是有变化的, Corner (1953) 的研究提出了证明。孢子性状是本属分类的重要依据, 但不幸地是有不少种类很难找到孢子, 因而失去其特别重要意义。

根据实际经验, 作者对本属的概念是: 一年生。菌肉白色, 肉质到肉革质。单柄或分枝。管口圆形或多角形, 或辐射状排列。一体菌丝型 (monomitic) 或二体菌丝型 (dimitic, 生殖菌丝和缠绕菌丝)。孢子单孢无色, 平滑, 多种形状。地生或木生。模式种 *Polyporus tuberaster* Jacq. ex Fr.

本文共记载 36 种, 其中有 2 个新种, 3 个新记录。全部标本保藏于中国科学院微生物研究所真菌标本室。关于本属在中国文献中的记载是, 邓叔群 (1964)^[20] 记载

31 种; 戴芳澜 (1979)^[21] 记载 34 种并把前者的 31 种分属于 *Bondarzewia*, *Polyporellus*, *Grifola* 和 *Polyporus* 等 4 个属中。这是由于各人对分类的观点不同的结果, 本文不加评论。至于本文未包括的以上两著作中有关本属的种类, 其中少数种类应隶属于其他属, 多数种类只有名称而无标本, 这些问题必须进一步研究后再加处理。

中国已知种与新分类单位

A. 菌柄单生

B. 柄基部呈黑色或全柄呈黑色

1. 宽鳞多孔菌 *Polyporus squamosus* (Huds.) Fr.
2. 长根多孔菌 *P. radicans* Schw.
3. 草原多孔菌 *P. rhizophilus* (Pat.) Sacc.
4. 条纹多孔菌 *P. virgatus* Berk. & Curt.
5. 尖柄多孔菌 *P. nummularius* Pers.*
6. 黑柄多孔菌 *P. melanopus* (Saw.) Fr.
7. 奇异多孔菌 *P. admirabilis* Peck*
8. 新疆多孔菌 *P. xinjiangensis* Zhao et Zhang
9. 小褐多孔菌 *P. blanchetianus* Berk. & Mont.
10. 小黑多孔菌 *P. dictyopus* Mont.
11. 黄多孔菌 *P. elegans* (Bull.) Fr.
12. 异多孔菌 *P. varius* (Pers.) Fr.
13. 褐多孔菌 *P. picipes* Fr.

BB. 柄不呈黑色

14. 光斗大孔菌 *P. boucheanus* (Klotzsch) Fr.
15. 漏斗大孔菌 *P. arcularius* (Batsch ex Fr.) Ames
16. 卵孢多孔菌 *P. ovinus* Schaeff. ex Fr.*
17. 卷树掌 *P. obovatus* Jungh.
18. 冬生多孔菌 *P. brumalis* (Pers.) Fr.
19. 春生多孔菌 *P. vernalis* Fr.
20. 粘树掌 *P. glutinifer* Berk.
21. 射纹树掌 *P. gramocephalus* Berk.
22. 丛树掌 *P. aceratus* Lloyd
23. 树掌 *P. antilopos* (Kalchbr.) Lloyd

AA. 菌柄分枝或基部簇生

B. 子实体由菌核生出

24. 孤苓 *P. rhinoceros* (Cke.) Lloyd
25. 层架菌 *P. superpositus* Berk.
26. 猪苓 *P. umbellatus* (Pers.) Fr.
27. 雷丸 *P. mylittae* Cke. et Mass.

* 中国新纪录。

BB. 子实体不由菌核生出

28. 北京莲座菌 *P. rosulatus* Zhao et Xu
29. 硬树掌 *P. osseus* Kalchbr.
30. 树花 *P. fimbriatus* Fr.
31. 白树花 *P. albicans* (Imazeki) Teng
32. 亚灰树花 *P. giganteus* (Pers.) Fr.
33. 灰树花 *P. frondosus* Dicks. ex Fr.
34. 毛地花 *P. cristatus* (Pers.) Fr.
35. 地花 *P. confluens* (Alb. et Schw.) Fr.
36. 亚地花 *P. peckianus* Cke. et Mass.

新疆多孔菌 新种 图版 I-1

Polyporus xinjiangensis Zhao et Zhang sp. nov.

子实体一年生,有柄,干时轻,硬而脆,软骨质。菌盖近圆形或不规则形,单一或多个紧密相连,不呈覆瓦状,3.5—7×3—5厘米,厚3—8毫米,表面污淡白色,淡灰褐色,黑褐色到变黑色,光滑,常有纵皱,有时具放射状的稜,无环带,常裂成小块,在老的部分有疣;边缘钝或薄,完整或破裂,常内卷,下部不孕。菌肉淡白色,木材色或稍带乳黄色,厚0.2—6毫米,易成粉末。菌管通常短,不超过1毫米长,淡灰褐色,污淡白色或淡黄褐色,有时呈黑色。管口近圆形或近多角形,平均每毫米3—4个,与菌管同色。菌柄侧生或偏生,单一,圆柱形,长2—4厘米,粗7—15毫米,有时不规则形并常常多个紧密连结在一起,黑褐色到黑色。

菌丝体二体型,无色,有分枝;生殖菌丝直径2—5微米,稀有隔膜,锁状联合不清楚;缠绕菌丝直径1.5—2.5微米,厚壁,无隔膜,弯曲。孢子无色,圆柱形或狭长圆形,稍弯曲,平滑,7—8.7(10.4)×3—3.5微米(图1)。

生阔叶树干基部。

新疆:铁峰,海拔3200米,1977,6,29,卯晓岚、文华安采,39号。

本种如描述中所指出的子实体的外部性状特殊,易于识别。它与硫黄多孔菌相似,但后者无菌柄,菌盖黄色或橙黄色,孢

子椭圆形到宽椭圆形或卵圆形。因本种形态特殊,故建立为新种。

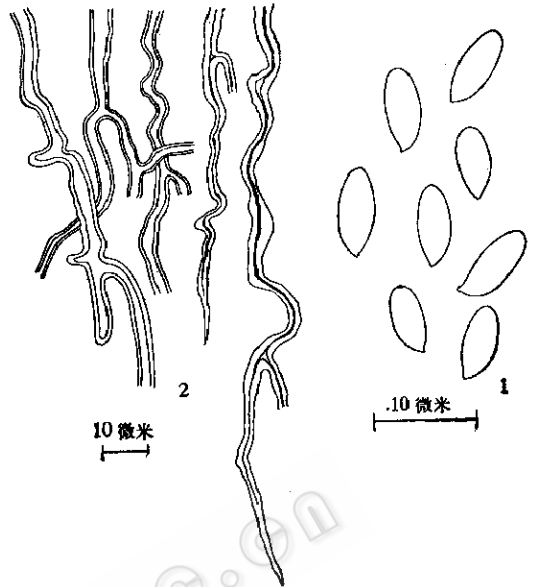


图1 新疆多孔菌 (*Polyporus xinjiangensis* Zhao et Zhang) 1. 孢子, 2. 生殖菌丝(左)、缠绕菌丝(右)(Typus 39)。

Polyporus xinjiangensis Zhao et Zhang sp. nov.

Sporophorus annuus, stipitatus, in sicco levis, rigidus et fragilis, cartilagineus. Pileus suborbicularis vel irregularis, singularis vel plures arcuato adjunctus, nec unquam imbricatus, 3.5—7×3—5 cm, 3—8 mm crassus, superficie sordide albidus, dilute cinereo-brunneus, nigro-brunneus ad nigrescens, glabrus, saepe longitudinaliter rugosus, interdum radiato-percatus, azonatus, frequenter areolatus et verruculosus in vetere parte; margine obtuso vel tenui, integro vel rupto, aliquando incurvo, fertili inferne. Contextus albidus, ligno-coloratus vel leviter cremeus, 0.2—6 mm crassus, facile pulverato. Tubuli vulgo breves, non excedentes 1 mm longi, dilute cinereo-brunnei, sordide albi vel flarido-brunnei, nonnunquam nigrescenti. Pori suborbiculares vel subangulares, 3—4 per mm, concoloribus tubulis. Stipes la

teralis vel excentricis, singularis, cylindricus, 2—4 cm longus, 7—15 mm crassus, aliquando irregularis, sed saepe plures adjunctus arete, nigro-brunneus ad nigrescens.

Systema hypharum dimiticum, hyalinum et ramosum; hyphae generatoriae, 2—5 μm diam., raro septatae, fibulis ignotae; hyphae ligantes 1.5—2.5 μm diam., luminibus, aseptatae, flexuosae. Sporae hyalinae, cylindricae vel anguste oblongae leviter curvae, laeves, 7—8.7 (10.4) \times 3—3.5 μm .

Hab. Ad basim truncorum frondosarum.

Xinjiang, Tiefeng, alt. 3200 m., 1977, 6, 29, legit. Mao Xiaolan, Wen Huaan, no. 39.

Haec species facile dignoscitur peculiari externa proprietate sporophorum, ut in diagnosi descripta. Proxima *Polyporo sulphureo* Bull. ex Fr. sed quo sessili, pileo sulphureo vel vivido-aurantiaco, sporis ellipticis ad late ellipticis vel ovoides differt.

北京莲座菌 新种 图版 I-2, 3

Polyporus rosulatus Zhao et Xu sp. nov.

子实体一年生,具短而粗不发育的柄,近肉质,薄而极脆,近圆形,宽约 18 厘米,高 6 厘米,厚 2—3 毫米,由 9 个紧密相连的菌盖组成,莲花状,中央漏斗状。菌盖一般全呈扇形或稍呈匙状,宽 5—11 厘米,趋向下部渐狭,在基部共同形成菌柄,表面淡黄褐色或污淡黄褐色,光滑或具小鳞片,有皱并有同心沟;边缘薄,常破裂,有时内卷或呈波状。菌肉淡白色,厚 0.5—1 毫米。菌管长 1—2 毫米,淡白色或淡乳黄色。管口标准地多角形,放射状排列,有时部分倾向褶状,长 1.5—5 毫米,宽 1—1.5 毫米,管壁薄;孔面淡白色到淡黄色。菌柄短而粗,长约 2.5 厘米,粗达 3 厘米,与菌管同色。

菌丝体一体型;生殖菌丝无色,分枝,

直径 3.5—7 微米,有隔膜,具薄壁和锁状联合。担子棒状,生 2 孢。孢子圆柱形,稍弯曲,有时顶端形成钩状,无色,11—12.5 \times 3.5—4.5 微米。囊状体稀少,细颈瓶状,无色,平滑,25 \times 10.5 微米(图 2)。

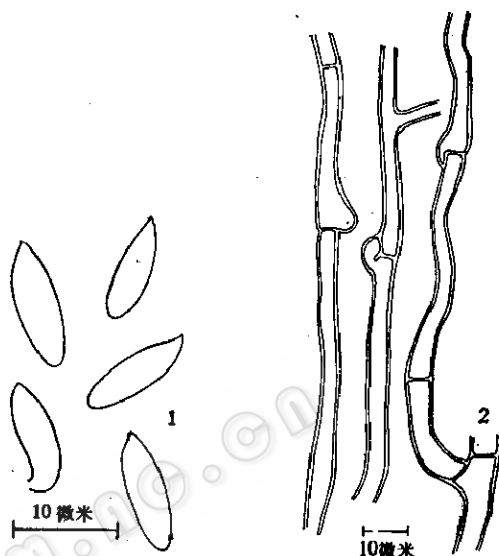


图 2 北京莲座菌 (*Polyporus rosulatus* Zhao et Xu) 1. 孢子, 2. 生殖菌丝,具隔膜和锁状联合 (Typus 1135)。

生于阔叶树干基部。

北京: 通县, 马头公社, 1979, 9, 14, 何连旺采, 1135 号。

本种的特点是由 9 个紧密相连的菌盖形成漏斗状的子实体,像莲花状,干时极脆,担子生 2 孢,孢子圆柱形,有时顶端成钩状。根据以上所指出的特征,它与本属中至今所已知的种类容易区别。

Polyporus rosulatus Zhao et Xu sp. nov.

Sporophorus annuus, brevi et crasso rudimentali stipite, fere carnosus, tenuis et fragilissimus, suborbicularis, ca. 18 cm diam., 6 cm alt., 2—3 mm crassus, constans ex 9 pileis arete adjunctis, similis fungiformi flori, in centro infundibuliformis. Pileus omnis plerumque flabelliformis vel leviter spathulatus, 5—11 cm latus, inferiorem partem versus

angustatus, basi stipite communiter, superficie luteolo-brunneus vel sordide luteolo-brunneus, glabatus vel squamulosus, rugosus et concentricalliter sulcatus; margine tenui, frequenter rupto, interdum incurvo vel undulato. Contextus albidus, 0.5—1 mm crassus. Tubuli 1—2 mm longi, albidi vel dilute cremei. Pori typice angulares, radiantes dispositi, aliquando partibus vergentes versus lamellatum, 1.5—5 mm longi, 1—1.5 mm lati, dissepimentis tenui; superficies porus albidus ad luteolus. Stipes brevis et crassus, ca. 2.5 cm longus, usque ad 3 cm crassus, concoloribus tubulis.

Systema hypharum, monomiticum; hyphae generatoriae hyalinae, ramosae, 3.5—7 μm diam., septatae, membrana tenui et fibulis. Basidia clavata, 2 sporas in sterigmatis gerentia. Sporae cylindricales, leviter curvatae, interdum apice unciformi, hyalinae, 11—12.5 \times 3.5—4.5 μm . Cystidium raro, ampulliforme, hyalinum, laeve, 25 \times 10.5 μm .

Hab. Ad basim truncorum frondosarum.

Beijing: Tongxian, Matou Commune, 1979, 9, 14, He Lianwang no. 1135.

Facillime dignoscenda species sporophoro constanti ex 9 pileis arcte adjunctis, infundibuliformi, smili flori fungiformi, in sicco fragilissimo, 2 sporis in sterigmatibus gerentia, sporis cylindricalibus, interdum apice unciformi. Fide secundum characteribus super indicatis a speciebus huius generis adhuc cognitae bene diversa.

对本属分类位置的讨论

1. 关于担孢子的形态在多孔菌分类上的重要性是没有异议的。由于这一类群来源不同,因而在同一属里孢子的类型常常不完全一致。

在 *Polyporus* (Micheli) Fr. 同一名称

下,各专家有不同的概念,如: Overholts (1953) 记载孢子无色到褐色,平滑或粗糙,有各种形状。邓叔群 (1964) 记载孢子无色,椭圆形或卵形,罕球形而有刺。Cunningham (1965) 记载孢子无色,各种形状,平滑或若干种类有小疣。Domanski (1973) 记载孢子无色,椭圆形到圆柱形,平滑。Singer (1975)^[22] 记载孢子无色,大多数圆柱形或圆柱形到椭圆形到长圆形,更稀有椭圆形到长圆形或纺锤形,有时稍呈腊肠形弯曲,平滑。所以只根据单一孢子类型不能作为本属的分类根据。而且实践证明有些种类很难找到它们的孢子。Singer (1975) 的 *Polyporus* 亚属,只包括 34 个种,它们孢子之间的差异也是很大的。所以 Overeem (1924, 1925)^[23,24] 只根据 *Polyporus* 少数种类的孢子与 *Pleurotus* 的大孢子种类相似,把外部形态完全不同的种置于同科 (*Pleurotaceae*) 中,从属伞菌目是不恰当的。

2. 关于利用菌髓 (trama) 和子实下层 (subhymenium) 的特性作为分类的依据,可参考的资料是很少的。因为这种性状随着子实体的发育时期不同变化比较大。在伞菌中菌髓性状还得到一定的重视,而利用子实下层作分类依据则比较少。但是, Bondarcev 和 Singer (1941) 以及 Singer (1949)^[25] 却很重视这两种性状,成为 *Polyporaceae* 归属伞菌目的重要依据。

根据作者的研究结果,在 *Pleurotus* 同一属内,因种类不同,菌髓的构造也不相同。如, *Pleurotus ulmarius* 的菌髓菌丝近平行 (图版 I-4), 而 *Pl. citrinopileatus*, *Pl. ostreatus* 和 *Pl. sapidus* 的菌髓菌丝则是交织的 (图版 I-5)。Singer (1975) 记载 *Pleurotus* 的菌髓菌丝完全不规则。同样,在 *Lentinus* 属中,如, *L. edodes* 在同一子实体中的菌髓菌丝有的近平行,有的

则成交织(图版 I-6, 图版 II-1)。*L. adhaerens* 的菌髓菌丝是平行的(图版 II-2)。而 *L. tigrinus*、*L. sajor-caju* (图版 II-3) 和 *L. cyathiformis* 的菌髓菌丝则是交织的。Singer (1975) 记载 *Lentinus* 菌髓菌丝不完全不规则, 但在幼小标本里菌髓的菌丝近平行或交织在一起。以上所指出的是与 Singer (1975) 记载不同之处。另外, *Polyporus squamosus* 和 *Panus rudis* 的髓层菌丝都是交织的(图版 II-4, 5)。至于, 子实下层的构造除在 *Pleurotus* 属中的种类中发育比较良好外, 在 *Lentinus*、*Panus* 和 *Polyporus* 三属中都不很发育, 很不容易分清楚。总之, 从文献记载中和我们的研究结果都说明这两种性状因变化很大都不能作为分类的重要性状。把它们作为 *Polyporus* 归属伞菌目的重要依据是很不适当的。

3. Kühnel (1929, 1962)^[26, 27] 先后研究了 *Lentinus cyathiformis* 和 *L. adhaerens* 的菌丝体型。作者研究了 *Pleurotus ulmaricus* 的菌丝体型(图版 II-6)。Corner (1923, 1953) 研究了多孔菌的菌丝体型。特别对于 *Polyporus squamosus* 研究的详细, 发现这种早期只有生殖菌丝, 后来则从前者发育出缠绕菌丝。Cunningham (1965)、Domanski (1973) 都对 *Polyporus* 属的菌丝体型进行了详细研究。作者对本属也同样进行了细致的研究, 其结果是一致的。Singer (1975) 比较详细地记载了 *Pleurotus* 属的菌丝体型, 并指出伞菌中各经典科(classical families) 就目前所知都是一体菌丝型。这说明 *Polyporus* 和 *Pleurotus* 两属的菌丝体型有共同之处。也说明 *Pleurotus* 属在伞菌中处于孤立的地位。但是, 作者比较同意 Donk (1964) 的意见。他指出 Singer 把 *Polyporus* 转移到伞菌中证据不够。对 *Polyporus* 和 *Lentinus* 的菌丝构造知道的尚少。在这种情况下保持人为的多

孔菌科是适宜的。直到有较好的基础才有变动的可能。

4. 若对于 Singer (1975) 的 *Polyporaceae* 略加分析, 不难看出这一科不是一个自然科, 很不能说明它们之间的亲缘关系。科下分 *Polyporeae* 和 *Lentineae* 两个族。前者包括 *Polyporus*、*Pseudofavolus* 和 *Mycobonia* 三个属, 后者包括 *Pleurotus*、*Lentinus*、*Panus*、*Phyllotopsis* 和 *Geopetalum* 等五个属。它们的子实层体从菌管一放射状脉纹一菌褶。*Polyporus* 属包括 *Polyporus* 和 *Asterochaete* 两亚属。前者菌肉白色和褐色, 后者具有带色的分枝或撕裂的刚毛。*Pseudofavolus* 是一个不确切的属。Cunningham (1965) 记载此属都是三体菌丝型(trimitic)。Mycobonia 已被归属于 *Stereaceae* (Ainsworth, 1971)。从以上所指出的, Singer 的这种处理是不能令人满意的。

5. 多孔菌科是一个很大的自然类群。全世界已达 600 多种。各地都有发生。虽然它们的来源不同, 但它们有共同的显著菌管和形态一致的担子把它们联系在一起。虽然 *Polyporus* (狭义) 与 *Pleurotus*、*Lentinus* 和 *Panus* 等三属有一定亲缘关系, 但是在大多数种类尚未研究清楚之前就急于把 *Polyporus* 转移到伞菌目中这是不恰当的。

至于 Locquin (1957)^[28]、Kreisel (1960)^[29]、Singer (1961)^[30] 先后企图建立 *Poriaceae*, *Poriales* 和 *Coriolaceae* 等新科、新目以解决多孔菌科未被转移的种类, 但也是不可能的。因为前者新科、新目都是无效发表, 而后者也只能包括很少的革质种类。总之, 要掌握大量的可靠材料后再进一步划分自然类群是适当的。处理中间类群种类必须谨慎进行。

分类工作者要认识到物种是处在又变又不变与又连续又间断的状态中。分类是

通过共性与特性的对立对比而进行的。任何片面强调个别性状或抓住一点概括全面的思想方法,显然是违背客观实际的,达不到认识自然的目的。

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ON THE GENUS *POLYPORUS* OF CHINA AND ITS TAXONOMIC POSITION

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It is well known that the genus *Polyporus* is a large and complicated group. Since it was established by Micheli in 1729 about 250 years have passed. During this period it has been studied by numbers of taxonomists throughout the world. The generic diagnostic characters have been changed to a considerable degree. As different taxonomists are of different opinions on its taxonomy, none of the systems proves satisfactory. For the genus *Polyporus* (Micheli) Fr., the concept varies with different taxonomists, erroneous or confused and conflicting opinions are no doubt extant. For this reason an intensive study should be undertaken. The present paper is an attempt for this purpose with particular attention paid to its natural system.

According to the existing literature there are chiefly three kinds of concept for the taxonomy of this genus: (1) Under *Polyporus* sensu lato, based on Fries system, it includes all annual species with white or brown context, either sessile or stipitate. This system was accepted by Overholts (1953); (2) The genus was subdivided by some authors into many smaller genera in order to make the system more natural. However, Overholts (1953) noted that 37 genera segregated from *Polyporus* by many investigators were not accepted by him.

Pegler (1973) recognized 63 genera in the key to British *Polyporus* in which only 140 species were included. It is

splitting too much to be applicable for the mycological students; and (3) Cunningham's system (1965) seems to be plausible. His system aims at both the naturalness and its applicability. The present writers tend to have the same point of view.

The generic delimitation prepared in the present paper is confined to those fungi which are annual with white flesh to flesh-coriaceous context, simple or branched stipe, circular to angular and radiating pores, simple, smooth and hyaline spores which are various shapes, monomitie or dimitie hyphal systems, and growing on ground or on wood.

According to the literature, the concept regarding the taxonomic position of this genus it may be grouped into (1) some taxonomists consider that *Polyporus* sensu stricto is allied to the genera *Lentinus*, *Panus* and *Pleurotus* and it should be transferred to Agaricales according to Locquin (1957), Kreisel (1961) and Singer (1959, 1962, 1975), and (2) some others such as Donk (1964) and Domanski (1973) also recognize the affinity of these two groups, but they do not agree with transferring *Polyporus* to Agaricales.

The following is the present writers' view regarding the taxonomic position of this genus *Polyporus*:

(1) The spore feature proves always to be the most important both in generic and specific circumscription in *Polyporus*.

But because its constituent species are of different origins, the spore types accordingly vary. This fact has already been explained by many authoritative taxonomists, as one spore type could not be representative of the whole genus. Of course, it is unsatisfactory to place a few species of *Polyporus squamosus* group and the big-spored species group of *Pleurotus* together into the family Pleurotaceae as by Van Overeem (1924, 1925).

(2) In accordance with Bondarev & Singer (1941) and Singer (1949) the trama, and subhymenium of hymenophore were used as the most important basis of transferring *Polyporus* to Agaricales because of their similar structure. But these characters are very much complicated and changeable. As a result of our study, it has shown that the trama structure of *Pleurotus ulmarius* is subparallel to parallel and of *P. sapidus*, *P. ostreatus* and *P. citrinopileatus* clearly interwoven. In a same sporophore of *Lentinus edodes* the trama structure of the long gills is interwoven but of the short gills subparallel to parallel. In *L. adhaerens* it is parallel and in *L. tigrinus*, *L. sajor-caju* and *L. cyathiformis* truly interwoven.

The subhymenium develops well only in *Pleurotus* and in *Lentinus* and *Panus* it is always more or less or little developed. In *Polyporus* both trama and subhymenium are so little understood so far that they would not be used as the useful characters.

As mentioned above the trama and subhymenium are much changeable not only within the same genus but likewise in the same sporophore. Moreover, in different development stages of the same species this structure is also variable. It can be seen clearly that these characters are of little value in taxonomy.

(3) Kühnel (1929, 1962) and Corner (1953) studied the structure of hyphal systems of *Lentinus cyathiformis*, *L. adhaerens* and *Polyporus squamosus*, respectively. Singer (1975) also mentioned the hyphal systems of *Lentinus*, *Panus* and *Pleurotus*. They all came to same conclusion that *Polyporus* sensu stricto is allied to the above three agaric genera, owing to the similarity in their hyphal systems. In particular, Singer (1975) pointed out that in addition to *Lentinus*, *Panus* and *Pleurotus*, all classical families of Agaricales are monomitic in their hyphal systems. As a matter of fact the hyphal system of these two groups seems to have certain relationships. But this could not be considered as the only most important generic character, because so little is known about their hyphal structure. Furthermore, this structure is changeable. For example, Corner (1953) pointed out that in early stage of *Polyporus squamosus* its sporophore consists only of generative hyphae, but in later the binding hyphae develop well from the generative hyphae. The differences in the hyphal characters of these genera are certainly not easy to understand clearly.

As to the species included Polyporaceae of Singer (1975), they are various. The types of their hymenophore vary from tubes to radiating veins and to lamellae. Under the subgenus *Polyporus* it may be noticed that the context is white or brown, and under the subgenus *Asterochaete*, However, the species always with colored and branched setae. The genus *Mycobonia* has been attributed to Stereaceae (Ainsworth 1973, p. 562) and the genus *Pseudofavolus* with trimitic hyphal systems (Cunningham 1965, p. 182). And so this family in the sense of Singer is not a natural one.

In conclusion, Polyporaceae is a large

natural group, the species of which all produce the tubes and holobasidia. About 600 species have been reported throughout the world, among which only 42 species are transferred to Agaricales by Singer (1975) and how to arrange the large number of species left out of it has been a most difficult problem. Although Singer (1961) proposed to found a new family Coriolaceae to include those species which were not transferred, it is still not much of help to solve this problem. Locquin (1957) and Kreisel (1962) also intended to solve this difficult problem and established new family Poriaceae and new order Poriales, unfortunately they are all not validly published. It should be pointed out that taxonomists would be careful in arranging intermediate species.

Indeed, the affinity of *Polyporus* sensu stricto with *Pleurotus*, *Lentinus* and *Panus* has clearly been demonstrated. But it must be remembered that a great deal of important information about them is still lacking at the present time and there is doubtlessly a great need for a natural

classification of the family Polyporaceae. Consequently a large work should be done in the future.

At last the writers think that no system could be accepted as final until the interrelationships of its components are fully known. It would be a great mistake, however, to assume that any thing is final or definite. There is yet a long way towards a full systematic understanding of such complicated group, Polyporaceae. In case if the writers' points are mistaken they will gladly accept with gratitude any criticisms.

In the present paper 36 species are presented, of which 3 species are first recorded from China and 2 as new species. The specimens examined were collected by the writers and other comrades from 25 Chinese provinces in the past several years and the named specimens in the Herbarium of our Institute were also inspected by us. All the materials cited are deposited in the Mycological Herbarium of Institute of Microbiology, Academia Sinica, Beijing.