

Hyalopsora nodispora is the new holomorph name for *Uredo capilli-veneris* (Uredinales, Pucciniastraceae) from Pakistan

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Abstract *Hyalopsora* sp. was collected on *Adiantum capillus-veneris* in the Himalayan moist temperate forest of Pakistan. The uredinial state of the fungus tallied with *Uredo capilli-veneris* is previously described from the same host plant. The new name *H. nodispora* is proposed for the holomorph. A key to rust species on *Adiantum* is presented based on the original description of species.

Keywords *Adiantum* · Himalayan moist temperate forest · Rust fungi

Introduction

During a field survey on the rust fungi of the Himalayan moist temperate forests of Pakistan, we collected *Adiantum capillus-veneris* L. infected with a *Hyalopsora* sp. On the same host species two rust fungi, *Hyalopsora adianti-capilli-veneris* (DC.) Syd. and *Uredo capilli-veneris* Jørst. & Iqbal, have been described previously (Jørstad and Iqbal 1967; Kuprevich and Transchel 1957). In the present paper we show that the recently collected *Hyalopsora* represents the holomorph of the anamorph state *U. capilli-veneris* and that it differs from other rust fungi described on *Adiantum*.

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Materials and methods

Spores and hand sections were embedded in lactophenol and gently heated to boiling. The preparations were examined with an Olympus BX40 light microscope and micrographs were taken with a ColourView-IIIu digital camera mounted on an Olympus BX51. Twenty-five to 50 spores were measured. Measurements comprise the usual ranges with the extremes given in brackets and the arithmetic means given in brackets as well after the ranges of measurements. Line drawings were made using a Camera Lucida attached to the Olympus BX40. Names of herbaria are abbreviated by their acronyms.

Results

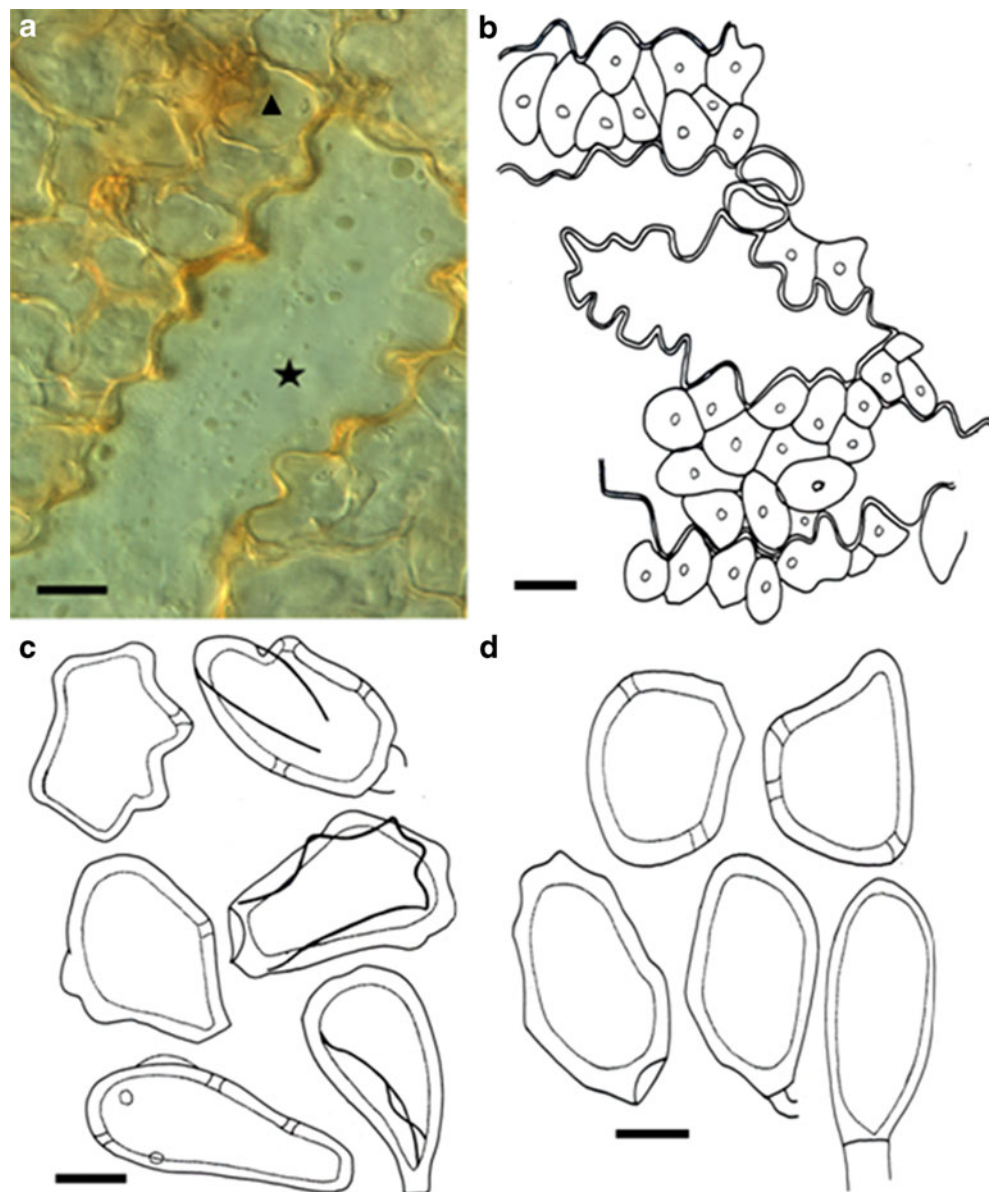
Hyalopsora nodispora M. Saba & R. Berndt, spec. nov. (Fig. 1)

Etymology: Named after the tuberculate wall of the amphispores

Anamorph: *Uredo capilli-veneris* Jørstad and Iqbal 1967. Uredinales from West Pakistan, p. 36

Spermogonia and aecia unknown. Uredinia scattered on abaxial surface of fronds, sometimes bulging on both sides, hence appearing to be amphigenous, circular or elliptical, sometimes confluent, yellowish orange, 0.14–0.41 × 0.3–1 mm, subepidermal, *Milesia* type with pseudoparenchymatous peridium composed of smooth polygonal cells, (6)9–17(20) × 10–24(26) μm (12.6 × 17.5 μm), wall subhyaline to yellowish, 1–2 μm thick; only amphispores present, fresh amphispores with yellowish contents, oblong, very irregularly angular or subangular club-shaped, obovate or heart shaped, 27–44 × (39)40–57 μm (33 × 47.2 μm); wall hyaline to pale brown, with tuberculate

Fig. 1 a–c *Hyalopsora nodispora* (type). **a** Teliospores (optical section) within the epidermal cells (triangle), epidermal cell without teliospores (star). **b** Intra-epidermal teliospores. **c** Amphispores showing tuberculate thickenings and ridges on surface. **d** Amphispores of *Hyalopsora aspidiotus* (LAH 1153) (**a–d**, bars=15 μ m)



thickenings, (2)3–6(7) μ m thick, smooth but sometimes with linear, longitudinal or oblique delicate ridges; germ pores 6–8, scattered, mostly located on tubercles but difficult to see; pedicel breaking off at or shortly from hilum, hyaline, 6–12 \times 4–15 μ m; paraphyses intermingled between amphispores, thin-walled, cylindrical, clavate or sometimes sub-capitate. Teliospores abaxial, densely aggregated within epidermal cells on diffuse, pale reddish brown discolored leaf spots. Teliospores apparently one-celled, ovoid, subglobose, oblong, triangular or irregular, 9–18 \times (10)12–30(32) μ m (14.2 \times 21.2 μ m); wall subhyaline to pale brown, 1–1.5 μ m, smooth.

Holotype (LAH 1152). Pakistan, Khyber Pakhtoonkhaw Province, Dunga Gali, on *Adiantum capilli-veneris* L. (Pteridaceae), 10 Jun 2011, leg. Malka Saba (II + III). Isotype in Z+ZT (ZT Myc 4283).

Additional material examined: Pakistan, Gilgit Baltistan Province, Bashu Jungle near Skardu, on *A. venustum* D. Don, 11 Oct 2002, leg. Asim Sultan (II) (# AS 34).

Hyalopsora aspidiotus (Magn.) Magn. Switzerland, Walensee, Durschlegli W of Amden, on *Gymnocarpium dryopteris* Newman (Woodsiaceae), 9 Aug 2011, leg. R. Berndt & M. Saba (II) (LAH 1153).

Discussion

The identity of *H. nodispora* and *U. capilli-veneris* cannot be proven as the type specimen of *U. capilli-veneris* is probably lost from LAH. The uredinial characters of *H. nodispora* agreed closely; however, with the description of

U. capilli-veneris and both fungi were collected at the same locality on the same host plant. There remains little doubt therefore that both represent the same fungal species.

Three *Hyalopsora* species have been described on *Adiantum*, *H. adianti-capilli-veneris* (DC.) Syd., *H. orientalis* Chona & Munjal and *H. polypodii* (Pers.) Magn. *Uredo viegasii* Jørst., described on *Adiantum* spp. from the neotropics, may also belong to *Hyalopsora*. These species differ from *H. nodispora* and are differentiated in the key presented below.

Hyalopsora nodispora resembles *H. aspidiotus* on *Gymnocarpium dryopteris*. It differs in the slightly larger, strongly angular or tuberculate and delicately ridged amphispores and in the absence of ordinary urediniospores. The placement of the host genera *Adiantum* and *Gymnocarpium* in different families (Smith et al. 2006) may also indicate that both species are distinct.

We could not find out whether all teliospores of *H. nodispora* were one-celled or whether multi-celled spores occurred as well. Fischer (1904, p. 474) encountered the same problem in *H. polypodii* whose teliospores were so crowded and pressed together within host epidermal cells that he was uncertain whether they had only one or more cells.

Hyalopsora nodispora is only known from moist temperate forests of Pakistan where it grows on *Adiantum* spp. in the vicinity of *Abies pindrow* Royle. The latter may be the host of the haploid states.

Key to the rust fungi on *Adiantum* spp. based on original descriptions

1. Only amphispores present 2

1. Ordinary urediniospores present, amphispores present or not 4
2. Amphispores less than 35 μm long *Hyalopsora adianti-capilli-veneris*
2. Amphispores longer than 35 μm 3
3. Amphispores without tuberculate thickenings, germ pores 4, equatorial *Hyalopsora orientalis*
3. Amphispores with tuberculate thickenings and delicate ridges, germ pores 6–8, scattered *Hyalopsora nodispora*
4. Amphispores present; germ pores 4, equatorial in ordinary urediniospores *Hyalopsora polypodii*
4. Amphispores absent; germ pores 8–10, scattered in ordinary urediniospores *Uredo viegasii*

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