



## *Talpapellis solorinae* sp. nov. and an updated key to the species of *Talpapellis* and *Verrucocladosporium*

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The genus *Talpapellis* Alstrup & M.S.Cole (1998: 227) was introduced for a lichenicolous hyphomycete on *Peltigera venosa* collected in British Columbia, Canada (Alstrup & Cole 1998). Details of the conidiogenesis, the generic affinity and application of this genus name have previously been unclear and largely confused. Based on a revision and reassessment of type material and examination of additional collections from North America and Asia, Heuchert *et al.* (2014) published an amended circumscription of *Talpapellis*, discussed the conidiogenesis of this genus, described a new variety of *T. peltigerae* Alstrup & M.S.Cole (1998: 227) and provided a key to the recognised taxa of *Talpapellis* and confusable species of *Verrucocladosporium* K.Schub. *et al.* (Crous *et al.* 2007, Braun *et al.* 2009).

During the course of field work in connection with a project dealing with lichenicolous fungi of the Caucasus (Zhurbenko & Kobzeva 2014), thalli of *Solorina crocea* with conspicuous colonies of an asexual ascomycete have been encountered. General habit and micro-morphological traits bear resemblance to *Talpapellis*. A closer examination and comparison with *T. peltigerae* and its two varieties revealed a new undescribed species.

### Material and methods

Material of the treated species was mounted in distilled water and examined by means of light microscopy (Olympus BX 50, Zeiss Stemi 2000–CS and Axio Imager A1 equipped with Nomarski differential interference contrast optics). Digital pictures were made by B. Heuchert with a ZEISS Axioskop 2 with ZEISS AxioCam HR and occasionally optimised with the software ZEISS AxioVision. Freehand drawings were carried out on the basis of microscopic preparations by B. Heuchert. Measurements were taken from water mounts, with 30 measurements taken for each structure, the 95 % confidence intervals were determined and extreme values given in parentheses. The examined material is housed in the mycological herbarium of V. L. Komarov Botanical Institute in St.-Petersburg, Russia (LE).

### Results and discussion

*Talpapellis solorinae* Zhurb., Heuchert & U.Braun, sp. nov.

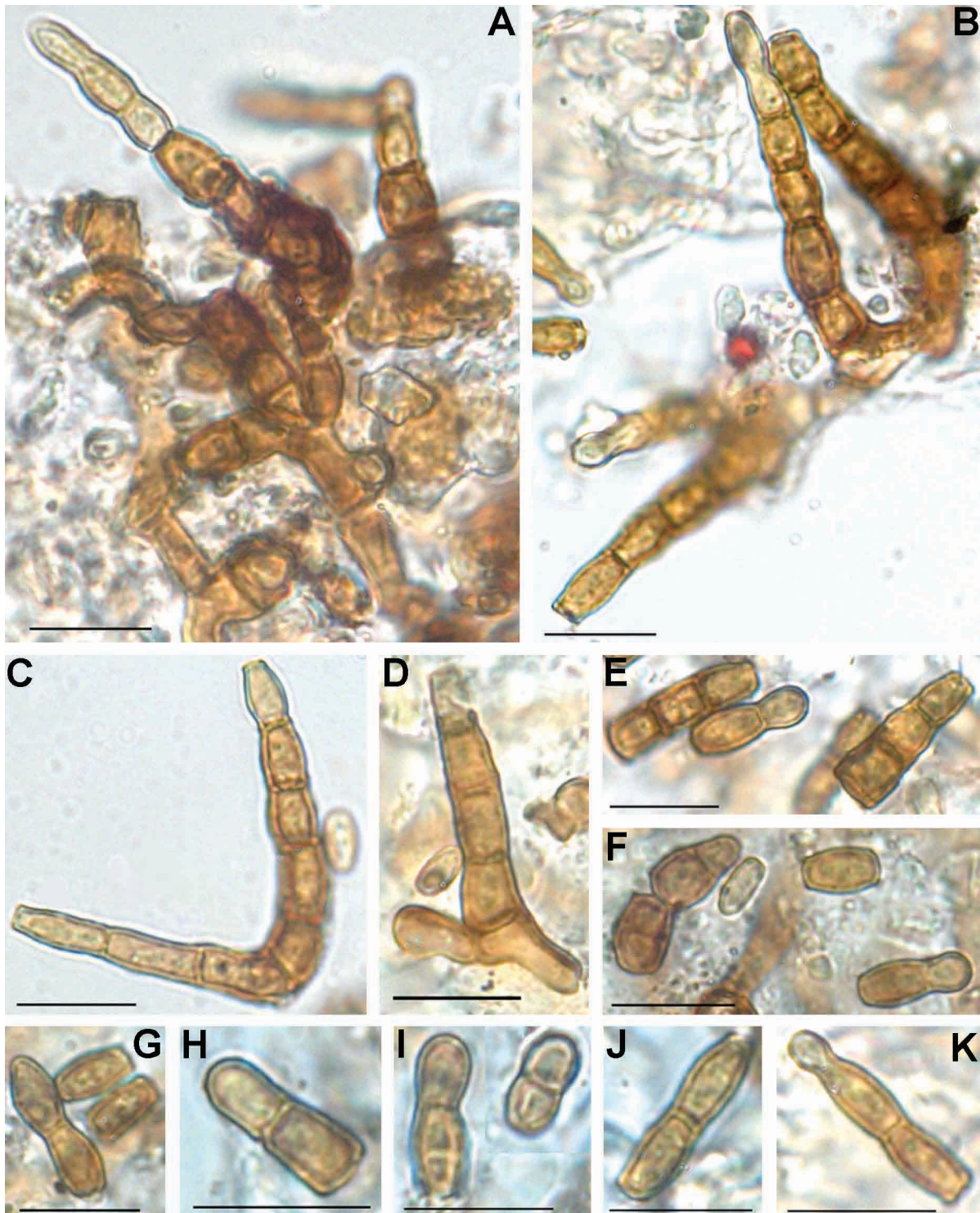
Mycobank MB814619

Figs. 1–2

Diagnosis:—Differs from *Talpapellis peltigerae* var. *rossica* which has longer unbranched conidiophores, (18–)30–65(–80) µm and usually aseptate, wider conidia, (3–)4–5.5(–6) µm.

Type:—RUSSIA. Republic of Adygeya: Northwest Caucasus, Caucasian State Nature Biosphere Reserve, north-western spur of Mt. Tybga near 17<sup>th</sup> km of trail from Guzeripl, 43°52'48" N, 40°15'59" E, elev. 2480 m, alpine vegetation, on living thallus of *Solorina crocea*, 4 August 2014, M. P. Zhurbenko 14148 (holotype LE 264367). Accompanied by *Pyrenidium actinellum* Nyl.

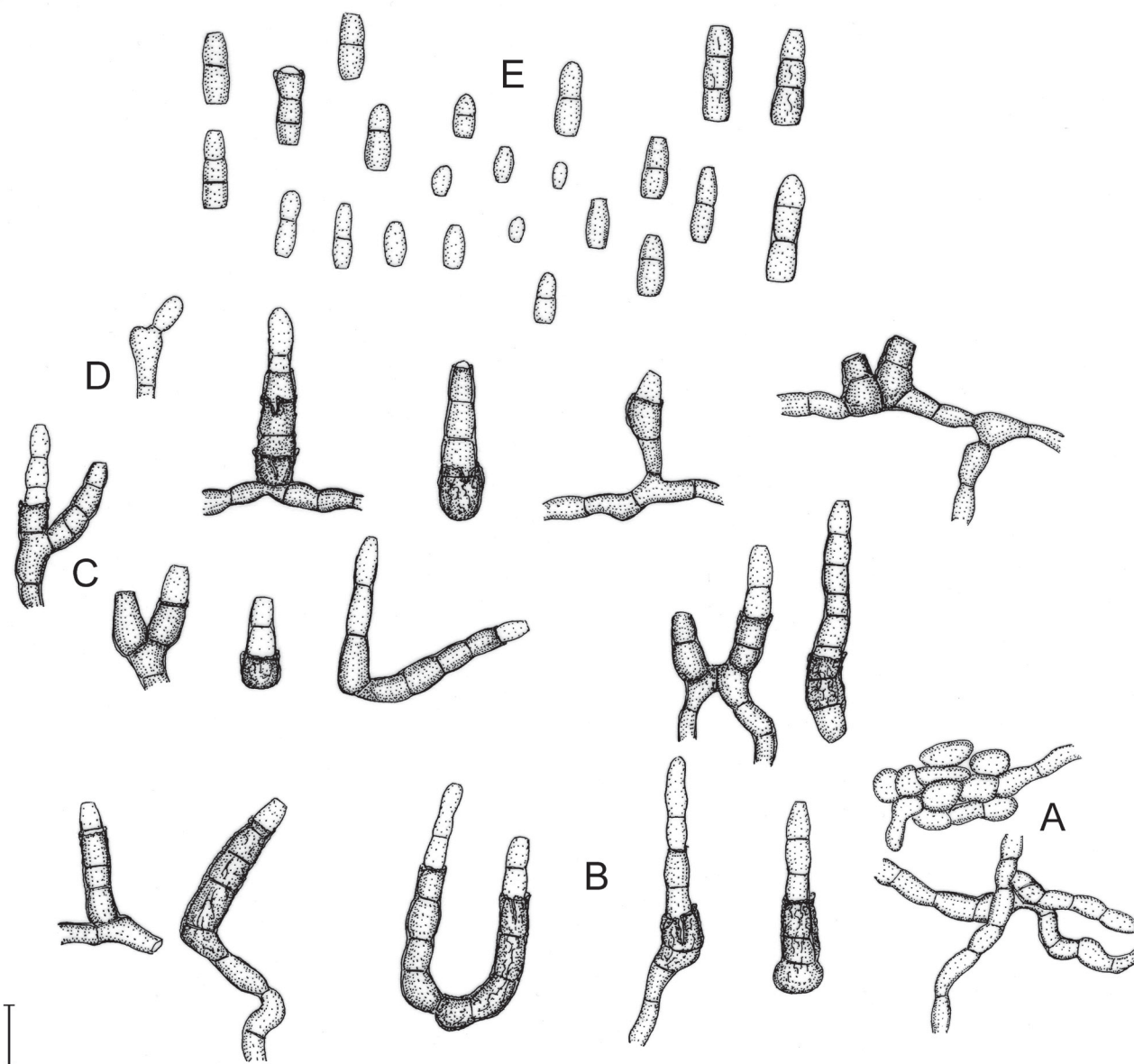
Colonies on discoloured host thalli, forming small to large black patches or covers on the upper surface of the host lobes, loose to mostly dense, velvety. Mycelium immersed, occasionally exposed; hyphae sparingly branched, 1.5–4 µm wide, septate, subhyaline to medium brown, smooth, thin-walled, up to 0.3 µm, forming small, loose stromatic hyphal aggregations composed of swollen hyphal cells, to 6 µm diam., but true stromata lacking. Conidiophores solitary, arising from internal



**FIGURE 1.** *Talpapellis solorinae* (holotype, in water). A–D, conidiophores with monopodial rejuvenation. E–K, conidia. Scale bars=10  $\mu\text{m}$ .

hyphae or swollen hyphal cells, rarely in small aggregations or lateral on exposed hyphae, erect to assurgent, subcylindrical or slightly tapering from base to top, non-geniculate, unbranched or once branched, straight to somewhat curved, 8–40  $\times$  3–5(–6)  $\mu\text{m}$ , base not or only slightly enlarged, (0–)2–5(–7)-septate, often somewhat constricted at the septa, medium brown throughout or somewhat paler towards the tip after rejuvenation, wall slightly thickened, about 0.5–0.8  $\mu\text{m}$ , smooth to usually distinctly verruculose or verrucose, sometimes rimulose, at least in older portions of conidiophores and around rejuvenations; rejuvenation monopodial by enteroblastic proliferation, leaving conspicuous annellations. *Conidiogenous cells* directly formed by enteroblastic proliferation, integrated, terminal, 5–15  $\mu\text{m}$  long, subcylindrical or somewhat conical, determinate or rarely sympodial, usually with a single terminal conidiogenous locus, occasionally with two loci, 1–2.5(–3)





**FIGURE 2.** *Talpapellis solorinae* (holotype, in water; B. Heuchert del.). A, hyphae and aggregations composed of swollen hyphal cells. B, conidiophores with monopodial rejuvenation. C, branched conidiophore. D, polyblastic conidiogenous cell. E, conidia. Scale bar=10  $\mu\text{m}$ .

$\mu\text{m}$  wide, neither thickened nor darkened, at most somewhat refractive. *Ramoconidia* not observed. *Conidia* solitary to usually catenate, formed in simple chains, holoblastic, ellipsoid, ovoid to doliiform, occasionally short subcylindrical, straight or occasionally slightly curved, 0–1(–2)-septate, aseptate conidia (3.5–)4–8  $\times$  2–4  $\mu\text{m}$ , 1-septate conidia 7–12  $\times$  3.5–4  $\mu\text{m}$ , rarely 2-septate, 12–17  $\times$  4–5  $\mu\text{m}$ , in 1-septate conidia septum more or less median, not or slightly constricted at the septum, subhyaline, pale olivaceous to brown, thin-walled, usually up to 0.3  $\mu\text{m}$ , smooth or almost so to distinctly verruculose, often irregularly verruculose, apex obtuse, broadly rounded in terminal (primary) conidia and truncate or subtruncate in catenate (secondary) conidia, base truncate or short obconically truncate, 1.5–2(–3)  $\mu\text{m}$  wide, hila unthickened, not darkened, occasionally slightly refractive.

Distribution and host:—Known from the type locality in Northwest Caucasus, Asia growing on living thallus of the widespread terricolous foliose lichen *Solorina crocea*; distinct damage to the infected host thallus not observed.

Notes:—Based on the general habit and morphological traits such as verruculose conidiophores with percurrent rejuvenation, truncate, unthickened conidiogenous loci, holoblastic conidiogenesis, and verruculose conidia formed in chains, the Russian collection on *Solorina crocea* could readily be assigned to the genus *Talpapellis* as currently circumscribed (Heuchert *et al.* 2014). The latter genus was hitherto monospecific. *T. peltigerae*, the type species of *Talpapellis*, comprises two varieties. *T. peltigerae* var. *peltigerae* is easily distinguishable from the new sample collected in the Caucasus by having

longer, usually unbranched conidiophores, (18–)30–65(–80) × 3–4(–5) μm, conidiogenous cells with a single or up to four conidiogenous loci, developed ramoconidia, and usually aseptate conidia formed in simple or branched chain (Heuchert *et al.* 2014). *T. peltigerae* var. *rossica* Heuchert *et al.* (2014: 88) is morphologically closer to the lichenicolous hyphomycete on *Solorina crocea*, above all with regard to lacking ramoconidia and conidiogenous cells with a single conidiogenous locus, but differs in having longer, usually unbranched conidiophores (length conforming with var. *peltigerae*), and aseptate, wider conidia, (4–)5.5–9.5(–13) × (3–)4–5.5(–6) μm, average > 4 μm (Heuchert *et al.* 2014). With regard to the assessment of the taxonomic status of the *Solorina* material, two options might be taken into consideration, viz. the description of another variety of *T. peltigerae* or the introduction of a new species. However, owing to clear morphological differences combined with a different host genus, though within the same family Peltigeraceae, and disjunct distribution we prefer the latter version.

Heuchert *et al.* (2014) published a key to the two varieties of *Talpapellis peltigerae* and morphologically confusable species of *Verrucocladosporium* (Crous *et al.* 2007, Braun *et al.* 2009).

### Updated key to the species of *Talpapellis* and *Verrucocladosporium*

- 1 Conidiophores with enteroblastic proliferations (rejuvenation), leaving coarse annellations, or conidiogenous cells formed at the apex of conidiophores as result of enteroblastic proliferation, but conidiogenesis holoblastic; on *Peltigera* and *Solorina* spp. (Peltigeraceae, Peltigerales) [*Talpapellis*] ..... 2
- 1\* Conidiophores without enteroblastic proliferations (rejuvenation), annellations lacking, conidiogenous cells not enteroblastically formed; on *Dirina* and *Roccella* spp. (Roccellaceae, Arthoniales) [*Verrucocladosporium*] ..... 4
- 2 Conidiophores relatively short, 8–40 × 3–5(–6) μm, sometimes branched; conidia 0–1(–2)-septate; on *Solorina crocea* ..... *T. solorinae*
- 2\* Conidiophores longer, (18–)30–65(–80) × 3–4(–5) μm, usually unbranched; conidia usually aseptate; on *Peltigera venosa* ..... 3
- 3 Conidiogenous cells with a single or up to four conidiogenous loci; ramoconidia present, 9–10.5 × 3–3.5 μm; conidia solitary or mostly in simple to branched chains, aseptate conidia (3–)5.5–7(–8) × (2–)2.5–4(–4.5) μm, width on average < 4 μm ..... *T. peltigerae* var. *peltigerae*
- 3\* Conidiogenous cells with a single or occasionally two conidiogenous loci; ramoconidia lacking; conidia solitary or in simple chains, aseptate conidia (4–)5.5–9.5(–13) × (3–)4–5.5(–6) μm, width on average > 4 μm ..... *T. peltigerae* var. *rossica*
- 4 Conidiophores 2–3 μm wide; conidiogenous loci 1–2 μm diam.; ramoconidia present; conidia in long unbranched or branched chains, 4–18(–23) × (2–)2.5–3.5 μm, often strongly irregular in shape (see Crous *et al.* 2007: 42, Fig. 5H); on *Dirina massiliensis* ..... *V. dirinae* K.Schub. *et al.*, in Crous *et al.* (2007: 41)
- 4\* Conidiophores 3–5 μm wide; conidiogenous loci 0.7–1.5 μm diam.; ramoconidia absent; conidia in chains, somewhat shorter and wider, 5–12 × 3–5 μm, shape not strongly irregular; on *Roccella boergesenii* ..... *V. roccellae* U.Braun *et al.* (2009: 167)

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