

## 中国灵芝亚科的分类研究

赵继鼎 徐连旺 张小青

(中国科学院微生物研究所, 北京)

著者研究了大量标本和参考了国内外重要文献之后, 共确认了中国灵芝 53 种, 1 个变种和 1 个变型, 并提出了灵芝类群较合理而便于使用的分类系统。以亚科等级隶属多孔菌科。亚科下包括灵芝和假芝两属。灵芝属下分灵芝和紫芝两组。灵芝组下再分灵芝和粗皮灵芝两亚组。紫芝组下再分紫芝和树舌两亚组。本文共记载 1 个新组, 9 个新种和 2 个新改级。它们是: *sectio nova*, *Phaeonema*; *species novae*, *Ganoderma hainanense*, *G. calidophilum*, *G. atrum*, *G. rotundatum*, *G. ienue*, *G. sinense*, *G. austrofujianense*, *G. luteomarginatum* et *Amauroderma fujianense*, *gradus novi*, *subsect. Trachyderma* et *subsect. Elfvingia*.

灵芝属 (*Ganoderma*) 是 Karsten (1881)<sup>[1]</sup>建立的。当时只包括灵芝(*Ganoderma lucidum*) 一个种。Patouillard (1889)<sup>[2]</sup>确立了本属的广义概念。他把本属分成两个组, 即灵芝组 (Section *Ganoderma*) 和假芝组 (Section *Amauroderma*)。灵芝组中包括树舌一类的种类。该文记载了 48 种。Patouillard (1900)<sup>[3]</sup>的重要著作中仍把本属分为两组。Karsten (1889)<sup>[4]</sup>建立了树舌属 (*Elfvingia*)。Murrill (1905)<sup>[5,6]</sup>建立了假芝属 (*Amauroderma*)。Donk (1933)<sup>[7]</sup>把灵芝属提升为灵芝亚科 (*Ganodermoideae*)。Imazeki (1952)<sup>[8]</sup>把他的(1939)<sup>[9]</sup>粗皮灵芝亚属 (*Subgenus Trachyderma*) 提升为属的等级。伊藤诚哉(1955)<sup>[10]</sup>成立多孔菌科中的灵芝族 (*Ganodermeae*)。它包括灵芝, 树舌, 粗皮灵芝和假芝四个属。Donk (1948)<sup>[11]</sup>把灵芝亚科提升为科 (*Ganodermataceae*)。他(1964)<sup>[12,13]</sup>在灵芝科中包括灵芝和假芝两个属。Cunningham (1965)<sup>[14]</sup>把假芝属、灵芝属和树舌属分别隶属于多孔菌亚科 (*Polyporoideae*) 和层孔菌亚科 (*Fomitoidae*) 中。Ainsworth & Bisby (1971)<sup>[15]</sup>的灵芝科

中包括灵芝、树舌和假芝三个属, 共 105 种。Pelger (1973)<sup>[16]</sup>的灵芝科包括灵芝, 假芝和树舌三个属。记载世界已报道的灵芝属约 60 种, 假芝属约 45 种, 树舌属约 6 种, 共约 111 种。

我国历代医药学家都认为灵芝是滋补强壮, 扶正培本的珍贵药材。近年来许多医疗单位临床实验结果证明, 灵芝对慢性支气管炎等数种疾病有不同程度的疗效<sup>[17]</sup>。

灵芝古称瑞草。李时珍《本草纲目》一书<sup>[18]</sup>中有许多记载。吴其浚<sup>[19]</sup>“植物名实图考长编”也有灵芝的记载。

近代关于灵芝的记载是: 贾祖璋等 (1935)<sup>[20]</sup>, 周宗璜等 (1935)<sup>[21]</sup>, Lohwag (1937)<sup>[22]</sup>, 邓叔群 (1939, 1964)<sup>[23,24]</sup>, 戴芳澜<sup>[25]</sup>等共记载灵芝和假芝两属 36 种, 1 变种, 1 变型。著者在这项研究中又鉴定了大量标本, 并参考了国内外重要文献, 共确认了以上两属 53 个种, 1 个变种和 1 个变型。分布 24 省。其中 9 个种是中国的新记录。

本文于 1978 年 11 月 8 日收到。

著者在这里承认亚科等级, 隶属多孔菌科 (Polyporaceae)。根据本亚科孢子的特殊构造, 菌肉的颜色, 菌盖皮壳的构造, 子实体有无似漆样的光泽, 菌柄的有无与其着生方式以及管口大小等特征的分析, 并参考生态与分布和前人研究的结果, 提出

了较合理而便于使用的分类系统。今后, 还要随着研究的进展, 不断地加以修正, 使它更趋于完善。

本文共记载 1 个新组, 9 个新种和 2 个新改级。全部标本保藏于中国科学院微生物研究所。

## 分类系统<sup>[26-33]</sup>

### 灵芝亚科分类系统检索表与中国已知种

- A. 灵芝属 *Gen. Ganoderma* Karst.<sup>[34-36]</sup>, 孢子卵形或顶端平截。
  - B. 灵芝组 *Sect. Ganoderma*, 菌肉白色、淡白色、木材色或形成两层, 上层白色, 下层淡褐色到褐色。
    - C. 灵芝亚组 *Subsect. Ganoderma*, 菌盖皮壳形成栅栏状组织。
      - D. 孢子内壁有显著的小刺。
        - 1. 灵芝 *G. lucidum* (Leyss. ex Fr.) Karst.
        - 2. 海南灵芝 *G. hainanense* Zhao, Xu et Zhang
        - 3. 喜热灵芝 *G. calidophilum* Zhao, Xu et Zhang
        - 4. 黑灵芝 *G. atrum* Zhao, Xu et Zhang
        - 5. 咖啡灵芝 *G. coffeatum* (Berk.) J. Furtado
        - 6. 弱光泽灵芝 *G. curtisii* (Berk.) Murr.
        - 7. 黄灵芝 *G. luteum* Steyaert
        - 8. 无柄灵芝 *G. sessile* Murr.
        - 9. 大圆灵芝 *G. rotundatum* Zhao, Xu et Zhang
        - 10. 松杉树芝 *G. tsugae* Murr.
        - 11. 内蒙灵芝 *G. mongolicum* Pilat
      - DD. 孢子内壁小刺不清楚或无小刺
        - 12. 紫光灵芝 *G. valesiacum* Boud.
        - 13. 薄树芝 *G. capense* (Lloyd) Teng
        - 14. 密纹薄芝 *G. tenue* Zhao, Xu et Zhang
        - 15. 弯柄灵芝 *G. flexipes* Pat
        - 16. 鹿角芝 *G. amboinense* (Lam. ex Fr.) Pat.
    - CC. 粗皮灵芝亚组 *Subsect. Trachyderma* (Imazeki) Zhao, Xu et Zhang  
菌盖皮壳不形成栅栏状组织。
      - 17. 粗皮灵芝 *G. tsunodae* (Yasuda) Trott.
  - BB. 紫芝组 *Sect. Phaeonema* Zhao, Xu et Zhang, 菌肉全部均匀褐色, 深褐色至栗褐色。
    - C. 紫芝亚组 *Subsect. Phaeonema*, 菌盖皮壳形成栅栏状组织。
      - D. 孢子内壁有显著的小刺
        - 18. 紫芝 *G. sinense* Zhao, Xu et Zhang
        - 19. 硬孔灵芝 *G. duropora* Lloyd
        - 20. 闽南灵芝 *G. austrofujianense* Zhao, Xu et Zhang
        - 21. 黄边灵芝 *G. luteomarginatum* Zhao, Xu et Zhang
        - 22. 背柄紫芝 *G. cochlear* (Bl. & Nees) Bres.
        - 23. 拱状灵芝 *G. fornicatum* (Fr.) Pat.
        - 24. 热带灵芝 *G. tropicum* (Jungh.) Bres.
        - 25. 黄褐灵芝 *G. fulvellum* Bres.
        - 26. 伞状灵芝 *G. subumbraculum* Imazeki
      - DD. 孢子内壁小刺不清楚或无小刺
        - 27. 小孔栗褐芝 *G. balabacense* Murr.

28. 狭长孢灵芝 *G. boninense* Pat.

29. 无柄紫芝 *G. mastoporum* (Lev.) Pat.

30. 赭漆灵芝 *G. ochrolaccatum* (Mont.) Pat.

CC. 树舌亚组 Subject, *Elfvigia* (Karst.) Zhao, Xu et Zhang 菌盖皮壳不形成栅栏状组织。

D. 孢子内壁有显著小刺

31. 树舌 *G. applanatum* (Pers. ex Gray) Pat.

32. 树舌有柄变种 *G. applanatum* var. *gibbosum* (Bl. & Nees) Teng

33. 黄孔树舌 *G. oroflavum* (Lloyd) Teng

34. 南方树舌 *G. australe* (Fr.) Pat.

35. 白皮壳树舌 *G. leucophaeum* (Montg.) Pat.

36. 层迭树舌 *G. lobatum* (Schw.) Atk.

DD. 孢子内壁小刺不清楚或无小刺

37. 胶纹树舌 *G. koningsbergii* (Lloyd) Teng

38. 橡胶树舌 *G. pseudoferreum* (Wakef.) Over. & Steinm.

39. 长管树舌 *G. annulare* (Fr.) Gilbertson

40. 硬皮树舌 *G. tornatum* (Pers.) Bres.

41. 褐孔树舌 *G. subornatum* Murr.

AA. 假芝属 *Gen. Amauroderma* (Pat.) Torrend<sup>[37]</sup>, 孢子球形或近球形。

D. 孢子内壁有明显小刺

42. 长柄假芝 *A. longipes* (Lev.) Pat.

43. 福建假芝 *A. fujianense* Zhao, Xu et Zhang

DD. 孢子内壁小刺不清楚或无小刺

44. 黄肉假芝 *A. scopulosum* Bres.

45. 小孢假芝 *A. juxtarugosum* Lloyd

46. 黑假芝 *A. niger* Lloyd

47. 黑漆假芝 *A. macer* (Berk.) Pat.

48. 白肉假芝 *A. auriscalpium* (Pers.) Pat.

49. 假芝 *A. rugosum* (Bl. & Nees) Bres.

50. 亚假芝 *A. subrugosum* Bres. et Pat.

51. 皱盖假芝 *A. rude* (Berk.) Pat.

52. 光假芝 *A. salebrosum* Lloyd

53. 大孔假芝侧柄变型 *A. bataanense* f. *lateralis* Bres.

54. 光粗柄假芝 *A. conjunctum* Lloyd

55. 粗柄假芝 *A. elemerianum* Murr.

## 新分类单位与新改级

### 1. 紫芝组 新组

Sect. *Phaeonema* Zhao, Xu et Zhang, sect. nov.

Contextus aequaliter brunneus, valde brunneus ad castaneus omnino. Typus sectionis: *G. sinense* Zhao, Xu et Zhang

菌肉全体均匀地褐色, 深褐色至栗褐色。

### 2. 大圆灵芝 新种

*Ganoderma rotundatum* Zhao, Xu et Zhang, sp. nov.

Sporophorus sessilis, suberoso-ligno-

sus, imbricatus, usque ad 43 cm. diam., basi ad 7 cm. crassus. Pileus suborbicularis vel subflabelliformis, 17—21 cm. latus, superficie obscure purpureo-brunneus vel sordide rufo-brunneus, laccatus vel parum laccatus, concentrice sulcatus et zonatus, laevigatus; margine obtuso, integro vel leviter undulato. Contextus usque ad 2.5 cm. crassus, indistincte stratosus, strato superiore dilute albido ad ligno-colorato, prope tubulorum straturam dilute brunneo ad brunneo. Contextus

hyphae hyalinae ad albidiae vel parum brunneae, ramosae, 1.5—5.2  $\mu$  diam., ad apices hypharum crassarum aliquando attenuatae, non septatae et fubulis destitutae. Tubuli usque ad 2.5 cm. longi, non stratosi, sordide brunnei ad brunnei vel cinnamomei. Pori suborbiculares, dispimentis marginibus crassioribus et integris, 4—5 per mm. Sporae ovoideae vel apice truncatae, episporis hyalinis, laevibus, endosporis distincte echinulis, dilute brunneae, 6.9—8.7  $\times$  5.2—6.5  $\mu$ .

Ad caudicem arboris frondosae

Species nova sporophoro sessili, imbricato, basi angusto connexo, substrato laxiuscule adhaerens, usque ad 43 cm. diam., basi ad 7 cm crasso; sporis minoribus et distincte echinulis. A speciebus huius generis adhuc cognitae bene diversa.

子实体无柄，木栓质到木质，覆瓦状，基部连结，围绕基物形成圆形，疏松地附着在基物上，直径达 43 厘米，基部最厚达 7 厘米。菌盖略圆形或近扇形，宽 17—21 厘米，厚 1.5—3 厘米，表面暗紫褐色或污红褐色，稍有光泽到有光泽，有显著的同心环沟和环带，平滑；边缘钝，完整或稍呈波状。菌肉厚达 2.5 厘米，形成不明显的两层，上层淡白色到木材色，下层淡褐色到褐色；菌丝无色到淡白色或微带褐色，有分枝，直径 1.5—5.2 微米，粗菌丝有时顶端尖细，无隔膜，无锁状连合，薄壁到厚壁。菌管长达 2.5 厘米，不分层，污褐色到褐色或肉桂色。管口略圆形，管壁较薄，污白色到淡褐色，每毫米 4—5 个。孢子卵形或顶端平截，形状比较一致，双层壁，外壁无色，平滑，内壁小刺显著，淡褐色，6.9—8.7  $\times$  5.2—6.5 微米。[见图版 I-1，图 1-(1)]

生于阔叶树木桩上。

海南岛：坝王岭，雅加林场，1977，4 月，林场工人同志送 HN1083(模式 Typus)。

这个种的特点是子实体无柄，覆瓦状，基部连结在一起，围绕基物形成圆形，直径达 43 厘米，基部厚达 7 厘米；孢子较小，内壁有显著小刺。以上所指特征与本属至今所知种类容易区别。

### 3. 黑灵芝 新种

*Ganoderma atrum* Zhao, Xu et Zhang, sp. nov.

Sporophorus annuus, stipitatus, suberosus-lignosus. Pileus dimidiatus vel suborbicularis, applanatus vel subunguliformis, 2—4.5  $\times$  2—6.5 cm., 0.8—2 cm. crassus, superficie ater vel sordide rubro-nigrus, non laccatus vel leviter laccatus, concentrice sulcatus vel indistinctus, saepe longitudinaliter rugulosus; margine obtuso vel leviter truncato. Contextus 0.2—1 cm crassus, dilute brunneus vel intense ligno-coloratus, vulgo prope tubulorum straturam intense coloratus; context hyphae hyaline ad dilute luteo-brunneae vel brunneae, ramosae, 1.5—6  $\mu$  diam., non septatae et fibulis destitutae. Tubuli 0.3—1 cm. longi, dilute brunnei. Pori suborbiculares, obscure rufo-brunnei, 5—6 per mm.. Stipes dorsalo-lateralis vel dorsalis, 10—23 cm. longus, 0.3—0.7 cm. crassus, cylindricus, tortus, inaequalis, interdum subtorulosus, concolore pileo. Sporae ovoideae, frequenter apice obtuso, interdum apice truncato, episporis hyalinis, laevibus, endosporis echinulis, dilute brunneae, 8—10.5  $\times$  5.5—7.5  $\mu$ .

In silvis ad caudes arborum frondosarum.

Haec species facile dignoscitur sporophoro obscurato-nigro, vixlaccato, stipite usque ad 23 cm. longo. Affinis *Ganodermati hainanensi* Zhao, Xu et Zhang et *G. calidophilo* Zhao, Xu et Zhang, sed illa differt sporophoro polymorpho, pileo non obscurato-nigro; hic differt sporis majoribus et poris albidis.

子实体 1 年生，有柄，木栓质到木质。

菌盖扁平或近马蹄形, 半圆形或近圆形, 2—4.5×2—6.5 厘米, 厚 0.8—2 厘米; 表面乌黑色或乌红黑色, 无光泽或稍有光泽, 有或无同心环沟, 常有轻微的纵皱; 边缘较厚或稍呈截形。菌肉厚 0.2—1 厘米, 上层深木材色或淡褐色, 下层褐色; 菌丝无色到淡黄褐色或褐色, 有分枝, 直径 1.5—6 微米, 无隔膜, 无锁状连合, 通常壁厚。菌管长约 0.3 厘米, 淡褐色到褐色。管口近圆形, 管壁较薄, 污褐色, 每毫米 5—6 个。菌柄背生或背侧生, 长 10—23 厘米, 粗 0.3—0.7 厘米, 圆柱形, 弯曲, 常粗细不等或近似念珠状, 与菌盖同色。孢子卵形, 多一端圆钝, 有时顶端平截, 外壁无色, 平滑, 内壁有小刺, 淡褐色, 8—10.5 × 5.5—7.5 微米。[见图版 1-2, 图 1-(2)]

生于林中阔叶树木桩上。

海南岛: 坝王岭, 雅加林场, 海拔 800 米, 1977, 4 月, 韩树金等 6 人采 HN 825 (模式 Typus), HN 829。

这个种的特点是子实体呈乌黑色, 几乎没有光泽, 菌柄长达 23 厘米。它与 *Ganoderma hainanense* Zhao, Xu et Zhang 的区别为后者子实体多态型, 菌盖表面非乌黑色。它与 *Ganoderma calidophilum* Zhao, Xu et Zhang 的区别为后者, 孢子较大和管口淡白色。

#### 4. 海南灵芝 新种

*Ganoderma hainanense* Zhao, Xu et Zhang, sp. nov.

Sporophorus annuus vel perennis, stipitatus, suberoso-lignosus. Pileus dimidiatus, suborbicularis vel reniformis, applanatus vel subunguliformis, 1.5—5.5 × 1.5—4.5 cm, 1—2.2 cm crassus, superficie fufo-brunneus ad nigro-brunneus, purpureo-rufus ad purpureo-brunneus laccatus, distincte concentric sulcatus, longitudinally rugosus; margine obtuso vel truncato, integro. Contextus

0.1—0.2 cm crassus, obscure stratosus, strato superiore ligno-colorato vel flavo-brunneo, prope tubulorum straturam brunneo ad dilute brunneo. Contextus hyphae hyalinae ad dilute brunneae vel brunneae, ramosae, sed plures ramosae cum hyphis tenuioribus, 2—5 μ diam, non septatae, fibulis destitutae. Tubuli 0.3—2 cm longi, haud distincte stratosi, brunnei. Pori suborbiculari vel orbiculari, sordide albidii, dilute brunnei vel brunnei, 4—6 per mm. Stipes dorsalis, dorsalo-lateralis, cylindricus, inaequalis, interdum subtorulosus, 4—15 cm longus, 0.3—1 cm crassus, uti pileo laccato, saepe valde profundo. Sporae saepe longe ovoideae, ovoideae vel apice truncatae, episporis hyalinis, laevibus, endosporis distincte vel obscure echinulis, dilute brunneae, 8.7—10.4 × 5.2—6.9 μ.

In silvis ad truncos vel caudes arborum frondosarum.

Facillime dignoscenda sporophoro minore, polymorpho, vulgo vulgatissimo, particulariter subtropico specie. Proxima *Ganodermati calidophilo* Zhao, Xu et Zhang et *G. atro* Zhao Xu et Zhang, sed prior differt sporis majoribus, endosporis distincte echinulis, Pori albidis; posterior differt sporophoro obscurato-nigro, haud laccato, stipite usque ad 23 cm longo, endosporis etiam distincte echinulis.

子实体 1 年生或多年生, 有柄, 木栓质到木质。菌盖半圆形, 近圆形或近肾形, 扁平或近马蹄形, 1.5—5.5 × 1.5—4.5 厘米, 厚 1—2.2 厘米, 表面红褐色到黑褐色, 紫红色到紫褐色, 有光泽, 有明显的同心环沟, 纵皱不明显; 边缘钝或呈截形, 完整。菌肉分层不明显, 上层木材色, 黄褐色或淡褐色, 接近菌管处呈褐色, 厚 0.1—0.2 厘米; 菌丝无色到淡褐色或褐色, 有分枝, 但细菌丝分枝较多, 直径 2—5 微米, 无隔膜, 无锁状连合, 通常壁厚, 有时壁稍薄。菌管长 0.3

—2 厘米, 分层不明显, 褐色。管口近圆形或圆形, 污白色, 淡褐色或褐色, 每毫米 4—6 个。菌柄背生或背侧生, 圆柱形, 多粗细不等, 有时近似念珠状, 长 4—15 厘米, 粗 0.3—1 厘米, 与菌盖同色, 但颜色多比较深。孢子长卵形, 卵形或顶端平截, 双层壁, 外壁无色, 平滑, 内壁有小刺或小刺不清楚, 淡褐色,  $8.7-10.4 \times 5.2-6.9$  微米。[见图版 1-3, 图 1-(3)]。

生于林中阔叶树干或树桩上。

浙江: 兰溪县冶炼厂, 1977, 7 月, 陈陆根 1094。

云南: 勐腊补蚌, 1975 年, 杨永康 1072。

海南岛: 黎母山林场, 海拔 800 米, 1977, 4 月, 韩树金等 6 人采 HN339; 1977, 12 月, 陈居伯 HN1110; 坝王岭, 雅加林场, 海拔 700 米, 1969, 11 月, 余永年等 HN3, HN 14, HN 26; 同地, 海拔 800—1000 米, 1977, 4 月, 韩树金等 6 人采 HN 714, HN 727, HN 754; HN 759 (模式 Typus), HN 761, HN 819, HN 827, HN 889, HN 897, HN 904, HN 1033, HN 1034, HN 1035, HN 1038, HN 1050, HN 1098。

这个种的特点是子实体小型, 一年生或多年生, 扁平或马蹄形, 形态变化多样, 发生数量多, 是一个亚热带的特殊种类。它与 *Ganoderma calidophilum* Zhao, Xu et Zhang 的区别为后者孢子较大, 内壁小刺清楚, 管口白色。它与 *G. atrum* Zhao, Xu et Zhang 的区别为后者子实体乌黑色, 几乎没有光泽, 孢子内壁小刺清楚, 菌柄长达 23 厘米。

### 5. 喜热灵芝 新种

*Ganoderma calidophilum* Zhao, Xu et Zhang, sp. nov.

Sporophorus annuus, stipitatus, suberoso-lignosus. Pileus suborbicularis, dimidiatus vel subflabelliformis, interdum leviter irregularis,  $2-2.7 \times 2.4-4.5$  cm,

0.5—1.5 cm crassus, superficie rufo-brunneus vel purpureo-brunneus, interdum atro-brunneus, laccatus, concentric sulcatus et striatus, longitudinaliter regulosus; margine obtuso vel truncato. Contextus 0.1—0.3 cm crassus, stratosus, strato superiore ligno-colorato ad dilute brunneo, prope tubulorum straturam dilute brunneo vel fusco. Context hyphae hyalinae ad luteo-brunneae, leviter ramosae, sed plures ramosae cum hyphis tenuioribus,  $2-4.5 \mu$  diam, non septatae fubulis destitutae, vulgo membranae crassae. Tubuli 0.3—0.5 cm longi, brunnei. Pori suborbiculares, albi vel albid, 4—6 per mm. Stipes dorsalo-lateralis vel dorsalis, 5—12 (24) cm longus, 0.4—0.7 (0.9) cm crassus, vulgo purpureo-brunneus vel purpureo-nigrus, laccatus, inaequalis et saepe tortus. Sporae ovoideae, apice obtusae vel truncatae, dilute brunneae ad brunneae, episporis hyalinis, laevibus, endosporis distincte echinulis,  $10-12.1 (13) \times 6.2-8.7 \mu$ .

In silvis ad truncos vel caudes arborum frondosarum. Sporophoro parvo, poris albidis, sporis majoribus. Affinis *Ganodermati hainanensi* Zhao, Xu et Zhang et *G. atro* Zhao, Xu et Zang, sed prior differt sporophoro polymorpho, poris non albidis, sporis minoribus; posterior differt sporophoro obscurato-nigro, stipite valde longo, sporis minoribus.

子实体 1 年生, 有柄, 木栓质到木质。菌盖近圆形, 半圆形或近扇形, 有时稍呈不规则形,  $2-2.7 \times 2.4-4.5$  厘米, 厚 0.5—1.5 厘米, 表面红褐色或紫褐色, 有时呈黑褐色, 有同心环沟和环纹并有纵皱; 边缘钝或呈截形。菌肉二层, 上层木材色到淡褐色, 近菌管处呈淡褐色到暗褐色, 厚 0.1—0.3 厘米; 菌丝无色到黄褐色, 稍有分枝, 细菌丝分枝较多; 直径  $2-4.5$  微米, 无隔膜, 无锁状连合, 通常壁厚。菌管长 0.3—0.5

厘米,褐色。管口近圆形,白色或淡白色,每毫米4—6个。菌柄背侧生或背生,长5—12(24)厘米,粗0.4—0.7(0.9)厘米,通常呈紫褐色或紫黑色,有光泽,常粗细不等并多弯曲。孢子卵形,顶端钝或平截,淡褐色到褐色,双层壁,外壁无色,平滑,内壁小刺清楚,10—12.1(13) × 6.2—8.7微米。

[见图版1-4,图1-(4)]

生于林中阔叶树树干或树桩上。

吉林:通化县,东来供销社,1975,12月送来,编号1070,

河南:宜阳县,西立顶山,1974,12月,人民来信,编号1075。

海南岛:尖峰岭,1969年,余永年等HN 18, HN 25;坝王岭,雅加林场,海拔630—1000米,1969年,余永年等HN 5, HN 10;同地,1977,4月,韩树金等6人采HN 892, HN 895, HN 905, HN 906(模式Typus)。

这个种的特点是子实体小型,管口白色,孢子较大。它与 *Ganoderma hainanensis*<sup>c</sup> Zhao, Xu et Zhang 的区别为后者子实体多态型,管口非白色,孢子较小。它与 *G. atrum* Zhao, Xu et Zhang 的区别为后者子实体乌黑色,菌柄长,孢子较小。

## 6. 密纹薄芝 新种

*Ganoderma tenue* Zhao, Xu et Zhang, sp. nov.

*Sporophorus annuus*, stipitatus, interdum sessilis, suberosolignosus. Pileus dimidiatus vel subflabelliformis, vulgo basi angusto connexo, 5.5—7.5 × 3.5—6 cm, 2—3 cm crassus, superficie purpureo-brunneus vel subnigro-brunneus, marginem versus leviter rufo-brunneus, laccatus, concentrice multizonatus, longitudinaliter rugosus; margine tenui vel acuto, frequenter incurvo, integro et undulato. Contextus dilute albidus ad ligno-coloratus, 0.1—0.2 cm crassus, non zonatus, multibus gasterosporis, 10—14 μ diam.,

dilute brunneis ad brunneis. Contextus hyphae hyalinae ad albidae, parum ramosae, 1.5—6 μ diam, ad apices hypharum crassarum aliquando attenuatae, non septatae et fubulis destitutae, vulgo membranae crassae. Tubuli 0.1—0.15 cm longi, dilute brunnei. Pori obscurato-albidi vel sordide luteo-albidi, 5—6 per mm. Stipes lateralis vel leviter dorsalo-lateralis, cylindricus, inaequalis vel leviter depressus, interdum subtorulosus, saepe apice convexus, concolore pileo, laccatus. Sporae ovoideae vel truncatae apice, episporis hyalinis, laevibus, endosporis indistincte echinulis, brunneae, 8.7—10.4 × 5.7—6.9 μ.

## In cultura

Species haec pileo superficie purpureo-brunneo, dense zonato, contexto multibus gasterosporis instructo, stipite cylindrico, interdum subtoruloso distincta est. Affinis *Ganodermati capensi* (Lloyd) Teng, sed quo sessili vel stipite brevi et crasso, contexto distincte et concentrice zonato, pileo grandi et superficie non zonato, non rugoso, nec purpureo-brunneo differt.

子实体1年生,有柄,有时无柄,木栓质到木质。菌盖半圆形或近扇形,基部常连结在一起,5.5—7.5 × 3.5—6厘米,厚2—4毫米,表面紫褐色或近黑褐色,近边缘处稍呈红褐色,有光泽,有显著的轮纹,靠近边缘轮纹更加稠密,基部纵皱显著;边缘薄而锐,多向内卷,呈波状。菌肉淡白色到木材色,厚1—2毫米;菌肉里有多数球形或近球形的腹孢子(gasterosporis)<sup>[38,39]</sup>,粗糙,直径10—14微米,淡褐色到褐色;菌丝无色到淡白色,稀分枝,直径1.5—6微米,粗菌丝有时顶端尖细,无隔膜,无锁状联合,通常壁厚。菌管长1—1.5毫米,淡褐色。管口圆形或近圆形,污白色到污黄色,每毫米5—6个。菌柄圆柱形,粗细不等,或

稍扁,有时近念珠状,侧生或稍呈背侧生,与菌盖接触处凸起,与菌盖同色或较深,有光泽。孢子卵形或顶端平截,双层壁,外壁无色,平滑,内壁小刺不明显,淡褐色到褐色,  $8.7-10.4 \times 5.7-6.9$  微米。[见图版 I-5, 图 I-(5)]。

北京: 培养子实体(中国科学院植物研究所送)。

标本编号 No. 1095(模式 Typus), No. 1122, No. 1123。

这个种的特点是菌盖表面有稠密的轮纹,紫褐色,菌肉里有多数腹孢子,菌柄圆柱形,有时近似念珠状。它与薄树芝 [*Ganoderma capense* (Lloyd) Teng] 的区别为后者菌盖表面无轮纹,菌肉有明显的轮纹,无菌柄或菌柄短粗。根据国际植物命名法规第九条规定建立为新种。

## 7. 紫芝 新种

*Ganoderma sinense* Zhao, Xu et Zhang, sp. nov.

*Ganoderma lucidum* var. *japonicum* sensu Teng (*Sinensia* 5: 199, 1934), non (Fr.) Bres. (Fr., *Epierisis* 442, 1838; Bres., *Ann. Myc.*, 10: 300, 1912).

*Ganoderma japonicum* sensu Teng (《中国的真菌》, 447 页, 1964 和戴芳澜, 《中国真菌总汇》, 印刷中), non (Fr.) Lloyd (*Myc. Writ.*, 3: Syn. Stip. Polyp. p. 102: 1912).

Sporophorus annuus, stipitatus, suberoso-lignosus. Pileus dimidiatus, suborbicularis vel subcochleariformis,  $2.5-9.5 \times 2.2-8$  cm.,  $0.4-1.2$  cm. crassus, superficie purpureo-nigrus vel purpureo-brunneus, laevis, distincte concentricae sulcatus vel non, longitudinaliter rugosus; margine tenui vel obtuso, vulgo subtruncate, concolore pileo vel dilute luteo-brunneo. Contextus aequaliter brunneus ad intense brunneus,  $0.1-0.3$  cm. crassus; contextus hyphae hyalinae ad intense brunneae, ramosae,  $1.7-5.2 \mu$  diam, ad apices hypharum crassarum aliquando attenuatae, non septatae, fibulis destitutae, vulgo membranae crassae. Tubuli

$0.3-1$  cm longi, brunnei, intense brunnei vel griseo-brunnei. Pori suborbiculares, sordide albi, dilute brunnei ad intense brunnei,  $5-6$  per mm. Stipes lateralis, dorsalo-lateralis vel excentricus, cylindricus vel subapplanatus,  $7-19$  cm longus,  $0.5-1$  cm crassus, concolore pileo, laevis. Sporae ovoideae vel apice truncatae, episporis hyalinis, laevibus, endosporis echinulis profunde, dilute brunneae,  $9.5-13.8 \times 6.9-8.1$  (8.7)  $\mu$ .

In silvis ad truncos et caudes arborum frondosarum

Facillime dignoscenda species pileo purpureo-brunneo, contexto aequaliter brunneo ad castaneo-brunneo, sporis majoribus. Proxima *Ganodermati* lucido (Leyss. ex Fr.) Karst., sed quo differt pileo rubro-brunneo, contexto albido ad ligno-colorato, aliquando stratoso, strato superiore ligno-colorato, prope tubulorum straturam dilute brunneo, sporis minoribus.

子实体 1 年生,有柄,木栓质到木质。菌盖半圆形,近圆形或近匙形,  $2.5-9.5 \times 2.2-8$  厘米,厚  $0.4-1.2$  厘米,表面紫黑色到近黑色,或紫褐色,有光泽,有明显或不明显的同心环沟和纵皱;边缘薄或钝,常近似截形,与菌盖同色或较淡,或呈淡黄褐色。菌肉全体均匀褐色到深褐色,或栗褐色,厚  $0.1-0.3$  厘米;菌丝无色到深褐色,有分枝,直径  $1.7-5.2$  微米,粗菌丝有时顶端尖细,无隔膜,无锁状连合,通常壁厚。菌管长  $0.3-1$  厘米,褐色,深褐色或灰褐色。管口近圆形,污白色,淡褐色到深褐色,每毫米  $5-6$  个。菌柄侧生或背侧生,或偏生,圆柱形或略扁平,长  $7-19$  厘米,粗  $0.5-1$  厘米,与菌盖同色或颜色更深,有光泽。孢子卵形或顶端平截,双层壁,外壁无色,平滑,内壁有明显小刺,淡褐色,  $9.5-13.8 \times 6.9-8.1$  (8.7) 微米。[见图版 II-1, 图 2-(6)]



生于林中阔叶树或针叶树木桩上。

海南岛: 1976 年, 符拔太 HN 1051, HN 1053; 尖峰岭, 1969, 9 月, 黄金 HN 17; 同地, 海拔 950 米, 1969, 11 月, 余永年等 HN 19, 王德祯 HN 20 (模式 Typus), 郑铁曾等 HN 23; 坝王岭, 雅加林场, 1969, 11 月, 谭天等 HN 13。

浙江、江西、湖南、广西、福建等省都有采集记载。

## 关于紫芝学名的讨论

赤、紫、黄、白、青、黑六芝原出神农本草经。赤芝一名丹芝, 味苦、平、生霍山(即衡山)。紫芝一名木芝, 味甘、温、生高夏山谷。两千多年前, 我国古代劳动人民对于灵芝(即赤芝)和紫芝早已很熟习。直至今日在中国, 对灵芝和紫芝的区分仍然是容易而明确。灵芝菌盖红褐色, 淡黄褐色至黄褐色; 菌肉淡白色至木材色, 或上层淡白色, 近菌管处呈淡褐色, 孢子  $8.5-11.2 \times 5.2-6.9$  微米。紫芝菌盖褐色, 紫黑色至近黑色, 菌肉全体呈均匀的褐色, 深褐色至栗褐色, 孢子  $9.5-13.8 \times 6.9-8.1(8.7)$  微米。Leysser (1783)<sup>[40]</sup> 建立了 *Boletus lucidus* 这个种。Karsten (1881) 建立 *Ganoderma* 属时只包括 *Polyporus lucidus* (即 *Boletus lucidus*) 一个种。Fries (1838) 建立 *Polyporus japonicus* 种。根据 Fries (1838) 的记载, 比较这两个种如下: (1) Fries 把 *Polyporus lucidus* 编为 56 号。把 *P. japonicus* 放在灵芝种下未加编号, 不作独立种看待。(2) 形态描述比较如表。(3) Fries 认为 *P. japonicus* 是灵芝的近似中间型 (4) Fries (*Syst. Myc.*, I: 353, 1821.) 引证 *Boletus dimidiatus* Thunb. (Fl. Jap., 348, Pl. 39, 1784) 作为灵芝的同物异名。同样也作为 *P. japonicus* 的同物异名 (Epicrisis p. 442, 1838)。(5) Fries 在这两个种的描述中都

特 征	菌 名	<i>Polyporus lucidus</i>	<i>P. japonicus</i>
	有似漆样光泽	菌盖 木栓质到木质, 扇形, 有环沟和皱	木栓质到木质, 平展, 波状到分裂, 平滑
	菌柄	侧 生	长而垂直, 稍念珠状, 光滑
	颜 色	黄色, 血红色到栗褐色	铁锈色
	管 口	小, 长形, 白色到肉桂色	平展, 长而小, 白色到肉桂色

未记载菌肉的颜色。他在 1821 年灵芝描述中, 提到变异时, 只记载菌肉硬, 极韧, 与管口同色, 而且较薄。从以上的资料分析, 说明 Fries 当时并未把 *P. japonicus* 作为一个独立种看待, 只认为是灵芝的一个变型或中间型。

Bresadola (1912)<sup>[41-43]</sup> 把 *P. japonicus* 降为 *G. lucidum* 的变种, 即 *G. lucidum* var. *japonicum* (Fr.) Bres.。指出它与原变种的唯一区别是孢子较大 ( $11-14 \times 9-10$  微米)。Lloyd (1912)<sup>[44]</sup> 记载, 在日本把 *G. japonicus* 描画的比欧洲标本较黑, 但与灵芝确属同一个种。欧洲人通常把日本的这个较黑色型归属于灵芝种下。

之后, 今关六也 (1939), 川村清一 (1954)<sup>[45]</sup>, 伊藤诚哉 (1955), 今关六也和本乡次雄 (1957)<sup>[46, 47]</sup>, 他们都把 *G. lucidum* 和 *G. japonicum* 这两个学名互相作为同物异名。认为这两个学名指的是一个种。贾祖璋 (1935) 以 *Fomes japonicus* 作为灵芝的学名。周宗璜 (1935) 认为这两个学名指的不是两个独立的种。它们不代表两个区分明显的种。总之, 从以上引证的许多资料都说明 *G. lucidum* 和 *G. japonicum* 是一个种。因此, 把 *G. japonicum* 作为 *P. lucidus* 的同物异名是恰当的。

邓叔群 (1934, 1939) 把 *G. lucidum* var. *japonicum* (Fries) Bres. 作为紫芝的学名, 他 (1964) 又把 *G. japonicum* (Fr.)

Lloyd 作为紫芝的学名, 都是错误的鉴定, 应当予以更正。

### 8. 闽南灵芝 新种

*Ganoderma austrofujianense* Zhao, Xu et Zhang, sp. nov.

Sporophorus annuus, stipitatus, suberoso—lignosus. Pileus dimidiatus vel reniformis, 1.5—4.5 × 3—6 cm, 0.5—1.5 cm crassus, superficie nigro-brunneus vel leviter purpureo—nigrus, laccatus, marginem versus albidis et brunneis zonis; margine acuto vel tenui, albido zonato, fertili inferne. Contextus brunneus ad valde brunneus, 0.4—0.8 cm crassus; Contextus hyphae dilute luteo-brunneae ad luteo—brunneae, plures ramosae cum hyphis tenuioribus, 1.7—5.2 μ diam, membranae tenues ad crassae, non septatae, fibulis destitutae. Tubuli 0.3—0.4 cm longi, brunnei. Pori suborbiculares vel irregulares, 4—5 per mm, albidis vel dilute brunnei. Stipes lateralis, 6—7 cm longus, 0.7—1.5 cm crassus, inaequalis, cylindricus vel depressus, tortus, apicem versus, interdum in dichotomis et formante 2 capitatos, nigrus, laccatus. Sporae ovoideae, apice aculeatae, episporis hyalinis, laevibus, endosporis echinulis, brunneae, 5.7—10.4(12.1) × 3.4—5.2(6.9) μ.

Ad caudes arborum pinorum.

Dignoscitur pileo superficie albedo et brunneo zonato, margine albedo zonato, fertili inferne, sporis apice aculeatis, stipite interdum apicem versus dichotomo et apice dichotomiae 2 capitatos formante. Proxima *Ganoderma sinense* Zhao, Xu et Zhang et *G. luteomarginato* Zhao, Xu et Zhang, sed prior differt sporis majoribus, poris brunneis, pileo superficie purpureo—brunneo; posterior differt pileo tenui, margine luteomarginato, fertili inferne, sporis minoribus, endosporis indistincte echinulis.

子实体 1 年生, 有柄木栓质到木质。菌盖半圆形或肾形, 1.5—4.5 × 3—6 厘米, 厚 0.5—1.5 厘米, 表面黑色, 黑褐色或稍带紫黑色, 具污白色和褐色相间的环带, 环纹不显著, 但纵皱清楚, 有光泽; 边缘薄或锐, 有污白色带, 下边孕。菌肉褐色至深褐色, 厚约 0.8 厘米; 菌丝淡黄褐色到黄褐色, 细菌丝上分枝多, 直径 1.7—5.2 微米, 薄壁到厚壁, 无隔膜, 无锁状连合。菌管长 0.3—0.4 厘米, 褐色。管口近圆形或不规则形, 灰白色或淡灰褐色, 每毫米 4—5 个。菌柄侧生, 长 6—7 厘米, 粗 0.7—1.5 厘米, 圆柱形或稍扁平, 粗细不等, 多弯曲, 顶端分枝形成两个菌盖, 黑色, 有光泽。孢子卵形, 顶端很尖, 双层壁, 外壁无色, 平滑, 内壁有小刺, 带褐色, 5.7—10.4(12.1) × 3.4—5.2(6.9) 微米。[见图版 II-2, 图 2-(7)]

生于松树桩上。

福建: 南靖县, 和溪公社, 1976, 5 月, 李惠中、张小青, 闽 18 (模式 Typus)。

这个种的特点是菌盖表面有污白色和褐色相间的环带, 边缘具污白色带, 下边孕, 孢子较小而顶端尖, 管口污白色。它与 *Ganoderma sinense* Zhao, Xu et Zhang 的区别为后者菌盖呈均匀的褐色, 孢子较大, 顶端多平截, 管口褐色。它与 *G. luteomarginatum* Zhao, Xu et Zhang 的区别为后者菌盖薄, 边缘呈黄褐色, 孢子内壁小刺不清楚。

### 9. 黄边灵芝 新种

*Ganoderma luteomarginatum* Zhao, Xu et Zhang, sp. nov.

Sporophorus annuus, stipitatus, suberoso—lignosus. Pileus tenuis, dimidiatus, suborbicularis vel subflabelliformis, 3—4.5 × 5.5 cm, usque ad 0.5 cm crassus, superficie nigro—brunneus vel obscure brunneus, laccatus, marginem versus flavo-brunnescens, longitudinaliter rugosus, concentrice zonatus indistinctus; margine

acuto vel leviter obtuso, fertili inferne, integro vel fissili. Contextus castaneus vel valde brunneus, 0.1—0.4 cm crassus. Contextus hyphae hyalinae ad valde brunneae, parum ramosae, 1.5—5.2  $\mu$  diam, membranae tenues ad crassae, non septatae, fibulis destitutae. Tubuli dilute brunnei, griseo-brunnei ad brunnei, 0.1—0.4 cm longi. Pori suborbiculares, sordide albi ad sordide brunnei vel brunnei, 4—6 per mm. Stipes dorsalo—lateralis vel lateralis, inaequalis, inferiorem partem versus incrassatus, 6—19 cm longus, 0.5—1.1 cm crassus, concolore pileo vel vix nigrescens, laccatus. Sporae ovoideae vel apice truncatae, episporis hyalinis, laevibus, endosporis echinulis vel indistinctis, dilute brunneae, 8.7—10.4  $\times$  5.2—7  $\mu$ .

In silvis ad truncos et caudes arborum frondosarum.

Species haec pileo tenui, margine luteomarginato, fertili inferne, sporis minoribus, endosporis echinulis vel indistinctis insignibus. Proxima *Ganoderma sinensi* Zhao, Xu et Zhang et *G. austrofujianensi* Zhao, Xu et Zhang, sed prior differt pileo crassiore, margine non luteomarginato, superficie purpureo—brunneo ad nigro, sporis majoribus; posterior differt pileo superficie sordide albo et brunneo zonato, margine sordide albo zonato, sporis apice aculeatis.

子实体 1 年生, 有柄, 木栓质到木质。菌盖薄, 半圆形, 略圆形或近扇形, 3—4.4  $\times$  5.5 厘米, 厚达 0.5 厘米, 表面黑褐色或暗褐色, 有光泽, 有纵皱, 同心环纹不显著; 边缘薄, 下边孕, 黄褐色。菌肉均匀的褐色或深褐色, 厚 0.1—0.4 厘米; 菌丝无色到深褐色, 稀分枝, 直径 1.5—5.2 微米, 薄壁到厚壁, 无隔膜, 无锁状连合。菌管长 0.1—0.4 厘米, 淡褐色, 灰褐色或褐色。管口近圆形, 污白色至污褐色, 或褐色, 每毫米 4—6

个。菌柄背侧生或侧生, 不等粗, 趋向下部渐粗, 长 6—19 厘米, 粗 0.5—1.1 厘米, 与菌盖同色或几乎呈黑色, 有光泽。孢子卵形或顶端平截, 双层壁, 外壁无色, 平滑, 内壁有小刺或小刺不明显, 淡褐色, 8.7—10.4  $\times$  5.2—7 微米。[见图版 II-3, 图 2-(8)]

生于林中阔叶树桩上。

海南岛: 海口市, 1976 年, 符拔太 HN 1057, HN 1069 (模式 Typus); 坝王岭, 雅加林场, 海拔 800 米, 韩树金等 6 人采 HN 826; 同地, 1978, 3 月, 蒙永光 HN 1122。

这种的特点是菌盖薄, 边缘呈黄褐色和下边孕, 孢子较小, 内壁有小刺或小刺不明显。它与 *Ganoderma sinense* Zhao, Xu et Zhang 的区别为后者菌盖较厚, 边缘无黄褐色带, 表面紫褐色到黑色, 孢子较大。它与 *G. austrofujianense* Zhao, Xu et Zhang 的区别为后者菌盖表面有污白色和褐色相间的环带, 边缘具污白色带, 孢子顶端尖。

### 10. 福建假芝 新种

*Amauroderma fujianense* Zhao, Xu et Zhang, sp. nov.

Sporophorus annuus, stipitatus, suberoso—lignosus. Pileo dimidiatus, sublabelliformis vel cochleariformis, 6—10  $\times$  5—6 cm, 0.5—1.5 cm crassus, superficie nigro-brunneus ad nigrescens vel rufo—brunneus, vulgo latiore rufo—brunneo zonato marginem versus, sublaccatus vel laccatus, distincte et concentricae sulcatus et zonatus, interdum longitudinaliter rugosus; margine acuto vel tenui, leviter incurvo. Contextus ochraceo-brunneus vel castaneus, albo mycelio intermixtus, 0.5—1 cm crassus. Contextus hyphae hyalinae ad luteo—brunneae, parum ramosae 1—5.2  $\mu$  diam., non septatae, membranae tenuiores ad crassiores, ad apices hypharum crassarum aliquando attenuatae. Tubuli usque ad 0.4 cm longi, pallido—brunnei vel subpurpureo-brunnei. Pori suborbicul-

ares, dissepimentis marginibus crassioribus, luteo-albidi, 4—5 per mm. Stipes horizontali—lateralis, depressus, 2—4 cm longus, 1—3 cm crassus, concolore pileo, laccatus. Sporae subglobosae, episporis hyalinis, laevibus, endosporis echinulis, brunneae, 10—12.5  $\mu$  diam.

Ad ligna putrefactos.

Dignoscitur pileo superficie laccato, stipite horizontali—lateralis, sporis subglobosis, endosporis echinulis. Affinis Amaurodermati longipedi (Lev.) Pat. et G. fulvello Bres., a quibus differt, prior stipite valde longo; posterior sporis ovoidis.

子实体 1 年生, 有柄, 木栓质到木质。菌盖半圆形, 近扇形或近匙形, 6—10×5—6 厘米, 厚 0.5—1.5 厘米, 表面黑褐色到黑色, 通常趋向边缘有较宽的红褐色带, 略有光泽, 有同心环沟和环带, 纵皱有时较显著; 边缘薄或锐, 稍向内卷, 下边孕。菌肉棕褐色或栗褐色, 杂有白色菌丝, 厚 0.5—1 厘米; 菌丝无色到黄褐色, 稀分枝, 直径 1—5.2 微米, 粗菌丝有时顶端尖, 无隔膜, 无锁状连合, 壁薄到壁厚。菌管长约 0.4 厘米, 淡褐色或略带紫褐色。管口近圆形, 管壁较厚, 黄白色, 每毫米 4—5 个。菌柄平侧生, 由菌盖基部收缩下延而形成, 长 2—4 厘米, 粗 1—3 厘米, 基部常较粗, 与菌盖同色, 略有光泽。孢子近球形, 双层壁, 外壁无色, 平滑, 内壁有小刺, 褐色, 直径 10—12.5 微米。[见图版 II-4, 图 2-(9)]

生于腐木上。

福建: 三明, 台江, 1976, 6 月, 李惠中, 张小青, 闽 68(模式 Typus)。

这个种的孢子近球形, 双层壁, 内壁有清楚的小刺, 隶属本属是无疑的。它的特点是子实体略有光泽, 菌柄平侧生, 菌盖几乎成匙状。易与本属中其他种类区分。从略具光泽这一特征比较, 它近似长柄假芝

(*Amauroderma longipes* (Lév.) Pat.), 但后者有细长的柄。从外部形态比较它又与黄褐灵芝 (*Ganoderma fulvellum* Bres.) 相似, 但后者孢子卵形。因为这号采集有 6 个标本, 形态比较稳定, 所以建立为新种。

### 11. 粗皮灵芝亚组 新改级

Subsect. *Trachyderma* (Imazeki) Zhao, Xu et Zhang, grad. nov. *Ganoderma* subgen. *Trachyderma* Imazeki: *Bull. Tokyo Sci. Mus.*, 1: 49, 1939.

*Trachyderma* Imazeki: *Bull. Gov. Forest. Exp. St. Tokyo*, 57: 97, 1952.

菌盖表面粗糙。菌肉白色, 新鲜时肉质, 水分多, 柔软, 干时坚硬, 显著收缩。菌盖皮壳不形成栅栏状组织。孢子灵芝型。

### 12. 树舌亚组 新改级

Subsect. *Elfvigia* (Karst.) Zhao, Xu et Zhang, grad. nov. *Elfvigia* Karst., *Bidrag till Kannedom om Finlands Natur Och Folk*, 48: 333, 1889.

Subgen. *Elfvigia* (Karst.) Imazeki: *Bull. Tokyo Sci. Mus.*, 1: 49, 1939.

菌盖表面无光泽。菌肉褐色到栗褐色。菌盖皮壳不形成栅栏状组织。孢子灵芝型。

## 参 考 文 献

- [1] Karsten, P.: *Rev. Mycol.*, 3(9): 17, 1881.
- [2] Patouillard, N.: *Bull. Soc. Mycol. Fr.*, 5(3): 64—80, 1889.
- [3] ———: *Essai taxonomique sur les Familles et les genres des Hymenomyces*, 1900.
- [4] Karsten, P.: *Bidrag till Kannedom om Finlands Natur Och Folk*, 48: 333, 1889.
- [5] Murrill, W. A.: *North Amer. Fl.*, vol. 9, 1907.
- [6] ———: *Tropical Polypores*, 1915.
- [7] Donk, M. A.: *Med. Bot. Mus. Univ. Utrecht*, no. 9, 1933.
- [8] Imazeki, R.: *Bull. Govt. Forest Exp. Stn. Japan*, no. 57: 87—128, 1952.
- [9] ———: *Bull. Tokyo Sci. Mus.*, 1: 29—52, 1939.
- [10] 伊藤誠哉: 《日本菌類誌》, 第二卷, 担子菌類, 第四號, 養賢堂發行, 1955。
- [11] Donk, M. A.: *Bull. Bot. Gdns. Buitenz.*, III, 17: 474, 1948.

- [12] ———: *Persoonia*, vol. 1, part 2, 1960.
- [13] ———: *Persoonia*, vol. 3, part 2, 1964.
- [14] Cunningham, G. H.: Polyporaceae of New Zealand, 1965.
- [15] Ainsworth & Bisby: Dictionary of the Fungi, 1971.
- [16] Pelger, D. N.: Ganodermataceae in Ainsworth, G. C. et al.: The Fungi an advanced treatise, p. 416, 1973.
- [17] 中国科学院北京植物研究所, 北京医学院药理教研组编著: 《灵芝》, 1976.
- [18] 李时珍: 《本草纲目》, 商务印书馆版, 1590.
- [19] 吴其浚: 《植物名实图考长篇》, 商务印书馆版, 1848.
- [20] 贾祖璋等: 《中国植物图鉴》, 1935.
- [21] 周宗瑛等: *Bull. Fan. Mem. Inst. Biol. (Bot.)*, VI (2): 4, 1935.
- [22] Lohwag, H.: *Hand-Mazz., Symb. Sin.* II, p. 50, 1937.
- [23] Teng, S. C.: Contr. Knowl. High. Fung. China, 1939.
- [24] 邓叔群: 《中国的真菌》, 1964.
- [25] 戴芳澜: 《中国真菌总汇》, 印刷中.
- [26] Domanski, S.: Fungi (Polyporaceae II), 1973.
- [27] Furtado, J. S.: *Mycologia*, 57: 588—611, 1965.
- [28] ———: *Persoonia*, vol. 4, part 4, 1967a.
- [29] ———: *Bull. Jard. Bot. Belg.*, 37: 309—317, 1967b.
- [30] Overholts, L. C.: The Polyporaceae of the United States, Alaska and Canada, 1953.
- [31] Steyaert, R. L.: *Bull. Jard. Bot. Brux.*, 30(1): 69—108, 1961.
- [32] ———: *Bull. Soc. Roy. Bot. Belg.*, 100: 189—211, 1967.
- [33] ———: *Persoonia*, 7(1): 55—118, 1972.
- [34] Heim, R. et G. Malencon: *Ann. Crypt. Exot.*, I, p. 58—74, 1928.
- [35] Heim, R.: *Ann. Crypt. Exot.*, VI: 131—149, 1933.
- [36] ———: *Rev. Mycol.*, 27: 199—212, 1962.
- [37] Otieno, N. C.: *Sydowia*, 22: 173—178, 1968.
- [38] Bosc, S. R.: *Mycologia*, 25: 431—434, 1933.
- [39] ———: *Sydowia*, 1: 176—178, 1957.
- [40] Leysser: Fl. Halens, 300, 1783.
- [41] Bresadola, A. J.: *Ann. Myc.*, 10: 492—508, 1912.
- [42] ———: *Hedwigia*, 58: 46—80, 1913.
- [43] ———: *Iconographia Mycologica*, vol. 21, 1932.
- [44] Lloyd, C. G.: Index of the Mycological Writings vol. 3, 1912; vol. 5, 1917; vol. 6, 1920—1921; vol. 7, 1922—1925.
- [45] 川村清一: 《原色日本菌類圖鑑》, 第貳卷, 風間書房, 1954.
- [46] 今关六也, 本郷次雄: 《原色日本菌類圖鑑》, 1957.
- [47] ———: 《続原色日本菌類圖鑑》1965.

## TAXONOMIC STUDIES ON THE SUBFAMILY GANODERMOIDEAE OF CHINA

Zhao Ji-ding\* Xu Lian-wang\* Zhang Xiao-qing

(Institute of Microbiology, Academia Sinica, Beijing)

Ganodermoideae is included in Polyporaceae. Two genera, *Ganoderma* and *Amauroderma*, are recognized here. Since the genus *Ganoderma* was established by Karsten in 1881 about one hundred years have passed. During this period a lot of important works with respect to the

study of this group has been done by many investigators in the world. Great progress has been made on the taxonomy of this group. But it should be noted that no one of the systems can be satis-

\* i.e. Zhao Chi-ding, Hsu Lian-wang

factorily adopted as different investigators are of different opinion on its taxonomy. In studying this group of fungi the writers have paid particular attention to its natural system. As a result a more reasonable taxonomic system is proposed here in this paper. The genus *Ganoderma* is divided into two sections of which one is described as new and four subsections. They are Sections *Ganoderma* and *Phaeonema*, Subsections *Ganoderma*, *Trachyderma*, *Phaeonema* and *Elfvingia*. Of course, it should be revised in time as soon as new progress will be made in future.

During the course of studying the genus *Amauroderma* the writers discovered a collection from the province Fujian and on the basis of its external feature with the laccate appearance it should have been attributed to the genus *Ganoderma*, the spores are however truly of *Amauroderma* type. This species is quite different from those already described in the genus *Amauroderma* and therefore reported as new in this paper. Evidently due to the scarcity of specimens many works on the taxonomy of *Amauroderma* need to be investigated in detail.

Regarding this subfamily Ganodermoideae several writer's points are written as follows:

We are of opinion that the spore feature which is always most important both in generic and specific distinction should be emphasized in this subfamily. In addition to this, the context color is very useful in dividing into sections of *Ganoderma*. In section *Ganoderma* its context color is white, whitish, ligneous-colored or brownish. In some other species of this section the context consists of two layers, i.e. in the upper layer white to whitish and in the lower layer brownish to brown or cinnamon. The

limitation of the two layers is always distinct although sometimes indistinct. In Section *Phaeonema* the context color is uniformly brown to deep brown or castaneous throughout, never showing any other colored layers.

The formation of the crust is the third important feature in this genus. Regarding its structure there is no generalized type but the genus is divided into subsections chiefly based on it. In subsections *Ganoderma* and *Phaeonema* the crust consists of the hyphae arranged very compactly together in vertical position, forming a sort of palisade layer, while in subsections *Elfvingia* and *Trachyderma* they do not, but being somewhat irregularly interwoven and compactly agglutinated each other.

The type of stipe insertion is the fourth important feature, which may be lateral, excentric, central, dorsal or dorsal-lateral and sometimes horizontal-lateral together with its relative thickness, length, etc., have certain value in separating the species. Unfortunately its importance has always been neglected by some authors and they stated only stipitate or sessile in their description. For this reason it usually leads to the difficulty in defining species. Accurate notes of stipe are much need for description.

The laccate appearance is the fifth important feature and has shown various importance on the taxonomy of this subfamily. The evidence derived recently from the analysis of the microstructures of the sporophore and of their value in the taxonomic treatment of this group indicates, however, that the laccate appearance plays no important role in the segregation of genera and sections in this subfamily. Moreover the analysis of a large number of specimens has revealed that a complete series of laccate appearance

rance exist. However, this feature is still available to separate the species in this group.

The character of the pores is the sixth important external feature. Its forms and the characters of dissepiments, thick or thin, entire or lacerate, are comparatively constant. The number of pores per mm may serve as a specific character.

Hyphal characters such as clamp connection, septation, diameter, branched or unbranched, etc. are useful in defining species as other investigators have pointed out.

The specimens examined by the writers were collected by their comrades from 24 provinces, most of them from South China, especially Hainan Island of Kwantung in 1977. 53 species, 1 variety and 1 form are described by the writers, of which several species determined by other investigators. Of all these 9 species are first recorded from China.

In this paper 1 new section, 9 new species and 2 new rank are presented. All the materials cited are deposited in the Mycological Herbarium of Institute of Microbiology, Academia Sinica, Beijing.