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Two new species of *Perrotia* (Helotiales, Hyaloscyphaceae) from tropical China and a key to the known species of the genus

by

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With 9 figures

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Abstract: Two new species of *Perrotia* with septate ascospores are described from tropical Yunnan, China. The new taxa are compared with related fungi. A key to the accepted species of *Perrotia* is provided.

Key words: *Perrotia pilifera*, *Perrotia yunnanensis*, Yunnan

Introduction

Perrotia Boud. was established a century ago (Boudier 1901). The genus is typified by *P. flammea* (Fr.) Boud. and characterized by sessile to short-stipitate apothecia, thick-walled hairs with incrusted to granulate walls, clavate asci with a rounded and non-amyloid apex, cylindrical, allantoid, fusoid, ellipsoid, broadly ellipsoid, vermiform to aciculate ascospores which are aseptate to multiseptate, and subcylindrical or occasionally lanceolate paraphyses with an obtuse apex. The genus is cosmopolitan and occurs mostly on woody substrata (bark, twigs, and decorticated wood), very rarely on culms of gramineous plants and leaves of dicotyledons. Taxonomic studies of the genus were carried out by many authors (Dennis 1958, 1961, 1962, 1963, Gamundí 1987, Haines 1989, Haines & McKnight 1977, Raitviir 1970, Spooner 1987, Wang & Haines 1999, Zhuang & Hyde 2001). Eighteen species have so far been recognized, of which four have been found in China. These species differ in apothecial size, color of the hymenium and the hairs covering the receptacle surface and the margin, and the shape and size of the asci, ascospores, and paraphyses.

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In our expeditions to tropical areas of Yunnan Province, China, two taxa were encountered on rotten twigs, which differ from all known species of the genus and are thus described as new species. Measurements were made in from lactophenol-cotton blue and/or water mounts.

Taxonomy

Perrotia pilifera W.Y. Zhuang & Z.H. Yu, sp. nov. Figs 1-4

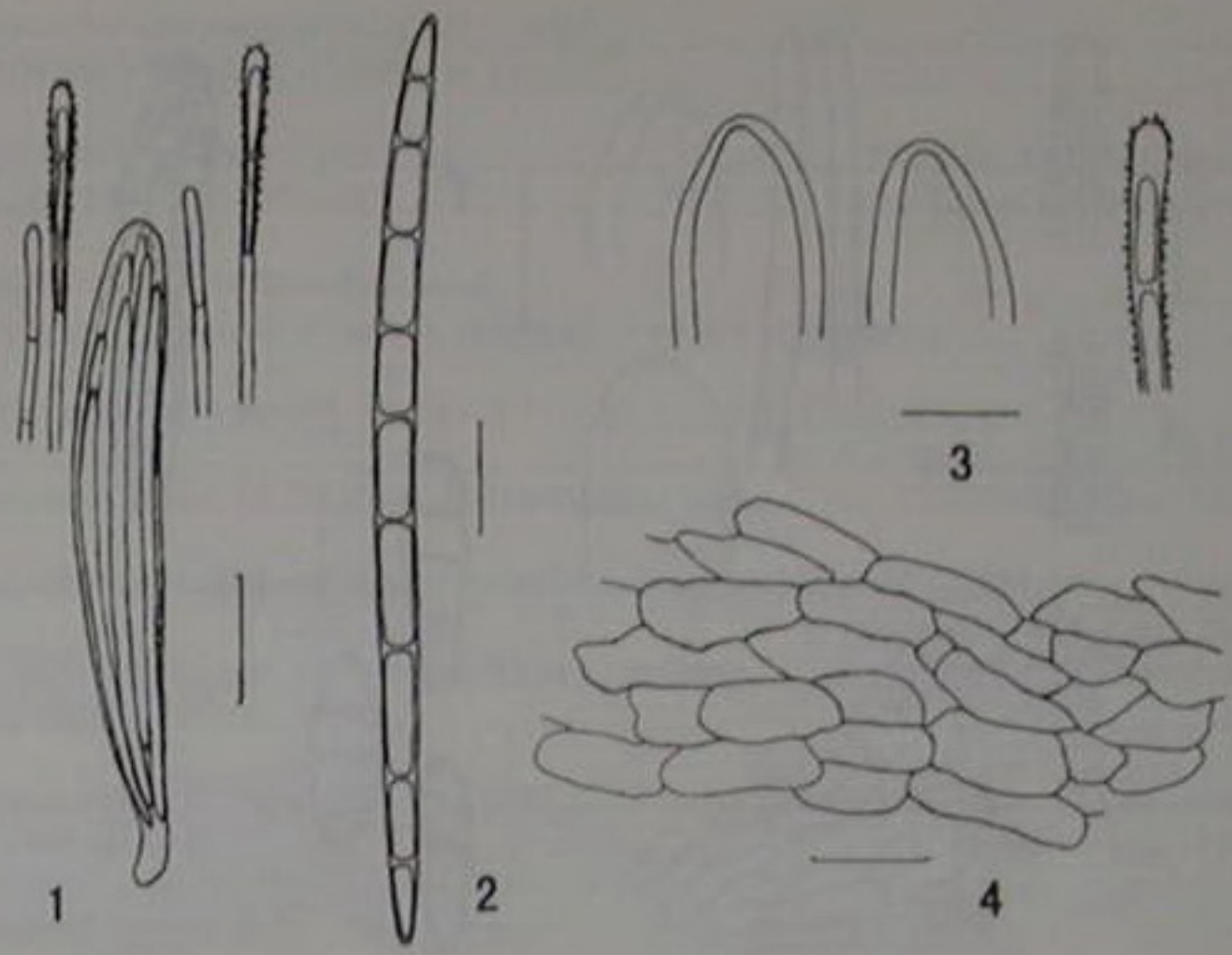
Ascosporis filiformibus, 7-17-septatis, 71-94(-105) × 2-3.5 µm, pilis hyalinis, hymeniis pallide luteis; *Perrotiae atrocitrinae* similis quae differt ascosporis vermiformibus, 20-40 × 4-5 µm, pilis brunneis, hymeniis fulvis, laevibus.

Apothecia convex to flat, sessile to substipitate, 0.6-1 mm diam.; hymenium light yellow to cream, surface pubescent to hairy; receptacle lighter than the hymenium, surface hairy. Hairs on receptacle surface cylindrical, granular, hyaline to subhyaline, septate, (25-)30-110(-145) µm long, 2.2-3.5 µm wide in lactophenol-cotton blue and 2.5-3.8 µm wide in water excluding granules; walls 0.6-1 µm thick; granules 0.5 µm diam. and 1 µm high. Ectal excipulum of textura prismatica, 33-76 µm thick; cells hyaline, 3-15 × 3-7 µm. Medullary excipulum of textura intricata, 35-180 µm thick; hyphae hyaline, 2-4 µm wide. Hymenium 117-142 µm thick excluding the hymenial hairs. Asci 8-spored, clavate, somewhat conical at the apex, often with the apical portion thinner than the lateral wall, J- in Melzer's reagent, mostly 100-122 × 12.5-16 µm in lactophenol-cotton blue, c. 97-115 × 13-16.5 µm in water mounts. Ascospores filiform and tapering towards both ends, very narrowly fusoid or sometimes slightly sigmoid, with 7-17 septa, fasciculate, 71-94(-105) × 2-3.5 µm in lactophenol-cotton blue, c. 75-89 × 2.5-3.8 µm in water. Paraphyses subcylindrical, slightly enlarged at the apex, septate, 1.5-2.5 µm wide in the upper portion, protruding beyond the asci by 0-10 µm. Hymenial hairs evenly distributed among the paraphyses, about equal in number to the paraphyses; strongly granulate above the asci and smooth or nearly so below the apices of asci, portions above the asci similar morphologically to hairs on receptacle surface, about 2.5-3.5 µm wide at the apex, excluding the granules, and 1.5-2 µm wide below the asci, protruding beyond the asci by 28-50 µm.

Holotype: on rotten twig, Cai-yang-he Nature Reserve, Simao, Yunnan, China, 1300 m alt., W.Y. Zhuang & Z.H. Yu 3017, 13-X-1999, HMAS 78157. Paratype: same origin, W.Y. Zhuang & Z.H. Yu 2996, HMAS 78166.

Etymology: The specific epithet refers to presence of hairs in the hymenium.

Notes: Presence of hymenial hairs which are similar to those on the receptacle surface is the most diagnostic feature of *Perrotia pilifera*, a feature never seen before in *Perrotia*. The ascospores of *P. atrocitrina* (Berk. & Broome) Dennis are similar to those of *P. pilifera* in possessing more than 10 septa, but spore shape and other features are quite different. Ascospores of the former are cylindrical-clavate to vermiform, 20-40 × 4-5 µm, whereas in the latter they are filiform with pointed ends, 71-94 × 2-3.5 µm. The color of the hairs is also a distinctive feature, brown in *P. atrocitrina* (Dennis 1963) and subhyaline in our new species.

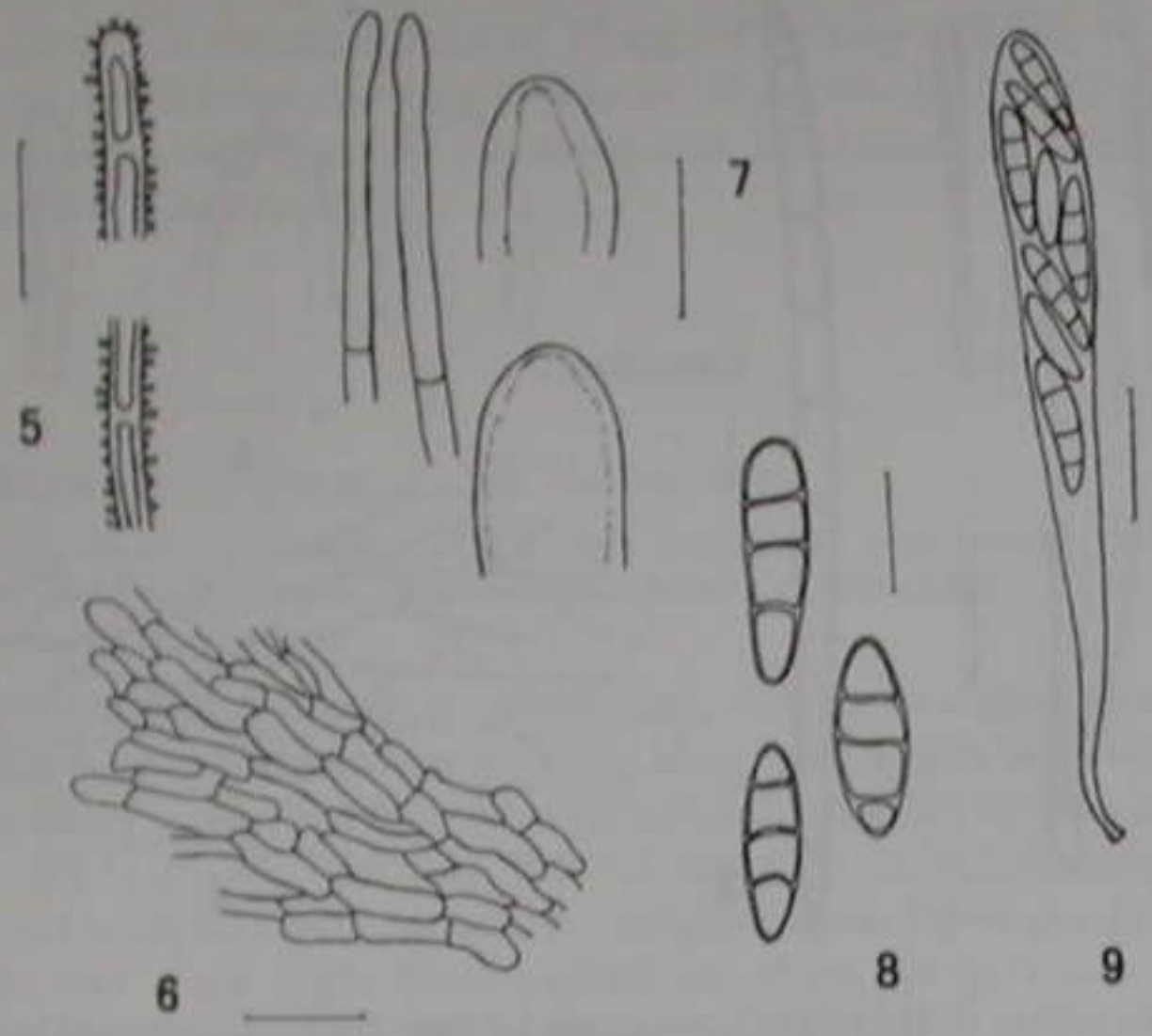


Figs 1-4. *Perrotia pilifera* (HMAS 78157, holotype). 1. Upper portion of hymenial hairs, paraphysis apices, and ascus with ascospores. 2. A septate ascospore. 3. Two ascus apices and apex of a hair on the receptacle surface. 4. Ectal excipular structure at flank. Scale bars: 1 = 20 μm, 2-4 = 10 μm.

Perrotia yunnanensis W.Y. Zhuang & Z.H. Yu, sp. nov. Figs 5-9

Ascosporis non-appendiculatis, ascis 120-140 × 9.5-10.5 μm, apotheciis sessilibus vel substipitatis; similis *Perrotiae nanjenshanae* quae differt ascosporis appendiculatis, ascis 70-90(-112) × 8-12 μm, apotheciis brevistipitatis.

Apothecia discoid, sessile to substipitate, 0.8-1.4 mm diam.; hymenium light yellow; receptacle white, surface hairy. Hairs cylindrical, hyaline, septate, granulate, with slightly thickened walls, up to 140 μm long and 1.8-3 μm wide in lactophenol-cotton blue and c. 2.5 μm wide in water mounts excluding the granules; granules 0.5 μm diam. and 1 μm high. Ectal excipulum of textura prismatica to textura porrecta, 30-40 μm thick; cells hyaline, 3-14 × 2.5-4 μm. Medullary excipulum of textura intricata, 40-110 μm thick; hyphae hyaline, 1.5-3 μm wide. Hymenium 150-180 μm thick. Asci 8-spored, clavate, rounded at the apex, apical pore not distinguishable, J- in Melzer's reagent, mostly (99-)112-125 × 9.5-10.5 μm mounted in lactophenol-cotton blue, 96.5-127 × 9.5-11 μm in water. Ascospores fusoid with rounded ends, sometimes somewhat narrower at the lower end, guttulate, with (1-)3(-5) septa, biseriate above and uniseriate below, 12.5-23 × 3.5-5.5 μm in lactophenol-cotton blue and 13.5-23 × 4-5.5 μm in water, very few spores producing subglobose microconidia while still in the ascus. Paraphyses subcylindrical, slightly enlarged at the apex, septate, c. 2-2.5 μm wide, protruding beyond the asci by 0-18 μm.



Figs 5-9. *Perrotia yunnanensis* (HMAS 78158, holotype). 5. Two fragments of hairs. 6. Ectal excipular structure at flank. 7. Paraphysis apices and ascus apices. 8. Three ascospores. 9. An ascus with ascospores. Scale bars: 5-8 = 10 μm, 9 = 20 μm.

Holotype: on rotten twig, Cai-yang-he Nature Reserve, Simao, Yunnan, China, 1300 m alt., W.Y. Zhuang & Z.H. Yu 2999, 13-X-1999, HMAS 78158.

Etymology: The specific epithet refers to locality of the collection.

Notes: *Perrotia nanjenshana* Y.Z. Wang & J.H. Haines (1999), recorded from Taiwan Province, is the only other known species of the genus with 3-septate ascospores. The narrowly cylindrical appendages up to 8 μm long at each end of the ascospores are the most diagnostic feature of this species. The spores of *Perrotia yunnanensis* are similar to those of *P. nanjenshana* in size and septation; their lower end is slightly narrowed. Moreover, the asci of *P. yunnanensis* are longer and narrower [120-140 × 9.5-10.5 μm] than those of *P. nanjenshana* [70-90(-112) × 8–12 μm].

Key to the known species of *Perrotia*

1. Ascospores non-septate..... 2
1. Ascospores septate..... 9

2. On dicotyledonous leaves; ascospores aciculate..... *P. hongkongensis* W.Y. Zhuang & K.D. Hyde (2001)
2. On twigs, wood, or bark; ascospores other shapes..... 3

3. Ascospores ellipsoid to broadly ellipsoidal..... 4
3. Ascospores cylindrical, allantoid or fusiform..... 5

4. Ascospores 8.5-12 × 5-7 µm..... *P. gallica* (P. Karst. & Hariot) Spooner (1987) L
4. Ascospores 11-15 × 7-9 µm..... *P. robusta* Grélet ex Spooner (1987) L

5. Ascospores fusoid to broadly fusoid..... 6
5. Ascospores cylindrical, allantoid, ellipsoid, or ellipsoidal-oblong..... 7

6. Ascospores broadly fusoid, 12-18 × 3.5-5 µm; on bark of *Nothofagus*.....
..... *P. apiculata* (Dennis) Spooner (1987) ?
6. Ascospores fusoid, 15-24 × 3-5 µm; on conifer wood..... *P. abietis* (P. Karst.) Raitv. (1970) L

7. Hairs hyaline, incrusted with orange granules; ascospores ellipsoid, 10-12 (-14) × 3-4(-5) µm.....
..... *P. succinea* (W. Phillips) Dennis (1962) ✓
7. Hairs dark brown, not incrusted with orange granules; ascospores cylindrical, allantoid, or oblong-ellipsoidal..... 8

8. Ascospores cylindrical to allantoid, 9-11 × 2.5 µm; hairs smooth-walled; hymenium yellowish; on decorticated twigs..... *P. andina* (Speg.) Dennis (1963)
8. Ascospores oblong ellipsoidal, (7-)8-13(-14) × 2-3.5(-4.5) µm; hairs granulate; hymenium pale yellowish pink, light yellowish brown, or intensely yellow; on wood of *Populus*.....
..... *P. populina* (Seaver) Dennis (1963) ✓

9(1). Ascospores mostly uniseptate..... 10
9. Ascospores with 3 or more septa..... 14

10. On culms of *Phragmites* and *Andropogon*..... *P. distincta* (Peck) J.H. Haines (1989) ✓
10. On woody substrata..... 11

11. Hymenium pallid to pale yellow; hairs hyaline..... 12
11. Hymenium darker, with orange or reddish tints; hairs pigmented..... 13

12. Ascospores ellipsoidal-cylindrical, 12-17 × 3-4.5 µm; hymenium pale yellow.....
..... *P. alba* Dennis (1961) ✓
12. Ascospores allantoid, 12-16 × 2.4-3 µm; hymenium pallid.....
..... *P. velutarioides* (Speg.) Gamundí (1987) ?

13. Hymenium reddish brown; hairs cinnabar red; ascospores 10-14 × 2.5-3 µm.....
..... *P. flammea* (Alb. & Schwein. : Fr.) Boud. (1901) ✓
13. Hymenium dull orange; hairs hyaline to light yellow; ascospores 14-21 × 2.8-4 µm.....
..... *P. sphaerula* (Sacc.) Spooner (1987) ✓

14. Ascospores mostly with 3 septa..... 15
14. Ascospores with more than 7 septa..... 16

15. Ascospores 16-20 × 4.2-5.2 µm, with appendages at both ends.....
..... *P. nanjenshana* Y.Z. Wang & J.H. Haines (1999) ? Arachnop
15. Ascospores 12.5-23 × 3.5-5.5 µm, without appendages.....
..... *P. yunnanensis* W.Y. Zhuang & Z.H. Yu (2001) ? Arachnop.

16. Ascospores with more than 22 septa..... *P. lutea* (W. Phillips) Dennis (1958) ?
16. Ascospores with fewer than 17 septa..... 17

17. Ascospores vermiform, 20-40 × 4-5 µm; hairs absent in the hymenium.....
..... *P. atrocitrina* (Berk. & Broome) Dennis (1962) ?
17. Ascospores filiform, 71-94 × 2-3.8 µm; hairs present in the hymenium.....
..... *P. pilifera* W.Y. Zhuang & Z.H. Yu (2001) ?

Perrotia species with changed names

Perrotia phragmiticola (Hann. & Ploett.) Dennis, Persoonia 2: 182, 1962.
≡ *Dasyscypha phragmiticola* Hann. & Ploett., Verh. Bot. Vereins Prov. Brandenburg 41: 97, 1899.
≡ **Perrotia distincta** (Peck) Haines, Mycotaxon 35: 328, 1989.
≡ *Peziza distincta* Peck, Annual Rep. New York State Mus. 30: 60, 1878.

Notes: According to Haines (1989), *Perrotia phragmiticola* is a later synonym of *P. distincta*.

Perrotia aurea (Massee) Dennis, Kew Bull. 13: 323, 1958.
≡ *Dasyscypha aurea* Massee, J. Bot. 34: 146, 1896.
≡ **Perrotia sphaerula** (Sacc.) Spooner, Bibl. Mycol. 116: 624, 1987.
≡ *Trichopeziza sphaerula* Sacc., Hedwigia 29: 155, 1890.

Notes: According to Spooner (1987), *Perrotia sphaerula* is the correct name for the fungus.

Species excluded or imperfectly known

Perrotia fusca Müller & Dennis, Sydowia 13: 46 1959.
≡ **Lasiobelonium fuscum** (Müller & Dennis) Raitv., Scripta Mycol. 9: 119, 1980.

Perrotia lonicerae (Alb. & Schwein.) Müller & Dennis, Sydowia 13: 44, 1959
≡ **Lasiobelonium lonicerae** (Alb. & Schwein.) Raitv., Scripta Mycol. 9: 115, 1980.

Perrotia himalayensis E. Müller & Dennis, Sydowia 13: 48, 1959.

Notes: According to Raitviir (1980), the fungus belongs to the genus *Trichopezizella* which was later synonymized with *Lasiobelonium* (Spooner, 1987).

Perrotia malemchiensis Balfour-Browne, Bull. Brit. Mus. (Nat. Hist.) Bot. 4(3): 102, 1968.

Notes: The iodine reaction of the ascus pore was not indicated by the original author (Balfour-Browne, 1968). According to the original illustrations, the shape of ascus apex does not fit *Perrotia* but *Lasiobelonium*.

Perrotia sharmae Svrček, Česká Mykol. 30: 13, 1976.

Notes: The ectal excipulum of textura globulosa as described and illustrated by the original author (Svrček, 1976) is unusual for *Perrotia*. Type examination is required to make the final decision.

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