

Four new species of *Ijuhya* (*Bionectriaceae*) from Belgium, metropolitan France and French Guiana

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Ascomycete.org, 9 (1) : 11-18.
Janvier 2017
Mise en ligne le 07/01/2017



Abstract: Four new species of *Ijuhya* are described and illustrated based on material collected in Belgium, metropolitan France and French Guiana. The four new species described herein were sequenced and one of them was successfully cultured. They are placed in the *Bionectriaceae* based on ascomata not changing colour in 3% KOH or lactic acid, acremonium-like asexual morph and phylogenetic affinities of LSU sequences with five morphologically related genera of the *Bionectriaceae*. Their placement in *Ijuhya* is based on morphological and phylogenetic comparison with the most similar genera including *Lasionectria* and *Lasionectriella*. An updated dichotomous key to *Ijuhya* is presented.

Keywords: acremonium-like, Ascomycota, *Hypocreales*, ribosomal DNA, taxonomy.

Résumé : quatre espèces nouvelles du genre *Ijuhya* sont décrites et illustrées d'après du matériel récolté en Belgique, France métropolitaine et Guyane française. Les quatre espèces nouvelles décrites ici ont été séquencées et l'une d'entre elles a pu être cultivée. Elles sont placées dans les *Bionectriaceae* d'après les ascomes ne changeant pas de couleur dans KOH à 3 % ou dans l'acide lactique, la forme asexuée de type acremonium et les affinités phylogénétiques des séquences LSU avec des espèces représentant cinq genres de *Bionectriaceae* morphologiquement proches. Leur placement dans *Ijuhya* est établi sur la comparaison morphologique et phylogénétique avec les genres les plus ressemblants, dont *Lasionectria* et *Lasionectriella*. Une clé dichotomique mise à jour du genre *Ijuhya* est proposée.

Mots-clés : acremonium-morphe, ADN ribosomal, Ascomycota, *Hypocreales*, taxinomie.

Introduction

In the continuity of a survey of hypocrealean fungi in temperate and neotropical areas (LECHAT & BARAL, 2008; LECHAT & COURTECUISE, 2010; LECHAT & FOURNIER, 2012; 2015a; 2015b; 2016a; 2016b; 2016c; LECHAT & HAIRAUD, 2012; LECHAT *et al.*, 2014; 2015a; 2015b; 2015c; 2016a; 2016b), four new species of *Ijuhya* Starbäck were collected on *Cornus sanguinea* L. and on old stromata of *Eutypa lata* (Pers.) Tul. & C. Tul. in France, on *Humulus lupulus* L. in Belgium, on *Hypocreopsis lichenoides* (Tode) Seaver in the Netherlands and on dead palm leaves in French Guiana, which proved different from the species reported in the literature. The genus *Ijuhya* is morphologically distinguished from other genera in the *Bionectriaceae* by ascomata with a flat apex bearing either fasciculate hairs arranged in a stellate fringe around the upper margin of the ascomata, or agglutinated hairs forming a thick, apical disc with a rounded, protruding margin or with protuberances around the upper margin of ascomata. Morphologically, the four new species conform well with this definition and the analysis of their LSU sequences confirms their phylogenetic affinities with this genus. The differences between *Ijuhya* and the most closely related genera *Lasionectria* (Sacc.) Cooke and *Lasionectriella* Lechat & J. Fourn. are discussed.

Materials and methods

Specimens were examined using the method described by ROSSMAN *et al.* (1999). Microscopic observations and measurements were made in water and the ascospore ornamentation was observed in lactic cotton blue without heating. The holotype specimens are deposited in LIP herbarium (Lille) and the ex-type culture of *I. tetraspora* at CBS. Cultures of the living specimens were made on PDA (Potato Dextrose Agar) with 5mg/l of streptomycin in Petri dishes 55 mm diam. A mass of ascospores and asci was removed from a perithecium with a fine needle and placed in a drop of sterile water that was stirred with a needle to distribute the elements on the slide. A part of the drop containing ascospores was placed on PDA using a sterile micropipette, then the Petri dish was incubated at 25°C. The specimens were sequenced and phylogenetically analysed using the methods described in LECHAT & FOURNIER (2015b).

Taxonomy

Ijuhya faveliana Lechat & J. Fourn. *sp. nov.* Fig. 1
Mycobank MB818678

Diagnosis: Differs from known species with apically fasciculate hairs in having white to pale orange ascomata, ascospores 15–17 × 3–3.5 µm with slightly spiralling striae and occurrence on palm leaves in tropical rainforest.

Holotypus: FRENCH GUIANA: Sinnamary, piste Saint-Elie, rainforest, 22 Apr. 2010, on dead leaves of *Astrocarium* sp. (*Areaceae*), leg. Christian Lechat CLLG10007 (LIP), Genbank LSU KX950705.

Etymology: The specific epithet "*faveliana*" refers to Dr. Anne Favel (UMR 1163 Biotechnologie des Champignons filamenteux, INRA/AMU, France) to whom the authors dedicate this species in appreciation of her friendly collaboration and her management of the scientific mission 2010 in French Guiana.

Ascomata solitary, scattered on the host surface, superficial, easily removed from substrate, non-stromatic, seated on an inconspicuous mycelium, globose, 160–190 µm diam. ($m=180$ µm, $n=15$), white to pale orange, not collapsing when dry, not changing colour in 3% KOH or lactic acid. Ascomatal apex obtusely conical with an acute papilla. Ascomatal wall abundantly covered by flexuous hyphae 1.5–2 µm diam developing from ascomatal base and proliferating to form triangular teeth 140–190 µm long, up to 40 µm wide at base, arranged in a stellate fringe around the upper margin of ascumata and composed of fasciculate hairs 1.5–3 µm wide, white to pale yellowish, slightly flexuous, thick-walled, wall 0.7–1 µm thick, rounded at tip. Ascomatal wall 25–32 µm thick, composed of a single region of thick-walled, globose to ellipsoidal cells, 6–10 × 2–5 µm, with pale yellow wall 1.5–1.8 µm thick, becoming hyaline and elongate toward the inside. **Asci** fusiform to clavate, (45–)48–55(–60) × 8–10 µm ($m=50$ × 9.5 µm, $n=20$), apices rounded to slightly flattened, without ring, with 8 irregularly biseriolate ascospores. **Filamentous paraphyses** 1–1.5 µm wide interspersed between the asci. **Ascospores** (14–)15–17(–18) × 3–3.5(–4) µm ($m=16$ × 3.3 µm, $n=30$), fusiform, rounded at the ends, equally 1-septate, hyaline, conspicuously striate, striae oblique to somewhat spiralling, completely filling each ascus.

Cultural characteristics: The culture of this species was unsuccessful.

Asexual morph: Unknown.

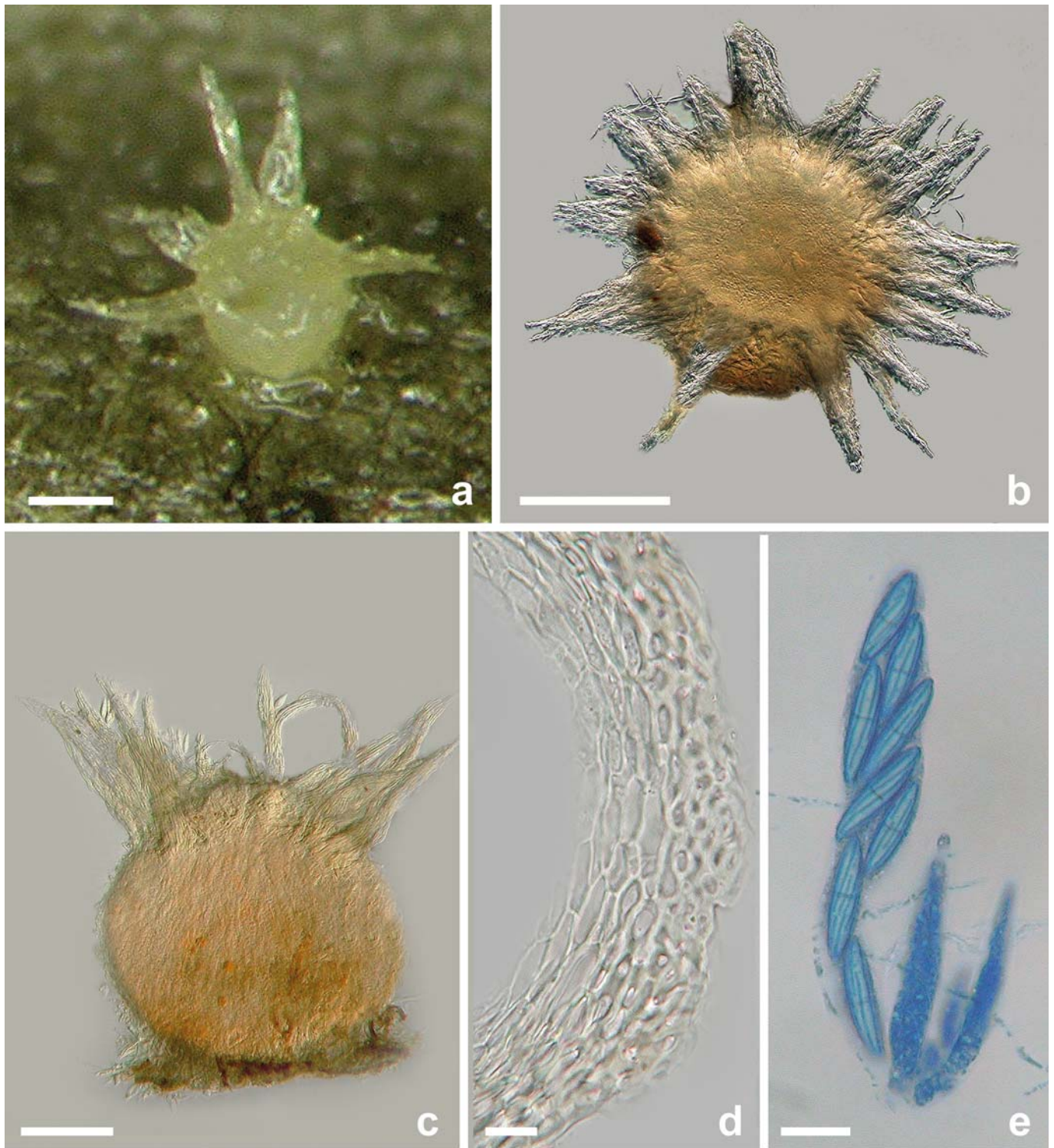


Fig. 1 – a–e: *Ljuhya faveliana* (Holotype CLLG10007). a: Immature, rehydrated ascoma on the substrate. b: Ascomatal apex in top view. c: Close-up of ascoma in side view in water. d: Vertical section through the lateral ascomatal wall. e: Asci and ascospores, in cotton blue. Scale bars: a–c = 100 μ m; d–e = 10 μ m.

Ljuhya lilliputiana Lechat & J. Fourn. *sp. nov.*
Mycobank MB 818680

Fig. 2

Diagnosis: Differs from known *Ljuhya* species in having minute, glabrous ascomata, measuring (90–)100–110(–120) μ m diam., with conspicuous protuberances around ascomatal apex.

Holotypus: FRENCH GUIANA: Régina, Nouragues natural reserve, Inselberg camp, primary rainforest, 18 Jun. 2012, on dead palm leaves, *leg.* Christian Lechat CLLG12015B (LIP); Genbank LSU KX950703.

Etymology: The specific epithet is derived from lilliputian = tiny, minute, for the smallest ascomata within the genus *Ljuhya*, in reference to the very small inhabitants of the fabulous island of Lilliput.

Ascomata solitary, scattered on the host surface, superficial, easily removed from the substrate, non-stromatic, seated on an inconspicuous mycelium, globose, (90–)100–110(–120) μ m diam., glabrous, white to pale yellow, not collapsing when dry, not changing colour in 3% KOH or lactic acid. Ascomatal apex with a minute, acute papilla and 3–4 cylindrical protuberances 35–45 μ m high, 25–45 μ m diam. protruding upwards around the upper margin of ascumata, resulting from proliferation of cells of the ascomatal wall. Cells at the surface of the ascomatal wall forming a *textura epidermoidea* in surface view. Ascomatal wall 15–20 μ m thick, composed of a single region of thick-walled, globose to ellipsoidal cells, 3.5–6 \times 2.5–4 μ m, with pale yellow wall 1–2 μ m thick, becoming hyaline and

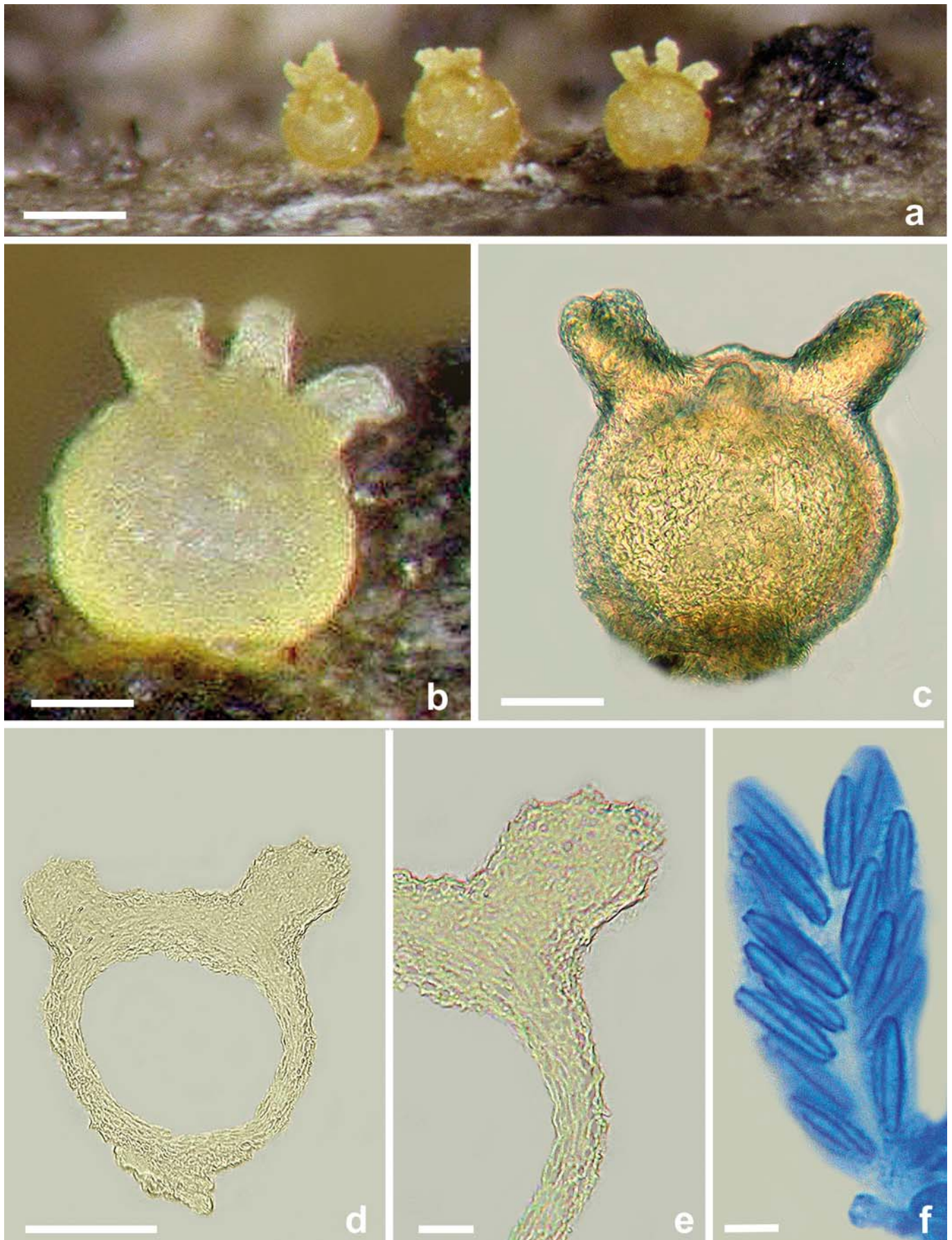


Fig. 2 – a–f: *Ljuhya lilliputiana* (Holotype CLLG12015B). a–b: Ascomata on the substrate. c: Close-up of ascoma in water. d: Vertical section through an ascoma. e: Section through the lateral ascomatal wall. f: Asci and ascospores, in cotton blue. Scale bars: a = 100 μ m; b–d = 50 μ m; e = 20 μ m; f = 5 μ m.

elongate toward the inside. **Asci** clavate, (30–)34–42(–45) × 6–8 µm (m=38 × 7 µm, n=20), apices truncate, without ring, with 8 irregularly biseriolate ascospores. **Filamentous paraphyses** 1–1.5 µm wide interspersed between the asci. **Ascospores** (8.5–)9–10(–11) × 2.5–2.8 µm (m=9.5 × 2.6 µm, n=30), fusiform, rounded to slightly truncate at the ends, equally 1-septate, with 1–2 visible striae in surface view and 1–2 drops in each cell, completely filling each ascus.

Cultural characteristics: The culture of this species was unsuccessful.

Asexual morph: Unknown.

Ijuhya pachydisca Lechat & J. Fourn. sp. nov. Mycobank MB 818681

Fig. 3

Diagnosis: Differs from known species of *Ijuhya* by the combination of a thick, protruding apical disc and spinulose ascospores (11–)12–14(–15) × 2.8–3.2(–3.5) µm.

Holotypus: FRENCH GUIANA: Régina, Nouragues natural reserve, Inselberg camp, primary rainforest, 16 Jun. 2012, on dead palm leaves, leg. Christian Lechat CLLG12001B (LIP); Genbank LSU KX950701.

Additional specimens examined: FRENCH GUIANA: Régina, Nouragues natural reserve, Inselberg camp, rainforest, 17 Jun. 2012, on dead palm leaves, leg. Christian Lechat CLLG12015 (LIP), Genbank LSU KX950702; Sinnamary, Paracou, (P15), near CIRAD field station, rainforest, 24 Jun. 2012, on dead palm leaves, leg. Christian Lechat CLLG12044 (LIP). Genbank LSU KX950704.

Etymology: The specific epithet “*pachydisca*” derives from the Greek παχύς (pachy-) = thick, for the unusually thick apical disc of ascomata.

Ascomata solitary, abundantly distributed on the host surface, superficial, easily removed from the substrate, non-stromatic, seated on an inconspicuous mycelium, subglobose to globose, (120–)140–160(–180) µm diam., glabrous, white to pale yellow, not collapsing when dry, not changing colour in 3% KOH or lactic acid. Ascromatal apex with a thick, flattened disc 140–180 µm diam with a minute, acute papilla. Ascromatal surface composed of angular thin-walled cells, covered by hyphal elements 2–3 µm diam arising from base of ascromata, proliferating and agglutinating to form a thick, flat apical disc with a protruding margin. Ascromatal wall 25–35 µm thick, composed of a single region of thick-walled, globose to ellipsoidal cells, 4–8 × 2–5 µm, with pale yellow wall 1–1.5 µm thick becoming hyaline and elongate toward the inside. **Asci** clavate, 25–32 × 5–7 µm (m = 30 × 6.5 µm, n=20), apices truncate, with a faint apical ring-like thickening, with 8 biseriolate ascospores. **Filamentose paraphyses** 3–5 µm wide interspersed between the asci. **Ascospores** (11–)12–14(–15) × 2.8–3.2(–3.5) µm (m=13 × 3 µm, n=30), long ellipsoidal to fusiform, rounded at the ends, equally 1-septate, with 1–3 drops in each cell, hyaline, spinulose, completely filling each ascus.

Cultural characteristics: The culture of this species was unsuccessful.

Asexual morph: Unknown.

Updated key to species of *Ijuhya*

- | | |
|--|-----------------------------|
| A. Perithecia with a crown of fasciculate hairs around apical disc | 1 |
| B. Perithecia without fasciculate hairs | 10 |
| 1. Hairs longer than 200 µm | 2 |
| 1. Hairs shorter than 200 µm | 4 |
| 2. Hairs up to 300 µm long; ascospores (24–)30–60(–110) × 4–7(–8) µm, (1–)5–7(–11)-septate, striate; ascromata pale yellow | <i>I. peristomialis</i> |
| 2. Hairs 145–240 µm long; ascospores smaller | 3 |
| 3. Hairs 150–200 × 3–4 µm; ascospores 6–8(–9) × 3–4 µm, spinulose; ascromata orange-yellow | <i>I. dentifera</i> |
| 3. Hairs 160–250 × 2–3.5 µm; ascospores (18–)22–23.5(–25) × 4.5–5(–5.5) µm, striate; ascromata white to pale yellow | <i>I. fourneri</i> |
| 4. Ascospores striate or smooth | 5 |
| 4. Ascospores spinulose, 14.5–20 × (2.5–)3–5(–5.4) µm, ascromata orange to brownish-orange, hairs sparse, 30–50 µm long, or absent | <i>I. parilis</i> |
| 5. Ascospores striate | 6 |
| 5. Ascospores smooth | <i>I. hongkongensis</i> |
| 6. Ascospores faintly striate (8.5–)9.5–11.5(–12.5) × 2.8–3.2(–3.5) µm; ascromata brownish-orange, hairs 28–80 µm long | <i>I. equiseti-hyemalis</i> |
| 6. Ascospores strongly striate | 7 |
| 7. Ascospores averaging 14–28 µm long | 8 |
| 7. Ascospores (10.5–)11–13(–14) × 2.5–3.5 µm; ascromata dark orange, hairs 100–160 µm × 2.5–3 µm | <i>I. antillana</i> |
| 8. Hairs longer than 100 µm | 9 |
| 8. Hairs shorter than 100 µm, ascospores (19–)21–28 × 3.5–4.5 µm; ascromata dull orange | <i>I. chilensis</i> |
| 9. Ascospores (12–)14–16.5(–18) × (2.5–)3–3.5(3.8) µm; ascromata pale orange to dark orange, temperate | <i>I. oenanthicola</i> |
| 9. Ascospores (14–)15–17(–18) × 3–3.5(–4) µm; ascromata white to pale orange, tropical | <i>I. faveliana</i> |
| 10. Asci containing dictyosporous ascospores | <i>I. dictyospora</i> |
| 10. Asci containing uni- to multiseptate ascospores | 11 |
| 11. Ascospores striate | 12 |
| 11. Ascospores smooth or spinulose | 13 |
| 12. Ascospores (19.5–)21.5–24.5(–25.5) × 4–5 µm | <i>I. paraparilis</i> |
| 12. Ascospores (8.5–)9–10(–11) × 2.5–2.8 µm | <i>I. lilliputiana</i> |
| 13. Ascospores smooth (7.5–)8.5–10(–11) × 2–2.7(–3) µm | <i>I. leucocarpa</i> |
| 13. Ascospores spinulose | 14 |
| 14. Asci 8-spored, ascospores (11–)12–14(–15) × 2.8–3.2(–3.5) µm | <i>I. pachydisca</i> |
| 14. Asci 2–4-spored | 15 |
| 15. Asci 2–4-spored, ascospores (15–)16–20 × 3–3.3 µm (China) | <i>I. hubeiensis</i> |
| 15. Asci 4-spored, ascospores (14–)15–18(–19) × 3.5–4(–4.5) µm (Europe) | <i>I. tetraspora</i> |

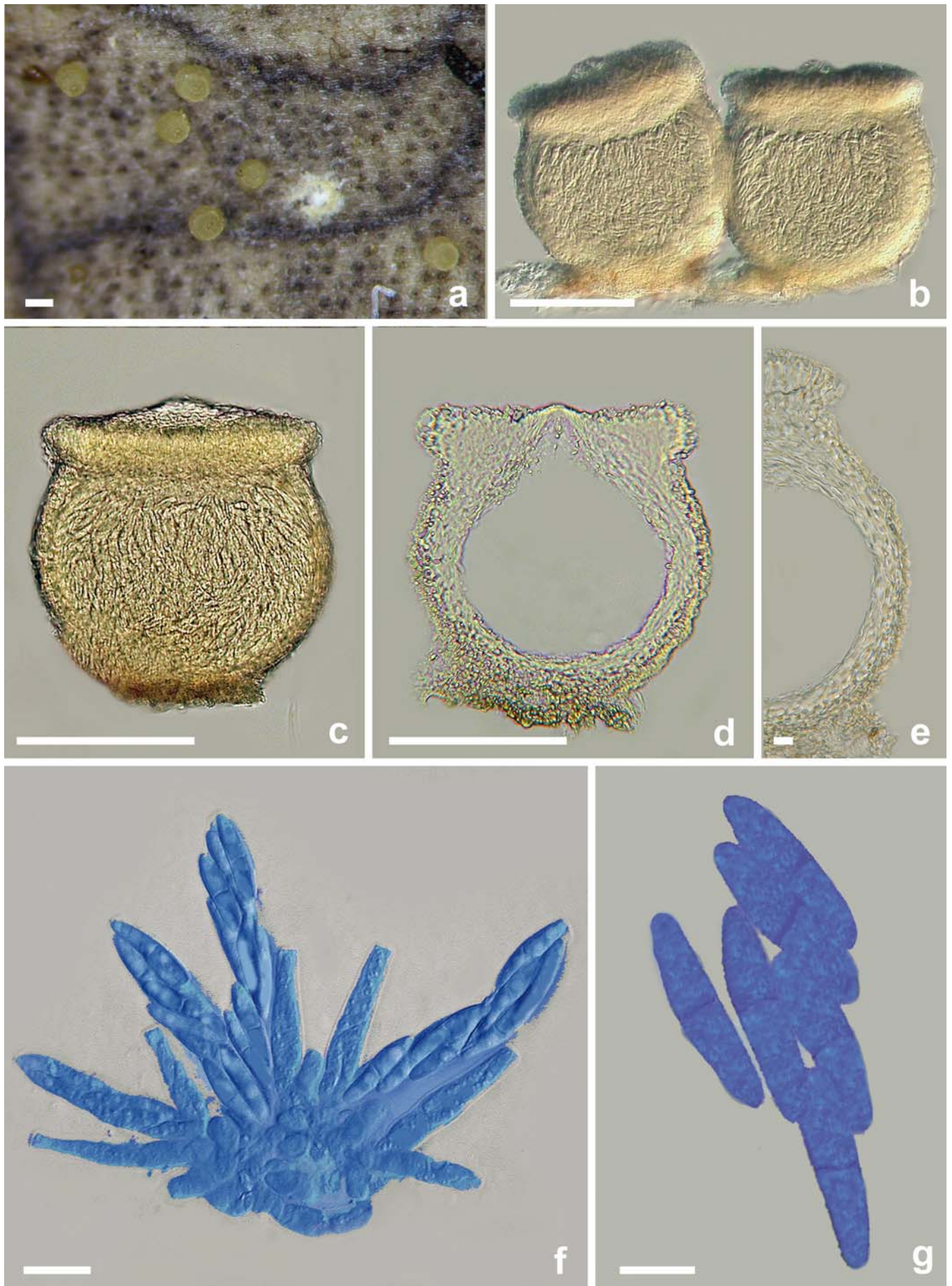


Fig. 3 – a–g: *Ljuhya pachydisca* (Holotype CLLG12001B) a: Ascomata on the substrate, in top view. b–c: Close-up of ascomata in side view, in water. d: Vertical section through an ascoma. e: Section through the lateral ascomatal wall. f: Asci and ascospores in cotton blue. g: Ascospores in cotton blue. Scale bars: a–d = 100 μm ; e = 20 μm ; f = 10 μm ; g = 5 μm .

Ijuhya tetraspora Lechat & J. Fourn. *sp. nov.*
Mycobank MB818683

Fig. 4

Diagnosis: Resembles *I. hubeiensis* but differs in having shorter and wider ascospores (14–) 15–18(–19) × 3.5–4(–4.5) μm vs. (15–)16–20 × 3–3.3 μm.

Holotypus: BELGIUM: Stekene, 23 Sept. 2015, on *Humulus lupulus* L., leg. Michel Hairaud MH 30915 (LIP); ex-type culture CBS 140721, Genbank LSU KX950706.

Additional specimens examined: FRANCE: Ariège, Rimont, Las Muros, 2 Sept. 2011, on dead twig of *Cornus sanguinea* L., leg. Jacques Fournier JF11115 (LIP); CBS 131614; *ibid*, 25 Dec. 2016, on old stroma of *Eutypa lata* on a dead corticated branch of *Crataegus* sp., leg. J. Fournier, JF16096 (LIP). THE NETHERLANDS: Enschede, Natural reserve Lonnekermeer, 27 Jul. 2016, on stromata of *Hypocreopsis lichenoides*, on old shrubs of *Salix* sp., leg. Marian Jagers, CLL16015 (LIP).

Etymology: The specific epithet “*tetraspora*” refers to the 4-spored asci.

Ascomata solitary or crowded in groups of 2–4, abundantly distributed on the host surface, superficial, easily removed from the substrate, non-stromatic, seated on an inconspicuous mycelium, subglobose, (120–)140–170(–180) μm high × (100–)120–160(–170) μm diam. (m=160 × 150 μm, n=25), glabrous, white to pale yellow, not collapsing when dry, not changing colour in 3% KOH or lactic acid. Ascomatal apex with a thick, flattened disc 140–180 μm diam. with a minute, acute papilla. Ascomatal surface composed of angular thin-walled cells, covered by hyphal elements 2–3 μm diam arising from the base of ascomata, with rounded to narrowly clavate tips, agglutinating to form a flat apical disc. Ascomatal wall 25–30 μm thick, composed of a single region of thick-walled, globose to ellipsoidal cells 4–7 × 3–4 μm, with pale yellow wall 1–1.5 μm thick, becoming hyaline and elongate toward the inside. **Asci** clavate, (30–)35–45(–50) × 5–7(–8) μm (m=40 × 6.5 μm, n=20), apices rounded, without ring, with 4 biseriate ascospores. No interthecial elements seen. **Ascospores** (14–)15–18(–19) × 3.5–4(–4.5) μm (m=17 × 3.8 μm, n=30), narrowly fusiform with rounded ends, equally 1-septate, with 1–3 drops in each cell, hyaline, spinulose, completely filling each ascus.

Asexual morph: acromonium-like.

Cultural characteristics: Colony after three weeks 25–35 mm diam, greyish white in center, white at the margin, sporulating at the margin, reverse pale yellow to pale yellowish brown. Conidiophores macronematous, mononematous, unbranched or branched, flexuous, hyaline, smooth, arising from 2.5–3 μm wide, smooth to rugulose, pale yellow hyphae. Conidiogenous cells monophialidic, 18–35(–50) μm long, 1.8–2.5 μm wide at apex with a slightly flared collarette, 2–2.8 μm wide at base. Conidia solitary at the tip of phialides, aseptate, narrowly ellipsoidal to subcylindrical with rounded apex, attenuated at the base with a flat abscission scar, smooth, hyaline, 6.5–12 × 2.5–3.5 μm (m=9.4 × 3 μm, n=30).

Discussion

Culturing of the four species described above were attempted but only *I. tetraspora* was isolated successfully, producing an acromonium-like asexual morph, while *I. faveliana*, *I. lilliputiana* and *I. pachydisca* did not grow. To date, thirteen species of *Ijuhya* are known of which six were relatively recently described: *I. hongkongensis* Fröhlich & Hyde (FRÖHLICH & HYDE, 2000), *I. hubeiensis* Y. Nong & W.-Y. Zhuang (ZHUANG *et al.*, 2007), *I. equiseti-hyemalis* Lechat & Baral (LECHAT & BARAL, 2008), *I. antillana* Lechat & Courtec. (LECHAT & COURTECUISSÉ, 2010), *I. oenanthicola* Lechat & Hairaud (LECHAT & HAIRAUD, 2012) and *I. fournieri* Lechat (LECHAT *et al.*, 2015c). The remaining species were described during the 19th and 20th century and none of these species match the four new species described herein.

Morphologically, *Ijuhya* resembles *Lasionectria* and *Lasionectriella* by the presence of conspicuous hairs on the ascomatal surface. *Ijuhya* primarily differs from *Lasionectria* and *Lasionectriella* in having ascomata usually with a thick, flat, discoid apex or with fasciculate hairs agglutinated to form triangular teeth arranged in a stellate fringe around the upper margin of the ascoma. *Lasionectria* differs

from *Ijuhya* in having hairs scattered over the ascomatal surface, not arising from the base of ascomata but from cells of the ascomatal wall. *Lasionectriella* differs from *Ijuhya* in having pale brownish orange to pale reddish brown ascomata collapsing cupulate upon drying, a conical apex surrounded by a crown of hyaline to pale yellow, thick-walled entangled hairs developing from the ascomatal base, proliferating and agglutinating to form a fringe around the upper margin of ascomata (LECHAT & FOURNIER, 2016b). The value of these morphological differences of the ascomatal vestiture is supported by our phylogenetic analysis showing that *Ijuhya* is distant from both *Lasionectriella* and *Lasionectria* (Fig. 5). This molecular analysis, comparing *Ijuhya* to five genera in the *Bionectriaceae*, shows that the closest genera to *Ijuhya* are *Hydropisphaera* Dumort. and *Lasionectriella*. *Hydropisphaera* differs from *Ijuhya* in having a thicker ascomatal wall, which is composed of large, thin-walled cells causing a cupulate collapse of ascomata upon drying.

Ijuhya faveliana primarily differs from all species discussed above in having ascomata with a crown of long, fasciculate hairs arranged in a stellate fringe around the upper margin of ascomata. It is distinguished from the most closely related species *I. oenanthicola* by paler ascomata, a slightly different ascospore ornamentation and occurrence on palm leaves in tropical rainforests. *I. lilliputiana* is easily distinguished from other species by its minute ascomata, which are the smallest in the genus *Ijuhya* and by the ascomatal apex with cylindrical protuberances around the upper margin, a unique feature in the genus. Macroscopically, *I. pachydisca* resembles *I. tetraspora* and *I. hubeiensis* but differs from them in having 8-spored asci and a thick, protruding apical disc. *I. tetraspora* is morphologically similar to *I. paraparilis* (Samuels) Rossman & Samuels (SAMUELS, 1988, as *Peristomialis paraparilis*), *I. parilis* (Syd.) Rossman & Samuels (ROSSMAN *et al.*, 1999), *I. pachydisca* and *I. hubeiensis* in having glabrous ascomata with a thick apical disc. *I. hubeiensis* is the most similar species to *I. tetraspora* in having 4-spored asci but differs in having larger ascomata, longer and narrower ascospores as well as in its Asian distribution. The fungicolous habitat showed by our two collections of *I. tetraspora* on old stromata of Ascomycota is unusual within the genus. However, the two other lignicolous and herbicolous collections suggest that the fungicolous lifestyle might be fortuitous or just reflects a non-selective adaptation to various substrates.

All the species of *Ijuhya* included in our phylogenetic analysis cluster in a well-supported clade with *I. peristomialis*, the type species (Fig. 5), which confirms the segregation of *Ijuhya* from related bionectriaceous genera formerly based on morphological characters (ROSSMAN *et al.*, 1999). Interestingly, the seven species of *Ijuhya* included in the analysis fall into two well-supported subclades segregating the species with glabrous ascomata bearing a disc from those with fasciculate hairs, with the exception of *I. paraparilis*, which appears misplaced in the “hairy” group.

Finally, based on molecular data as well as morphological and cultural characters, the four new species *I. faveliana*, *I. lilliputiana*, *I. pachydisca* and *I. tetraspora*, are proposed, bringing the number of known species to 17 and suggesting that *Ijuhya* is more diverse than previously assumed in temperate and tropical areas.

Acknowledgements

The authors gratefully acknowledge Dr Amy Rossman (Oregon State University, Corvallis, U.S.A.) for her advices and scientific help and for her presubmission review. Dr Mélanie Roy is warmly thanked for her management of the 2012 scientific mission in French Guiana. Many thanks to Michel Hairaud and Marian Jagers for the material they collected.

References

- FRÖHLICH J. & HYDE K.D. 2000. — *Palm Microfungi*. Fungal Diversity Research Series: 3. Hong Kong, Fungal Diversity Press, 393 p.
- LECHAT C. & BARAL H.-O. 2008. — A new species of *Ijuhya* on *Equisetum hyemale* and its *Acremonium* anamorph, with notes on *Hydropisphaera arenula*. *Österreichische Zeitschrift für Pilzkunde*, 17: 15–24.

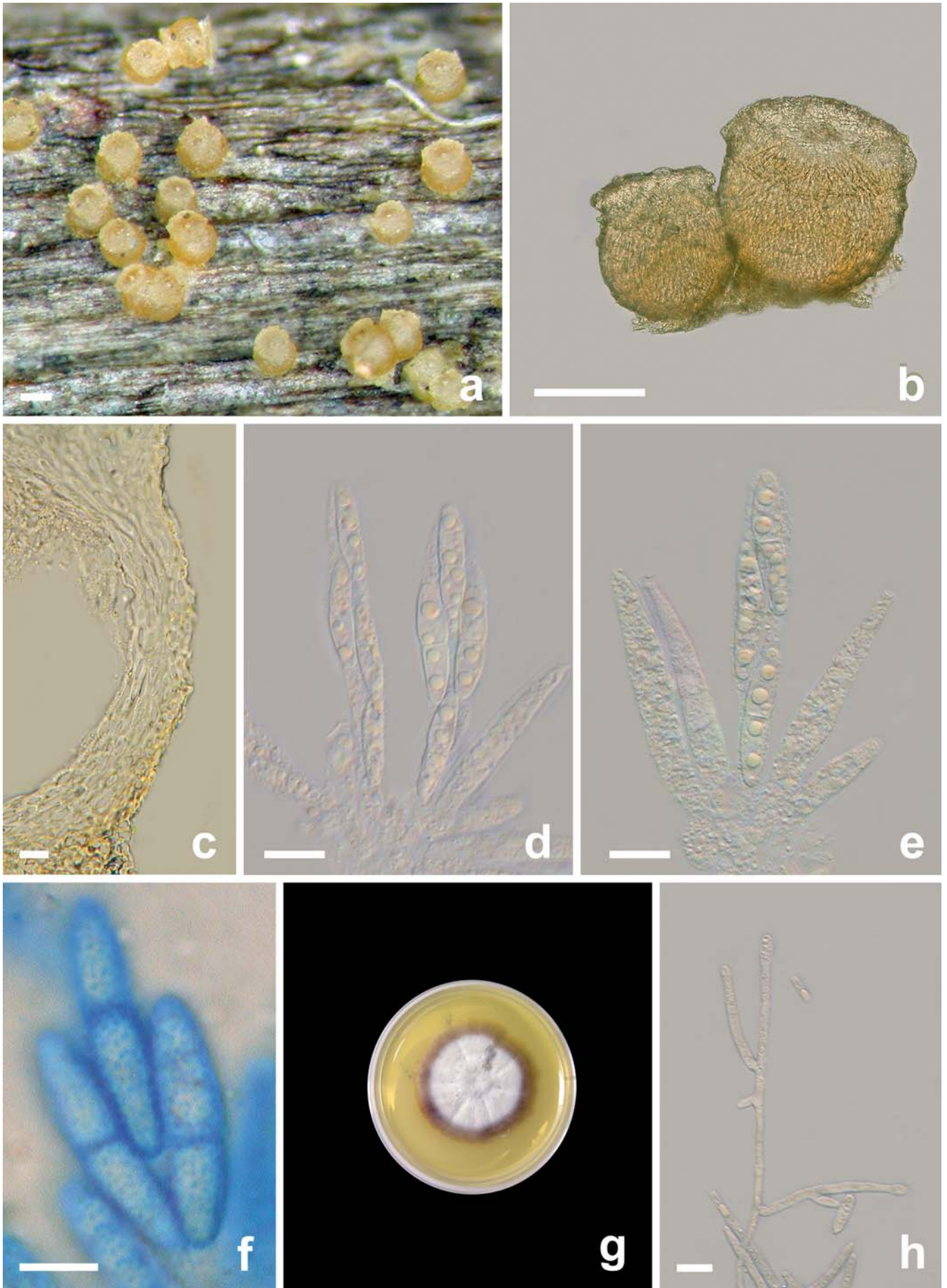


Fig. 4 – a–h: *Ljuhya tetraspora* (Holotype CLL15085). a: Ascomata on the natural substrate. b: Close-up of two ascomata in water. c: Vertical section through the ascromatal wall. d–e: Asci and ascospores in water. f: Ascospores in cotton blue showing ornamentation. g: Culture after two weeks. h: Conidiophores and conidia. Scale bars: a–b = 100 μ m; c– e, h = 10 μ m; f = 5 μ m.

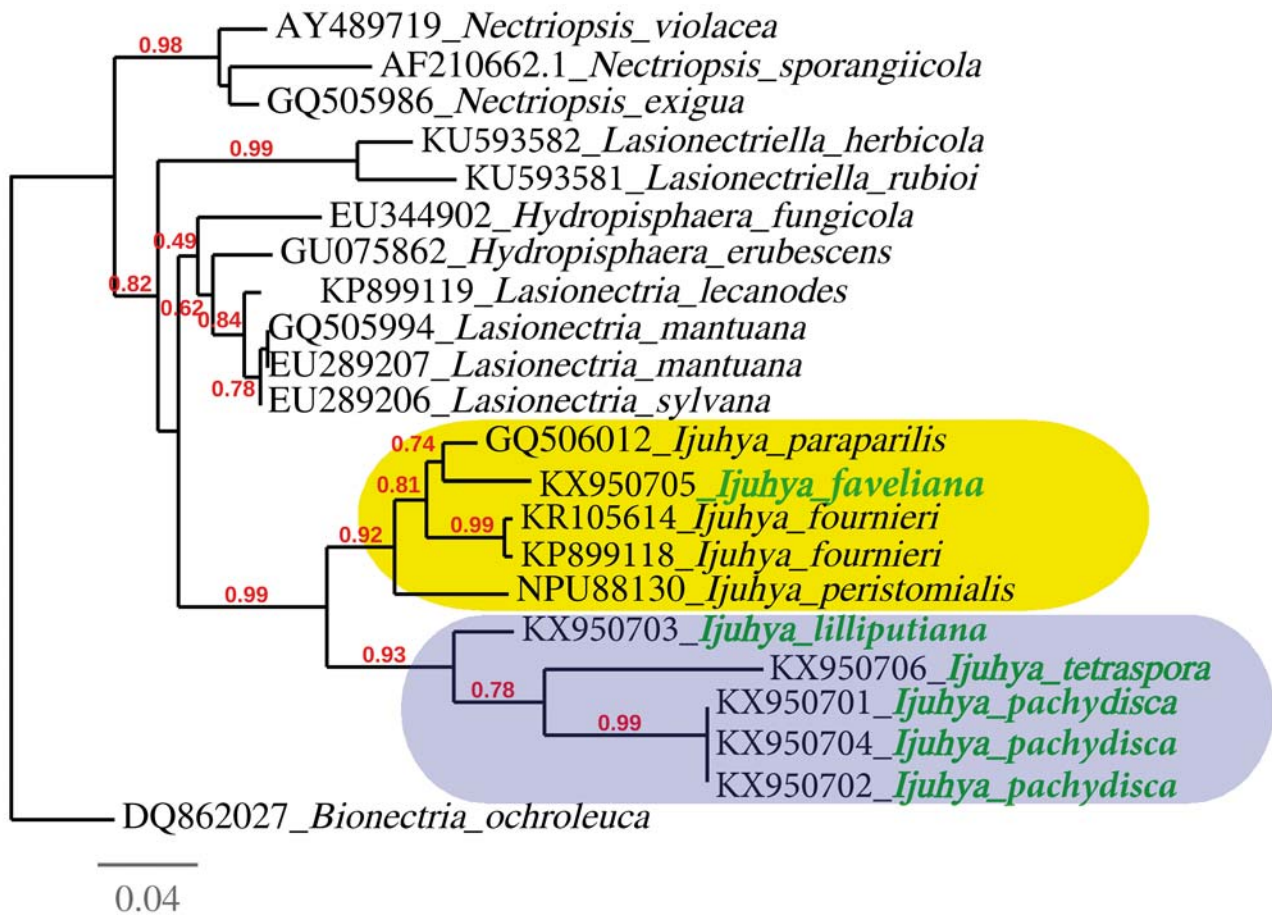


Fig. 5 – Maximum likelihood phylogeny of *Ijuhya* spp. based on LSU sequences. Species with hairy ascomata are highlighted in yellow and those with glabrous ascomata in blue.

LECHAT C. & COURTECUISE R. 2010. — A new species of *Ijuhya*, *I. antillana*, from the French West Indies. *Mycotaxon*, 113: 443-447.

LECHAT C. & FOURNIER J. 2012. — Two new species of *Lasionectria* (*Bionectriaceae*, *Hypocreales*) from Guadeloupe and Martinique (French West Indies). *Mycotaxon*, 121: 275-280.

LECHAT C. & FOURNIER J. 2015a. — *Varicosporella*, a new aquatic genus in the *Nectriaceae* from France. *Ascomycete.org*, 7 (1): 1-8.

LECHAT C. & FOURNIER J. 2015b. — *Protocreopsis korfii* (*Hypocreales*, *Bionectriaceae*), a new species from Martinique (French West Indies). *Ascomycete.org*, 7 (6): 307-310.

LECHAT C. & FOURNIER J. 2016a. — *Hydropisphaera znieffensis*, a new species from Martinique. *Ascomycete.org*, 8 (2): 55-58.

LECHAT C. & FOURNIER J. 2016b. — *Lasionectriella*, a new genus in the *Bionectriaceae*, with two new species from France and Spain, *L. herbicola* and *L. rubioi*. *Ascomycete.org*, 8 (2): 59-65.

LECHAT C. & FOURNIER J. 2016c. — *Varicosporellopsis*, a new aquatic genus from South of France. *Ascomycete.org*, 8 (3): 96-100.

LECHAT C., FOURNIER J. & COURTECUISE R. 2015a. — *Verrucostoma martinicense* Lechat, J. Fourn. & Courtec. *Fungal Planet* 366. *Persoonia*, 34: 254-255.

LECHAT C., FOURNIER J. & NORDÉN B. 2015b. — *Stylonectria norvegica* (*Nectriaceae*), a new species from Norway. *Ascomycete.org*, 7 (5): 220-224.

LECHAT C., FOURNIER J. & MOREAU P.-A. 2016a. — *Xanthonectria*, a new genus for the nectrioid fungus *Nectria pseudopeziza*. *Ascomycete.org*, 8 (4): 172-178.

LECHAT C., FOURNIER J. & RICHTER T. 2016b. — *Protocreopsis caricicola* (*Hypocreales*, *Bionectriaceae*), the first species of *Protocreopsis* reported from a north temperate area. *Ascomycete.org*, 8 (1): 30-32.

LECHAT C., GARDIENNET A. & FOURNIER J. 2014. — *Pseudonectria rusci* sp. nov. *Fungal Planet* 277. *Persoonia*, 32: 296-297.

LECHAT C. & HAIRAUD M. 2012. — A new species of *Ijuhya*, *I. oenanthicola*. *Mycotaxon*, 119: 249-253.

LECHAT C., LESAGE-MEESSEN L. & FAVEL A. 2015c. — A new species of *Ijuhya*, *I. fournieri* from French Guiana. *Ascomycete.org*, 7 (3): 101-104.

ROSSMAN A.Y., SAMUELS G.J., ROGERSON C.T. & LOWEN R. 1999. — Genera of *Bionectriaceae*, *Hypocreaceae* and *Nectriaceae* (*Hypocreales*, *Ascomycetes*). *Studies in Mycology*, 42: 1-248.

SAMUELS G.J. 1988. — Fungicolous, lichenicolous and myxomyceticolous species of *Hypocreopsis*, *Nectriopsis*, *Nectria*, *Peristomialis* and *Trichonectria*. *Memoirs of the New York Botanical Gardens*, 48: 1-78.

ZHUANG W.-Y., NONG Y. & LUO J. 2007. — New species and new Chinese records of *Bionectriaceae* and *Nectriaceae* (*Hypocreales*, *Ascomycetes*) from Hubei, China. *Fungal Diversity*, 24: 347-357.



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