

- 11 (5). Ascospores averaging more than 25  $\mu\text{m}$  long ..... 12  
 11. Ascospores averaging less than 25  $\mu\text{m}$  long ..... 14
- 12 (11). Ascomata dark red with red hairs; ascospores 27–30  $\times$  7–8  $\mu\text{m}$ , spinulose to spinulose-striate ..... *H. haematites*  
 12. Ascomata dark orange to brown with concolorous hairs; ascospores smooth-walled 13
- 13 (12). Ascospores 48–55  $\times$  6–7  $\mu\text{m}$ ; ascomata dark orange with orange hairs *H. gigantea*  
 13. Ascospores 25–38  $\times$  5–7  $\mu\text{m}$ ; ascomata brown with brown hairs ... *H. dolichospora*
- 14 (11). Ascomata with white or orange, fasciculate hairs; ascospores averaging more than 17  $\mu\text{m}$  long ..... 15  
 14. Ascomata with white, fasciculate hairs; ascospores averaging less than 17  $\mu\text{m}$  long ..... 16
- 15 (14). Ascomata yellow to orange or nearly brown with white hairs; ascospores 16–22  $\times$  4–5  $\mu\text{m}$ , striate or spinulose ..... *H. leucotricha*  
 15. Ascomata orange with orange hairs; ascospores 17–23  $\times$  5–7  $\mu\text{m}$ , striate *H. cyatheae*
- 16 (14). Ascospores striate, 12–17  $\times$  4–5  $\mu\text{m}$ ; ascomata pale yellow to yellow .... *H. suffulta*  
 16. Ascospores smooth or spinulose, not striate; ascomata orange to dark orange ..... 17
- 17 (16). Ascospores 12.5–17.5  $\times$  3.5–4  $\mu\text{m}$ , spinulose; warm temperate and tropical .....  
 ..... *H. rufofusca*  
 17. Ascospores 12–15  $\times$  4–5  $\mu\text{m}$ , smooth; known only from England ..... *H. boothii*

**IJUHYA** Starbäck, Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25: 30. 1899.

Type: *I. vitrea* Starbäck, a synonym of *I. peristomialis*.

= *Peristomialis* (W. Phillips) Boud., Hist. Classif. Discom. Europe p. 116. 1907.

= *Mollisia* subgenus *Peristomialis* W. Phillips, Man. Brit. Discom. p. 201. 1887.

= *Cyathicula* subgenus *Peristomialis* (W. Phillips) Sacc., Syll. Fung. 8: 306. 1889. — Type: *P. berkeleyi* Boud., a nomenclatural synonym of *I. peristomialis*.

= *Lepidonectria* Speg., Revista Fac. Agron. Univ. Nac. La Plata 6: 97. 1910. — Type: *L. chilensis* Speg., recognized as *I. chilensis*.

Ascomata solitary or in small groups, superficial, non-stromatic, white to pale yellow, KOH–, globose to subglobose, usually with a discoidal apex; disk formed of intertwined hyphae that often develop into triangular fasciculate hairs forming an apical crown, rarely apex discoidal without hairs or with short, sinuous hairs. Ascumatal wall usually less than 20  $\mu\text{m}$  thick, of one region of thick-walled, relatively small cells, often forming *textura epidermoidea* in surface view. Asci clavate, 8-spored. Ascospores clavate or fusiform to long fusiform, one- to multiseptate or muriform, hyaline, smooth to striate. Anamorph, where known, *Acremonium*-like. On decaying herbaceous debris or wood, also on black stroma, hyphae, and ascomata of pyrenomycetous fungi.

NOTES.— *Ijuhya* was originally placed in the *Gymnoascaceae*; later it was considered a member of the *Sphaeriaceae* (Müller & von Arx, 1973) as well as the *Hypocreaceae* (Rogerson, 1970). Samuels (1976b) examined the type specimen and determined *Ijuhya vitrea* to be a synonym of *Nectria peristomialis*.

Phillips (1887) described *Mollisia* subgenus *Peristomialis* for one species having triangular hairs on the ascumata and fusiform, multiseptate ascospores. *Mollisia peristomialis* was the only species included in the subgenus, thus, when raised to generic rank, the taxon is automatically typified by that species. When raising the subgenus to generic rank, Boudier (1907) proposed a new epithet for the type species in order to avoid a tautonym. He included six species in *Peristomialis*. Samuels (1976b) examined the type specimen and regarded the type species as *Nectria peristomialis*, thus he considered *Peristomialis* to be a synonym of *Nectria*. Although listed as a synonym of *Peristomialis* by Samuels (1976b), *Ijuhya* has priority over *Peristomialis*.

Spegazzini (1910) described one species in the genus *Lepidonectria*. Based on the presence of 'squamules' on the ascumata of *L. chilensis*, Spegazzini may have intended his species to be in *Nectria* subgenus *Lepidonectria* Sacc.; however, no reference is made to that taxon. Spegazzini was the first to use the name *Lepidonectria* at the generic level which constitutes the valid publica-

tion of a new genus with *L. chilensis* as the implicit type species. None of the species in *Nectria* subgenus *Lepidonectria* were ever placed in the genus *Lepidonectria*. The type specimen of *Lepidonectria chilensis* was examined and the species is herein placed in *Ijuhya*.

Samuels (1988) recognized *Ijuhya* (as *Peristomialis*) as a genus distinct from other pallid members of *Nectria*-like fungi, differentiated primarily by the fasciculate hairs around the ascumatal apex. In addition to the fasciculate hairs, the ascumatal wall anatomy is distinct, composed of thick-walled, relatively small cells. Within *Ijuhya*, ten species are recognized, distinguished primarily on characteristics of the ascospores that vary from one-septate to multiseptate or muriform and are generally coarsely striate, although some species have smooth or spinulose ascospores.

***Ijuhya peristomialis* (Berk. & Broome) Rossman & Samuels, *comb. nov.***

≡ *Peziza peristomialis* Berk. & Broome, Ann. Mag. Nat. Hist., Ser. 3, 18: 126. 1866.

≡ *Mollisia peristomialis* (Berk. & Broome) W. Phillips, Man. Brit. Discom. p. 201. 1887.

≡ *Cyathicula peristomialis* (Berk. & Broome) Sacc., Syll. Fung. 8: 308. 1889.

≡ *Actiniopsis peristomialis* (Berk. & Broome) Petch, Trans. Brit. Mycol. Soc. 21: 282. 1938.

≡ *Nectria peristomialis* (Berk. & Broome) Samuels, New Zealand J. Bot. 14: 251. 1976.

≡ *Peristomialis berkeleyi* Boud., Hist. Classif. Discom. Europe p. 116. 1907.

≡ *Helotium ciliatum* P. Crouan & H. Crouan, Fl. Finistère p. 47. 1867.

≡ *Cyathicula ciliata* (P. Crouan & H. Crouan) Sacc., Syll. Fung. 8: 306. 1889.

≡ *Peristomialis ciliata* (P. Crouan & H. Crouan) Boud., Hist. Classif. Discom. Europe p. 116. 1907.

≡ *Ijuhya vitrea* Starbäck, Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25: 30. 1899.

≡ *Ijuhya vitrea* Starbäck var. *javanica* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1, 121: 380. 1912.

≡ *Nectria tympaniformis* Petrak, Sydowia 4: 514. 1950.

Anamorph: *Acremonium* sp.

Ascomata solitary or in small groups, superficial, without a stroma or on a sparse, hyphal subiculum. Ascomata hyaline to pale yellow, translucent, becoming darker and opaque when dry, KOH-, globose to subglobose with flattened apex, apex often slightly sunken; ascomata not collapsing when dry, 230–375  $\mu\text{m}$  high  $\times$  260–350  $\mu\text{m}$  diam, without papilla; each ascoma with an apical disk 150–200  $\mu\text{m}$  diam with a ring of long, fasciculate, hyaline hairs; fascicles of hairs 145–300  $\times$  30–90  $\mu\text{m}$ , tapering to a narrowly rounded tip, agglutinated hyphae hyaline, septate, 2.5–4  $\mu\text{m}$  wide with a 0.5–1  $\mu\text{m}$  thick wall. Ascumatal wall 35–60  $\mu\text{m}$  thick, of three regions: outer region 10–20

$\mu\text{m}$  thick, of loose, prosenchymatous hyphae 3–4  $\mu\text{m}$  wide, with up to 1  $\mu\text{m}$  thick walls; middle region 15–25  $\mu\text{m}$  thick, of elongate cells, 7–12  $\times$  5–7  $\mu\text{m}$ , with hyaline, up to 1  $\mu\text{m}$  thick walls, thicker in the corners, middle region up to 75  $\mu\text{m}$  thick in the upper part, expanding into a flattened apical disk; inner region 10–15  $\mu\text{m}$  thick, of hyaline, thin-walled, elongate cells. Asci 50–100  $\times$  12–15  $\mu\text{m}$ , clavate, simple, 8-spored, ascospores irregularly biseriate to pluriseriate. Ascospores fusiform with rounded ends, often curved, (24–)30–60(–110)  $\times$  4–7(–8)  $\mu\text{m}$ , (1–)5–7(–11)-septate, hyaline, coarsely striate, 3–4 striae per half spore.

ANAMORPH.— Conidiophores arising from the colony surface, solitary, erect, straight, unbranched, cylindrical, tapering toward the apex, septate at the base, occasionally with one or two additional septa, smooth, 20–50  $\mu\text{m}$   $\times$  2–3.5  $\mu\text{m}$  at the base. Conidiogenous cells monophialidic, terminal cell of erect conidiophore, cylindrical, 22–33  $\times$  1.5–1.8  $\mu\text{m}$  at the unflared apex. Conidia ellipsoid to cylindrical with rounded ends, 5–8  $\times$  1.7–2.5  $\mu\text{m}$ , aseptate, hyaline, smooth, held in a solitary, hyaline drop of liquid.

HABITAT.— On monocotyledonous and dicotyledonous wood and herbaceous debris.

DISTRIBUTION.— Brazil, Colombia, England, France, India, Java, New Zealand, Panama and Venezuela (Rossman, 1983; Samuels, 1976b).

TYPES.— ENGLAND. Penzance, on *Ilex* sp., no. 248 (K, holotype of *P. peristomialis*); BRAZIL. Rio Grande do Sul, on culms of bamboo, 7 Apr 1893, Malme 340 (S, holotype of *Ijuhya vitrea*); INDONESIA. Java, Tjibodas, on bamboo, 1907–8, Höhnel 5792 (FH, holotype of *I. vitrea* var. *javanica*). Culture: CBS 569.76.

ILLUSTRATIONS.— Dennis (1978, Pl. 31K, as *A. peristomialis*); Rossman (1983, Fig. 40, Pl. 13A–B, as *N. peristomialis*); Samuels (1976b, Fig. 9, as *N. peristomialis*).

NOTES.— Samuels (1976b) and Rossman (1983) provided descriptions of *I. peristomialis* (as *N. peristomialis*) and its *Acremonium* anamorph.

***Ijuhya chilensis* (Speg.) Rossman & Samuels, *comb. nov.* — Plate 2, d, Plate 5, c–e.**

≡ *Lepidonectria chilensis* Speg., Revista Fac. Agron. Univ. Nac. La Plata 6: 97. 1910.

Ascomata gregarious, superficial, without visible basal mycelium, difficult to remove from the substratum. Ascomata globose, 275  $\mu\text{m}$  diam, non-papillate, dull orange, KOH-, not collapsed, with a fringe of thick-walled, fasciculate hairs around the apex, hairs up to 100  $\mu\text{m}$  long. Ascumatal surface of tightly intertwined hyphae, wall of several regions of intertwined, thick-

walled hyphae. Asci clavate to fusiform, 65–96 × 9–11.2 µm, widest in the middle, apex simple, 6–8-spored, ascospores pluriseriate. Ascospores narrowly fusiform, (19–)21–28 × 3.5–4.5 µm, 1-septate, slightly or not constricted at septum, hyaline, coarsely striate with striations extending over the length of the spore, few in number.

**HABITAT AND DISTRIBUTION.**— Known only from the type specimen.

**HOLOTYPE.**— CHILE. *Valdivia*, on decaying shoots of *Lobelia lupia*, Jan 1909. C. Spegazzini (LPS-1696).

**NOTES.**— Based on Spegazzini's illustrations and the type specimen, *Lepidonectria chilensis* belongs in *Ijuhya* and is similar to *Ijuhya paraparilis* except that ascomata of *I. paraparilis* have a flattened apical disk and occur on black mycelium on bamboo. The ascomata of *I. chilensis* are associated with an effete, black fungus.

EIGHT ADDITIONAL SPECIES are included in *Ijuhya* as follows:

***Ijuhya aquifolii*** (Cooke & Ellis) Rossman & Samuels, *comb. nov.* — Plate 2, c.

≡ *Peziza aquifolii* Cooke & Ellis, *Grevillea* 6: 91. 1878 (as '*aquifoliae*'). — Lectotype, designated in Rossman *et al.* (1993); UNITED STATES. New Jersey: Newfield, on dead leaves of *Ilex*, associated with dematiaceous hyphae, 21 May 1877, J.B. Ellis 2559 (BPI 1113199).

≡ *Pseudonectria aquifolii* (Cooke & Ellis) Dennis, *Personia* 3: 35. 1964.

≡ *Peristomialis aquifolii* (Cooke & Ellis) Rossman *et al.*, *Mycologia* 85: 696. 1993 (as '*aquifoliae*').

This species was described and illustrated in Rossman *et al.* (1993) as *N. aquifolii*.

***Ijuhya bambusina*** (Syd. & P. Syd.) Rossman & Samuels, *comb. nov.*

≡ *Pseudonectria bambusina* Syd. & P. Syd., *Ann. Mycol.* 15: 214. 1917.

≡ *Peristomialis bambusina* (Syd. & P. Syd.) Rossman *et al.*, *Mycologia* 85: 699. 1993.

This species was described and illustrated in Rossman *et al.* (1993) as *N. corynespora*.

***Ijuhya corynespora*** (Samuels) Rossman & Samuels, *comb. nov.*

≡ *Nectria corynespora* Samuels, *New Zealand J. Bot.* 16: 78. 1978.

≡ *Peristomialis corynespora* (Samuels) Samuels, *Mem. New York Bot. Gard.* 48: 18. 1988.

This species was described and illustrated in Samuels (1978) as *N. bambusina*.

***Ijuhya dentifera*** (Samuels) Rossman & Samuels, *comb. nov.*

≡ *Nectria dentifera* Samuels, *New Zealand J. Bot.* 14: 253. 1976.

≡ *Peristomialis dentifera* (Samuels) Samuels, *Mem. New York Bot. Gard.* 48: 18. 1988.

This species was described and illustrated in Samuels (1976b) as *N. dentifera*. Culture CBS 574.76.

***Ijuhya dictyospora*** (Rossman) Rossman & Samuels, *comb. nov.*

≡ *Nectria dictyospora* Rossman, *Mycol. Pap.* 150: 69. 1983.

≡ *Peristomialis dictyospora* (Rossman) Samuels, *Mem. New York Bot. Gard.* 48: 20. 1988.

This species was described and illustrated in Rossman (1983) as *N. dictyospora* and Samuels (1988) as *P. dictyospora*.

***Ijuhya leucocarpa*** (Samuels) Rossman & Samuels, *comb. nov.*

≡ *Peristomialis leucocarpa* Samuels, *Mem. New York Bot. Gard.* 48: 16. 1988.

This species was described and illustrated in Samuels (1988) as *P. leucocarpa*.

***Ijuhya paraparilis*** (Samuels) Rossman & Samuels, *comb. nov.*

≡ *Peristomialis paraparilis* Samuels, *Mem. New York Bot. Gard.* 48: 16. 1988.

This species was described and illustrated in Samuels (1988) as *P. paraparilis*.

***Ijuhya parilis*** (Syd.) Rossman & Samuels, *comb. nov.*

≡ *Nectria parilis* Syd., *Ann. Mycol.* 28: 121. 1930.

≡ *Peristomialis parilis* (Syd.) Samuels, *Mem. New York Bot. Gard.* 48: 15. 1988.

This species was described and illustrated in Samuels (1988) as *P. parilis*.

KEY TO THE SPECIES OF *IJUHYA*

1. Ascospores 5- or more-septate or muriform ..... 2
1. Ascospores 1-3-septate ..... 4
- 2 (1). Ascospores muriform, with 7-13 transverse septa and one, irregular, longitudinal septum, 48-97 × 10-16 μm, smooth ..... *I. dictyospora*
2. Ascospores only transversely septate, generally less than 45 μm long, coarsely striate 3
- 3 (2). Ascospores 5-7-septate, rarely 1-3- or up to 11-septate, (24-)30-60(-110) × 4-7(-8) μm, fusiform ..... *I. peristomialis*
3. Ascospores 5-9(-13)-septate, 27-42 × 3-4.5 μm, narrowly fusiform . *I. corynespora*
- 4 (1). Ascospores fusiform, more than 10 μm long ..... 5
4. Ascospores oblong to ellipsoid or narrowly ellipsoid, less than 10 μm long ..... 8
- 5 (4). Ascospores 14.5-20 × (2.5-)3-5(-5.5) μm, spinulose ..... *I. parilis*
5. Ascospores more than 20 μm, coarsely striate ..... 6
- 6 (5). Ascomata with a flattened apical disk; ascospores (19.5-)21.5-24.5(-25.5) × 4-5 μm ..... *I. paraparilis*
6. Ascomata with an apical fringe of fasciculate hairs ..... 7
- 7 (6). Ascospores (1-)5-7(-11)-septate, (24-)30-60(-110) × 4-7(-8) μm long; ascomata white to pale yellow ..... *I. peristomialis* (see under 3)
7. Ascospores 1-septate, 21-28 × 3.5-4.5 μm; ascomata dull orange ..... *I. chilensis*
- 8 (4). Ascospores finely striate, 7.5-9 × 2.5-3 μm; ascomata umber, with an acute apex, finely scurfy due to free ends of hyphae ..... *I. bambusina*
8. Ascospores smooth or finely spinulose; ascomata white, yellow to orange or sienna, with an apical disk and/or fasciculate hairs or hyphae ..... 9
- 9 (8). Ascomata white, 150 μm diam or less; ascospores ellipsoid to oblong, (7.5-)8.5-10(-11) × 2-2.5(-3) μm, smooth-walled ..... *I. leucocarpa*
9. Ascomata yellow, orange or sienna, more than 150 μm diam; ascospores smooth or finely spinulose ..... 10
- 10 (9). Ascomata sienna, with short, sinuous hairs extending from the wall; ascospores oblong to narrowly ellipsoid, 7-9 × 2-2.5 μm, smooth-walled ..... *I. aquifolii*
10. Ascomata yellow to orange, with fasciculate hairs; ascospores ellipsoid, 6-8 × 3-4 μm, finely spinulose ..... *I. dentifera*

**KALLICHROMA** Kohlm. & Volkm.-Kohlm., Mycol. Res. 97: 759. 1993.

Type: *K. tethys* (Kohlm. & E. Kohlm.) Kohlm. & Volkm.-Kohlm. (≡ *Hydronectria tethys* Kohlm & E. Kohlm.).

Ascomata depressed subglobose to ellipsoid, at first immersed, erumpent, ostiolate, periphyses surrounded by a gelatinous matrix, non-papillate, indistinctly clypeate, fleshy-leathery, yellow-orange, gregarious or frequently confluent; clypeoid tissue extending from peridium around the ostiole and often connecting with adjacent ascomata. Ascomatal wall of three regions: outer region of

polygonal cells with large lumina; middle region of thick-walled cells with small lumina; inner region of elongate, flattened, thick-walled cells, forming a *textura angularis*. Apical paraphyses present, septate, simple, apically attached, merging with the periphyses. Asci subcylindrical to clavate, thin-walled at maturity except for the narrow, thick-walled persistent apex, without apical apparatus, maturing successively on the ascogenous tissue at the bottom of the centrum, 8-spored, ascospores biseriata. Ascospores ellipsoid, equally 1-septate, hyaline, longitudinally striate by thin ribs or smooth, with or without an early dissolving mucilaginous sheath. Anamorph un