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Phlebiella ailaoshanensis sp. nov. (Polyporales, Basidiomycota) described from China

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Phlebiella P. Karst. (1890: 271) (Polyporales, Basidiomycota) was typified by *P. vaga* (Fr.) P. Karst. (1890: 271), which is a cosmopolitan genus characterized by a combination of resupinate to effused basidiocarps, hymenophore smooth to ceraceous to subgelatinous, a monomitic hyphal structure with clamped generative hyphae, basidia pleural and basidiospores hyaline, thin- to thick-walled, warted, subglobose, ellipsoid, cylindrical and acyanophilous (Karsten 1890, Bernicchia & Gorjón 2010). So far about ten species have been accepted in the genus worldwide (Karsten 1890, Bondartsev 1953, Hjortstam & Larsson 1987, Roberts 1995, Bernicchia & Gorjón 2010).

Molecular study involving *Phlebiella* was very few (Larsson 2007). Larsson (2007) proposed the classification of corticioid fungi and suggested that three species, *P. ardosiaca* (Bourdot & Galzin) K.H. Larss. & Hjortstam (1987: 316), *P. christiansenii* (Parmasto) K.H. Larss. & Hjortstam (1987: 316) and *P. vaga* (Fr.) P. Karst. (1890: 271), grouped together and then clustered within Corticiaceae and Polyporaceae.

During investigations on wood-inhabiting fungi in southern China, an additional taxon of *Phlebiella* was found which could not be assigned to any described species. In this study, the authors expand samplings from previous studies to examine morphological and molecular characters of this new species within the *Phlebiella*.

The specimens studied are deposited at the herbarium of Southwest Forestry University (SWFC). Macro-morphological descriptions are based on field notes. Special colour terms follow Petersen (1996). Micro-morphological data were obtained from the dried specimens, and observed under a light microscope following Dai *et al*. (2015). The following abbreviations were used: KOH = 5% potassium hydroxide, CB = Cotton Blue, CB– = acyanophilous, IKI = Melzer's reagent, IKI– = both inamyloid and indextrinoid, L = mean spore length (arithmetic average of all spores), W = mean spore width (arithmetic average of all spores), Q = variation in the L/W ratios between the specimens studied, n (a/b) = number of spores (a) measured from given number (b) of specimens.

DNA extraction, amplification, sequencing and phylogenetic analyses:—The EZNA HP Fungal DNA Kit (Omega Biotechnologies Co., Ltd, USA) was used to obtain PCR products from dried specimens, according to the manufacturer's instructions with some modifications. ITS region was amplified with primer pairs ITS5 and ITS4 (White *et al*. 1990). The PCR procedure for ITS was as follows: initial denaturation at 95 °C for 3 min, followed by 35 cycles at 94 °C for 40 s, 58 °C for 45 s and 72 °C for 1 min, and a final extension of 72 °C for 10 min. The PCR products were purified and directly sequenced at the Kunming Tsingke Biological Technology Limited Company.

The internal transcribed spacer (ITS) sequences of the studied samples were generated, and the results of BLAST queries in NCBI based on ITS showed the sequences producing significant alignments descriptions: the top ten taxa are *P. ardosiaca*, *P. borealis* K.H. Larss. & Hjortstam, *P. christiansenii* and *P. vaga* (Maximum record descriptions: Max score 998; Total score 998; Query cover 92%; E value 10; Ident 97%).

Phlebiella ailaoshanensis C.L. Zhao, ***sp. nov.*** Figs. 1, 2

MycoBank no.: MB 832677

Type: **CHINA**. Yunnan Province, Puer, Jingdong County, Ailaoshan National Nature Reserve, on the angiosperm trunk, 4 October 2017, *CLZhao 3895* (holotype, SWFC!; GenBank MN 487105).

Etymology:—*Ailaoshanensis* (Lat.): referring to the locality (Ailaoshan) of the type specimens.

Description:—Basidiocarps annual, resupinate, thin, without odor or taste when fresh, becoming membranous to soft ceraceous when dry, up to 15 cm long, 100–200 µm thick. Hymenial surface pruinose to farinaceous, white when fresh, white to greyish upon drying.

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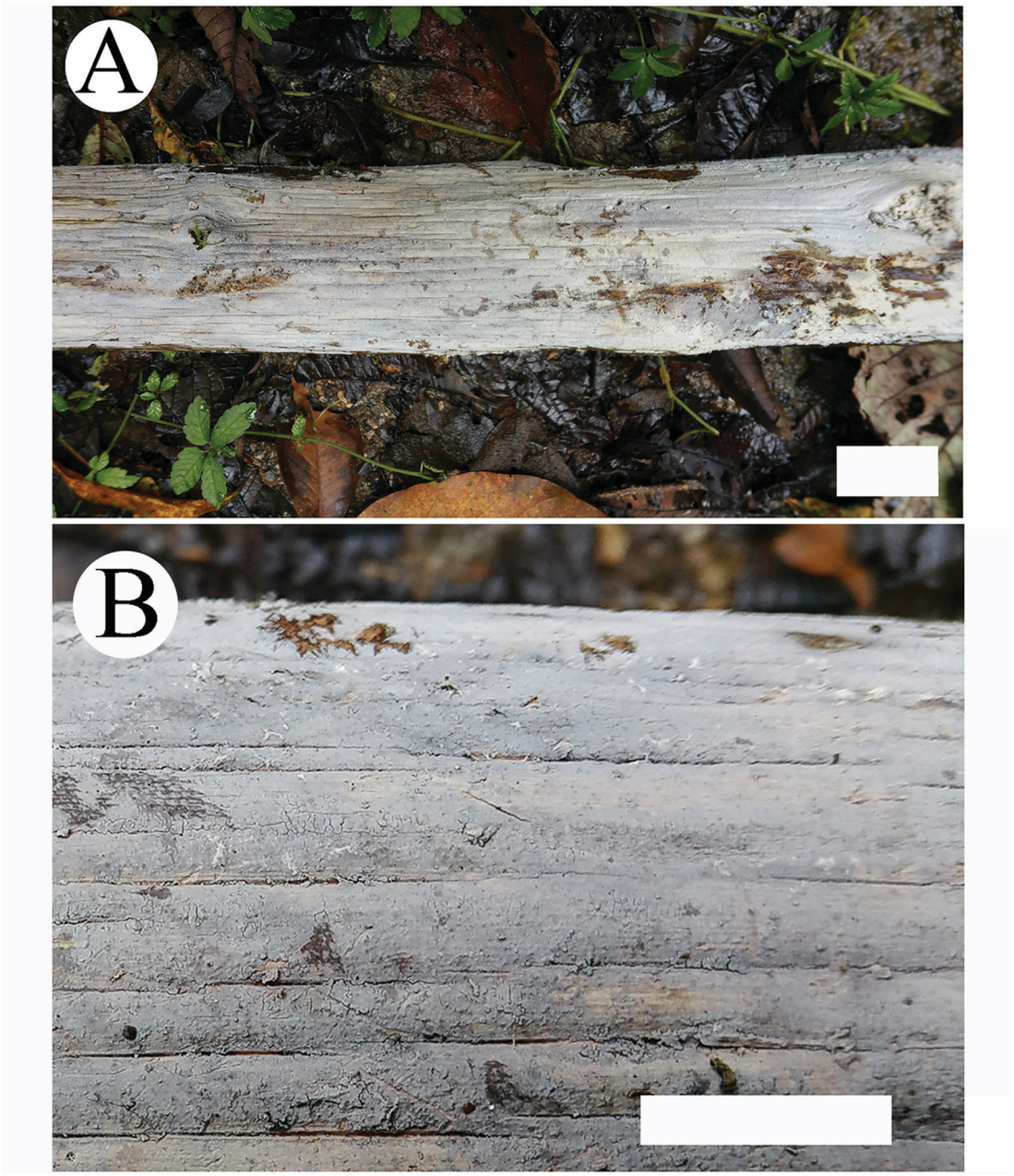

FIGURE 1. A basidiomata of *Phlebiella ailaoshanensis* (holotype). Scale bars: a–1 cm. b–0.5 cm. Photos by: Chang-Lin Zhao

Hyphal structure:—Hyphal system monomitic; generative hyphae with clamp connections, thin-walled, branched, 1.5–2.5 µm in diam., IKI–, CB–; tissues unchanged in KOH.

Hymenium:—Cystidia and cystidioles absent; basidia pleural, clavate to cylindrical, with 4 sterigmata and a basal clamp connection, 11–18 × 4.5–6.5 µm; basidioles dominant, in shape similar to basidia, but slightly smaller. Basidiospores subglobose, hyaline, thin-walled, warted, IKI–, CB–, (3.5–)4–5(–5.5) × (3–)3.5–4.5(–5) µm, L = 4.78 µm, W = 4.11 µm, Q =1.15–1.19 (n = 60/2).

Additional specimen examined:—**CHINA**. Yunnan Province, Puer, Zhenyuan County, Ailaoshan National Nature Reserve, on the angiosperm trunk, 11 January 2018, *CLZhao 4839* (SWFC! GenBank MN 487106).

In the present study, a new species, *Phlebiella ailaoshanensis*, is described based on the morphological and molecular characters. Six similar species in the genus *Phlebiella* are: *P. ardosiaca*, *P. californica* (Liberta) K.H. Larss. & Hjortstam (1987: 316), *P. christiansenii*, *P. fibrillosa* (Hallenb.) K.H. Larss. & Hjortstam (1987: 316), *P. gaspesica* (Liberta) K.H. Larss. & Hjortstam (1987: 316) and *P. vaga*. *Phlebiella ardosiaca* differs from *P. ailaoshanensis* by having larger and thick-walled basidiospores (5–6 × 5–5.5 µm, Hjortstam & Larsson 1987, Bernicchia & Gorjón 2010). *P. californica* can be distinguished from *P. ailaoshanensis* by the effused basidiocarps with bluish-gray hymenophore and cylindrical basidiospores (5.5–7 × 3–4 µm, Hjortstam & Larsson 1987). *P. christiansenii* is different from *P. ailaoshanensis* by having the effused basidiocarps

with radially arranged rhizomorphs, and larger basidiospores (6–7 × 4–4.5 µm, Bernicchia & Gorjón 2010). *Phlebiella fibrillose* differs from *P. ailaoshanensis* by having white to pale yellowish hymenophore surface and the encrusted generative hyphae (Bernicchia & Gorjón 2010). *P. gaspesica* differs from *P. ailaoshanensis* by having the effused basidiocarps forming an inconspicuous film over the substratum and cylindrical basidiospores (5.5–7 × 1.5–2 µm, Hjortstam & Larsson 1987). *Phlebiella vaga* can be distinguished from *P. ailaoshanensis* by the smooth to grandinioid hymenophore, tissues changed to reddish in KOH and the encrusted generative hyphae (Bernicchia & Gorjón 2010).

Although some wood-decaying species have been described from Yunnan Province (Dai *et al.* 2003, Yuan & Dai 2008, Dai & Li 2010, Cui *et al*. 2011, Dai *et al.* 2011, Zhao *et al.* 2015, Ren & Wu 2017, Wu *et al*. 2017, Yuan *et al*. 2017a, b), the diversity of *Phlebiella* is not well known in the province and five species were reported from this region, but all of them were transferred to other genera (Hjortstam & Ryvarden 2005, Dai 2011). More taxa will be found after further investigations.

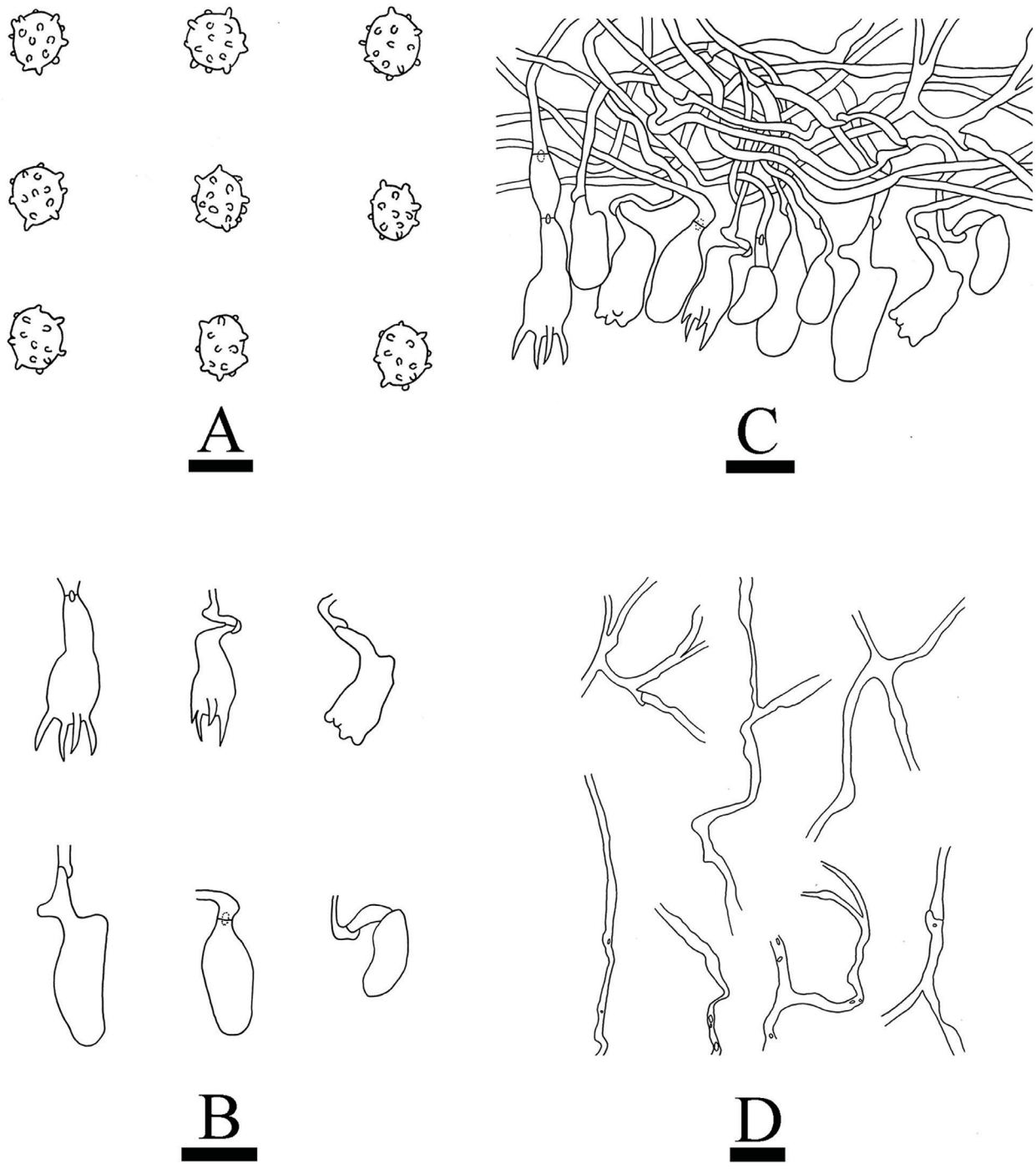

FIGURE 2. Microscopic structures of *Phlebiella ailaoshanensis* (drawn from the holotype). a. Basidiospores. b. Basidia and basidioles. c. A section of basidiocarps. d. Generative hyphae with clamp connections. Bars: a–d–10 µm. Drawings by: Ruo-Xia Huang

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