

# First report of *Hemileia wrightiae* on *Wrightia* spp. in Australia

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**Abstract** The rust fungus *Hemileia wrightiae* is reported for the first time in Australia on *Wrightia saligna* and *W. pubescens*. This is the first species of *Hemileia* that has been found in Australia. The rust is described and illustrated from Australian specimens.

**Keywords** Uredinales · Pucciniales

*Wrightia* (Apocynaceae) is a genus of about 23 species distributed across tropical Africa and Asia (Mabberley 2008), including four species that occur in Australia (Clifford and Ludlow 1972). Two of these, *Wrightia pubescens* R. Br. and *W. saligna* (R. Br.) F. Muell. ex Benth., are small trees distributed across tropical regions in the Northern Territory, Queensland and Western Australia.

The uredinial and telial stages of leaf rust were examined from fresh specimens on seedlings of *W. pubescens* and *W. saligna* collected from a plant nursery near Darwin, NT in late 2010 as well as from fresh specimens collected from near Charters Towers, Qld in

early 2011. A further unidentified rust on *W. saligna* that had been collected in the NT in 2001 and deposited as a herbarium specimen was also examined. The rust was examined by mounting spores in lactic acid on microscope slides and gently heating to expel air bubbles. The slides were examined with Leica DM series compound microscopes using differential interference contrast and images taken with Leica DFC500 cameras. Measurements were obtained only from turgid urediniospores and teliospores.

The rust was identified as *Hemileia wrightiae* (Racib.) P. Syd. & Syd., according to the descriptions provided by Sydow and Sydow (1914), Stevens (1932) and Ritschel (2005). The description of the rust based on these Australian specimens follows.

*Hemileia wrightiae* (Racib.) P. Syd. & Syd. (Figs. 1, 2, 3 and 4)

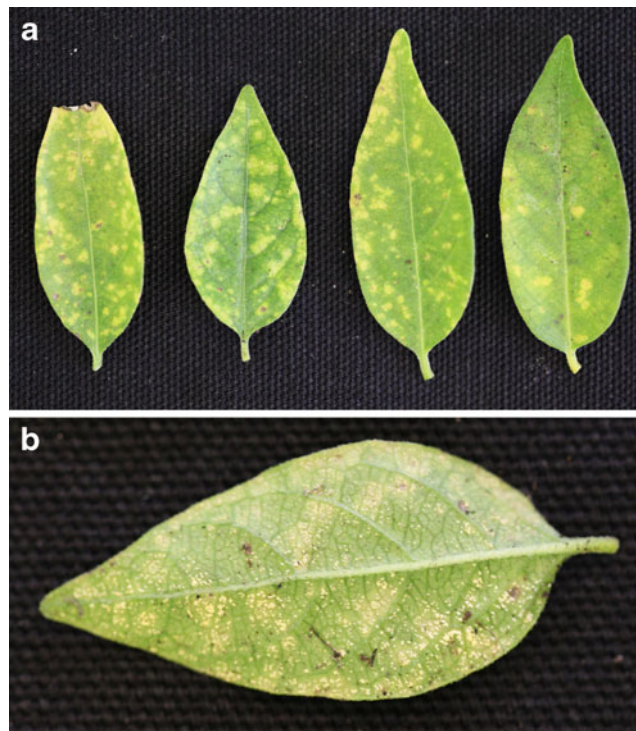
*Monographia Uredinearum* 3: 218 (1915).

≡ *Hemileiopsis wrightiae* Racib., *Parasitische Algen und Pilze Javas* 1: 26 (1900). Lectotype on *Wrightia tomentosa* (as *W. mollissima* Wall.), Indonesia, Java, Bogor (as Buitenzorg), 1899, *M. Raciborski* (*Raciborski, Crypt. Paras. Java* No. 34 (M)); isolectotypes: B, M (as Sydow, *Uredineen* No. 2290), NY; *fide* Ritschel (2005: 68).

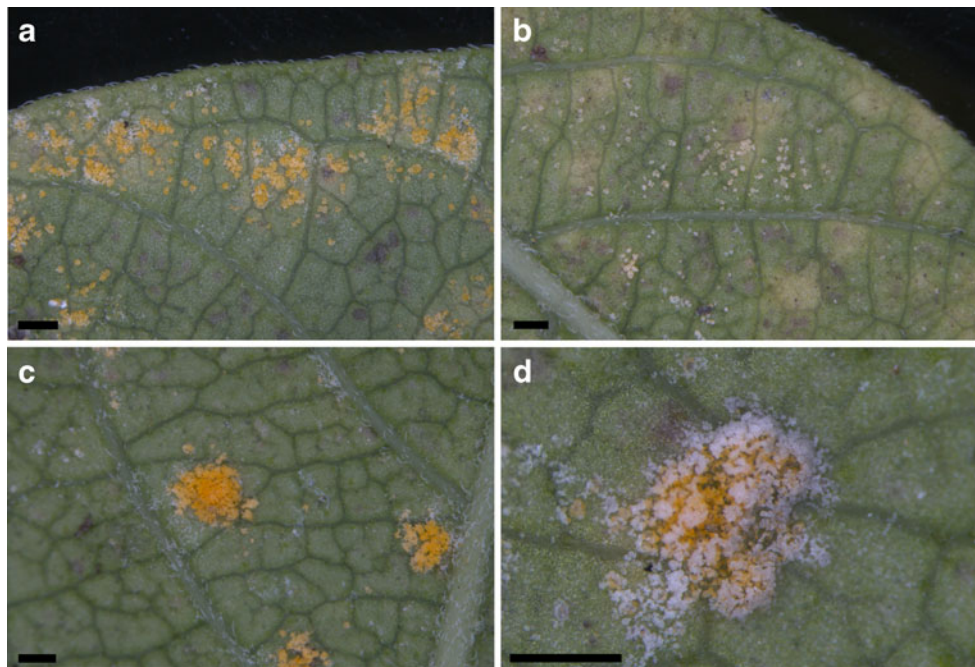
*Specimens examined*: AUSTRALIA, NORTHERN TERRITORY: Berrimah, Thorak Road, on seedling of *W. pubescens*, 23 Sept. 2010, *M. Connelly* (DNAP 4606), II; on seedlings of *W. saligna*, 18 Nov. 2010, *M. Connelly* (DNAP 4491), II; Kakadu National Park, Border Store, about 170 m from the west margin of the East Alligator

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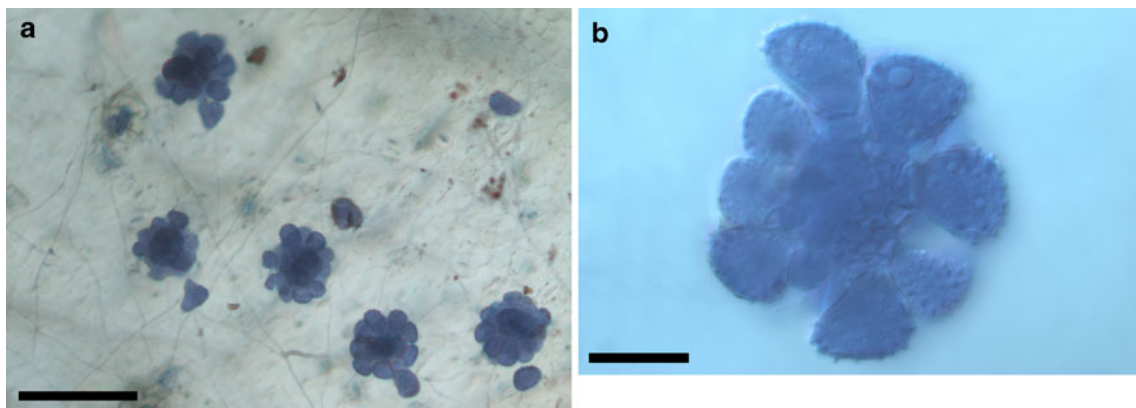
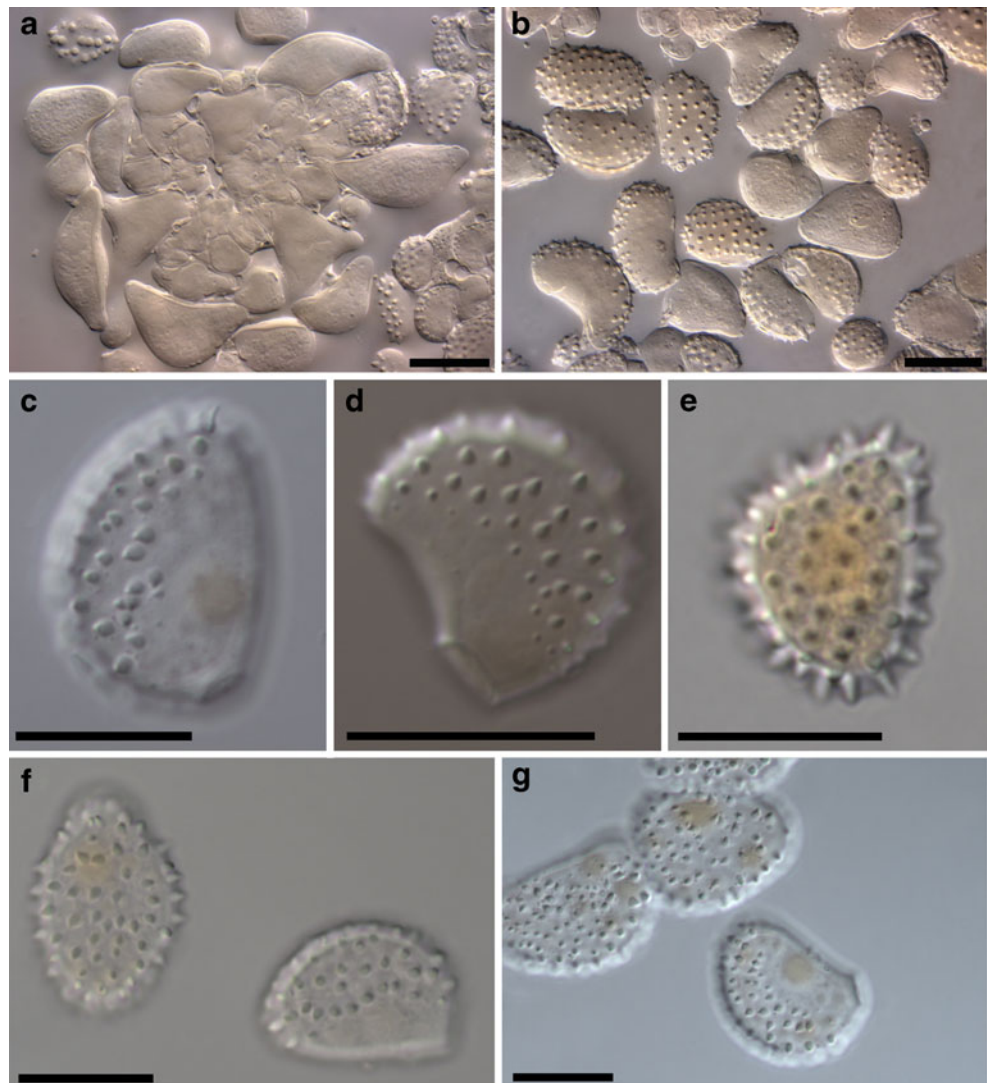


**Fig. 1** *Hemileia wrightiae* on *Wrightia pubescens* (DNAP 4606). **a** Symptoms on the upper leaf surface. **b** Signs on the lower leaf surface



**Fig. 2** **a–d** Uredinia of *Hemileia wrightiae* on a fresh lower leaf surface of *Wrightia pubescens* seen under stereo microscope (DNAP 4606). **b** Discoloured uredinia, **d** Discoloured urediniospores surrounding orange urediniospores on uredinia. (Bar = 1 mm)

**Fig. 3** a–g *Hemileia wrightiae*.  
**a** Teliospores (smooth, “Napoleon Hat” shaped) and uredinospores (echinulated).  
**b–g** Uredinospores. **a–b** BRIP 51425. **c–g** DNAP 4606.  
 (Bars = 20  $\mu$ m)



**Fig. 4** Stained *Hemileia wrightiae* (DNAP 4606) on *Wrightia pubescens*. **a** Uredinia on leaf (bar = 100  $\mu$ m). **b** Upper view of an uredinium (bar = 20  $\mu$ m)

River and 340 m from the north margin of the Oenpelli Road, on *W. saligna*, 31 Jan. 2001, M.P. Weinert (BRIP 51425), II, III. QUEENSLAND: near Charters Towers, between Haughton River and Reid River, on *W. pubescens*, 23 Fe. 2011, C.A. Pearce & M. Berridge (BRIP 54123), II, III.

Spermogonia and aecia absent. Uredinia hypophyllous (amphigenous on *W. saligna*, which has stomata present on both leaf surfaces and in approximately equal numbers (Ngan 1965)), corresponding to chlorotic spots on the upper leaf surface, numerous, pulverulent sometimes covering the entire lower leaf surface, orange, suprastomatal, 50–110  $\mu\text{m}$  in diam.; urediniospores borne singly on short pedicels, orange, strongly asymmetrical, kidney-shaped or ellipsoidal to triangular (depending on angle viewed), 17–32  $\times$  14–25  $\mu\text{m}$ , wall 1.0–1.5  $\mu\text{m}$  wide, usually with a concave smooth side and a dorsally convex coarsely echinulate side, with conical spines up to 2  $\mu\text{m}$  high and 2  $\mu\text{m}$  wide at base, germ pores obscure. Teliospores form in the same sori as the urediniospores, “Napoleon Hat” shaped or irregular with lobes and a dorsally convex side, 21–38  $\times$  10–22  $\mu\text{m}$ , subhyaline, wall 1  $\mu\text{m}$  thick, smooth, germinating without dormancy to form cylindrical 4-celled basidia that are up to 80  $\times$  10  $\mu\text{m}$  bearing 4 basidiospores c. 8  $\mu\text{m}$  diam.

Spermogonia and aecia are unknown for the genus *Hemileia* (Cummins and Hiratsuka 2003, Ritschel 2005). Stevens (1932) described aecia for *H. wrightiae* on *W. pubescens* (= *W. laniti* (Blanco) Merr.). Thirumalachar’s (1947) inoculation experiments gave negative results when basidiospores produced by teliospores of *H. wrightiae* were inoculated on young leaves of *W. tinctoria* R. Br. Teliospores germinated within 5 h but no signs of infection appeared within 20 days. Thirumalachar (1947) considered that *H. wrightiae* must be heteroecious and further suggested that Stevens (1932) may have mistaken uredinia for aecia.

*Hemileia wrightiae* has been previously found in Indonesia, Philippines, Taiwan, India and Sri Lanka, on the following species: *Wrightia arborea* (Dennst.) Mabb. (= *W. tomentosa* (Roxb.) Roem & Schult.), *W. javanica* DC., *W. mollissima*, *W. pubescens*, *W. tinctoria*, *W. antidysenterica* (L.) R.Br. (= *W. zeylanica* (L.) R. Br.) and *Wrightia* sp. (Sydow and Sydow 1914, Ramakrishnan and Soumini 1946, Thirumalachar 1947, Bagyanarayana et al. 2003, Ritschel 2005). This discovery represents the first report of the genus *Hemileia* in Australia and the first report of *H. wrightiae* on *W. saligna*.

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