

## TAXONOMIC POSITION OF THE SMUT FUNGUS *USTILAGO ALSINES*

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**Abstract:** *Ustilago alsines* G. P. Clinton & Zundel on *Stellaria praecox* A. Nelson (= *Stellaria nitens* Nutt.) from North America belongs to the genus *Microbotryum* Lév. emend. Vánky; therefore the new combination *M. alsines* (G. P. Clinton & Zundel) M. Piątek is proposed. The species is described in detail and also illustrated. Its affinities to similar species are discussed. The geographical range of this taxon is discussed.

**Key words:** Microbotryales, Urediniomycetes, taxonomy, nomenclature

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### INTRODUCTION

*Ustilago alsines* G. P. Clinton & Zundel was described from North America by Clinton and Zundel (in Zundel 1939: 991, as ‘*alsineae*’) based on a specimen collected in 1911 by Macbride, infecting ovaries of *Stellaria praecox* A. Nelson. However, the description of *Stellaria praecox* was based on a plant (probably *Stellaria nitens* Nutt.) deformed by a smut fungus, which much later was described as *Ustilago alsines* (comp. Zundel 1953: 137). This is not an exceptional situation. For instance, some species of the genus *Silene* L. are known from Asia, which were probably described due to the presence of an anther smut – *Microbotryum violaceum* (Pers.: Pers.) G. Deml & Oberw. s.l. (Hood & Antonovics 2003). Similarly, the description of a new genus and species *Spondylantha aphylla* C. Presl was based on samples of *Cissus sicyoides* L. infected by a species of *Mycosyrinx* Beck (Vánky 1996).

*Ustilago alsines*, which parasitizes host plants belonging to the Caryophyllaceae, cannot be retained in the genus *Ustilago* (Pers.) Roussel because representatives of this genus are known only on host plants belonging to Poaceae. Vánky (1998a) suspected that *U. alsines* belongs to the genus *Microbotryum* Lév. emend. Vánky, but he could not examine the type specimen and for that reason did not propose the appropriate new com-

bination. Re-examination of the type and several non-type specimens of *Ustilago alsines* revealed that this species indeed belongs to *Microbotryum*. It is also different from the remaining known species in the ovaries of Caryophyllaceae. Accordingly, the appropriate taxonomic and nomenclatural changes are proposed. In addition, the re-examined collections enable the completion of the description and illustration of this species.

### TAXONOMY

***Microbotryum alsines*** (G. P. Clinton & Zundel) M. Piątek, *comb. nov.* (Figs 1–5)

**BASIONYM:** *Ustilago alsines* G. P. Clinton & Zundel (as ‘*alsineae*’), in Zundel, North American Flora 7(14): 991. 1939. – Type on *Stellaria praecox* A. Nelson (= *Stellaria nitens* Nutt.), Idaho, Falk’s Store, 22 Apr. 1911, leg. Macbride (HOLOTYPE: BPI 157050!).

Sori in the ovaries, but apparently restricted to the ovules, ovoid to ellipsoidal, replacing the seeds by a dark brownish-purple, at first agglutinated, later dusty spore mass, sori inconspicuous, hidden by the capsules of the host plants, infection systemic. Spores globose or subglobose, (9–)11–14 × (8–)11–13(–14) μm, dark brownish-purple, wall minutely reticulate, 6–7(–8) meshes per spore



**Fig. 1.** Sori of *Microbotryum alsines* (G. P. Clinton & Zundel) M. Piątek in the ovaries of *Stellaria nitens* Nutt. (BPI 157043). Scale bar = 1 cm.

diameter, muri 0.5–1.0  $\mu\text{m}$  high, in SEM regularly reticulate, interspaces and basal part of the muri with 4–7 club-shaped or round protuberances.

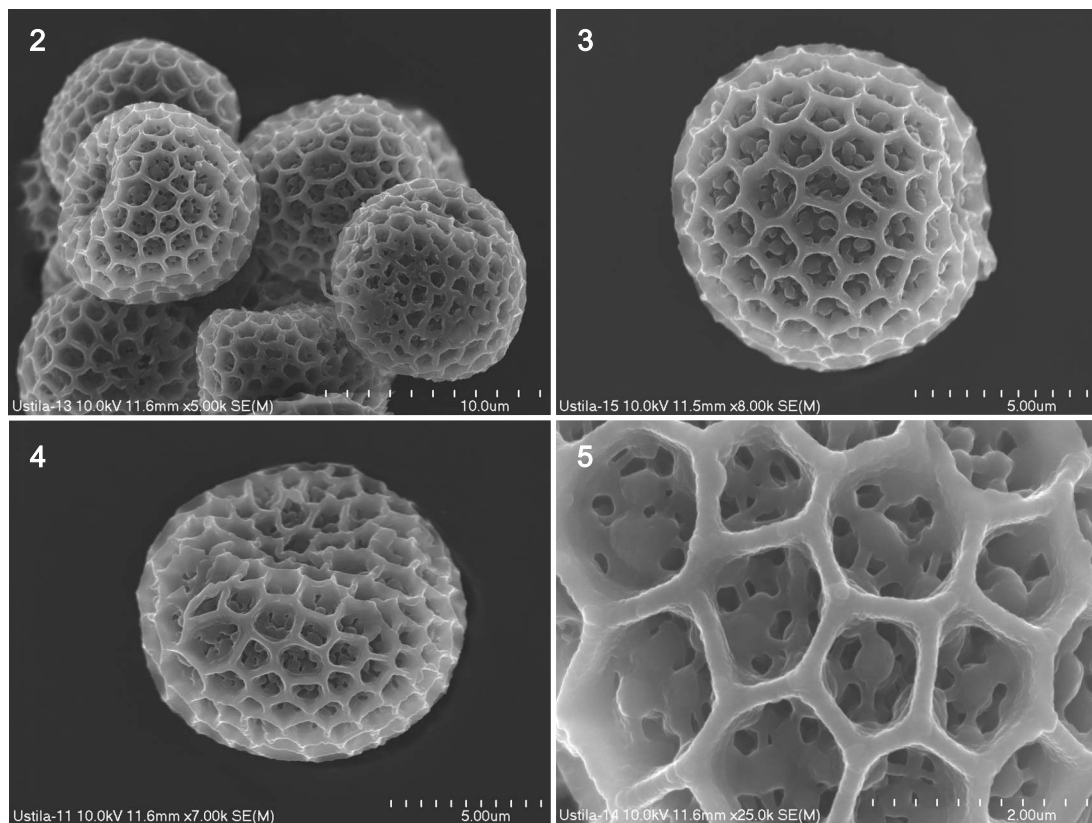
On Caryophyllaceae subfam. Alsinoideae: *Stellaria nitens* Nutt.; North America (United States).

**SPECIMENS EXAMINED.** On *Stellaria nitens* Nutt. [= *Alsine nitens* (Nutt.) Greene]: NORTH AMERICA. United States: Idaho, Falk's Store, 22 Apr. 1911, leg. Macbride (BPI 157050 – holotype); Washington, Pullman, 15 May 1920, leg. G. L. Zundel (BPI 157042), 5 May 1926, leg. G. L. Zundel (BPI 157037, 157043); Washington, Pullman, Washington State College campus, 15 May 1920, leg. G. L. Zundel (BPI 157038, 157046), 9 May 1925, leg. G. L. Zundel (BPI 157039), 29 Apr. 1926, leg. G. L. Zundel (BPI 157041, 157044); Washington, Addy, 1 mile south of Stevens Co., 19 May 1926, leg. G. L. Zundel (BPI 157040);

Washington, Addy, 1 mile south of Stevens Co. on Shady Rocky Hillside, 19 May 1926, leg. G. L. Zundel (BPI 157048); Washington, Pullman, SE of Whitman Co., near Whitlow Station, 1 May 1926, leg. G. L. Zundel & E. E. Honey (BPI 157047); Washington, Pullman, Whitman Co. West Side of State College campus, 5 May 1926, leg. G. L. Zundel (BPI 157049).

## DISCUSSION

The type material is very scarce and contains only three small fragments of infected plant. Therefore, the spores for SEM examination were collected from dispersed spores on spore print lying on the envelope of the herbarium packet, while the drawings of infected plants were made from a non-type specimen (Fig. 1). SEM study revealed that *Microbotryum alsines* has characteristic ornamentation of spores, with a regularly reticulate spore wall and the presence of protuberances within interspaces and basal part of the muri. There were known seven species of *Microbotryum* in ovaries of host plants belonging to Caryophyllaceae, namely *M. arenariae-bryophyllae* (Vánky) Vánky, *M. duriaeanum* (Tul. & C. Tul.) Vánky, *M. holostei* (de Bary) Vánky, *M. jehudanum* (Zundel) Vánky, *M. moehringiae* (Togashi & Y. Maki) Vánky, *M. moenchiae-manticae* (Lindtner) Vánky and *M. nivale* (Liro) Vánky (Vánky 1998). Amongst them, *Microbotryum holostei* has superficially similar spores, but the muri in this species are 1.0–1.5  $\mu\text{m}$  high and the number of meshes per spore diameter is 4–7. The characteristic protuberances present in *M. alsines* and *M. holostei* are not typical only for this group of smut fungi. They can also be observed in smut fungi belonging to other genera of Microbotryales, for instance in *Bauerago cyperi-lucidi* (J. Walker) Vánky (Vánky 1991: 487 & fig. 5), *B. gardnerii* (McKenzie & Vánky) Vánky (Vánky 1991: 486 & fig. 3), or in *Microbotryum* species infecting other than Caryophyllaceae host families, including *M. tragopogonis-pratensis* (Pers.) R. Bauer & Oberw. on Asteraceae (Vánky 1994: 381 & 440), *M. calyptratae* Vánky on Portulacaceae (Vánky 1998b: 96–97 & fig. 7), *M. scabiosae* Vánky on Dipsacaceae (Vánky 1994: 374 & 429) and so on.



**Figs 2–5.** Spores of *Microbotryum alsines* (G. P. Clinton & Zundel) M. Piątek on *Stellaria nitens* Nutt., in SEM (HOLOTYPE: BPI 157050).

*Microbotryum alsines* is known only from the United States in North America. The type collection is from Idaho. Further collections are known from Washington. It seems that this species has not been collected again in recent years. All records are from the early 20th century (Zundel 1939: 991), while all later authors (e.g., Fischer 1953; Zundel 1953; Vánky 1998a) only repeat the first reports. The host plant, *Stellaria nitens*, is scattered throughout North America, and present in British Columbia (Canada), Arizona, California, Idaho, Montana, Nevada, Oregon, Utah and Washington (United States). Therefore, *Microbotryum alsines* is probably more widely distributed.

**ACKNOWLEDGEMENTS.** I am grateful to Dr. Kálmán Vánky (Tübingen, Germany) and to Dr. Lori M. Carris (Washington, U.S.A.) for reading the manuscript,

helpful improvements and checking the English, to Dr. Jolanta Piątek (Kraków, Poland) for her illustrations, to the Curator of BPI for loan of specimens of *Ustilago alsines*, and to Anna Łatkiewicz for assistance with SEM images. SEM micrographs were taken in the Laboratory of Field Emission Scanning Electron Microscopy and Microanalysis at the Institute of Geological Sciences of the Jagiellonian University, Kraków. This study was supported by the Polish Ministry of Education and Science for the years 2005–2008, grant no. 2 P04G 019 28.

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Received 16 September 2005