

# *Hydropisphaera heliconiae*, a new species from Martinique (French West Indies)

Christian LECHAT  
Jacques FOURNIER

*Ascomycete.org*, 9 (3) : 59-62.  
Avril 2017  
Mise en ligne le 30/04/2017



**Abstract:** A detailed description of *Hydropisphaera heliconiae* sp. nov. is presented based on two collections on dead leaves of *Heliconia caribea* (*Heliconiaceae*) in Martinique (FWI). The fungus was cultured and sequenced and its placement in the genus *Hydropisphaera* confirmed by analysis of LSU sequences. This species primarily differs from all known species in having ascomata nearly black when mature and deeply cupulate when dry. The new combination *Ijuhya boothii* is proposed for a taxon examined during this study that was formerly placed in *Hydropisphaera*.

**Keywords:** Ascomycota, *Bionectriaceae*, *Hypocreales*, ribosomal DNA, taxonomy.

**Résumé :** Une description détaillée d'*Hydropisphaera heliconiae* sp. nov. est présentée à partir de deux récoltes sur feuilles mortes d'*Heliconia caribea* (*Heliconiaceae*) en Martinique (Petites Antilles françaises). Le champignon a été cultivé et séquençé et son placement dans le genre *Hydropisphaera* est confirmé par l'analyse des séquences LSU. Cette espèce diffère tout d'abord de toutes les espèces connues en ayant des ascomes presque noirs à maturité et profondément cupulés par le sec. La nouvelle combinaison *Ijuhya boothii* est proposée pour un taxon examiné pendant cette étude qui était auparavant placé dans *Hydropisphaera*.

**Mots-clés :** ADN ribosomal, Ascomycota, *Bionectriaceae*, Hypocréales, taxinomie.

## Introduction

In continuation of a research program on the fungal diversity of the Lesser Antilles (LECHAT & FOURNIER, 2017), we collected a surprising species of *Hydropisphaera* (Tode: Fr.) Dumort. with blackish and deeply cupulate ascomata occurring on dead leaves of *Heliconia caribea* Lamb. Usually, the ascomata of *Hydropisphaera* are pale yellow to dark orange or brownish-orange but none are dark brown to nearly black, which prompted a thorough study of both the sexual morph and the asexual morph obtained in culture. The genus *Hydropisphaera* is distinguished from other genera in the *Bionectriaceae* by morphological characters defined by ROSSMAN *et al.* (1999), LECHAT *et al.* (2010) and LECHAT & FOURNIER (2016, 2017). Based on these characters, phylogenetic analysis and comparison with known species of *Hydropisphaera*, the specimen described herein is determined to represent a previously undescribed species of *Hydropisphaera* for which the new name *H. heliconiae* is proposed.

## Materials and methods

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

## Taxonomy

*Hydropisphaera heliconiae* Lechat & J. Fourn., sp. nov. Fig. 2  
Mycobank: MB 819916

**Diagnosis:** Differs from all known species of *Hydropisphaera* in having dark brown to blackish ascomata.

**Holotype:** FRENCH WEST INDIES, MARTINIQUE. Le Prêcheur, Anse Couleuvre, path to the Couleuvre waterfall, on dead leaf of *Heliconia caribea*, 3 Jun. 2014, leg. Christian Lechat CLLM14011 (LIP), ex-type culture: CBS 138704. GenBank LSU: KY656904.

**Etymology:** The epithet is derived from the host *Heliconia* L.

**Perithecia** solitary, superficial, subglobose, (200–)220–260 (–280)  $\mu\text{m}$  high  $\times$  (220–)280–300  $\mu\text{m}$  diam. ( $X = 250 \times 290 \mu\text{m}$ ,  $n = 15$ ), dark brownish orange, becoming dark brown to nearly black and collapsing deeply cupulate when dry, not changing colour in 3% KOH or lactic acid. **Basal hyphae** densely radiating from asco-

matal base and extending over substratum, yellowish to pale brownish orange, 2.5–3.5  $\mu\text{m}$  diam., flexuous, smooth. **Perithecial apex** with short, acute papilla, margin with fasciculate, thick-walled hairs 27–45  $\mu\text{m}$  long, 2.5–3  $\mu\text{m}$  wide, brownish-orange, cylindrical, slightly flexuous with wall 1–1.5  $\mu\text{m}$  thick, rounded at tips, septate, arising from cells of ascomatal wall, agglutinated to form sparse, triangular teeth 10–14  $\mu\text{m}$  wide at base, arranged in an irregular, stellate fringe around upper margin of perithecia. **Perithecial wall** 40–60  $\mu\text{m}$  thick, composed of two regions: outer region 30–45  $\mu\text{m}$  wide, of globose to ellipsoidal 10–16  $\times$  8–12  $\mu\text{m}$  cells with brownish orange walls 1–1.5  $\mu\text{m}$  thick, with outermost coating of a thin layer of amorphous brown material; inner region 10–15  $\mu\text{m}$  wide, of elongate, flattened cells 8–14  $\times$  5–8  $\mu\text{m}$ , with hyaline walls 1–1.5  $\mu\text{m}$  thick. **Asci** evanescent, (55–)60–70(–74)  $\times$  (9–)10–11(–12)  $\mu\text{m}$  ( $X = 64.5 \times 10.5 \mu\text{m}$ ,  $n=20$ ), fusiform-clavate, apices rounded, without ring, with 6–8 biseriolate ascospores. **Ascospores** (13.5–)14.5–17.8(–18.5)  $\times$  (–3.8)4.5–5(–5.3)  $\mu\text{m}$  ( $x = 16 \times 4.9 \mu\text{m}$ ,  $n=30$ ), narrowly ellipsoid, rounded at ends, equally 1-septate, hyaline, longitudinally striate, completely filling each ascus.

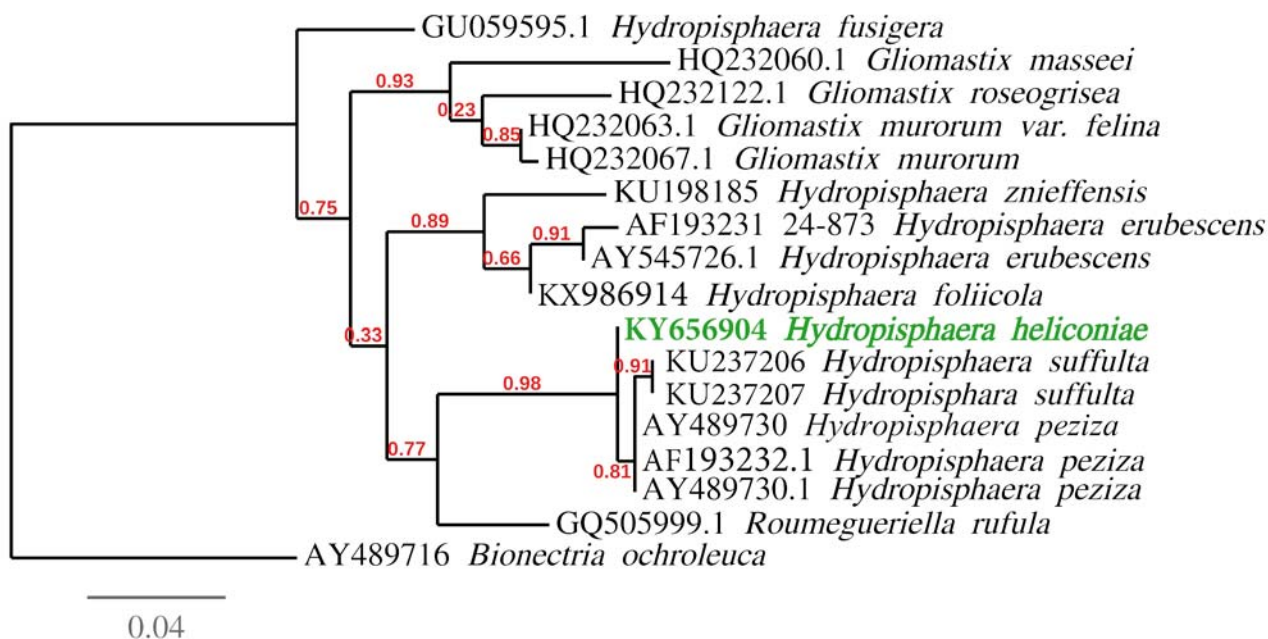
**Asexual morph:** acremonium-like.

**Cultural characteristics:** After one week at 25°C on Difco PDA containing 5 mg/L streptomycin, colony 4–5 cm diam, mycelium white, producing an abundant acremonium-like asexual morph at margin; conidiophores branched, 15–50  $\mu\text{m}$  long, 4–5  $\mu\text{m}$  diam, flexuous, smooth, arising from smooth, septate hyphae 5–7  $\mu\text{m}$  diam, each branch septate, with a simple conidiogenous cell 15–25  $\mu\text{m}$  long, 3–4  $\mu\text{m}$  diam at base producing conidia (4–)5–9(–11)  $\times$  2–3.5(–4)  $\mu\text{m}$ , ellipsoidal to subcylindrical, hyaline, smooth, non-septate, with rounded apex, attenuated at base with a basal abscission scar, grouped at tip of phialides to form a mucous head. After three weeks, colony proliferating irregularly, reaching 6–8 cm in diam, diffusing a pale reddish brown coloration into medium.

**Additional specimen examined:** FRENCH WEST INDIES, MARTINIQUE. Le Marigot, Forêt départementalo-domaniale de la Reclée, sentier du plateau d'Encens, on dead leaf of *Heliconia caribea*, 22. Aug. 2011, leg. Christian Lechat, CLLM11071 (LIP).

## Discussion

The fungus described above is characterized by superficial, non-stromatic, subglobose ascomata with a blackish wall composed of thin-walled cells not changing colour in 3% KOH or lactic acid, becoming strongly cupulate upon drying and bearing fasciculate hairs scattered around the apical region; its asci are unitunicate, fusiform-



**Fig. 1** – Maximum likelihood phylogeny of *Hydropisphaera heliconiae* based on LSU sequences, rooted with *Bionectria ochroleuca*

clavate, ascospores averaging  $16 \times 4.9 \mu\text{m}$  are ellipsoid, one-septate, hyaline and longitudinally striate, and the asexual morph obtained in culture is acremonium-like. This combination of morphological and cultural features clearly place it in the genus *Hydropisphaera*, which is confirmed by phylogenetic analysis of its LSU sequence showing it is nested within members of this genus (Fig. 1). When run through the updated key to *Hydropisphaera* spp. with fasciculate hairs proposed by LECHAT & FOURNIER (2016), based on colour of ascumatal wall and hairs, dimensions, septation and ornamentation of ascospores, the closest match appears to be with *H. suffulta* (Berk. & M.A. Curtis) Rossman & Samuels. *Hydropisphaera suffulta* is a common, widespread pantropical species, often present on dead *Heliconia* leaves, which primarily differs from our fungus by yellow to orange ascumatal wall composed of thin-walled ( $< 1 \mu\text{m}$  thick) cells, bearing fasciculate hairs scattered all over the ascumatal surface and smaller ascospores  $11.2\text{--}13.8 \times 4\text{--}5.5 \mu\text{m}$  (SAMUELS *et al.*, 1990).

Maximum likelihood phylogeny based on LSU sequences (Fig. 1) shows that the closest species to the fungus described above are *H. peziza* (Tode) Dumort. (type species of *Hydropisphaera*) and *H. suffulta*. *Hydropisphaera peziza* is different in having yellow to orange, glabrous ascumata (rarely with sparse hairs) containing numerous orange oily droplets in ascumatal wall and hymenium as well as shorter ascospores  $11\text{--}14 \times 5\text{--}7 \mu\text{m}$ , while *H. suffulta* is different for the reasons expressed above.

Based on morphological comparison and phylogenetic analysis, the new taxon *H. heliconiae* Lechat & J. Fourn. is thus proposed to accommodate this collection from Martinique.

In the field, a confusion with *H. fusigera* (Berk. & Broome) Rossman, L. Lombard & Crous (LOMBARD *et al.*, 2015) is possible when its reddish brown cupulate ascumata appear blackish due to the accumulation of dark brown to black conidia of its associated gliomastix-like asexual morph trapped in its ascumatal hairs. *Hydropisphaera fusigera* can be distinguished from *H. heliconiae* by its occurrence on bamboo, its larger one-celled ascospores averaging  $23.6 \times 6.7 \mu\text{m}$  and its gliomastix-like asexual morph (LECHAT *et al.*, 2010, as *H. bambusicola*).

*Hydropisphaera boothii* (D. Hawksw.) Rossman & Samuels, a further hairy species of *Hydropisphaera* excluded from the aforementioned key and unknown to us at that time, has been revised recently. HAWKSWORTH & MINTER (1980) described *Nectria boothii* as a

species occurring on *Oenanthe crocata* (Apiaceae), which was combined in *Hydropisphaera* as *H. boothii* by ROSSMAN & SAMUELS (1999). Examination of the holotype (K[M]) revealed that it belongs to *Ijuhya* Starbäck, and all morphological characters of this specimen match well with those of *I. oenanthicola* Lechat & Hairaud (LECHAT & HAIRAUD, 2012). The synonymy is established here, and we introduce the new combination *Ijuhya boothii* (D. Hawksw.) Lechat & J. Fourn. *comb. nov.*, MycoBank MB 819968 [basonym: *Nectria boothii* D. Hawksw., in Hawksworth & Minter, *Trans. Brit. mycol. Soc.*, 74 (3): 572 (1980)].

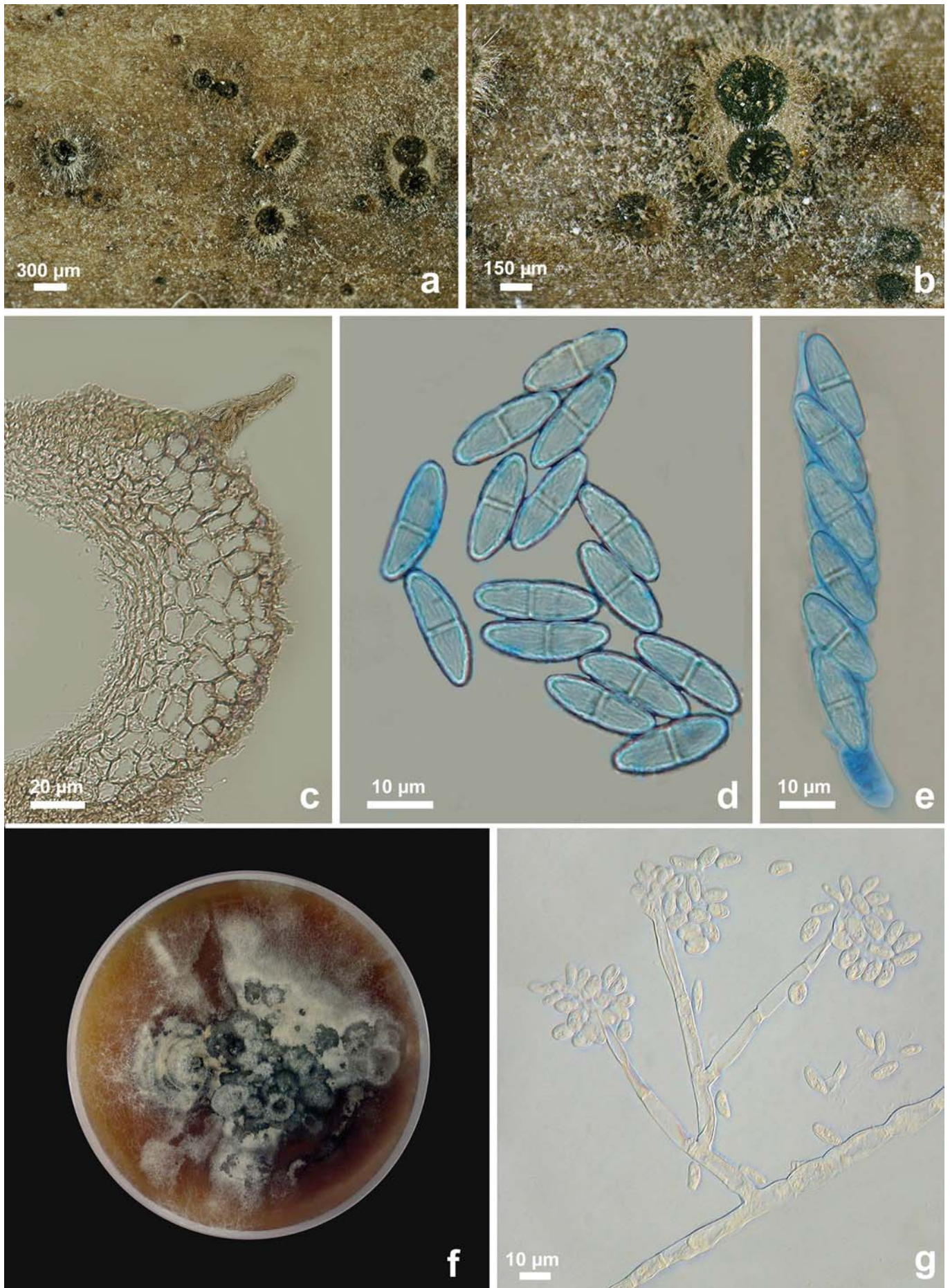
The known asexual morphs of *Hydropisphaera* spp. are considered acremonium-like (ROSSMAN *et al.*, 1999), but to date two species recently published have a gliomastix-like asexual morph as discussed by LECHAT *et al.* (2010) and LECHAT & FOURNIER (2016). Phylogenetic analysis (Fig. 1) shows that *H. heliconiae* is nested in the clade comprising the species having an acremonium-like asexual morph, which is in agreement with the asexual morph obtained in culture during this study.

## Acknowledgements

The authors gratefully acknowledge Dr Amy Rossman (Oregon State University, Corvallis, U.S.A.) for her advice and scientific assistance and for her pre-submission review. Mrs Begona Aguirre-Hudson (Kew Herbarium, Richmond, UK) is warmly thanked for the loan of the type specimen of *N. boothii* as well as Dr. Pierre-Arthur Moreau (Laboratoire des sciences végétales et fongiques, Faculté des sciences pharmaceutiques et biologiques, Université de Lille 2, France) for his nomenclatural assistance.

## References

- HAWKSWORTH D. L. & MINTER D. W. 1980 — New and interesting micro-fungi from the 1978 Exeter foray. *Transactions of the British Mycological Society*, 74 (3): 567–577.
- 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.



**Fig. 2 – a-g: *Hydropisphaera heliconiae*** (holotype). a-b: Ascomata on the substratum, showing the blackish cupulate ascomata with the base surrounded by dense radiating hyphae; c: Lateral ascomatal wall in vertical section showing a fascicle of hairs toward the apex; d: Ascospores with striate wall, in lactic cotton blue; e: Ascus and ascospores, in lactic cotton blue; f: Culture at three weeks; g: Conidiophores and conidia, in lactic acid.

- LECHAT C. & FOURNIER J. 2015. — *Protocreopsis korffii* (Hypocreales, Bionectriaceae), a new species from Martinique (French West Indies). *Ascomycete.org*, 7 (6): 307-310.
- LECHAT C. & FOURNIER J. 2016. — *Hydropisphaera znieffensis*, a new species from Martinique. *Ascomycete.org*, 8 (2): 55-58.
- LECHAT C. & FOURNIER J. 2017. — *Hydropisphaera foliicola*, a new species from Martinique. *Ascomycete.org*, 9 (1): 6-8.
- LECHAT C. & HAIRAUD M. 2012 — A new species of *Ijuhya*, *I. oenanthicola*. *Mycotaxon*, 119: 249-253.
- LOMBARD L., MERWE N.A. (VAN DER), GROENEWALD J.Z. & CROUS P.W. 2015. — Generic concepts in *Nectriaceae*. *Studies in Mycology*, 80: 189-245.
- 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., DOI Y. & ROGERSON C.T. 1990. — *Hypocreales*. In: SAMUELS G.J. (ed.). Contributions toward a mycobiota of Indonesia. *Memoirs of the New York Botanical Garden*, 59: 6-108.



**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