

Additions to the smut fungi (*Ustilaginomycetes*) of Bolivia

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Received: 13 November 2009 / Accepted: 21 November 2009

Abstract. In addition to the 46 known smut fungi of Bolivia, a further 16 species are reported as new to Bolivia, three of which are new to science, viz. *Moreaua scirpi*, *Sporisorium christineae* and *Tilletia spinulosa*. New host plants are given for four smut fungi.

Key words: Bolivia, new host plants, new smut fungi

Introduction

Smut fungi from Bolivia were reported by Stevenson & Cárdenas (1949), Farr & Stevenson (1964), and Piepenbring (2001, 2002). The number of known species in Bolivia, according to Piepenbring (2002: 55) is 46. An additional species, *Macalpinomyces loudetiopsisidis*, is described separately (Vánky 2009b).

A collecting trip to Bolivia, between 15 and 26 of April 2009, resulted in 49 collections, representing 28 smut fungus species on 30 host plant species. Of these smuts 15 species are new to Bolivia and 3 new to science. Three additional smut fungi were found in the phanerogamic herbarium LPB (La Paz, Bolivia), of which one is new to Bolivia. Four new host plants are also reported for four known smut fungi.

Materials and methods

Sorus structure, spore ball, spore and sterile cell characteristics were studied using dried herbarium specimens. For light microscopy (LM) spores were suspended in a small droplet

of lactophenol, covered with a cover glass, gently heated to boiling point to rehydrate the spores and eliminate air bubbles from the preparation, and studied at 1000× magnification. For scanning electron microscopy (SEM), spores were placed on double-sided adhesive tape, mounted on a specimen stub, sputter-coated with gold-palladium, *ca* 20 nm, and examined in a SEM at 10 kV.

Results and discussions

The following three new species are described:

***Moreaua scirpi* Vánky, C. Vánky, R.G. Shivas & McTaggart, sp. nov.**

Mycobank # MB 515 497

Typus in matrice Scirpus rigidus (Steud.) Boeckl., Bolivia, Dept. La Paz, 9 km SE urbe Copacabana, 16°08'48.8" S, 69°02'27.2" W, alt. 4178 m.s.m., 26.IV.2009, leg. R.G. & M.D.E. Shivas, A. McTaggart, W.A. Arce, C. & K. Vánky. Holotypus in H.U.V. 21 669, isotypi in LPB, BRIP 52 753, et in Vánky Ust. exs. no. 1331.

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Sori ad superficiem organorum floralium internarum massam nigram glomerulorum sporarum formantes, involucris floralibus perfecte abditis. *Glomeruli* sporarum subglobosi, ovoidei, ellipsoideales vel irregulares, $15\text{--}100 \times 16\text{--}130\ \mu\text{m}$, atro-olivaceobrunnei, e sporis 2- usque nonnullis decem firmiter agglutinatis compositi, raro sporae per singulas. *Sporae* globosae, ellipsoideales, plerumque irregulares, cum lateribus 1 vel pluribus planis, superficie libera convexa, $9\text{--}15 \times 9,5\text{--}18,5\text{--}(20)\ \mu\text{m}$, olivaceobrunneae; pariete $1\text{--}2,5\ \mu\text{m}$ crasso, in lateribus contactis levi, ad superficiem liberam subtiliter. irregulariter verrucoso.

Sori (Fig. 1) on the surface of inner floral organs (filaments, ovaries), forming a black, agglutinated to granular-powdery mass of spore balls, completely hidden by the floral envelopes. *Spore balls* (Figs 4–5) subglobose, ovoid, ellipsoidal or irregular, $15\text{--}100 \times 16\text{--}130\ \mu\text{m}$, dark olivaceous brown, composed of two to a few tens of firmly agglutinated spores, rarely spores single. *Spores* (Figs 4–5) globose, ellipsoidal, usually irregular with one or several flattened sides, free surface convex, $9\text{--}15 \times 9,5\text{--}18,5\text{--}(20)\ \mu\text{m}$, olivaceous brown; wall $1\text{--}2,5\ \mu\text{m}$ thick, smooth on the contact sides, finely, irregularly verrucose on the free surface, there often with small, irregular squamae, probably remnants of the sporogenous hyphae.

On *Cyperaceae*: *Scirpus rigidus* (Steud.) Boeckl.

Distribution: South America (Bolivia). Known only from the type locality.

Thecaphora cornuana A.A. Fisch. Waldh. (Fischer v. Waldheim 1877: 35), on *Scirpus affinis* Roth, W Indies, Island of Guadeloupe, is comparable with *Moreaua scirpi*. According to the original description, *T. cornuana* differs from *M. scirpi* in having spore balls that are $40\text{--}70 \times 50\text{--}90\ \mu\text{m}$, composed of numerous (50 or more?) spores. The spores are angular, $8\text{--}14\ \mu\text{m}$ in diam, pale olive-brown, smooth, bright. *T. cornuana* is likely a *Moreaua* sp. distinct from *M. scirpi*.

Sporisorium christineae R.G. Shivas, McTaggart & Vánky, sp. nov.

Mycobank # MB 515 498

Typus in matrice Schizachyrium sanguineum (Retz.) Alston, Bolivia, Prov. Potosí, prope Toro Toro National Park, $18^{\circ}07'17,8''\text{ S}$, $65^{\circ}45'0,3''\text{ W}$, alt. 2765 m.s.m., 21.IV.2009, leg. R.G. & M.D.E. Shivas, A. McTaggart, W.A. Arce, C. & K. Vánky. Holotypus in H.U.V. 21 668, isotypi in LPB et in BRIP 52 751.

Sporisorium christineae differt a specie *Sporisorium guaraniticum* (Speg.) Vánky (Mycotaxon 35: 155, 1989), ei proxime propinquo sporis parum dimorphicis, pariete sporarum $2,5\text{--}4\ \mu\text{m}$ crasso et superficie libera sporarum humiliter verruculosa in imagine obliqua sporarum conspicua, sporis definite dimorphicis, pariete earum $0,5\text{--}1,5\ \mu\text{m}$ crasso, superficie sporarum libera conspicue verrucosa-echinulata imagine obliqua sporarum leniter subserrulata.

Sori (Fig. 2) destroying all racemes in the inflorescence, narrow-cylindrical, $0,5\text{--}1 \times 15\text{--}30\ \text{mm}$, completely hidden by the spatheolae from which a filiform, twisted, up to 70 mm long columella is protruding. *Spore balls* (Figs 6–7)



Fig. 1. *Sori* of *Moreaua scirpi* on the surface of inner floral organs of *Scirpus rigidus*. To the left a healthy inflorescence, and two infected inflorescences, to the right with opened floral envelopes (type). Bar = 1 cm

subglobose, ovoid, ellipsoidal, elongated or irregular, $45\text{--}100 \times 50\text{--}130\ \mu\text{m}$, dark reddish brown, composed of tens of spores that separate easily by pressure. *Spores* (Figs 6–7) dimorphic, outer spores subglobose, ellipsoidal, or slightly irregular, $12\text{--}15 \times 13\text{--}17,5\ \mu\text{m}$, reddish brown with paler and darker areas; wall uneven, $0,5\text{--}1,5\ \mu\text{m}$, thickest at the angles and contact sides, evidently verrucose-echinulate on the free surface, spore profile finely subserrulate. Inner spores subglobose, ellipsoidal to rounded subpolyhedrally irregular, about the size of the outer spores, paler, apparently smooth; wall unevenly c. $0,5\text{--}1\ \mu\text{m}$ thick, accordingly the spores have paler and darker areas. *Sterile cells* absent.

On *Poaceae*: *Schizachyrium sanguineum* (Retz.) Alston.

Distribution: South America (Bolivia). Known only from the type locality.

Sporisorium christineae differs from the closely related *S. guaraniticum* in which the spores are only slightly dimorphic, $13\text{--}20\ \mu\text{m}$ long, the spore wall is $2,5\text{--}4\ \mu\text{m}$ thick and the free surface of the spores is low verruculose which just affects the spore profile.

Etymology: Named in honour of the biologist and smut fungus specialist Christine Vánky, who found and collected innumerable smut fungi, many new, including this species.

The discovery of this taxon warrants modification of part of the key to the *Sporisorium* spp. on *Andropogon* and *Schizachyrium* (Vánky 2009a: 7) that destroy the racemes, possess sori with one filiform columella, have dimorphic spores in easily separating spore balls, as follows:

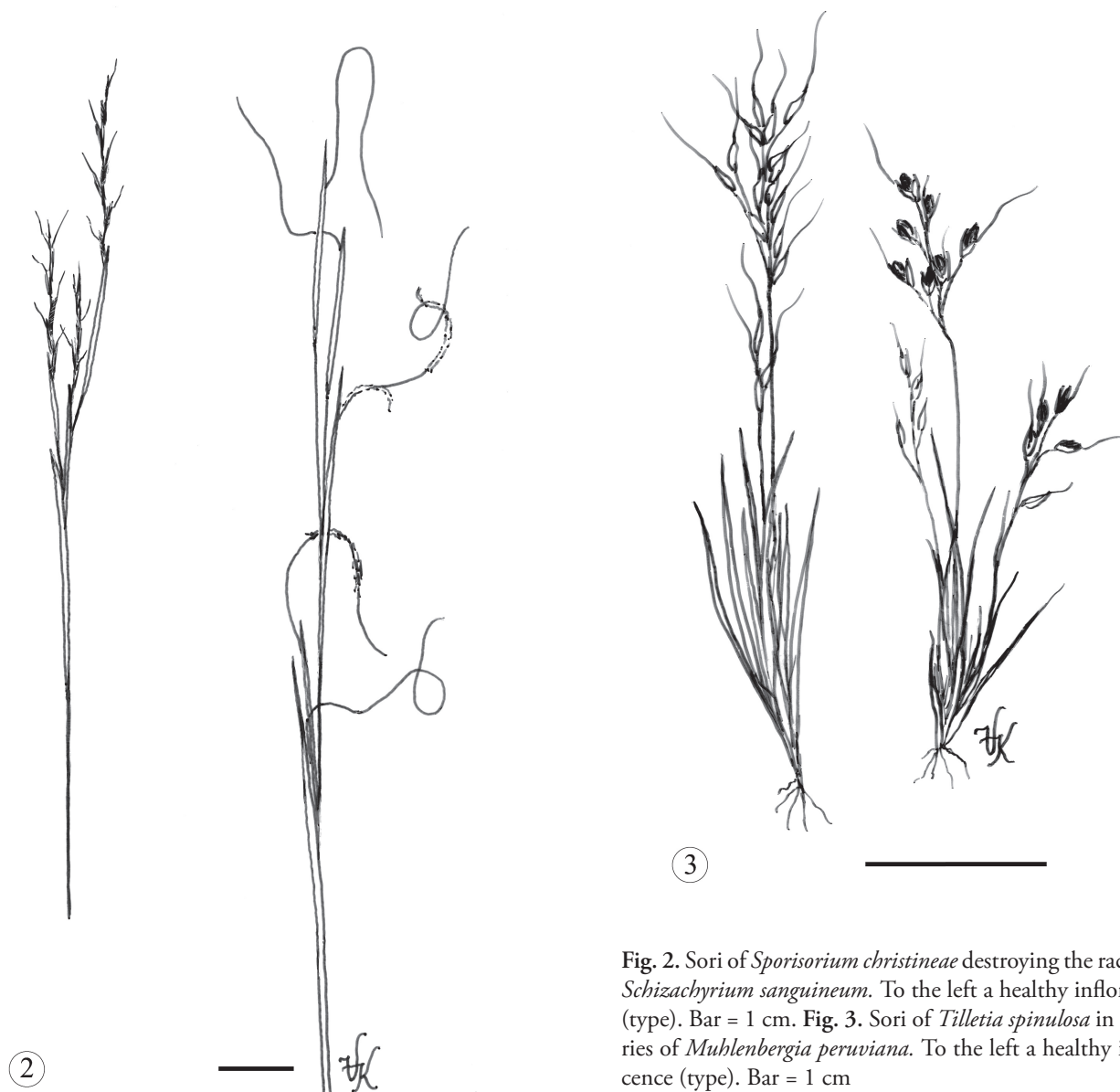


Fig. 2. Sori of *Sporisorium christineae* destroying the racemes of *Schizachyrium sanguineum*. To the left a healthy inflorescence (type). Bar = 1 cm. Fig. 3. Sori of *Tilletia spinulosa* in the ovaries of *Muhlenbergia peruviana*. To the left a healthy inflorescence (type). Bar = 1 cm

1	Spores 13–20 μm long; free spore wall 2.5–4 μm thick, finely verrucose	<i>S. guaraniticum</i>
1*	Spores up to 17 μm long; free spore wall thinner, echinulate or verrucose-echinulate	2
2	Free spore wall 0.5–2.5 (–3) μm thick, coarsely echinulate	<i>S. zambianum</i>
2*	Free spore wall 0.5–1.5 μm thick, verrucose-echinulate	<i>S. christineae</i>

Tilletia spinulosa Vánky, C. Vánky, R.G. Shivas & McTaggart, sp. nov.

Mycobank # MB 515 499

Typus in matrice Muhlenbergia peruviana (P. Beauv.) Steud., Bolivia, Dept. La Paz, 9 km SE urbe Copacabana, 16°08'48.8" S, 69°02'27.2" W, alt. 4178 m.s.m., 26.IV.2009, leg. R.G. & M.D.E. Shivas, A. McTaggart, W.A. Arce, C. & K. Vánky. Holotypus in H.U.V. 21 658, isotypi in LPB et in BRIP 52 750.

Sori in ovariis omnibus inflorescentiae contaminatae, ellipsoideales cum apice breve acuto, 0,5–0,8 × 1–1,3 mm, involucris floralibus partim absconditi et pericarpio atrobrunneo cooperti, quo rupto massam nigrobrunneam, pulveream sporarum et cellularum sterilium ostendentes. Sporae globosae vel subglobosae, 21–24 × 21–24 μm , pallide usque atrobrunneae; pariete 3,5–4,5 μm crasso spinis 2,5–3,5 (–4) μm altis inclusis, involucro hyalino coopertae. Sporae spinis 29–36 circumdantibus, in SEM sicut verrucis dense situatis

apparentibus. Cellulae steriles globosae, ovoideae, ellipsoidales, 8–13 × 9.5–15 µm, hyalinae, pariete 1.5–2 µm crasso, levi vel majores et cum vestigiis ornamentorum.

Sori (Fig. 3) in all ovaries of an infected inflorescence, ellipsoidal with a short acute tip, 0.5–0.8 × 1–1.3 mm, partly hidden by the floral envelopes and covered by a dark brown pericarp which ruptures disclosing the blackish brown, powdery mass of spores and sterile cells. **Spores** (Figs 8–9) globose or subglobose, 21–24 × 21–24 µm, pale to dark olivaceous brown; wall 3.5–4.5 µm thick including the 2.5–3.5 (–4) µm high spines, embedded in a

hyaline sheath. Spines 29–36 on the spore circumference, in SEM appearing as densely situated warts. **Sterile cells** (Figs 8–9) globose, ovoid, ellipsoidal, 8–13 × 9.5–15 µm, hyaline, wall 1.5–2 µm thick, smooth or with a trace of ornamentation.

On *Poaceae*: *Muhlenbergia peruviana* (P. Beauv.) Steud.

Distribution: South America (Bolivia). Known only from the type locality.

On *Muhlenbergia* 11(+1) species of *Tilletia* are known. In the key to the smut fungi of *Muhlenbergia* (Vánky 2009a: 24), with sori in the ovaries, this fungus can be keyed out as:

1	Spores spinulose	<i>T. spinulosa</i>
1*	Spores otherwise ornamented	2
2	Spores verrucose-tuberculate	3
2*	Spores reticulate	6
3	Spores with inconspicuous, pale coloured, blunt, subpyramidal tubercles, 2–3 µm high	<i>T. buchloëana</i> = <i>Salmacisia buchloëana</i>
3*	Spores with conspicuous tubercles or warts	4
4	Tubercles 2.5–4 µm high; spores 21–24 (–28) µm long	<i>T. macrotuberculata</i>
4*	Tubercles or warts lower; spores smaller	5
5*	Tubercles 1–2.5 µm high, conical, with subacute or blunt tip, (3–) 4–6 (–8) per spore diam; spores 15–21 (–23) µm long	<i>T. tuberculata</i>
5*	Warts 1.5–2.5 µm high, irregularly polyangular, with a flattened tip, 6–8 per spore diam; spores 18.5–26.5 µm long	<i>T. microtuberculata</i>
6	Spores 29–36 (–38) µm long; (muri 2–4 µm high)	<i>T. muhlenbergiae</i>
6*	Spores smaller	7
7	Spores 24–30 (–34) µm long; (muri 1.5–2.5 µm high)	<i>T. asperifolioides</i>
7*	Spores smaller	8
8	Spores 21–26 (–27) µm long; (muri 2–3 (–4) µm high)	<i>T. pachyderma</i>
8*	Spores c. 19–24 µm long	9
9	Spores incompletely, irregularly reticulate, in SEM cerebriform	<i>T. montana</i>
9*	Spores clearly reticulate, in SEM not cerebriform	10
10	Meshes 6–8 per spore diam; (muri 1.5–2.5 µm high)	<i>T. asperifolia</i>
10*	Meshes 3–5 per spore diam	11
11	Spores 20–24 µm long, lacking sheath	<i>T. brefeldii</i>
11*	Spores 19–24 µm long, including the 2–3 µm thick sheath	<i>T. zonata</i>

Smut fungi collected in Bolivia between 15 and 26 of April 2009

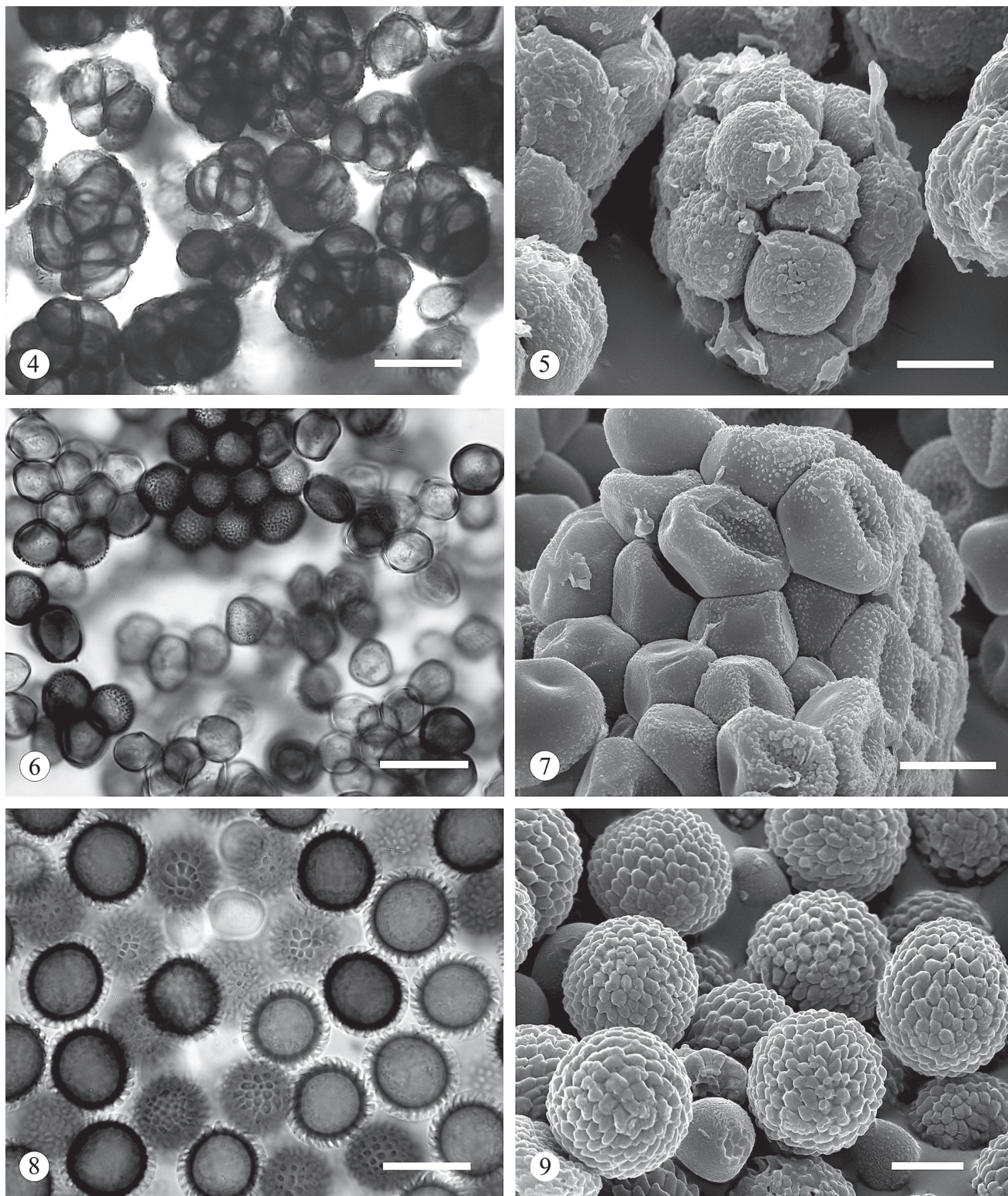
(The collectors are R.G. & M.D.E. Shivas, A.R. McTaggart, W.A. Arce, C. & K. Vánky, the identifier is K. Vánky. Collections marked with asterisk (*) are new to Bolivia)

Cintractia axicola (Berk.) Cornu on *Fimbristylis dichotoma* (L.) Vahl, Dept. La Paz, Prov. Nor Yungas, north of Coroico, River Yolosa, 16°12'14.5" S, 67°50'22.9" W, 1378 m, 16 Apr 2009.

**Conidiosporomyces ayresii* (Berk.) Vánky on *Megathyrsus maximus* (Jacq.) B.K. Simon & S.W.L. Jacobs (*Panicum maximum*), Dept. La Paz, Prov. Nor Yungas, between La Paz and Coroico, 16°13'13.3" S, 67°44'38.4" W, alt. 1931 m, 15 Apr 2009.

**Entorrhiza fineraniae* Vánky on *Eleocharis* sp., Dept. La Paz, Prov. Sud Yungas, between Chulumani and Inquisivi, 16°30'33.8" S, 67°24'59.4" W, alt. 1661 m, 18 Apr 2009.

Entyloma bidentis Henn. on *Bidens pilosa* L., Dept. La Paz, Prov. Sud Yungas, between Chulumani and Inquisivi, 16°21'19.7" S, 67°06'26.0" W, alt. 1680 m, 18 Apr 2009.



Figs 4-5. Spore balls and spores of *Moreaua scripi* on *Scirpus rigidus* in LM and in SEM (type). Bars = 10 μ m. Figs 6-7. Spore balls and spores of *Sporisorium christineae* on *Schizachyrium sanguineum* in LM and in SEM (type). Bars = 10 μ m. Figs 8-9. Spores and sterile cells of *Tilletia spinulosa* on *Muhlenbergia peruviana* in LM and in SEM (type). Bars = 10 μ m

- **Entyloma spegazzinii* Sacc. & P. Syd. on *Bidens pilosa*, Dept. La Paz, Prov. Nor Yungas, Surroundings of Coroico, 16°12'58.0" S, 67°44'10.4" W, alt. 1478 m, 16 Apr 2009.
- Entyloma zinniae* Syd. on *Zinnia pauciflora* L., Dept. La Paz, Prov. Nor Yungas, between Coroico and Chulumani, 16°11'19.8" S, 67°43'41.2" W, alt. 1742 m, 17 Apr 2009.
- Farysia chardoniana* Zundel on *Carex polystachya* Swartz ex Wahlenb., Dept. La Paz, Prov. Nor Yungas, between La Paz and Coroico, 16°12'58.3" S, 67°49'28.9" W, alt. 1966 m, 15 Apr 2009.
- Ingoldiomyces hyalosporus* (Masee) Vánky on *Nassella* cf. *pubiflora* (Trin. & Rupr.) E. Desv., Dept. La Paz, Prov. Murillo, between La Paz and Coroico, 16°19'46.4" S, 67°57'34.5" W, alt. 4121 m, 15 Apr 2009.
- Ingoldiomyces hyalosporus* on *Nassella?* sp., Dept. La Paz, Prov. Loayza, between Inquisivi and Cochabamba, 17°14'18.6" S, 67°20'04.6" W, alt. 4200 m, 19 Apr 2009.
- Ingoldiomyces hyalosporus* (and a *Tilletia* sp.) on *Nassella?* sp., Dept. Cochabamba, Prov. Tapacari, between Mizque and Oruro, 17°41'10.8" S, 66°28'57.9" W, alt. 4066 m, 24 Apr 2009.
- **Macalpinomyces* aff. *bothriochloae* (L. Ling) Vánky on *Bothriochloa bladhii* (Retz.) S.T. Blake, Dept. La Paz, Prov. Sud Yungas, between Chulumani and Inquisivi, 16°21'19.7" S, 67°06'26.0" W, alt. 1680 m, 18 Apr 2009.
- **Moreaua scirpi* Vánky, C. Vánky, R.G. Shivas & McTaggart (described in this article).
- Sporisorium andropogonis* (Opiz) Vánky on *Bothriochloa barbinodis* (Lag.) Herter (new host plant), Dept. Cochabamba, Prov. Esteban Arce, between Cochabamba and Toro Toro, 17°46'51.1" S, 65°56'25.1" W, alt. 3078 m, 20 Apr 2009.
- **Sporisorium aristidicola* (Speg.) Vánky on *Aristida adscensionis* L., Dept. Cochabamba, Prov. Esteban Arce, between Toro Toro and Punata, 17°47'07" S, 65°57'27.5" W, alt. 3053 m, 22 Apr 2009; Dept. Cochabamba, Prov. Arani, between Arani and Mizque, 17°35'02.1" S, 65°45'06.8" W, alt. 2906 m, 23 Apr 2009.
- **Sporisorium caledonicum* (Pat.) Vánky on *Heteropogon contortus* (L.) P. Beauv., Dept. Potosí, Prov. Toro Toro, Toro Toro National Park, 18°07'17.8" S, 65°46'0.3" W, alt. 2765 m, 21 Apr 2009.
- **Sporisorium christineae* R.G. Shivas, McTaggart & Vánky (described in this article).
- **Sporisorium consanguineum* (Ellis & Everh.) Vánky on *Aristida antoniana* Steud. ex Döll (new host plant), Dept. Cochabamba, Prov. Arani, between Arani and Mizque, 17°34'30" S, 65°43'40.3" W, alt. 3222 m, 23 Apr 2009.
- Sporisorium consanguineum* on *Aristida* sp., Dept. Cochabamba, Prov. Esteban Arce, between Cochabamba and Toro Toro, 17°47'07" S, 65°57'27.5" W, alt. 3053 m, 20 Apr 2009; Dept. Potosí, Prov. Charcas, between Toro Toro and Punata, 18°05'59.9" S, 65°45'17.9" W, alt. 2371 m, 22 Apr 2009.
- Sporisorium holwayi* (Clinton & Zundel) Vánky on *Andropogon bicornis* L., Dept. La Paz, Prov. Nor Yungas, between La Paz and Coroico, 16°09'24.6" S, 67°43'10.5" W, alt. 958 m, 15 Apr 2009; surroundings of Coroico, 16°13'13.9" S, 67°44'38.4" W, alt. 1345 m, 16 Apr 2009.
- **Sporisorium magnusianum* (A.A. Fisch. Waldh.) Vánky on *Setaria parviflora* (Poir.) Kerguelen, Dept. Cochabamba, Prov. Esteban Arce, between Cochabamba and Toro Toro, 17°47'07" S, 65°57'27.5" W, alt. 3053 m, 20 Apr 2009; idem, 22 Apr 2009.
- **Sporisorium myosuroidis* (Hirschh.) Vánky on *Cenchrus myosuroides* Kunth, Dept. Cochabamba, Prov. German Jordan, between Cochabamba and Toro Toro, 17°37'41.7" S, 65°58'0.5" W, alt. 2741 m, 20 Apr 2009.
- **Sporisorium paspali* (Speg.) Vánky on *Paspalum humboldtianum* Flügge, Dept. Cochabamba, Prov. Esteban Arce, between Cochabamba and Toro Toro, 17°46'51.1" S, 65°56'25.1" W, alt. 3078 m, 20 Apr 2009.
- Thecaphora haumanii* Speg. on *Iresine diffusa* Humb. & Bonpl. ex Willd., Dept. La Paz, Prov. Nor Yungas, between Coroico and Chulumani, 16°11'19.8" S, 67°43'41.2" W, alt. 1742 m, 17 Apr 2009.
- **Tilletia spinulosa* Vánky, C. Vánky, R.G. Shivas & McTaggart (described in this article).
- Tranzscheliella hypodytes* (Schltdl.) Vánky & McKenzie, s. lat. on *Stipa ichu* (Ruiz & Pav.) Kunth, Dept. La Paz, Prov. Murillo, between La Paz and Coroico, 16°30'43.3" S, 68°06'7.2" W, alt. 3467 m, 15 Apr 2009; Dept. La Paz, Prov. Loayza, between Inquisivi and Cochabamba, 17°31'3.6" S, 67°25'22.5" W, alt. 3934 m, 19 Apr 2009; Dept. La Paz, Prov. Loayza, between Inquisivi and Cochabamba, 17°14'18.6" S, 67°20'04.6" W, alt. 4200 m, 19 Apr 2009; Dept. Cochabamba, Prov. German Jordan, between Cochabamba and Toro Toro, 17°37'41.7" S, 65°58'00.5" W, alt. 2741 m, 20 Apr 2009; Dept. Potosí, Prov. Charcas, between Toro Toro and Punata, 18°05'59.9" S, 65°45'17.9" W, alt. 2371 m, 22 Apr 2009; Dept. Cochabamba, Prov. Arani, between Arani and Mizque, 17°37'57.7" S, 65°37'16" W, alt. 3502 m, 23 Apr 2009.
- Tranzscheliella hypodytes*, s. lat. on *Stipa mucronata* Kunth, Dept. Cochabamba, Prov. Arani, between Arani and Mizque, 17°34'30.5" S, 65°43'40.3" W, alt. 3222 m, 23 Apr 2009.
- Tranzscheliella hypodytes*, s. lat. on *Stipa* sp., Dept. Cochabamba, Prov. Esteban Arce, between Toro Toro and Punata, 17°47'07" S, 65°57'27.5" W, alt. 3053 m, 22 Apr 2009.
- **Ustilago bromivora* (Tul. & C. Tul.) A.A. Fisch. Waldh. on *Bromus catharticus* Vahl, Dept. La Paz, Prov. Murillo, between La Paz and Coroico, 16°26'12.0" S, 68°04'48.1" W, alt. 4150 m, 15 Apr 2009; Dept. Cochabamba, Prov. Arani, between Arani and Mizque, 17°32'51.8" S, 65°40'17.9" W, alt. 3424 m, 23 Apr 2009; Dept. Oruro, Prov. Cercado, between Oruro and Copacabana, 17°37'12.9" S, 67°14'23.7" W, alt. 3824 m, 25 Apr 2009.
- Ustilago bromivora* on *Hordeum muticum* J. Presl (new host plant), Dept. La Paz, Prov. Murillo, between La Paz and

Coroico, 16°26'12.0" S, 68°04'48.1" W, alt. 4150 m, 15 Apr 2009; Dept. Oruro, Prov. Cercado, between Inquisivi and Cochabamba, 17°39'5.0" S, 67°01'38.7" W, alt. 3870 m, 19 Apr 2009.

Ustilago hordei (Pers. : Pers.) Lagerh. on *Avena sativa* L., Dept. Cochabamba, Prov. Manuel M. Caballero, between Arani and Mizque, 17°41'6.3" S, 64°34'31.6" W, alt. 3752 m, 23 Apr 2009.

Ustilago hordei on *Hordeum vulgare* L., Dept. Cochabamba, Prov. Tapacari, between Mizque and Oruro, 17°41'10.8" S, 66°28'57.9" W, alt. 4066 m, 24 Apr 2009; Dept. Oruro, Prov. Cercado, between Oruro and Copacabana, 17°37'12.9" S, 67°14'23.7" W, alt. 3824 m, 25 Apr 2009.

Ustilago maydis (DC.) Corda on *Zea mays* L., Dept. Potosi, Prov. Toro Toro, Toro Toro National Park, 18°10'16.6" S, 65°43'33.4" W, alt. 2838 m, 21 Apr 2009.

Ustilago nuda (Jensen) Kellerman & Swingle on *Hordeum distichon* L., Dept. Potosi, Prov. Toro Toro, Toro Toro National Park, 18°10'16.6" S, 65°43'33.4" W, alt. 2838 m, 21 Apr 2009.

Ustilago nuda on *Hordeum vulgare* L., Dept. Potosi, Prov. Toro Toro, Toro Toro National Park, 18°10'16.6" S, 65°43'33.4" W, alt. 2838 m, 21 Apr 2009.

Ustilago quitensis Lagerh. on *Cortaderia* cf. *selloana* (Schult. & Schult. f.) Asch. & Graebner, Dept. Cochabamba, Prov. Tapacari, between Mizque and Oruro, 17°41'10.8" S, 66°28'57.9" W, alt. 4066 m, 24 Apr 2009.

**Ustilago trichophora* (Link) J. Kunze ex Körn. on *Echinochloa chacoensis* P.W. Michael ex Renwoize (new host plant), Dept. Cochabamba, Prov. German Jordan, between Cochabamba and Toro Toro, 17°32'46.5" S, 66°00'21.8" W, alt. 2709 m, 20 Apr 2009.

Three further smut fungi were found in the phanerogamic herbarium LPB:

Kuntzeomyces ustilaginoideus (Henn.) Henn. ex Sacc. & P. Sydow on *Rhynchospora* sp., Dept. Beni, Prov. Ballivián, south of Midión Fatima, alt. 700 m, 24 May 1988, leg. St.G. Beck, R. Foster, S. Estenssoro & T. Hinojosa, det. K. Vánky (5937).

**Trichocintractia utriculicola* (Henn.) M. Piepenbr. on *Rhynchospora gigantea* Link, Dept. Beni, Prov. Cercado, Laguna Suarez, 14°52' S, 64°52' W, alt. 200 m, without date of collection, leg. A. Sanjines & M.R. Orrelana, det. K. Vánky (5938).

Ustanciosporium majus (Desm.) M. Piepenbr. on *Rhynchospora tenuis* Link, Dept. Santa Cruz, Nuflo de Chavez, Est. Las Madres, 9 km north of Concepción, 16°00' S, 62°00' W, alt. 500 m, 15 Feb 1986, leg. T. Killen. This smut was given by Piepenbring (2002: 58) as *U. taubertianum*.

Acknowledgements. The authors are grateful to Dr. Sándor Tóth (Gödöllő, Hungary) for the Latin diagnoses and to Dr. Stephan G. Beck (La Paz, Bolivia) for help and advice during our visit in Bolivia. The field assistance of Ms Marjan D.E. Shivas (Brisbane, Australia) and the technical assistance of Mr K.-H. Hellmer (Tübingen, Germany) with SEM pictures is gratefully acknowledged.

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