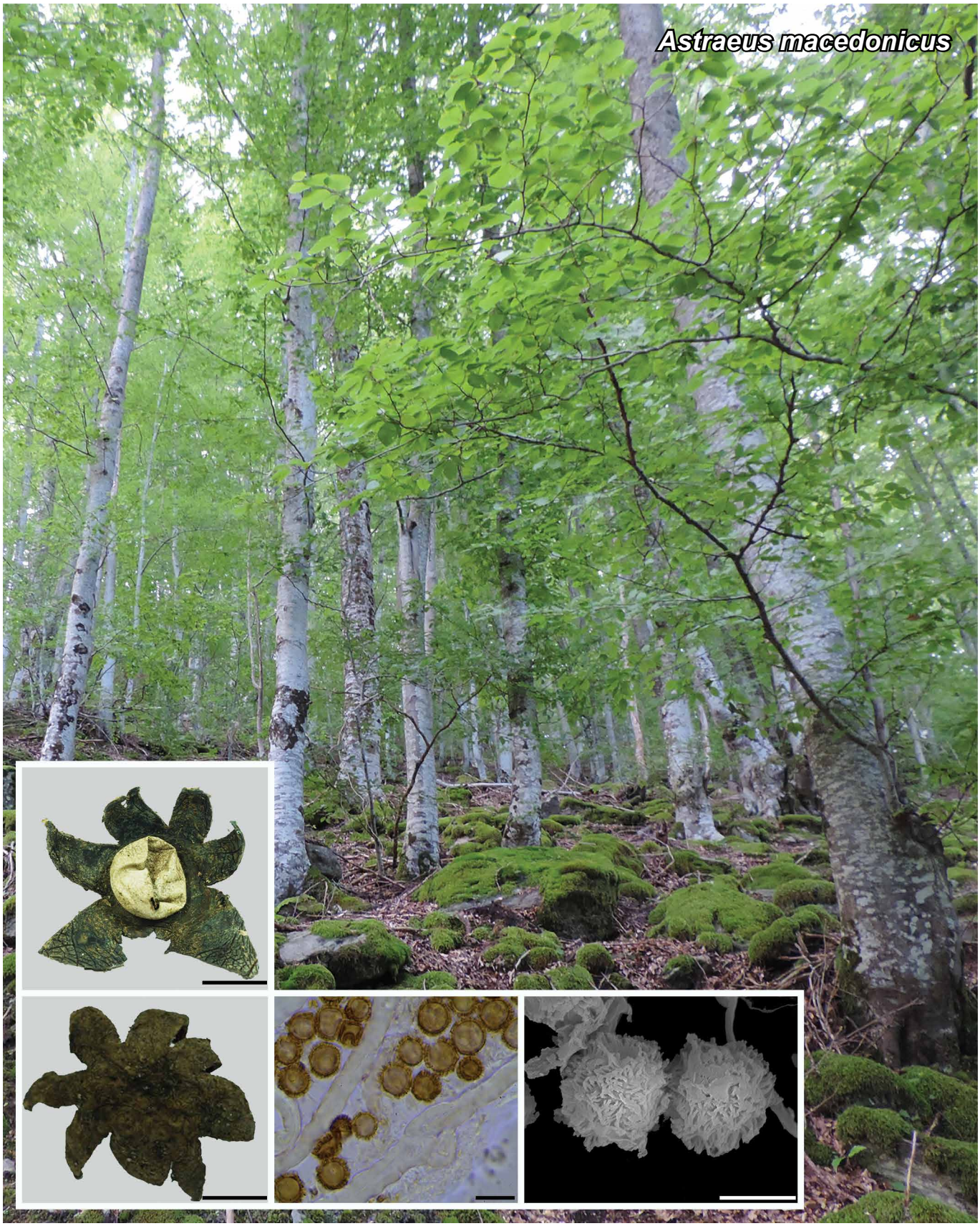

Astraeus macedonicus

Fungal Planet 906 – 19 July 2019

Astraeus macedonicus Rusevska, Karadelev, Telleria & M.P. Martín, *sp. nov.*

Etymology. Named after the country where this species was collected, the Republic of Macedonia.

Classification — *Diplocystaceae*, *Boletales*, *Agaricomycetes*.

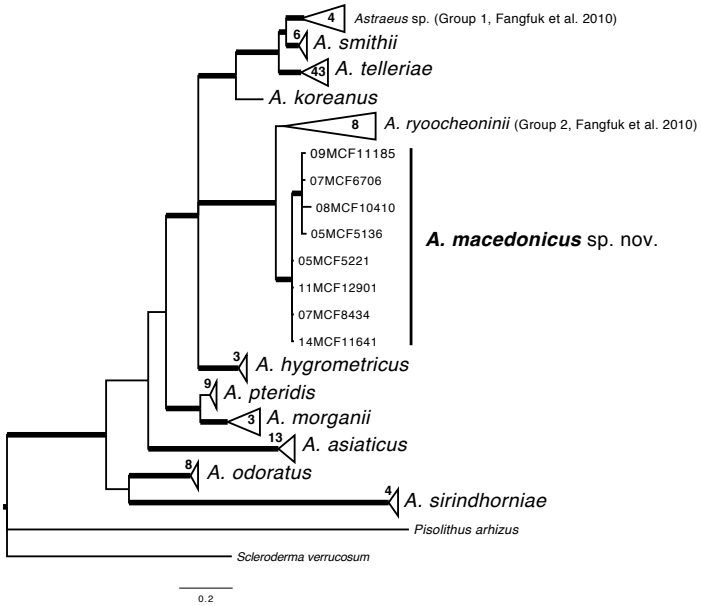
Basidiomata from closed specimens 17 × 22 mm, not fully opened 25 × 30 mm, and almost opened 27 × 37 mm; regularly globose to slightly subglobose, epigeous, sessile. *Outer peridium* splitting to star shaped when mature into (6–)8–10 rough rays, expanding to 14–33 mm in length, 10–11 mm in width (at the middle, at the longest part), hygroscopic. *Endoperidium* sessile, subglobose to globose, papery-thin sack, 18–23 mm diam, pale cream to very light grey coloured, the surface papery-fibrillose; opening as an irregular slit. *Gleba* pale brownish to dark brownish, without columella. *Capillitium* hyaline, thick-walled, branched and interwoven, 4.2–10 µm diam, with capitates ends up to 12 µm diam, with rare septa, some of them with a clamp connection-like structure. *Basidiospores* globose, 7.3–10.1 µm diam, with dense, rounded, narrow, tapered, separate tubercles (up to 1 µm) which coalesce in groups.

Typus. Macedonia, Bistra, Lazaropole village, footpath to St. Gjorgija church, 1300 m asl, 8 Aug. 2005, *K. Rusevska* (holotype 05MCF5221, ITS and LSU sequences GenBank MK491320 and MK496886, MycoBank MB829660).

Additional materials examined. Macedonia, Bilina Planina, Zhidilovo vill., deciduous forest (*Quercus* sp., *Fagus*, *Betula pendula*), 19 May 2011, *K. Rusevska*, 11MCF12901, ITS sequence GenBank MK491321; Kozhuf, r. Stara Reka (vicinity), riparian vegetation, 18 July 2005, *K. Rusevska*, 05MCF5136, ITS sequence GenBank MK491319; Osogovski Planini, Stanci vill., deciduous forest (*Carpinus*, *Betula*, *Fagus*), 900–970 m asl, 13 May 2007, *K. Rusevska*, 07MCF6706, ITS and LSU sequences GenBank MK491317 and MK496884; ibid., Ponikva, *Fagus* forest, 1500–1600 m asl, 11 July 2007, *K. Rusevska*, 07MCF8434, ITS sequence GenBank MK491322; ibid., Sasa, *Quercus frainetto* forest, 685 m asl, 9 Apr. 2008, *K. Rusevska*, 08MCF10410, ITS and LSU sequences GenBank MK49318 and MK496885; Plachkovica, above Laki vill., Selska Reka, *Fagus* forest with *Pinus nigra*, 21 Oct. 2014, *K. Rusevska*, 14MCF11641, ITS sequence GenBank MK491323. – Serbia, Vuchje (vicinity), edge of deciduous forest, 12 Sept. 2009, *K. Rusevska*, 09MCF11183, ITS and LSU sequences GenBank MK491316 and MK496886.

Additional materials examined of other Astraeus species from Macedonia. Herbarium number is indicated, as well as the ITS sequence GenBank between brackets: *Astraeus hygrometricus*. 05MCF5511 [MK491324]. — *Astraeus pteridis*. 06MCF5817 [MK491326]; 07MCF8009 [MK491327]; 09MCF10671 [MK491325]. — *Astraeus telleriae*. 83MCF7728 [MK491314]; 83MCF7729 [MK491297]; 83MCF7730 [MK491294]; 83MCF7731 [MK491307]; 87MCF9566 [MK491300 and MK491304]; 88MCF9574 [MK491295]; 98MCF6531 [MK491280]; 01MCF3439 [MK491303]; 03MCF2896 [MK491296]; 04MCF4362 [MK491292]; 04MCF6532 [MK491288]; 05MCF911 [MK491310]; 05MCF4908 [MK491293]; 05MCF5329 [MK491284]; 05MCF5422 [MK491283]; 05MCF7977 [MK491275]; 06MCF1244 [MK491305]; 06MCF8811 [MK491309]; 07MCF6640 [MK491287]; 07MCF6887 [MK491281]; 07MCF6896 [MK491306]; 07MCF8028 [MK491282]; 07MCF8228 [MK491279]; 07MCF8549 [MK491290]; 08MCF9078, [MK491277]; 08MCF10109 [MK491285]; 08MCF10272 [MK491286]; 08MCF10282 [MK491299]; 09MCF9816 [MK491298]; 09MCF11502 [MK491313]; 09MCF11527 [MK491315]; 09MCF13788 [MK491302]; 10MCF12021 [MK491289]; 10MCF12678 [MK491308]; 11MCF9817 [MK491291]; 11MCF12654 [MK491276 and MK491278]; 12MCF14080 [MK491311]; 12MCF13532 [MK491312]; 13MCF14623 [MK491301].

Notes — *Astraeus macedonicus* is known from deciduous forests in four Macedonian localities (the mountains located in the west, north, south and east part of the country). Morphologically, this species is very similar to *A. hygrometricus*, *A. pteridis* and *A. telleriae*, not only in its habitat but also in its microscopic characters, such as capillitium and spores; therefore all records (collected up to 2007) were previously published as *A. hygrometricus* (Karadelev et al. 2008). However, the Bayesian analyses, based on 53 collections from Macedonia, and a number of published sequences mainly from Phosri et al. (2007, 2013, 2014), Fangfuk et al. (2010) and Ryoo et al. (2017), clearly grouped eight Macedonian collections as a sister clade of *Astraeus ryoocheoninii*, a species described from Japan and Korea, and separated *A. hygrometricus*, *A. pteridis* and *A. telleriae*.



The 50 % majority rule Bayesian tree inferred from ITS nrDNA sequences with the GTR+I+G model and using MrBayes v. 3.1.2 (Ronquist & Huelsenbeck 2003) for 2 M generations. Posterior probabilities values > 0.90 are marked as thick branches. In every collapsed clade, the number of sequences is indicated in or close to the triangle. *Astraeus macedonicus* holotype in **bold**. *Pisolithus arhizus* (GenBank AJ629887) and *Scleroderma verrucosum* (GenBank AJ629886) were included as outgroup.

Colour illustrations. Macedonia, Bistra mountain, beech forest, 1300 m asl, where the holotype species was collected (05MCF5221). Basidiomata; basidiospores and capillitium under LM; basidiospores under SEM. Scale bars = 1 cm (basidiomata), 10 µm (basidiospores and capillitium) and 5 µm (basidiospores).

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