

Microbotryum savilei sp. nov. (*Microbotryaceae*)

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Abstract. A new anther smut fungus on *Silene uralensis*, *Microbotryum savilei*, is described and illustrated from Canada.

Key words: Canada, *Caryophyllaceae*, *Lychnis apetala*, *Microbotryum majus*, *Silene otites*, *Silene uralensis*, smut fungi

Introduction

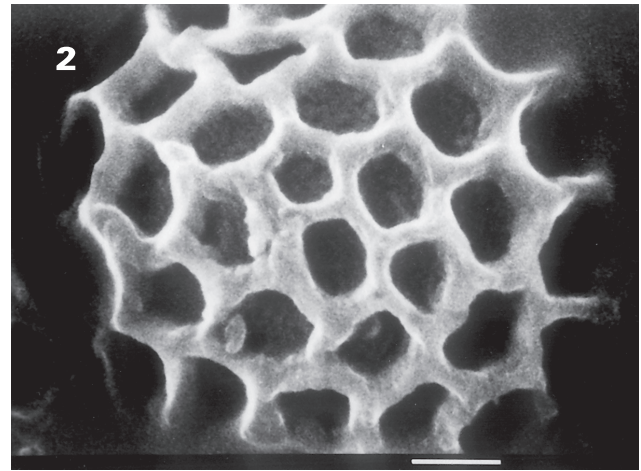
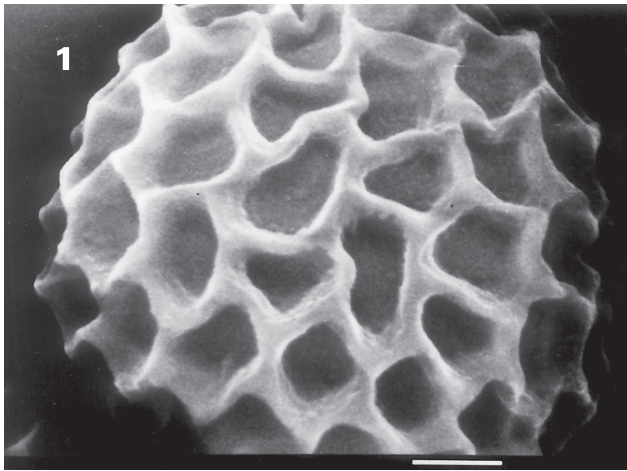
The taxonomic status of smut fungi classified in *Microbotryum* that destroy both the anthers and ovaries of species of *Silene*, is discussed and a new species on *Silene uralensis*, *Microbotryum savilei*, is described and illustrated.

Materials and Methods

Material from the herbaria of BPI, COLO, DAOM, F, FH, GZU, H, ILL, KSC, M, MA, MICH, NY, S, SOME, and UC was examined by light microscopy (LM) and with the scanning electron microscope (SEM). Herbaria abbreviations follow Holmgren & Holmgren (1998). For LM the spores were mounted in lactophenol solution on glass slides, gently heated to boiling point and then cooled. The measurements of spores are given in the form: min-max (mean \pm 1 standard deviation). In the description, the symbol 'n/x=' is used to indicate the total numbers of measured collections and spores, respectively. For SEM, the spores were attached to specimen holders by double-sided adhesive tape and coated with gold. The surface structure of spores was observed at 15 kV and photographed with a scanning electron microscope. The spore mass colour treatment is based on Rayner's colour chart (Rayner 1970; explanations in Stearn 1998: 233–235).

Taxonomic status of *Microbotryum* species destroying anthers and ovaries of *Silene*

Among the Canadian specimens of anther smuts on *Silene uralensis* subsp. *uralensis* (as *Lychnis apetala* L. var. *arctica* (Fr.) Cody), obtained for examination from DAOM, two species of *Microbotryum* were observed: one species showed the typical symptoms of infection by *Microbotryum violaceum*, and another species (represented by two specimens) showed symptoms of infection similar to that caused by *M. majus*, namely deformed flowers, calyces full of smut spores, with anthers and ovaries virtually destroyed. These two specimens were found to have smaller flowers (than those infected with *M. violaceum* and collected in the same area), with a globose calyx which is atypical for healthy plants of this host species with an ovoid calyx (as well as compared to plants infected with *M. violaceum* and collected in the same area), with erect calyces that were closed at the throat (atypical for the same host plants infected with *M. violaceum*). Flowers attacked by *M. violaceum* and collected in the same area were not deformed. However, the spores for these two specimens were smaller than the recorded sizes of European and Asian specimens of *M. majus* (cfr Săvulescu 1957: 740; Vánky 1994: 155; etc.), as well as of these cited by Clinton (1902: 139) for *Ustilago violacea* var. *major* G.P. Clinton from U.S.A. Because of this we propose a new species, *M. savilei*, for these two Canadian specimens.



Figs 1-2. Spores of *Microbotryum majus* (J. Schröt.) G. Deml & Oberw. on *Silene otites*, in SEM (Poland, Breslau, Carlowitz, sine dat., J. Schröter (J. Schröter, Pilze Schlesiens, no. 440 – H). Bars = 1 µm

Numerous descriptions of *M. majus* are available in the literature. However, in some of them the spore mass colour and the size of spores do not correlate with our data, obtained during an extended examination (1994–2007) of this species. Therefore, in order to compare and distinguish these two species, we have also provided a description of *M. majus*.

Microbotryum majus (J. Schröt.) G. Deml & Oberw. (as *M. major*), *Phytopath. Z.* **104**: 353, 1982. — *Ustilago major* J. Schröt. in Cohn, *Krypt.-Fl. Schlesiens* **3**(1): 273, 1886. — Lectotype on *Silene otites* (L.) Wibel, Poland, Breslau, Carlowitz, 1884, J. Schröter (WRS�; design. by Lutz *et al.* 2005: 234). (Figs 1-2)

Sori in deformed flowers, in anthers (sometimes also in the filaments), in ovaries and in the basal parts of petals; the petals usually are reduced and remain within the calyx. Infection systemic. **Spore mass** powdery, dark purple (*atropurpureus*) or purple slate (*purpureo-ardesiacus*), sometimes an intermediate colour, dark purple <> dark reddish brown or dark purple <> dark livid (*atrolividus*). **Spores** subglobose, broadly ellipsoidal or ovoid, rarely globose or ellipsoidal, 7–14 × 6.5–11.5 (8.8±0.8 × 7.8±0.7) µm (n/44=2200), length/width ratio 1.09–1.19 (mean 1.13), in the rare cases of ellipsoidal spores length/width ratio up to 1.44; spore wall reticulate, 6–9 (–12) meshes per spore diameter, meshes irregularly polygonal or irregularly rounded, (0.5–) 0.8–1.5 (–2) µm long, 0.3–0.5 µm high; muri and bottom of the meshes rough.

Hosts: on *Silene* (Sect. *Otites*): *S. borysthena* (Gruner) Walters (*S. parviflora* (Ehrh.) Pers.), *S. densiflora* D'Urv., *S. otites* (L.) Wibel, *S. pseudotites* Besser ex Reichenb., *S. roemerii* Friv., *S. sendtneri* Boiss.

Distribution: Europe, Asia, North America.

Specimens examined:

On *Silene borysthena* (Gruner) Walters: HUNGARY: comit. Pest, Sukosd, Aug–Sep 1914, leg. F. Greinich, det. G. Moesz (Fl. hungarica exsic., Cent. IV, *Fungi* 35, no. 305, as *U. major* – DAOM 215 225, F 1 125 386, FH, ILL 17 041, UC 253 412) (1) [dark purple]; Budapest, Rákos, 1875,

Richter (C. Baenitz, *Herb. europ.*, no. 2633, as *U. major* – H) [dark purple]; ditto, 1873, L. Richter (as *Ustilago* sp. – H) [dark purple]; ROMANIA: distr. Tulcea, Delta Danubii, prope pag. C.A. Rosetti, 14 Aug 1978, G. Negrean (*Herb. mycol. roman.*, no. 2850, as *U. major* – M, MICH, NY) (2) [dark purple].

On *S. 'demiflora'*: TURKEY: Ankara, 28 Sep 1941, H. Bremer (as *U. major* – S, UC 800 815) (3) [purple slate].

On *S. otites* (L.) Wibel: AUSTRIA: Niederösterreich, Marchtal, südöstlich von Drösing in der Sandbergen am Rand des Föhrenwaldes, 1 Jun 1989, Melzer (as *U. violacea* – GZU) (4); Tirol, bei (?) Brixen, Garker..., 1896, F. von Höhnell (as *U. violacea* – FH) (5); Südtirol, Bozen, Jul 1891, P. Dietel (Rabenhorst-Pazschke, *Fungi europ.*, no. 4206, as *U. major* – F 1 125 375, S) (6); Südtirol, Vintschgau, Sudeitige Felshänge am Eingang in das Schlandrauntal bei Schlanders, 15 Jul 1966, J. Poelt (as *U. major* – GZU) (7); Südtirol, Vintschgau, Trockenrasen W am Eingang in das Schnalstal bei Naturns, 23 Jul 1976, J. Poelt (as *U. major* – GZU) (8); BULGARIA: Mt Lyulin, 2 Jun 1960, C. Hinkova (as *U. major* – SOMF 5758 – Denchev 2001); CZECH REPUBLIC: Welwarn, 7 Jul 1898, J.E. Kabát (Vestergren, *Micromycetes rar. sel.*, no. 279, as *U. major* – F 1 289 938, FH, S) (9) [dark purple]; Moravia, Pollauer Berge, May 1923, R. Picbauer (F. Petrak, *Fl. bohemiae et moraviae exsic.*, no. 1551, as *U. major* – S) (10); Moravia, Brünn, Aug 1930, Hruby (as *U. major* – S) (11); bei Lubupilz, 17 Jun 1887, E. Hippe (*Fl. bohemiae*, as *U. major* – S) (12); prope Teplitz, aestate, W. Siegmund (Rabenhorst-Winter, *Fungi europ.*, no. 3202, as *U. violacea* – F 1 124 655, NY, S, UC 49 425) (13) [dark purple <> purple slate]; DENMARK: Tanö, 8 Aug 1879, (?) P. Nieltin (as *U. major* – H) [dark purple]; FRANCE: Le (?)...ouliguen (Loru Sup.), 1893, Morot (ex *Herb. Patouillard*, as *U. major* – FH) (14); silvae S:t Maur prope Parisios, 26 Jul 1908, P. Hariot (Vestergren, *Micromycetes rar. sel.*, no. 1413, as *U. major* – F 1 293 431, FH, NY, S) (15); Pays-Bas, Haye, automne, C. Destrée (Roumeguere, *Fungi sel. gallici exsic.*, no. 5916a, as *U. violacea* – NY) [purple slate]; Vendée, St. Gilles, 23 Jun 1885, leg. ? (as *U. major* – H) [dark purple]; GERMANY: Bayern, Grettstadt in Unterfranken, Jul 1897, A. Vill (Allescher et Schnabl, *Fungi bavarici exsic.*, no. 601, as *U. major* – DAOM 215 224, NY) (16) [dark purple]; Niedersachsen, Baltrum, Begraste Dunen, 23 Jul 1960, A. Ludwig (as *U. major* – M 21 522) (17); Schleswig-Holstein, bei Kongsmark auf der nordfries. Insel Röm., 28 Jul 1901, O. Jaap (Otto Jaap, *Fungi selecti exsic.*,

no. 113, as *U. major* – F 1 125 388, GZU) (18) [dark purple]; Brandenburg & Berlin, prope Berolinum, Chamisso, Sep –, sine coll. (Klotzsch, Herb. mycol., no. 192, as *Erysibe antherarum* Wallr. – M) (19); Brandenburg & Berlin, Westend b. Berlin, 1884, P. Sydow (Mycotheca marchica, no. 630, as *U. violacea* – NY, S) (20); Brandenburg & Berlin, Rüdersdorfer Kalkberge b. Berlin, Jun 1889, P. Sydow (Mycotheca marchica, no. 2626, as *U. major* – NY, S) (21); Brandenburg & Berlin, Potsdam, Exerzierplatz, Aug 1896, P. Sydow (Sydow, Ustilagineen, no. 109, as *U. major* – M, NY) (22) [dark purple <> dark reddish brown]; Brandenburg & Berlin, Neumark, Kr. Königsberg, Großmantel, 10 Jul & 1 Aug 1924, E. Fahrndorff (Zillig, Ustilagineen Europas, no. 26, as *U. major* – M) (23) [dark purple]; ditto, Jul 1924, E. Fahrndorff (as *U. major* – S) (24); Thüringen, Schwellenburg bei Erfurt, 7 Sep 1906, H. Diedicke (Sydow, Mycotheca german., no. 670, as *U. major* – COLO F-6670, ILL 17 040, F 1 093 663, FH, KSC, M, MICH) (25) [dark purple <> dark reddish brown]; Germany, sine loc., Jun 1893, P. Sydow (Sydow, Ustilagineen, no. 13, as *U. major* – M) (26); (?) Germany, bei Ruine Rungelstein, Bozen, 18 Apr 1884, C.E. Correns (as *U. major* – M) (27); HUNGARY: Pest, prope Pilioszenti, 23 Jul 1929, A. Péntes (A. Péntes, Fl. Hungarica excis., no. 57, as *U. major* – UC 223 640) [purple slate]; Háromszék, “Rétyi Nyir”, May –, G. Moesz (Kryptog. excis. Vindobon., no. 2601, as *U. major* – F s.n., NY, S, UC 1 031 066) (28) [dark purple <> dark livid]; ditto, May 1908, G. Moesz (F. Petrak, Mycotheca generalis, no. 1052, as *U. major* – S) (29); Budapest, May 1936, G. Moesz (Cryptog. excis. Vindobon., no. 3802, as *U. major* – NY, S) (30) [dark purple]; sine loc., 21 Jul 1925, leg. Greinich, det. G. Moesz (as *U. major* – FH) (31); sine loc., 28 Jul 1925, G. Moesz (as *U. major* – FH) (32); pr. urbem Gödöllő, 27 Jun 1968, S. Tóth & K. Vánky (as *U. major* – H) [dark purple]; LATVIA: Prov. Kurzeme, Kr. Liepāja, Liepāja, am Meeresstrande, 15 Sep 1934, A. Kirulis (J. Smarods, Fungi latvici excis., no. 607, as *U. major* – M) (33); LITHUANIA: prope lacum Dusia, 19 Jul 1957, A. Minkevicius (as *U. major* – H) [dark purple]; the NETHERLANDS: prov. Zuid-Holland, 20 Jul 1962, leg. G.J. de Bruyn, det. G. Maas (as *U. major* – DAOM 185 233) (34); POLAND: Breslau, Carlowitz, sine dat., J. Schröter (J. Schröter, Pilze Schlesiens, no. 440, as *U. major*; topotypus – H, S) (35) [dark purple]; ditto, Aug –, leg. Schneider (Fl. Mycol. Silesiae, as *U. major* ‘Schröter sp. nov.’; topotypus – H, S) (36) [dark purple]; ROMANIA: Transsilvania, distr. Bihor, Episcopia Bihorului, 2 Aug 1933, T. Săvulescu & T. Rayss (Herb. mycol. roman., no. 533, as *U. major* – BPI 163 235, M, MA 10 483) (37); Transsilvania, distr. Braşov, ad colles “Capu Vişelului” prope pag. Podu Oltului, alt. ca 560 m, May 1969, J. Morariu & M. Danciu (Fl. roman. excis., no. 3221, as *U. major* – S) (38) [dark purple]; ROSSIA: Saratow bei d. Dorfe Katowras, 23 Jun 1890, W. Tranzschel (as *U. major* – S) (39); SLOVAKIA: Bratislava, 2 Jul 1922, R. Picbauer (as *U. major* – S) (40); SWEDEN: Mu(?)skau, O.L., Park, Jun 1893, P. Sydow (Sydow, Ustilagineen, no. 13, as *U. major* – M, NY) (41); SWITZERLAND: Binnegegen, Valais, 30 Jul 1903, P. Cruchet (as *U. major* – DAOM 80 076) (42); UKRAINE: prope Kiev, Smila, 3 Jul 1913, Newadowski (as *U. major* – S) (43).

On *S. roemerii* Friv.: BULGARIA: Central Balkan Mts, Karlovo, 17 Jun 1927, leg. I. Urumov (as *U. violacea* – SOMF 5758 – Denchev 2001) (44).

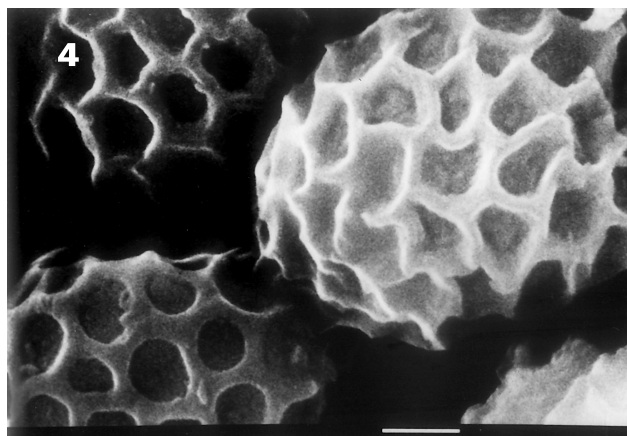
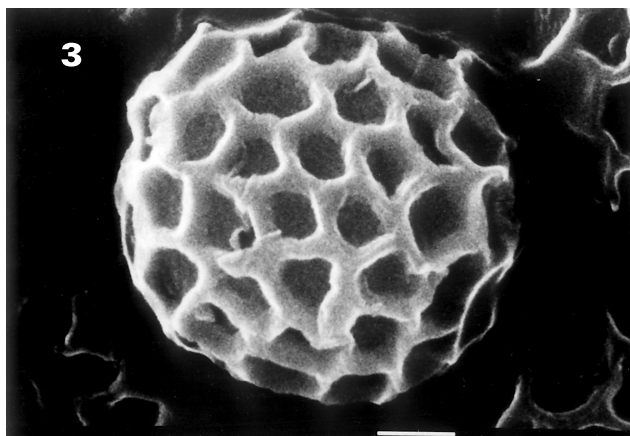
Morphometric variability of the spores

On *Silene borysthena*: (1) Hungary, Aug-Sep 1914, det. G. Moesz (Fl. Hungarica excis., Cent. IV, Fungi 35, no. 305), spores 7.5-14 × 6.5-11.5 (9.2±1.0 × 8.3±0.8) µm; (2) Romania, 14 Aug 1978, G. Negrean

(Herb. Mycol. Roman., no. 2850), spores 7.5-11.5 × 6.5-9 (8.9±0.8 × 7.7±0.6) µm.

On *S. ‘demiflora’*: (3) Turkey, 28 Sep 1941, H. Bremer, spores 7.5-11.5 × 6.5-9 (8.6±0.8 × 7.5±0.6) µm.

On *S. otites*: (4) Austria, 1 Jun 1989, Melzer, spores 7-12.5 × 6.5-9.5 (8.5±0.9 × 7.4±0.7) µm; (5) Austria, 1896, F. von Höhnel, spores 7-11 × 6.5-8 (8.1±0.7 × 7.4±0.4) µm; (6) Austria, Jul 1891, P. Dietel (Rabenhorst-Pazschke., Fungi europ., no. 4206), spores 7-10.5 × 6.5-9 (8.7±0.9 × 7.6±0.6) µm; (7) Austria, 15 Jul 1966, J. Pölt, spores 7.5-11.5 × 6.5-9 (8.7±0.7 × 7.7±0.6) µm; (8) Austria, 23 Jul 1976, J. Poelt, spores 7.5-12.5 × 6.5-10 (8.9±0.8 × 7.8±0.5) µm; (9) Czech Republic, 7 Jul 1898, J.E. Kabát, spores 7.5-11.5 × 6.5-9 (8.8±0.9 × 7.7±0.6) µm; (10) Czech Republic, May 1923, R. Picbauer (F. Petrak, Fl. bohemiae et moraviae excis., no. 1551), spores 7-11.5 × 6.5-10 (8.7±1.1 × 7.4±0.9) µm; (11) Czech Republic, Aug 1930, Hruby, spores 7-10.5 × 6.5-10 (8.0±0.7 × 7.3±0.6) µm; (12) Czech Republic, 17 Jun 1887, E. Hippe, spores 7-12.5 × 6.5-10 (8.5±0.9 × 7.5±0.6) µm; (13) Czech Republic, aestate, W. Siegmund, spores 7-11.5 × 6.5-10 (9.2±0.9 × 8.1±0.8) µm; (14) France, 1893, Morot, spores 7-10 × 6.5-8 (8.1±0.8 × 7.2±0.5) µm; (15) France, 26 Jul 1908, P. Hariot, spores 7-13 × 6.5-10 (8.6±0.9 × 7.7±0.7) µm; (16) Germany, Jul 1897, A. Vill (Allescher et Schnabl, Fungi bavarici excis., no. 601), spores 7-12.5 × 6.5-10 (8.7±0.7 × 7.9±0.6) µm; (17) Germany, 23 Jul 1960, A. Ludwig, spores 7-10.5 × 6.5-10 (8.6±1.0 × 7.3±0.8) µm; (18) Germany, 28 Jul 1901, O. Jaap (Otto Jaap, Fungi selecti excis., no. 113), spores 7.5-12.5 × 6.5-10 (9.5±0.9 × 8.0±0.8) µm; (19) Germany, Sep –, sine coll. (Klotzsch, Herb. mycol., no. 192), spores 7.5-14 × 6.5-10 (9.4±1.0 × 8.4±0.6) µm; (20) Germany, 1884, P. Sydow (Mycotheca marchica, no. 630), spores 7.5-11.5 × 6.5-10 (8.7±0.8 × 7.5±0.7) µm; (21) Germany, Jun 1889, P. Sydow (Mycotheca marchica, no. 2626), spores 8-12.5 × 6.5-11.5 (9.3±0.8 × 8.4±1.0) µm; (22) Germany, Aug 1896, P. Sydow (Sydow, Ustilagineen, no. 109), spores 8-13 × 7.5-10.5 (10.1±0.9 × 9.3±0.8) µm; (23) Germany, 10 Jul & 1 Aug 1924, E. Fahrndorff (Zillig, Ustilagineen Europas, no. 26), spores 7-11.5 × 6.5-10 (8.9±0.9 × 8.1±0.9) µm; (24) Germany, Jul 1924, E. Fahrndorff, spores 7.5-10.5 × 6.5-9 (8.8±0.8 × 7.9±0.7) µm; (25) Germany, 7 Sep 1906 (Sydow, Mycotheca german., no. 670), spores 7-12.5 × 6.5-10.5 (9.1±1.0 × 7.9±0.9) µm; (26) Germany, Jun 1893, P. Sydow (Sydow, Ustilagineen, no. 13), spores 7.5-11.5 × 6.5-10.5 (9.3±1.1 × 8.3±0.9) µm; (27) (?) Germany, 18 Apr 1884, C.E. Correns, spores 7.5-11.5 × 6.5-9 (8.8±0.6 × 7.9±0.6) µm; (28) Hungary, May –, G. Moesz (Kryptog. excis. Vindobon., no. 2601), spores 7-11.5 × 6.5-9 (8.7±1.1 × 7.6±0.6) µm; (29) Hungary, May 1908, G. Moesz (F. Petrak, Mycotheca generalis, no. 1052), spores 8-11.5 × 6.5-10.5 (9.2±0.9 × 7.8±0.8) µm; (30) Hungary, May 1936, G. Moesz (Cryptog. excis. Vindobon., no. 3802), spores 7-10 × 6.5-9 (7.9±0.7 × 7.2±0.7) µm; (31) Hungary, 21 Jul 1925, leg. Greinich, det. G. Moesz, spores 7-11.5 × 6.5-10.5 (8.0±0.8 × 7.3±0.7) µm; (32) Hungary, 28 Jul 1925, G. Moesz, spores 7.5-10.5 × 6.5-9 (8.5±0.6 × 7.6±0.6) µm; (33) Latvia, 15 Sep 1934, A. Kirulis (J. Smarods, Fungi latvici excis., no. 607), spores 7-11.5 × 6.5-9 (7.9±0.9 × 7.1±0.6) µm; (34) the Netherlands, 20 Jul 1962, G. Maas, spores 7.5-11.5 × 6.5-10 (9.0±0.9 × 7.8±0.8) µm; (35) Poland: sine dat., J. Schröter (J. Schröter, Pilze Schlesiens, no. 440), spores 7-11.5 × 6.5-9 (8.8±0.9 × 8.1±0.6) µm; (36) Poland, Aug –, leg. Schneider, spores 7.5-11.5 × 6.5-10 (8.9±0.9 × 7.8±0.7) µm; (37) Romania, 2 Aug 1933, T. Săvulescu & T. Rayss (Herb. mycol. roman., no. 533), spores 7.5-11.5 × 6.5-10 (8.8±0.7 × 7.6±0.8) µm; (38) Romania, May 1969, J. Morariu & M. Danciu (Fl. roman. excis., no. 3221), spores 7-10.5 × 6.5-9 (8.1±0.8 × 7.3±0.6) µm; (39) Rossia, 23 Jun 1890, W. Tranzschel, spores 7-10.5 × 6.5-9 (8.6±0.9 × 7.5±0.7) µm; (40) Slovakia, 2 Jul 1922, R. Picbauer, spores 7.5-11.5 × 6.5-10.5 (9.2±0.9



Figs 3-4. Spores of *Microbotryum savilei* Denchev on *Silene uralensis* subsp. *uralensis*, in SEM (holotype). Bars = 1 μ m

$\times 8.3 \pm 0.8$ μ m; (41) Sweden, Jun 1893, P. Sydow (Sydow, Ustilagineae, no. 13), spores 7.5-11.5 \times 6.5-9 (8.4 \pm 0.7 \times 7.3 \pm 0.6) μ m; (42) Switzerland, 30 Jul 1903, P. Cruchet, spores 7.5-14 \times 6.5-10.5 (9.6 \pm 1.3 \times 8.6 \pm 0.8) μ m; (43) Ukraine, 3 Jul 1913, Newadowski, spores 7.5-11.5 \times 6.5-10 (9.4 \pm 0.8 \times 8.5 \pm 0.8) μ m.

On *S. roemerii*: (44) Bulgaria, 17 Jun 1927, leg. I. Urumov, spores 7-14 \times 6.5-10 (9.3 \pm 1.4 \times 8.0 \pm 0.9) μ m.

***Microbotryum savilei* Denchev, sp. nov.** Figs 3-4
Sori antheras et ovaria destruentes. Massa sporarum pulverea, atrolivida vel atropurpurea. Sporae subglobosae, globosae, ovoideae vel late ellipsoideae, 5,5-10 \times 5-9 (7,0 \pm 0,6 \times 6,5 \pm 0,7) μ m; paries reticulatus, 5-8 (-9) maculis in diametro sporae, maculae irregulariter polyangulares, 0,5-1,4 (-1,8) μ m longae.

Holotypus on *Silene uralensis* (Rupr.) Bocquet subsp. *uralensis*, Canada, Distr. Keewatin, Southampton I., Coral Harbour, 16.VIII.1959, leg. D.B.O. Savile, J.A. Calder & I. Kukkonen (DAOM 66 879). **Isotypi** in COLO F-14 545, FH s.n., H s.n., UC 1 203 347 (ut *Ustilago violacea* var. *violacea*). **Paratypi**: Canada, Distr. Keewatin, Southampton I., Coral Harbour, 16.VIII.1959, leg. D.B.O. Savile, J.A. Calder & I. Kukkonen (DAOM 66 880, FH s.n., ut *Ustilago violacea* var. *violacea*).

Sori in deformed flowers, destroying the anthers and ovaries; the petals remain within the closed calyx. Infection systemic. **Spore mass** powdery, dark livid (*atrolividus*) or dark

purple (*atropurpureus*). **Spores** subglobose, globose, ovoid or broadly ellipsoidal, 5.5-10 \times 5-9 (7.0 \pm 0.6 \times 6.5 \pm 0.7) μ m (n/2=300), length/width ratio 1.08-1.09; spore wall reticulate, 5-8 (-9) meshes per spore diameter, meshes irregularly polygonal, rarely irregularly rounded, 0.5-1.4 (-1.8) μ m long, ca 0.2-0.4 μ m high; muri and bottom of the meshes rough.

Distribution: North America (Canada).

Etyymology: named in honour of the Canadian mycologist and botanist D.B.O. Savile (1909-2000).

Specimens examined:

On *Silene uralensis* subsp. *uralensis*: CANADA: District of Keewatin, Southampton I., Coral Harbour, 16 Aug 1959, leg. D.B.O. Savile, J.A. Calder & I. Kukkonen (as *Ustilago violacea* var. *violacea* on *Lychmis apetala* var. *arctica*) (DAOM 66 879, COLO F-14 545, FH s.n., H s.n., UC 1 203 347) [dark livid or dark purple spore mass]; ditto, 16 Aug 1959, leg. D.B.O. Savile, J.A. Calder & I. Kukkonen (as *Ustilago violacea* var. *violacea* on *Lychmis apetala* var. *arctica*) (DAOM 66 880, FH s.n.) (white-flowered host plants) [dark livid or dark purple spore mass].

Morphometric variability of the spores

DAOM 66 879 (Holotype) – spores 5.5-10 \times 5.5-8 (7.2 \pm 0.6 \times 6.6 \pm 0.6) μ m (n=150); length/width ratio 1.09; DAOM 66 880 – spores 5.5-10 \times 5-9 (6.8 \pm 0.6 \times 6.3 \pm 0.7) μ m (n=150); length/width ratio 1.08.

The species of *Microbotryum majus* gr. can be presented in the following key.

Key to the species of *Microbotryum*

- 1 Sori destroying the anthers only; infected flowers usually not deformed, the petals usually well-developed and extended, the ovaries healthy. *M. violaceum* compl.
- 1* Sori destroying the anthers and ovaries; attacked flowers deformed, the petals usually reduced and remain within the calyx *M. majus* gr. 2
- 2 Spores 7-12 (-14) μ m long (mean > 7.8 μ m). *M. majus*
- 2* Spores 5.5-10 μ m long (mean < 7.8 μ m) *M. savilei*

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References

- Clinton, G.P. 1902. North American Ustilagineae. – *Journal of Mycology* 8: 128-156.
- Denchev, C.M. 2001. Classis Ustomycetes (Ordines Tilletiales, Ustilaginales et Graphiolales). – In: V. Fakirova [ed.]. *Fungi Bulgariae*. Vol. 4. Pp. 1-286. Editio Academica “Prof. Marin Drinov” & Editio Pensoft, Sofia. (In Bulgarian)
- Lutz, M., Göker, M., Piatek, M., Kemler, M., Begerow, D. & Oberwinkler, F. 2005. Anther smuts of *Caryophyllaceae*: molecular characters indicate host-dependent species delimitation. – *Mycological Progress* 4: 225-238.
- Rayner, R.W. 1970. A mycological colour chart. CMI, Surrey and the British Mycological Society, Kew.
- Săvulescu, T. 1957. [Ustilaginales from Romanian People’s Republic]. Vol. 2. Editura Academiei Republicii Populare Române, București. (In Romanian)
- Stearn, W.T. 1998. *Botanical Latin*. 4th edn. Timber Press, Portland, Oregon, U.S.A.
- Vánky, K. 1994. *European smut fungi*. Gustav Fischer Verlag, Stuttgart, Jena, New York.