

Contributions to the smut fungi of Africa. 4. Taxonomic re-examination and emended description of *Bauerago capensis*

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Abstract. A type specimen of *Bauerago capensis*, a smut fungus endemic to the Cape Floristic Region, is re-examined and designated as a lectotype. An emended description of that species and for the first time, illustrations of the spores in SEM are presented.

Key words: Africa, *Bauerago*, Cape Floristic Region, *Juncaceae*, *Juncus capensis*, *Microbotryaceae*, smut fungi, South Africa, taxonomy

Introduction

Bauerago is a small genus in the *Microbotryales* comprising nine species on host plants belonging to three, monocotyledonous families, namely, *Commelinaceae* (*Commelina* and *Tinantia*), *Cyperaceae* (*Cyperus*), and *Juncaceae* (*Juncus* and *Luzula*). Their sori destroy ovules of infected plants, filling the capsules (achenes, in the cases of host plants in *Cyperus*) with spores. The sori lack peridia and columellae, and there are no sterile cells between the spores (Vánky 2013).

Two species of *Bauerago*, *B. abstrusa* (Malençon) Vánky and *B. capensis*, are known to infect species of *Juncus* (Reess 1875a; Malençon 1929; Zundel 1938; Vánky & McKenzie 2002; Vánky 2011; Vánky et al. 2011). *Bauerago abstrusa* is reported from Europe and New Zealand on rushes in *Juncus* subg. *Agathryon* Raf., members of two sections, *Juncus* sect. *Steiroschloa* Griseb. (*J. gerardii* Loisel.) and *Juncus* sect. *Juncotypos* Dumort. (*J. balticus* Willd. and *J. gregiflorus* L.A.S. Johnson), while *B. capensis* is known to infect only two

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rushes in *Juncus* subg. *Agathryon* Raf., members of *Juncus* sect. *Graminifolii* Engelm. (*J. lomatoxyllus* Spreng. and *J. capensis* Thunb.).

Ustilago capensis was described from two specimens of rushes that were examined by F. Buchenau for preparation of a monographic treatment of the *Juncaceae* of the Cape of Good Hope region (see Buchenau 1875: 486, 1906: 32). Buchenau noticed that the plants were infected by a smut fungus and sent them to M. Reess who described *Ustilago capensis* (Reess 1875a, in the same year, re-published as Reess 1875b, c). The description was accompanied by an illustration of the spore ornamentation (Pl. XI, 3–4). A type specimen of *Ustilago capensis* was compared with the type of *U. vuyckii* by Oudemans & Beijerinck (1895: 56) who found them to be different. The type specimens of *Ustilago capensis* have not been examined anymore. In the Zundel's monograph of the *Ustilaginales* of South Africa (1938), a compilation of the description of *U. capensis*, obtained from Saccardo's *Sylloge Fungorum* (Saccardo 1888: 478), is given, without information about the herbarium where the authentic specimens of *U. capensis* were kept. Vánky (2011: 84) noted that “no specimen of this species could be located”.

A type specimen of *Ustilago capensis* was found by us among Buchenau's specimens of *Juncus capensis*, kept at the herbarium of the Natural History Museum Vienna (W). This smut fungus was re-examined and its emended description is presented herein.

Material and methods

A dried specimen from the herbarium of the Natural History Museum Vienna (W) was examined with a light microscope (LM) and scanning electron microscope (SEM). For LM observations and measurements, spores were mounted in lactoglycerol solution (w : la : gl = 1 : 1 : 2) on glass slides, gently heated to boiling point to rehydrate the spores, and then cooled. The measurements of spores are given in the form: min–max (extreme values) (mean \pm 1 standard deviation). For SEM, spores were attached to specimen holders by double-sided adhesive tape and coated with platinum in an ion sputter. The surface structure of spores was observed and photographed at 10 kV accelerating voltage using a JEOL JSM 6610-LV scanning electron microscope. The description given below is based entirely on the specimen examined.

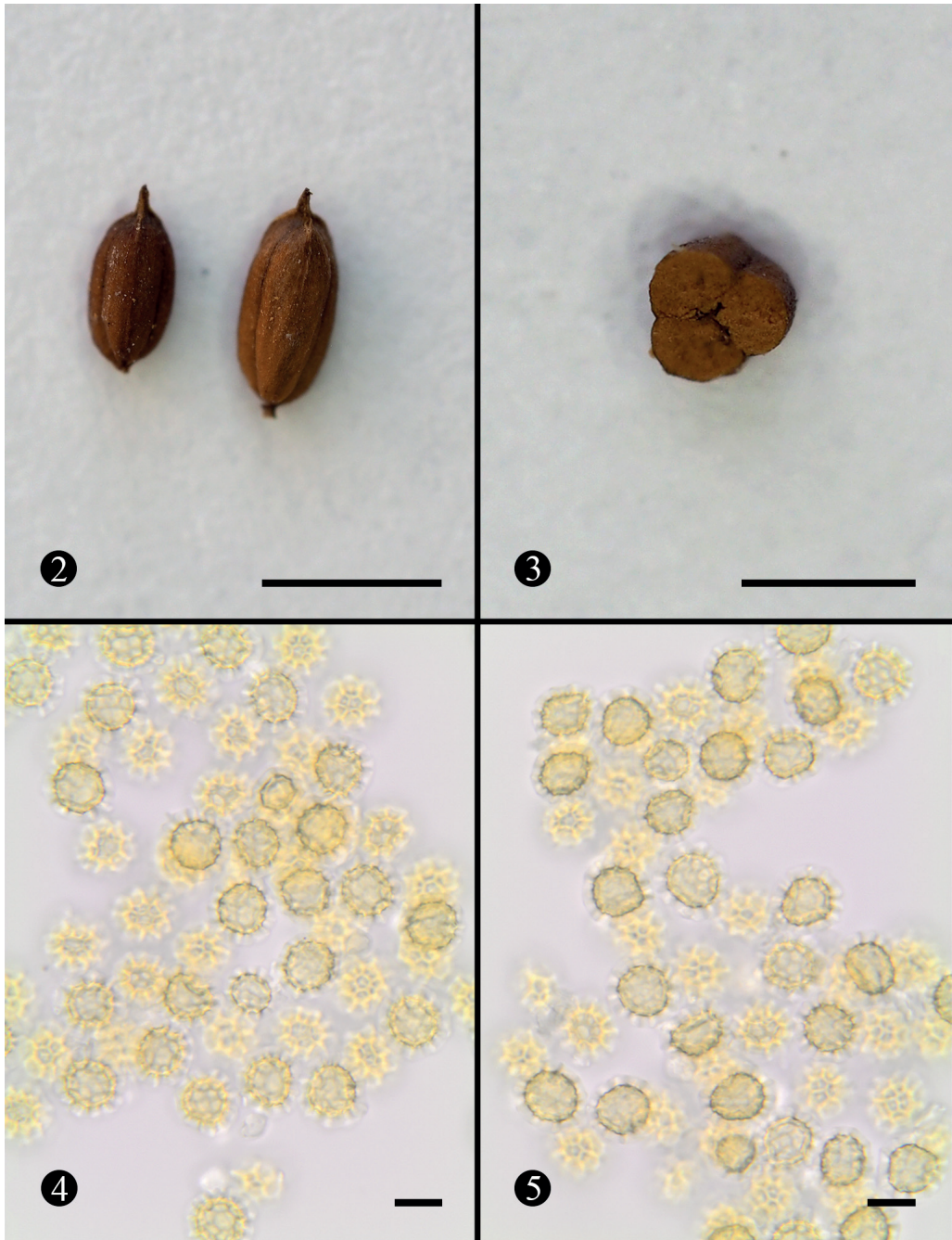
Taxonomy

Bauerago capensis (Reess) Vánky, Mycotaxon 70: 44, 1999, emend. T. Denchev & Denchev
Figs 2–9

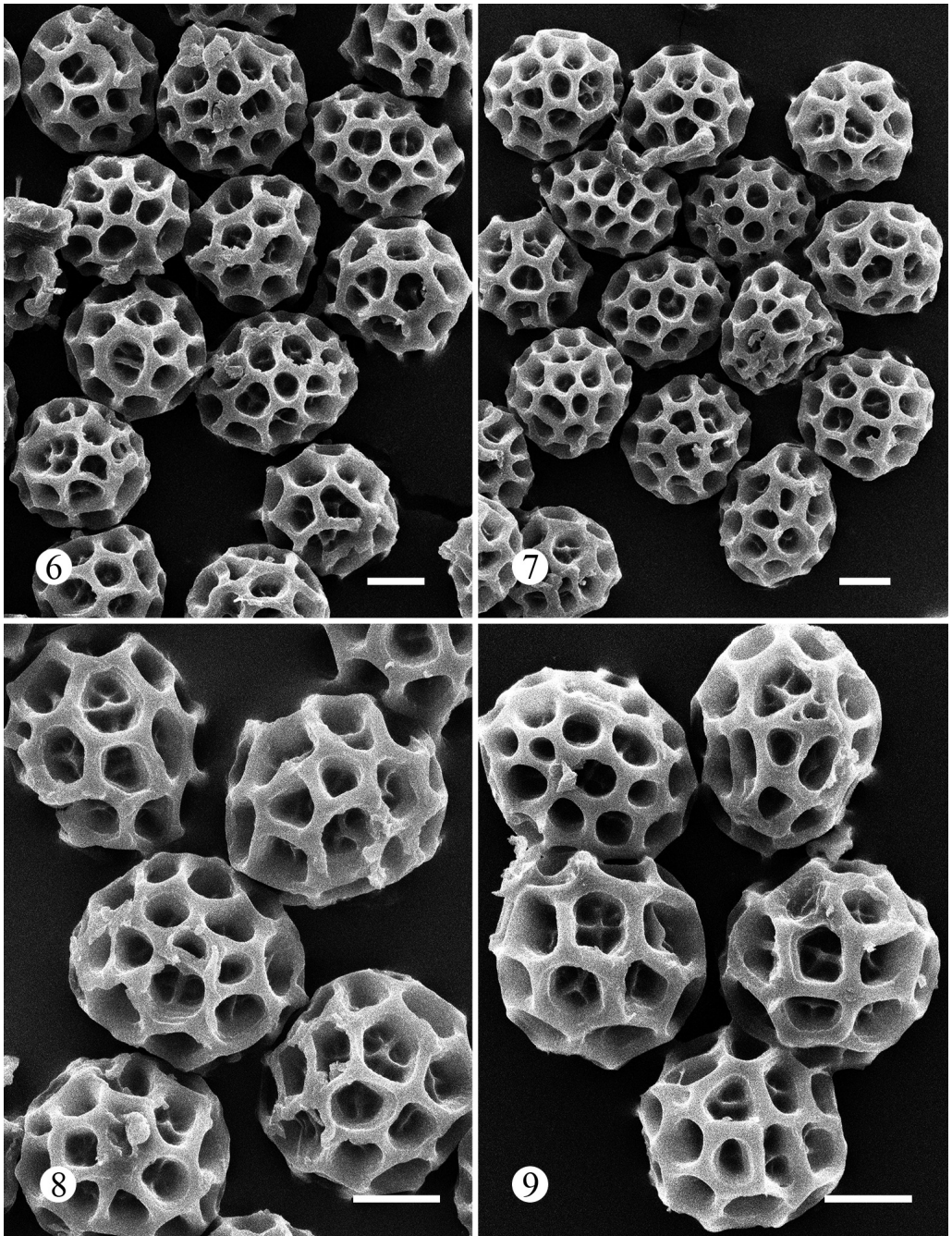
\equiv *Ustilago capensis* Reess, Sitzungsberichte der Physikalisch-Medizinischen Sozietät zu Erlangen 7: 70, 1875.

\equiv *Cintractia capensis* (Reess) Cif., Annales Mycologici 29(1–2): 72, 1931.

Sori destroying the ovules, filling the capsules with a semi-agglutinated, light to moderate orange-yellow (saffron, based on the Rayner's colour chart; Rayner 1970) spore mass. Infection systemic. **Spores** globose, subglobose, broadly ellipsoidal or ovoid, (10.5–)12–17.5(–18.5) \times (8.5–)10–15.5(–16.5) ($14.5 \pm 1.5 \times 13.1 \pm 1.3$) μm (n = 100), light yellowish



Figs 2–5. *Bauerago capensis* on *Juncus capensis* (W 1906-0005707). 2. Infected capsules, scale bar = 2 mm. 3. Transversal section through an infected 3-locular capsule filled with a spore mass, scale bar = 1 mm. 4, 5. Spores in LM, scale bars = 10 μ m



Figs 6–9. *Bauerago capensis* on *Juncus capensis* (W 1906-0005707) – spores in SEM, scale bars = 5 μ m

brown, completely reticulate; spore wall (2.2–)2.5–3.7(–4.2) μm thick (including reticulum); meshes (2–)3–4(–5) per spore diameter, irregularly polyhedral, sometimes rounded, (1.0–)1.3–3.8(–4.5) μm long; muri (9–)10–13(–14) on equatorial circumference, in optical median view subacute, (1.1–)1.3–2.6(–3.0) μm high; the interspaces often with lower muri, forming smaller meshes. In SEM spore wall bi-reticulate, one reticulum with irregularly polyhedral or irregularly rounded meshes, with a second reticulum in the interspaces with lower muri and smaller meshes.

Hosts and specimens — On *Juncus capensis* Thunb.: SOUTH AFRICA, WESTERN CAPE, mountains near Cape Town, ca 600 m (2000 ft.), December 1827, leg. C.F. Ecklon & C.L.P. Zeyher (W 1906-0005707(!), **lectotype, designated here** – a small packet dated ‘17.V.74’, annotated ‘Standort 64, *Juncus capensis* var. *longifolius*’, attached to a syntype sheet of *J. capensis* subsp. *longifolius* Buchenau) (Fig. 1). — On *Juncus lomatophyllus* Spreng., SOUTH AFRICA, WESTERN CAPE, Kirstenbosch at Table Mountain, near Cape Town, 18 Feb 1816, leg. K.H. Bergius (syntype, n.v.).

Distribution — On *Juncaceae*: *Juncus* sect. *Graminifolii*: *Juncus capensis* and *J. lomatophyllus*; Africa (South Africa).

It is difficult to determine the exact date when the specimen selected herein as a lectotype was collected. The annotation ‘17.V.74’ (Fig. 1) refers to the date when the plant was studied by F. Buchenau. Based on Buchenau’s comments about the infected specimen (Buchenau 1875: 486), it may be a duplicate of an Ecklon’s specimen (no. 899), collected near Seekuhvalley, in December, 1827.

Juncus capensis is endemic to South Africa (Northern Cape, Western Cape, and Eastern Cape), while *J. lomatophyllus* is distributed in Zimbabwe, southern Mozambique, South Africa (Limpopo, Gauteng, Mpumalanga, KwaZulu-Natal, Western Cape, Eastern Cape), Swaziland, and Lesotho (Foden & Potter 2005; Cholo & Foden 2006). *Juncus capensis* subsp. *longifolius* Buchenau, cited as a host plant in Vánky (2011), is currently recognized as a synonym of *J. capensis* (Kirschner et al. 2002).

Bauerago capensis is known only from the Cape Floristic Region (from mountainous areas near Cape Town) – one of the world’s biodiversity hotspots. The flora of this region comprises about 9000 species, 69 % of which are endemic (Goldblatt & Manning 2000).

The spores of *Bauerago capensis* possess characteristic, bi-reticulate ornamentation (Figs 6–9).

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