Hydropisphaera znieffensis, a new species from Martinique

Christian LECHAT
Jacques FOURNIER

Ascomycete.org, 8 (2) : 55-58.
Mars 2016
Mise en ligne le 15/03/2016

Abstract: A detailed description of *Hydropisphaera znieffensis* sp. nov. is presented, based on a collection on dead leaf of *Cyathea arborea* (L.) Sm. in Martinique (French West Indies). The asexual morph has been obtained in culture and sequenced. This species has coarsely verrucose ascospores, an unusual feature in the genus *Hydropisphaera*.
Keywords: Ascomycota, *Bionectriaceae*, *Gliomastix*, *Hypocreales*, ribosomal DNA, taxonomy.

Résumé : une description détaillée de *Hydropisphaera znieffensis* sp. nov. est présentée à partir d'une récolte sur feuille de *Cyathea arborea* (L.) Sm. en Martinique (Petites Antilles françaises). Le stade asexué a été obtenu en culture et séquencé. Cette espèce a des ascospores fortement verruqueuses, ce caractère est inhabituel dans le genre *Hydropisphaera*.
Mots-clés : ADN ribosomal, Ascomycota, *Bionectriaceae*, *Gliomastix*, *Hypocreales*, taxinomie.

Introduction

The research program on the fungal diversity of Lesser Antilles, conducted by Prof. R. Courtecuisse "Les champignons des Petites Antilles; diversité, écologie, protection" (Courtecuisse, 2006), allowed us to find a new species of *Hydropisphaera* occurring on dead leaf of *Cyathea arborea* (L.) Sm., which proved to be different from species reported in the literature. The genus *Hydropisphaera* Dumort is based on the type *Hydropisphaera peziza* (Tode : Fr.) Dumort. The ascomata of this genus are pale yellow to dark orange or brownish-orange, not changing colour in 3% KOH or lactic acid as defined by Rossman *et al.* (1999); The genus *Hydropisphaera* is distinguished from other genera in the *Bionectriaceae* by the ascomata becoming cupulate when dry and the ascomatal wall more than 30 µm thick, composed of two regions with an outer region composed of large, subglobose to globose, thin-walled cells and an acremonium or gliomastix-like asexual morph. Based on these characteristics, phylogenetic analysis and comparison with known species in the genus, the specimen described herein is determined to represent a previously undescribed species of *Hydropisphaera*.

Materials and methods

The specimen was examined, cultured, sequenced and phylogenetically analysed using the methods described in Lechat & Fournier (2015).

Taxonomy

Hydropisphaera znieffensis Lechat & J. Fourn., *sp. nov.* – Fig. 1
Mycobank: MB 815589

Diagnosis: Differs from the most similar species *Hydropisphaera cyatheae* and *H. fusigera* in having strongly verrucose ascospores.

Holotype: French West Indies, Martinique, Fort-de-France, Forêt départementalo-domaniale des Pitons du Carbet, Fond Mitton, 21 Jun. 2015, on dead leaf of *Cyathea arborea*, *leg*. C. Lechat CLLM15060 (LIP), ex-type culture CBS 140584. GenBank KU198185.

Etymology: The epithet refers to ZNIEFF (Zone Naturelle d'Intérêt Écologique, Faunistique et Floristique), an acronym for the ecologically outstanding forest area where this species was collected.

Perithecia solitary, scattered on substratum, without stroma, globose, (280–) 320–360 (–380) µm diam. (X = 340 µm, n = 20), pale yellow, becoming brownish orange and collapsing cupulate or sometimes laterally pinched when dry, not changing color in 3% KOH or lactic acid. Perithecial apex with short, acute papilla. **Hairs** sparse, scattered on ascomatal surface, white, thick-walled, septate, sometimes solitary, 30–50 µm long, 1.5–2 µm diam., mostly fasciculate to form denticles, 8–11 µm wide at base. **Perithecial wall** 45–55 µm thick, composed of two regions: outer region 30–40 µm wide, of subglobose 8–15 × 6–14 µm cells, with pale orange walls 1–1.2 µm thick, wall thicker up to 2 µm in the outermost layer; inner region 10–15 µm wide, of elongate, flattened cells 4–14 × 2–4.5 µm, with hyaline walls. **Asci** (65–) 75–90 (–95) × (11–) 12–15 (–18) µm (X = 82.5 × 13.5 µm, n = 20), clavate, apex simple, containing 8 irregularly biseriate ascospores. **Ascospores** (15–) 16–18 (–19) × (5.5–) 7–8 (–8.5) µm (X = 17.5 × 7.5 µm, n = 30), ellipsoidal, 1-septate, constricted at septum, hyaline, strongly verrucose.

Asexual morph: gliomastix-like.

Cultural characteristics: After two weeks on PDA at 25° C, 20–25 mm diam., colony cottony with hyphae branching, septate, hyaline, smooth, 2.5–4 µm wide diffusing a pale reddish orange pigment in medium. Conidiophores born on aerial hyphae, macronematous, mononematous, unbranched, elongate, erect, straight to flexuous, hyaline, smooth to faintly roughened. Conidiogenous cells integrated, monophialidic, terminal, subulate, 30–50 µm long, 2.5–3.5 µm wide at base, 1–1.5 µm wide at apex. Conidia solitary or catenulate in chains, fusiform with apices rounded and bases having a prominent, darker, apiculate hilum, aseptate, wall strongly verrucose, hyaline becoming green appearing dark green to nearly black in mass, (6–)7–8.5(–10) × 2.5–3 µm (X = 8 × 2.8 µm, n = 50).

Discussion

Hydropisphaera znieffensis is placed in the genus *Hydropisphaera* based on morphological features of its sexual and asexual morphs, along with phylogenetic analysis of its LSU sequences. Sexual morphs of *Hydropisphaera* have brownish-orange ascomata not changing colour in 3% KOH or lactic acid, ascomatal wall of large, thin-walled cells that result in a cupulate collapse upon drying and frequently an apical crown of long fasciculate hairs. However, some species have glabrous perithecia or with sparse, solitary or somewhat fasciculate hairs, which is the case of *H. znieffensis*. The most similar genus is *Ijuya* Starbäck which mainly differs from *Hydropisphaera* in having the ascomatal wall composed of thick-

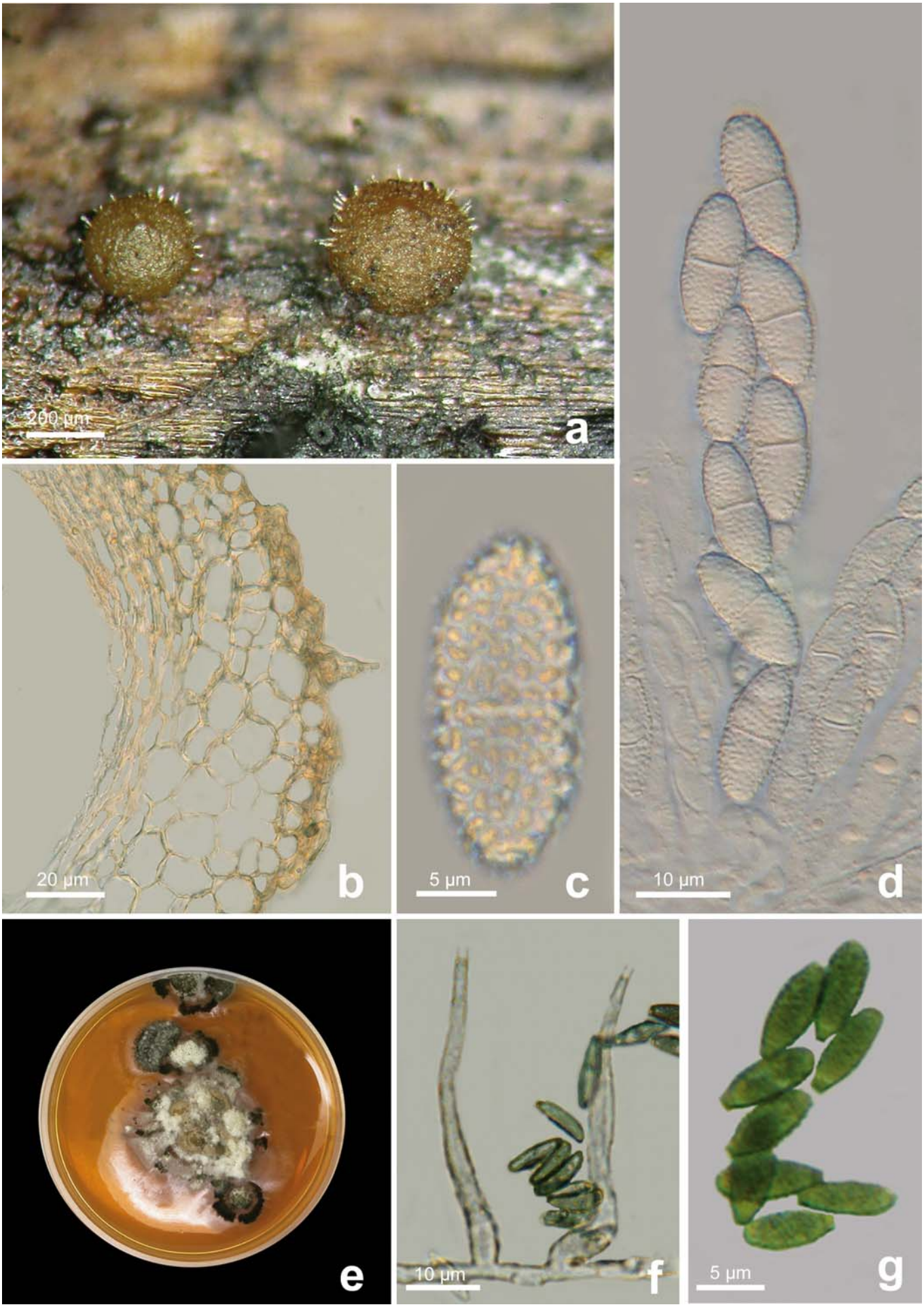

Fig. 1 – a-g: *Hydropisphaera znieffensis* (holotype). a: Ascomata on the substratum; b: Lateral ascomatal wall in vertical section; c: Close-up on ascospore wall; d: Asci and ascospores; e: Culture at three weeks; f: Conidiophores and conidia; g: Conidia.

walled cells, which does not involve a cupulate collapse upon drying.

The known asexual morphs for species of *Hydropisphaera* are considered acremonium-like as well as gliomastix-like, the former with hyaline conidia, the latter with pigmented conidia. Arguments in favor of keeping both genera separate were discussed by Summerbell *et al.* (2011) and Lechat *et al.* (2013). The asexual morph of *H. znieffensis* resembles the characteristic gliomastix-like asexual morph of *H. fusigera* (Berk. & Broome) Rossman, L. Lombard & Crous (= *Hydropisphaera bambusicola* Lechat = *Gliomastix fusigera* (Berk. & Broome) C.H. Dickinson) (Rossman *et al.*, 2015) but differs from it in having smaller (6–) 7–8.5 (–10) × 2.5–3 µm vs. 6.3–17.2 × 5.0–8.5 µm and differently shaped conidia. No known species of *Gliomastix* matching the asexual morph of *H. znieffensis* was found in the following literature: Dickinson (1968), Ellis (1971; 1976), Gams (1971), Hughes & Dickinson (1968) and Matsushima (1971; 1975).

Maximum likelihood phylogeny based on LSU sequences (fig. 2) shows that *H. znieffensis* is nested in the *Hydropisphaera* clade and clusters with species known to have a gliomastix-like asexual morph. The closest species to *H. znieffensis* is *H. fusigera*, which differs mainly by long fasciculate hairs on the perithecial wall and aseptate striate ascospores. Only *Hydropisphaera cyatheae* (Dingley) Rossman & Samuels, from New Zealand and *H. suffulta* (Berk. & M.A. Curtis) Rossman & Samuels from Martinique, Fort-de-France, FDD des Pitons du Carbet, Fond Mitton, 22 Jun. 2015, coll. C. Lechat, are known to occur on *Cyathea* but both species differ from *H. znieffensis* in having striate ascospores. Finally, *H. znieffensis* differs from all known species of *Hydropisphaera* in having verrucose ascospores, which warrants its status as a new taxon.

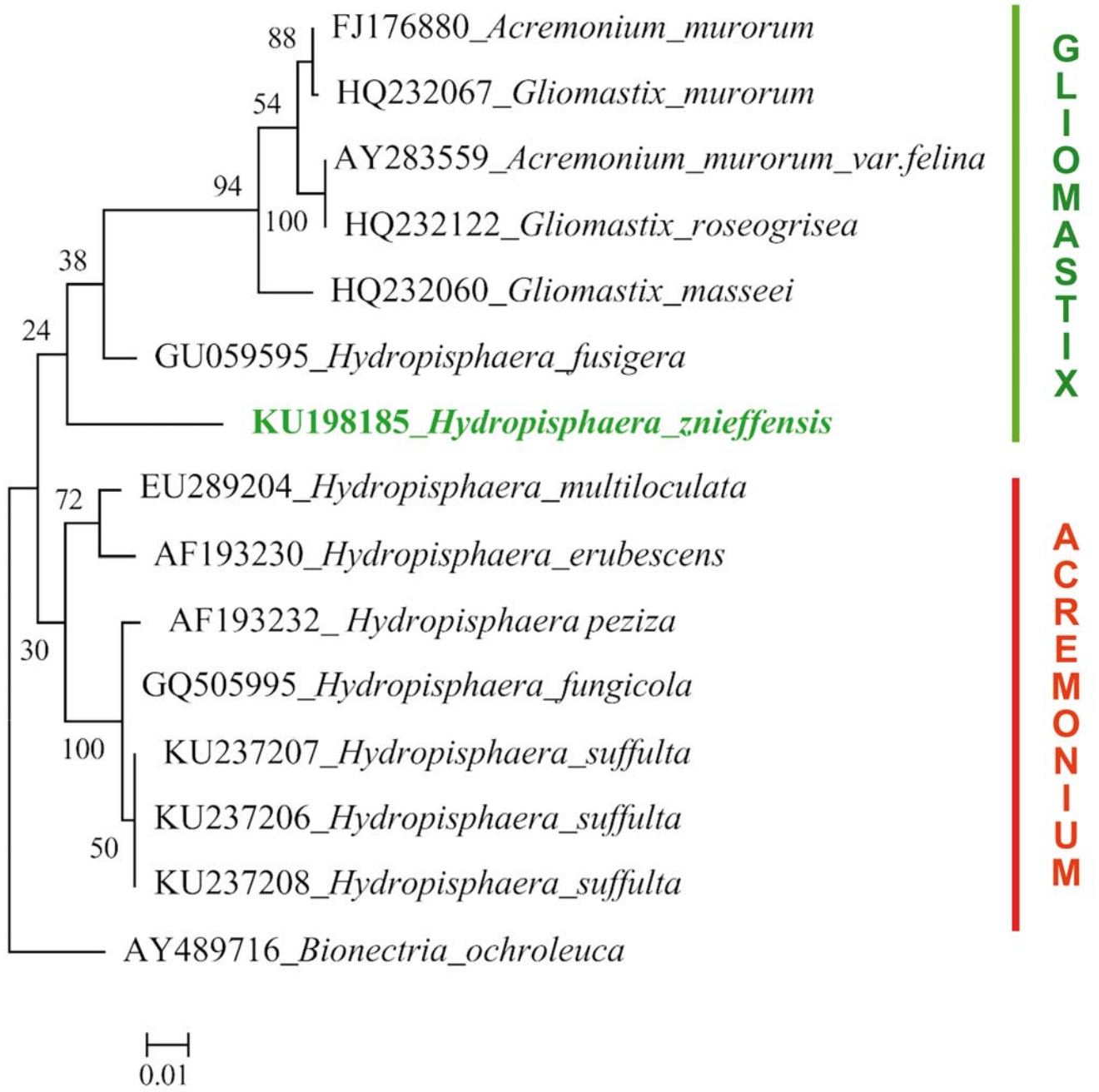

Fig. 2 – Maximum likelihood phylogeny of *Hydropisphaera znieffensis* based on LSU sequences, rooted with *Bionectria ochroleuca*.

Key to species of *Hydropisphaera* with fasciculate hairs

modified from Lechat *et al.* (2010)

1. Ascospores averaging more than 25 µm long **2**
1. Ascospores averaging less than 25 µm long **4**
2. Ascomata dark red with red hairs; ascospores spinulose-striate ..... ***H. haematites***
2. Ascomata dark orange to brown with concolorous hairs; ascospores smooth-walled to finely striate **3**
3. Ascospores 48–55 × 6–7 µm; ascomata dark orange with orange hairs ..... ***H. gigantea***
3. Ascospores 25–38 × 5–7 µm; ascomata brown with brown hairs ..... ***H. dolichospora***
4. Ascomata yellow, orange to brownish orange with white to orange, fasciculate hairs; ascospores averaging more than 17 µm long **6**
4. Ascomata pale yellow to pale brownish orange with white, solitary or fasciculate hairs; ascospores ± 17 µm long **5**
5. Ascospores striate; ascomata pale yellow to orange ..... ***H. suffulta***
5. Ascospores spinulose, ascomata pale brownish orange 12.5–17.5 × 3.5–4 µm ..... ***H. rufofusca***
6. Ascospores aseptate ..... ***H. fusigera***
6. Ascospores one-septate **7**
7. Ascomata orange with orange hairs; ascospores 17–23 × 5–7 µm, striate ..... ***H. cyatheae***
7. Ascomata yellow to nearly brown with white hairs; ascospores verrucose or striate **8**
8. Ascospores striate, (12–)16–22(–26) ×4–5(–6) µm ..... ***H. leucotricha***
8. Ascospores verrucose, 16–18 × 7–8 µm ..... ***H. znieffensis***

Acknowledgments

The authors gratefully acknowledge Dr Amy Rossman (Oregon State University, Corvallis, U.S.A.) for her advice and scientific assistance. Martin Bemmann (Germany) is warmly thanked for his help in supplying literature.

References

Courtecuisse R. 2006. — Liste préliminaire des Fungi recensés dans les îles françaises des Petites Antilles : Martinique, Guadeloupe et dépendances. 1. Basidiomycètes lamellés et affines (*Agaricomycetideae*). *Documents mycologiques*, 133-134: 81-140.

Dickinson C.H. 1968. — *Gliomastix* Guéguen. *Mycological Papers*, 115: 1-24.

Ellis M.B. 1971. — *Dematiaceous Hyphomycetes*. Commonwealth Mycological Institute, Kew, 608 p.

Ellis M.B. 1976. — *More Dematiaceous Hyphomycetes*. Commonwealth Mycological Institute, Kew, 507 p.

Gams W. 1971. — *Cephalosporium-artige Schimmelpilze (Hyphomycetes)*. Gustav Fischer, Stuttgart, 262 p.

Hughes S.J. & Dickinson C.H. 1968. — New Zealand fungi: 11, *Gliomastix* Guéguen. *New Zealand Journal of Botany*, 6 (1): 106-114.

Lechat C., Farr D.F., Hirooka Y., Minnis A.M. & Rossman A.Y. 2010. — A new species of *Hydropisphaera*, *H. bambusicola*, is the sexual state of *Gliomastix fusigera*. *Mycotaxon*, 111: 95-102.

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

Lombard L., Merwe N.A. (van der), Groenewald J.Z. & Crous P.W. 2015. — Generic concepts in *Nectriaceae*. *Studies in Mycology*, 80: 189-245.

Matsushima T. 1971. — *Microfungi of the Solomon Islands and Papua-New Guinea*. Shionogi Research Laboratory, Kobe, 78 p.

Matsushima T. 1975. — *Icones Microfungorum a Matsushima Lectorum*. Nippon Printing & Publishing Co., Osaka, 209 p.

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. 1976. — Perfect morphs of *Acremonium*. The genera *Nectria*, *Actiniopsis*, *Ijuhya*, *Neohenningsia*, *Ophiodictyon*, and *Peristomialis*. *New Zealand Journal of Botany*, 14: 231-260.

Summerbell R.C., Gueidan C., Schroers H.-J., De Hoog G.S., Starink M., Arocha Rosete Y., Guarro J. & Scott J.A. 2011. — *Acremonium* phylogenetic overview and revision of *Gliomastix*, *Sarocladium*, and *Trichothecium*. *Studies in Mycology*, 68: 139-162. doi: 10.3114/sim.2011.68.06

Christian Lechat
64 route de Chizé
79360 Villiers-en-Bois
France
lechat@ascofrance.fr

Jacques Fournier
Las Muros
09420 Rimont
France
jacques.fournier@club-internet.fr