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ARTICLE

# Unveiling fungal diversity in China: New species and records within the Xylariaceae

**Li QR[1,2,3#], Habib K[1,4#], Long SH[1], Wu YP[1], Zhang X[1], Hu HM[1], Wu QZ[1], Liu LL[5,6], Zhou SX[7], Shen XC[2*], and Kang JC[3*]**

*[1] State Key Laboratory of Functions and Applications of Medicinal Plants, Guizhou Medical University, Guiyang, China*
*[2] The High Efficacy Application of Natural Medicinal Resources Engineering Center of Guizhou Province (The Key Laboratory of Optimal Utilization of Natural Medicine Resources), School of Pharmaceutical Sciences, Guizhou Medical University, Guiyang, China*
*[3] Engineering and Research Center for Southwest Bio-Pharmaceutical Resources of National Education Ministry of China, Guizhou University, Guiyang, China*
*[4] Department of Botany, Khushal Khan Khattak University, Karak, KP, Pakistan*
*[5] Immune Cells and Antibody Engineering Research Center of Guizhou Province / Key Laboratory of Biology and Medical Engineering, Guizhou Medical University, Guiyang 550004, P.R. China*
*[6] Key Laboratory of Infectious Immune and Antibody Engineering of Guizhou Province, Engineering Research Center of Cellular Immunotherapy of Guizhou Province, School of Biology and Engineering/School of Basic Medical Sciences, Guizhou Medical University, Guiyang 550025, China*
*[7] Institute of Animal Husbandry and Veterinary, Guizhou Academy of Agricultural Sciences, Guiyang, 550002, P.R. China*

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## Abstract

In this study, we describe 27 new species of xylarialean taxa based on a comprehensive analysis that combines morpho-anatomy and multi-locus phylogenetics using ITS, *rpb2*, and TUB2 loci sequences. The newly identified species include *Anthostomella guizhouensis*, *An. yunnanensis*, *Astrocystis dinghuensis*, *As. guizhouensis*, *As. heterocyclae*, *As. sichuanensis*, *Collodiscula baoshanensis*, *C. quadrangularis*, *Kretzschmaria sichuanensis*, *K. kuankuoshuiensis*, *K. landingshanensis*, *Nemania bannaensis*, *N. buxi*, *N. landingshanensis*, *N. lasiocarpae*, *N. leigongshanensis*, *N. mengmanensis*, *N. subchangningensis*, *Nigropunctata khalidii*, *Pandanicola guizhouensis*, *Rosellinia cerasi*, *R. guiyangensis*, *R. guizhouensis*, *R. limushanensis*, *R. lishuicola*, *R. wuzhishanensis*, and *R. yaorenshanensis*. Additionally, we report the occurrence of xylarialean taxa in China or on the Chinese mainland as new geographical findings, which includes *Anthostomella leucobasis*, *An. pseudobambusicola*, *An. rhaphidophylli*, *An. smilacis*, *An. vestita*, *Astrocystis bambusae*, *Rosellinia yumingjui*, *Stilbohypoxylon elaeidicola* and *Xylaria frustulosa*, *X. glebulosa*, and *X. longissima*. Morphologically similar species and phylogenetically close taxa are compared and discussed. This extensive exploration enhances our understanding of fungal diversity and distribution, particularly within the context of China's rich ecological landscape and the Xylariaceae.

**Keywords** – 27 new species – Taxonomy – Xylariaceae in China – Xylariales

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***Corresponding Author:** Xiangchun Shen – e-mail – shenxiangchun@126.com,
Jichuan Kang – e-mail – jckang@gzu.edu.cn
Accepted by: Mingkwan Doilom, Marc Stadler
# These authors contributed equally as first authors to this work.

## INTRODUCTION

Fungi are a diverse and ecologically significant group of organisms that play crucial roles in various ecosystems worldwide. Fungal diversity is vast, and many regions around the world, including China, still have unexplored or underexplored areas. Within this kingdom, the Xylariaceae family stands out as an intriguing group, well-recognized for their diversity, global distribution, ecological activities and the remarkable novel compounds they produce, boasting a wide range of bioactivities (Suwannasai et al. 2023). Within this context, China, with its vast and varied landscapes, offers a unique setting for the discovery and study of fungal diversity.

Generally, the Xylariaceae are not strongly pathogenic but are basically facultative parasites being opportunistic and weakly pathogenic, predominantly inhabiting wood and occasionally seeds. (Whalley 1996, Edwards et al. 2003, Rogers 2000, 2020). They form stromata on freshly fallen wood or branches, occasionally invading living leaves and petioles. A significant number of *Xylaria* species establish associations with ant and termite nests, with stromata typically emerging only after these nests have been abandoned (Suwannasai et al. 2023).

The number of genera in the Xylariaceae family has seen variations in different taxonomic treatments by different authors over the years (Maharachchikumbura et al. 2016, Wendt et al. 2018). Daranagama et al. (2018) provided an updated list of Xylariaceae genera, recognizing 37 based on their examination of type specimens. However, in 2020, Hyde et al. following recent updates, accepted 32 genera in Xylariaceae. Since then, the genus *Dematophora* R. Hartig has been resurrected (Wittstein et al. 2020), and four new genera, namely *Albicollum* Voglmayr, J. Fourn., Tello & Jaklitsch, *Nigropunctata* Samarak. & K.D. Hyde (Samarakoon et al. 2022), *Oligostoma* Voglmayr, J. Fourn. & Jaklitsch, and *Spiririma* Voglmayr, J. Fourn., Tello & Jaklitsch (Voglmayr et al. 2022), have been established within Xylariaceae.

The present study focuses on the exploration of fungal diversity within the Xylariaceae family in China. Our findings unveil a rich collection of discoveries, including 27 newly identified species and also documenting the presence of xylarialean taxa in China.

## MATERIALS AND METHODS

### Sample Collection and Morphological Study

The specimens were collected during surveys conducted in the tropical and subtropical regions of China (Guizhou, Yunnan, Hainan provinces) between 2020 and 2022. All related habitat information, including details about elevation, climatic conditions, and geographical features, was recorded. The photos of the collected materials were taken using a Canon G15 camera (Canon Corporation, Tokyo, Japan). Materials were placed in paper bags and were taken to the lab for examination. To preserve the freshness of the specimens, they were dried at room temperature. The dried specimens were carefully labelled and stored in an ultra-low freezer at –80 °C for one week to eliminate any insects and their eggs. After this preparation, the specimens were ready for both morphological and molecular studies.

Herbarium materials were deposited at the herbarium of Guizhou Medical University (GMB) and the Herbarium of Cryptogams, Herbarium of Kunming Institute of Botany, Chinese Academy of Sciences (KUN-HKAS), and living cultures were deposited at the Guizhou Medical University Culture Collection (GMBC).

### Isolation and morphological characterization

Macroscopic characteristics were observed under an Olympus SZ61 stereomicroscope and photographed with a Canon 700D digital camera fitted to a light microscope (Nikon Ni). Morphological characteristics of specimens were examined, and photomicrographs were taken as described in Long et al. (2019). Materials were mounted in water for anatomical examination and added Melzer's reagent where necessary. More than 30 ascospores and 30 asci were measured using the Tarosoft ® image framework (v. 0.9.0.7). Images were arranged using Adobe Photoshop CS6 (Adobe Systems, USA). Pure cultures were obtained by single-ascospore isolation following

the method described in Senanayake et al. (2020). Pure cultures were maintained at 25 °C for 1–2 weeks on PDA (potato dextrose agar) medium.

**DNA extraction, PCR amplification and sequencing**

Mycelia were scraped from pure culture plates using a sterilized scalpel and were used for DNA extraction following the manufacturer's instructions of the BIOMIGA fungus genomic DNA extraction kit. For some specimens where the ascospores did not germinate, we used a method of directly extracting DNA from the contents of the perithecium. Using a sterile needle under a stereomicroscope, the contents of the ascospore case were picked up and DNA was extracted using a BIOMIGA fungus genomic DNA extraction kit. The DNA samples were kept at –20 °C.

Internal transcribed spacers (ITS), TUB2, and partial second largest subunit of the RNA polymerase II (*rpb2*) were amplified by PCR with primers ITS1/ITS4 (White et al. 1990, Gardes & Bruns 1993), Bt2a/Bt2b or T1/T22 (Glass & Donaldson 1995, O'Donnell & Cigelnik 1997), and RPB2-5F/RPB2-7cR (Liu et al. 1999), respectively. The components of a 25 μL volume PCR mixture were: 9.5 μL of double distilled water, 12.5 μL of PCR Master Mix, 1 μL of each primer and 1 μL of template DNA. Qualified PCR products were checked through 1.5% agarose gel electrophoresis stained with GoldenView, and sent to Sangon Co., China, for sequencing (Xie et al. 2020).

**Sequence alignments and phylogenetic analyses**

All the sequences obtained were deposited in the GenBank (Table 1). These sequences were compared with each other and all the known sequences in the GenBank by using the BLAST algorithm for identification. The molecular phylogeny was inferred from a combined dataset of ITS, TUB2 and *rpb2* sequences. The sequences retrieved from open databases originated from Hsieh et al. (2010), Stadler et al. (2013), U'Ren et al. (2016), Daranagama et al. (2018), Voglmayr & Beenken (2019), Xie et al. (2019), Hyde et al. (2020abc), Garcia-Aroca et al. (2021), Ma et al. (2022), Pan et al. (2022), Voglmayr et al. (2022), Konta et al. (2023), the BLASTn results of close matches and other *Xylariaceae* representatives. Sequences were aligned using the MAFFT v.7.110 online programme (Katoh et al. 2019) with the default settings, respectively alignment was adjusted manually using BioEdit v.7.0.5.3 (Hall 1999) where necessary. The ML analysis was implemented in RAxML v.8.2.12 using the GTRGAMMA substitution model with 1,000 bootstrap replicates (Stamatakis 2014).

The phylogenetic analyses were performed for Bayesian inference in MrBayes v. 3.2.1 (Ronquist et al. 2012) online. The model of evolution was estimated by MrModeltest 2.2 (Nylander 2004). The Markov chain Monte Carlo (MCMC) sampling in MrBayes v.3.2.2 (Ronquist et al. 2012) was used to determine the posterior probabilities (PP). Six simultaneous Markov chains were run for 1,000,000 generations, and trees were sampled every 1000$^{th}$ generation. The phylogenetic tree was visualized in FIGTREE v.1.4.3 (Rambaut 2012). All analyses were run on the CIPRES Science Gateway v 3.3 webportal (Miller et al. 2010).

## RESULTS

**Phylogenetic analyses**

After exclusion of ambiguously aligned regions and long gaps, the final combined data matrix contained 2,340 characters. *Jackrogersella cohaerens* (Pers.) L. Wendt, Kuhnert & M. Stadler, *Hypoxylon fragiforme* (Pers.) J. Kickx f. and *Daldinia loculatoides* Wollw. & M. Stadler were added as the outgroup. The tree topology derived from Maximum Likelihood (ML) analysis closely resembled that of Bayesian Inference (BI) analysis. The best scoring RAxML tree is shown in Fig. 1.

The sequences of our collected specimens nested within the clades corresponding to their respective genera. Although certain nodes within the clades lacked robust support (they consistently

appeared stable in repeated phylogenetic analyses), most other relationships obtained strong bootstrap support.

In the phylogram (Fig. 1), the genus *Nemania* is represented by three distinct clades, most of which nodes obtained robust bootstrap support. These clades contain 7 novel species. The genus *Rosellinia* is represented by a single large clade, represent 7 new species. Our sequence of the genus *Pandanicola* formed a clade in a relationship with *Anthostomella* species. The sequence of this genus is not present in GenBank. The species within the genera *Anthostomella* and *Xylaria* do not share a common ancestor, and evolved from different ancestral lineages. Previous studies also support the polyphyletic nature of both *Xylaria* and *Anthostomella* within the Xylariaceae (Daranagama et al. 2015, 2018, Wendt et al. 2018, Konta et al. 2020). In the multi-locus phylogeny, presented by Samarakoon et al. (2022), *Nigropunctata* is observed to clusters independently in Xylariales. However, in our phylogenetic analysis (Fig. 1), it does not exhibit an independent clustering but rather shares clades with species from *Anthostomella*. Within GenBank, DNA sequence data are available for three *Stilbohypoxylon* species: *S. elaeidicola*, *S. elaeidis*, and *S. quisquiliarum*. Phylogenetically, *S. quisquiliarum* clusters very distantly from the other two species, representing the *Stilbohypoxylon* polyphyletic status. The genus *Kretzschmaria* forms a monophyletic clade, representing three novel species. The *Astrocystis* species formed a clade that shares a sister relation with the monophyletically supported *Collodiscula* species. The phylogeny of all the noval species is discussed in the notes section of each species.

## Taxonomy

***Anthostomella*** Sacc., Atti Soc. Veneto-Trent. Sci. Nat., Padova, Sér. 4 4: 84 (1875).

Notes – The genus *Anthostomella*, originally described by Saccardo, is a complex and diverse group of fungi comprising approximately 95 species (Lu & Hyde 2000, Daranagama et al. 2015, 2016). Within the Xylariaceae, *Anthostomella* species exhibit polyphyletic characteristics, making their taxonomic delineation challenging. However, specific morphological features serve as key criteria for circumscribing the genus, including immersed ascomata, cylindrical asci with short pedicels, and pigmented, equilateral ascospores with germ slits (Daranagama et al. 2016). *Anthostomella*, with its intriguing array of species, has not been extensively studied in China. Yuan & Zhao (1992), Lu et al. (2003), and Jiang et al. (2022) have together contributed to the identification and documentation of 30 species within this genus. Species of *Anthostomella* have been found to be distributed across multiple genera within the phylogenetic tree (Fig. 1), representing its polyphyletic status. Our research extends the understanding of *Anthostomella* in China. Through a combination of morphological and phylogenetic assessments involving markers such as ITS, *rpb2*, and TUB2, we have identified two new species and recorded five new occurrences of this genus.

***Anthostomella guizhouensis*** Y.P. Wu & Q.R. Li, sp. nov. Fig. 2

MycoBank number: MB850405

Etymology – The name “guizhouensis” refers to the location it was found, Guizhou province.

Description – *Saprobic* on dead bamboo. Sexual morph: Ascomata 518–594 × 264–288 µm ($\overline{x}$ = 563 × 272 µm, n = 10), immersed, visible as conical blackened dots, solitary, without a clypeus, globose in vertical section. Ostioles papillate, black, surrounding by white tissue. Peridium 28–36 µm ($\overline{x}$ = 30 µm, n = 10) wide, comprising several layers, outer layer brown, thick-walled *textura irregularis* cells, inner layer hyaline. Paraphyses 3.6–5 µm ($\overline{x}$ = 4.2 µm, n = 10) wide, shorter than the asci, hyaline, unbranched, without septa. Asci 176–215 × 11.8–14.2 µm ($\overline{x}$ = 188 × 12.6 µm, n = 30), 8-spored, unitunicate, long-cylindrical, short pedicellate, apically rounded, wedge-shaped, amyloid apical apparatus, 4.3–5.2 × 4.2–4.5 µm ($\overline{x}$ = 4.6 × 4.3 µm, n = 30). Ascospores 22.3–25.2 × 7.5–8.5 µm ($\overline{x}$ = 23.3 × 7.6 µm, n = 30), uniseriate, unicellular, brown to brownish black, ellipsoidal-inequilaterally ellipsoidal, with narrowly rounded ends,

**Table 1** GenBank accession numbers used in this study. The newly generated sequences are marked bold.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| *Abieticola koreana* | EML-F0010-1 | South Korea | JN977612 | KP792128 | KP792126 | Park et al. (2005) |
| *Albicollum berberidicola* | WU:MYC:0043995 | Spain | ON869276 | ON808456 | ON808499 | Voglmayr et al. (2022) |
| *Albicollum berberidicola* | WU:MYC:0043994 | Greece | ON869278 | ON808457 | ON808501 | Voglmayr et al. (2022) |
| *Albicollum canicolle* | WU:MYC:0043997 | Spain | NR182513 | ON808458 | ON808502 | Voglmayr et al. (2022) |
| *Albicollum canicolle* | WU:MYC:0044000 | Spain | ON869280 | ON808459 | ON808503 | Voglmayr et al. (2022) |
| *Albicollum longisporum* | WU:MYC:0044004 | Spain | ON869286 | ON808465 | ON808509 | Voglmayr et al. (2022) |
| *Albicollum longisporum* | WU:MYC:0044009 | Spain | ON869287 | ON808466 | ON808510 | Voglmayr et al. (2022) |
| *Albicollum novomexicanum* | WU:MYC:0040048 | USA | ON869296 | – | – | Voglmayr et al. (2022) |
| *Albicollum vincensii* | WU:MYC:0044014 | Austria | ON869297 | ON808475 | ON808519 | Voglmayr et al. (2022) |
| *Albicollum vincensii* | WU:MYC:0044017 | Spain | ON869298 | ON808476 | ON808520 | Voglmayr et al. (2022) |
| *Alloanthostomella rubicola* | MFLUCC:14-0175 | Italy | KP297407 | KP340535 | KP406618 | Daranagama et al. (2016) |
| *Amphirosellinia fushanensis* | HAST 91111209 | China | GU339496 | GQ848339 | GQ495950 | Hsieh et al. (2010) |
| *Amphirosellinia nigrospora* | HAST 91092308 | China | GU322457 | GQ848340 | GQ495951 | Hsieh et al. (2010) |
| *Annulohypoxylon cohaerens* | HAST, JF 310 | France | EF026140 | GQ844766 | AY951655 | Hsieh et al. (2010) |
| *Anthostomella formosa* | MFLUCC 14-0170 | Italy | KP297403 | KP340531 | KP406614 | Voglmayr et al. (2018) |
| ***Anthostomella guizhouensis*** | **GMB1140** | **China** | **PP133233** | **–** | **PP209122** | **This study** |
| ***Anthostomella guizhouensis*** | **GMB1141** | **China** | **PP133234** | **–** | **PP209123** | **This study** |
| *Anthostomella lamiacearum* | MFLU 18-0101 | Thailand | MW240669 | MW658648 | – | Samarakoon et al. (2022) |
| ***Anthostomella leucobasis*** | **GMB1143** | **China** | **PP153382** | **PP198092** | **PP203030** | **This study** |
| *Anthostomella obesa* | MFLUCC:14-0171 | Italy | KP297405 | – | KP406616 | Daranagama et al. (2016) |
| ***Anthostomella pseudobambusicola*** | **GMB1144** | **China** | **PP153383** | **PP198093** | **PP203031** | **This study** |
| ***Anthostomella pseudobambusicola*** | **GMB1146** | **China** | **PP153384** | **PP198094** | **PP203032** | **This study** |
| *Anthostomella pseudobambusicola* | MFLU 16-0255 | Thailand | KU940153 | – | – | Dai et al. (2017) |
| ***Anthostomella rhaphidophylli*** | **GMB1149** | **China** | **PP153385** | **–** | **PP203033** | **This study** |
| ***Anthostomella rhaphidophylli*** | **GMB1150** | **China** | **PP153386** | **–** | **PP203034** | **This study** |
| ***Anthostomella smilacis*** | **GMB1151** | **China** | **PP153387** | **–** | **PP203035** | **This study** |
| ***Anthostomella vestita*** | **GMB1152** | **China** | **PP153388** | **–** | **PP209112** | **This study** |
| ***Anthostomella yunnanensis*** | **GMB1153** | **China** | **PP133235** | **–** | **PP209124** | **This study** |
| ***Anthostomella yunnanensis*** | **GMB0801** | **China** | **PP133236** | **–** | **PP209125** | **This study** |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| *Anthostomelloides brabeji* | CBS:110128 | South Africa | EU552098 | – | – | Marincowitz et al. (2008) |
| *Anthostomelloides krabiensis* | MFLUCC15-0678 | Thailand | KX305927 | KX305929 | – | Tibpromma et al. (2017) |
| *Anthostomelloides leucospermi* | CBS:110126 | South Africa | EU552100 | – | – | Marincowitz et al. (2008) |
| *Anthostomelloides proteae* | CBS:110127 | South Africa | EU552101 | – | – | Marincowitz et al. (2008) |
| *Ascotricha bosei* | CBS 448.93 | Iraq | KF893283 | – | KF893270 | Cheng et al. (2015) |
| *Ascotricha chartarum* | CBS:234.97 | Papua New Guinea | KF893284 | – | KF893271 | Cheng et al. (2015) |
| *Ascotricha erinacea* | CBS:535.73 | China | KF893285 | – | KF893272 | García et al. (2006) |
| *Ascotricha lusitanica* | CBS:462.70 | Portugal | KF893289 | – | KF893275A | García et al. (2006) |
| *Ascotricha* sp. | OUCMBIII141331 | China | KX709900 | – | KX709904 | Unpublished |
| *Astrocystis bambusae* | GMB0700 | China | PP146578 | – | PP209113 | This study |
| *Astrocystis bambusae* | HAST 89021904 | China | GU322449 | GQ844836 | GQ495942 | Hsieh et al. (2010) |
| *Astrocystis cocoes* | GMB0037 | China | MW732441 | MW755333 | MW755339 | Wu et al. (2021) |
| *Astrocystis concavispora* | MFLUCC 14.0174 | Italy | KP297404 | KP340532 | KP406615 | Daranagama et al. (2015) |
| ***Astrocystis dinghuensis*** | **GMB0704** | **China** | **PP133237** | **PP198070** | **PP197684** | **This study** |
| ***Astrocystis dinghuensis*** | **GMB0783** | **China** | **PP133238** | **PP198071** | **PP197683** | **This study** |
| ***Astrocystis guizhouensis*** | **GMB0705** | **China** | **PP133239** | **PP198072** | **PP197682** | **This study** |
| ***Astrocystis guizhouensis*** | **GMB0796** | **China** | **PP133240** | **PP198073** | **PP197681** | **This study** |
| ***Astrocystis heterocyclae*** | **GMB0706** | **China** | **PP153340** | **PP198074** | **PP197680** | **This study** |
| ***Astrocystis heterocyclae*** | **GMB0788** | **China** | **PP153341** | **PP198075** | **PP197679** | **This study** |
| *Astrocystis mirabilis* | HAST 94070803 | China | GU322448 | GQ844835 | GQ495941 | Hsieh et al. (2010) |
| *Astrocystis multiloculata* | GMB0033 | China | MW732439 | MW755330 | MW755336 | Wu et al. (2021) |
| *Astrocystis pseudomirabilis* | GMB0122 | China | ON471845 | ON462000 | ON461996 | Li et al. (2022) |
| ***Astrocystis sichuanensis*** | **GMB0708** | **China** | **PP153343** | **PP198076** | **PP197678** | **This study** |
| ***Astrocystis sichuanensis*** | **GMB0709** | **China** | **PP153342** | **–** | **PP197677** | **This study** |
| *Astrocystis sublimbata* | HAST 89032207 | China | GU322447 | GQ844834 | GQ495940 | Hsieh et al. (2010) |
| *Astrocystis tessellati* | GMB0120 | China | ON471849 | ON462003 | ON461994 | Li et al. (2022) |
| *Brunneiperidium gracilentum* | MFLUCC:14-0011 | Italy | KP297400 | KP340528 | KP406611 | Daranagama et al. (2015) |
| *Ceratocladium microspermum* | CBS:488.77 | Slovakia | ON400740 | ON399324 | – | Hernãndez-Restrepo et al. (2022) |
| *Circinotrichum papakurae* | CBS:101373 | Brazil | KR611876 | – | – | Konta et al. (2023) |
| *Collodiscula bambusae* | GZUH0102 | China | KP054279 | KP276675 | KP276674 | Li et al. (2015a) |
| ***Collodiscula baoshanensis*** | **GMB0720** | **China** | **PP153344** | **PP198077** | **PP197676** | **This study** |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| ***Collodiscula baoshanensis*** | **GMB0795** | **China** | **PP153345** | **PP198078** | **PP197675** | **This study** |
| *Collodiscula fangjingshanensis* | GZUH0109 | China | KR002590 | KR002591 | KR002592 | Li et al. (2015a) |
| *Collodiscula japonica* | CBS:124266 | China | JF440974 | KY624273 | KY624316 | Jaklitsch & Voglmayr (2012) |
| *Collodiscula lancangjiangensis* | GMB0030 | China | MW732442 | – | MW755343 | Wu et al. (2021) |
| *Collodiscula leigongshanensis* | GZUH0107 | China | KP054281 | KR002588 | KR002587 | Li et al. (2015a) |
| ***Collodiscula quadrangularis*** | **GMB0722** | **China** | **PP153347** | **–** | **PP197674** | **This study** |
| ***Collodiscula quadrangularis*** | **GMB0784** | **China** | **PP153346** | **–** | **PP197673** | **This study** |
| *Collodiscula tubulosa* | GACP QR0111 | China | MN017302 | MN018403 | MN018405 | Xie et al. (2020) |
| *Coniolariella gamsii* | IRAN:842C | Iran | GU553325 | – | – | Asgari et al. (2011) |
| *Daldinia loculatoides* | CBS:113279 | UK | MH862918 | KY624247 | KX271246 | Vu et al. (2019) |
| *Dematophora pepo* | CBS:123592 | Peru | MN984620 | – | MN987246 | Wittstein et al. (2020) |
| *Dematophora bunodes* | CBS:123584 | Peru | MN984617 | – | MN987243 | Wittstein et al. (2020) |
| *Dematophora bunodes* | CBS:123597 | Peru | MN984618 | – | MN987244 | Wittstein et al. (2020) |
| *Dematophora necatrix* | CBS 349.36 | Argentina | AY909001 | KY624275 | KY624310 | Peláez et al. (2008) |
| *Emarcea eucalyptigena* | CBS:H-22237 | Malaysia | MK762711 | – | MK776963 | Samarakoon et al. (2020) |
| *Engleromyces sinensis* | CNUCC 200801 | China | MZ622699 | MZ622186 | MZ622188 | Unpublished |
| *Entalbostroma erumpens* | ICMP 21152 | New Zealand | KX258206 | KX258204 | KX258205 | Johnston et al. (2016) |
| *Entoleuca mammata* | JDR 100 | France | GU300072 | GQ844782 | GQ470230 | Hsieh et al. (2010) |
| *Gyrothrix eucalypti* | CPC:36066 | South Africa | MN562109 | – | – | Crous et al. (2014) |
| *Halorosellinia krabiensis* | MFLU 17-2596 | Thailand | MN047119 | – | – | Dayarathne et al. (2020) |
| *Halorosellinia rhizophorae* | MFLU 17-2591 | Thailand | MN047118 | – | MN431492 | Dayarathne et al. (2020) |
| *Halorosellinia xylocarpi* | MFLU 18-0545 | Thailand | MN047120 | – | MN077076 | Dayarathne et al. (2020) |
| *Haploanthostomella elaeidis* | MFLU 20-0522 | Thailand | MT929161 | MT928154 | – | Konta et al. (2023) |
| *Helicogermslita clypeata* | MFLU 18-0852 | Thailand | MW240666 | MW658647 | MW775614 | Samarakoon et al. (2022) |
| *Hypocopra anomala* | TTI-000339 | USA | – | MT901033 | MT901030 | Becker et al. (2020) |
| *Hypocopra rostrata* | NRRL 66178 | USA | KM067909 | – | – | Jayanetti et al. (2015) |
| *Hypocopra zeae* | MFLU 18-0809 | Thailand | MW240671 | MW658650 | MW775616 | Samarakoon et al. (2022) |
| *Hypocreodendronsanguineum* | JDR 169 | Mexico | GU322433 | GQ844819 | GQ487710 | Hsieh et al. (2010) |
| *Hypoxylon fragiforme* | MUCL 51264 | Germany | KC477229 | KM186296 | KX271282 | Stadler et al. (2013) |
| *Kretzschmaria clavus* | JDR 114 | French Guiana | EF026126 | GQ844789 | EF025611 | Hsieh et al. (2010) |
| *Kretzschmaria deusta* | CBS:163.93 | Germany | KC477237 | KY624227 | KX271251 | Stadler et al. (2013) |
| *Kretzschmaria guyanensis* | HAST 89062903 | China | GU300079 | GQ844792 | GQ478214 | Hsieh et al. (2010) |
| *Kretzschmaria hedjaroudei* | GUM:1549 | Iran | NR161062 | OP359597 | OP359602 | Pourmoghaddam et al. (2018) |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| ***Kretzschmaria kuankuoshuiensis*** | **GMB0728** | **China** | **PP153350** | **–** | **PP197669** | **This study** |
| ***Kretzschmaria landingshanensis*** | **GMB0726** | **China** | **PP153353** | **–** | **PP197668** | **This study** |
| ***Kretzschmaria landingshanensis*** | **GMB0727** | **China** | **PP153352** | **–** | **PP197667** | **This study** |
| *Kretzschmaria lucidula* | JDR 112 | French Guiana | EF026125 | GQ844790 | EF025610 | Hsieh et al. (2010) |
| *Kretzschmaria megalospora* | JDR 229 | Malaysia | EF026124 | GQ844791 | EF025609 | Hsieh et al. (2010) |
| *Kretzschmaria neocaledonica* | HAST 94031003 | China | GU300078 | GQ844788 | GQ478213 | Hsieh et al. (2010) |
| *Kretzschmaria pavimentosa* | JDR 109 | China | GU300077 | GQ844787 | GQ478212 | Hsieh et al. (2010) |
| *Kretzschmaria quercicola* | TPML150908-046 | Korea | KX260114 | KX260116 | KX260112 | Yun et al. (2016) |
| *Kretzschmaria sandvicensis* | JDR 113 | USA | GU300076 | GQ844786 | GQ478211 | Hsieh et al. (2010) |
| ***Kretzschmaria sichuanensis*** | **GMB0729** | **China** | **PP153348** | **–** | **PP197672** | **This study** |
| ***Kretzschmaria sichuanensis*** | **GMB0785** | **China** | **PP153349** | **–** | **PP197671** | **This study** |
| ***Kretzschmaria sichuanensis*** | **GMB0789** | **China** | **PP153351** | **–** | **PP197670** | **This study** |
| *Kretzschmariella culmorum* | JDR 88 | France | KX430043 | – | KX430046 | Pi et al. (2021) |
| *Leptomassaria simplex* | WU:MYC:0044025 | Austria | ON869305 | ON808483 | ON808527 | Voglmayr et al. (2022) |
| *Leptomassaria simplex* | WU:MYC:0044026 | Austria | ON869306 | ON808484 | ON808528 | Voglmayr et al. (2022) |
| *Linosporopsis ischnotheca* | WU:40024 | Switzerland | MN818952 | MN820708 | MN820715 | Voglmayr & Beenken (2020) |
| *Linosporopsis ischnotheca* | WU:40025 | Switzerland | MN818953 | MN820709 | MN820716 | Voglmayr & Beenken (2020) |
| *Linosporopsis ochracea* | WU:40031 | Germany | MN818958 | MN820714 | MN820721 | Voglmayr & Beenken (2020) |
| *Linosporopsis ochracea* | WU:40030 | Germany | MN818957 | MN820713 | MN820720 | Voglmayr & Beenken (2020) |
| *Lunatiannulus irregularis* | MFLUCC:14-0014 | Italy | KP297398 | KP340526 | KP406609 | Daranagama et al. (2015) |
| *Melanographium phoenicis* | MFLU 18-1587 | Thailand | NR168826 | – | – | Hyde et al. (2020c) |
| *Nemania abortiva* | BISH 467 | USA | GU292816 | GQ844768 | GQ470219 | Hsieh et al. (2010) |
| *Nemania aquilariae* | HKAS 111935 | China | MW729422 | MW717891 | MW881142 | Tibpromma et al. (2021) |
| ***Nemania bannaensis*** | **GMB0731** | **China** | **PP153355** | **PP198079** | **PP197666** | **This study** |
| ***Nemania bannaensis*** | **GMB0732** | **China** | **PP153354** | **PP198080** | **PP197665** | **This study** |
| *Nemania beaumontii* | HAST, JF 405 | Martinique | GU292819 | GQ844772 | GQ470222 | Hsieh et al. (2010) |
| *Nemania bipapillata* | HAST 90080610 | China | GU292818 | GQ844771 | GQ470221 | Hsieh et al. (2010) |
| ***Nemania buxi*** | **GMB0735** | **China** | **PP153356** | **PP198081** | **PP197664** | **This study** |
| ***Nemania buxi*** | **GMB0790** | **China** | **PP153357** | **PP198082** | **PP197663** | **This study** |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| *Nemania camelliae* | GMBC0068 | China | MW851889 | MW836055 | MW836029 | Pi et al. (2021) |
| *Nemania camelliae* | GMBC0067 | China | MW851888 | MW836056 | MW836030 | Pi et al. (2021) |
| *Nemania caries* | GMB0069 | China | MW851873 | MW836069 | MW836035 | Pi et al. (2021) |
| *Nemania caries* | GMB0070 | China | MW851874 | MW836071 | MW836036 | Pi et al. (2021) |
| *Nemania changningensis* | GMB0056 | China | MW851875 | MW836061 | MW836027 | Pi et al. (2021) |
| *Nemania changningensis* | GMB0057 | China | MW851876 | MW836062 | MW836028 | Pi et al. (2021) |
| *Nemania chestersii* | JF04024 | France | – | DQ631949 | DQ840089 | Tang et al (2007) |
| *Nemania cyclobalanopsina* | GMB0062 | China | MW851883 | MW836057 | MW836025 | Pi et al. (2021) |
| *Nemania cyclobalanopsina* | GMB0061 | China | MW851882 | MW836058 | MW836026 | Pi et al. (2021) |
| *Nemania delonicis* | MFLU 19-2124 | Thailand | MW240613 | MW342617 | MW775574 | Samarakoon et al. (2022) |
| *Nemania diffusa* | HAST 91020401 | China | GU292817 | GQ844769 | GQ470220 | Hsieh et al. (2010) |
| *Nemania ethancrensonii* | WU:MYC:0040047 | USA | ON869311 | ON808489 | ON808533 | Voglmayr et al. (2022) |
| *Nemania feicuiensis* | GMB0058 | China | MW851879 | MW836064 | MW836024 | Pi et al. (2021) |
| *Nemania feicuiensis* | GMB0059 | China | MW851880 | MW836063 | MW836023 | Pi et al. (2021) |
| *Nemania fusoidispora* | GZUH0098 | China | MW851881 | MW836070 | MW836037 | Pi et al. (2021) |
| *Nemania hyrcana* | GUM:1627 | Iran | OP359333 | OP359599 | OP359604 | Pourmoghaddam et al. (2022) |
| *Nemania hyrcana* | GUM:1628 | Iran | OP359332 | OP359598 | OP359603 | Pourmoghaddam et al. (2022) |
| *Nemania illita* | JDR 236 | USA | EF026122 | GQ844770 | EF025608 | Hsieh et al. (2010) |
| ***Nemania landingshanensis*** | **GMB0791** | **China** | **PP153358** | **PP198083** | **PP197685** | **This study** |
| ***Nemania landingshanensis*** | **GMB0786** | **China** | **PP153359** | **PP198084** | **PP197686** | **This study** |
| ***Nemania lasiocarpae*** | **GMB0742** | **China** | **PP153360** | **PP198085** | **PP197687** | **This study** |
| ***Nemania lasiocarpae*** | **GMB0792** | **China** | **PP153361** | **PP198086** | **PP197688** | **This study** |
| ***Nemania leigongshanensis*** | **GMB0743** | **China** | **PP153362** | **PP198087** | **PP197689** | **This study** |
| ***Nemania leigongshanensis*** | **GMB0787** | **China** | **PP153363** | **PP198088** | **PP197690** | **This study** |
| *Nemania lishuicola* | GMB0065 | China | MW851886 | MW836065 | MW836033 | Pi et al. (2021) |
| *Nemania longipedicellata* | MFLU 18-0819 | Thailand | MW240612 | MW342616 | MW775573 | Samarakoon et al. (2022) |
| *Nemania macrocarpa* | WSP 265 | USA | GU292823 | GQ844776 | GQ470226 | Hsieh et al. (2010) |
| *Nemania maritima* | HAST 89120401 | China | GU292822 | GQ844775 | GQ47022 | Hsieh et al. (2010) |
| ***Nemania mengmanensis*** | **GMB0745** | **China** | **PP153364** | **–** | **PP197691** | **This study** |
| ***Nemania mengmanensis*** | **GMB0793** | **China** | **PP153365** | **–** | **PP197692** | **This study** |
| *Nemania paraphysata* | MFLU 19-2121 | Thailand | MW240609 | MW342613 | – | Samarakoon et al. (2022) |
| *Nemania plumbea* | JF TH 04-01 | Thailand | DQ641634 | DQ631952 | DQ840084 | Tang et al (2007) |
| *Nemania prava* | TROM:104 | Norway | OP289674 | – | – | Pourmoghaddam et al. (2022) |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| *Nemania primolutea* | HAST 91102001 | China | EF026121 | GQ844767 | EF025607 | Hsieh et al. (2010) |
| *Nemania rubi* | GMB0064 | China | MW851885 | MW836059 | MW83602 | Pi et al. (2021) |
| *Nemania rubi* | GMB0063 | China | MW851884 | MW836060 | MW836022 | Pi et al. (2021) |
| *Nemania serpens* | HAST 235 | Canada | GU292820 | GQ844773 | GQ470223 | Hsieh et al. (2010) |
| *Nemania sphaeriostoma* | JDR 261 | USA | GU292821 | GQ844774 | GQ470224 | Hsieh et al. (2010) |
| ***Nemania subchangningensis*** | **GMB0749** | **China** | **PP153366** | **–** | **PP197693** | **This study** |
| ***Nemania subchangningensis*** | **GMB0797** | **China** | **PP153369** | **–** | **PP197694** | **This study** |
| *Nemania thailandensis* | MFLU 19-2122 | Thailand | MW240610 | MW342614 | MW775571 | Samarakoon et al. (2022) |
| *Nemania thailandensis* | MFLU 19-2117 | Thailand | MW240611 | MW342615 | MW775572 | Samarakoon et al. (2022) |
| *Nemania uda* | WU:MYC:0040046 | Austria | ON869312 | ON808488 | ON808532 | Voglmayr et al. (2022) |
| *Nemania yunnanensis* | HKAS 111934 | China | NR173237 | MW717892 | MW881141 | Tibpromma et al. (2021) |
| *Neoanthostomella fici* | MFLU 19-2765 | China | MW114390 | MW177711 | – | Tennakoon et al. (2021) |
| *Neoanthostomella pseudostromatica* | MFLUCC11-0610 | Thailand | KU940158 | – | – | Dai et al. (2014) |
| *Neoanthostomella viticola* | MFLUCC 16-0243 | Italy | KX505957 | – | KX789495 | Daranagama et al. (2016) |
| *Neoxylaria arengae* | MFLUCC 15-0292 | Thailand | MT496747 | MT502418 | – | Konta et al. (2023) |
| *Neoxylaria juruensis* | HAST 92042501 | China | GU322439 | GQ844825 | GQ495932 | Hsieh et al. (2010) |
| *Nigropunctata bambusicola* | MFLU 19-2134 | Thailand | MW240662. | MW658644 | – | Samarakoon et al. (2022) |
| *Nigropunctata bambusicola* | MFLU 19-2145 | Thailand | MW240664 | MW658646 | – | Samarakoon et al. (2022) |
| ***Nigropunctata khalidii*** | **GMB1156** | **China** | **PP153389** | **–** | **PP209114** | **This study** |
| *Nigropunctata nigrocircularis* | MFLU 19-2130 | Thailand | MW240661 | – | MW775612 | Samarakoon et al. (2022) |
| *Nigropunctata thailandica* | MFLU 19-2118 | Thailand | MW240659 | MW658643 | – | Samarakoon et al. (2022) |
| *Occultitheca rosae* | HKAS 102393 | China | MW240672 | MW658651 | MW775617 | Samarakoon et al. (2022) |
| *Oligostoma insidiosum* | WU:MYC:0044034 | Austria | ON869313 | ON808490 | ON808534 | Voglmayr et al. (2022) |
| *Oligostoma insidiosum* | WU:MYC:0044033 | Austria | ON869315 | ON808492 | ON808536 | Voglmayr et al. (2022) |
| ***Pandanicola guizhouensis*** | **GMB1157** | **China** | **PP153367** | **PP198089** | **PP209121** | **This study** |
| *Penzigia cantareirensis* | HAST, JF 526 | Guadeloupe | GU300085 | GQ844798 | GQ478220 | Hsieh et al. (2010) |
| *Podosordaria mexicana* | WSP 176 | Mexico | GU324762 | GQ853039 | GQ844840 | Hsieh et al. (2010) |
| *Podosordaria muli* | WSP 167 | Mexico | GU324761 | GQ853038 | GQ844839 | Hsieh et al. (2010) |
| *Poronia pileiformis* | WSP 88113001 | China | GU324760 | GQ853037 | GQ502720 | Hsieh et al. (2010) |
| *Pseudoanthostomella conorum* | IE250-HA-I | Switzerland | KT149745 | – | – | Gross & Sieber (2016) |
| *Pseudoanthostomella conorum* | AR173 | Germany | FN435813 | – | – | Jaklitsch & Voglmayr (2011) |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| *Pseudoanthostomella delitescens* | MFLUCC 16-0477 | Italy | KX533451 | – | KX789490 | Daranagama et al. (2016) |
| *Pseudoanthostomella pini-0nigrae* | MFLUCC 16-0478 | Italy | KX533453 | – | – | Daranagama et al. (2016) |
| *Pseudoanthostomella pini-nigrae* | MFLU 15-3608 | Italy | MW240655 | – | – | Samarakoon et al. (2022) |
| *Pseudoanthostomella senecionicola* | MFLUCC 15-0013 | Italy | MW240674 | – | MW820913 | Samarakoon et al. (2022) |
| *Pseudoanthostomella sepelibilis* | F-160,798 | USA | AY908989 | – | – | Unpublished |
| *Pseudoanthostomella thailandica* | MFLUCC 15-0017 | Thailand | KX533447 | KX599538 | KX600496 | Konta et al. (2023) |
| *Rosellinia aquila* | MUCL:51703 | France | KY610392 | KY624285 | KX271253 | Wendt et al. (2017) |
| *Rosellinia britannica* | HKAS 102349 | Italy | MW240606 | MW342610. | MW775569 | Samarakoon et al. (2022) |
| *Rosellinia britannica* | MFLU 17-0987 | Italy | MW240607 | MW342611 | MW775570 | Samarakoon et al. (2022) |
| *Rosellinia buxi* | JDR 99 | France | GU300070 | GQ844780 | GQ470228 | Hsieh et al. (2010) |
| ***Rosellinia cerasi*** | **GMB0755** | **China** | **PP153371** | **–** | **PP215122** | **This study** |
| ***Rosellinia cerasi*** | **GMB0794** | **China** | **PP153373** | **–** | **PP215123** | **This study** |
| *Rosellinia cf akulovii* | GUM IRN:1632 | Iran | OL635184 | OL657210 | OL657219 | Pourmoghaddam et al. (2022) |
| *Rosellinia convexa* | MFLU:19-0773 | Thailand | MN707567 | MN987003 | MN987002 | Su et al. (2015) |
| *Rosellinia corticium* | MUCL:51693 | France | KY610393 | KY624229 | KX271254 | Wendt et al. (2017) |
| *Rosellinia corticium* | STMA 13324 | Germany | MN984621 | MN987237 | MN987241 | Wittstein et al. (2020) |
| *Rosellinia corticium* | STMA 12170 | Germany | MN984623 | – | MN987242 | Wittstein et al. (2020) |
| ***Rosellinia guiyangensis*** | **GMB0769** | **China** | **PP153368** | **–** | **PP197695** | **This study** |
| ***Rosellinia guiyangensis*** | **GMB0798** | **China** | **PP153370** | **–** | **PP197696** | **This study** |
| ***Rosellinia guizhouensis*** | **GMB0084** | **China** | **PP153374** | **–** | **PP215124** | **This study** |
| ***Rosellinia guizhouensis*** | **GMB0799** | **China** | **PP153375** | **–** | **PP215125** | **This study** |
| *Rosellinia lamprostoma* | HAST 89112602 | China | EF026118 | GQ844778 | EF025604 | Hsieh et al. (2010) |
| *Rosellinia limonispora* | MUCL:29409 | Japan | MN984615 | MN987235 | MN987240 | Wittstein et al. (2020) |
| ***Rosellinia limushanensis*** | **GMB0758** | **China** | **PP153376** | **–** | **PP215121** | **This study** |
| ***Rosellinia limushanensis*** | **GMB0802** | **China** | **PP153377** | **–** | **PP197697** | **This study** |
| ***Rosellinia lishuicola*** | **GMB0759** | **China** | **PP180028** | **–** | **PP197698** | **This study** |
| ***Rosellinia lishuicola*** | **GMB0800** | **China** | **PP175361** | **–** | **PP197699** | **This study** |
| *Rosellinia marcucciana* | CBS:123592 | France | MN984616 | MN987238 | – | Wittstein et al. (2020) |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| *Rosellinia merrillii* | HAST 89112601 | China (Taiwan) | GU300071 | GQ844781 | GQ470229 | Hsieh et al. (2010) |
| *Rosellinia nectrioides* | CBS 449.89 | Spain | FJ175181. | MN987239 | – | Wittstein et al. (2020) |
| *Rosellinia qiongensis* | GMB0083 | China | OM001199 | – | OM112275 | Long et al. (2022) |
| *Rosellinia qiongensis* | GMB0082 | China | OM001198 | – | OM112274 | Long et al. (2022) |
| *Rosellinia sanctae-cruciana* | HAST 90072903 | China | GU292824 | GQ844777 | GQ470227 | Hsieh et al. (2010) |
| *Rosellinia verticillata* | GMB0085 | China | OM001201 | – | OM112277 | Long et al. (2022) |
| *Rosellinia verticillata* | GMB0084 | China | OM001200 | – | OM112276 | Long et al. (2022) |
| ***Rosellinia wuzhishanensis*** | **GMB0757** | **China** | **PP153378** | **–** | **–** | **This study** |
| ***Rosellinia wuzhishanensis*** | **GMB0803** | **China** | **PP153379** | **–** | **–** | **This study** |
| ***Rosellinia yaorenshanensis*** | **GMB0760** | **China** | **PP153380** | **PP198090** | **PP197700** | **This study** |
| ***Rosellinia yaorenshanensis*** | **GMB0801** | **China** | **PP153381** | **PP198091** | **PP203029** | **This study** |
| ***Rosellinia yumingjui*** | **GMB0761** | **China** | **PP153390** | **–** | **PP209115** | **This study** |
| *Sarcoxylon compunctum* | CBS:359_61 | South Africa | KT281903 | KY624230 | KX271255 | Senanayake et al. (2015) |
| *Spirodecospora melnikii* | HHUF:30656 | Japan | LC731937 | LC731955 | – | Sugita et al. (2022) |
| *Spirodecospora paramelnikii* | HUFF:30658 | Japan | LC731939 | LC731956 | – | Sugita et al. (2022) |
| *Spirodecospora paulospiralis* | MAFF:247749 | Japan | LC731940 | LC731957 | – | Sugita et al. (2022) |
| ***Stilbohypoxylon elaeidicola*** | **GMB0763** | **China** | **PP153399** | **–** | **PP209120** | **This study** |
| *Stilbohypoxylon elaeicola* | HAST 94082615 | China | GU322440 | GQ844827 | GQ495933 | Hsieh et al. (2010) |
| *Stilbohypoxylon elaeicola* | JDR 173 | French Guiana | EF026148 | GQ844826 | EF025616 | Hsieh et al. (2010) |
| *Stilbohypoxylon elaeidis* | MFLUCC 15-0295a | Thailand | MT496745 | MT502416 | MT502420 | Konta et al. (2020) |
| *Stilbohypoxylon elaeidis* | MFLUCC 15-0295b | Thailand | MT496746 | MT502417 | MT502421 | Konta et al. (2020) |
| *Stilbohypoxylon quisquiliarum* | JDR 172 | French Guiana | EF026119 | GQ853020 | EF025605 | Hsieh et al. (2010) |
| *Stilbohypoxylon quisquiliarum* | HAST 89091608 | China | EF026120 | GQ853021 | EF025606 | Hsieh et al. (2010) |
| *Stromatoneurospora phoenix* | BCC THA:82041 | Thailand | – | MT742606 | MT700438 | Becker et al. (2010) |
| *Vamsapriya bambusicola* | MFLUCC 11-0477 | Thailand | KM462835 | KM462834 | KM462833 | Dai et al. (2014) |
| *Vamsapriya breviconidiophora* | MFLUCC 14-0436 | Thailand | MF621584 | – | – | Konta et al. (2020) |
| *Vamsapriya indica* | MFLUCC 12-0544 | Thailand | KM462839 | KM462838 | KM462841 | Dai et al. (2014) |
| *Vamsapriya khunkonensis* | MFLUCC 11-0475 | Thailand | MW240620 | KM462829 | KM462828 | Dai et al. (2014) |
| *Vamsapriya yunnana* | KUMCC 18-0008 | China | MG833874 | MG833875 | – | Jiang et al. (2018) |
| *Virgaria boninensis* | JCM18624 | Japan | AB740956 | – | – | Nonaka et al. (2013) |
| *Virgaria nigra* | NBRC32656 | Japan | AB670717 | – | – | Nonaka et al. (2013) |
| *Wawelia regia* | CBS 110.10 | Netherlands | MH854595 | – | – | Vu et al. (2019) |

**Table 1** Continued.

| Species | Culture collection/ Specimen voucher | Country | ITS | *rpb2* | β-tubulin | References |
|---|---|---|---|---|---|---|
| *Xenoanthostomella calami* | MFLUCC:14-0617A | Thailand | NR185735 | – | – | Konta et al. (2023) |
| *Xenoanthostomella chromolaenae* | MFLUCC 17-1484 | Thailand | MN638863 | MN648729 | – | Hyde et al. (2020c) |
| *Xenoanthostomella chromolaenae* | MFLUCC:17-1484 | Thailand | MN638863 | MN648729 | – | Konta et al. (2023) |
| *Xenoanthostomella cycadis* | CBS:137969 | Australia | KJ869121 | ON399350 | – | Crous et al. (2014) |
| *Xylaria arbuscula* | HAST 89041211 | China | GU300090 | GQ844805 | GQ478226 | Hsieh et al. (2010) |
| *Xylaria bambusicola* | WSP 205 | China | EF026123 | GQ844802 | AY951762 | Hsieh et al. (2010) |
| *Xylaria bambusicola* | JDR 162 | Thailand | GU300088 | GQ844801 | GQ478223 | Hsieh et al. (2010) |
| *Xylaria necrophora* | PYI1 | USA | MN846316 | MN917808 | MN917777 | Garcia-Aroca et al. (2021) |
| *Xylaria venosula* | HAST 94080508 | USA | EF026149 | GQ844806 | EF025617 | Hsieh et al. (2010) |
| *Xylaria arbuscula var. plenofissura* | HAST 93082814 | China | GU339495 | GQ844804 | GQ478225 | Hsieh et al. (2010) |
| *Xylaria cf. glebulosa* | HAST, JF 431 | Martinique | GU322462 | GQ848345 | GQ495956 | Hsieh et al. (2010) |
| *Xylaria feejeensis* | HAST, JF 565 | Martinique | GU322452 | GQ848334 | GQ495945 | Hsieh et al. (2010) |
| *Xylaria feejeensis* | JDR 180 | Thailand | GU322453 | GQ848335 | GQ495946 | Hsieh et al. (2010) |
| ***Xylaria frustulosa*** | **GMB1046** | **China** | **PP146612** | **PP198098** | **PP209119** | **This study** |
| *Xylaria frustulosa* | HAST 92092010 | China | GU322451 | GQ844838 | GQ495944 | Hsieh et al. (2010) |
| *Xylaria frustulosa* | HAST, JF 771 | Guadeloupe | GU322450 | GQ844837 | GQ495943 | Hsieh et al. (2010) |
| ***Xylaria glebulosa*** | **GMB1052** | **China** | **PP146610** | **PP198096** | **PP209116** | **This study** |
| ***Xylaria glebulosa*** | **GMB1053** | **China** | **PP153391** | **PP198097** | **PP209117** | **This study** |
| *Xylaria hypoxylon* | HAST 152 | Belgium | GU300096 | GQ844812 | GQ260187 | Hsieh et al. (2010) |
| *Xylaria hypoxylon* | HAST 95082001 | China | GU300095 | GQ844811 | GQ487703 | Hsieh et al. (2010) |
| ***Xylaria longissima*** | **GMB1076** | **China** | **PP146609** | **PP198095** | **PP209118** | **This study** |
| *Xylaria longissima* | FCATAS MHX 749 | China | MF774331 | – | – | Ma & Li (2018) |
| *Xylaria longissima* | IRAN:2269C | Iran | KP218906 | – | – | Hashemi et al. (2015) |
| *Xylaria necrophora* | TG06202017-03 | USA | MN846320 | MN917809 | MN917793 | Garcia-Aroca et al. (2021) |
| *Xylaria ophiopoda* | HAST 93082805 | China | GU322461 | GQ848344 | GQ495955 | Hsieh et al. (2010) |
| *Xylaria polymorpha* | JDR 1012 | USA | GU322460 | GQ848343 | GQ495954 | Hsieh et al. (2010) |
| *Xylaria schweinitzii* | HAST 92092023 | China | GU322463 | GQ848346 | GQ495957 | Hsieh et al. (2010) |
| *Xylaria striata* | HAST 304 | China | GU300089 | GQ844803 | GQ478224 | Hsieh et al. (2010) |
| *Xylotumulus gibbisporus* | ATCC MYA-4109 | USA | FJ172271 | – | – | Li et al. (2015) |

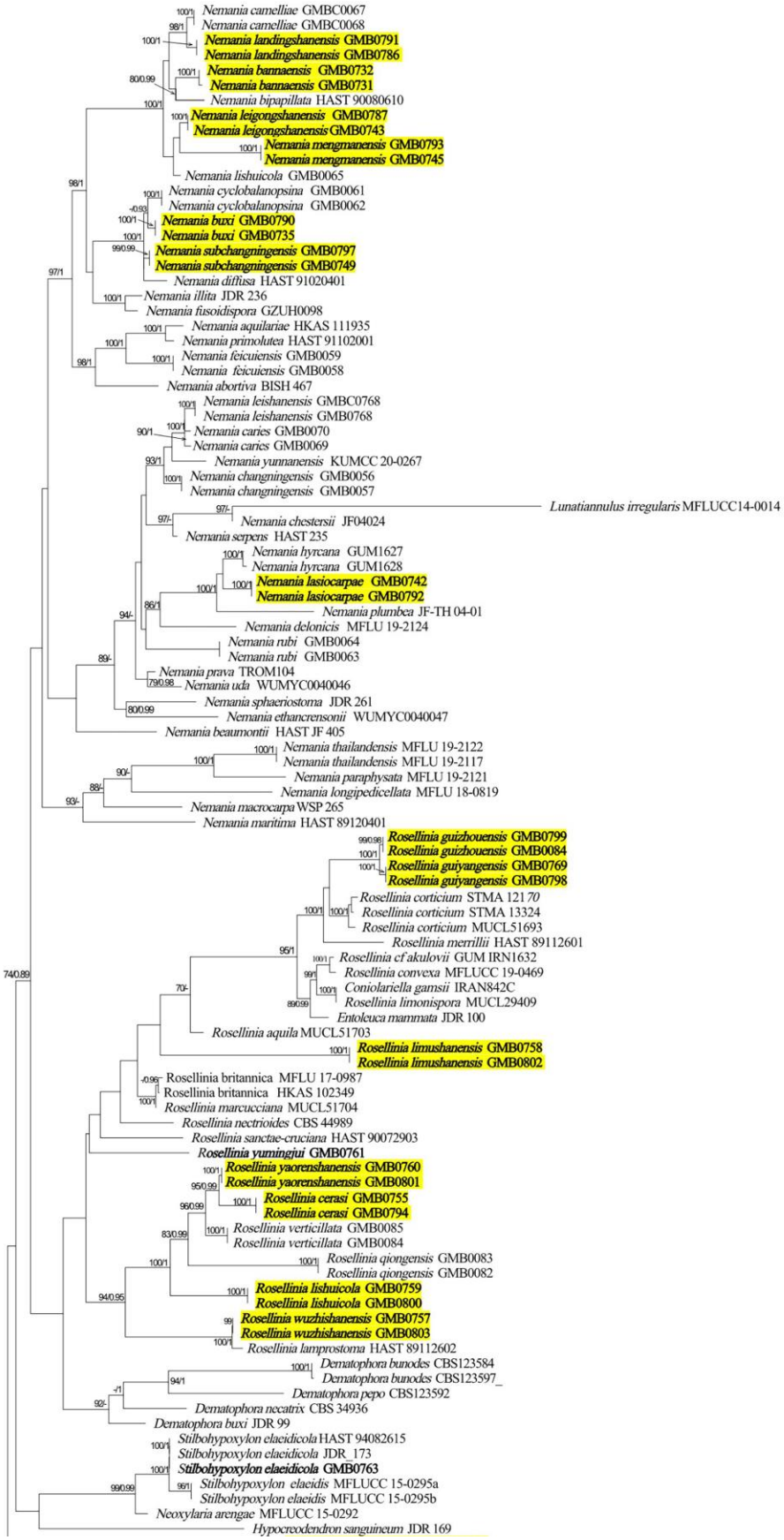


**Figure 1** – RAxML tree based on a combined ITS, TUB2 and *rpb2* sequences dataset. Bootstrap support values for maximum likelihood (ML) greater than 70% and Bayesian posterior probabilities (BPP) greater than 0.85 are displayed above the respective branches (ML/BI). The newly described species are marked highlighted, and new records are marked in bold only.

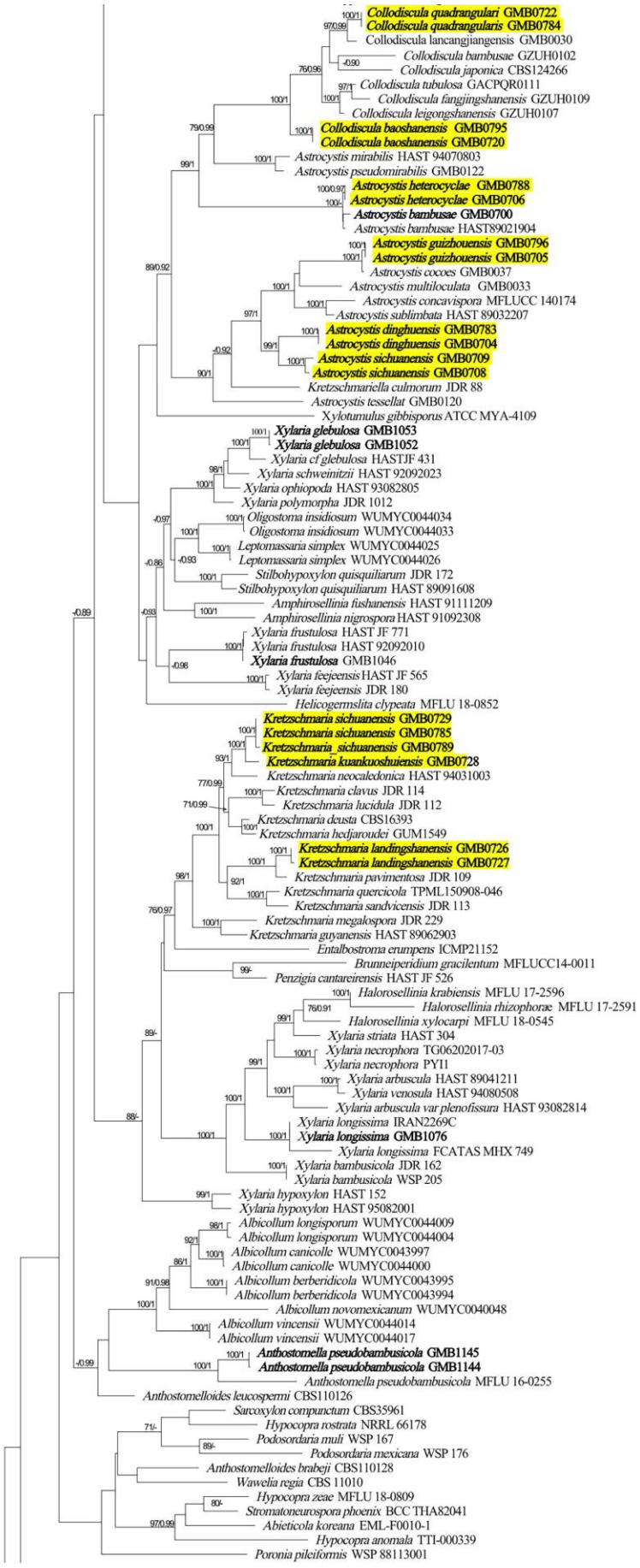


**Figure 1** – Continued.

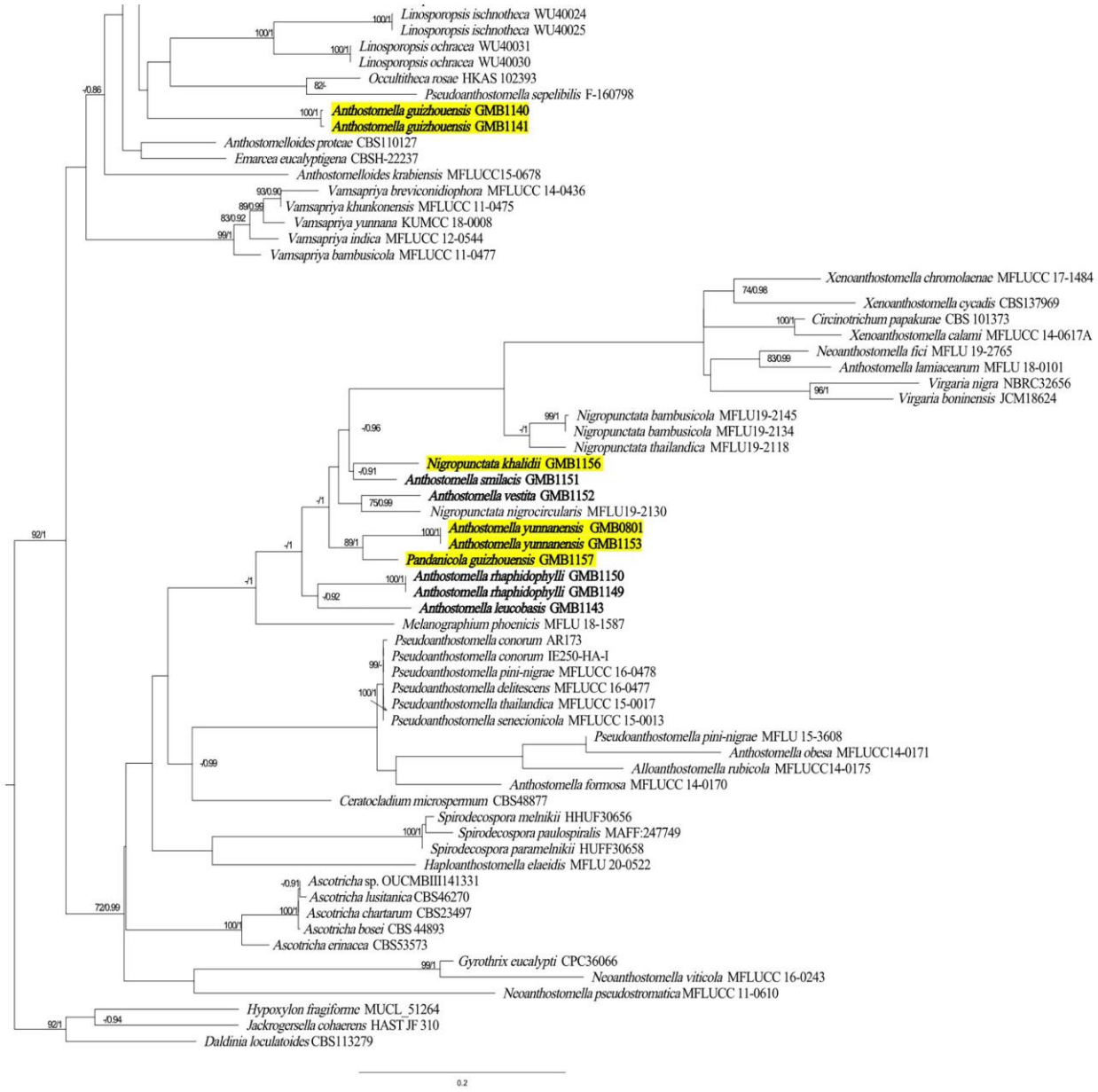


**Figure 1** – Continued.

with a straight germ slit, nearly spore-length, surrounded by a mucilaginous sheath 5.3–7.2 µm (n = 30) wide, lacking appendages. Asexual morph: undetermined.

Material examined – CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315528°N, 107.103718°E), altitude: 1548 m, on dead wood of bamboo, 2 November 2022, Youpeng Wu, 2022KKS21 (GMB1140, holotype; KUN-HKAS 131168, isotype; no culture was obtained).

Other examined material – CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315418°N, 107.103648°E), altitude: 1548 m, on dead bamboo, 2 November 2022, Youpeng Wu 2022KKS31 (GMB1141; KUN-HKAS 131169; no culture was obtained); CHINA, Guizhou Province, Xishui County, Xishui Nature Reserve (18.483814°N, 109.341436°E), altitude: 1098 m, on dead bamboo, 18 November 2022, Youpeng Wu 2022DXG2 (GMB1142; no culture was obtained).

Notes – Morphologically, *Anthostomella guizhouensis* shares similarities with *An. palmaria* B.S. Lu & K.D. Hyde, as both species have similar-sized ascospores. However, *An. palmaria* possesses a prominent clypeus in the upper part of the ascomata and lacks a visible mucilaginous sheath around the ascospores (Lu & Hyde 2000).

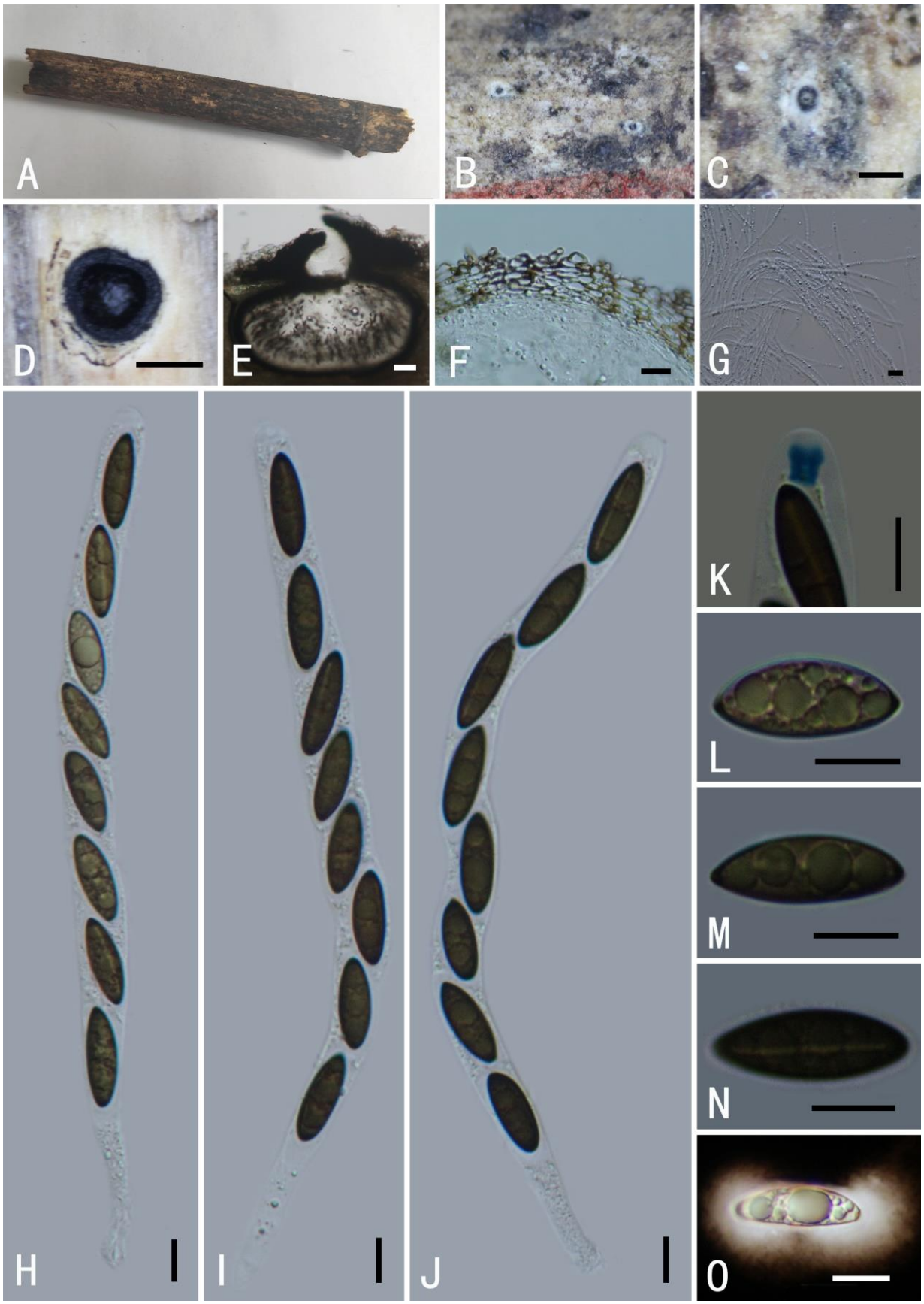


**Figure 2** – *Anthostomella guizhouensis* (GMB1140, holotype). A type material. B, C ascomata. D transverse section of ascomata. E, F section of ascomata. G paraphyses. H–J asci with ascospores. K ascus apical apparatus (stained in Melzer's reagent). L–O ascospores (O stained in India ink). Scale bars: C = 0.3 mm, D = 0.5 mm, E–O = 10 μm.

In addition, *An. clypeata* (De Not.) Sacc. and *An. clypeoides* Rehm exhibit similarities to *An. guizhouensis*, as they also possess immersed ascomata with an amyloid apical apparatus. However, both of these species have ascospores characterized by a large brown central cell and a hyaline dwarf cell, and notably, they lack germ slits (Lu & Hyde 2000, Lee & Crous 2003). In the repetitive phylogenetic analysis, it was found to be closely related to the *incertae sedis* genus species of *Occultitheca rosae* Samarak., Jian K. Liu & K.D. Hyde. The description of our collections aligns with the genus *Anthostomella*. *Occultitheca rosae* found on dead branches of *Rosa* sp. differs by centric ostioles with a periphysate canal, paraphyses longer than the asci embedded in a gelatinous matrix and small (16.5–20 × 6.5–8 μm) ascospore with with a hyaline, rounded basal cell (Samarakoon et al. 2022). Another *incertae sedis* species, *Magnostiolata mucida* Samarak. & K.D. Hyde differs by a black, thin clypeus in the upper part of the ascomata and ellipsoidal, smaller ascospores measuring 12.5–18 × 6.5–9 μm (compared to 22.3–25.2 × 7.5–8.5 μm in *An. guizhouensis*). Additionally, *Magnostiolata mucida* possesses a wider, winged, and thicker mucilaginous sheath (8.5–15 μm wide) (Samarakoon et al. 2022).

***Anthostomella leucobasis*** Ellis & G. Martin, Am. Nat. 16: 809 (1882) Fig. 3

Synonyms: *Sphaeria leucobasis* Ellis & G. Martin, Am. Nat. 16: 809 (1882)

Description – Saprobic on dead bamboo culms. Sexual morph: Ascomata 486–540 × 208–228 μm ($\bar{x}$ = 524 × 218 μm, n = 10), immersed, visible as black, circular dots, under a poorly developed black clypeus or without a clypeus, solitary, scattered, subglobose in cross-section with a fattened base. Ostioles centric, ostiolar canal periphysate. *Peridium* 20–25 μm ($\bar{x}$ = 22 μm, n = 10) wide, multi-layered, attached to the host with black innert substrate, outer layer comprising hyaline, thick-walled cells of *textura angularis.* Paraphyses 4.2–5.3 μm ($\bar{x}$ = 4.6 μm, n = 10) wide, shorter than the asci, hyaline, constricted at septa, guttulate. Asci 104–130 × 12.3–16.4 μm ($\bar{x}$ = 118 × 14.2 μm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apex rounded, with a discoid apical apparatus, amyloid in Melzer's reagent, 1.2–1.8 × 3.6–4.2 μm ($\bar{x}$ = 1.5 × 4 μm, n = 10). Ascospores 13.4–16.4 × 5.8–6.8 μm ($\bar{x}$ = 14.4 × 6 μm, n = 30), uniseriate, unicellular, brown, ellipsoidal, smooth, with boradly rounded ends, with straight germ slit, nearly the spore-length, surrounded by a mucilaginous sheath (1.4–2.1 μm; $\bar{x}$ = 1.8 μm, n = 30) wide, lacking appendages. Asexual morph: undetermined.

Distribution – Known from United States of America.

Material examined – CHINA, Guizhou Province, Guiyang City, Huaxi Wetland Park (26.443026°N, 106.671643°E), altitude: 1148 m, on dead bamboo culms, 15 April 2021, Youpeng Wu, 2021HX23 (GMB1143; KUN-HKAS 131170; no culture was obtained).

Notes – Morphologically, *Anthostomella leucobasis* closely resembles *An. conorum* (Fuckel) Sacc. and *An. contaminans* (Durieu & Mont.) Sacc. However, *An. conorum* has larger ascospores (14–19 × 7.5–10 μm) with thin sheaths at both ends and has wedge-shaped ascal apparatus. *Anthostomella contaminans* differs from *An. leucobasis* due to its fusiform, larger ascospores (14–18 × 5–7 μm vs. 11.5–15.5 × 4.5–6.5 μm) (Francis 1975, Lu & Hyde 2000).

Molecular data for this species is unavailable in GenBank. Our collection aligns with the morphological characteristics of *An. leucobasis* (Francis 1975). Phylogenetically also clusters within the *Anthostomella* group. *Anthostomella leucobasis* has previously only been reported in the United States (Francis 1975). This study represents the first documented occurrence of the species in Asia and serves as a new geographical record for China.

***Anthostomella pseudobambusicola*** D.Q. Dai & K.D. Hyde, Fungal Diversity, 82: 1–105 (2017). Fig. 4

Description – *Saprobic* on dead bamboo culms. Sexual morph: Ascomata 520–623 × 380–480 μm ($\bar{x}$ = 580 × 443 μm, n = 10), immersed, conical, globose to subglobose, black, coriaceous, centrally ostiolate, with a black pseudoclypeus. Ostioles centric, ostiolar canal periphysate. Peridium 20–32 μm ($\bar{x}$ = 26 μm, n = 10) wide, comprising several layers of compressed, brown to hyaline cells of *textura angularis*. Paraphyses 2–2.6 μm ($\bar{x}$ = 2.3 μm, n = 10) wide, shorter than the

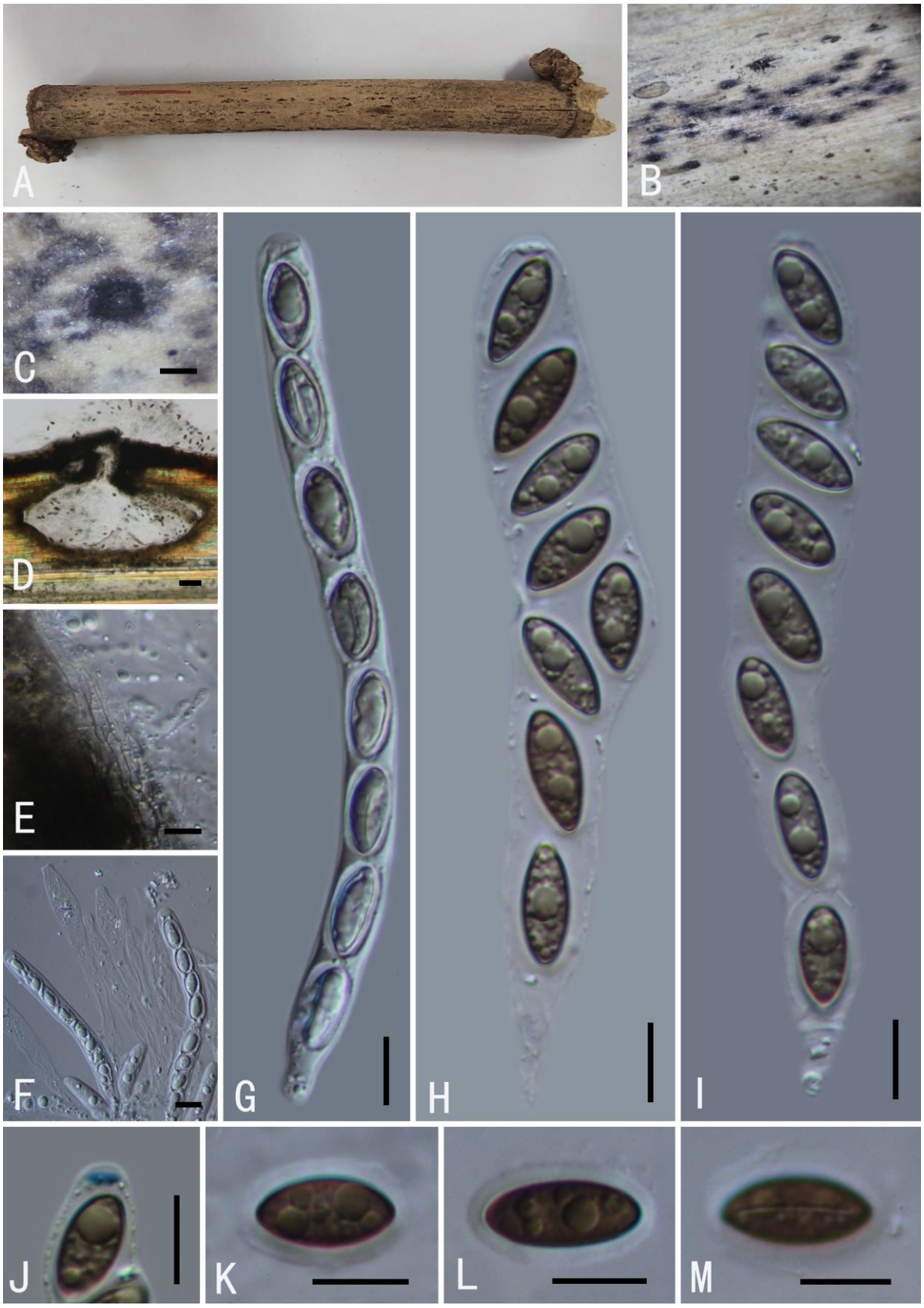


**Figure 3** – *Anthostomella leucobasis* (GMB1143). A material. B, C ascomata. D, E section of ascomata. F paraphyses. G–I asci with ascospores. J ascus apical apparatus (stained in Melzer's reagent). K–M ascospores. Scale bars: C = 0.2 mm, D = 40 µm, E–M = 10 µm.

asci, hyaline, constricted at septa, guttulate. *Asci* 135–191 × 6.7–10.8 μm ($\overline{x}$ = 156 × 7.7 μm, n = 30), 8-spored, unitunicate, cylindrical, long pedicellate, apex rounded, with a wedge-shaped apical apparatus, amyloid in Melzer's reagent, 1.1–2 × 1.6–3.1 μm ($\overline{x}$ = 1.5 × 2.2 μm, n = 10). Ascospores 9.2–11.2 × 4.2–5.4 μm ($\overline{x}$ = 10.4 × 4.8 μm, n = 30), uniseriate, unicellular, dark brown to black-brown, ellipsoidal-inequilaterally ellipsoidal, smooth, with boradly rounded ends, with straight germ slit, nearly the spore-length, lacking appendages and sheaths. Asexual morph: Undetermined.

Distribution – Known from Thailand.

Material examined – CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315410°N, 107.103644°E), altitude: 1548 m, on dead bamboo, 2 May 2022, Youpeng Wu, 2022KKS11 (GMB1144; KUN-HKAS 131171; GMBC1144); CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Resever (28.315408°N, 107.103648°E), altitude: 1546 m, on dead bamboo, 2 November 2022, Youpeng Wu, 2022KKS45 (GMB1145; KUN-HKAS 131172; GMBC1145); CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315618°N, 107.113246°E), altitude: 1552 m, on dead bamboo, 2 November 2022, Youpeng Wu, 2022KKS90 (GMB1146; KUN-HKAS 131173; GMBC1146).

Notes – Morphologically, *Anthostomella pseudobambusicola* shares similarities with *An. bambusicola* Hohn. Both species exhibit immersed ascomata that appear as conical structures, having central blackened ostioles and black clypeus. However, *An. bambusicola* lacks a discernible apical apparatus in Melzer's reagent treatment and features larger ascospores (16.5–24 × 7.5–10 μm) in contrast to the ascospores of *An. pseudobambusicola*, which measure 9.2–11.2 × 4.2–5.4 μm (Dai et al. 2017).

Our collections align morpho-anatomically with the description of *An. pseudobambusicola* (Dai et al. 2017). Furthermore, the initial BLAST results of LSU sequences of our collections showed a 99% similarity with the same taxon. This finding represents a new record for China.

The morphology of *Anthostomella pseudobambusicola* appears inconsistent with the established generic concept of *Anthostomella*, indicating a need for future taxonomic revision. The identified morphological traits deviate from the usual characteristics of *Anthostomella*, underscoring the requirement for thorough analyses.

***Anthostomella rhaphidophylli*** B.S. Lu & K.D. Hyde, Fungal Diversity Res. Ser. 4: 161 (2000).

Fig. 5

Description – Saprobic on dead bamboo. Sexual morph: Ascomata 304–336 × 155–183 μm ($\overline{x}$ = 322 × 174 μm, n = 10), immersed, visible as grey, circular dots, solitary or aggregated, without a clypeus, in cross-section globose to subglobose with a fattened base. Ostioles centric, ostiolar canal periphysate. Peridium 14–18 μm ($\overline{x}$ = 15 μm, n = 10) wide, multi-layered, attached to the host with black innert substrate, outer layer comprising hyaline, thick-walled cells of *textura angularis*. Paraphyses 4.8–8.5 μm ($\overline{x}$ = 6.3 μm, n =10) wide, shorter than the asci, hyaline, constricted at septa, guttulate. Asci 133–163 × 10.6–16.5 μm ($\overline{x}$ = 153 × 14.2 μm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apex rounded, with a discoid apical apparatus, amyloid in Melzer's reagent, 1.4–2.6 × 3.5–5 μm ($\overline{x}$ = 1.8 × 4.3 μm, n = 10). Ascospores 17.8–22.8 × 7.1–8.5 μm ($\overline{x}$ = 22.3 × 8 μm, n = 30), uniseriate, unicellular, grey to brown, fusiform to ellipsoidal, smooth, with boradly rounded ends, with a straight germ slit, nearly the spore-length, surrounded by a mucilaginous sheath (7.2–9.4 μm; $\overline{x}$ = 8 μm, n = 30) wide, lacking appendages. Asexual morph: undetermined.

Distribution – Known from Argentina; United States.

Material examined – CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315463°N, 107.103626°E), altitude: 1540 m, on dead bamboo, 2 May 2022, Youpeng Wu, 2022KKS17-1 (GMB1149; KUN-HKAS 131174; no culture was obtained); CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315622°N, 107.103814°E), altitude:1538 m, on dead bamboo, 2 May 2022, Youpeng Wu, 2022KKS17-2 (GMB1150; KUN-HKAS 131175; no culture was obtained).

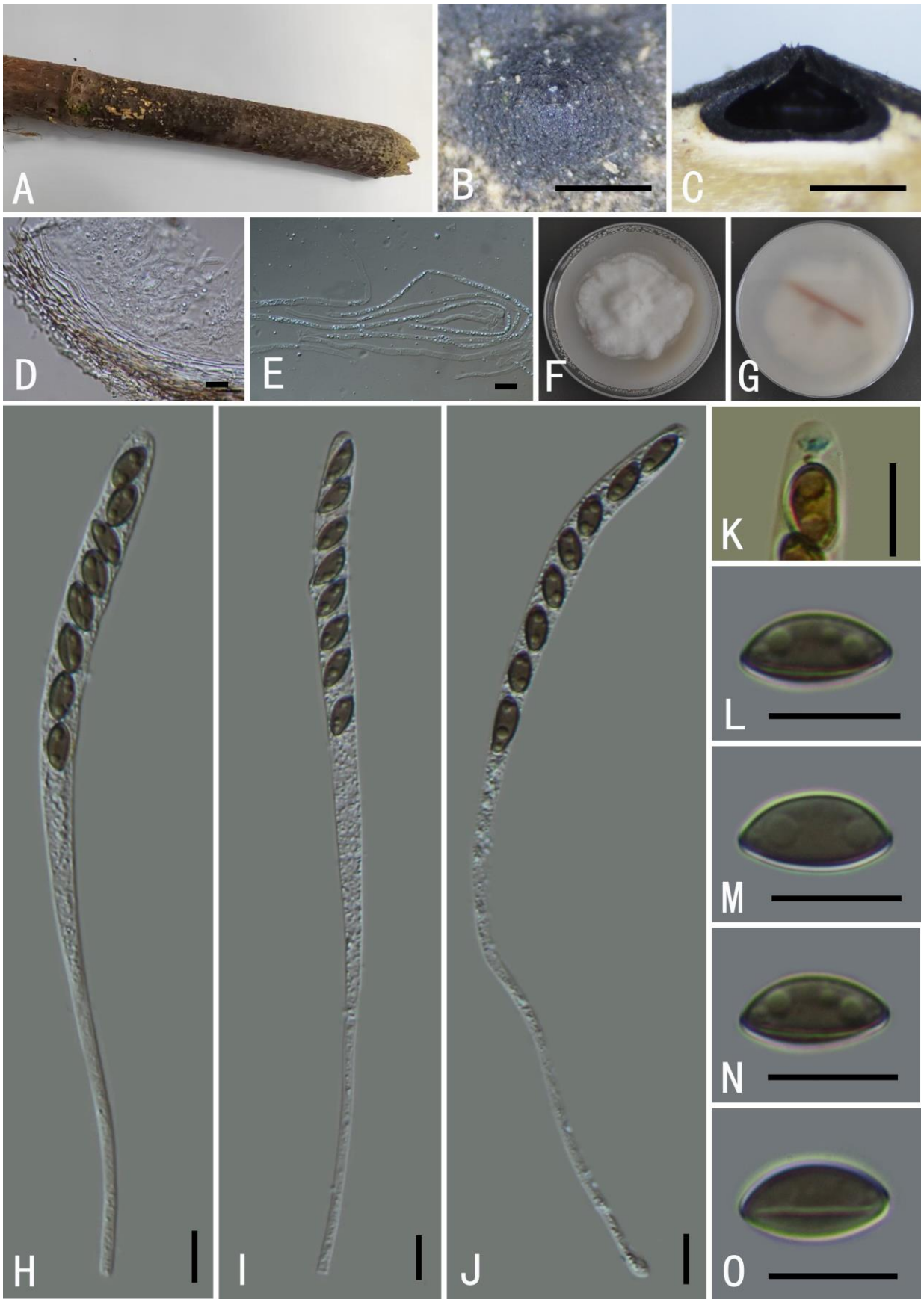


**Figure 4** – *Anthostomella pseudobambusicola* (GMB1144). A material. B ascomata. C longitudinal section of ascomata. D section of ascomata. E paraphyses. F, G culture OA. H–J asci with ascospores. K ascus apical apparatus (stained in Melzer's reagent). L–O ascospores. Scale bars: B, C = 0.3 mm, D, E, H–O = 10 μm.

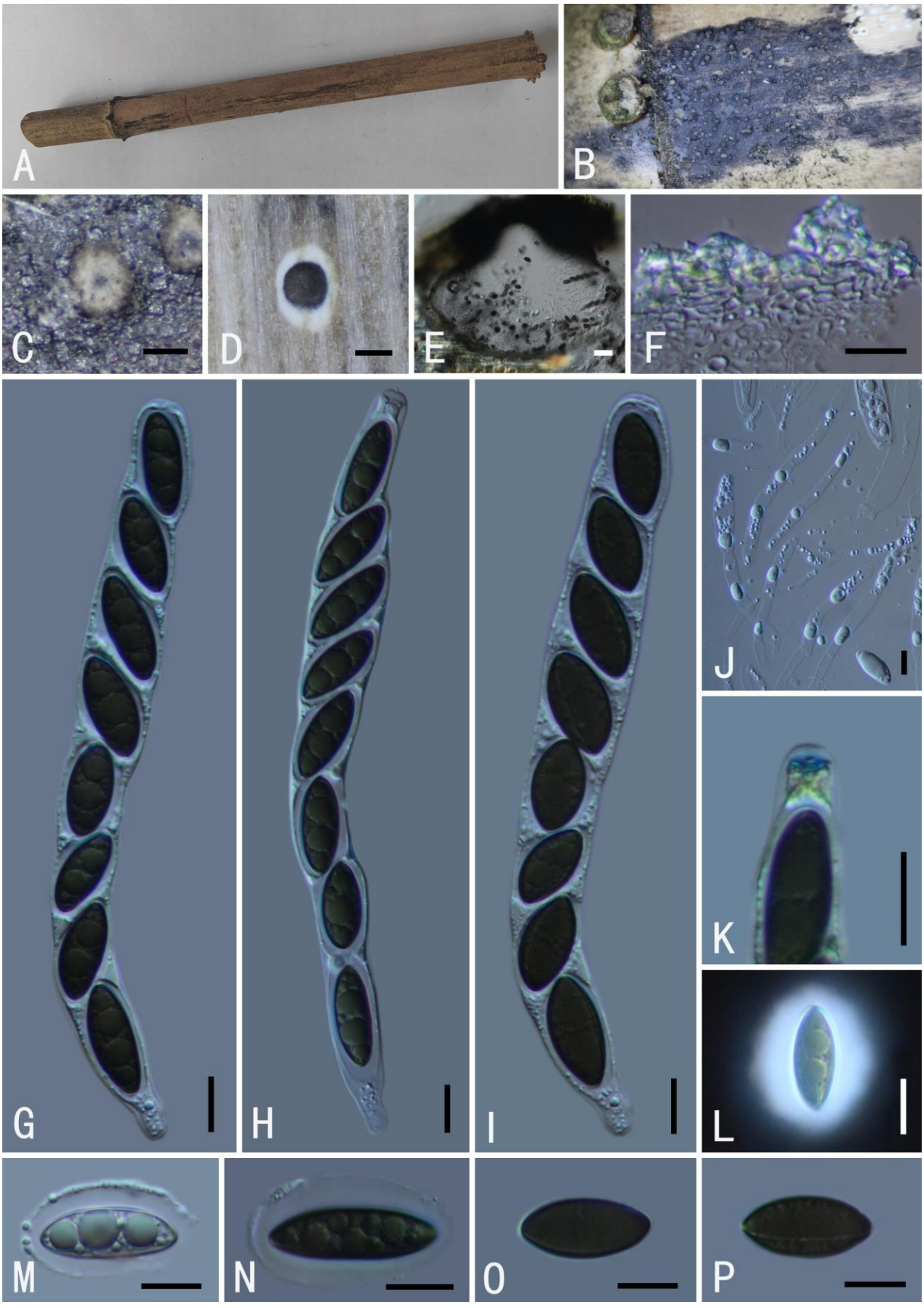


**Figure 5** – *Anthostomella rhaphidophylli* (GMB1149). A material. B, C ascomata. D transverse section of ascomata. E, F section of ascomata. G–I asci with ascospores. J paraphyses. K ascus apical apparatus (stained in Melzer's reagent). L–P ascospores (L stained in India ink). Scale bars: C, D = 0.2 mm, E–P = 10 μm.

Notes – Morphologically, *Anthostomella rhaphidophylli* shows resemblance to *An. tenacis* (Cooke) Sacc., sharing a similar shape of ascospores. However, the latter species possesses notably smaller ascospores, measuring between 7.5–12.5 × 5–5.6 µm. Furthermore, in terms of morphological proximity, *An. rhaphidophylli* can be distinguished from *An. palmicola* (Auersw.) Rabenh. by the smaller ascospores (9–12 × 6–8 µm) and ascus apical apparatus not blue in iodine (Lu & Hyde 2000). Our collections description aligns with the established morphological characteristics of *An. rhaphidophylli*. This study marks the first report of *An. rhaphidophylli* in China, serving as a new record for the country.

***Anthostomella smilacis*** Fabre, Annls Sci. Nat., Bot., sér. 6 9: 80 (1879) Fig. 6

Synonymy: *Sordaria smilacis* Auersw., Uni. itin. crypt.: no. 22 (1866)

*Sphaeria constipata* Mont., Annls. Sci. Nat., Bot., sér. 3 11: 43 (1849)

*Anthostomella constipata* (Mont.) Sacc., Syll. fung. (Abellini) 11: 282 (1895)

Description – Saprobic on dead bamboo culms. Sexual morph: Ascomata 412–443 × 292–443 µm ($\overline{x}$ = 428 × 362 µm, n = 10), immersed, visible as black, circular dots, solitary or aggregated, covered with a poorly developed clypeus, in cross-section globose to subglobose with a fattened base. Ostioles centric, ostiolar canal periphysate. Peridium 14–20 µm ($\overline{x}$ = 16 µm, n = 10) wide, multi-layered, attached to the host with light yellow innert substrate, outer layer comprising brown, thick-walled cells of *textura angularis*. Paraphyses 3.1–3.8 µm ($\overline{x}$ = 3.6 µm, n = 10) wide, shorter than the asci, hyaline, constricted at septa, guttulate. Asci 148–170 × 10.2–11.2 µm ($\overline{x}$ = 162 × 10.6 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apex rounded, J-, apical apparatus not blue in Melzer's reagent. Ascospores 16.3–18.3 × 7.7–8.4 µm ($\overline{x}$ = 17.2 × 8 µm, n = 30), uniseriate, unicellular, brown, ellipsoidal, smooth, with boradly rounded ends, with straight germ slit, nearly the spore-length, surrounded by a mucilaginous sheath (3.8–5.2 µm; $\overline{x}$ = 4.5 µm, n = 30) wide, lacking appendages. Asexual morph: undetermined.

Distribution – Known from France; Italy; Portugal; Sweden; UK.

Material examined – CHINA, Guizhou Province, Dushan County, Mawei Village (25.333648°N, 107.463978°E), altitude: 860 m, on dead bamboo, 24 November 2021, Youpeng Wu, 2021MWC3 (GMB1151; KUN-HKAS 131176; no culture was obtained).

Notes – Morphologically, *Anthostomella smilacis* shows similarities with *An. contaminans*, sharing similar-sized ascospores. However, *An. contaminans* is distinguished by its narrower ascospores (14–18 × 5–7 µm) compared to the wider ascospores of *An. smilacis* (16.3–18.3 × 7.7–8.4 µm). Additionally, *An. contaminans* features a distinctive blue apical apparatus when subjected to Melzer's reagent, a characteristic absent in *An. smilacis* (Lu & Hyde 2000). Our collection description aligns with the description of *An. smilacis.* Molecular data for this species is unavailable in GenBank. This study presents *An. smilacis* as a new addition to the mycobiota of China.

***Anthostomella vestita*** Speg., Revta Fac. Agron. Vet. Univ. nac. La Plata, Ser. 26 (1): 39 (1910) Fig. 7

Description – Saprobic on dead bamboo culms. Sexual morph: Ascomata 212–268 × 208–220 µm ($\overline{x}$ = 242 × 213 µm, n = 10), immersed, visible as black, circular dots, solitary or aggregated, with a poorly developed clypeus, in cross-section globose to subglobose with a fattened base. Ostioles centric, ostiolar canal periphysate. Peridium 16–20 µm ($\overline{x}$ = 17.2 µm, n = 10) wide, multi-layered, attached to the host with brown innert substrate, outer layer comprising hyaline, thick-walled cells of *textura angularis*. Paraphyses 3.8–4.3 µm ($\overline{x}$ = 4 µm, n = 10) wide, shorter than the asci, hyaline, constricted at septa, guttulate. Asci 97.6–134 × 10.1–14.2 µm ($\overline{x}$ = 118 × 11.4 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apex rounded, with a discoid apical apparatus, amyloid in Melzer's reagent, 0.6–1.2 × 2.4–3.5 µm ($\overline{x}$ = 0.9 × 3 µm, n = 10). Ascospores 11.4–15.3 × 5.5–8.3 µm ($\overline{x}$ = 13.3 × 6.8 µm, n = 30), uniseriate, unicellular, brown, ellipsoidal, smooth, with broadly rounded ends, without a conspicuous germ slit, surrounded by a mucilaginous sheath (1.8–3 µm; $\overline{x}$ = 2 µm, n = 30) wide, lacking appendages. Asexual morph: undetermined.

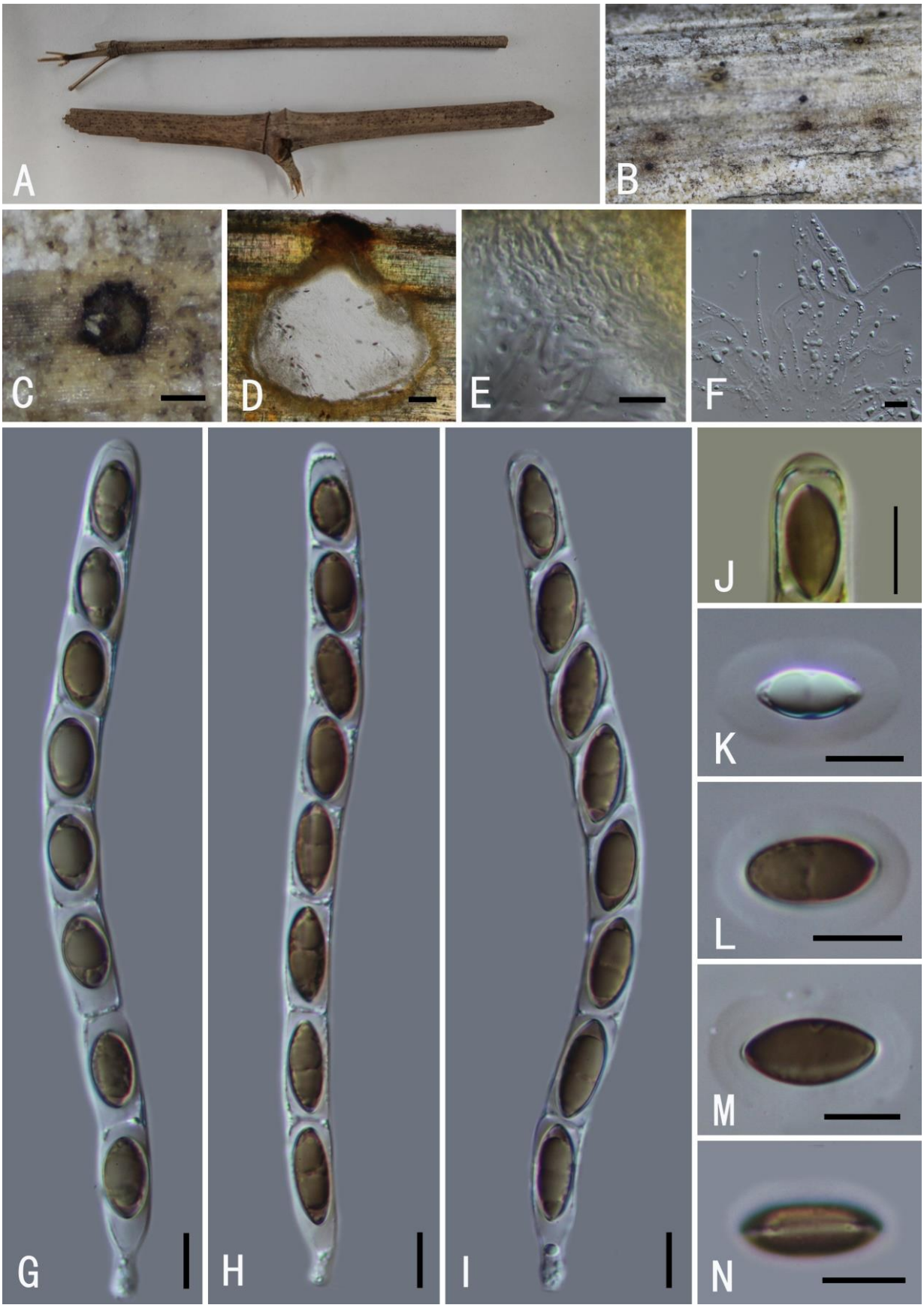


**Figure 6** – *Anthostomella smilacis* (GMB1151). A specimen. B, C ascomata. D, E section of ascomata. F paraphyses. G–I asci with ascospores. J ascal apical apparatus (stained in Melzer's reagent). K–N ascospores. Scale bars: C = 0.2 mm, D = 40 µm, E–N = 10 µm.

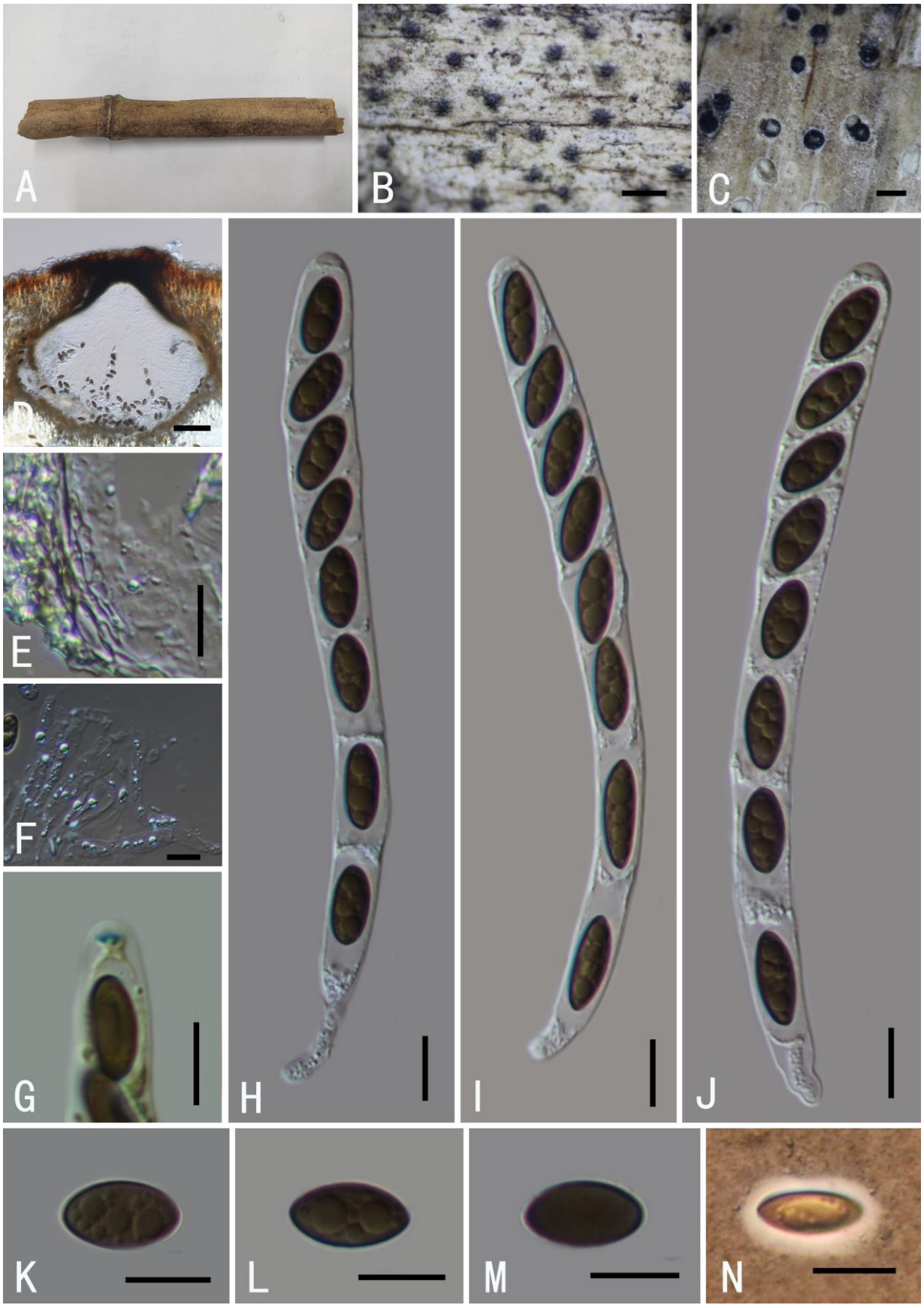


**Figure 7** – *Anthostomella vestita* (GMB1152). A specimen. B ascomata. C transverse section of ascomata. D, E section of ascomata. F paraphyses. G ascus apical apparatus (stained in Melzer's reagent). H–J asci with ascospores. K–N ascospores (N stained in India ink). Scale bars: B, C = 0.4 mm, D = 40 μm, E–N = 10 μm.

Distribution – Known from Chile; South Africa.

Material examined – CHINA, Guizhou Province, Anlong County Suburban (25.333508°N, 104.601632°E), altitude: 856 m, on dead bamboo, 23 September 2021, Youpeng Wu, 2021ALX10 (GMB1152; KUN-HKAS 131178; no culture was obtained).

Notes – Morphologically, *Anthostomella vestita* shows resemblance to *An. puiggarii* Speg., particularly in terms of ascomata size. However, a notable distinction lies in the smaller ascospores of *An. puiggarii* (10.5–13 × 2.5–3 μm vs. 11.4–15.3 × 5.5–8.3 μm). Moreover, *An. puiggarii* features a straight germ slit that is nearly the same length as the spore (Lu & Hyde 2000).

Phylogenetic analyses (Fig. 1) reveal that *An. vestita* forms a sister clade with *An. rhaphidophylli*. The latter is distinguishable by its wider parpahyses (4.8–8.5 μm), larger ascospores (17.8–22.8 × 7.1–8.5 μm) with a straight germ slit that is nearly spore length. This discovery represents a new addition to the fungal diversity of China (Lu & Hyde 2000).

***Anthostomella yunnanensis*** Y.P. Wu & Q.R. Li. sp. nov. Fig. 8

MycoBank number: MB850406

Etymology – The specific epithet refers to its collection location, Yunnan province.

Description – Saprobic on the culm of dead bamboo. Sexual morph: Ascomata 522–616 × 320–382 μm ($\overline{x}$ = 582 × 362 μm, n = 10), immersed, solitary, visible as conical blackened dots, without a clypeus, subglobose to globose in vertical section. Ostioles papillate at the centre, black, surrounded by brown area. Peridium 22–31 μm ($\overline{x}$ = 26 μm, n = 10) wide, comprising several layers, outer layer grey, cells thick-walled *textura irregularis* cells, inner layer hyaline. Paraphyses 3.8–4.5 μm ($\overline{x}$ = 4.2 μm, n = 10) wide, shorter than the asci, hyaline, unbranched, without septa. Asci 200–227 × 11.6–14.6 μm ($\overline{x}$ = 212 × 12.8 μm, n = 30), 8-spored, unitunicate, long-cylindrical, short pedicellate, apically rounded, wedge-shaped, amyloid apical apparatus 1.5–2.7 × 3.5–4.2 μm ($\overline{x}$ = 2.2 × 3.8 μm, n = 30). Ascospores 23.8–26.3 × 7.6–8.6 μm ($\overline{x}$ = 24.6 × 7.8 μm, n = 30), uniseriate, unicellular, brown, fusiform or ellipsoidal, with narrowly rounded ends, with a straight germ slit, extends the spore-length, surrounded by a mucilaginous sheath, 5.6–8.5 μm ($\overline{x}$ = 7 μm, n = 30) wide, lacking appendages. Asexual morph: undetermined.

Material examined – CHINA, Yunnan Province, Kunming City, Xishan Forest Park (24.648112°N, 102.406672°E), altitude: 1208 m, on dead wood of bamboo, 10 August 2021, Youpeng Wu 2021XS10-1 (GMB1153, holotype; KUN-HKAS 131178, isotype; no culture was obtained). CHINA, Yunnan Province, Kunming City, Xishan Forest Park (24.648124°N, 102.406685°E), altitude: 1215 m, on dead wood of bamboo, 10 August 2021, Youpeng Wu XS23_2021 (GMB0801; no culture was obtained).

Notes – *Anthostomella yunnanensis* exhibits morphological similarities to *An. bruneiensis* K.D. Hyde particularly in terms of ascospore size. However, *An. bruneiensis* has smaller ascomata (260–360 × 280–320 μm) and a thinner mucilaginous sheath (0.5–1 μm) compared to *An. yunnanensis* (ascomata: 522–616 × 320–382 μm, mucilaginous sheath: 5.6–8.5 μm). Another closely related species, *An. uniseriata* J. Fröhl. & K.D. Hyde, can be distinguished from *An. yunnanensis* by its larger ascomata (500–1200 × 500–1000 μm) and smaller ascospores (19.5–24 × 5.5–7.5 μm vs. 23.8–26.3 × 7.6–8.6 μm) (Lu & Hyde 2000). These differences in ascomata size, mucilaginous sheath thickness, and ascospore dimensions and phylogenetic analyses (formed an independent branch) support the recognition of *Anthostomella yunnanensis* as a new species.

***Astrocystis*** Berk. & Broome, J. Linn. Soc., Bot. 14(no. 74): 123 (1873) [1875].

Notes – *Astrocystis*, established by Berkeley and Broome in 1873, finds its niche primarily within monocotyledonous plants, characterized by uni- or occasionally multi-peritheciate stromata development, often beneath the host cuticle or on the surface. The asci have a relatively short stipe and the ascus apical apparatus is relatively small, amyloid and stopper-shaped (Smith et al. 2003). Within the genus, more than 22 species have been documented globally, with five of these species reported within China (Taylor & Hyde 2003, Hyde et al. 2019, Wu et al. 2021, Li et al. 2022). Our

current study contributes significantly to the knowledge of *Astrocystis* in Mainland China, unveiling four newly described species within the genus and documenting a new occurrence.

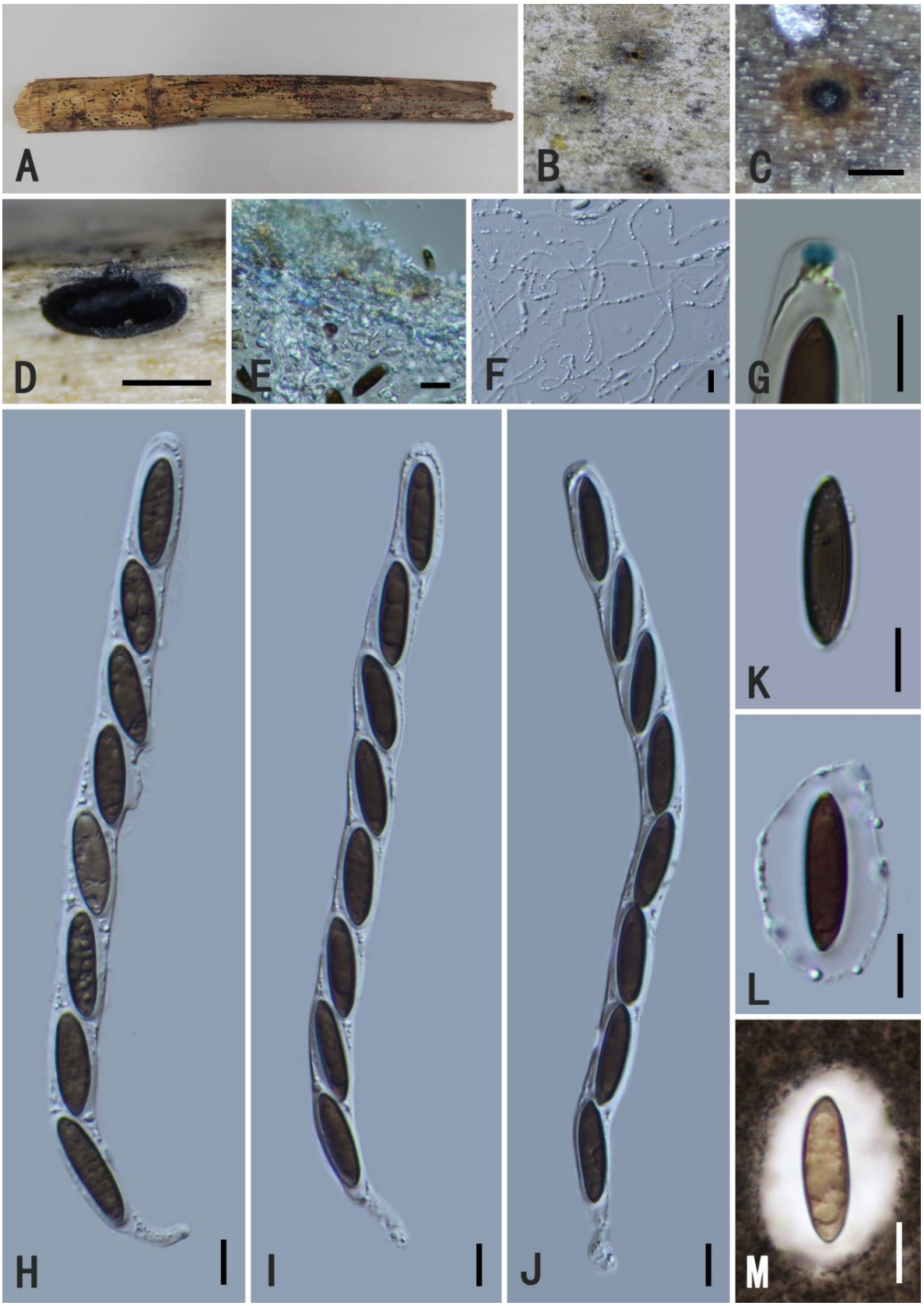


**Figure 8** – *Anthostomella yunnanensis* (GMB1153, holotype). A type material. B, C ascomata. D longitudinal section of ascomata. E section of ascomata. F paraphyses. G ascus apical apparatus

(stained in Melzer's reagent). H–J asci with ascospores. K–M ascospores (M stained in India ink). Scale bars: C, D = 0.3 mm, E–M = 10 μm.

***Astrocystis bambusae*** (Henn.) Læssøe & Spooner, Kew Bull. 49(1): 13 (1994) [1993]. Fig. 9

Basionym: *Rosellinia bambusae* Henn. 1908

Description – Saprobic on dead bamboo culms, visible as black raised lump on the host. Sexual morph: Stromata 0.4–0.6 mm diam., 0.2–0.5 mm high, scattered or gregarious, solitary, superficial, black, hexagonal prismshaped, top blunt, containing one ascomata, with a circle of black tissue at the bottom, with a papillary ostiole. Perithecia 0.3–0.5 mm diam., 0.1–0.4 mm high, comprising black, fragile, carbonaceous tissue. Ostioles at the same level as stromatal surface, with slight papillate openings. Asci 98–135 × 5.5–7.5 μm ($\overline{x}$ = 115 × 6.2 μm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, persistent, apically rounded, with amyloid square-shaped apical apparatus, blue staining in Melzer's reagent, 3.5–5.5 μm μm high × 1.5–2.5 μm wide ($\overline{x}$ = 4.6 × 1.9 μm). Ascospores 10–13.5 × 4–5.5 μm ($\overline{x}$ = 12 × 4.5 μm, n = 30), uniseriate, unicellular, hyaline when immature, dark brown at maturity, aseptate, equilateral ellipsoid, with rounded ends, smooth, with a straight germ slit nearly full-length, lack appendages and sheath. Asexual morph: undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours at 25 °C. On oat agar (OA) media, colonies reached 4–5 cm diam., after 2 weeks at 25 °C, white at first, cottony, slightly thinning towards the edge, edge irregular, white from above, reverse similar in colour. No conidia observed on PDA or OA media.

Distribution – Known from Guyana, Thailand, India, the Philippines, China (Taiwan).

Material examined – CHINA, Guangdong Province, Zhaoqing City, Dinghu Mountain Forest Park (23°10'3.71"N, 112°32'20.40"E), altitude: 502 m, dead bamboo culms, 9 September 2020, Qirui Li, DH14 (GMB0700, GMBC0700); CHINA, Hainan Province, Qiongzhong Li and Miao Autonomous County, Limu Mountain Forest Park (19°10'45.66"N, 109°44'20.51"E), altitude: 763 m, dead bamboo culms, 17 November 2020, Qirui Li, QZ116-2 (GMB0701, GMBC0701).

Notes – The morpho-anatomical description of our collection aligns with the published description of *As. bambusae*. In the phylogenetic analysis, it also clustered with the same taxon with strong support. This species has previously been documented in Guyana, Thailand, India, the Philippines, and China (Taiwan) (Læssøe & Spooner 1994). In China, this species had been previously documented in Chinese Taipei (Jiang et al. 2022). However, this study marks the first recorded occurrence of this species in mainland China.

***Astrocystis dinghuensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 10

MycoBank number: MB850407

Etymology – The specific epithet "dinghuensis" refers to its collection location, Dinghushan National Forest Park.

Description – Saprobic on dead bamboo culms, visible as black raised lump on the host. Sexual morph: Stromata 0.9–3.5 mm long 0.9–2 mm wide, 0.35–0.45 mm thick, erumpent, effused lump with flat top, irregular in outline, with a discoid black base, containing many perithecia, gregarious or solitary, scattered, carbonaceous, embedded on the host surface, smooth, tissue between perithecia woody. Perithecia 265–420 μm diam., 250–305 μm high, comprising black, fragile, carbonaceous tissue. Ostioles at the same level as stromatal surface, with slight papillate openings. Asci 94–119 × 5.5–9 μm ($\overline{x}$ = 107.3 × 7.3 μm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, persistent, apically rounded, with amyloid square-shaped apical apparatus, blue staining in Melzer's reagent, 2.0–3.0 μm high × 1.5–2.5 μm wide ($\overline{x}$ = 2.7 × 1.9 μm, n = 20). Ascospores 10.5–13 × 4–6 μm ($\overline{x}$ = 11.7 × 4.9 μm, n = 30), uniseriate, unicellular, hyaline when immature, slight brown to brown at maturity, inequilateral ellipsoidal, with rounded ends, smooth, with a straight germ slit nearly full-length, surrounded by thin mucilaginous sheath, thickening at both ends, lack appendages. Asexual morph: undetermined.

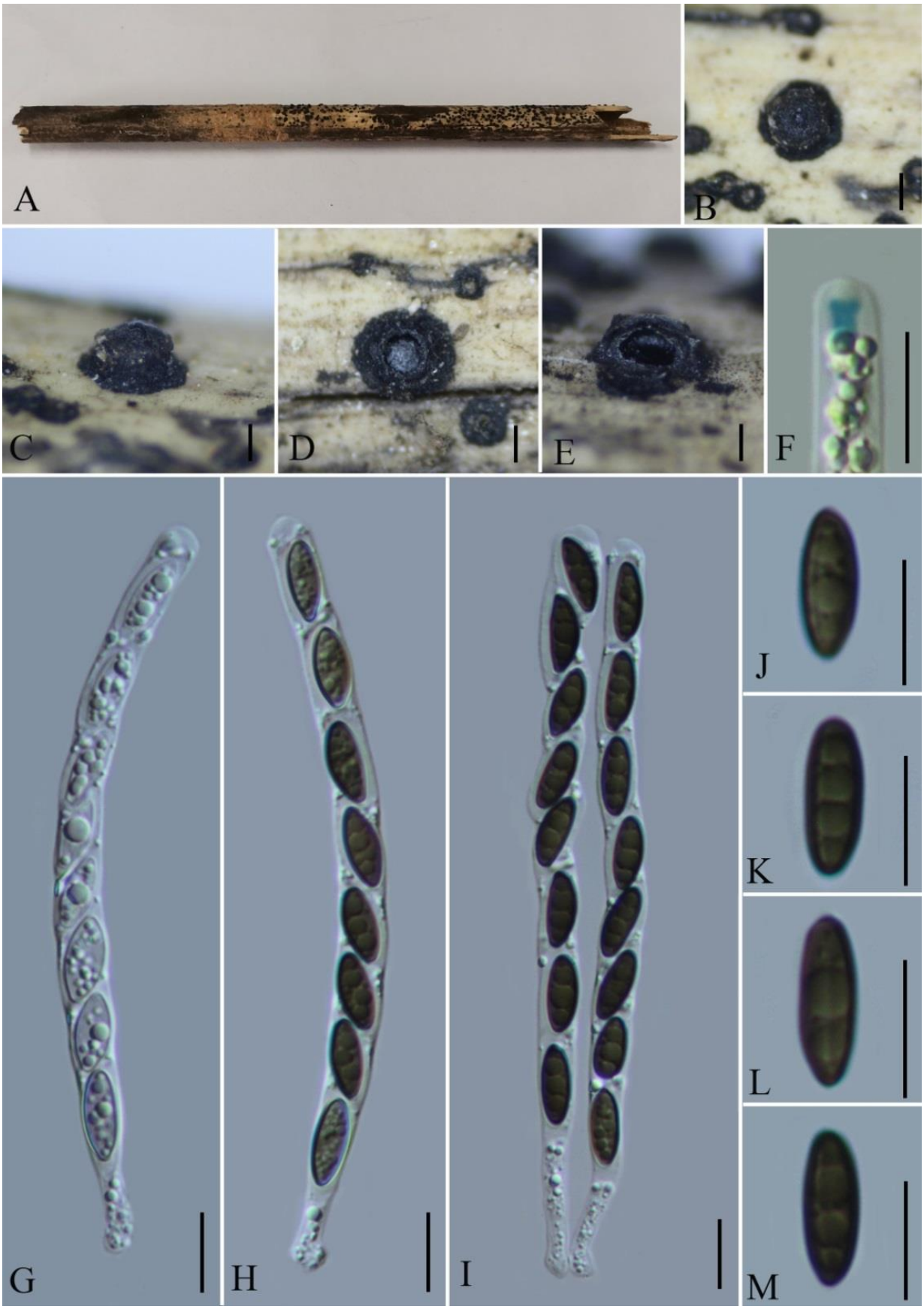


**Figure 9** – *Astrocystis bambusae* (GMB0700). A material. B, C stromata on the host. D transverse section of stroma. E longitudinal section of stroma. F ascus apical apparatus (stained in Melzer's reagent). G–I asci with ascospores. J–M ascospores. Scale bars: B–E = 200 μm. F–M = 10 μm.

Culture characteristics – Ascospores germinated on PDA within 24 hours at 25 °C. On oat agar (OA) media, colonies reached 4–5 cm diam., after 2 weeks at 25 °C, white at first, cottony, slightly thinning towards the edge, edge irregular, white from above, reverse similar in colour. No conidia were observed on PDA or OA media.

Material examined – CHINA, Guangdong Province, Zhaoqing City, Huangjing Dinghushan National Forest Park (23°10'3.71"N, 112°32'20.40"E), altitude: 502 m, dead branch of bamboo culms, 09 September 2020, Qirui Li, DH13-1 (GMB0704, holotype, KUN-HKAS 131179, isotype; ex-type GMBC0704)

Other examined material – CHINA, Guangdong Province, Zhaoqing City, Huangjing Dinghushan National Forest Park (23°10'63.01"N, 112°32'43.36"E), altitude: 510 m, dead branch of bamboo culms, 09 September 2020, Qirui Li, DH33 (GMB0783, GMBC0783).

Note – Phylogenetically (Fig. 1), it clusters with full support (100/1) to the newly described species *Astrocystis sichuanensis*. However, it can be distinguished from *As. sichuanensis* by its smaller asci (94–119 × 5.5–9 μm vs. 132–158 × 9–12 μm), smaller ascospores (10.5–13 × 4–6 μm vs. 16.5–24 × 6.5–9 μm), and smaller apical apparatus (2.0–3.0 × 1.5–2.5 μm vs. 5.0–6.0 × 3.0–4.5 μm).

Morphologically, *As. dinghuensis* shares similarities with *As. multiloculata* Y.P. Wu & Q.R. Li and *A. tessellati* Y.P. Wu & Q.R. Li, particularly in the morphology of stromata. However, the ascospores of *As. dinghuensis* are smaller than those of *As. multiloculata* (19–25 × 7–11 μm) and *As. tessellati* (16–19.5 × 7–9 μm). Additionally, *As. dinghuensis* has ascospores surrounded by a thin mucilaginous sheath, a feature that lacking in the latter two species. The stromata of *As. dinghuensis* are larger (0.9–3.5 mm long 0.9–2 mm wide, 0.35–0.45 mm thick), compared to *As. tessellati* (0.3–0.7 mm in diameter and 0.25–0.5 mm thick) (Wu et al. 2021).

The recently described *As. guyanae* L.E. Petrini also found on the dead culm of bamboo, is easily distinguishable due to its large ascospores measuring 23–28 × 12–14 μm. Additionally, the stromata of this species are 400–500 μm high and 575–700 μm wide (Petrini 2023).

***Astrocystis guizhouensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 11

MycoBank number: MB850408

Etymology – The specific epithet “guizhouensis” refers to its collection location, Guizhou province.

Description – Saprobic on dead bamboo culms, visible as black raised lump on the host. Sexual morph: Stromata 0.45–0.65 mm diam., 0.25–0.5 mm high, superficial, subglobose to dome-shaped, blackened, carbonaceous, with papillate ostioles, containing 1–3 ascomata, gregarious or solitary, scattered, carbonaceous. Perithecia 355–460 μm diam., 250–400 μm high, comprising black, fragile, carbonaceous tissue. Ostioles at the same level as stromatal surface, with slight papillate openings. Asci 127–143 × 8–11.5 μm ($\overline{x}$ = 134.7 × 9.6 μm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, persistent, apically rounded, with an amyloid square-shaped apical apparatus, blue staining in Melzer’s reagent, 3.5–5.5 μm high × 3.0–4.5 μm wide ($\overline{x}$ = 4.8 × 3.9 μm, n = 20). Ascospores 14.5–17.5 × 6.5–8 μm ($\overline{x}$ = 16.1 × 7.4 μm, n = 30), uniseriate, unicellular, hyaline when immature, slight brown to dark brown at maturity, equilateral ellipsoid, with rounded ends, smooth, with a straight germ slit slightly nearly full-length, with thin mucilaginous sheath and pad-like polar sheath, lacking appendages. Asexual morph: undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours at 25 °C. On oat agar (OA) media, colonies reached 4–5.5 cm diam., after 2 weeks at 25 °C, white at first, cottony, thinning towards the edge, edge irregular, white from above, slightly light yellow from the reverse. No conidia were observed on PDA or oat agar (OA) media.

Material examined – CHINA, Guizhou Province, Qiannan Buyi Miao Autonomous Prefecture Mawei Village (25°20'1.13"N, 107°27'50.32"E), altitude: 860 m, dead branch of unidentified plant, 25 September 2021, Sihan Long, MWC6 (GMB0705, holotype, KUN-HKAS 131180, isotype; ex-type GMBC0705).

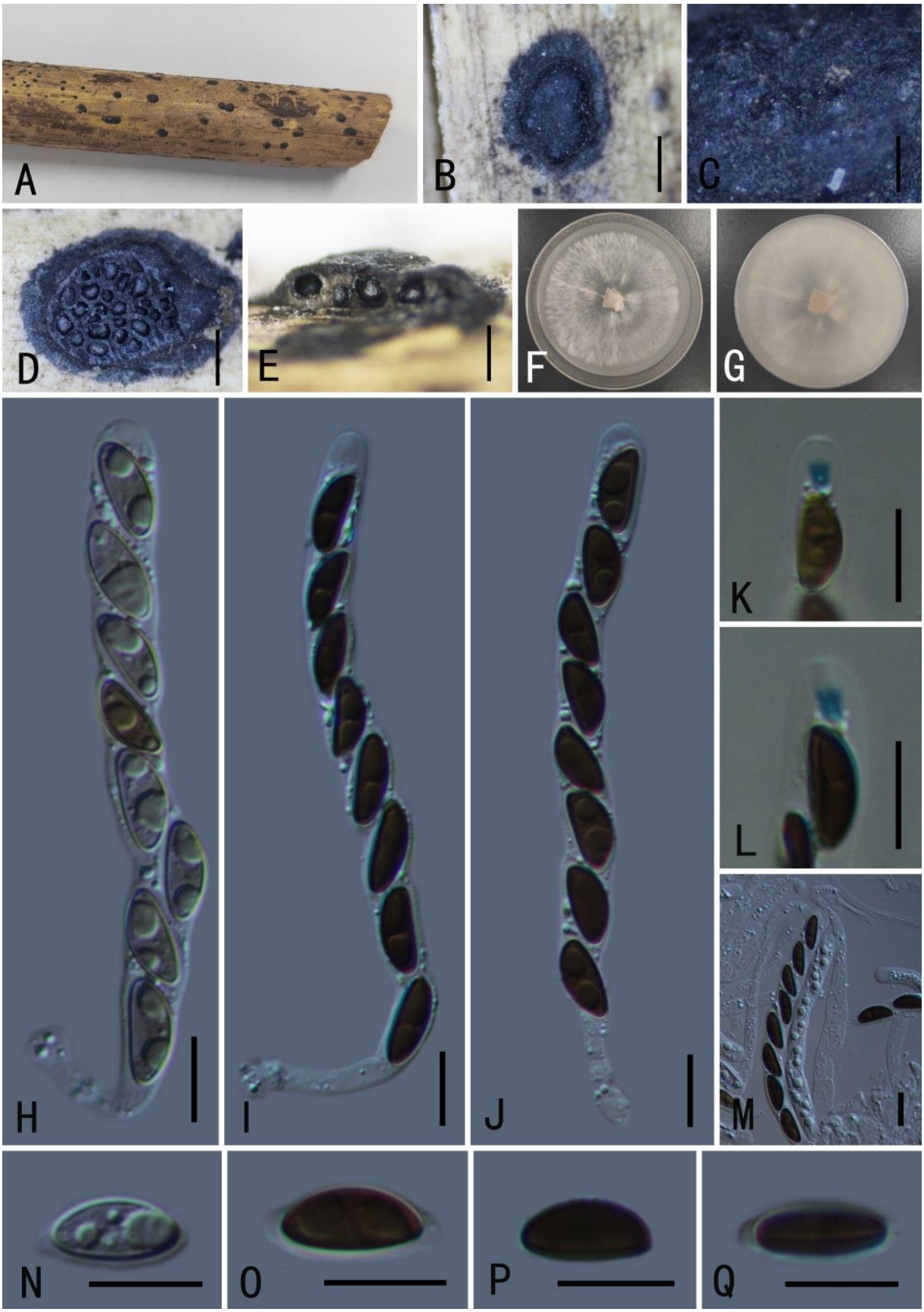


**Figure 10** – *Astrocystis dinghuensis* (GMB0704, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F, G cultures on PDA. H–J asci with ascospores. K, L ascus apical apparatus (stained in Melzer's reagent). M Paraphyses. N–Q ascospores. Scale bars: B, D–E = 500 μm, C = 3 mm, H–Q = 10 μm.

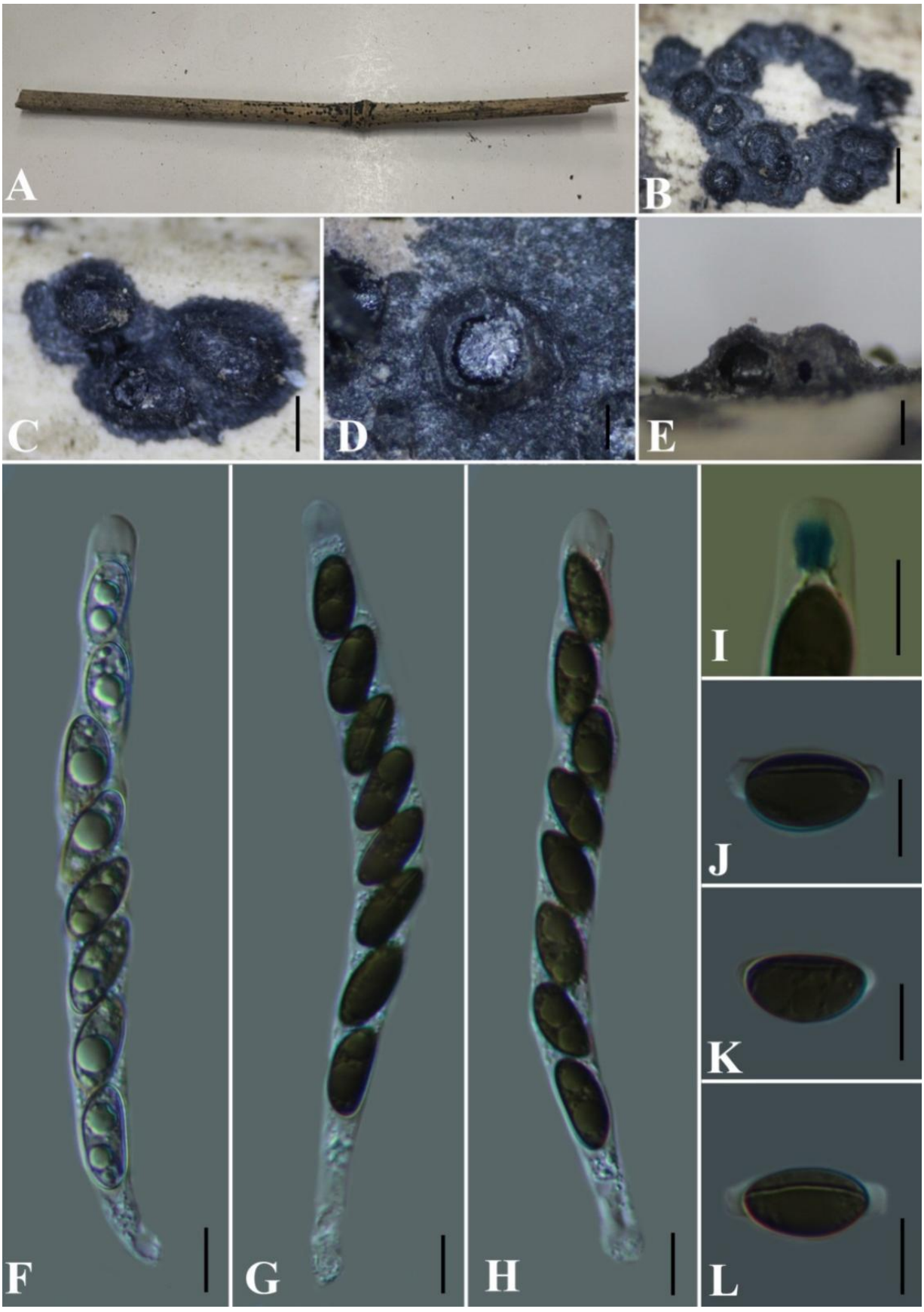


**Figure 11** – *Astrocystis guizhouensis* (GMB0705). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–L ascospores. Scale bars: B = 1 mm, C = 500 μm, D–E = 200 μm, H–Q = 10 μm.

Other material examined – CHINA, Guizhou Province, Qiannan Buyi Miao Autonomous Prefecture Mawei Village (25°20'39.66"N, 107°27'63.43"E), altitude: 833 m, dead branch of bamboo, 25 September 2021, Sihan Long, MWC34 (GMB0796, GMBC0796).

Notes – Morphologically, *As. guizhouensis* shares similarities with *As. multiloculata* Y.P. Wu & Q.R. Li. However, the latter can be distinguished by its superficial stromata, which contain numerous perithecia (usually more than 8), larger ascospores measuring 19–25 × 7–11 μm, and lack sheathes (Wu et al. 2021). Morphologically, *As. guizhouensis* also shares similarities with *As. cocoes* (Henn.) Læssøe & Spooner in ascospore size and phylogenetically also formed sister clade. *Astrocystis guizhouensis* can be distinguished by its appendage and a larger apical apparatus, measuring 3.5–5.5 × 3.0–4.5 μm, compared to 2.5–3.8 × 2.5–3.1 μm in *As. cocoes*. Additionally, *As. guizhouensis* has smaller stromata, measuring 0.45–0.65 × 0.25–0.5 mm, in contrast to 0.6–0.8 × 0.7–1 mm in *As. cocoes*, and typically possesses 1–3 ascomata, whereas *As. cocoes* usually has only 1 ascoma (Læssøe & Spooner 1994).

In comparison to the recently described *As. guyanae*, also found on the dead culm of bamboo, *As. guizhouensis* differs due to its large ascospores measuring 23–28 × 12–14 μm (Petrini 2023). *Astrocystis guizhouensis* exhibits larger ascospores than *As. sinensis, As. ambigens, As. nypae*, and *As. rudis*, but smaller ascospores than *As. eleiodoxae* and all of these species were recorded from palms (Petrini 2023).

***Astrocystis heterocyclae*** S. H. Long & Q. R. Li. sp. nov. Fig. 12

MycoBank number: MB850409

Etymology – The specific epithet "heterocyclae" refers to its host plant *Phyllostachys heterocycla* (Carr.) Mitford.

Description – Saprobic on *Phyllostachys heterocycla* culms, visible as black raised lump on the host. Sexual morph: Stromata 0.65–1 mm diam., 0.4–0.55 mm high, scattered or gregarious, solitary, superficial, black, hexagonal prism shaped, with blunt top, carbonaceous, containing 1–2 ascomata, with a circle of black tissue at the bottom, with papillary ostioles. Perithecia 290–350 μm diam., 390–480 μm high ($\bar{x}$ = 320 × 420 μm, n = 15), comprising black, fragile, carbonaceous tissue. Ostioles at the same level as stromatal surface, with slight papillate openings. Asci 108.5–122 × 8.5–15.5 μm ($\bar{x}$ = 115.3 × 12.5 μm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, persistent, apically rounded, with amyloid square-shaped apical apparatus, blue staining in Melzer's reagent, 1.5–3.0 μm high × 1.5–2.6 μm wide ($\bar{x}$ = 2.6 × 1.9 μm, n = 20). Ascospores 11–13.5 × 4.5–6 μm ($\bar{x}$ = 12.1 × 5.4 μm, n = 30), overlapped uniseriate, unicellular, hyaline when immature, dark brown at maturity, equilateral ellipsoid, with rounded ends, smooth, with a straight germ slit nearly full-length, surrounded by thin mucilaginous sheath, lack appendages. Asexual morph: undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours at 25 °C. On oat agar (OA) media, colonies reached 4–5 cm diam., after 2 weeks at 25 °C, white at first, cottony, thinning towards the edge, edge irregular, white from above, slightly light yellow from reverse. No conidia observed on PDA and oat agar (OA) media.

Material examined – CHINA, Yunnan Province, Jinghong City, Dadugang Village (22°25'14.18"N, 100°59'50.78"E), altitude: 1095 m, on the dead culms of *Phyllostachys heterocycla*, 11 August 2021, Sihan Long, DDG10 (GMB0706, holotype, KUN-HKAS 131181, isotype; ex-type GMBC0706).

Other Material examined – CHINA, Yunnan Province, Jinghong City, Dadugang Village (22°25'81.34"N, 100°59'33.66"E), altitude: 1133 m, dead culms of *Phyllostachys heterocycla*, 11 August 2021, Sihan Long, DDG30 (GMB0788, GMBC0788).

Notes – Phylogenetically, *Astrocystis heterocyclae* forms a close relationship with *As. bambusae* (Henn.) Læssøe & Spooner, and also morphologically shares similarities such as having hexagonal prism-shaped stromata and oval ascospores. However, *As. heterocyclae* can be distinguished from *As. bambusae* by the presence of a thin mucilaginous sheath surrounding its ascospores, whereas *As. bambusae* lacks this feature. Furthermore, the stromata of *As. heterocyclae*

are larger compared to *As. bambusae*, measuring 0.4–0.55 × 0.65–1 mm, while *As. bambusae* stromata range from 0.2–0.5 × 0.4–0.6 mm (Læssøe & Spooner 1994).

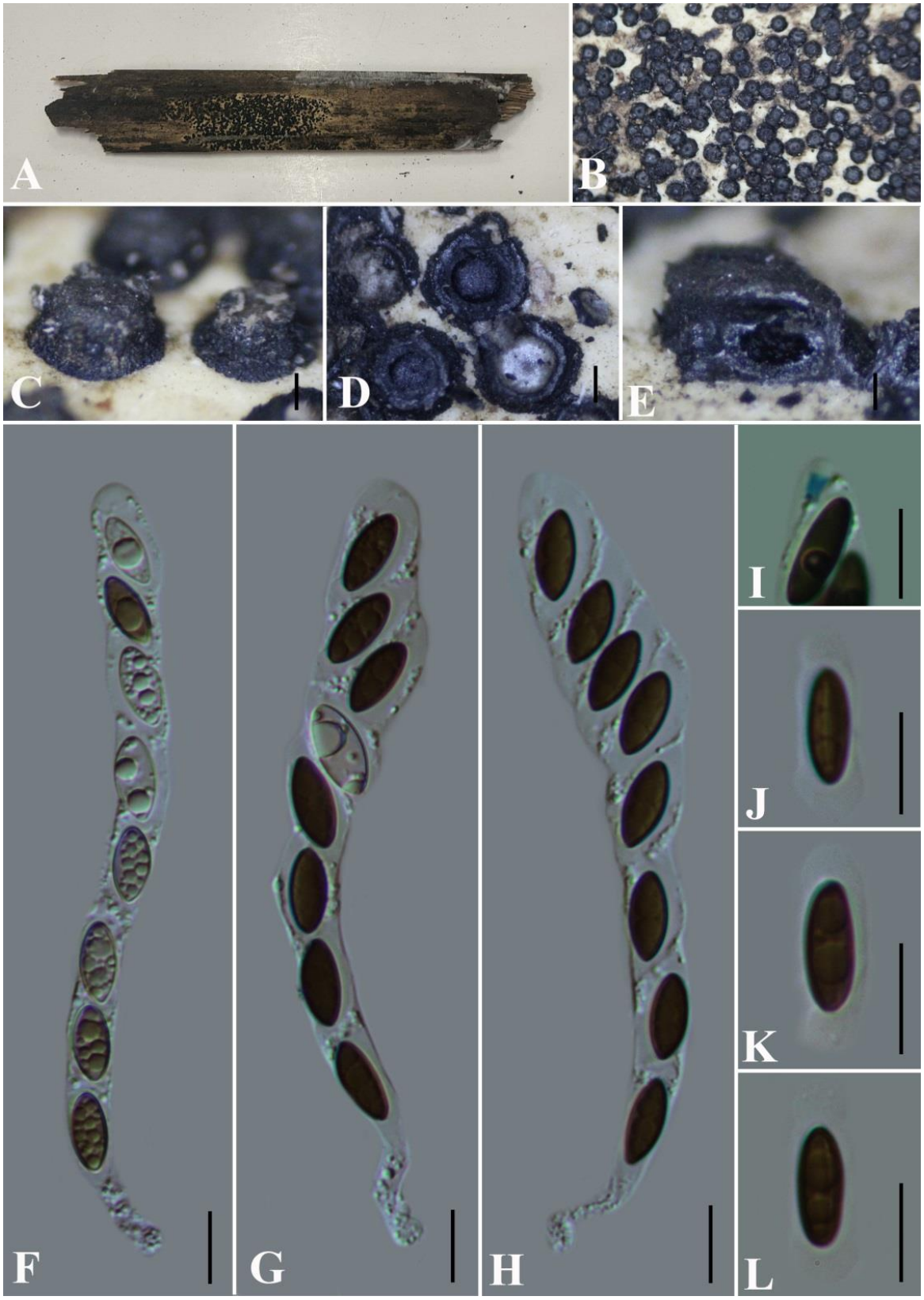


**Figure 12** – *Astrocystis heterocyclae* (GMB0706, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–L ascospores. Scale bars: B = 1 cm. C–E = 200 μm. F–L = 10 μm.

Another morphologically close species, *As. pseudomirabilis* Y.P. Wu & Q.R. Li, exhibits similar ascospore size and morphology but *As. pseudomirabilis* differs in having stromata with a flat top, larger perithecia with a diameter of 370–480 μm, and asci measuring 128–156 × 8–11 μm. Additionally, phylogenetically also distintly branch from the new species (Li et al. 2022).

***Astrocystis sichuanensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 13

MycoBank number: MB850410

Etymology – The specific epithet "sichuanensis" refers to its collection location, Sichuan Province, China.

Description – Saprobic on dead bamboo culms, visible as black raised lump on the host. Sexual morph: Stromata 0.8–4 mm long, 0.7–3 mm wide, 0.4–0.65 mm, erumpent, effused lump with flat top, irregular in outline, with a discoid black base, containing many perithecia, gregarious or solitary, scattered, carbonaceous, embedded on the host surface, thick, smooth, tissue between perithecia woody. Perithecia 245–430 μm diam., 250–360 μm high, comprising black, fragile, carbonaceous tissue. Ostioles at the same level as stromatal surface, with slight papillate openings. Asci 132–158 × 9–12 μm ($\overline{x}$ = 146 × 10.4 μm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, persistent, apically rounded, with amyloid square-shaped apical apparatus, blue staining in Melzer's reagent, 5.0–6.0 μm high × 3.0–4.5 μm wide ($\overline{x}$ = 5.6 × 3.8 μm, n = 20). Ascospores 16.5–24 × 6.5–9 μm ($\overline{x}$ = 18.9 × 7.8 μm, n = 30), uniseriate, unicellular, hyaline when immature, slight brown to dark brown at maturity, inequilateral ellipsoid to fusiform, with narrowly rounded ends, smooth, with a germ slit nearly full-length, surrounded by thin mucilaginous sheath, lack appendages. Asexual morph: undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours at 25 °C. On oat agar (OA) media, colonies reached 2–2.5 cm diam. after 2 weeks at 25 °C, white at first, cottony, slight thinning towards the edge, edge irregular, white from above, reverse similar in colour. No conidia observed on PDA and oat agar OA media.

Material examined – CHINA, Sichuan Province, Gulin County, Huangjing Old Forest Nature Reserve (23°10'3.71"N, 112°32'20.40"E), altitude: 1100 m, dead culms of bamboo, 04 August 2022, Sihan Long, HJLL4-1 (GMB0708, holotype, KUN-HKAS 131183, isotype; ex-type GMBC0708).

Other Material examined – CHINA, Sichuan Province, Gulin County, Huangjing Old Forest Nature Reserve (23°10'92.10"N, 112°32'09.33"E), altitude: 1033 m, dead branch of bamboo culms, 04 August 2022, Sihan Long, HJLL29-2 (GMB0709)

Notes – *Astrocystis sichuanensis* shares a similar stromata shape with *As. multiloculata* and *As. tessellati.* However, *As. sichuanensis* can be distinguished from them by the presence of a thin mucilaginous sheath surrounding its equilateral ellipsoid ascospores. Additionally, the stromata of *As. multiloculata* are taller (0.6–3 mm in diameter and 0.6–2.4 mm thick) compared to *As. sichuanensis*, while the stromata of *As. tessellati* are smaller (0.3–0.7 mm in diameter and 0.25–0.5 mm thick vs. 0.8–4 × 0.7–3 mm and 0.4–0.65 mm thick in *As. sichuanensis*) (Wu et al. 2021). The discussion with its phylogenetically close relative has been addressed in the notes section of *Astrocystis dinghuensis.*

In comparison to the keys provided by Petrini (2023), it is closely related to *As. guyanae* and *As. madeirensis*, but these two differ in ascospore size (12–14 μm wide, 23–28 μm long) and stromata dimensions (400–500 μm high, 575–700 μm wide) for *A. guyanae*, whereas *A. madeirensis* has ascospores measuring 9.5–12 μm wide and 22–29 μm long, and stromata dimensions of 375–525 μm high and 400–625 μm wide.

***Collodiscula*** I. Hino & Katum., Bull. Faculty of Agriculture, Yamaguchi University 6: 55 (1955).

Notes – The genus *Collodiscula* is typified by *C. japonica* I. Hino & Katum. discovered on bamboo culms in Japan, is characterized by the presence of superficial stromatal ascomata, a large, J+ (iodine-positive) wedge-shaped ascus, and brown, 1-septate ascospores devoid of a germ slit (Hino & Katumoto 1955).

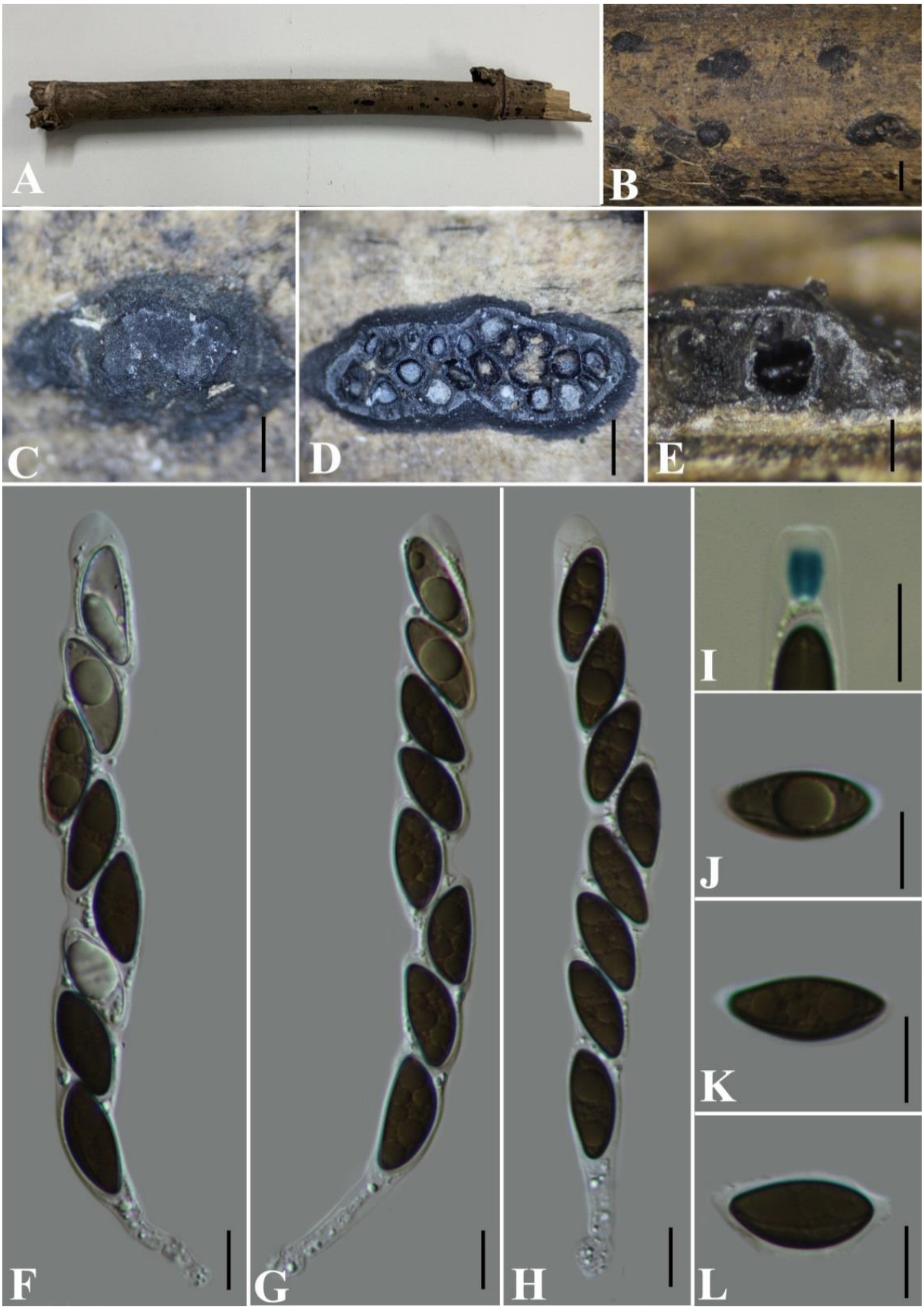


**Figure 13** – *Astrocystis sichuanensis* (GMB0708, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–L ascospores. Scale bars: B = 2 mm, C–D = 1 mm, E = 200 μm, F–L = 10 μm.

Within the genus, seven species have been documented globally, with six of these species identified within China (Hino & Katumoto 1955, Li et al. 2015a, b, Hyde et al. 2017, Xie et al. 2020, Wu et al. 2021). Notably, all *Collodiscula* species, except for *C. chiangraiensis*, have been observed thriving on bamboo. In our present study, we contribute to the genus by documenting two previously undiscovered *Collodiscula* species inhabiting bamboo twigs. These findings are the result of combines morpho-anatomical and multigene phylogenetic assessments, enriching our understanding of *Collodiscula* diversity.

***Collodiscula baoshanensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 14

MycoBank number: MB850411

Etymology – The specific epithet "baoshanensis" refers to its collection location, Baoshan City.

Description – Saprobic on dead bamboo culms. Sexual morph: Stromata 1.1–1.5 mm diam., 0.7–0.9 mm high, superficial, scattered or gregarious, solitary, visible as black, hexagonal prism, containing one ascoma, with a circle of black tissue at the bottom, with a papillary ostiole. External stromatal layer black, carbonaceous, easily chipped away to reveal the thin, black ascomata. Ostioles papillate in the centre, black. Perithecia 0.4–0.8 mm diam., 0.3–0.6 mm high ($\overline{x}$ = 0.6 × 0.5 mm), subglobose to globose. Asci 145.5–191 × 8.5–14 μm ($\overline{x}$ = 171.7 × 10.3 μm, n = 30), 8-spored, unitunicate, short pedicellate, apically rounded with an amyloid apical apparatus in Melzer's reagent, 1.3–1.9 μm ($\overline{x}$ = 1.6 μm, n = 20) broad, very short in height. Ascospores 25.5–34 × 7–10 μm ($\overline{x}$ = 29 × 8 μm, n = 30), overlapping uniseriate, fusiform, 3-septate, slightly constricted at septa, hyaline when immature, yellowish brown at maturity, with broadly rounded ends, smooth-walled, lacking germ slits or appendages, usually with oil droplets. Asexual morph: undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours at 25 °C. On OA media, colonies reached 5 cm in one week, dense, thinning towards the edge, edge irregular, white from above, reverse similar in colour. No conidia observed on PDA and oat agar (OA) media.

Material examined – CHINA, Yunnan Province, Baoshan City, Wayao Town (25°17'30.34"N, 107°56'16.20"E), altitude: 1267 m, on branches of bamboo, 5 August 2021, Sihan Long & Qirui Li, WYZ16 (GMB0720, holotype, KUN-HKAS 131184, isotype, ex-type living culture GMBC0720).

Other Material examined – CHINA, Yunnan Province, Baoshan City, Wayao Town (25°17'09.66"N, 107°56'31.40"E), altitude: 1233 m, on branches of bamboo, 5 August 2021. Sihan Long & Qirui Li, WYZ56 (GMB0795, GMBC0795).

Notes – Phylogenetically, *Collodiscula baoshanensis* clusters closely with *C. japonica*, which has ascospores with only one septum, while *C. baoshanensis* has three-septate ascospores (Hino & Katumoto 1955). The 3-septate ascospores of *C. baoshanensis* resemble those of *C. lancangjiangensis*, *C. fangjingshanensis*, and *C. leigongshanensis* (Li et al. 2015a, Wu et al. 2021). However, *C. baoshanensis* can be easily distinguished from *C. fangjingshanensis* and *C. lancangjiangensis* by its wider ascospores measuring 25.5–34 × 7–10 μm (compared to 19–25.5 × 4.5–6 μm in *C. fangjingshanensis* and 26–36.5 × 5–7.5 μm in *C. lancangjiangensis*). Moreover, ascospores of *C. lancangjiangensis* are blunt at both ends and larger apical apparatus, measuring 3.0–3.5 μm in height and 1.5–2.0 μm in width (Li et al. 2015a, Wu et al. 2021). The ascospores of *C. leigongshanensis* have narrow ends with germ slits along the entire length of the spores and a slimy sheath at the ends, and asci have larger apical apparatus measuring 4–6 μm in height and 3.5–4.5 μm in width, which is different from *Collodiscula baoshanensis* (Li et al. 2015a).

***Collodiscula quadrangularis*** S. H. Long & Q. R. Li. sp. nov. Fig. 15

MycoBank number: MB850412

Etymology – Refers to its host, *Chimonobambusa quadrangularis* (Fenzi) Makino.

Description – Saprobic on dead culms of bamboo, *Chimonobambusa quadrangularis*. Sexual morph: Stromata 0.55–1 mm diam., 0.45–0.6 mm high, superficial, scattered or gregarious, solitary, visible as black, hexagonal prism, containing 1–2 ascomata, with a circle of black tissue at the

bottom, with a papillary ostiole. The external stromatal layer black, carbonaceous, easily chipped away to reveal the thin, black ascomata. Ostioles papillate in the centre, black. Perithecia 0.35–0.5 mm diam., 0.45–0.6 mm high, subglobose to globose, Asci 215–260 × 10–17 μm ($\overline{x}$ = 239.3 × 14.3 μm, n = 30), 8-spored, unitunicate, short pedicellate, apically rounded with a amyloid apical apparatus in Melzer's reagent, 1.7–2.2 μm ($\overline{x}$ = 2 μm, n = 20) broad, 1.8–2.7 μm ($\overline{x}$ = 2.3 μm, n = 20) high. Ascospores 34–42 × 9–12 μm ($\overline{x}$ = 37 × 10.8 μm, n = 30), overlapping uniseriate, fusiform, 3-septate, not or slightly constricted at septa, yellowish brown when immature, dark brown at maturity, with narrowly pointed ends, smooth-walled, with slimy sheathes at the ends, lacking germ slits and appendages, usually with oil droplets. Asexual morph: undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours at 25 °C. On OA media, colonies reached 4 cm in one week, dense, slightly thinning towards the edge, edge irregular, white from above, reverse similar in colour. No conidia observed on PDA or oat agar (OA) media.

Material examined – CHINA, Guizhou Province, Zunyi City, Suiyang Country, Kuankuoshui National Nature Reserve (28°30'98.33"N, 107°9'27.86"E), altitude: 1589 m, on the dead branch of *Chimonobambusa quadrangularis* (Fenzi) Makino, 1 May 2022, Sihan Long, KKS58-1 (GMB0722, holotype, KUN-HKAS 131185, isotype; ex-type GMBC0722).

Other material examined – CHINA, Guizhou Province, Zunyi City, Suiyang Country, Kuankuoshui National Nature Reserve (28°29'33.64"N, 107°9'23.66"E), altitude: 1634 m, dead bamboo culms, 2 May 2022, Sihan Long, KKS133 (GMB0784, GMBC0784).

Notes – Phylogenetically, *Collodiscula quadrangularis* is closely related to *C. lancangjiangensis*. Morphologically also both shares similarities having 3-septate ascospores with narrowly pointed ends and a slimy sheath at the ends. However, the ascospores of *C. quadrangularis* are larger and wider (34–42 × 9–12 μm) and have slimy sheathes at the ends compared to *C. lancangjiangensis* (26–36.5 × 5–7.5 μm). Additionally, *C. lancangjiangensis* has smaller asci (145–175 × 9–16 μm) and larger apical apparatus 3.0–3.5 μm (Wu et al. 2021).

*Collodiscula fangjingshanensis* and *C. leigongshanensis*, reported from China, also have 3-septate ascospores, but they differ in size. *Collodiscula fangjingshanensis* has smaller ascospores (19–25.5 × 4.5–6 μm) with a slimy sheath covering the whole spore, while *C. leigongshanensis* has also smaller (28–35 × 8–10.5 μm) with an indistinct germ slit running the whole length of the spore (Li et al. 2015a).

***Kretzschmaria*** Fr. [as '*Kretschmaria*'], Summa veg. Scand., Sectio Post. (Stockholm): 409 (1849).

Notes – According to Rogers & Ju (1998) extensive study, this genus is categorized into two taxa: Kretzschmarioid and Ustulinoid. Stromata of the former are either stipitate or sessile, often with fused fertile parts and/or stipes, typically featuring entire margins. In contrast, stromata of the latter are mostly sessile but may have attachments through rhizoid-like processes or narrow connectives, typically displaying crenate margins. The genus is represented by 43 species, worldwide (Yun et al. 2016). The documentation of *Kretzschmaria* species from China has been limited (Teng 1963, Tai 1979, Ma 2011, Du et al. 2016a), highlighting the need for further investigations into species diversity. In our current study, we contribute by describing three new species within this genus based on a comprehensive analysis that combines morphoanatomical observations and multigene-based phylogenetic analyses.

***Kretzschmaria kuankuoshuiensis*** S.H. Long & Q.R. Li. sp. nov. Fig. 16

Mycobank number: MB850413

Etymology – The specific epithet "kuankuoshuiensis" refers to its collection location, Kuankuoshui National Nature Reserve.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Stromata 0.5–0.75 cm diam × 1.35–1.85 mm thick, superficial, pulvinate, globose to subglobose, sessile, attachment to substrate with strong connective, with crenate margins; brown-coppery to dark brown, with inconspicuous perithecial mounds and cracks, carbonaceous immediately beneath surface; tissue


**Figure 14** – *Collodiscula baoshanensis* (GMB0720, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–M ascospores. Scale bars: B = 1 mm, C–E = 500 μm, F–M = 10 μm.

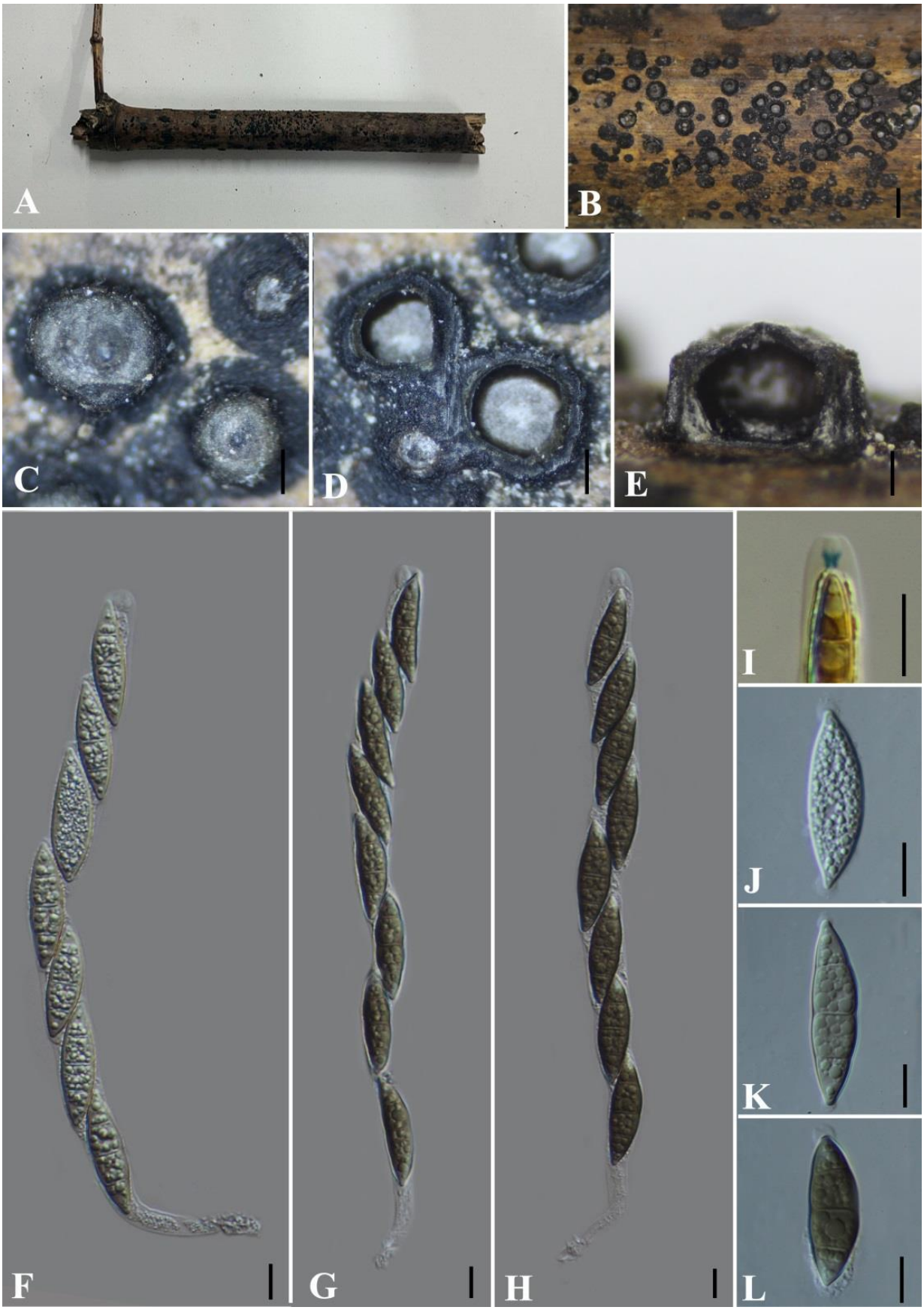


**Figure 15** – *Collodiscula quadrangularis* (GMB0722). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–L ascospores. Scale bars: B = 2 mm, C–E = 200 μm, F–L = 10 μm.

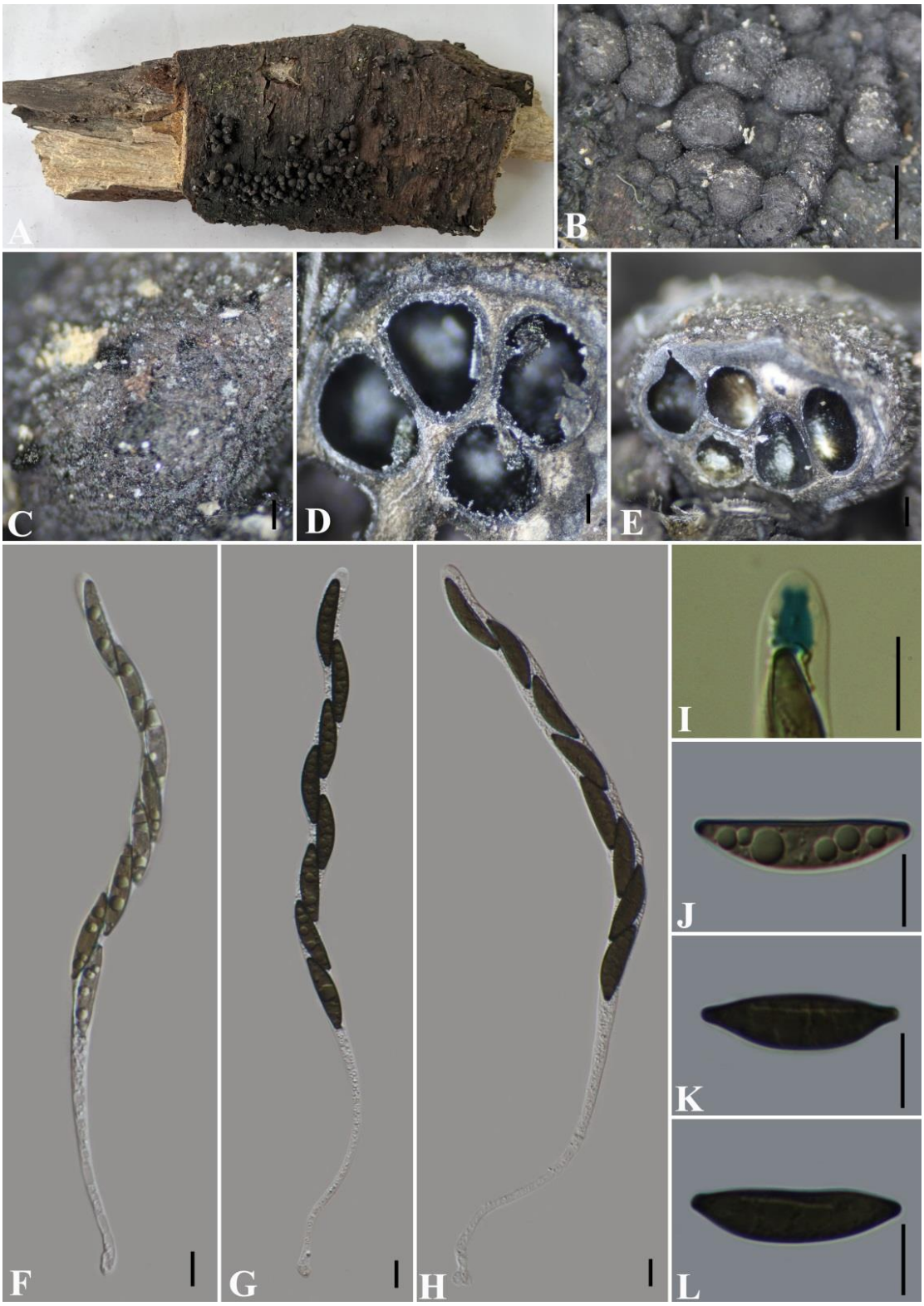


**Figure 16** – *Kretzschmaria kuankuoshuiensis* (GMB0728). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–L ascospores. Scale bars: B = 1 cm, C–E = 200 μm, F–L = 10 μm.

between and beneath perithecia white to light brown. Perithecia 0.45–0.55 mm wide × 0.6–0.9 mm high, obovoid to cylindrical. Ostioles finely papillate. Asci 239–317 × 9.5–14 μm ($\overline{x}$ = 302 × 12.4 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, with amyloid, urn-shaped apical apparatus, 6.5–8.5 μm high × 3.5–4.5 μm wide, spore bearing part 162.5–177 μm ($\overline{x}$ = 168 μm, n =

30) long. Ascospores 26.5–36 × 6.5–9 µm ($\bar{x}$ = 29.3 × 7.3 µm, n = 30), overlapping uniseriate, unicellular, smooth, hyaline when immature, slight brown to dark brown at maturity, fusoid to fusiform, with narrowly rounded ends, with straight germ slit, 15–17.5 µm, about half of spore-length on flattened side; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours. On OA media, colonies reached 5 cm in two weeks, at 25 °C, white to gray, appressed, with entire margins, with slightly radial on the surface, reverse slightly greyish. No conidia were observed on PDA or OA media.

Material examined – CHINA, Guizhou Province, Zunyi City, Suiyang Country, Kuankuoshui National Nature Reserve (28°31'11.58"N, 107°9'32.99"E), altitude: 1500 m, dead branch of unidentified plant, 26 November 2022, Sihan Long, KKS78 (GMB0728, holotype, KUN-HKAS 131186, isotype; ex-type GMBC0728).

Notes – In the phylogenetic tree (Fig. 1), *Kretzschmaria kuankuoshuiensis* is found to be closely related to *K. neocaledonica* (Har. & Pat.) J.D. Rogers & Y.M. Ju. However, there is a notable difference in the apical apparatus between the two species. The apical apparatus of *K. kuankuoshuiensis* is higher, measuring 6.5–8.5 × 3.5–4.5 µm, compared to *K. neocaledonica* 4.5–5.5 × 3–3.5 µm (Rogers & Ju 1998). Moreover, *K. neocaledonica* has large perithecia 0.7–1.2 mm in diam. × 1.7–2.5 mm high. The ITS sequence analysis of *K. kuankuoshuiensis* and *K. neocaledonica* demonstrates a sequence length of 508 base pairs, showing an 85.2% identity and similarity, with 6.1% gap presence, representing 433 matching positions out of 508. The difference from the other phylogenetically closely related species, *K. sichuanensis*, is discussed in the note section of the latter species. Morphologically, *K. kuankuoshuiensis*, *K. clavus* (Fr.) Sacc., and *K. lucidula* (Mont.) share similar dimensions of ascospores and all have finely papillate ostioles. However, the perithecia of *K. kuankuoshuiensis* are smaller than those of *K. clavus*, measuring 0.6–0.9 × 0.45–0.55 mm, compared to 1–1.5 × 0.5–1 mm for *K. clavus*. *Kretzschmaria lucidula* differs by having stromata that are attached to the substrate by narrow connectives and with fine vertical striations on the sides. Additionally, the apical apparatus of *K. kuankuoshuiensis* is larger (6.5–8.5 × 3.5–4.5 µm) than that of *K. lucidula* (5.5–7 × 3–4 µm) (Rogers & Ju 1998).

***Kretzschmaria landingshanensis*** S.H. Long & Q.R. Li. sp. nov. Fig. 17

Mycobank number: MB850414

Etymology – The specific epithet “landingshanensis” refers to its collection location, Landing Mountain National Forest Park.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Stromata 0.5–1.5 cm long × 0.4–0.8 cm wide ×1.4–1.7 mm thick, superficial, pulvinate, discrete, sessile, attachment to substrate with strong connective, with steep thick crenate margins; brown-coppery to dark brown, with inconspicuous perithecial mounds and cracks, carbonaceous immediately beneath surface; tissue between and beneath perithecia black to dark brown. Perithecia 0.5–0.95 mm wide × 1.5–1.7 mm high, obovoid to cylindrical, ostioles coarsely papillate. Asci 274.5–320 × 9.5–14 µm ($\bar{x}$ = 302 × 12.4 µm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, with amyloid, urn-shaped apical apparatus, 5–6.5 µm high × 3–4 µm wide, spore-bearing part 132.5–172 µm ($\bar{x}$ = 165 µm, n = 30) long. Ascospores 30.5–35.5 × 7.5–9.5 µm ($\bar{x}$ = 32.2 × 8.5 µm, n = 30), overlapping uniseriate, unicellular, smooth, hyaline when immature, slight brown to dark brown at maturity, fusoid, with narrowly rounded ends, with a straight germ slit, 14–15.5 µm, about half of spore-length on flattened side; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours; On OA media, colonies reached 5 cm in two weeks, white to gray, appressed, with entire margins, reverse white with slightly greyish colour. No conidia observed on PDA or OA media.

Material examined – CHINA, Guizhou Province, Sandu Shui Autonomous County, Landing Mountain National Forest Park (25.482853"N, 107.8982516"E), altitude: 545 m, dead branch of unidentified plant, 25 November 2021, Sihan Long, LDS9 (GMB0726, holotype, KUN-HKAS 131188, isotype; ex-type GMBC0726).


**Figure 17** – *Kretzschmaria landingshanensis* (GMB0726, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–M ascospores. Scale bars: B = 5 mm, C = 1 mm, D–E = 500 μm, F–M = 10 μm.

Other material examined – CHINA, Guizhou Province, Sandu Shui Autonomous County, Yao Ren Shan National Forest Park (25°56'31.11"N, 107°57'0.77"E), altitude: 563 m, dead branch of unidentified plant, 23 November 2021, Sihan Long, YRS4 (GMB0727, KUN-HKAS 131189, GMBC0727).

Notes – In the phylogram (Fig. 1), *K. landingshanensis* formed a clade in a sister relationship to *K. pavimentosa* (Ces.) P.M.D. Martin with full support (100/1). Morphologically, also closely resemble, both exhibit similar stromata characteristics, attached to the substrate with a strong connective and have steep thick crenate margins. However, there is a notable difference in the size of ascospores between the two species. The ascospores of *K. landingshanensis* are smaller, measuring 30.5–35.5 × 7.5–9.5 µm, compared to the larger ascospores 35–54 × 8–12 µm of *K. pavimentosa,* (Rogers & Ju 1998, Yun et al. 2016). Furthermore, *K. pavimentosa* has a larger apical apparatus measuring 6–9 × 4.5–6 µm (compared to 5–6.5 × 3–4 µm) (Pourmoghaddam et al. 2018). The ITS sequence analysis reveals a 91.8% sequence similarity and a 3.9% gap presence in the comparison between *K. pavimentosa* and *K. landingshanensis*.

In terms of ascospore size, it closely resembles *K. zonata* (Lév.) P. Martin; however, *K. zonata* can be distinguished by its up-sloped margins, larger stromata measuring up to 8.5 cm long × 2–3.5 cm wide × 1.8–2.54 mm thick, and the presence of a larger apical apparatus measuring 7–9 µm in height × 5–7 µm in width (Pourmoghaddam et al. 2018).

***Kretzschmaria sichuanensis*** S.H. Long & Q.R. Li. sp. nov. Fig. 18

Mycobank number: MB850415

Etymology – The specific epithet "sichuanensis" refers to its collection location, Sichuan Province.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Stromata 0.5–0.7cm long × 0.2–0.6 cm wide ×1.1–1.6 mm thick, superficial, pulvinate, discrete, sessile, attachment to substrate with strong connective, with crenate margins; brown to dark brown, with conspicuous perithecial mounds and cracks, carbonaceous immediately beneath surface; tissue between and beneath perithecia black to dark brown. Perithecia 0.6–1 mm wide × 0.9–1.1 mm high, obovoid to cylindrical, Ostioles sharply conical-papillate. Asci 277.5–298.5 × 7–12 µm ($\overline{x}$ = 288.6 × 8.6 µm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, with amyloid, urn-shaped apical apparatus, 4.5–5.5 µm high × 3.5–4.5 µm wide, spore-bearing part 180.5–223 µm ($\overline{x}$ = 209 µm, n = 30) long. Ascospores 28.5–35 × 6–7.5 µm ($\overline{x}$ = 31.9 × 6.8 µm, n = 30), overlapping uniseriate, unicellular, smooth, hyaline when immature, slight brown to dark brown at maturity, fusoid, rounded ends, with straight germ slit, 12–17.5 µm, about half of spore-length on flattened side; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours; On OA media, colonies reached 3.5 cm diam. after 2 weeks at 25 °C, white, velvety, thinning towards the edge, edge irregular, white from above, slightly brown from reverse. No conidia observed on PDA or OA media within three months.

Material examined – CHINA, Sichuan Province, Gulin County Huangjing Old Forest Nature Reserve (28°13'52.63"N, 105°44'41.36"E), altitude: 1100 m, dead branch of unidentified plant, 16 August 2021, Sihan Long, HJLL13 (GMB0729, holotype, KUN-HKAS 1311790, isotype; ex-type GMBC0729).

Other Material examined – CHINA, Sichuan Province, Gulin County Huangjing Old Forest Nature Reserve (28°13'12.87"N, 105°44'63.29"E), altitude: 1133 m, dead branch of unidentified plant, 16 August 2021, Sihan Long, HJLL103 (GMB0785, GMBC0785).

Notes – In the phylogram (Fig. 1), *Kretzschmaria sichuanensis* clustered closely with *K. kuankuoshuiensis* and *K. neocaledonica* (Har. & Pat.) J.D. Rogers & Y.M. Ju. However, the stromata of *K. sichuanensis* have the conspicuous perithecial mounds and cracks and sharply conical-papillate ostioles which is different to *K. kuankuoshuiensis.* Moreover, the tissue between and beneath perithecia is white to light brown in *K. kuankuoshuiensis* (This study). The ITS

sequences analysis of *K. sichuanensis* and *K. kuankuoshuiensis* showed a 94.0% similarity, and 3.7% gap presence with 581 matching positions out of 618.

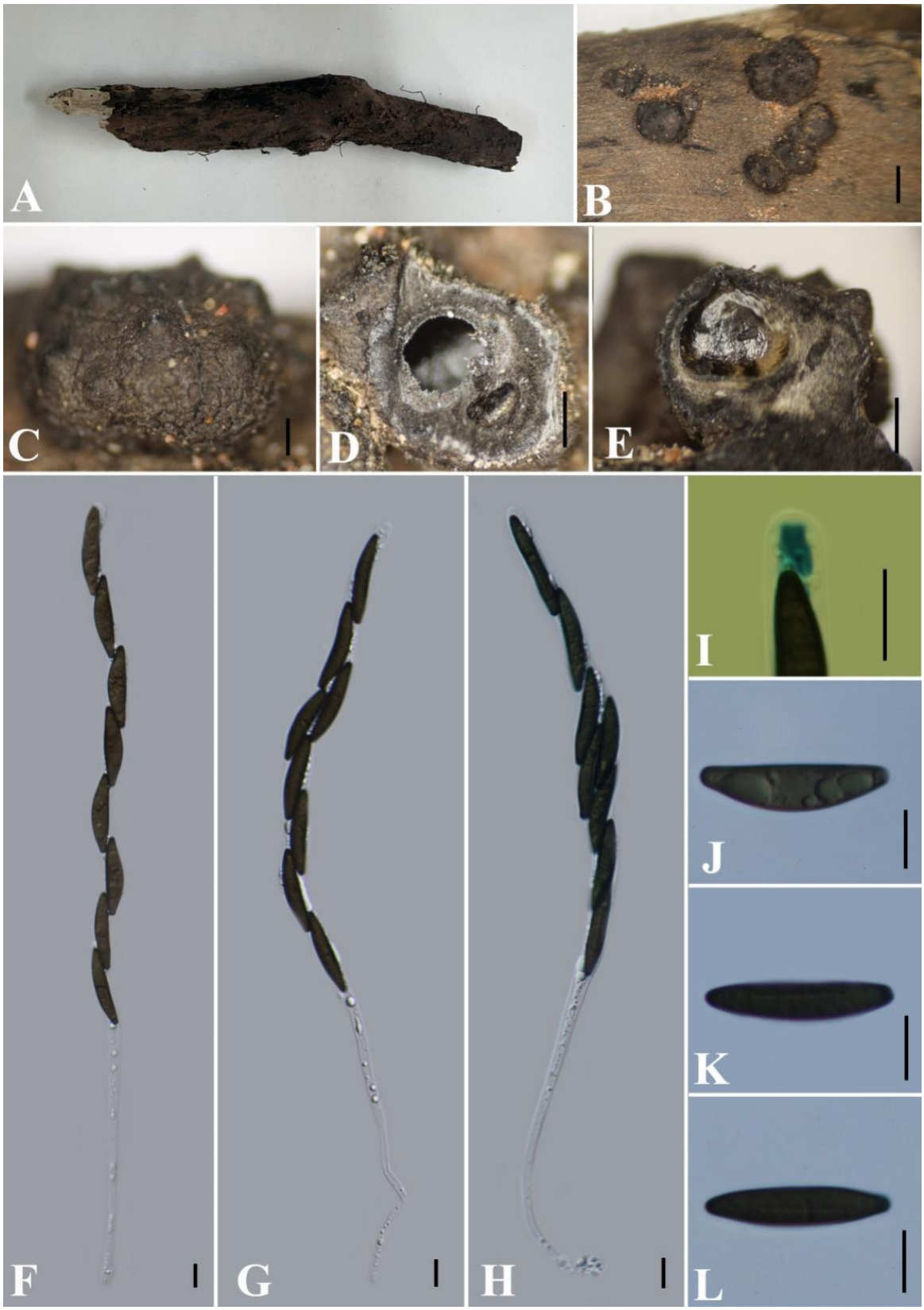


**Figure 18** – *Kretzschmaria sichuanensis* (GMB0729, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–L ascospores. Scale bars: B = 5 mm, C = 1 mm, D–E = 500 μm, F–L = 10 μm.

The perithecia of *K. sichuanensis* is smaller than those of *K. neocaledonica* (0.6–1 × 0.9–1.1 mm vs. 0.7–1.2 × 1.7–2.5 mm) and conspicuously conical (vs. sharply conical-papillate ostioles) (Recio et al. 2014). Morphologically, *K. sichuanensis* exhibits similarities to *K. micropus* (Fr.) Sacc. However, there is a distinguishing feature in the germ slits. In *K. micropus*, the germ slits exceed 20 μm, whereas in *K. sichuanensis*, the germ slits measure 12–17.5 μm. Moreover, the ascospores of *K. micropus* are slight larger 30–40 × 8–12 μm (Rogers & Ju 1998).

***Nemania*** Gray, Nat. Arr. Brit. Pl. (London) 1: 516 (1821).

Notes – *Nemania* Gray (1821), is a species-rich genus within Xylariaceae typified by *N. serpens* (Pers.) Gray (Daranagama et al. 2018, Wendt et al. 2018). Species of *Nemania* are characterized by carbonaceous, multiperitheciate, effused-pulvinate stromata with papillate ostioles and variable presence of soft, whitish, brownish, grey or yellow internal tissue, not release pigments in 10% KOH, unitunicate cylindrical asci, and ascospores with a conspicuous or inconspicuous germ slit of spore length to much less than spore-length (Daranagama et al. 2018). According to our estimation from Index Fungorum (Accessed on October 03, 2023), a total of 78 species of this genus have been reported globally. In China, 15 *Nemania* species have been recorded (Ju et al. 2005, Du et al. 2016b, Ariyawansa et al. 2015, Tibpromma et al. 2021, Pi et al. 2021). In this study, we introduce seven new species based on a comprehensive analysis that combines both morphological observations and multigene phylogenetic analysis using ITS, TUB2, and *rpb2* markers.

***Nemania bannaensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 19

MycoBank number: MB850416

Etymology – The epithet “Banna” is a short name for Xishuangbannan, referring to the collection location.

Description – Saprobic on decaying wood. Sexual morph: Stromata 5–40 mm long × 4–35 mm wide × 0.6–1 mm thick, pulvinate, attached to substrate along entire area of the base, solitary to gregarious, frequently confluent, with conspicuous perithecial mounds, carbonaceous between the perithecia, surface dull black and slightly shiny at maturity, the interperithecial tissue blackish, carbonaceous; not releasing a coloured pigment in 10% KOH. Perithecia 350–650 μm diam. × 300–420 μm high, subglobose to depressed-spherical. Ostioles coarsely papillate in discoid areas, ostiolar area blackish, shiny, frequently flattened, usually around a circle of white tissue. Asci 159–243 × 6–8 μm ($\overline{x}$ = 201.7 × 7.2 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, spore-bearing parts 86.5–92 μm ($\overline{x}$ = 88 μm, n = 30) long, apically rounded with an amyloid apical apparatus, 2–3 × 1.5–2 μm ($\overline{x}$ = 2.5 × 1.8 μm, n = 30), tubular with a faint upper rim. Ascospores 10.5–13 × 5.5–7.5 μm ($\overline{x}$ = 12 × 6.1 μm, n = 30), uniseriate, unicellular, ellipsoid-inequilateral, with broadly rounded ends, smooth, hyaline when immature, brown to dark brown at maturity, with a conspicuous, straight germ slit spore-length to slightly less than spore-length on the flattened side; lacking a sheath and appendage; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics. Colonies grown on PDA, reached 6 cm in one week at 25 °C. On OA media, white, velvety, rosette, high convex in centre, dense, white to cream from above, white irregular edge with light yellow to slightly brown at centre from the below. No conidia observed on PDA or OA media within three months.

Material examined – CHINA, Yunnan Province, Jinghong City, Xishuangbannan Primeval Forest Park (22°17'35.40"N, 100°55'57.17"E), altitude: 1100 m, on branches of an unidentified plant, 11 August 2021, Sihan Long, XSBN3 (GMB0731, holotype, KUN-HKAS 131191, isotype, ex-type living culture GMBC0731).

Other material examined – CHINA, Yunnan Province, Yuxi City, Maojuan Mountain Scenic Area, Jinshan Primeval Forest (23°57'8.27"N, 101°30'17.87"E), altitude: 2304 m, on branches of an unidentified plant, 7 July 2021. Sihan Long, JS9 (GMB0732, KUN-HKAS 131192)

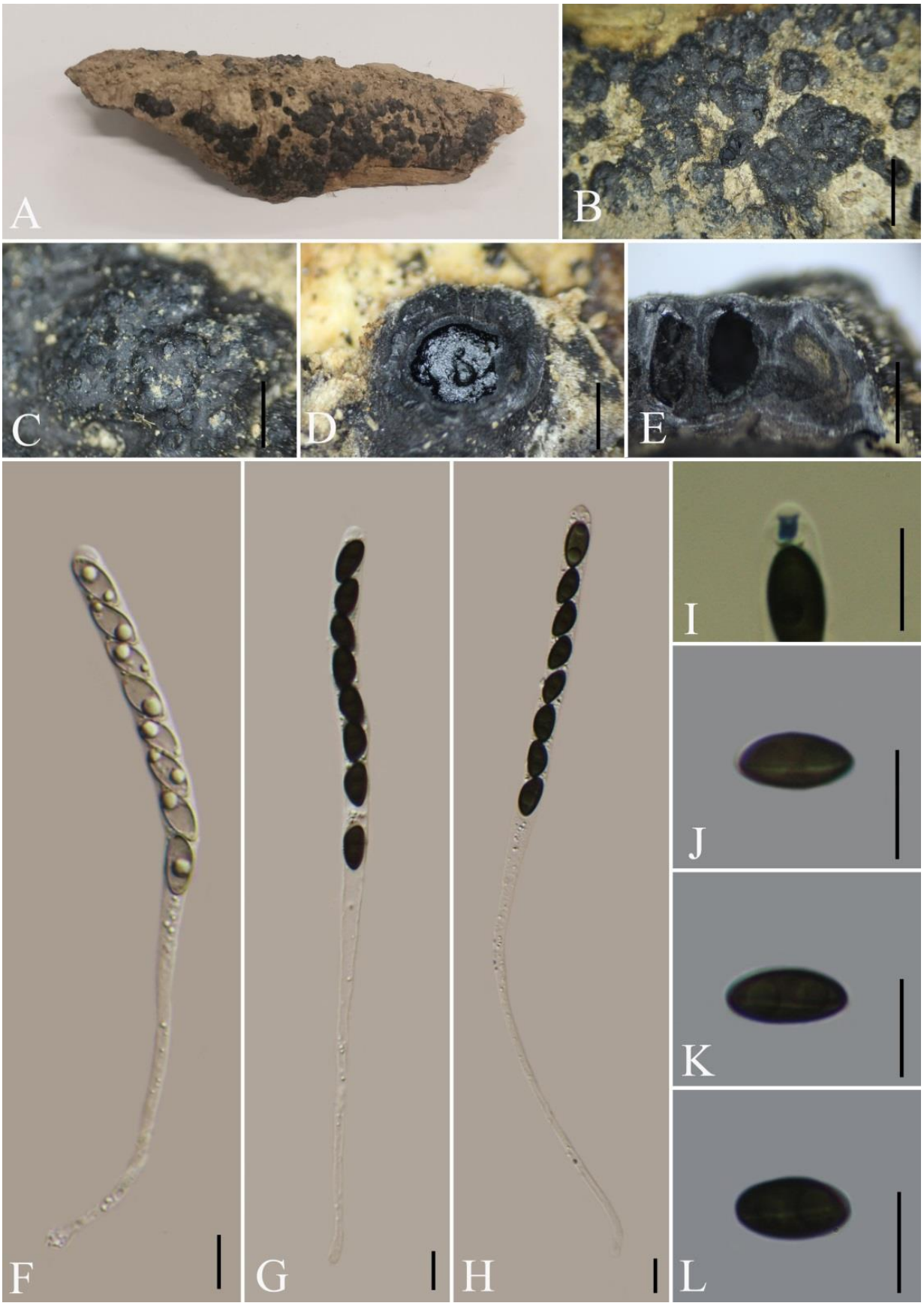


**Figure 19** – *Nemania bannaensis* (GMB0731, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's Reagent). J–L ascospores. Scale bars: B = 1 cm, C = 5 mm, D–E = 500 μm, F–L = 10 μm.

Notes – In the initial BLAST result of molecular analysis, *Nemania bannaensis* was found closely related to *N. bipapillata* (Accession: GU292818) and exhibiting morphological similarities, notably a similar size of ascospores. A diagnostic feature of *N. bipapillata* is the configuration of its ostiolar discs, which consist of a raised annulus with an outer diameter of 0.25–0.30 mm encircling an obtusely dome-shaped, shiny black ostiolar papilla and delimited by a narrow furrow. In contrast, *N. bannaensis* features ostioles that are coarsely papillate in discoid areas, with the ostiolar area being blackish, shiny, frequently flattened and usually surrounded by a circle of white tissue. The stromatal surface is initially orange-brown and turns brownish black in *N. bipapillata*, whereas dull black in *N. bannaensis* (Fournier et al. 2018). Furthermore, the stromata of *N. bannaensis* are larger, measuring 5–40 mm in length, 4–35 mm in width, as opposed to the stromata of *N. bipapillata*, which are 0.8–9 mm long, 0.8–2.3 mm wide (Fournier et al. 2018). The analysis of ITS sequences for these two species reveals a sequence length of 536 base pairs, with an 86.9% similarity, and an 8.4% gap presence, indicating 466 matching positions out of the total 536.

Morphologically, *Nemania bannaensis* and *N. creoleuca* share a similar stromata shape, they can be distinguished by the size of their ascospores. *Nemania bannaensis* has shorter ascospores 10.5–13 × 5.5–7.5 μm compared to *N. creoleuca* (12.5–17 × 5–8.5 μm) (Ju & Rogers 2002). Furthermore, *N. creoleuca* has shorter stromata, measuring 3–20 mm in length, 1–8 mm in width, sometimes with inconspicuous perithecial mounds, while *N. bannaensis* has larger stromata, measuring 5–40 mm in length, 4–35 mm in width, with conspicuous perithecial mounds. Additionally, *N. creoleuca* features whitish, soft tissue between the perithecia, while the interperithecial tissue in *N. bannaensis* is blackish and carbonaceous (Ju & Rogers 2002).

***Nemania buxi*** S. H. Long & Q. R. Li. sp. nov. Fig. 20

MycoBank number: MB850417

Etymology – The specific epithet refers to the genus of host, *Buxus*.

Description – Saprobic on decaying wood. Sexual morph: Stromata 3.5–8 mm long × 3–6.5 mm wide × 0.75–1.1 mm thick, superficial, gregarious, effused-pulvinate, orbicular to irregularly elongated, often coalescent, with abrupt to sloping margins, surface dark brown, with inconspicuous perithecial contours but roughened by deep cracks and wrinkles, hard-textured, carbonaceous, interior black, entire tissue carbonaceous around the perithecia. Perithecia 0.6–0.9 mm diam. × 0.65–1 mm high, subglobose obovoid or tubular. Ostioles obtusely papillate, at times inconspicuous, black, overlain by a tan pellicle on developing stromata, the tan colour fading with age; mature stromata lacking KOH extractable pigments. Asci 140.5–199 × 5.5–9 μm ($\overline{x}$ = 170.1 × 7.5 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, the spore-bearing parts 70–80 μm ($\overline{x}$ = 75 μm, n = 30) long, with an amyloid apical apparatus, 1.5–2.5 × 1.5–2.5 μm ($\overline{x}$ = 2 × 2.1 μm, n = 30), tubular with a faint upper rim. Ascospores 10.5–12.5 × 5.5–7.5 μm ($\overline{x}$ = 11.3 × 6.4 μm, n = 30), uniseriate, unicellular, smooth, dark brown, slightly inequilateral ellipsoid, with rounded ends, with a conspicuous, straight germ slit spore-length to slightly less than spore-length on the flattened side; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics. Colonies grown on PDA, reached 6 cm in one week at 25 °C. On OA meida, white, velvety, rosette, high convex in centre, dense, white to cream from above, white irregular edge, with white from the below. No conidia were observed on PDA or OA media within three months.

Material examined – CHINA, Yunnan Province, Linxiang City, Wulao Mountain National Forest Park (23°05'8.27"N, 98°40'17.87"E), altitude: 2583 m, on branches of a plant of *Buxus* sp., 7 August 2021. Sihan Long, WLS15 (GMB0735, holotype, KUN-HKAS 131193, isotype, ex-type living culture GMBC0735).

Other Material examined – CHINA, Yunnan Province, Linxiang City, Wulao Mountain National Forest Park (23°05'10.83"N, 98°40'75.66"E), altitude: 2504 m, on branches of an unidentified plant, 7 August 2021, Sihan Long, WLS77 (GMB0790, GMBC0790).

Notes – In the phylogram (Fig. 1), *Nemania buxi* is closely related to *N. cyclobalanopsina* Y.H. Pi & Q.R. Li. Morphologically, they also share similarities, particularly in the morphology of

their ascospores. However, notable differences are evident in the stromata and perithecia size, as well as features of the ostiole (Pi et al. 2021). Specifically, the stromata of *N. cyclobalanopsina* are larger, measuring 6–26 mm long × 3.5–10 mm wide, whereas those of *N. buxi* are smaller, measuring 3.5–8 mm long × 3–6.5 mm wide (Pi et al. 2021). Additionally, *N. cyclobalanopsina* possesses ostioles that are higher than the stromatal surface, coarsely rounded-papillate, and black, without an encircling disc. In contrast, *N. buxi* has obtusely papillate ostioles, which can be at times inconspicuous, and are overlain by a tan pellicle on developing stromata, with the tan color fading with age. Furthermore, the perithecia of *N. cyclobalanopsina* are smaller, measuring 0.2–0.3 mm diam. and 0.38–0.46 mm high, whereas those of *N. buxi* are larger, measuring 0.6–0.9 mm diam. and 0.65–1 mm high (Pi et al. 2021). The ITS sequence analysis for *N. buxi* and *N. cyclobalanopsina* reveals a sequence length of 502 base pairs, with a 90.0% similarity, and 8.2% gap presence, representing 452 matching positions out of 502.

Morphologically, *N. buxi* also resembles *N. discostoma* J. Fourn. & Lechat. Both species are characterized by black stromata with major cracks on the surface, ostioles that are weakly papillate and typically have a raised-discoid base (Fournier et al. 2018). In *Nemania discostoma*, perithecia are occasionally seated on a thick layer of white soft tissue, and their perithecia are small, measuring 0.5 × 0.25 mm to 0.45–0.5 mm in diameter. In contrast to *N. discostoma*, *N. buxi* features carbonaceous tissue throughout, with the entire tissue around the perithecia being carbonaceous (Fournier et al. 2018).

***Nemania landingshanensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 21

MycoBank number: MB850418

Etymology – The specific epithet “landingshanensis” refers to the geographical location Landingshan, where the holotype specimen was collected.

Description – Saprobic on decaying wood. Sexual morph: Stromata 1–2 mm long × 1–2 mm wide × 0.65–0.95 mm high, 1-2 perithecia per stromata, rarely three, pulvinate to effused-pulvinate, rarely perithecioid, orbicular, rarely coalescent; single distribution, rarely confluent, surface slight brown to brown, dark brown to black around the ostioles, hard-textured, with inconspicuous to moderately exposed perithecial contours and usually sloping margins, internally black between ascomata, carbonaceous; subperithecial tissue black, conspicuous; does not release a coloured pigment in 10% KOH. Perithecia 0.55–0.8 mm diam. × 0.65–0.7 mm high, subglobose to depressed-spherical. Ostioles conspicuous, shiny black, broadly conic-papillate or more finely papillate at the centre of a slightly raised discoid. Asci 180.5–268 × 6–9 μm ($\overline{x}$ = 228.1 × 7.3 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, the spore-bearing parts 67–80 μm ($\overline{x}$ = 74 μm, n = 30) long, apically rounded with an amyloid apical apparatus, 2–3 wide, 2.5–4 μm high ($\overline{x}$ = 2.5 × 3 μm, n = 30), jar shape. Ascospores 10–12.5 × 5–7 μm ($\overline{x}$ = 12 × 5.5 μm, n = 30), uniseriate, unicellular, inequilateral ellipsoid to slightly fusoid, with slightly narrowly rounded ends, smooth, brown to dark brown, with a fairly conspicuous, straight, almost spore-length germ slit on the least convex side; lacking a sheath and appendage; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics. Colonies grow on PDA, reached 6 cm in one week at 25 °C, On OA media, white, velvety, rosette, high convex in centre, dense, white to cream from above, white irregular edge, slightly brown from the below. No conidia were observed on PDA or OA media within three months.

Material examined – CHINA, Guizhou Province, Maolan County, Landing Mountain National Forest Park (25.482853"N, 107.8982516"E), altitude: 454 m, dead branch of unidentified plant, 23 November 2021, Sihan Long, LDS99 (GMB0791, holotype, KUN-HKAS 131194, isotype, ex-type living culture GMBC0791).

Other Material examined – CHINA, Guizhou Province, Maolan County, Landing Mountain National Forest Park (25.486642"N, 107.899274"E), altitude: 469 m, dead branch of unidentified plant, 23 November 2021, Sihan Long, LDS168 (GMB0786, GMBC0786).

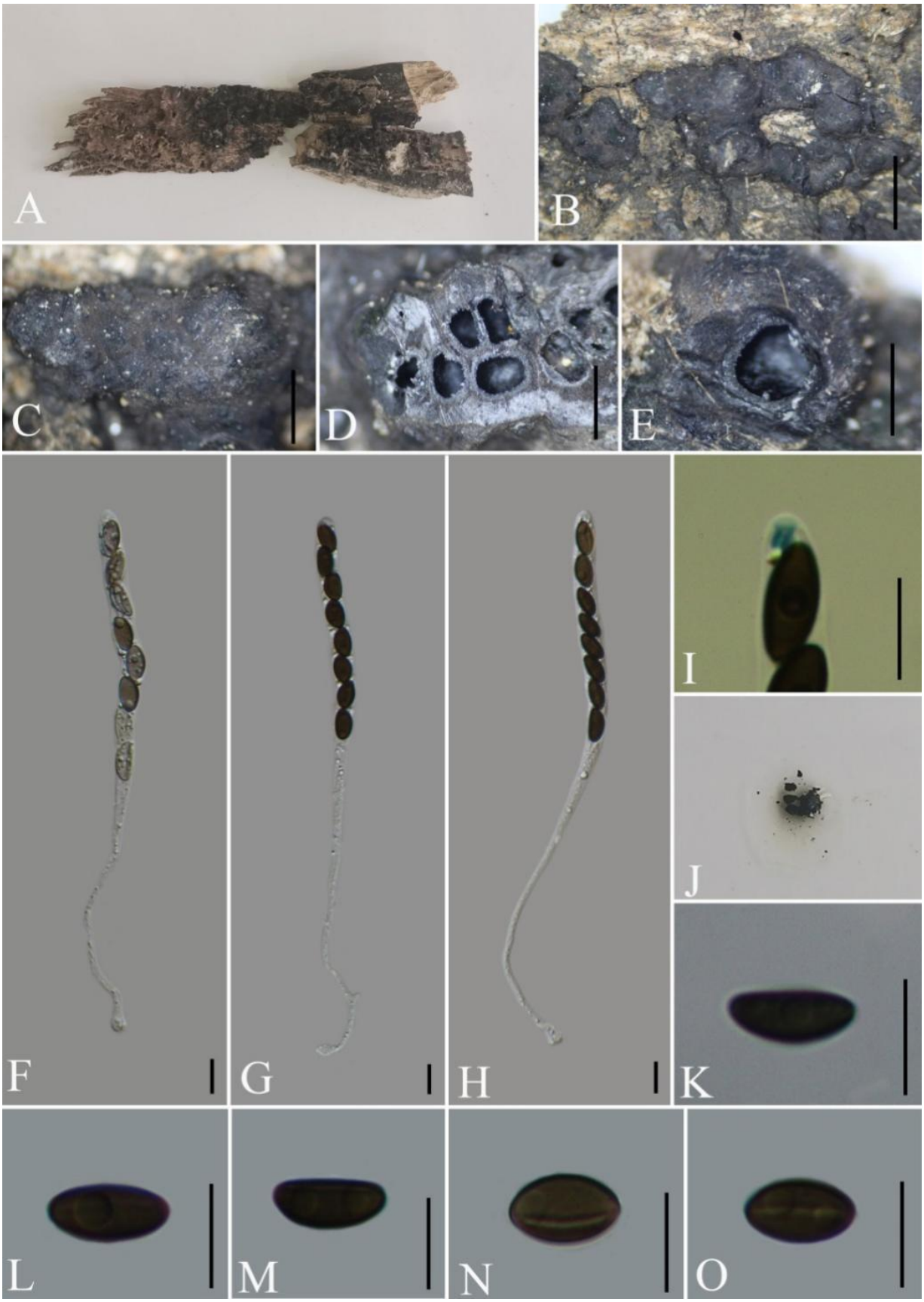


**Figure 20** – *Nemania buxi* (GMB0735, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stromata. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J pigments in KOH. K ascospore with indehiscent perispore in 10% KOH. L–O ascospores. Scale bars: B, D = 2 mm, C = 3 mm, E = 1 mm, F–I, K–O = 10 μm.

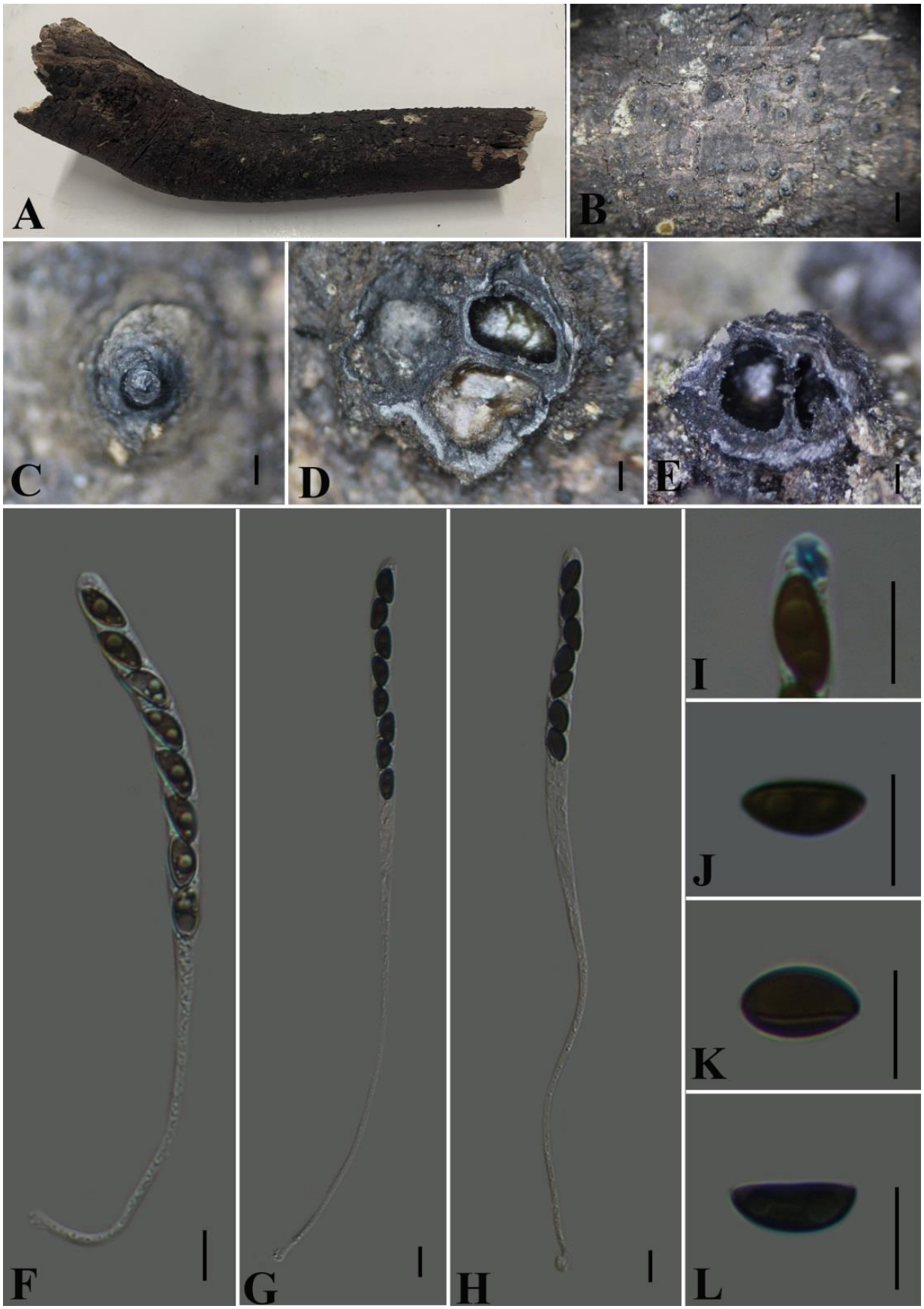


**Figure 21** – *Nemania landingshanensis* (GMB0791, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–L ascospores. Scale bars: B = 5 mm, C–E = 200 μm, F–L = 10 μm.

Notes – In our phylogram (Fig. 1), *N. landingshanensis* appeared sister to *N. camelliae* Y.H. Pi & Q.R. Li with a strong statistical support of 100/1. These two species share many similarities, but can be differentiated based on the stromatal size, surface coloration, and ostiole characteristics. *Nemania camelliae* stromata are 1.5–4 mm long × 1–2 mm wide, with a dull black surface and inconspicuous to moderately exposed perithecial contours, along with sloping margins (Pi et al. 2021). In contrast, *N. landingshanensis* stromata are slightly larger, measuring 1–4.5 mm long × 1–3.5 mm wide, with a surface that varies from slight brown to brown, with a darker brown to black area around the ostioles. *Nemania camelliae* ostioles are finely papillate, black, and conspicuously sunken in a shallow discoid depression. In contrast, *N. landingshanensis* ostioles are conspicuous either broadly conic-papillate or more finely papillate at the center and not sunken in a shallow discoid depression (Pi et al. 2021). The ITS sequence analysis of *N. landingshanensis* and *N. camelliae* shows a sequence length of 479 base pairs, with 95.8% similarity, and 2.7% gap presence.

*Nemania landingshanensis* shares morphological similarities with *N. bannaensis* but can be differentiated by the latter's larger stromata (5–40 mm long × 4–35 mm wide), coarsely papillate ostioles in discoid areas, frequently flattened, and the presence of a conspicuous germ slit on the flattened side of its ascospores (This study).

***Nemania lasiocarpae*** S. H. Long & Q. R. Li. sp. nov. Fig. 22

MycoBank number: MB850419

Etymology – The epithet refers to its host *Populus lasiocarpa* Oliv.

Description – Saprobic on *Populus lasiocarpa*. Sexual morph: Stromata 5–35 mm long × 3–7.5 mm wide × 0.7–1 mm high, pulvinate to effused-pulvinate, orbicular to irregularly lobed, with inconspicuous perithecial mounds, with sloping margins; perithecial contours barely exposed to unexposed, surface dark brown to black, carbonaceous, interior black, entirely carbonaceous around the perithecia; subperithecial tissue inconspicuous; mature stromata lacking KOH extractable pigments. Perithecia 0.4–0.55 mm diam. × 0.6–0.8 mm high, subglobose to depressed-spherical. Ostioles slightly higher than stromatal surface and with openings papillate, without encircling disc. Asci 197–251 × 9.5–13 μm ($\overline{x}$ = 227.4 × 11.3 μm, n = 30), 8-spored, unitunicate, long cylindrical, long stipitate, the spore-bearing parts 100–130 μm ($\overline{x}$ = 121 μm) long, with amyloid urn-shaped apical apparatus, 5.5–8 × 4.5–6 μm ($\overline{x}$ = 6.8 × 5.5 μm, n = 30), tubular with a faint upper rim. Ascospores 18.5–22 × 7–9 μm ($\overline{x}$ = 20.5 × 7.9 μm, n = 30), uniseriate unicellular, smooth, light brown, ellipsoid-inequilateral, with broadly and narrowly rounded ends, with a conspicuous, straight germ slit spore-length to slightly much less than spore-length on the flattened side; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics. Colonies grow on PDA, reached 6 cm in one week at 25 °C. On OA media, colonies white, velvety, rosette, high convex in centre, dense, irregular edge, white from above, orange from below. No conidia were observed on PDA or OA media within three months.

Material examined – CHINA, Yunnan Province, Yuxi City, Maojuan Mountain Scenic Area, Jinshan Primeval Forest (23°57'8.27"N, 101°30'17.87"E), altitude: 2405 m, on branches of *Populus lasiocarpa* Oliv., 7 July 2021. Sihan Long, JS18 (GMB0742, holotype, KUN-HKAS 131195, isotype, ex-type living culture GMBC0742).

Other Material examined – CHINA, Yunnan Province, Yuxi City, Maojuan Mountain Scenic Area, Jinshan Primeval Forest (23°57'91.38"N, 101°30'63.91"E), altitude: 2405 m, on branches of an unidentified plant, 7 July 2021. Sihan Long, JS89 (GMB0792, GMBC0792).

Notes – In stromata morphology, it closely resembles *N. plumbea* A.M.C. Tang, Jeewon & K.D. Hyde but can be distinguished from *N. lasiocarpae* by its smaller ascospores, measuring 13–16 × 5.4–6.6 μm (vs. 18.5–22 × 7–9 μm), with a germ slit on the concave side rather than the flattened side, which is a characteristic of the latter (Tang et al. 2007). Furthermore, *N. plumbea* features grey, soft-textured stromata with a persistent mat of white hyphae, setting it apart from the new species (Tang et al. 2007). Morphologically, *N. lasiocarpae* also resembles *N. rubi*, but it can

be easily differentiated based on ascospore morphology. *Nemania rubi* features smaller ascospores, measuring 9–12 × 4–6 μm, and lacks germ slits (Pi et al. 2021).

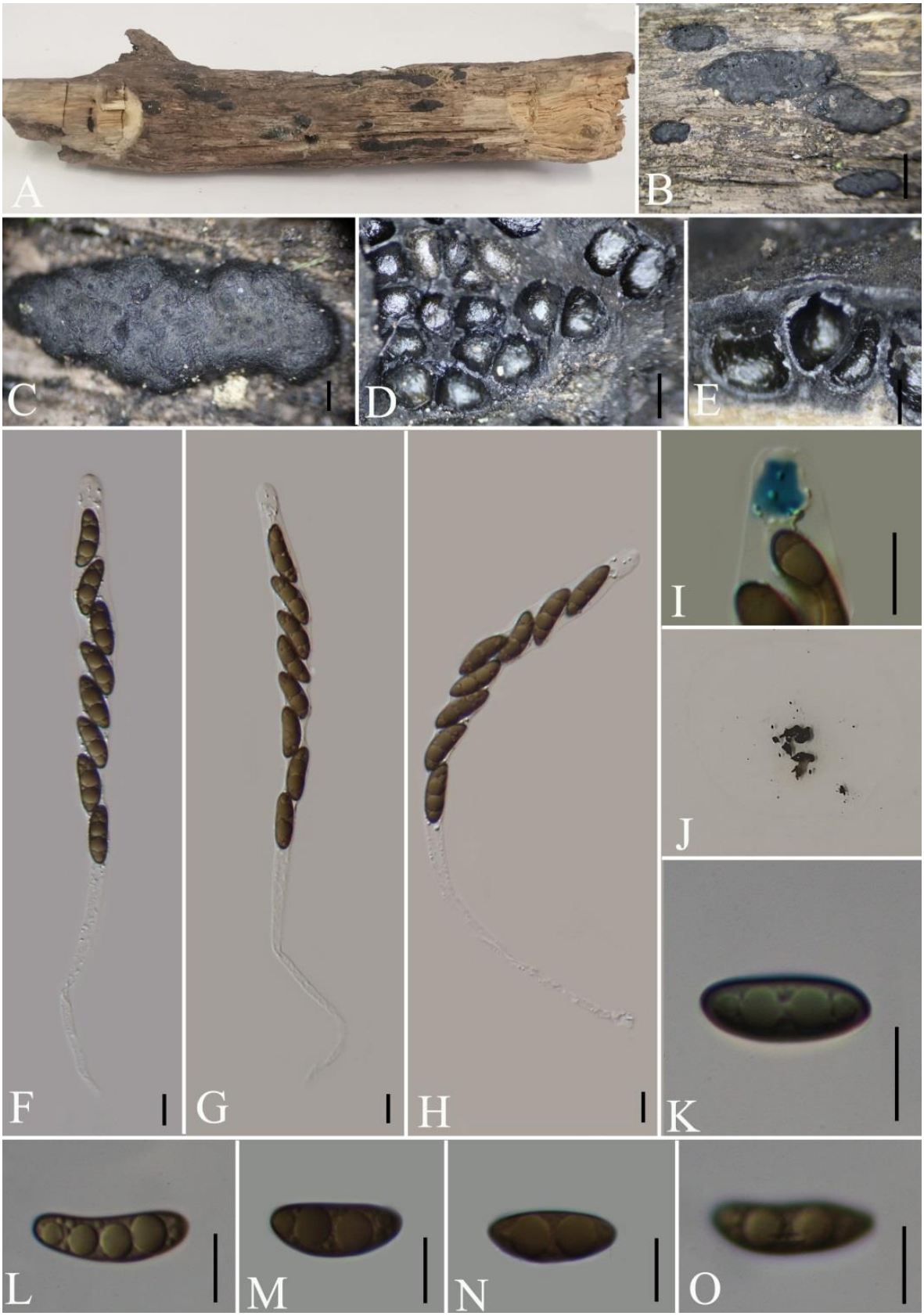


**Figure 22** – *Nemania lasiocarpae* (GMB0742, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stromata. F–H asci with ascospores. I pigment in KOH. J ascus apical apparatus (stained in Melzer's reagent). K ascospore

with indehiscent perispore in 10% KOH. L–O ascospores. Scale bars: B, C = 1 mm, D, E = 500 μm, F–I, L–O = 10 μm.

In our phylogram (Fig. 1), *Nemania lasiocarpae* appeared sister to *N. hyrcana* Pourmoghaddam, Voglmayr & Khodaparast. However, the latter can be distinguished by its stromata, which exhibit a metallic tone and conspicuous perithecial mounds. Additionally, *N. hyrcana* possesses ascospores with a straight germ slit that is much shorter than the spore-length on the dorsal side, and has a smaller apical apparatus measuring 3.5–4 μm in height and 2.5–3 μm in width (Pourmoghaddam et al. 2022). The ITS sequence analysis of *N. lasiocarpae* and *N. hyrcana* reveals a sequence length of 548 base pairs, with an 86.3% similarity, and 6.0% gap presence, representing 473 matching positions out of 548.

***Nemania leigongshanensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 23

MycoBank number: MB850420

Etymology – The specific epithet "leigongshanensis" refers to its collection location in Leigongshan.

Description – Saprobic on decaying wood. Sexual morph: Stromata 3–11.5 mm long × 1–9 mm wide × 1–1.3 mm thick, pulvinate, attached to substrate along entire area of the base, frequently confluent, with conspicuous perithecial mounds, surface dull black and slightly shiny at maturity, carbonaceous, stromatal tissue beneath perithecia light brown, stromatal tissue between the perithecia white to light brown loosely fibrous to cottony; not releasing a coloured pigment in 10% KOH. Perithecia 600–800 μm diam. × 400–700 μm high, subglobose. Ostioles slightly higher than the stromatal surface, with openings slightly papillate. Asci 183.5–277 × 5–7 μm ($\overline{x}$ = 216.3 × 6 μm, n = 30), 8-spored, unitunicate, long cylindrical, long stipitate, spore-bearing parts 65–75 μm long, apically rounded with an amyloid apical apparatus, 2–3 × 2–3 μm ($\overline{x}$ = 1.8 × 1.5 μm, n = 30), tubular with a faint upper rim. Ascospores 11–14 × 5.5–8 μm ($\overline{x}$ = 12.6 × 6.8 μm, n = 30), uniseriate, unicellular, smooth, brown to dark brown, slightly inequilateral, with narrowly rounded ends, with a germ slit running the whole ascospores length. Asexual morph: Undetermined.

Culture characteristics – Colonies grow slowly on the PDA, reached 4.5 cm in diam., in 2 weeks at 25 °C. On OA media, colonies white, thick in the middle, edges shallow, irregular bands, reverse slightlye orange. No conidia observed on PDA or OA media within three months.

Material examined – CHINA, Guizhou Province, Leishan town, Leigongshan Nature Reserve (26°20'66.28"N, 108°21'33.38"E), altitude: 802 m, on branches of an unidentified plant, 10 April 2021. Sihan Long, LGS53 (GMB0743, holotype, KUN-HKAS 131196, isotype, ex-type living culture GMBC0743).

Other Material examined – CHINA, Guizhou Province, Leishan town, Leigongshan Nature Reserve (26°20'35.34"N, 108°21'91.43"E), altitude: 834 m, on branches of an unidentified plant, 10 April 2021. Sihan Long, LGS150 (GMB0787, GMBC0787).

Notes – Morphologically, *Nemania leigongshanensis* shows resemblance to *N. immersidiscus* Van der Gucht, Y.M. Ju & J.D. Rogers as both share similar features and sized ascospores (Ju & Rogers 2002). However, *N. leigongshanensis* ostioles are slightly elevated than the stromatal surface, and their openings are slightly papillate. In contrast, ostioles in *N. immersidiscus* are finely papillate and more conspicuously sunken within a shallow discoid depression (Ju & Rogers 2002). Additionally, in *N. leigongshanensis*, the stromatal tissue beneath the perithecia presents a light brown colour, while the tissue located between the perithecia appears white to light brown. Furthermore, *N. immersidiscus* often forms a thin layer of white sterile tissue on the host surface, which persists at maturity, which distinguishing it from *N. leigongshanensis* (Ju & Rogers 2002).

In our phylogenetic analyses, *N. leigongshanensis* exhibited a close clustering with *N. lishuicola* and received robust support (96/1). Morphologically, *N. leigongshanensis* differes in having smaller ascospores 11–14 × 5.5–8 μm (vs. 12.5–17 × 5–8.5 μm) with narrowly rounded ends, while those of *N. lishuicola* had boroadly rounded ends and the stromatal tissue beneath and between the perithecia are carbonaceous and black (vs. the stromatal tissue beneath the perithecia

presents a light brown colour, while the tissue located between the perithecia appears white to light brown) (Pi et al. 2021). The ITS analysis of *N. leigongshanensis* and *N. lishuicola* reveals a sequence length of 519 base pairs, with an 88.2% identity, and 10.0% gap presence, indicating 458 matching positions out of 519.

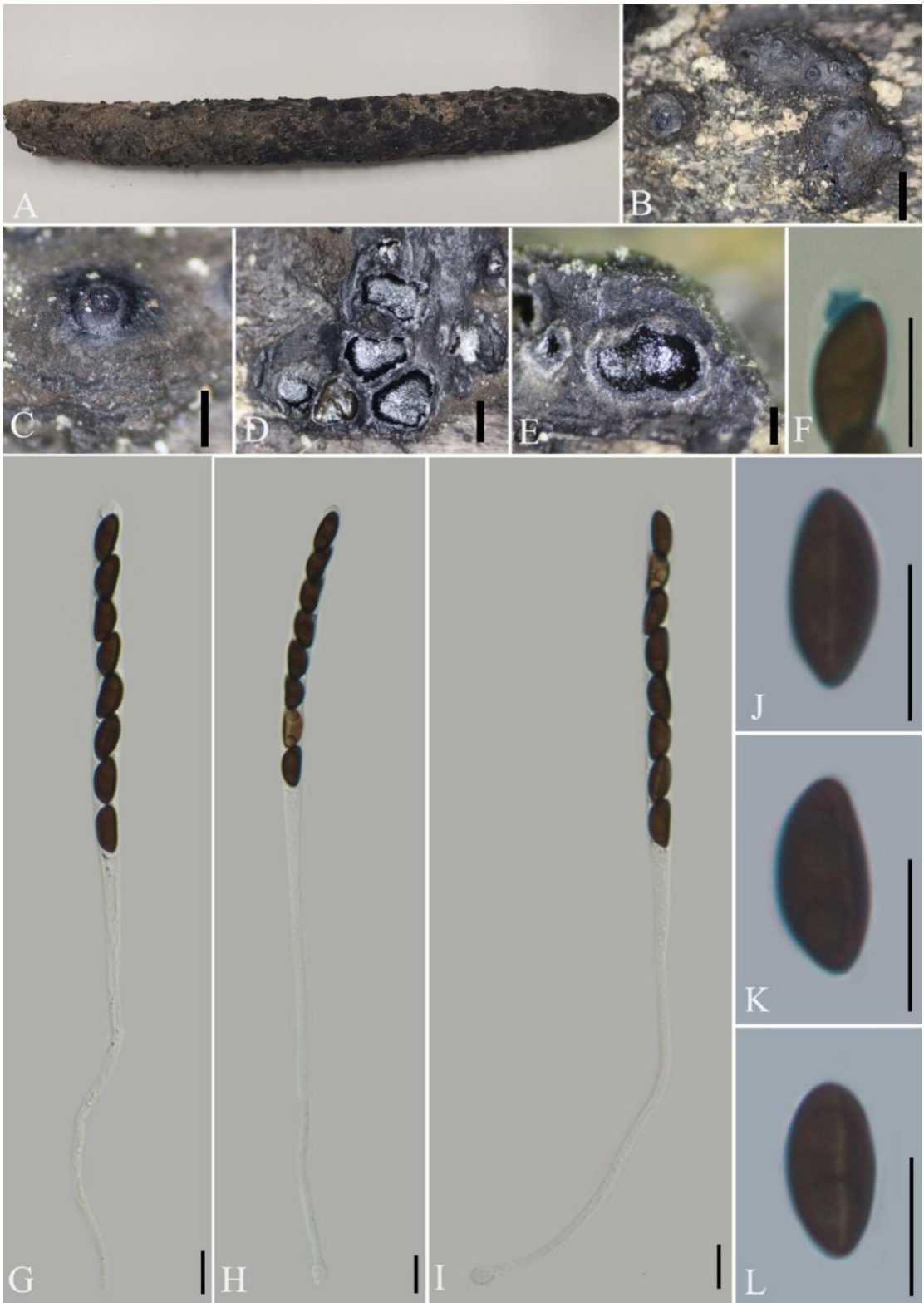


**Figure 23** – *Nemania leigongshanensis* (GMB0743, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F ascus apical apparatus (stained in Melzer's reagent). G–I asci with ascospores. J–L ascospores. Scale bars: B–C = 500 μm, D = 200 μm, F–L = 10 μm.

***Nemania mengmanensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 24

MycoBank number: MB850421

Etymology – The specific epithet “mengmanensis” refers to its collection location Mengman county.

Description – Saprobic on decaying wood. Sexual morph: Stromata 3–6 mm long × 2–5 mm wide × 1–2 mm high, 2 to many perithercia per stromata, pulvinate to effused-pulvinate, rarely perithecioid, orbicular to irregularly elongated, often coalescent; single distribution, usually confluent into irregularly elongated compound stromata, surface dark brown to dull black, hard-textured, with inconspicuous to moderately exposed perithecial contours and usually sloping margins, internally black between ascomata, carbonaceous; subperithecial tissue black, conspicuous; does not release a coloured pigment in 10% KOH. Perithecia 0.5–0.8 mm diam. × 0.7–0.8 mm high, subglobose. Ostioles conspicuous, black, broadly conic-papillate or more finely papillate at the centre of a slightly raised discoid. Asci 188.5–282 × 5.5–7.5 μm ($\overline{x}$ = 231.6 × 6.5 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, the spore-bearing parts 67–80 μm long, apically rounded with an amyloid apical apparatus, 1–3 wide, 1.5–3.5 μm high ($\overline{x}$ = 2.1 × 2.3 μm, n = 30), jar shape. Ascospores 11–13 × 5–7 μm ($\overline{x}$ = 12.1 × 6.1 μm, n = 30), uniseriate, unicellular, ellipsoid to slightly fusoid, inequilateral, with rounded ends, smooth, slight brown to dark brown, with a fairly conspicuous, straight, almost spore-length germ slit on the least convex side; lacking a sheath and appendage; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics – Colonies grow on PDA, reached 6 cm in diameter in one week at 25 °C. On OA media, Colonies white, velvety to hairy, zonnate, rosette, high convex in centre, dense, white from above, irregular edge, white from the below. No conidia were observed on PDA or OA media within three months.

Material examined – CHINA, Yunnan Province, Jinghong City, Mengman country (26°18'55.53"N, 100°56'20.51"E), 1201 m, on dead branch of unidentified plant, 23 November 2021, Sihan Long, MM2 (GMB0745, holotype, KUN-HKAS 131197, isotype, ex-type living culture GMBC0745).

Other material examined – CHINA, Yunnan Province, Jinghong City, Mengman country (26°18'63.44"N, 100°56'31.98"E), altitude: 1183 m, dead branch of an unidentified plant, 23 November 2021, Sihan Long, MM13 (GMB0793, GMBC0793).

Notes – The ascospore morphology of *N. mengmanensis* is similar to that of *N. camelliae* and *N. immersidiscus* (Ju & Rogers 2002, Pi et al. 2021). *Nemania immersidiscus* features stromata that can be much larger, with dimensions of (2.5–42 mm long × 2–12 mm wide × 0.65–1 mm thick). These stromata contain white soft tissue between and beneath the perithecia and are sometimes surrounded by white sterile tissue, forming a thin layer on the host surface. This species exhibits finely papillate, black ostioles that are more or less conspicuously sunken in a shallow discoid depression. The apical apparatus in *N. immersidiscus* measures 2.3–2.8 × 2–2.4 μm (Ju & Rogers 2002). *Nemania camelliae* has slightly smaller stromata measuring (1.5–4 mm long × 1–2 mm wide × 0.5–1 mm high) and features a small discoid depression around the ostiolar papilla, which distinguishes it from *N. mengmanensis* (Pi et al. 2021).

In the phylogram (Fig. 1), *Nemania mengmanensis* formd a clade in sister relationship with *N. bannaensis*, which is distinct in having large stromata, measuring 5–40 mm in length, with conspicuous perithecial mounds, small tubuler apical apparatus 2–3 × 1.5–2 μm (with faint upper rim). Additionally, its germ slit is spore-length to slightly less than spore-length on the flattened side, and the asci spore-bearing part is relatively large, measuring 86.5–92 μm (This study).

***Nemania subchangningensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 25

MycoBank number: MB850422

Etymology – The epithet refers to its similar species *Nemania changningensis*.

Description – Saprobic on decaying wood. Sexual morph: Stromata up to 10–23 mm long × 5.5–12.5 mm wide × 0.6–0.75 mm high, effused-pulvinate, confluent into irregularly elongated

compound stromata, irregularly lobed, plane or with inconspicuous perithecial mounds and sloping margins; surface covered with white tissue, persistent layer, with blackish-grey carbonaceous subsurface showing through in places; the tissue beneath the perithecial layer inconspicuous, greyish-white in places, the underlying wood blackened; mature stromata lacking KOH extractable pigments. Perithecia 0.35–0.5 mm diam. × 0.45–0.6 mm high, subglobose to depressed-spherical.

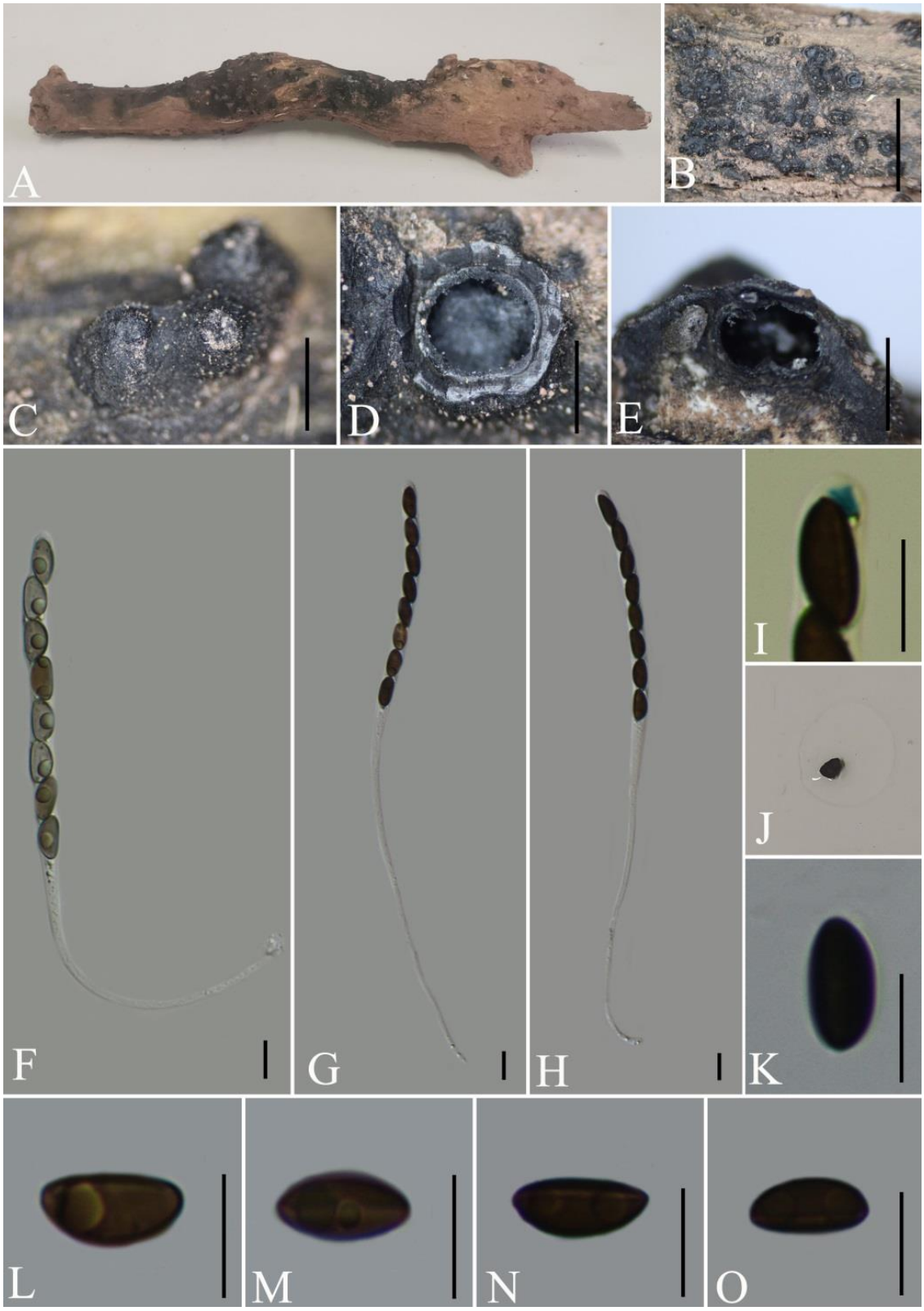


**Figure 24** – *Nemania manmengensis* (GMB0745, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stromata. F–H asci with

ascospores. I ascus apical apparatus (stained in Melzer's reagent). J pigments in KOH. K ascospore with indehiscent perispore in 10% KOH. L–O ascospores. Scale bars: B = 1 cm, C = 1 mm, D, E = 500 μm, F–I, L–O = 10 μm.

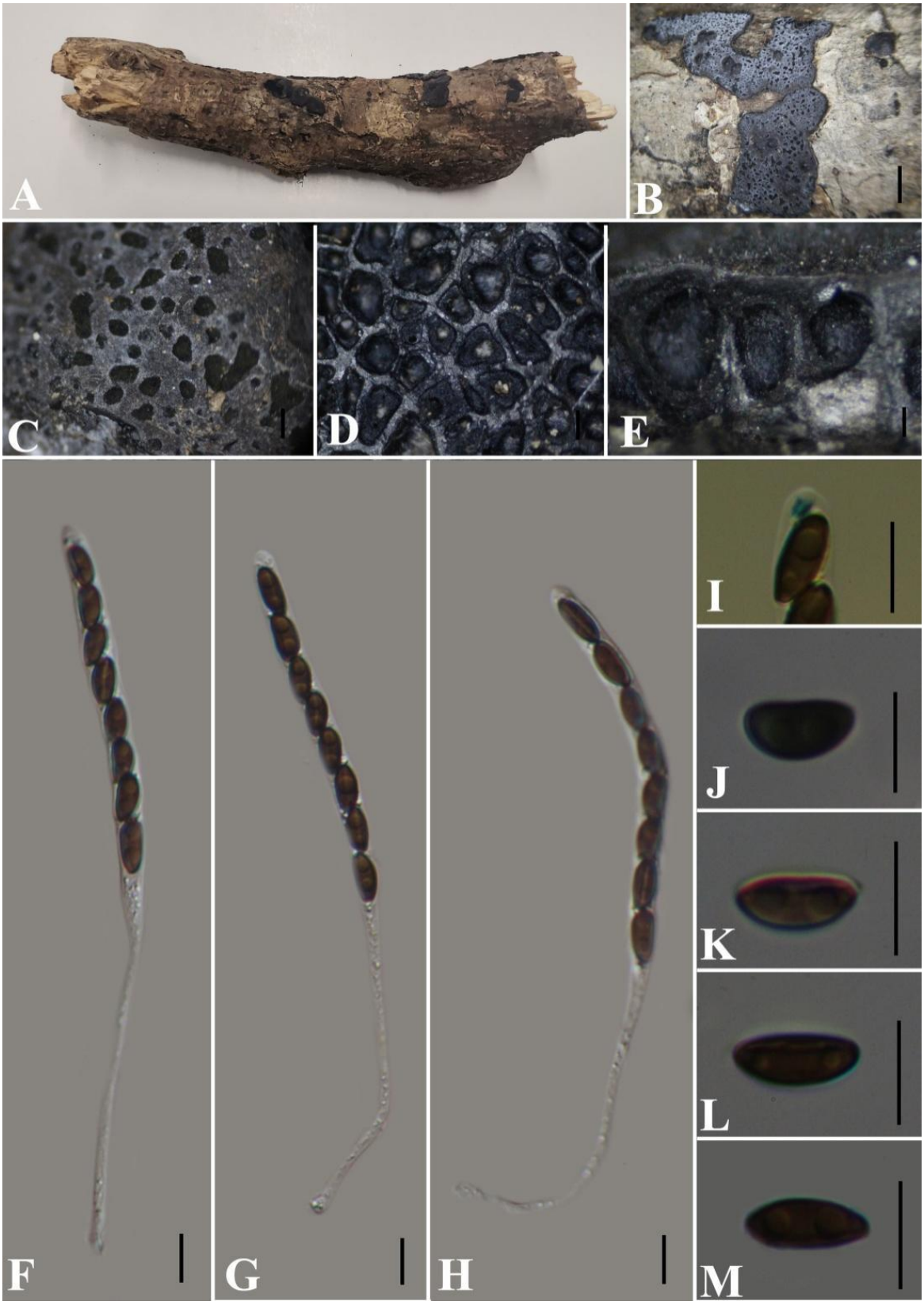


**Figure 25** – *Nemania subchangningensis* (GMB0749, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with

ascospores. I ascus apical apparatus (stained in Melzer's Reagent). J–M ascospores. Scale bars: B = 1 mm, C–E = 200 μm, F–M = 10 μm.

Ostioles slightly higher than stromatal surface and with openings papillate, often surrounded by white tissue, inconspicuous, black, without encircling disc. Asci 136.5–193.5 × 6–9 μm ($\bar{x}$ = 165.1 × 7.1 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, the spore-bearing parts 70–90 μm long, with a amyloid apical apparatus, 1.5–2 × 2–3 μm ($\bar{x}$ = 1.8 × 2.5 μm, n = 30), tubular with a faint upper rim. Ascospores 10.5–13 × 4.5–6.5 μm ($\bar{x}$ = 11.5 × 5.5 μm, n = 30), uniseriate unicellular, smooth, dark brown, slightly inequilateral, with rounded ends, with a conspicuous, straight germ slit spore-length to slightly less than spore-length on the flattened side; perispore indehiscent in 10% KOH. Asexual morph: Undetermined.

Culture characteristics. Colonies grow on PDA, reached 6 cm in one week at 25 °C. white. On OA media, colonies velvety, rosette, dense, white to cream from above, irregular edge, white from below. No conidia were observed on PDA or OA media within three months.

Material examined – CHINA, Yunnan Province, Yuxi City, Maojuan Mountain Scenic Area, Jinshan Primeval Forest (23°57'8.27"N, 101°30'17.87"E), altitude: 2405 m, on branches of an unidentified plant, 7 July 2021, Sihan Long, JS19 (GMB0749, holotype, KUN-HKAS 131198, isotype, ex-type living culture GMBC0749).

Other material examined – CHINA, Yunnan Province, Yuxi City, Maojuan Mountain Scenic Area, Jinshan Primeval Forest (23°57'48.29"N, 101°30'57 66"E), altitude: 2445 m, on branches of an unidentified plant, 7 July 2021, Sihan Long, JS103 (GMB0797, GMBC0797).

Notes – In the phylogram (Fig. 1), *N. subchangningensis* is closely related to *N. cyclobalanopsina* Y.H. Pi & Q.R. Li. However, there are distinct differences in their stromata morphology. *Nemania subchangningensis* stromata are covered with a persistent layer of white tissue, revealing blackish-grey carbonaceous sub-surface. Additionally, the ostioles in *N. subchangningensis* have papillate openings and are often surrounded by white tissue, setting it apart from *N. cyclobalanopsina* (Pi et al. 2021). The ITS sequence analysis of *N. subchangningensis* and *N. cyclobalanopsina* reveals a sequence length of 506 base pairs, with an 89.5% identity, and 8.9% gap presence, representing 453 matching positions out of 506. Morphologically, *N. subchangningensis* and *N. changningensis* Y.H. Pi & Q.R. Li share similarities in stromata morphology. However, *N. changningensis* lacks germ slits in its ascospores and possesses narrower stromata measuring 2–4 mm wide × 0.3–0.5 mm high (Pi et al. 2021).

**Key to the new species of *Nemania***

1. 10–14 μm long ascospores.....3
2. 18–22 μm long ascospore.....*N. lasiocarpae*
3. Asci on average ≥ 200 μm long.....4
3. Asci on average < 200 μm long.....7
4. Apical apparatus on average < 2 μm wide.....5
4. Apical apparatus on average ≥ 2 μm wide.....6
5. Stromata 5–40 mm long, asci 159–243 μm (average 201.7) long, apical apparatus 2.5 × 1.8 μm on average, perithecia 350–650 μm in diameter.....*N. bannaensis*
5. Stromata 3–11.5 mm long, asci 183–277 μm (average 216) long, apical apparatus 1.8 × 1.5 μm on average, perithecia 600–800 μm in diameter.....*N. leigongshanensis*
6. Stromata 1–2 mm long × 1–2 mm wide × 0.65–0.95 mm high, 1-2 perithecia per stromata, raraly three, apical apparatus 3 × 2.5 μm on average, ascospores with narrowly rounded end.....*N. landingshanensis*
6. Stromata 3–6 mm long × 2–5 mm wide × 1–2 mm high, 2 to many perithercia per stromata, apical apparatus 2.3 × 2.1 μm on average, ascospores with rounded end.....*N. mengmanensis*
7. Stromata 3.5–8 mm long, perithecia 0.6–0.9 mm in diameter.....*N. buxi*
7. Stromata 10–23 mm long, perithecia 0.35–0.5 mm in diameter.....*N. subchangningensis*

***Nigropunctata*** Samarak. & K.D. Hyde, in Samarakoon, Hyde, Maharachchikumbura, Stadler, Gareth Jones, Promputtha, Suwannarach, Camporesi, Bulgakov & Liu, Fungal Diversity 112: 68 (2022).

The genus *Nigropunctata*, typified by *N. bambusicola* Samarak. & K.D. Hyde, has recently been introduced within the Xylariales. *Nigropunctata* species are characterized by immersed ascomata with a thick clypeus, white or yellow ectostroma, cylindrical shape with a short pedicel, apically rounded asci that stain amyloid and possess discoid or inverted, hat-shaped apical apparatus, as well as cylindrical to broadly ellipsoidal, aseptate ascospores with a germ slit (Samarakoon et al. 2022). The genus comprises three species, all of which are found on dead bamboo. The multigene phylogeny presented by Samarakoon et al. (2022) demonstrates that *Nigropunctata* clusters independently within Xylariales. However, in our own phylogram, it does not cluster independently but rather shares a clade with *Anthostomella*. In this study, we introduce a new species to this genus based on a combination of morphological and multilocus phylogenetic assessments.

***Nigropunctata khalidii*** Y. P. Wu & Q. R. Li. sp. nov. Fig. 26

MycoBank number: MB850423

Etymology – The epithet "khalidii" pays tribute to the renowned Pakistani mycologist, Prof. Abdul Nasir Khalid, in recognition of his valuable contributions to the field of mycology.

Description – Saprobic on dead bamboo culms. Sexual morph: Ascomata 608–782 × 762–830 μm ($\overline{x}$ = 683 × 782 μm, n = 10), immersed under a black, poorly developed clypeus, visible as black, circular dots, solitary, scattered, in cross-section subglobose. Ostioles papillate on the centre, black. Peridium 11–16 μm ($\overline{x}$ = 13 μm, n = 10) wide, comprising several layers, outer layer brown, comprising brown to dark brown cells, inner layer thin, composed of hyaline, thin-walled cells of *textura angularis*. Paraphyses 3.6–5.4 μm ($\overline{x}$ = 4.3 μm, n = 10) wide, shorter than the asci, numerous, filamentous, sinuous, septate, constricted at septa, guttulate. Asci 146–173 × 8.6–13.6 μm ($\overline{x}$ = 162 × 11.3 μm, n = 30), 8-spored, unitunicate, long-cylindrical, short pedicellate, apically rounded, discoid amyloid apical apparatus, 2.3–3.1 × 2.7–3.7 μm ($\overline{x}$ = 2.7 × 3.4 μm, n = 30). Ascospores 14.8–18 × 6.3–9 μm ($\overline{x}$ = 16 × 7.4 μm, n = 30), uniseriate, unicellular, brown to dark brown, oblong to broadly ellipsoidal, guttulate, lack germ slit. surrounded by a mucilaginous sheath (3.4–4.4 μm; $\overline{x}$ = 4 μm, n = 30) wide. Asexual morph: undetermined.

Material examined – CHINA, Guangdong Province, Zhaoqing City, Dinghu Mountain National Nature Reserve (23.104238°N, 113.346816°E), altitude: 810 m, on dead bamboo, 12 September 2020, Qirui Li, 2020DH13-2 (GMB1156, holotype; KUN-HKAS 131201, isotype; no culture was obtained).

Notes – Morphologically, *N. khalidii* can be readily distinguished from all the *Nigropunctata* species by lacking a germ slit of ascospore. Additionally, *N. nigrocircularis* Samarak. & K. D. Hyde differs by its small ascomata measuring 450–535 × 455–560 μm and an apical apparatus measuring 1.2–2.5 × 3.2–3.6 μm, while *N. bambusicola* Samarak. & K.D. Hyde differs with small ascomata 285–315 × 260–340 μm and discoid, inverted hat-shaped (1.7–2 × 4–4.8 μm) ascal apical apparatus, and *N. thailandica* Samarak. & K.D. Hyde exhibits larger ascal apical apparatus 4.5–6 μm (Samarakoon et al. 2022). Morphologically, it also shares resemblances with *Anthostomella tenacis*. However, *An. tenacis* is distinct in having globose ascomata with smaller asci 65–90 × 6–9 μm, and smaller ascospores measuring 7.5–12.5 × 5–6.5 μm with full length germ slit (Lu & Hyde 2000). The ITS sequence of *N. khalidii* exhibits similarity to that of *N. thailandica*, with a sequence length of 457 base pairs, featuring a 91.5% identity and similarity, with 7.4% gap presence, representing 418 matching positions out of 457.

***Pandanicola*** K.D. Hyde, Sydowia 46(1): 35 (1994).

Notes – *Pandanicola*, a genus delineated by K. D. Hyde, is characterized by immersed ascomata under a black, shiny, dome-shaped clypeus, paraphyses in a gelatinous matrix, broad cylindrical asci without an apical apparatus, and reddish-brown unicellular ascospores featuring

thick, smooth walls and polar germ pores (Hyde 1994). Currently, this genus comprises only two known species. Notably, molecular data for *Pandanicola* are not available in GenBank. In this study, we introduce a novel species, *Pandanicola guizhouensis* based on morphoanatomical observations, and provides a comprehensive analysis combining multigene molecular analysis.

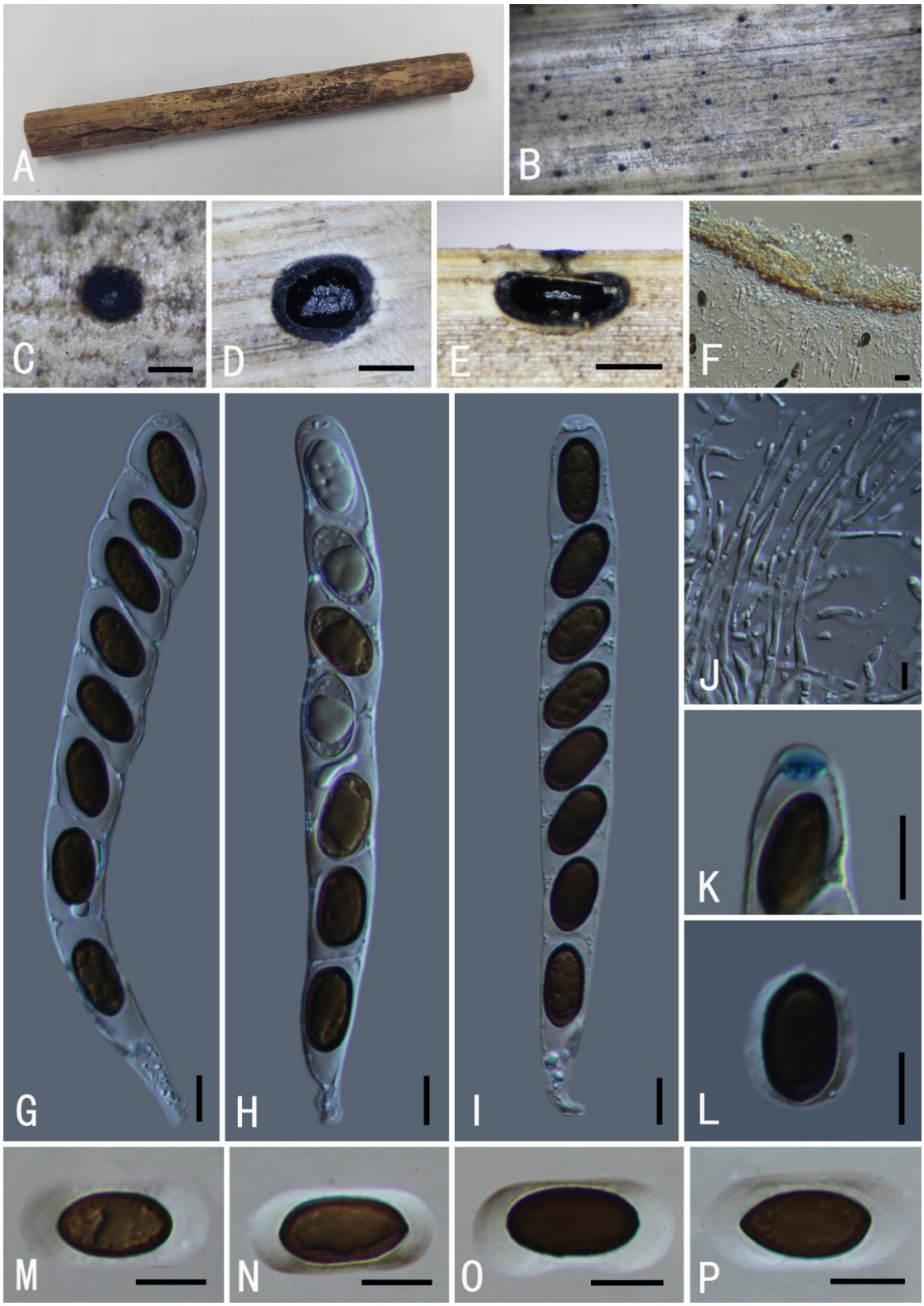


**Figure 26** – *Nigropunctata khalidii* (GMB1156, holotype). A type material. B, C ascomata. D transverse section of ascomata. E longitudinal section of ascomata. F section of ascomata. G–I asci with ascospores. J paraphyses. K ascus apical apparatus (stained in Melzer's reagent). L–P ascospores. Scale bars: C = 0.3 mm, D, E = 0.5 mm, F–P = 10 μm.

***Pandanicola guizhouensis*** Y.P. Wu & Q.R. Li. sp. nov. Fig. 27

MycoBank number: MB850424

Etymology – The specific epithet refers to its collection location, Guizhou province.

Description – Saprobic on dead bamboo. Sexual morph: Ascomata 582–634 × 316–378 µm ($\overline{x}$ = 608 × 352 µm, n = 10), immersed under a black, poorly developed clypeus, solitary, slightly raised, dome-shaped areas, globose in vertical section. Ostioles papillate at the centre, black. Peridium 16–24 µm ($\overline{x}$ = 18 µm, n = 10) wide, comprising several layers, outer layer brown, thick-walled angular cells, inner layer hyaline. Paraphyses 3.3–5.4 µm ($\overline{x}$ = 4.6 µm, n = 10) wide, shorter than the asci, hyaline, unbranched, without septa. Asci 173–202 × 10.8–14.2 µm ($\overline{x}$ = 188 × 12.6 µm, n = 30), 8-spored, unitunicate, long cylindrical, short pedicellate, apically rounded, apical apparatus not blue in Melzer's reagent. Ascospore*s* 21.4–25.2 × 8.8–10.8 µm ($\overline{x}$ = 23.6 × 9.4 µm, n = 30), uniseriate, unicellular, smooth, light brown, oblong, with narrowly rounded ends, with short germ slits at both ends, surrounded by a mucilaginous sheath (4.3–7.2 µm wide; $\overline{x}$ = 5.2 µm, n = 30), lacking appendages. Asexual morph: undetermined.

Material examined – CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315530°N, 107.103724°E), altitude: 1544 m, on dead wood of bamboo, 2 May 2022, Youpeng Wu 2022KKS5 (GMB1157, holotype; KUN-HKAS 131199, isotype; no culture was obtained).

Other examined material – CHINA, Guizhou Province, Suiyang County, Kuankuoshui Nature Reserve (28.315632°N, 107.103814°E), altitude: 1546 m, on dead bamboo, 2 November 2022, Youpeng Wu, 2022KKS44 (GMB1158; KUN-HKAS 131200; no culture was obtained).

Notes – Morphologically, *Pandanicola guizhouensis* closely resembles *P. calocarpa* (Syd. & P. Syd.) K.D. Hyde. However, *P. calocarpa* has larger, reddish-brown ascospores measuring 24–30 × 12–14 µm, lacks mucilaginous sheaths, which are present in *P. guizhouensis* (Hyde 1994). Another closely related species, *P. graminella*, can be distinguished from *P. guizhouensis* by its smaller ascomata measuring 190 × 140 µm and ascospores 17.5–24 × 10–14 µm (Lu & Hyde 2000).

Phylogenetically (Fig. 1), *P. guizhouensis* is closely related to *Anthostomella yunnanensis*. However, *Anthostomella yunnanensis* can be easily distinguished by the presence of a visible blue apical apparatus in Melzer's reagent and a straight germ slit that is nearly the same length as the spore (This study).

***Rosellinia*** De Not., G. bot. ital. 1(1): 334 (1844).

Notes – *Rosellinia* De Not. proposed in 1844 with *R. aquila* (Fr.) De Not. as its type species, is an important cosmopolitan genus. *Rosellinia* species are characterized by their superficial, subglobose to semiglobose, mammate to cupulate or conical, ostiolate, uniperitheciate, brown to black stromata seated within a subiculum. They possess cylindrical, stipitate asci with amyloid ascal apical plugs typically exhibiting a rounded, angular, or indistinct bulge at the upper rim, plugs often being higher than wide. Most species of *Rosellinia* feature unicellular ascospores with a germ slit. The anamorphs associated with this genus can be geniculosporium-like, nodulisporium-like, or dematophora-like (Petrini 2013a). The genus is represented by approximately 150 species, worldwide (Petrini 2013a, b, Li et al. 2015c, Su et al. 2016, Xie et al. 2019, Long et al. 2022). The research efforts of Teng (1963), Tai (1979), Ju & Rogers (1990, 1999), Yuan & Zhao (1993), Lu et al. (2000), Liu et al. (2010), Petrini (2013a, b), Li & Guo (2015, 2016, 2018), Li et al. (2015c), Su et al. (2016), Xie et al. (2019) and Long et al. (2022) have collectively led to the documentation of a remarkable 51 *Rosellinia* species in China. This extensive cataloging effort underscores the rich diversity of this genus within the country. In this study, we introduce seven new species within this genus and document one new record.

***Rosellinia cerasi*** S.H. Long & Q.R. Li. sp. nov. Fig. 28

MycoBank number: MB850425

Etymology – The specific epithet "cerasi" refers to the host, *Cerasus* sp.

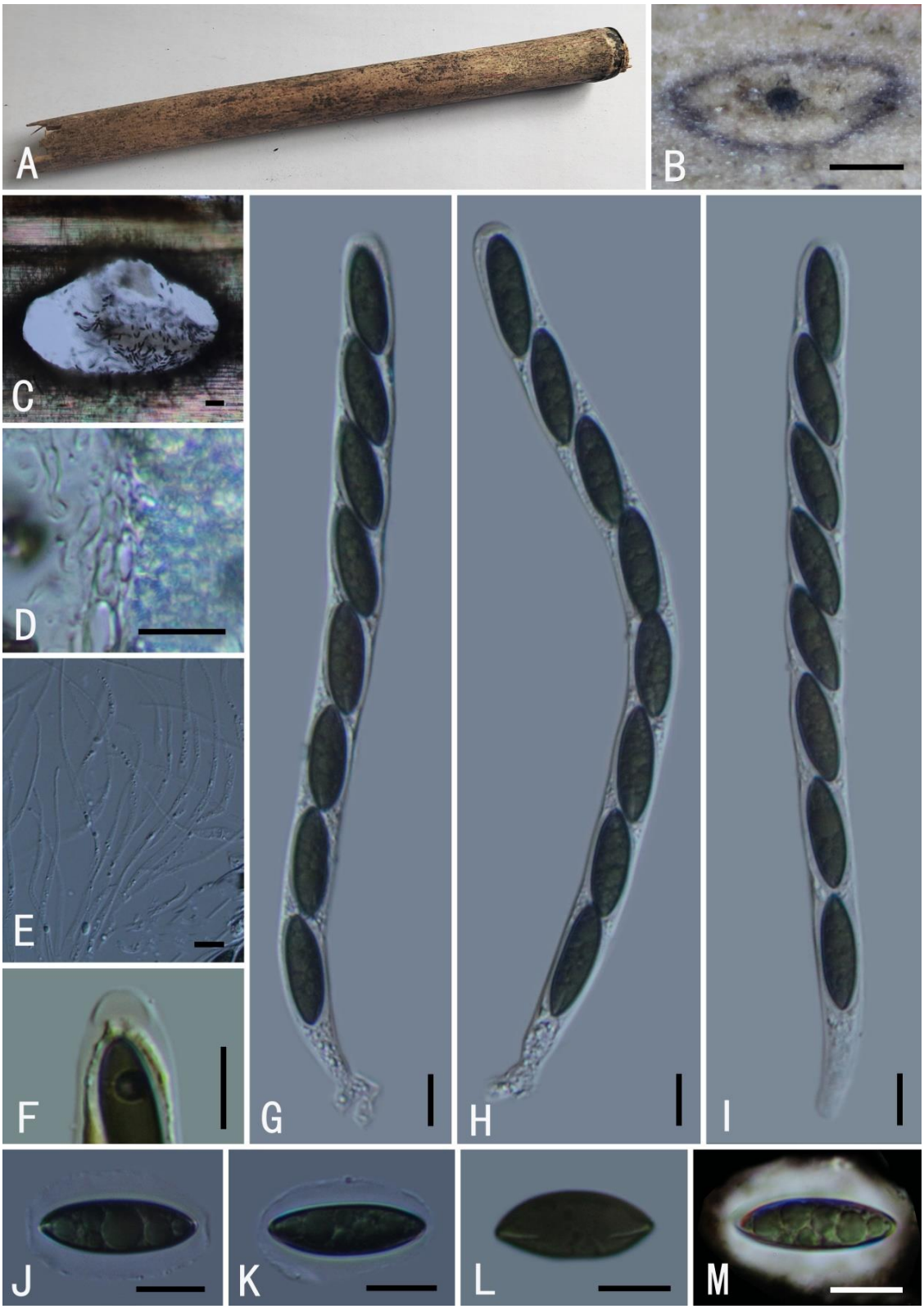


**Figure 27** – *Pandanicola guizhouensis* (GMB1157, holotype). A type material. B ascomata. C, D section of ascomata. E paraphyses. F ascus apical apparatus (stained in Melzer's reagent). G–I asci with ascospores. J–M ascospores (M stained in India ink). Scale bars: B = 0.4 mm, C = 40 μm, D–M = 10 μm.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Subiculum felted, brown to dark brown, persistent. Stromata 650–900μm high × 700–1000 μm diam. ($\overline{x}$ = 790 × 900 mm, n = 20), superficial, scattered to gregarious, solitary, globose, pyriform, dark brown – black,

shiny, carbonaceous. Ostioles black, papillate. Ectostroma 45–80 µm thick, black, carbonaceous. Entostroma disappearing at maturity. Perithecia filling entirely the stroma cavity. Asci 148.5–195.5 × 21–26 µm ($\bar{x}$ = 167.2 × 24.7 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded, with a long amyloid barrel-shaped apical apparatus in Melzer's reagent, 11.5–15.5 µm high, 7–10 µm wide. Ascospores 52.5–72 × 8–10 µm ($\bar{x}$ = 60.5 × 8.9 µm, n = 30), slightly overlapping uniseriate, fusiform, asymmetrically ellipsoidal, with rounded ends, hyaline when immature, slight brown to brown at maturity, straight to curved, lacking germ slit, lacking appendages and sheath. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours. Colonies on OA white, thin, fluffy, medium dense, irregular edge, white from above, reverse side white at margin, slightly brown at centre. No conidia observed on PDA or OA media within three months.

Material examined – CHINA, Sichuan Province, Gulin County, Li Moushan National Forest Park (23°10'3.71"N, 112°32'20.40"E), altitude: 1100 m, on the dead branch of Cerasus sp., 14 August 2022, Sihan Long, HJLL37 (GMB0755, holotype, KUN-HKAS 131202, isotype; ex-type GMBC0755).

Other material examined – CHINA, Sichuan Province, Gulin County, Li Moushan National Forest Park (23°10'10.66"N, 112°32'34.64"E), altitude: 1106 m, dead branch of unidentified plant, 14 August 2022, Sihan Long, HJLL63 (GMB0794, GMBC0794).

Notes – In the phylogenetic tree (Fig. 1), *Rosellinia cerasi* appears to be closely related to *R. yaorenshanensis*, but it can be easily distinguished from *R. yaorenshanensis* by the absence of a germ slit and sheath on its ascospores.

Morphologically, *R. cerasi* belongs to the *R. emergens* group (Petrini 2013a). Species with similar ascospore dimensions include *R. emergens* Sacc. and *R. horrida* Hazsl. However, *R. cerasi* differs from *R. emergens* and *R. horrida* in that it lacks a germ slit on its ascospores. Additionally, the stromata of *R. emergens* (450–825 µm high × 525–800 µm diameter) are smaller in size compared to those of *R. cerasi* (650–900 µm high × 700–1000 µm diameter) (Petrini 2013a).

***Rosellinia guiyangensis*** S.H. Long & Q.R. Li. sp. nov. Fig. 29

MycoBank number: MB850426

Etymology – The specific epithet "guiyangensis" refer to the its location, Guiyang City.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Subiculum felted, dark brown to black, restricted to rim around stromata, persistent. Stromata 0.7–1.1 mm high × 0.8–1.2 mm diam. ($\bar{x}$ = 0.94 × 0.9 mm, n = 20), superficial, scattered to gregarious, solitary, subglobose, with a conical pointed top, lower half embedded in the subiculum, dark, shiny, carbonaceous. Ostioles black, papillate. Ectostroma 80–120 µm thick, black, carbonaceous. Entostroma black. Perithecia globose, 550–620 µm high, 610–920 µm diam. Asci 201–259.5 × 10–15 µm ($\bar{x}$ = 231.3 × 12.1 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded, with a long amyloid urn-shaped apical apparatus in Melzer's reagent, 12–15.5 µm high, 4–7 µm wide. Ascospores 23.5–31 × 9–13 µm ($\bar{x}$ = 27 × 10.5 µm, n = 30), overlapping uniseriate, fusiform, asymmetrically ellipsoidal, ends rounded or pointed, hyaline when immature, slight brown to brown at maturity, smooth, straight to curved, with a germ slit running the entire length of the spores, entirely surrounded by a thin slimy sheath visible in water and in black ink, with a 2–3.5 µm wide 2.3–3.5 µm long, semiglobose, cellular appendages at one end. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours, colonies on PDA reached 6 cm diameter in 1 week. On OA media, colonies white, fluffy, dense but thinning towards edge, medium dense, white from above, irregular edge, reverse white at margin, white to pale brown at centre. No conidia observed on PDA or OA media within three months.

Material examined – CHINA, Guizhou Province, Guiyang City, Guizhou Medical University, Back Mountain (26°22'31.28"N, 106°38'18.38"E), altitude: 1011 m, dead branch of unidentified plant, 23 October 2022, Sihan Long, G35 (GMB0769, holotype; KUN-HKAS131203, isotype; ex-type culture GMBC0769).

Other Material examined – CHINA, Guizhou Province, Guiyang City, Guizhou Medical University, Back Mountain (26°22'93.10"N, 106°38'33.09"E), altitude: 1029 m, dead branch of unidentified plant, 23 October 2022, Sihan Long, G40 (GMB0798, GMBC0798).

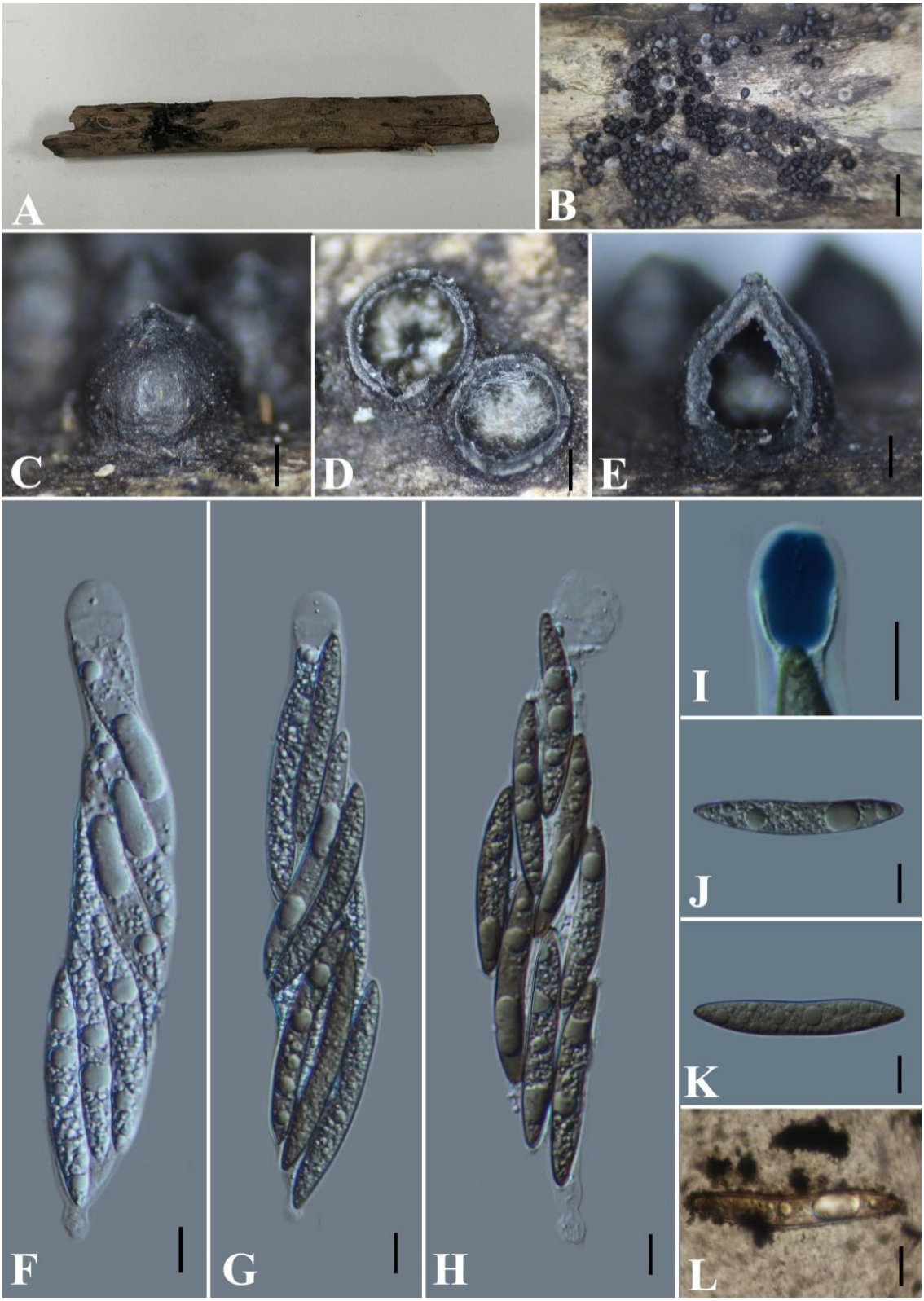


**Figure 28** – *Rosellinia cerasi* (GMB0755, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–K ascospores. L ascospores in black ink. Scale bars: B = 1 cm, C–E = 200 μm, F–L = 10 μm.

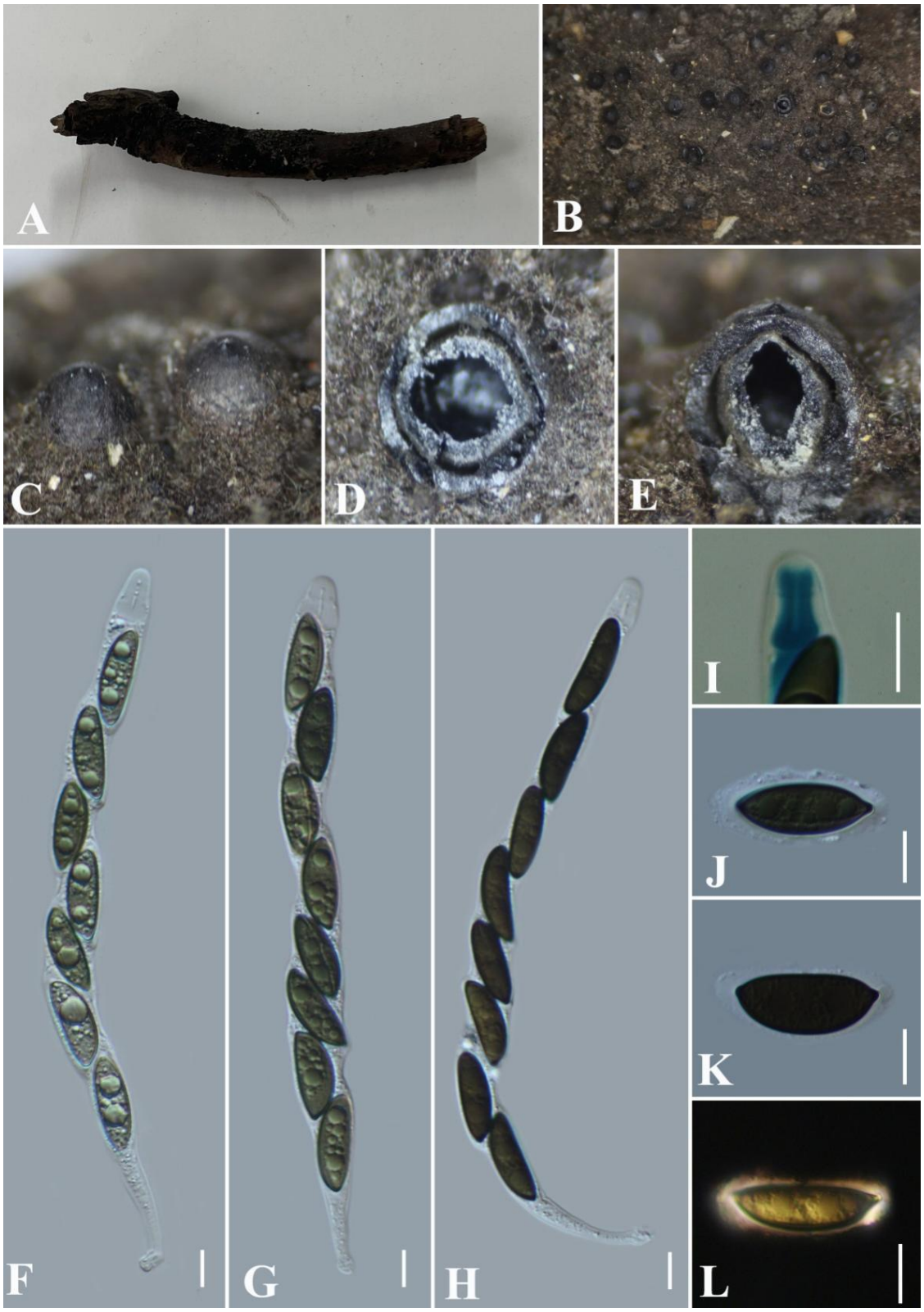


**Figure 29** – *Rosellinia guiyangensis* (GMB0769, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's Reagent). J–K ascospores. L ascospores in black ink. Scale bars: F–L = 10 μm.

Note – Morphologically, *Rosellinia guiyangensis* is closely related to *R. caudata* Petch and *R. guizhouensis*. However, the ascospores of *R. guiyangensis* are wider than those of the latter two species (23.5–31 × 9–13 μm in *R. guiyangensis*, 22.5–28.5 × 7–9.5 μm in *R. guizhouensis*, and

23.2–27.6 × 8.1–9.9 µm in *R. caudata*) (Petrini 2013a). Additionally, the size of the apical apparatus in *R. guiyangensis* is larger than those in *R. guizhouensis* and *R. caudata* (12–15.5 × 4–7 µm in *R. guiyangensis*, 10–14.5 × 4.5–6 µm in *R. guizhouensis*, and 6.0–9.0 × 4.0–5.0 µm in *R. caudata*). Moreover, ascospores of *R. guizhouensis* lack appendages. Morphologically, *R. guiyangensis* belongs to the *R. aquila* group (Petrini 2013a). Species with similar ascospore dimensions include *R. corticium* (Schwein.) Sacc (phylogenetically also closely related). However, *R. corticium* is readily distinguished from *R. guiyangensis* in having dark brown to reddish-brown subiculum covering young stromata completely that becoming gradually reduced (vs. dark brown to black, restricted to rim around stromata and persistent), and asci with a smaller apical apparatus (6–11 µm high and 4–6 µm diam.) (Petrini 2013a). The ITS sequence analysis of *R. guiyangensis* and *R. corticium* demonstrates a sequence length of 410 base pairs, with a 91.0% identity and similarity, and a minimal 1.5% gap presence, representing 373 matching positions out of 410.

***Rosellinia guizhouensis*** S.H. Long & Q.R. Li. sp. nov. Fig. 30

MycoBank number: MB850427

Etymology – The specific epithet "guizhouensis" refer to its locality, Guizhou Province.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Subiculum felted, dark brown to black, restricted to rim around stromata, persistent. Stromata 1.1–1.6 mm high × 1.5–1.9 mm diam. ($\overline{x}$ = 1.4 × 1.65 mm, n = 20), superficial, scattered to gregarious, solitary, globose, with a conical pointed top, dark, shiny, carbonaceous. Ostioles black, papillate. Ectostroma 170–250 µm thick, black, carbonaceous. Entostroma black. Perithecia globose, 850–1205 µm high, 1025–1620 µm diam, partly collapsed. Asci 196–240 × 8–11.5 µm ($\overline{x}$ = 213 × 9.2 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded, with a long amyloid barrel-shaped apical apparatus in Melzer's reagent, 10–14.5 µm high, 4.5–6 µm wide. Ascospores 22.5–28.5 × 7–9.5 µm ($\overline{x}$ = 25.6 × 8.5 µm, n = 30), slightly overlapping uniseriate, fusiform or long ellipsoid, asymmetrically ellipsoidal, ends rounded, hyaline when immature, slight brown to brown at maturity, smooth, straight to curved, with a germ slit running the entire length of the spores, surrounded by a thin slimy sheath visible in water and in black ink, lacking appendages. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours. Colonies on OA white became very light brown, medium dense, irregular edge, white from above, reverse white at margin, light yellow at centre. No conidia observed on PDA or OA media within three months.

Material examined – CHINA, Guizhou Province, Sandu Shui Autonomous County, Yao Ren Shan National Forest Park (25°56'31.11"N, 107°57'0.77"E), altitude: 563 m, dead branch of unidentified plant, 23 November 2021, Sihan Long YRS26 (GMB0084, holotype, KUN-HKAS 131204, isotype; ex-type GMBC0084).

Other Material examined – CHINA, Guizhou Province, Sandu Shui Autonomous County, Yao Ren Shan National Forest Park (25°56'69.99"N, 107°57'33.68"E), altitude: 571 m, on dead branch of unidentified plant, 23 November 2021, Sihan Long YRS109 (GMB0799, GMBC0799).

Notes – Morphologically *R. guizhouensis* belongs to the *R. aquila* group (Petrini 2013a). Species with similar ascospore dimensions include *R. corticium* (Schwein.) Sacc., *R. aquila* (Fr.) Ces, and *R. leopoldensis* L.E. Petrini. However, the apical apparatus of *R. guizhouensis* are larger compared to them (10–14.5 µm high, 4.5–6 µm wide in *R. guizhouensis*; 4.5–9 µm high, 3.5–5.5 µm wide in *R. aquila*; 5.5–12.5 µm high, 3.5–8 µm wide in *R. corticium*; 5.5–7 µm high, 3–4.5 µm wide in *R. leopoldensis*) (Petrini 2013a). Moreover, *Rosellinia corticium* is set apart from *R. guizhouensis* in having ascospores with typically one cellular appendage on the lower end and occasionally an additional cellular appendage on the upper end (Fournier et al. 2017). The discussion with its phylogenetically close relative has been addressed in the notes section of *R. guiyangensis.*

***Rosellinia limushanensis*** S.H. Long & Q.R. Li. sp. nov. Fig. 31

MycoBank number: MB850428

Etymology – The specific epithet “limushanensis” refers to the location where this species was discovered, which is Limushan National Forest Park.

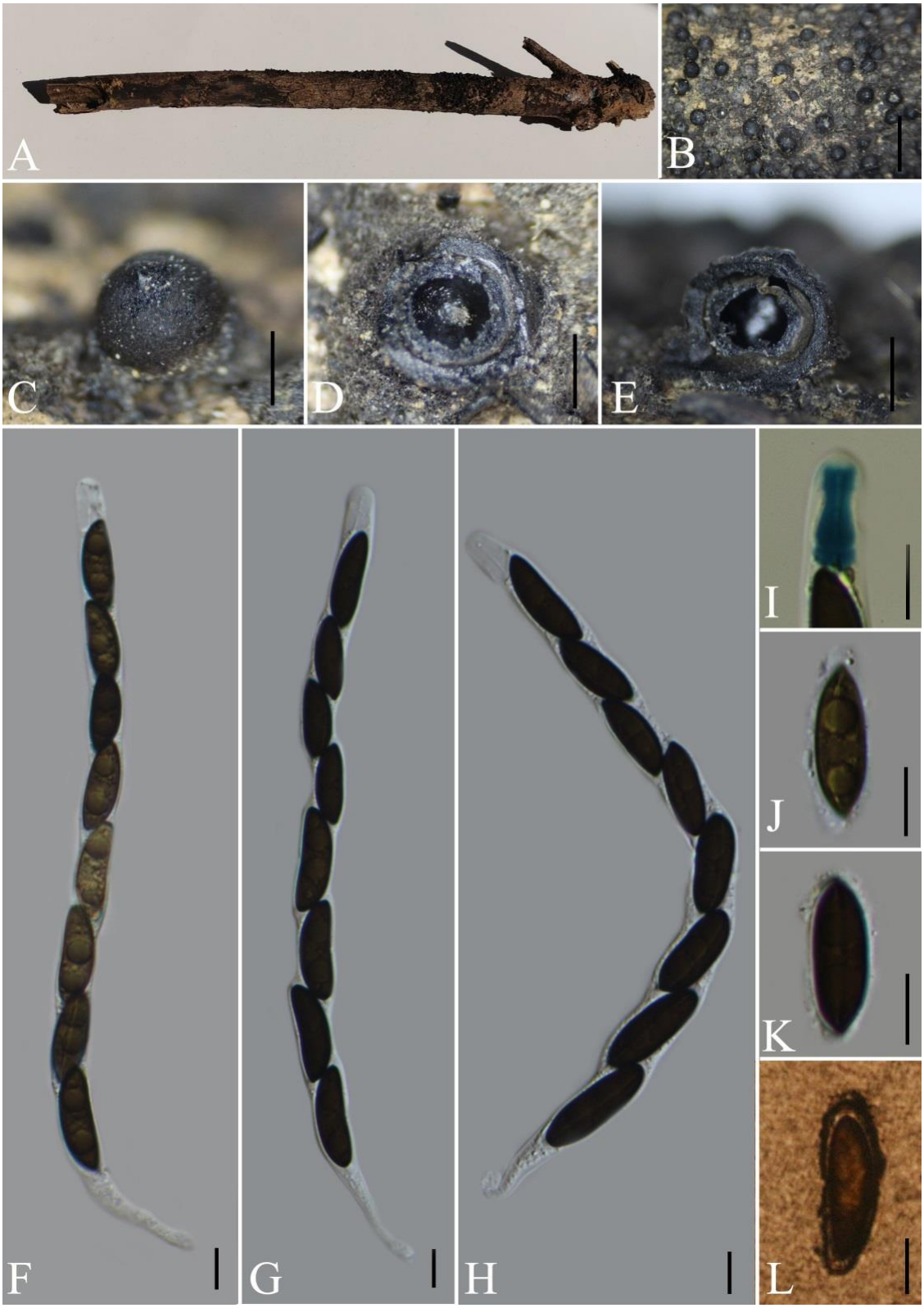


**Figure 30** – *Rosellinia guizhouensis* (GMB0084, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer’s reagent). J–K ascospores. L ascospores in black ink. Scale bars: B = 5 mm, C–E = 1 mm, F–L = 10 μm.

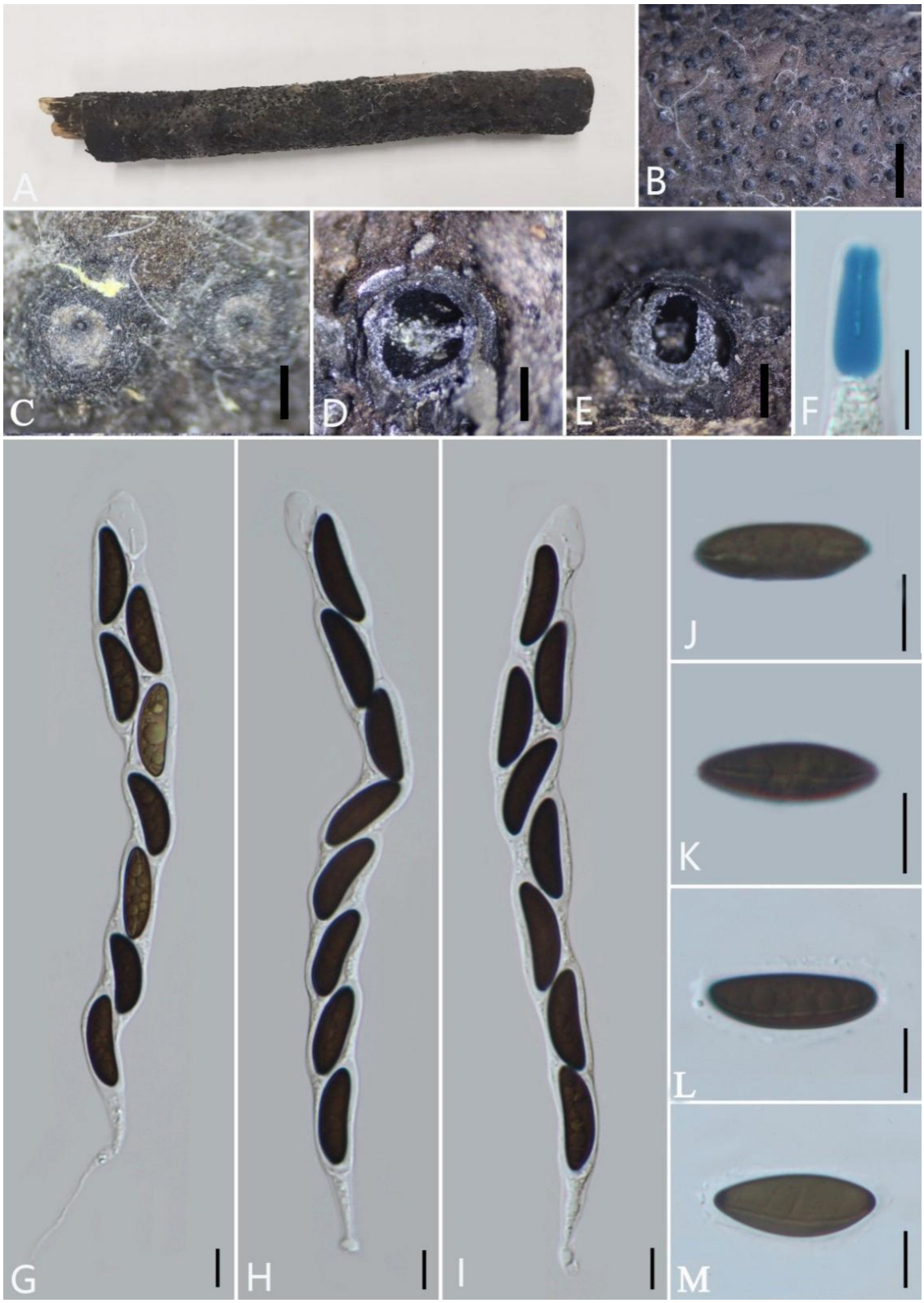


**Figure 31** – *Rosellinia limushanensis* (GMB0758, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F ascus apical apparatus (stained in Melzer's reagent). G–I asci with ascospores. J–M ascospores. Scale bars: B = 5 cm, C–E = 500 μm, F–M = 10 μm.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Subiculum well developed, felted, dark brown to black, embedding the lower part of the stromata, persistent. Stromata 850–1000 μm high × 940–1100 μm diam. ($\bar{x}$ = 980 × 1005 mm, n = 20), superficial, half

of them in subiculum, scattered to gregarious, solitary, globose, grey-brown to dark brown, shiny, carbonaceous. Ostioles black, papillate. Ectostroma 100–130 µm thick, black, carbonaceous. Entostroma disappearing at maturity. Perithecia filling entirely the stroma cavity or partly collapsed. Asci 180–214.5 × 11–18.5 µm ($\overline{x}$ = 193 × 14.6 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded, with a long amyloid barrel-shaped apical apparatus in Melzer's reagent, 10–13.5 µm high, 5.5–8.5 µm wide. Ascospores 21.5–30.5 × 7.5–10.5 µm ($\overline{x}$ = 25.1 × 8.4 µm, n = 30), overlapping uniseriate, fusiform, asymmetrically ellipsoidal, with rounded ends, hyaline when immature, slight brown to brown at maturity, straight to curved, with a germ slit running the entire length of the spores, entirely surrounded by a thin slimy sheath visible in water and in black ink, lacking appendages. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours, colonies on PDA reached 6 cm diam. in 1 week. On OA media, colonies white, fluffy, dense but thinning towards edge, medium dense, irregular edge, white from above, reverse white. No conidia observed on PDA or OA media within three months.

Material examined – CHINA, Hainan Province, Qiongzhong Li and Miao Autonomous County, Limushan National Forest Park (19°10'45.73"N, 109°44'19.98"E), altitude: 563 m, on dead branch of unidentified plant, 25 November 2021, Sihan Long, QZ23 (GMB0758, holotype, KUN-HKAS 131205, isotype; ex-type GMBC0758).

Other material examined – CHINA, Hainan Province, Qiongzhong Li and Miao Autonomous County, Limushan National Forest Park (19°11'07.36"N, 109°42'82.33"E), altitude: 590 m, dead branch of unidentified plant, 26 November 2021, Sihan Long, QZ196 (GMB0802, GMBC0802).

Notes – In the phylogenetic tree (Fig. 1), *R. limushanensis* formed an independent branch within the *Rosellinia*. Morphologically, *R. limushanensis* belongs to the *R. aquila* group (Petrini 2013a). Species with similar ascospore dimensions include *R. caudata* Petch, and *R. corticium* (Schwein.) Sacc. However, the ectostroma (100–130 µm thick) of *R. limushanensis* is larger than that of these and the size of apical apparatus in *R. limushanensis* is also larger (10–13.5 µm high, 5.5–8.5 µm wide in *R. limushanensis*; 6–9 µm high, 4–5 µm wide in *R. caudata*; 5.5–12.5 µm high, 3.5–8 µm wide in *R. corticium*) (Petrini 2013a). It also distinguishes from these species by lacking appendages. Nearly half of stromata of *R. limushanensis* immersed in subiculum. *Rosellinia leopoldensis* L.E. Petrin, which also lacks appendages, differs from *R. limushanensis* by having smaller ascospores, averaging 21.8 × 7.4 µm (compared to 25.1 × 8.4 µm), and 5.5–7 µm high, 3–4.5 µm wide apical apparatus (Fournier et al. 2017).

***Rosellinia lishuicola*** S.H. Long & Q.R. Li. sp. nov. Fig. 32

Mycobank number: MB850429

Etymology – The epithet refers to the Chinese name of the genus of its host, *Quercus* L.

Description – Saprobic on dead twig of *Quercus* sp. Sexual morph: Subiculum felted, dark brown to black, restricted to rim around stromata, evanescent. Stromata 720–790 µm high × 780–890 µm diam. ($\overline{x}$ = 749 × 834 µm, n = 20), superficial, scattered to gregarious, solitary, globose, with a conical pointed top, dark, shiny, carbonaceous. Ostioles black, papillate. Ectostroma 80–100 µm thick, black, carbonaceous. Entostroma disappearing at maturity. Perithecia filling entirely the stroma cavity, not collapsed. Asci 180–235.5 × 31–52 µm ($\overline{x}$ = 210 × 40 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded, with a long amyloid barrel-shaped apical apparatus in Melzer's reagent, 18–25.5 µm high, 9–11.5 µm wide. Ascospores 65–130.5 × 9.5–15 µm ($\overline{x}$ = 93 × 11.9 µm, n = 30), overlapping uniseriate or biseriate, fusiform, with rounded ends, hyaline when immature, slight brown to brown at maturity, straight to curved, with a germ slit running the entire length of the spores, with two ends surrounded by a thin slimy sheath visible in water and in black ink, lacking appendages. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours, colonies on PDA reached 3 cm diam. in 1 week. On OA media, colonies white, medium thin, irregular edge, white from above, reverse white. No conidia observed on PDA or OA media within three months.


**Figure 32** – *Rosellinia lishuicola* (GMB0759, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F ascus apical apparatus (stained in Melzer's reagent). G–J asci with ascospores. K–L ascospores. Scale bars: B = 1 mm, C–E = 500 μm, F–L = 10 μm.

Material examined – CHINA, Hainan Province, Qiongzhong Li and Miao Autonomous County (19°7'8.54"N, 109°52'21.06"E), altitude: 107 m, dead branch of *Quercus* sp., 23 November 2020, Sihan Long QZ94 (GMB0759 holotype, KUN-HKAS 131206, isotype; ex-type GMBC0759).

Other material examined – CHINA, Hainan Province, Qiongzhong Li and Miao Autonomous County (19°8'63.33"N, 109°53'57.82"E), altitude: 239 m, dead branch of unidentified plant, 21 November 2020, Sihan Long QZ1 (GMB0800, GMBC0800).

Notes – In the initial BLAST result of molecular analysis *R. lishuicola* was found to be closely related to *R. qiongensis* S. H. Long & Q. R. Li. Phylogenetically also clusters closely. However, the latter, found on the dead branch of bamboo, differs from *R. lishuicola* in several aspects. These differences include a cream-colored to light brown subiculum, 60–80 µm thick ectostroma, smaller apical apparatus 6.0–6.8 µm in height and 6.6–9.9 µm in width, and ascospores measuring 24.5–31 × 5–8 µm, which lack slimy sheathes (Long et al. 2022).

Morphologically, *R. lishuicola* belongs to the *R. emergens* group (Petrini 2013a). Species with similar ascospore dimensions include *R. chiangmaiensis* Q.R. Li & J.C. Kang, *R. formosana* Y.M. Ju & J.D. Rogers, *R. markhamiae* Sivan., and *R. megalosperma* Syd. & P. Syd. *Rosellinia chiangmaiensis* features longer ascospores with a thin mucilaginous sheath, terminating in acute ends, possesses a white to pale yellow subiculum that is confined to the stromatal base, lacks germ slits, and have larger stromata (measuring 600–800 µm in height × 950–1200 µm in width) compared to *R. lishuicola* (Li et al. 2016). The new species exhibits higher apical apparatus when compared to *R. formosana*, *R. markhamiae*, and *R. megalosperma* (Petrini & Petrini 2005, Petrini 2013a). Moreover, *R. megalosperma* differs by its ascospores having caps at the ends and its ascospores lack sheaths (Petrini & Petrini 2005).

***Rosellinia wuzhishanensis*** S.H. Long & Q.R. Li. sp. nov. Fig. 33

Mycobank number: MB850430

Etymology – The specific epithet "wuzhishanensis" refers to the location where this species was discovered, which is Wuzhishan City, China.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Subiculum felted, remnants at stromata base, dark brown to black, evanescent. Stromata 1200–1400 µm high × 1000–1300 µm diam. ($\overline{x}$ = 1305 × 1005 mm, n = 20), superficial, scattered to gregarious, solitary, globose, dark brown to black, carbonaceous. Ostioles black, papillate. Ectostroma 120–150 µm thick, black, carbonaceous. Entostroma disappears at maturity. Perithecia filling entire stroma cavity. Asci 234.5–295 × 15–17.5 µm ($\overline{x}$ = 272.2 × 16.7 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded, with a long amyloid barrel-shaped apical apparatus in Melzer's reagent, 13–15 µm high, 6.5–8 µm wide. *Ascospores* 33.5–61.5 × 9.5–14 µm ($\overline{x}$ = 48 × 11.6 µm, n = 30), slightly overlapping uniseriate, fusiform, asymmetrically ellipsoidal, narrowly rounded or pointed ends, hyaline when immature, slight brown at maturity, smooth, straight to curved, with a germ slit running the entire length of the spores, two ends surrounded by a thin cap slimy sheath visible in black ink, lacking appendages. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 24 hours, colonies on PDA reached 3 cm diam. in 1 week. On OA media, colonies white, medium thin, irregular edge, white from above, reverse white. No conidia were observed on PDA or OA media within three months.

Material examined – CHINA, Hainan Province, Wuzhishan City, Atuoling National Forest Park (18°48'26.47"N, 109°30'55.68"E), altitude: 430 m, dead branch of unidentified plant, 19 November 2020, Sihan Long, ATL01 (GMB0757, holotype, ex-type GMBC0757).

Other Material examined – CHINA, Hainan Province, Wuzhishan City, Atuoling National Forest Park (18°48'06.96"N, 109°30'01.62"E), altitude: 526 m, dead branch of unidentified plant, 19 November 2020, Sihan Long, ATL60 (GMB0803, GMBC0803).

Notes – In the phylogenetic tree (Fig. 1), *R. wuzhishanensis* is closely related to *R. lamprostoma* Syd. & P. Syd. and exhibits morphological affinities with *R. mearnsii* Tennakoon, Phook. & K.D. Hyde; however, the ascospores of *R. wuzhishanensis* are light brown, fusiform, with narrowly rounded or pointed ends, and possess capitate sheaths at both ends, along with buds that are as long as the ascospores. These distinctive features set *R. wuzhishanensis* apart from *R. lamprostoma* and *R. mearnsii* (Petrini 2013a, Tibpromma et al. 2017, Long et al. 2022).

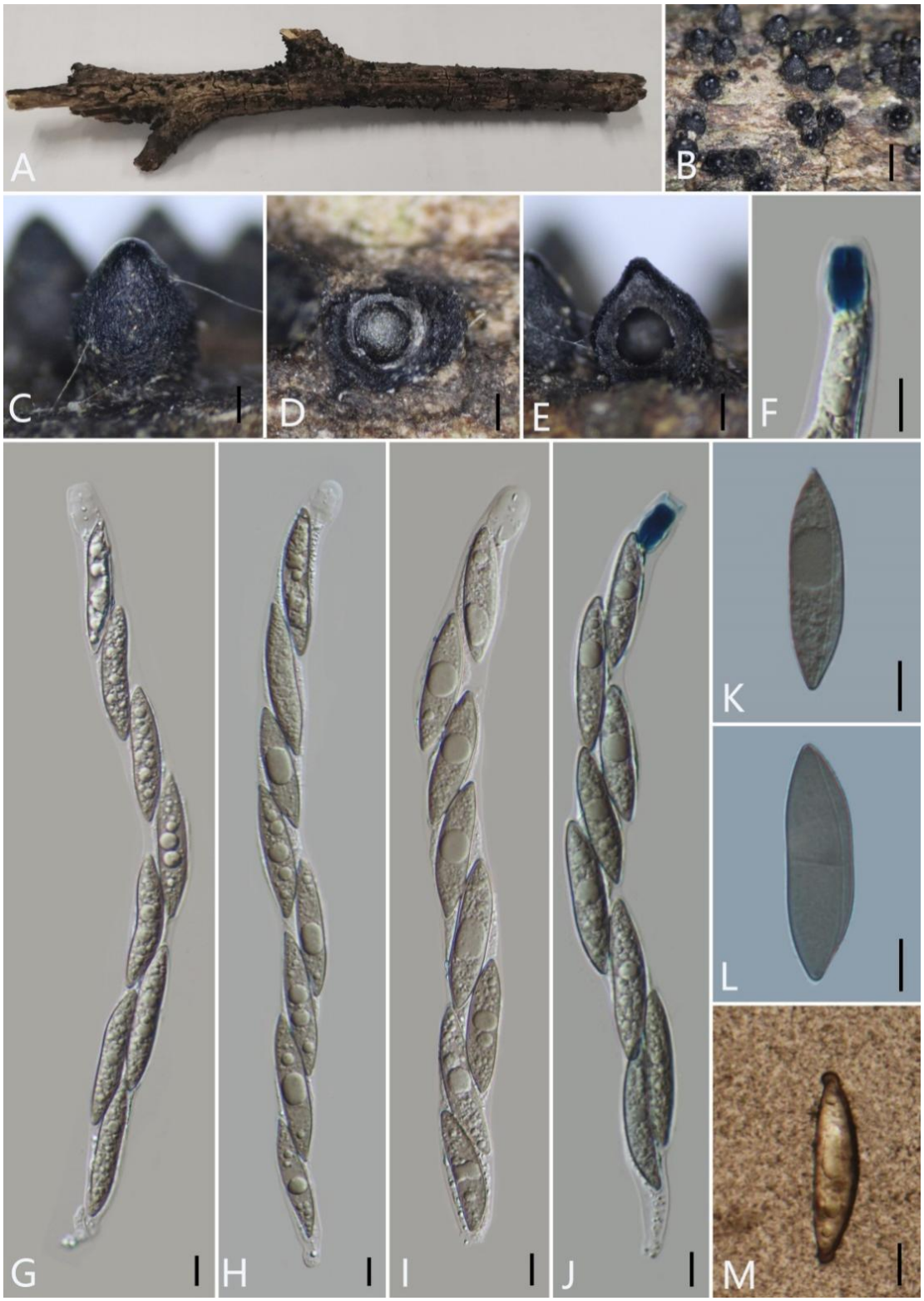


**Figure 33** – *Rosellinia wuzhishanensis* (GMB0757, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F ascus apical apparatus (stained in Melzer's reagent). G–J asci with ascospores. K–L ascospores. M ascospores in black ink. Scale bars: B = 2 mm, C–E = 500 μm, F–M = 10 μm.

Morphologically, *R. wuzhishanensis* is classified within the *R. emergens* group (Petrini 2013a). Species closely related in terms of morphology include *R. emergens*, *R. markhamiae*, *R. megalosperma*, and *R. megalospora*. However, *R. wuzhishanensis* is significantly different from them by its ascospores having spore-length germ slits and the cap sheaths at both ends. Moreover,

*R. markhamiae, R. megalosperma*, and *R. megalospora* have larger ascospores (*R. markhamiae*: 83.5–112.9 × 10.1–12.7 µm; *R. megalosperma*: 68.1–84.3 × 8.8–11.8 µm; *R. megalospora*: 59–97 × 9–14 µm), making them easily discernible from *R. wuzhishanensis* (Saccas 1956, Sivanesan 1975, Petrini 2013a). In addition, *R. megalospora* and *R. megalosperma* are also distinct in that its ascospores lack sheaths. The stroma of *R. megalospora* is densely gregarious and subglobose to pyriform. *Rosellinia emergens* has ascospores with broadly rounded ends, a characteristic that differs from the pinched or narrowly rounded ends observed in *R. wuzhishanensis* (Petrini 2013a).

***Rosellinia yaorenshanensis*** S. H. Long & Q. R. Li. sp. nov. Fig. 34

MycoBank number: MB850431

Etymology – The specific epithet "yaorenshanensis" refers to its collection location.

Description – Saprobic on dead twig of unidentified plant. Sexual morph: Subiculum felted, black, restricted to rim around stromata, evanescent. Stromata 1–1.2 mm high × 0.95–1.1 mm diam. ($\overline{x}$ = 1.1 × 0.99 mm, n = 20), superficial conical from top view, scattered to gregarious, solitary, dark brown to black, shiny, carbonaceous. Ostioles black, finely to coarsely papillate. Ectostroma 100–120 µm thick, black, carbonaceous. Entostroma disappearing at maturity. Perithecia nearly semiglobose, not collapsed. Asci 196.5–226.5 × 24–30 µm ($\overline{x}$ = 209.9 × 28.2 µm, n = 30), 8-spored, cylindrical, short pedicellate, apically rounded, with a amyloid apical apparatus in Melzer's reagent, urn-shaped, 15–18 µm high, 7.5–9.5 µm wide. Ascospores 54.5–63 × 7.5–9.5 µm ($\overline{x}$ = 58.2 × 8.4 µm, n = 30), overlapping, uniseriate, fusiform, with rounded ends, hyaline when immature, slight brown to brown at maturity, smooth, straight to curved, with a germ slit running the entire length of the spores, slightly constricted at the middle part, entirely surrounded by a thin slimy sheath visible in water and in black ink, lacking appendages. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinated on PDA within 1 week, colonies on PDA reached 4 cm diam. On OA media, colonies white, medium thin, irregular edge, white from above, reverse white. No conidia were observed on PDA or OA media within three months.

Material examined – CHINA, Guizhou Province, Qiannan Buyi Miao Autonomous Prefecture, Yaoren Mountain (25°17'52.14"N, 108°4'27.01"E), altitude: 651 m, on branches of an unidentified plant, 29 September 2021, YRS49 (GMB0760, holotype; KUN-HKAS 131207, isotype; ex-type culture GMBC0760)

Other Material examined – CHINA, Guizhou Province, Qiannan Buyi Miao Autonomous Prefecture, Yaoren Mountain (25°17'63.12"N, 108°3'34.92"E), altitude: 690, on branches of an unidentified plant, 29 September 2021. m, Sihan Long, YRS123 (GMB0801, GMBC0801).

Notes – Morphologically, *R. yaorenshanensis* belongs to the *R. emergens* group (Petrini 2013a), sharing similarities with *R. longispora* Rick. However, *R. longispora* differs from *R. yaorenshanensis* in having longer ascospores (69.4–85.6 × 11.1–14.5 µm vs. 54.5–63 × 7.5–9.5 µm) with acute ends and two bipolar slimy caps but lacking a sheath on sides. Moreover, the ectostroma of *R. longispora* are 40–50 µm thick (vs. 100–120 µm thick) (Fournier et al. 2017).

In the phylogenetic analysis (Fig. 1), *R. yaorenshanensis* clusters closely with *R. cerasi* and *R. verticillata*. However, *R. yaorenshanensis* possesses larger stromata 1–1.2 mm in height and 0.95–1.1 mm in diameter (vs. 630–735 µm in height and 525–700 µm in diameter), wider ascospores (54.5–63 × 7.5–9.5 µm vs. 42–62 × 6.5–12 µm), urn-shaped apical apparatus 15–18 µm high, 7.5–9.5 µm wide (vs barrel-shaped apical apparatus 11.5–15.5 µm high, 7–8 µm wide) (Long et al. 2022). The discussion with the other phylogenetically close *R. cerasi* has been addressed in the notes section of *R. cerasi.*

***Rosellinia yumingjui*** L.E. Petrini Bibliotheca Mycologica, J. Cramer: Stuttgart, pp 410. Fig. 35

Description – Saprobic on dead bamboo. Sexual morph: Subiculum felted, dark brown to black, restricted to rim around stromata, persistent. Stromata 0.4–0.6 mm high × 0.45–1.6 µm diam, superficial conical from top view, scattered to gregarious, solitary, dark brown to black, shiny, carbonaceous. Ostioles black, finely to coarsely papillate. Ectostroma 80–110 µm thick, black,

carbonaceous. Entostroma disappearing at maturity. Perithecia nearly semiglobose, not collapsed. Asci 161.5–204.5 × 5–8 µm ($\overline{x}$ = 181 × 6.3 µm, n = 30), 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded, with an amyloid apical apparatus in Melzer's reagent, urn-shaped, 5.5–8.5 µm high, 3.5–5 µm wide. Ascospores 16–21 × 4–7 µm ($\overline{x}$ = 18.1 × 5.2 µm, n = 30), overlapping uniseriate, fusiform, piched ends, hyaline when immature, slight brown to brown at maturity, straight to curved, with a germ slit about 1/2 length of the spores, one side and two ends surrounded by a thin slimy sheath visible in water and in black ink, lacking appendages. Asexual morph: Undetermined.


**Figure 34** – *Rosellinia yaorenshanensis* (GMB0760, holotype). A type material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with

ascospores. I ascus apical apparatus (stained in Melzer's reagent). J ascospores. K ascospores in black ink. Scale bars: B = 5 mm, C–E = 500 μm, F–K = 10 μm.

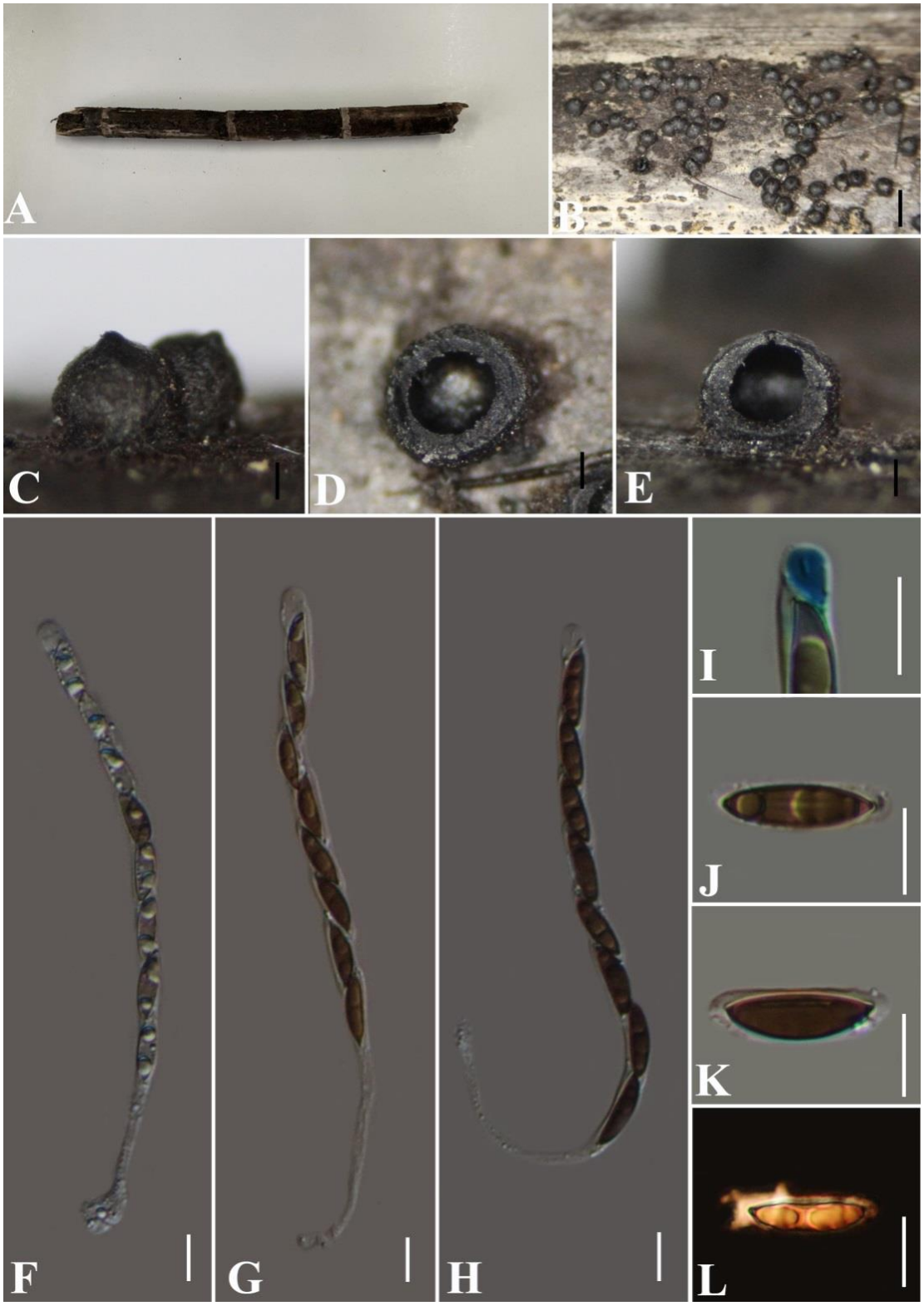


**Figure 35** – *Rosellinia yumingjui* (GMB0761). A material. B, C stromata on the surface of host. D transverse section of stroma. E longitudinal section of stroma. F–H asci with ascospores. I ascus apical apparatus (stained in Melzer's reagent). J–K ascospores. L ascospores in black ink. Scale bars: B = 1 mm, C–E = 200 μm, F–L = 10 μm.

Distribution – Known from China (Taiwan).

Material examined – CHINA, Guizhou Province, Anshun City, Pingba Country (26°25'9.65"N, 106°24'24.48"E), altitude: 1250 m, on dead bamboos, 25 December 2020, PB129 (GMB0761, KUN-HKAS 131208, living culture GMBC0761)

Notes – Morphologically, *R. yumingjui* is categorized within the *R. mammaeformis* group (Petrini 2013a). Our collection shares key characteristics with *R. yumingjui*, including a germ slit spanning half the spore-length and a thin, slimy sheath surrounded two ends and one side of the spore (Petrini 2013a). Moreover, both our collection and *R. yumingjui* exhibit a saprobic lifestyle, thriving on dead bamboo. Previously, *R. yumingjui* had been described solely based on morphology, with no available DNA sequences in NCBI. In this study, we successfully identify *R. yumingjui* based on its morphology and present, for the first time, molecular data for this species. This discovery also marks a new record for Chinese Mainland.

**Key to New *Rosellinia* species**

1. Subiculum evanescent.....3
2. Subiculum persistent.....4
3. Ectostroma 120–150 µm thick, asci 234.5–295 × 15–17.5 µm, ascospores 33.5–61.5 × 9.5–14 µm with pointed ends.....*R. wuzhishanensis*
3. Ectostroma 100–120 µm thick, asci 196.5–226.5 × 24–30, ascospores 54.5–63 × 7.5–9.5 µm with rounded ends.....*R. yaorenshanensis*
4. Ectostroma 45–80 µm thick.....*R. cerasi*
4. Ectostroma > 80 µm thick, apical apparatus < 16 µm high.....5
4. Ectostroma > 80 µm thick, apical apparatus 18–25.5 × 9–11.5 µm.....*R. lishuicola*
5. Ectostroma 80–120 µm thick, ascospores 23.5–31 × 9–13 µm, cellular appendages at one end, urn-shaped apical apparatus 12–15.5 × 4–7 µm.....*R. guiyangensis*
5. lacking appendages, spore-length germ slit.....6
5. lacking appendages, germ slit 1/2 length of the spores, ascospores 16–21 × 4–7 µm.....*R. yumingjui*
6. Stromata with a conical pointed top, ectostroma 170–250 µm thick, ascospores 22.5–28.5 × 7–9.5 µm, apical apparatus 10–14.5 × 4.5–6 µm.....*R. guizhouensis*
6. Half of stromata in subiculum, ectostroma 100–130 µm thick, ascospores 21.5–30.5 × 7.5–10.5 µm, apical apparatus 10–13.5× 5.5–8.5 µm.....*R. limushanensis*

***Stilbohypoxylon*** Henn., Hedwigia 41: 16 (1902).

Notes – *Stilbohypoxylon* was introduced by Hennings (1902) with the type species *S. moelleri.* The genus is characterized by globose to pulvinate black stromata, with scales or blunt spines on the surface, cylindrical asci, with an amyloid apical apparatus, brown, ellipsoidal ascospores, often with a thin mucilaginous sheath, with a straight or spiral germ slit and geniculosporium-like asexual morphs (Hennings 1902, Rogers & Ju 1997, Petrini 2004, Daranagama et al. 2018). Globally, the genus is represented by 19 different species (Indexfungorum; Accessed on Oct 2023). In the context of this study, we introduce a new record of this genus in China.

***Stilbohypoxylon elaeidicola*** (Henn.) L.E. Petrini [as 'elaeicola'], Sydowia 56(1): 55 (2004).

Fig. 36

Description – Saprobic on dead branch of Palm. Sexual morph: Stromata superficial, 0.85–1.3 mm diam, 0.4–0. 7 mm high, visible as a black conical, or globose on the top view of host surface, solitary, or in groups, bearing conical to acicular synnematal remnants on mature stromata, carbonaceous, brittle, fragile. Perithecia 290–360 × 320–420 µm ($\overline{x}$ = 332 × 385 µm, n = 25), black, carbonaceous, brittle, conical to mammiform, 1 per stroma, with indistinct ostiolate. Asci 68–82 × 4–6.5 µm ($\overline{x}$ = 75 × 5.2 µm, n = 20), 8-spored, unitunicate, cylindrical, long pedicellate, apically rounded, with an amyloid apical apparatus, 1.5–2.5 high, 1–2 µm wide. Ascospores 14–18 × 6–7.5 µm ($\overline{x}$ = 16.6 × 6.8 µm, n = 30), uniseriate, hyaline to pale brown when immature, dark brown at

maturity, equilateral ellipsoidal to broadly fusoid, unicellular, with two large guttules, smooth-walled, with a straight germ slit over the whole spore length, two ends surrounded by thin mucilaginous sheath. Asexual morph: Undetermined.

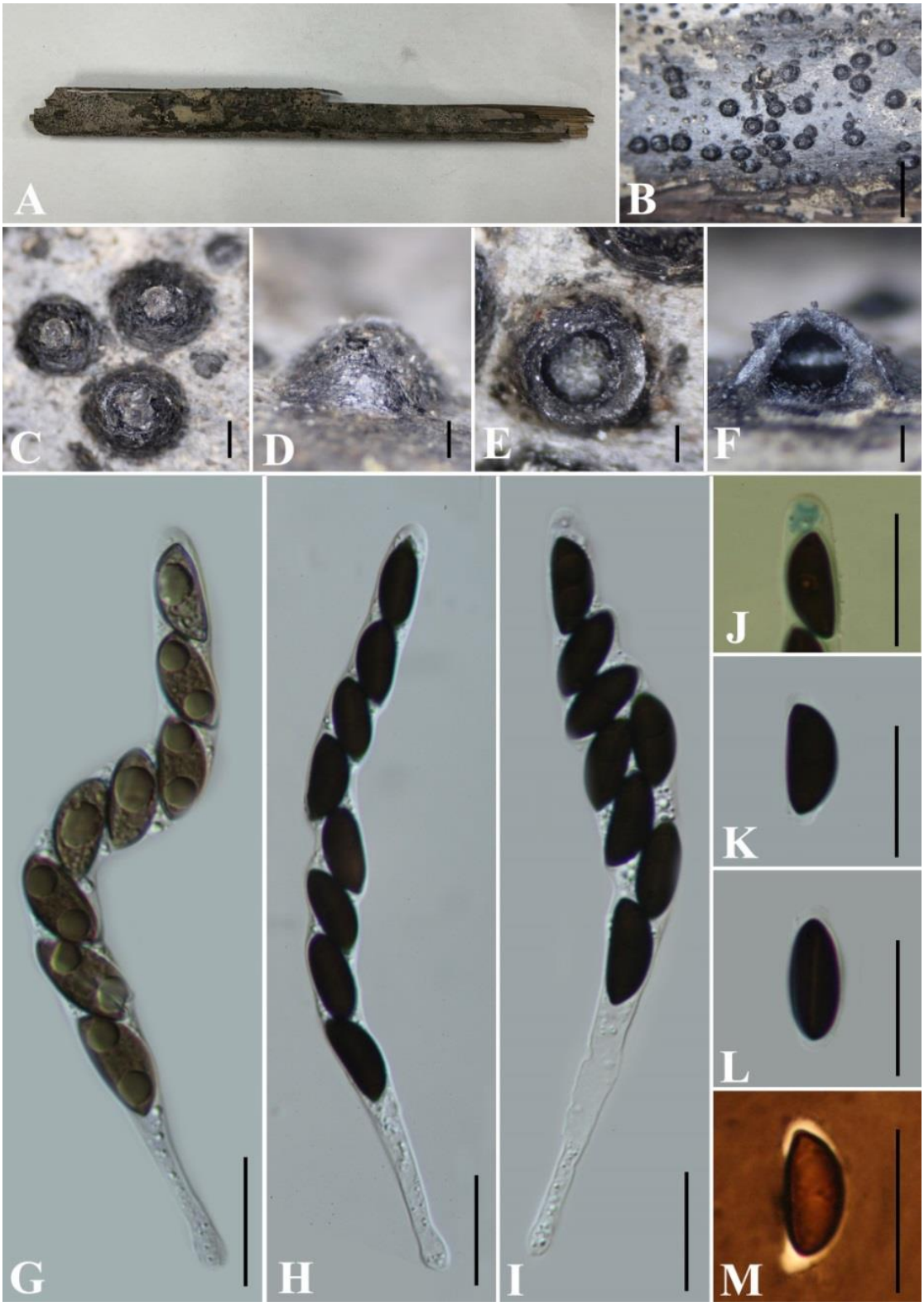


**Figure 36** – *Stilbohypoxylon elaeidis* (GMB0763). A material. B–D stromata on the surface of host. E transverse section of stroma. F longitudinal section of stroma. G–I asci with ascospores. J ascus apical apparatus (stained in Melzer's Reagent). K–L ascospores. M ascospores in black ink. Scale bars: B = 5 mm, C = 500 µm, D–F = 200 µm, F–L = 10 µm.

Culture characteristics – Ascospores germinated on PDA within 24 hours, germ tube produced from germ slit. Mycelium immersed in media, mycelium at the center appears as grey to dark-green, towards margin appears white, hyphae, septate, branched, and smooth.

Material examined – CHINA, Hainan Province, Linshui Country, Hangluo Mountain National Forest Park (18°38'33.54"N, 109°40'31.89"E), altitude: 601 m, dead branch of unidentified plant, 18 July 2022, Sihan Long, DLS31 (GMB0763, KUN-HKAS 131209)

Notes – The sequences of our collection, GMB0763, clusters with *Stilbohypoxylon elaeidicola* with a high bootstrap value, and their morpho-anatomical descriptions are also similar, except for the apical apparatus of GMB0763, which are slightly smaller than those of *S. elaeidicola* (1.5–2.5 high, 1–2 μm wide vs. upper 3–4, lower 2–3 × 2–4 high) (Konta et al. 2020). *Stilbohypoxylon elaeidicola* clustered with *S. elaeidis* with high statistical support (Fig. 1). However, these two species are distinct, as discussed in Konta et al. 2020. Our report marks the first instance of its presence in mainland China.

***Xylaria*** Hill ex Schrank, Baier. Fl. (München) 1: 200 (1786).

Notes – The genus *Xylaria*, typified by *Xylaria hypoxylon* (L.) Grev., represents one of the most complex and challenging genera within the *Xylariaceae* family. It plays a vital ecological role as a wood decomposer in forest ecosystems and serves as a prolific source of bioactive secondary metabolites (Ma et al. 2022). The stromata morphology of many *Xylaria* species often exhibits significant variations in colour, size, and overall shape at different developmental stages. These species are characterized by their upright, stipitate, woody to leathery stromata with perithecia entirely immersed (San Martin & Rogers 1989). Over 300 *Xylaria* species have been reported worldwide (Kirk et al. 2008), and Index Fungorum lists more than 800 epithets (Ma et al. 2022). In China, approximately 74 species of *Xylaria* have been documented (Ma et al. 2020, 2022). Furthermore, in this study, we present new records of *Xylaria* in China or mainland China.

***Xylaria frustulosa*** (Berk. & M.A. Curtis) Cooke, Grevillea 12 (61): 5 (1883). Fig. 37

Synonyms: *Kretzschmaria frustulosa* (Berk. & M.A. Curtis) P.M.D. Martin, Jl S. Afr. Bot. 36 (2): 79 (1970)

*Hypoxylon frustulosum* Berk. & M.A. Curtis, in Berkeley, J. Linn. Soc., Bot. 10 (no. 46): 383 (1868)

*Penzigia frustulos*a (Berk. & M.A. Curtis) L.W. Mill., in Chardón & Toro, *Monograph Univ. Puerto Rico* 2: 211 (1934)

Description – Saprobic on dead wood. Sexual morph: Stromata 0.5–0.8 mm high × 8–28 mm broad ($\overline{x}$ = 0.6 × 18 mm, n = 10), superficial, erumpent through bark, pulvinate, flat-topped to slightly convex, irregularly orbicular, subsessile, attached to the wood by a wide central connective; surface black to brownish, smooth to wrinkled; interior tissue white to cream-coloured, soft, solid. Perithecia 326–480 μm high × 260–382 μm broad ($\overline{x}$ = 394 × 311 μm, n = 10), ovoid to subglobose. Ostioles obtusely papillate to hemispherical, conspicuous, black. Asci 64.7–84.2 × 5.2–7.5 μm ($\overline{x}$ = 74 × 6.3 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, apically rounded, with a amyloid wedge-shaped apical apparatus, blue staining in Melzer's reagent, 0.5–1.3 μm ($\overline{x}$ = 0.8 μm, n = 10) high, 0.6–1.7 μm ($\overline{x}$ = 0.95 μm, n = 30) wide. Ascospores 4.8–6 × 2–2.7 μm ($\overline{x}$ = 5.4 × 2.3 μm, n = 30), overlapping uniseriate, unicellular, ellipsoid-equilateral to suboblong, with broadly rounded ends, pale olivaceous brown, without visible germ slit, lacking appendages and sheaths. Asexual morph: Undetermined.

Culture characteristics – Colonies grown on OA at 25 °C for 4 weeks, 6 cm in diam., surface white, cottony, flocculent, edges grayish-white and irregular, reverse side gray-white. Not sporulating on OA nor on PDA.

Distribution – Known from Mexico; Cuba; France; USA; Venezuela; China (Taiwan).

Material examined – CHINA, Hainan Province, Haikou City, Huoshankou Geological Park (19.555248°N, 110.132642°E), altitude: 538 m, on dead wood of unknown plant surface, 18 November 2020, Youpeng Wu, 2020HSK9 (GMB1046; GMBC1046).

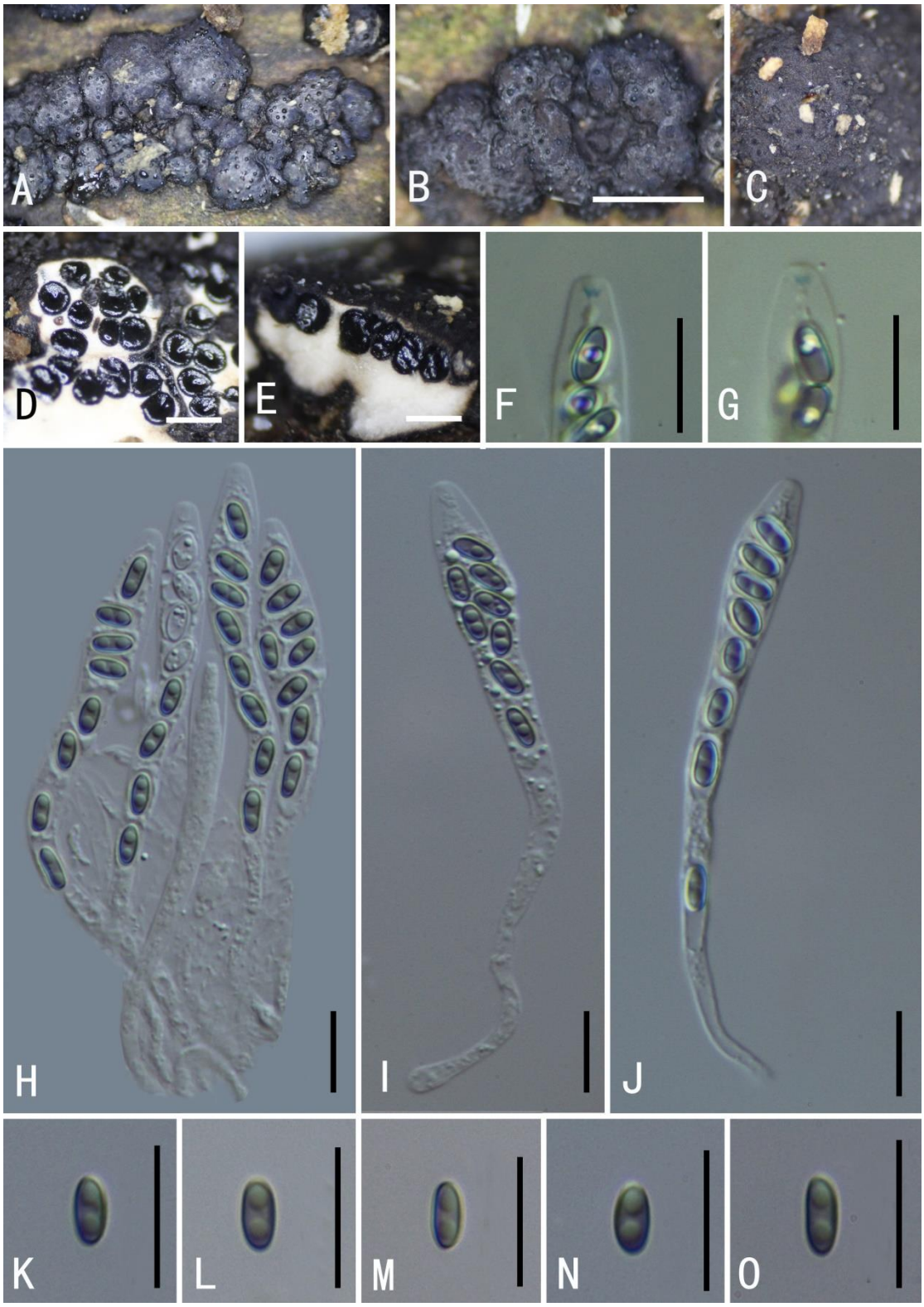


**Figure 37** – *Xylaria frustulosa* (GMB1046). A, B stromata. C surface of stromata. D transverse section of stroma. E longitudinal section of stroma. F, G ascus apical apparatus (stained in Melzer's reagent). H–J asci with ascospores. K–O ascospores. Scale bars: B = 2 cm, D = 0.3 mm, E = 0.4 mm, F–O = 10 μm.

Notes – *Xylaria frustulosa* is characterized by the disc-shaped or flattened to pulvinate fruiting bodies, pale greenish brown ascospores, and an inconspicuous germ slit. It has undergone successive taxonomic reclassifications, including shifts between genera such as *Hypoxylon*, *Penzigia*, and *Kretzschmaria* (Jong & Roger 1970, Dennis 1970). Hsieh et al. (2010) confirmed that

this species forms a sister clade with *X. feejeensis*, warranting its placement within the genus *Xylaria*. The description of our collection (GMB1046) aligns with that of *X. frustulosa*. Moreover, based on multi-gene phylogenetic analyses (Fig. 1), the strain GMBC1046 clustered with *X. frustulosa* with high statistical support (100% ML, 1.00 BYPP). This is the first report of this species from mainland China.

***Xylaria glebulosa*** (Ces.) Y.M. Ju & J.D. Rogers, Mycotaxon 73: 405 (1999). Fig. 38

Synonyms: *Hypoxylon glebulosum* Ces., Atti Accad. Sci. fis. mat. Napoli 8 (no. 3): 17 (1879)

Description – Saprobic on dead wood. Sexual morph: Stromata 0.2–0.3 cm high × 0.4–1.2 cm broad ($\overline{x}$ = 0.26 × 0.8 cm, n = 10), scattered to gregarious, pulvinate to spherical, with flattened to slightly convex top, on narrow central connective; surface dark brown to black, conspicuously reticulately cracked, carbonaceous; interior tissue white, spongy, solid. Perithecia 410–930 μm high × 380–940 μm broad ($\overline{x}$ = 640 × 600 μm, n = 10), spherical. Ostioles conspicuous, black, faint to hemispherical. *Asci* 187–280 × 12–22 μm ($\overline{x}$ = 232 × 18 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, apically rounded, with an amyloid urn-shaped apical apparatus, blue staining in Melzer's reagent, 10–11.6 μm ($\overline{x}$ = 11 μm, n = 10) high, 5.8–7.2 μm ($\overline{x}$ = 6.6 μm, n = 30) wide. Ascospores 28.8–32 × 9.3–12.4 μm ($\overline{x}$ = 30.5 × 10.6 μm, n = 30), overlapping uniseriate, unicellular, ellipsoid-inequilateral, frequently with abruptly pointed ends, dark brown, with an oblique germ slit much less than spore-length, lacking appendages and sheaths. Asexual morph: Undetermined.

Culture characteristics – Colonies grown on OA at 25 °C for 4 weeks, 6 cm in diam., surface white, cottony, flocculent, edges grayish-white and irregular, reverse side gray-white. Not sporulating on OA nor on PDA.

Distribution – Known from Sri Lanka; China (Taiwan).

Material examined – CHINA, Hainan Province, Haikou City, Huoshankou Geological Park (19.554365°N, 110.13203°E), altitude: 152 m, on dead wood of an unkown plant, 18 November 2020, Youpeng Wu, 2020HSK19 (GMB1052; GMBC1052); CHINA, Hainan Province, Haikou City, Huoshankou Geological Park (19.554372°N, 110.132242°E), altitude: 156 m, on dead wood of unkown plant surface, 18 November 2020, Youpeng Wu, 2020HSK22 (GMB1053; GMBC1053).

Notes – *Xylaria glebulosa* was originally classified in the genus *Hypoxylon*. Ju & Rogers (1996) later reassigned it to the genus *Xylaria* after conducting a morphological analysis of its type specimen of stromata, asci, and ascospores (Ju & Rogers 1996). The description of our new collections is consistent with the description of *X. glebulosa*. The phylogenetic tree further confirms its identification, as it forms a well-supported cluster with the strain of *X. glebulosa* (100% ML, 1.00 BYPP). This study marks its addition as a new record for Hainan Province.

***Xylaria longissima*** Hashemi, Khodap., Zare & Elahinia, Mycologia Iranica 2(1): 2 (2015). Fig. 39

Description – Saprobic on root of unknown plant. Sexual morph: Stromata 3–6 cm long × 0.2–0.4 cm broad ($\overline{x}$ = 4.3 × 0.34 cm, n = 10), caespitose, with long setiform and branched sterile apices; stipe pubescent. Stromatal surface roughened from evidently to slightly perithecial elevations, with light brown peeling outer layer splitting in longitudinal bands; interior white grey. Perithecia 520–760 μm high × 533–746 μm broad ($\overline{x}$ = 616 × 620 μm, n = 10), immersed, subglobose to laterally compressed, closely arranged. Ostioles inconspicuous. Asci 186–280 × 7.4–10.4 μm ($\overline{x}$ = 224 × 8.7 μm, n = 30), 8-spored, unitunicate, cylindrical, long stipitate, apically rounded, with apical apparatus bluing in Melzer's iodine reagent, rectangular, 3.4–4.8 μm ($\overline{x}$ = 4.2 μm, n = 30) high, 2.4–3.2 μm ($\overline{x}$ = 2.8 μm, n = 30) wide. Ascospores 15.7–17.8 × 5.2–8.4 μm ($\overline{x}$ = 16.5 × 6.5 μm, n = 30), overlapping uniseriate, unicellular, inequilateral ellipsoid, light brown, with broadly narrowed ends, smooth, with a straight germ slit nearly the spore-length, lacking appendages and sheaths. Asexual morph: Undetermined.

Cultural characteristics – Colonies grown on OA at 25 ℃ for 2 weeks, reached 4 cm in diam., surface light white, velvety with irregular outgrowths or furrows, with a peripheral fan-shaped extension spreading toward the edge of the Petri dish. After 4 weeks, covered 9 cm white greyish, velvety or inflorescence, appressed with entire margins branched and setiform stromata with white tip.

Distribution – Known from Iran

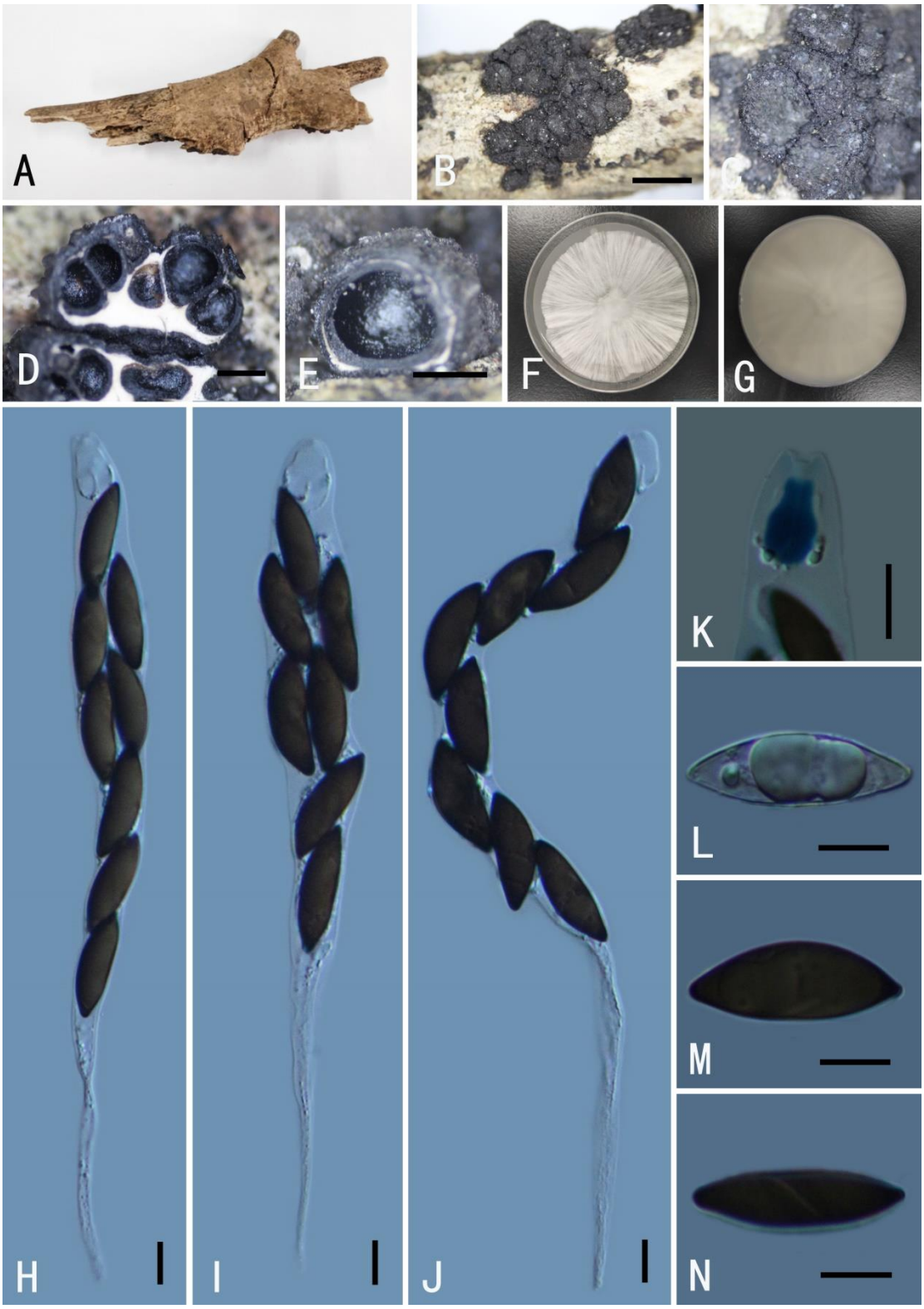


**Figure 38** – *Xylaria glebulosa* (GMB1053). A material. B stromata. C surface of stromata. D transverse section of stroma. E longitudinal section of stroma. F, G culture on OA. H–J asci with

ascospores. K ascus apical apparatus (stained in Melzer's reagent). L–N ascospores. Scale bars: B = 1 cm, D, E = 0.5 mm, H–N = 10 µm.

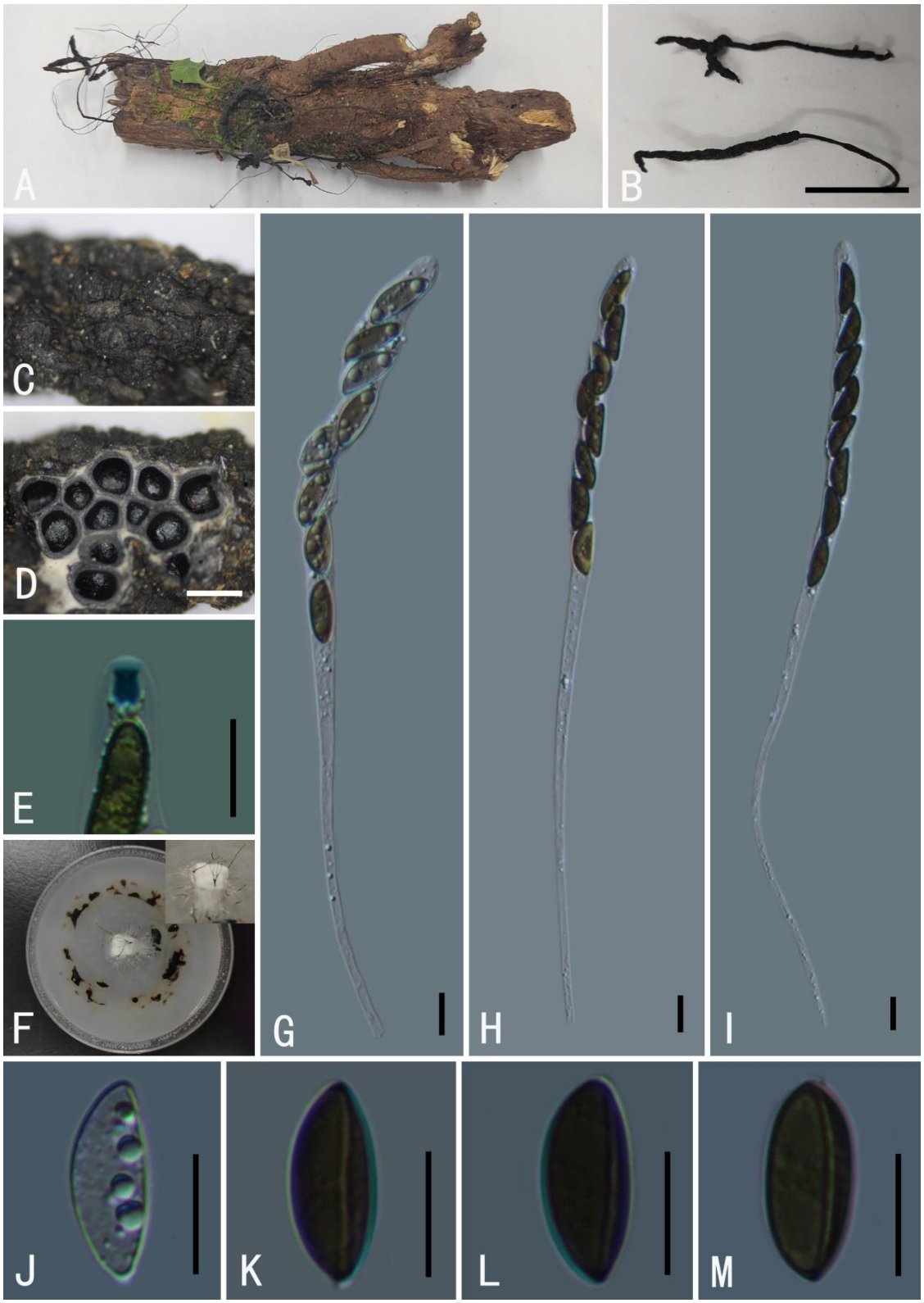


**Figure 39** – *Xylaria longissima* (GMB1076). A material. B stromata. C surface of stromata. D transverse section of stroma. E ascus apical apparatus (stained in Melzer's reagent). F culture OA. G–I asci with ascospores. J–M ascospores. Scale bars: B = 4 cm, D = 0.5 mm, E, G–M = 10 µm.

Material examined – CHINA, Guizhou Province, Libo County, Landingshan Forest Park (25.224635°N, 108.468242°E,), altitude: 578m, on dead wood of unkown plant root, 28 November 2021, Youpeng Wu, 2021LDS62 (GMB1076; GMBC1076).

Notes – *Xylaria longissima*, originally reported from Iran, is characterized by its distinctive features, including very long setiform sterile apices, perithecia that can vary in visibility, a light brown peeling outer layer, and ascospores measuring 16–18 × 5–6 μm with a straight spore-length germ-slit, which distinguish it from other *Xylaria* species (Hashemi et al. 2015). Our newly collected specimen (GMB1076) closely resembles *X. longissima* in terms of morphology. Furthermore, after conducting a BLAST search using ITS sequences on NCBI, we found the closest matching taxon to be *Xylaria longissima* (KP218906) with a 100% sequence homology. This is the first report of this species from mainland China.

## DISCUSSION

The year 2020 marked a significant milestone in the realm of mycology, as it witnessed an unprecedented surge in the discovery of new fungal species and records globally. Wang et al. (2021) reported a staggering total of 4,996 newly described fungal names, comprising 652 higher taxa, 2,905 species and intraspecific taxa, 1,342 combinations, and 97 other novelties. This historic high in annual fungal nomenclature encompassed contributions from 103 countries and regions across the world, with East and Southeast Asia emerging as the primary hotspots for these discoveries. Remarkably, China stood out as the leading contributor to this fungal taxonomic surge, unveiling a remarkable 663 new species, accounting for a remarkable 23% of the global total. Among these fungal discoveries, the Xylariaceae family held its ground as the 12th highest family with the most newly described fungal species in 2020 (Wang et al. 2021).

Our current study reveals that, in addition to the 2020 findings, China has further expanded its contribution to global fungal taxonomy by describing an additional 27 new species, thereby augmenting the existing body of knowledge. This extensive exploration of fungal diversity within the Xylariaceae family enriches our understanding of the intricate web of fungal life within China's rich ecological landscape.

The rate of fungal species description remains at a relatively low level, and this presents a long-term and arduous task for mycologists to efficiently discover and describe the vast number of undescribed fungi. The fungal kingdom is vast and incredibly diverse, with countless species awaiting discovery.

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**Abbreviations list:**
*An.*: *Anthostomella*
*As.*: *Astrocystis*
ITS: Internal Transcribed Spacer
*TUB2*: β-tubulin gene
*rpb2*: DNA-directed RNA polymerase II subunit 2
GMB: Guizhou Medical University
GMBC: Guizhou Medical University Culture Collection

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