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A new species of *Collodiscula* (Xylariaceae) from China

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Abstract

A *Collodiscula* isolate, found on a bamboo stalk in China, differs from *C. japonica* by having smaller ascospores. On the basis of morphology and molecular phylogeny it is described as a new species, *Collodiscula bambusae sp. nov.*

Key words: ascomycetes, taxonomy, Xylariales

Introduction

Collodiscula I. Hino & Katum. was introduced as a monotypic genus by Hino & Katumoto (1955) and later referred to the Sphaeriaceae (Hino 1961). However, based on features such as the stromatal ontogeny, heavily carbonized stromata, amyloid ascus apical apparatus, and short stipitate asci it is now included in the Xylariaceae (Samuels & Rossman 1992, Læssøe & Spooner 1994, Kang *et al.* 1999). Jaklitsch & Voglmayr (2012) provided a phylogenetic study based on LSU and ITS sequences and confirmed that the genus *Collodiscula* belongs to Xylariaceae. Samuels *et al.* (1987) gave a detailed description of the sexual morph, and *Acanthodochium collodisculae* was identified as the asexual state of *C. japonica*. *Collodiscula japonica* has been reported from Chinese mainland (Jaklitsch & Voglmayr 2012), Japan (Hino & Katumoto 1955), Russia (Vasiljeva 1998) and Taiwan (Ju & Rogers 1999).

A species of *Collodiscula* was found in Guizhou Province, China that differed from *C. japonica* by having smaller ascospores. Phylogenetic analysis also indicated that this species was distinct and it described as *C. bambusae sp. nov.*

Materials and methods

Morphological studies and isolation

Specimens of bamboo with ascocarps of an unknown fungus were collected from Guizhou Province, China and taken to the laboratory in plastic bags. The methodology used for morphological examination of fungi growing on the bamboo followed that used by Stadler *et al.* (2004). Materials were mounted in water and Melzer's iodine reagent for examination. Asci and ascospores were examined by light microscopy (BX41, Olympus). At least 20 propagules were measured, length and width ranges were recorded. Material was deposited in the herbarium of Guizhou University (GZUH).

DNA extraction, PCR amplification and sequencing

A culture was initiated from perithecial contents of freshly collected stromata, propagated and studied as described by Stadler *et al.* (2004) on potato dextrose agar (PDA) medium at 25˚C. Total genomic DNA was extracted from fresh cultures using a modified protocol of Doyle & Doyle (1987) and Lee & Taylor (1990). DNA preparations were stored at -20 °C until used for PCR.

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large, J+, wedge-shaped ascal apical apparatus (Hino & Katum 1955). Currently, there is only one species in the genus. Samuels *et al.* (1987) studied the type material of *C. japonica*, gave a detailed description and reported its asexual state, *Acanthodochium collodisculae*. Kang *et al.* (1999) and Jaklitsch & Voglmayr (2012) placed *Collodiscula* in Xylariaceae.

In the molecular analyses of ITS, LSU, RPB2 and β–tubulin genes *Collodiscula* showed a very close relationship with *Astrocystis*. *Astrocystis* is a genus mostly confined to monocotyledons and has uni- or rarely multi-peritheciate stromata, which may develop beneath the host cuticle and appear superficial. The asci have a relatively short stipe and the ascal apical apparatus is relatively small, amyloid and stopper-shaped (Smith & Hyde 2001). *Astrocystis* also has a *Acanthodochium* asexual state (Samuels *et al.* 1987). However, *Collodiscula* species have septate ascospores, whereas those of *Astrocystis* are aseptate.

Collodiscula japonica has ascospores measuring 18–24 × 4.5–5.5 µm with one median not or slightly constricted septum, fusoid, inaequilateral, with rounded ends, rarely one end pinched, yellowish brown to dark brown, initially with a hyaline minute globose basal cell, smooth, with two guttules in each cell and thin hyaline sheath (Jaklitsch & Voglmayr 2012). *Collodiscula bambusae* has smaller ascospores (15–17.5 × 4.5–5.5 µm) without guttule and sheath. Phylogenetic analysis of ITS, LSU, RPB2 and β–tubulin genes and ITS–LSU also indicated that *C. bambusae* was distinct from *C. japonica*.

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References

Chen, J., Zhang, L.C., Xing, Y.M., Wang, Y.Q., Xing, X.K., Zhang, D.W., Lang, H.Q. & Guo S.X. (2013) Diversity and taxonomy of endophytic xylariaceous fungi from medicinal plants of *Dendrobium* (Orchidaceae). *PloS one* 8(3): e58268. http://dx.doi.org/10.1371/journal.pone.0058268

Crous, P.W. & Groenewald, J.Z. (2013) A phylogenetic re-evaluation of *Arthrinium*. *IMA Fungu*s 4 (1):133–154. http://dx.doi.org/10.5598/imafungus.2013.04.01.13

Doyle, J.J. & Doyle, J.L. (1987) A rapid DNA isolation procedure for small quantities of fresh leaf tissue. *Phytochemical Bulletin* 19: 11–15.

Felsenstein, J. (1985) Confidence limits on phylogenies: an approach using the bootstrap. *Evolution* 39: 783–791.

Fournier, J., Stadler, M., Hyde, K.D. & Duong, L.M. (2010) The new genus *Rostrohypoxylon* and two new *Annulohypoxylon* species from Northern Thailand. *Fungal Diversity* 40: 23–36. http://dx.doi.org/10.1007/s13225-010-0026-4

Hall, T.A. (1999) BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucleic Acids Symposium Series* 41: 95–98.

Hino, I. (1961) Icones fungorum bambusicolorum japonicorum. *The Fuji Bamboo Garden*.

Hino, I. & Katumoto, K. (1955) Illustrationes fungorum bambusicolorum III. *Bulletin of the Faculty of Agriculture, Yamaguchi University* 6: 29–68.

Hsieh, H.M., Lin, C.R., Fang, M.J., Rogers, J.D., Fournier, J., Lechat, C. & Ju, Y.M. (2010) Phylogenetic status of *Xylaria* subgenus *Pseudoxylaria* among taxa of the subfamily Xylarioideae (Xylariaceae) and phylogeny of the taxa involved in the subfamily. *Molecular Phylogenetics and Evolution* 54: 957–969.

Jaklitsch, W.M. & Voglmayr, H. (2012) Phylogenetic relationships of five genera of *Xylariales* and *Rosasphaeria* gen. nov. (Hypocreales). *Fungal Diversity* 52: 75–98. http://dx.doi.org/10.1007/s13225-011-0104-2

Ju, Y.M. & Rogers, J.D. (1999) The *Xylariaceae* of Taiwan (excluding *Anthostomella*). *Mycotaxon* 73: 343–440.

Kang, J.C., Hyde, K.D. & Kong, R.Y.C. (1999) Studies on Amphisphaeriales: The genera excluded from the *Amphisphaeriaceae*, *Cainiaceae* and *Clypeosphaeriaceae*. *Fungal Diversity* 2: 135–151.

Læssøe, T. & Spooner, B.M. (1994) *Rosellinia* & *Astrocystis* (*Xylariaceae*): new species and generic concepts. *Kew Bulletin* 49: 1–70. http://dx.doi.org/10.2307/4110199

Lee, S.B. & Taylor, J.W. (1990) Isolation of DNA from fungal mycelia and single spores. *In*: Innis, M.A., Gelfand, D.H. Sninsky, J.J. & White, T.J. (Eds.) *PCR protocols: a guide to methods and applications*. Academic Press, San Diego, USA, pp. 282–287.

Maharachchikumbura, S.S.N., Guo, L.D., Cai, L., Chukeatirote, E., Wu, W.P., Sun, X., Crous, P.W., Bhat, D.J., McKenzie, E.H.C., Bahkali, A.H. & Hyde, K.D. (2012) A multi-locus backbone tree for *Pestalotiopsis*, with a polyphasic characterization of 14 new species. *Fungal Diversity* 56: 95–129. http://dx.doi.org/10.1007/s13225-012-0198-1

Miller, A.N. & Huhndorf, S.M. (2005) Multi-gene phylogenies indicate ascomal wall morphology is a better predictor of phylogenetic relationships than ascospore morphology in the Sordariales (Ascomycota, Fungi). *Molecular Phylogenetics and Evolution* 35 (1): 60–75. http://dx.doi.org/10.1016/j.ympev.2005.01.007

Okane, I., Toyama, K., Nakagiri, A., Suzuki, K., Srikitikulchai, P., Sivichai, S., Hywel-Jones, N., Potacharoen, W. & Læssøe, T. (2008) Study of endophytic Xylariaceae in Thailand: diversity and taxonomy inferred from rDNA sequence analyses with saprobes forming fruit bodies in the field. *Mycoscience* 49 (6): 359–372. http://dx.doi.org/10.1007/S10267-008-0440-6

Samuels, G.J. & Rossman, A.Y. (1992) *Thuemenella* & *Sarawakus*. *Mycologia* 84: 26–40. http://dx.doi.org/10.2307/3760399

Samuels, G.J., Rogers, J.D. & Nagasawa, E. (1987) Studies in the *Amphisphaeriaceae* (sensu lato) 1. *Collodiscula japonica* and its anamorph, *Acanthodochium collodisculae*. *Mycotaxon* 28: 453–459.

Schoch, C.L., Sung, G.H., López-Giráldez, F., Townsend, J.P., Miadlikowska, J., Hofstetter, V., Robbertse, B., Matheny, P.B., Kauff, K., Wang, Z., Gueidan, C., Andriel, R.M., Trippe, K., Ciufettil, L.M., Wynns, A., Fraker, E., Trippe, K., Ciufetti, L.M., Wynns, A., Fraker, E., Hodkinson, B.P., Bonito, G., Groenewald, J.Z., Arzanlou, M., de Hoog, G.S., Crous, P.W., Hewitt, D., Pfister, D.H., Peterson, K., Gryzenhout, M., Wingfield, M.J., Aptroot, A., Suh, S.O., Blackwell, M., Hillis, D.M., Griffith, G.W., Castlebury, L.A., Rossman, A.Y., Lumbsch, H.T., Lücking, R., Büdel, B., Rauhut, A., Diederich, P., Ertz, D., Geiser, D.M., Hosaka, K., Inderbitzin, P., Kohlmeyer, J., Volkmann-Kohlmeyer, B., Mostert, L., O'Donnell, K., Sipman, H., Rogers, J.D., Shoemaker, R.A., Sugiyama, J., Summerbell, R.C., Untereiner, W., Johnston, P.R., Stenroos, S., Zuccaro, A., Dyer, P.S., Crittenden, P.D., Cole, M.S., Hansen, K., Trappe, J.M., Yahr, R., Lutzoni, F. & Spatafora, J.W. (2009) The Ascomycota Tree of Life: a phylum-wide phylogeny clarifies the origin and evolution of fundamental reproductive and ecological traits. *Systematic Biology* 58 (2): 224–392. http://dx.doi.org/10.1093/sysbio/syp020

Seifert, K.A., Louis-Seize, G. & Sampson, G. (2003) *Myrothecium acadiense*, a new hyphomycete isolated from the weed *Tussilago farfara*. *Mycotaxon* 87: 317–327.

Smith, G.J.D. & Hyde, K.D. (2001) Fungi from palms. XLIX. *Astrocystis*, *Biscogniauxia*, *Cyanopulvis*, *Hypoxylon*, *Nemania*, *Guestia*, *Rosellinia* and *Stilbohypoxylon*. *Fungal Diversity* 7: 89–127.

Spatafora, J.W. & Blackwell, M. (1993) Molecular systematics of unitunicate perithecial ascomycetes: the *Clavicipitales*-*Hypocreales* connection. *Mycologia* 85 (6): 912–922.

Stadler, M., Wollweber, H., Jäger, W., Briegert, M., Venturella, G., Castro, J.M. & Tichy, H.V. (2004) Cryptic species related to *Daldinia concentrica* and *D. eschscholzii,* with notes on *D. bakeri. Mycological Research* 108: 257–273. http://dx.doi.org/10.1017/S0953756204009335

Stadler, M., Fournier, J., Læssøe, T., Chlebicki, A., Lechat, C., Flessa, F., Rambold, G. & Peršoh D. (2010a) Chemotaxonomic and phylogenetic studies of *Thamnomyces* (Xylariaceae). *Mycoscience* 51: 189–207. http://dx.doi.org/10.1007/S10267-009-0028-9

Stadler, M., Fournier, J., Læssøe, T., Decock, C., Peršoh, D. & Rambold, G. (2010b) *Ruwenzoria*, a new genus of the Xylariaceae from Central Africa. *Mycological Progress* 9: 169–179. http://dx.doi.org/10.1007/S11557-009-0623-3

Stadler, M., Kuhnert, E., Peršoh, D. & Fournier, J. (2013) The Xylariaceae as model example for a unified nomenclature following the "One Fungus-One Name(1F1N) concept. *Mycology* 4 (1): 5–21. http://dx.doi.org/10.1080/21501203.2013.782478

Swofford, D.L. (2002) *PAUP*: phylogenetic analysis using parsimony (*and other methods), version 4.0b10.* Sinauer Associates, Sunderland.

Tanaka, K., Hirayama, K., Yonezawa, H., Hatakeyama, S., Harada, Y., Sano, T., Shirouzu, T. & Hosoya, T. (2009) Molecular taxonomy of bambusicolous fungi: Tetraplosphaeriaceae, a new pleosporalean family with Tetraploa-like anamorphs. *Studies in Mycology* 64: 175–209. http://dx.doi.org/10.3114/sim.2009.64.10

Tang, A.M.C., Jeewon, R. & Hyde, K.D. (2009) A re-evaluation of the evolutionary relationships within the Xylariaceae based on ribosomal and protein-coding gene sequences. *Fungal Diversity* 34: 127–155.

Trouillas, P., Honnorat, J., Bret, P., Jouvet, A. & Gerard, J.P. (2001) Redifferentiation therapy in brain tumors: long-lasting complete regression of glioblastomas and an anaplastic astrocytoma under long term 1-alpha-hydroxycholecalciferol. *Journal of Neuro-Oncology* 51 (1): 57–66.

Vasilyeva, L.N. (1998) Plantae non vasculares, Fungi et Bryopsidae Orientis extremi Rossica. Fungi. Tomus 4. Pyrenomycetidae et Loculoascomycetidae. *Nauka*, *Petropoli* 1–418.

Vilgalys, R. & Hester, M. (1990) Rapid genetic identification and mapping of enzymatically amplified ribosomal DNA from several *Cryptococcus* species. *Journal of Bacteriology* 172: 4238–4246.

White, T.J., Bruns, T., Lee, S. & Taylor, J.W. (1990) Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. *In*: Innis, M.A., Gelfand, D.H., Sninsky, J.J. & White, T.J. (Eds.) *PCR protocols: a guide to methods and applications*. Academic Press, New York, pp. 315–322.