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Aciculosporium sasicola sp. nov. on witches' broom of *Sasa senanensis*

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A new species of *Aciculosporium*, *A. sasicola* (anam. *Albomyces sasicola*), is described and illustrated. The fungus differs from *Aciculosporium take* by its small asci and ascospores, though witches' broom and signs probably caused by the former on *Sasa senanensis* are similar to those caused by the latter on bamboos.

Key Words——*Aciculosporium sasicola*; grass bamboo; new species; witches' broom.

In Hokkaido, bamboos are found only in the southern part of the island, and these are species introduced from Honshu. There are, however, species of grass bamboos that occur naturally as a component of forest vegetation: *Sasa kurilensis* (Rupr.) Makino et Shibata (chishima-zasa), *S. nipponica* (Makino) Makino et Shibata (miyako-zasa), *S. senanensis* (Franch. et Sav.) Rehder (kumai-zasa), and *Sasamorpha borealis* (Hack.) Nakai (suzudake).

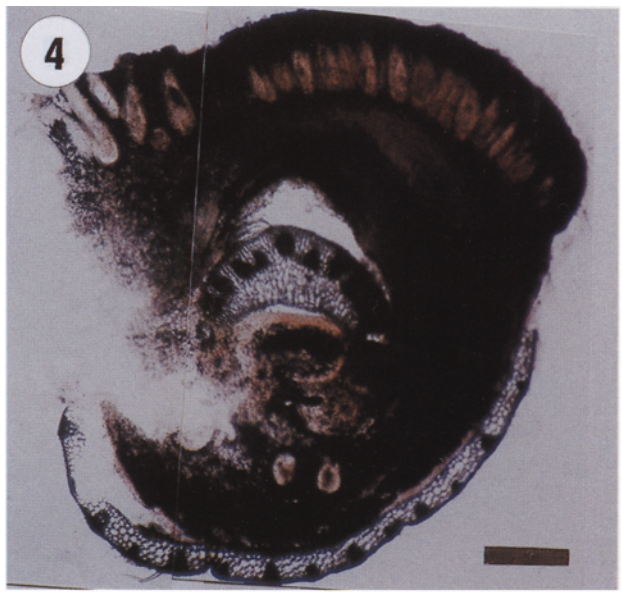
Two witches' broom diseases of bamboos and grass bamboos have been recorded in Japan, and that caused by *Aciculosporium take* I. Miyake was reported by Miyake (1908). This disease, however, is not distributed in Hokkaido. The witches' broom of *S. borealis* caused by *Parepichloë sasae* (Hara) J. F. White et P. V. Reddy (Syn.: *Epichloë sasae* Hara) was reported from Hokkaido by Hino (1961).

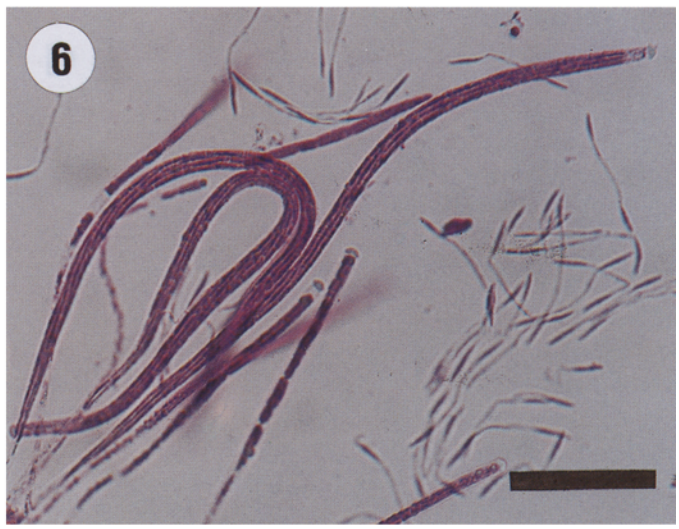
Hara (1923, 1936) listed *Sasa veitchii* (Carr.) Rehder (kuma-zasa) as a host of the witches' broom fungus without any details. The witches' broom of grass bamboo is rarely observed in Hokkaido, and I am always interested in this disease and its causal fungus.

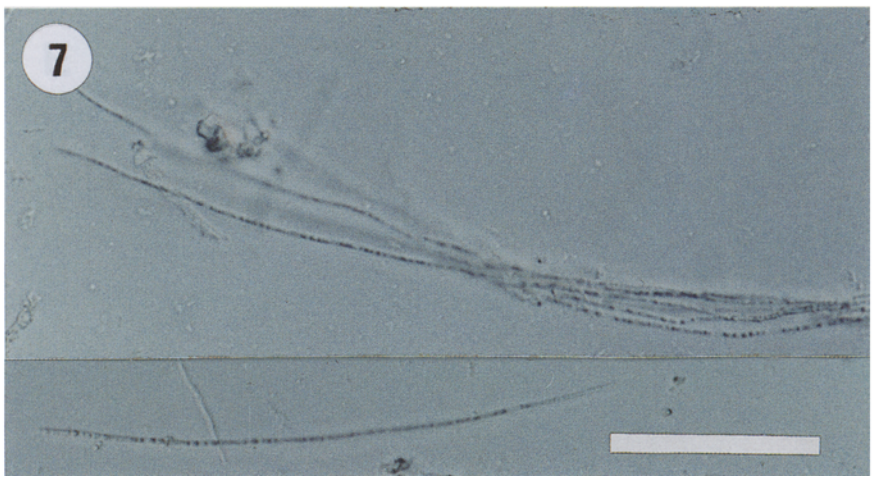
In June 1999, I found a witches' broom of *S. senanensis* accompanied by the anamorph and teleomorph stages of its causal fungus in Sapporo, Hokkaido, and I continued observations up to August 2000.

After investigating the morphological characteristics of the causal fungus on *S. senanensis* found in Hokkaido, I concluded that the fungus is a different species from *A. take* in its smaller asci and ascospores.

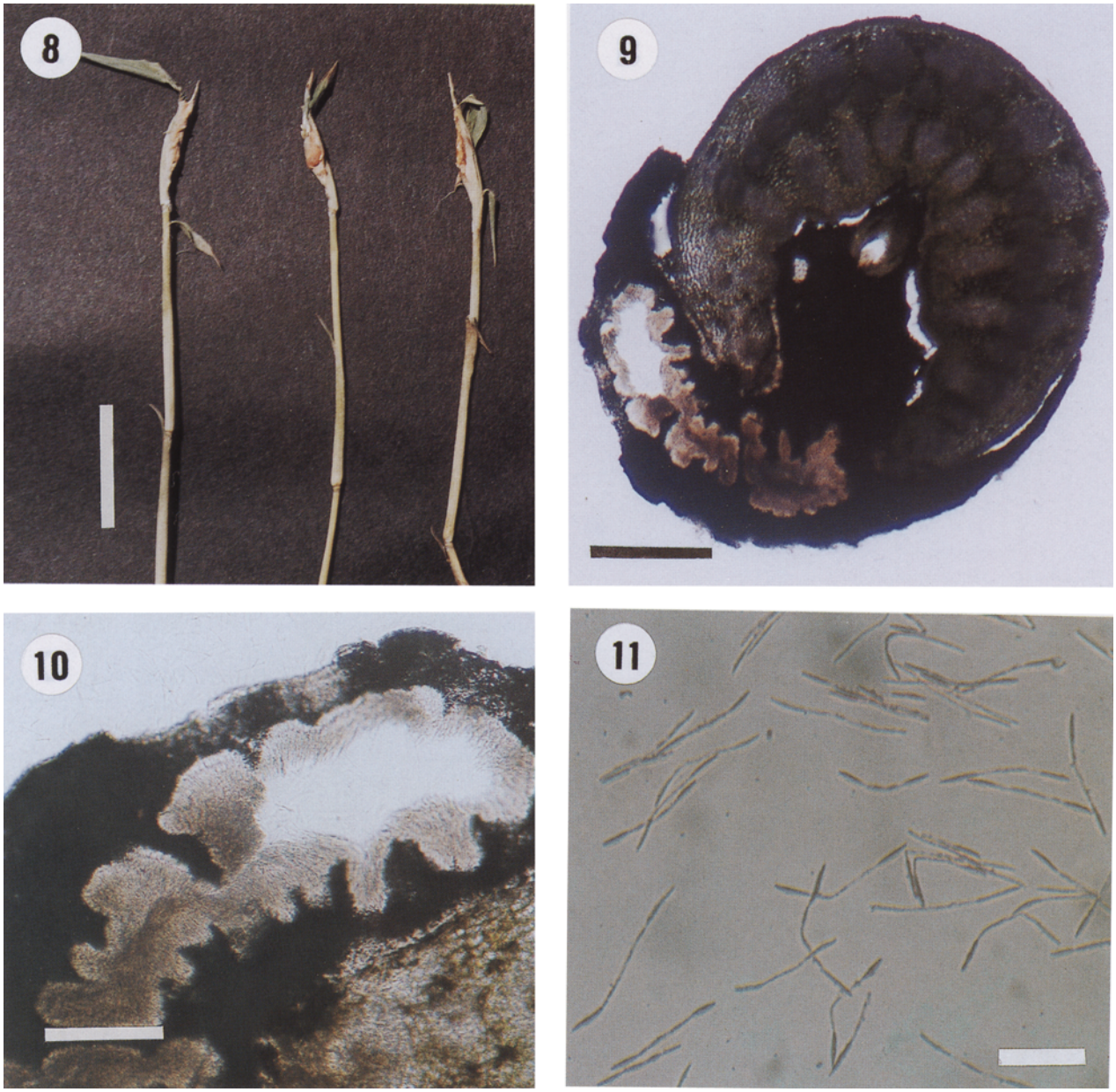
Figs. 1, 2. Witches' broom of *Sasa senanensis*. 1. Symptoms. 2. Broomed shoots with the anamorph (arrowheads).







Figs. 3–7. Morphology of *Aciculosporium sasicola*. 3. Teleomorphic stromata formed on leaf sheath of broomed shoots. 4. A cross section of teleomorphic stroma. 5. A row of perithecia. 6. Asci and ascospores stained with carbol fuchsin. 7. Nomarski's micrograph of ascospores. Scale bars: 3=20 mm, 4=500 μm, 5–7=50 μm.



Figs. 8–11. Morphology of *Albomyces sasicola*. 8. Stromata with an anamorph. 9. A cross section of anamorphic stroma. 10. A part of stromatic pycnidia. 11. Conidia. Scale bars: 8=20 mm, 9=500 μm, 10=200 μm, 11=20 μm.

Symptoms and signs Infected twigs become longer than normal twigs and have numerous nodes with shortened internodes. These broomed twigs arise close together at a node on the branch. Some shoots grow at each node of broomed twigs and have small leaves.

A whitish spindle-shaped solid body appears on the topmost part of the leaf sheath of the shoot on a previously infected twig from early June to the middle of July. This is an anamorphic stroma of the causal fungus. Upon maturity, the anamorphic stroma is reduced to a powdery mass and falls off.

In late July, a pale brown and roughened teleomorphic stroma is formed on the base of leaf sheath of the infected shoot. The teleomorphic stromata later granulate and also fall off.

Description of the causal fungus

Aciculosporium sasicola Oguchi, sp. nov. Figs. 3–7, 12

Stromata cum vagina foliae circumdantia foliam juveniles tegentia, sarco-pseudoparenchymatica, asperata, brunneola, ca. 5 mm diam, 8–15 mm longa. Perithecia immersa, circulatim apposita in stromatibus, ovata vel pyriformia, apice ostiolata, 90–180 μm diam, 350–520 μm alta. Asci longi-cylindracei, apice crassi-pileati, interdum ostiolo centrali lineari longitudinali praediti, ad basim attenuati, brevi-stipitati, 8-spori, hyalini, 112–275 × 5–7.5 μm. Ascosporae filiformes, hyalinae, fascicula-

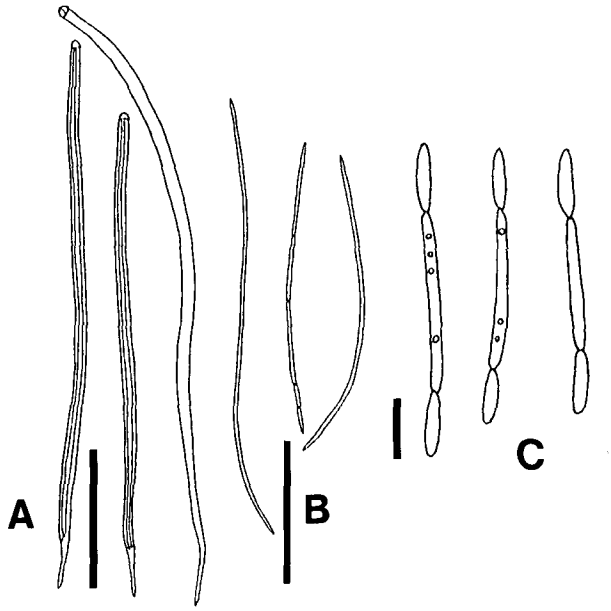


Fig. 12. *Aciculosporium sasicola.* A. Asci. B. Ascospores. C. Conidia. Scale bars: A, B=50 μm, C=10 μm.

tae, rectae vel curvatae, multi-septatae, 75–175×1–2 μm.

Status anamorphus: *Albomyces sasicola* Oguchi, anam. sp. nov.

Stroma pale brown, roughened, fleshy pseudoparenchymatous, 5 mm diam and 8–15 mm long. Perithecia immersed at marginal part of stroma, rounded, oval or pyriform, tips opened toward outside, 350–520×90–180 μm. Asci narrowly cylindrical with cap-like thickened tip, occasionally having vertical narrow hollow at the tip, tapered toward the base, short-stalked, 8-spored, hyaline, 112–275×5–7.5 μm in size. Ascospores filiform, nearly as long as ascus, hyaline, fascicular in parallel, straight or curved, multiseptate, 75–175×1–2 μm, stained with carbol fuchsin.

Holotype: On shoots of *Sasa senanensis*, Sapporo, Hokkaido, Japan. 3 Aug. 1999, T. Oguchi, NTS-392 deposited in SAPA (Herbarium of the Faculty of Agriculture, Hokkaido University, Sapporo, Japan).

Etymology: The specific ephithet, *sasicola*=dweller on *Sasa*, referring to its habitat.

Host and distribution: *Sasa senanensis* (Franch. et Sav.) Rehder in Hokkaido, Japan.

Disease name: Witches' broom of grass bamboo (Sasa-tengusu-byo).

Albomyces sasicola Oguchi, anamorph sp. nov.

Figs. 8–12

Stromata contextum hospitis involventia, pseudoparenchymatica, fusiformia, albida vel brunneola, ca 4 mm diam, 15–20 mm longa, intra loculo irregulari formantia. Conidiophora linearia, 10–25×1–2 μm, simplicia, continua, hyalina. Conidia linearia, hyalina, recta vel curvata, apice utrinque incrassulata, 2-septata, ad septa constricta, 40–50×1–2 μm, persicina in massa.

Status teleomorphus: *Aciculosporium sasicola* Oguchi, sp. nov.

Stroma involved the host tissue, pseudoparenchymatous, fusiform, whitish or pale brown, 4 mm in diam and 15–20 mm long, forming irregular cavities. Conidiophores arising from the innermost cells of stromatal wall, hyaline, simple, one-celled, 10–25×1–2 μm. Conidia filiform, hyaline, straight or curved, 2-septate, slightly constricted at the septa, slightly obtuse at both ends, 40–50×1–2 μm, end cells stained with carbol fuchsin, peach colored in mass.

Holotype: On broomed shoots of *Sasa senanensis*, Sapporo, Hokkaido, Japan. 10 July 1999, T. Oguchi, NTS-390 deposited in SAPA (Herbarium of the Faculty of Agriculture, Hokkaido University, Sapporo, Japan).

Etymology: From the generic name of the host plant and *-cola* meaning a dweller on the host.

Discussion

Witches' broom of bamboos is one of the important diseases causing yield decline of bamboo shoots, poor quality of bamboo materials, and poor growth of the infected bamboo.

The genus *Aciculosporium* was established by Miyake (1908), with *Aciculosporium take* as its type species, for the causal fungus of the witches' broom disease of bamboos in Japan. According to Hino (1962), Hara (1919) revised *A. take* as *Balansia take* (I. Miyake) Hara. This assignment to *Balansia*, however, is not accepted at present. Clements and Shear (1931) illegitimately used the generic name *Mitosporium* I. Miyake for *Aciculosporium*, and Ainsworth and Bisby (1954) noticed '*Albomyces* Miyake?=*Aciculosporium* (Hypocr.)'. As Hino noted, confusion long persisted concerning the generic name of the bamboo witches' broom fungus. Hino (1962) described the genus *Albomyces* as the anamorph of *Aciculosporium* and provided a Latin diagnosis. At present, *Aciculosporium* is recognized as the teleomorph of *Albomyces*.

Hara (1923, 1927, 1936) listed three grass bamboo hosts, *Sasa cernua* Makino f. *nebulosa* (Makino et Shibata) Tatew. (shakotan-chiku), *S. veitchii* and *Pleioblastus simonii* (Carr.) Nakai (medake), among 13 hosts of *A. take*. However, most of these hosts belonged to the genus *Phyllostachys*. As no details of the causal fungus on grass bamboos have been made clear, the host range of *A. take* was restricted to the genus *Phyllostachys* by Kobayashi et al. (1992) and Ikegami et al. (1996). Recently, Tsuda et al. (1997) listed 35 plants, including two *Sasa* species, as hosts of *A. take*, basing their conclusions on conidial morphology. They did not observe an ascigenous stage on these hosts.

The symptoms and signs of the present fungus on *S. senanensis* in Hokkaido are quite similar to those of *A. take*, as has been pointed out. However, the asci and ascospores of the present fungus are apparently smaller than those of *A. take*, as shown Table 1.

I conclude that the present fungus, *A. sasicola*, is a new species of the genus *Aciculosporium* and its host is *Sasa*.

Table 1. Sizes of conidia, asci and ascospores of *Aciculosporium take* and *A. sasicola*.

Species (Author)	conidium (μm)	Ascus (μm)	Ascospore (μm)
A. take			
(Miyake, 1908)	35–55×1.6–2	270–330×5–6	230–300×1.5–2
(Hara, 1918)	35–55×1.6–2	250–350×5–6	230–320×1.5–2
(Hara, 1936)	35–55×1.6–2	270–330×5–6	230–300×1.5–2
(Hino, 1962)	52.7–57.2×1.5–1.8	——	——
(Shinohara, 1965)	45–61.3×1–1.5	235–380×6.7–8.3	210–305×1.3–2
(Ito, 1973)	27–52×1.5–1.8	270–330×5–6	230–300×1.5–2
(Kao & Leu, 1976)	48×1.5–2	300	250
A. sasicola	40–50×1–2	112–275×5–7.5	75–175×1–2

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