

Contributions to the smut fungi of Africa. 7. First records of *Tilletia brachypodii-ramosi* and *Ustilago constantineanui*

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Abstract. Two poorly known smut fungi are recorded for the first time from Africa: *Tilletia brachypodii-ramosi* on *Brachypodium retusum* (from Morocco) and *Ustilago constantineanui* on *Sporobolus schoenoides* (from Algeria). Descriptions and illustrations are provided for these taxa.

Key words: Africa, Algeria, *Brachypodium retusum*, Morocco, smut fungi, *Sporobolus schoenoides*, taxonomy, *Tilletia brachypodii-ramosi*, *Ustilago constantineanui*

Introduction

During an examination of grass specimens in the herbarium of the National Museum of Natural History, Paris (P), some interesting smut fungi were found, two of which, *Tilletia brachypodii-ramosi* and *Ustilago constantineanui*, are reported here for the first time from Africa (cfr Vánky et al. 2011).

Material and methods

Dried specimens from the herbarium of the National Museum of Natural History, Paris were examined under light microscope (LM) and scanning electron microscope (SEM). For

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LM observations and measurements, spores and sterile cells were mounted in lactoglycerol solution (w : la : gl = 1 : 1 : 2) on glass slides, gently heated to boiling point to rehydrate the spores and sterile cells, and then cooled. The measurements of spores and sterile cells are given as min–max (extreme values) (mean \pm 1 standard deviation). For SEM, spores and sterile cells were attached to specimen holders by double-sided adhesive tape and coated with gold using an ion sputter coater. The surface structure of spores and sterile cells was observed and photographed at 10 kV accelerating voltage using a Hitachi SU3500 scanning electron microscope. The descriptions below are based entirely on the specimens examined. The shapes of spores and sterile cells are arranged in descending order of frequency.

Taxonomy

Tilletia brachypodii-ramosi H. Zogg, Ber. Schweiz. Bot. Ges. 77: 53, 1967. — Holotype on *Brachypodium retusum* (Pers.) P. Beauv. (as '*B. ramosum* (L.) Roem. & Schult.'). France, Vaucluse Department, Mont Ventoux, 8 km from Malaucène, alt. 850 m, 22 May 1962, H. Zogg, s.n. (ZT). Figs 1–5

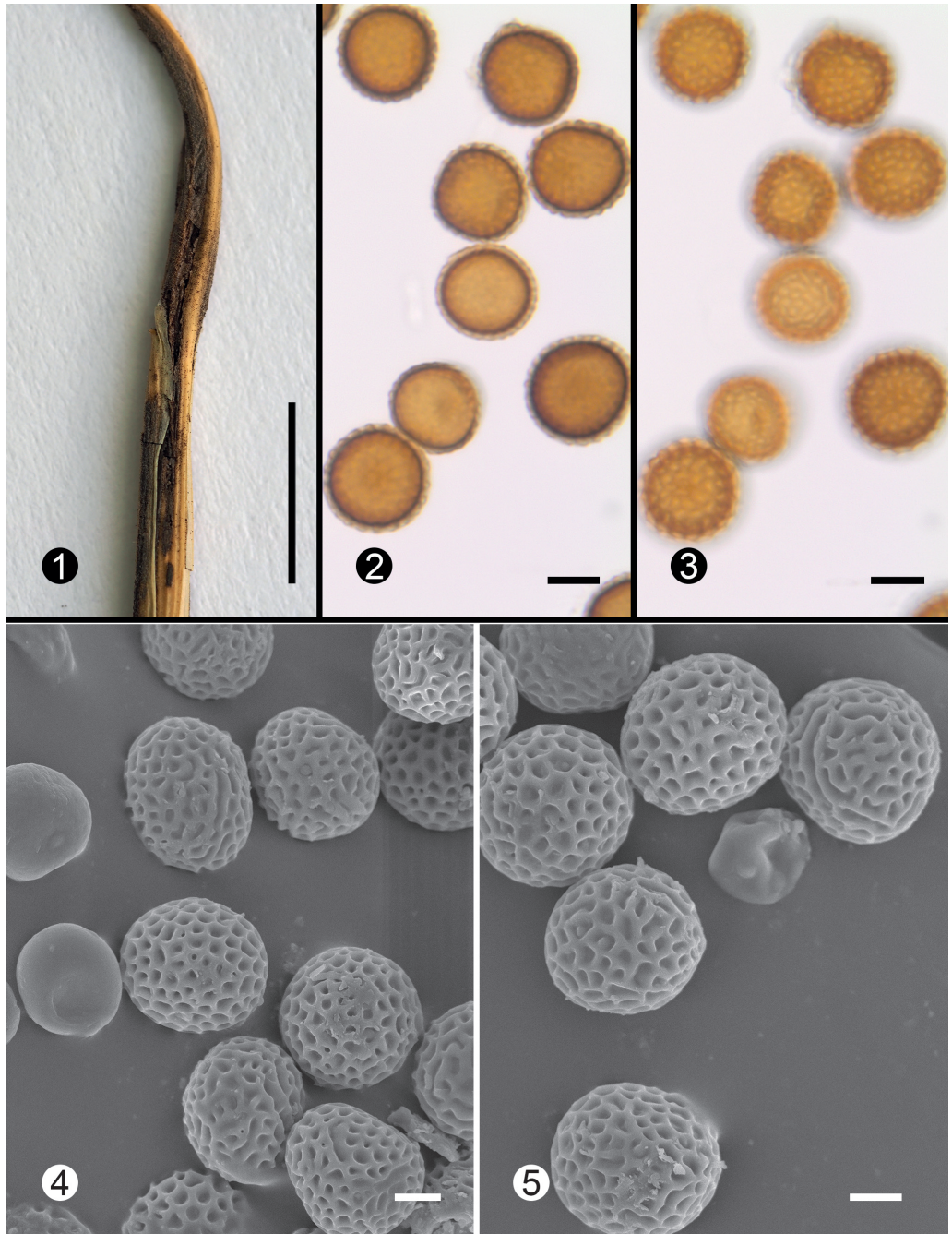
Infection systemic. **Sori** in leaves as long, swollen striae, initially covered by the epidermis that later ruptures disclosing a very dark reddish brown, powdery mass of spores and sterile cells. **Sterile cells** subglobose to irregular, often collapsed, usually smaller than spores, (10.5–)11.5–18.5(–20.5) \times (8.5–)10–15(–16.5) (15.5 \pm 2.2 \times 13.2 \pm 1.8) μm (n = 50), subhyaline to pale yellowish; cell wall two-layered, (1.1–)1.3–1.7(–2.0) μm thick. In SEM, smooth to rugulose. **Spores** subglobose, broadly ellipsoidal, globose or slightly irregular, (18–)19–23(–24) \times (17–)18–22(–23) (20.5 \pm 1.1 \times 19.4 \pm 1.3) μm (n = 100), medium reddish brown to dark reddish brown, reticulate; spore wall 1.6–2.3(–2.6) μm thick (including reticulum); meshes 7–9(–10) per spore diameter, polyhedral or irregular, (0.6–)1.0–3.5(–4.3) μm long; muri 23–31 on equatorial circumference, in optical median view subacute or blunt, 0.6–1.4(–1.7) μm high; sometimes covered by a thin hyaline sheath; sometimes with a papilla. In SEM, interspaces sometimes with a hemispherical protuberance.

Specimen examined – On *Brachypodium retusum* (Pers.) P. Beauv.: **MOROCCO**, the High Atlas Range, above Seksoua, alt. 1200–1600 m, 26–27 May 1871, leg. J. Ballz, Iter Maroccanum 1871 (P-P02627423; as '*B. ramosum*').

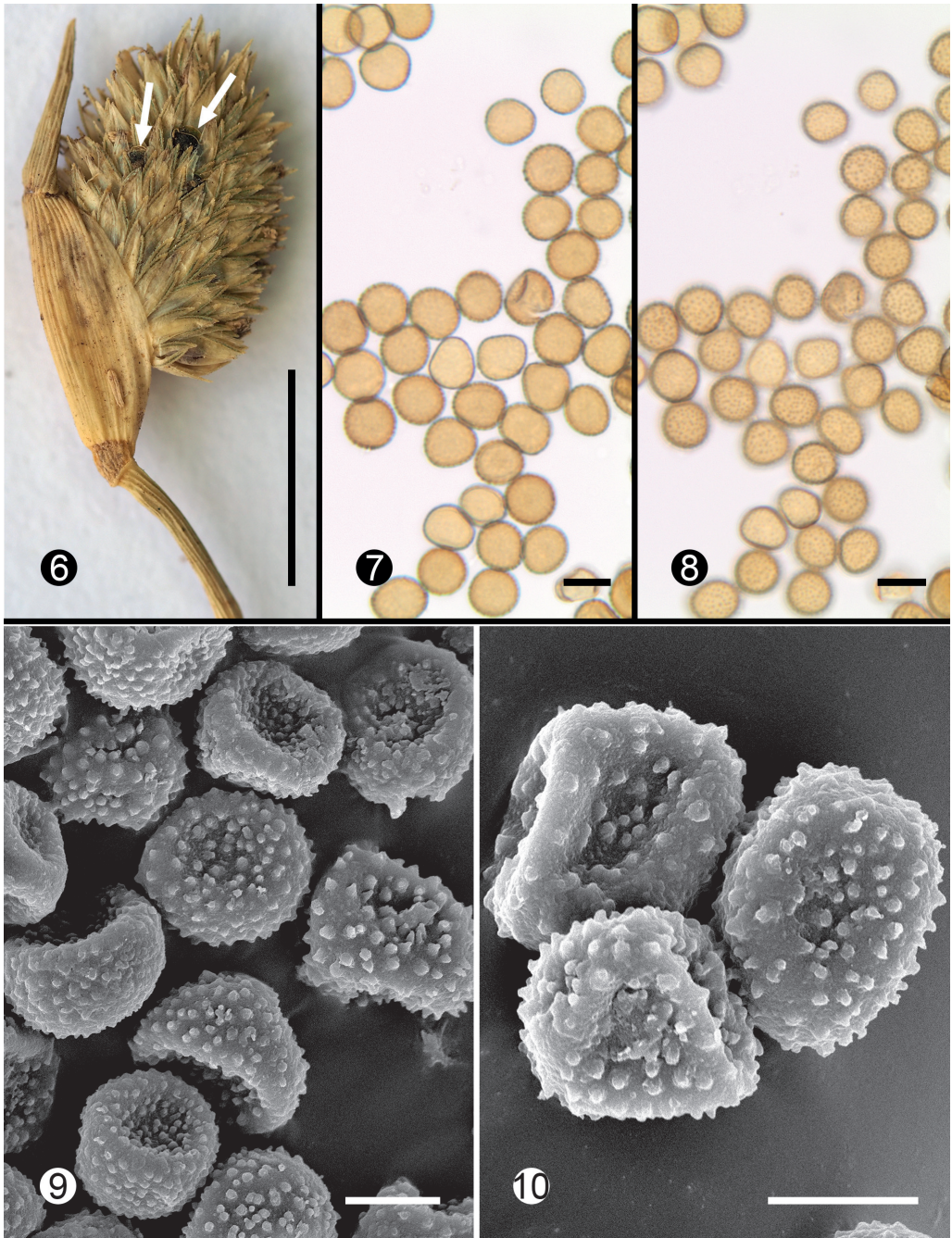
Distribution – On *Poaceae*: *Brachypodium retusum*; Europa (France, Spain, and Croatia) and Africa (Morocco).

Two species of *Tilletia* form sori in leaves of *Brachypodium*: *T. olida* (Riess) J. Schröter on *Brachypodium pinnatum* (L.) P. Beauv. and *B. sylvaticum* (Huds.) P. Beauv., and *Tilletia brachypodii-ramosi* on *Brachypodium retusum* (Zogg 1967; Vánky 1994, 2011). *Tilletia brachypodii-ramosi* is distinguished from *T. olida* by having higher muri, 0.6–1.5(–2.5) μm high vs. 0.3–1.0(–1.3) μm high for *T. olida*.

Tilletia brachypodii-ramosi is known from France, Spain (mainland Spain and the Balearic Islands), and Croatia (Jaap 1916, as '*T. olida*'; Guyot et al. 1955, as '*T. olida*'; Zogg 1967; Vánky 1979, 1994, 2005, 2011; Ivić et al. 2013). This smut fungus is reported here for the first time from Morocco.



Figs 1–5. *Tilletia brachypodii-ramosi* on *Brachypodium retusum* (P-P02627423). 1. Habit. 2, 3. Spores in LM (in median and surface view, respectively). 4, 5. Spores and sterile cells in SEM. Scale bars: 1 = 0.5 cm, 2, 3 = 10 μ m, 4, 5 = 5 μ m



Figs 6–10. *Ustilago constantineanui* on *Sporobolus schoenoides* (P-P02655721). 6. Habit; arrows show sori. 7, 8. Spores in LM (in median and surface view, respectively). 9, 10. Spores in SEM. Scale bars: 6 = 0.5 cm, 7, 8 = 10 µm, 9, 10 = 5 µm

Ustilago constantineanui (Sävul.) Vánky, Symb. Bot. Upsal. 24(2): 201, 1985. ≡ *Sphacelotheca constantineanui* Sävul., Bul. Şti. Acad. Republ. Populare Române 3: 214, 1951. — Holotype on '*Alopecurus aequalis* Sobol.' (misidentified *Sporobolus alopecuroides*, det. K. Vánky, 1985: 201), Romania, Giurgiu County, Bolintin, 4 Oct 1918, leg. M. Brândză, s.n. (BUCM).

Figs 6–10

= *Ustilago heleochloae* Vánky & Gönczöl, Bot. Not. 131: 247, 1978. — Holotype on *Sporobolus schoenoides* (as '*Heleochloa schoenoides*'), Hungary, Budapest, near Pestlőrinc, 47°30'N, 19°03'E, alt. 130 m, 10 Oct 1977, J. Gönczöl, s.n. (HUV 6514, isotypes in BP, S, and Vánky, *Ustilag.*, no. 313) (syn. by Vánky 1985: 201).

Infection local. **Sori** in single ovaries of infected plant, inconspicuous, hidden by the glumes, broadly ellipsoidal, ellipsoidal, subglobose or lemon-shaped, 1.0–2.2 × 0.8–1.8 mm, covered by a thin, greenish brown pericarp that later ruptures exposing a powdery, dark reddish brown mass of spores. **Spores** single, subglobose, broadly ellipsoidal, irregular, ellipsoidal, globose or ovoid, (8.5–)9.5–13(–14) × (7.5–)8.5–10.5(–11.5) (11.0 ± 1.0 × 9.7 ± 0.7) µm (n = 100), medium yellowish brown; wall 0.9–1.3 µm thick, echinulate-verrucose, ornaments up to 0.5(–0.6) µm high. In SEM, spore wall punctate between the ornaments.

Specimen examined – On *Sporobolus schoenoides* (L.) P.M. Peterson: **ALGERIA**, SIDI BEL ABBÈS PROVINCE, near Sidi Bel Abbès, 25 Aug 1873, leg. A. Warion, *Plantae Atlanticae Selectae*, no. 96 (P-P02655721; as '*Crypsis schoenoides*').

Distribution – On *Poaceae*: *Sporobolus aculeatus* (L.) P.M. Peterson (*Crypsis aculeata* (L.) Aiton), *S. alopecuroides* (Piller & Mitterp.) P.M. Peterson (*Crypsis alopecuroides* (Piller & Mitterp.) Schrad.), *S. schoenoides* (*Crypsis schoenoides* (L.) Lam., *Heleochloa schoenoides* (L.) Host ex Roem.); Europa (Hungary and Romania) and Africa (Algeria).

Ustilago constantineanui is known only from Hungary and Romania (Sävulescu 1951, as '*Sphacelotheca constantineanui*'; Vánky & Gönczöl 1978, as '*Ustilago heleochloae*'; Vánky 1980, as '*Ustilago heleochloae*'; Vánky 1985a, b, 1994, 2011). This smut fungus is reported here for the first time from Algeria.

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