

SHORT COMMUNICATION

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Bambusicolous fungi in Japan (2): *Phialosporostilbe gregariclava*, a new anamorphic fungus from *Sasa*

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Abstract One new hyphomycete, *Phialosporostilbe gregariclava*, is described and illustrated based on specimens collected on dead culms of two *Sasa* species in Hokkaido and Iwate, Japan. This fungus is compared with previously described species of *Phialosporostilbe* and *Nawawia*, and its morphological and cultural characteristics are reported.

Key words Hyphomycetes · *Nawawia* · New species · *Phialosporostilbe* · Taxonomy

During investigations on bambusicolous fungi in northern Japan, one noteworthy dematiaceous hyphomycete having a macronematous, mononematous conidiophore with a terminal phialide and hyaline, tetrahedral conidia bearing setulae was found from dead culms of two bamboo grass species, *Sasa kurilensis* (Rupr.) Makino & Shibata and *S. nipponica* (Makino) Makino & Shibata. The morphological characteristics of this fungus conform to the circumscription of the genus *Phialosporostilbe* Mercado & J. Mena. However, it differs from the previously described *Phialosporostilbe* species by having two types of mononematous conidiophores and larger conidia. Therefore, this fungus is described here as a new species.

The methods of microscopic and cultural works were detailed in a previous study (Shirouzu and Harada 2004), and the color descriptions in Kornerup and Wanscher (1978) were followed.

Phialosporostilbe gregariclava Shirouzu & Y. Harada, anam. sp. nov. Figs. 1–13

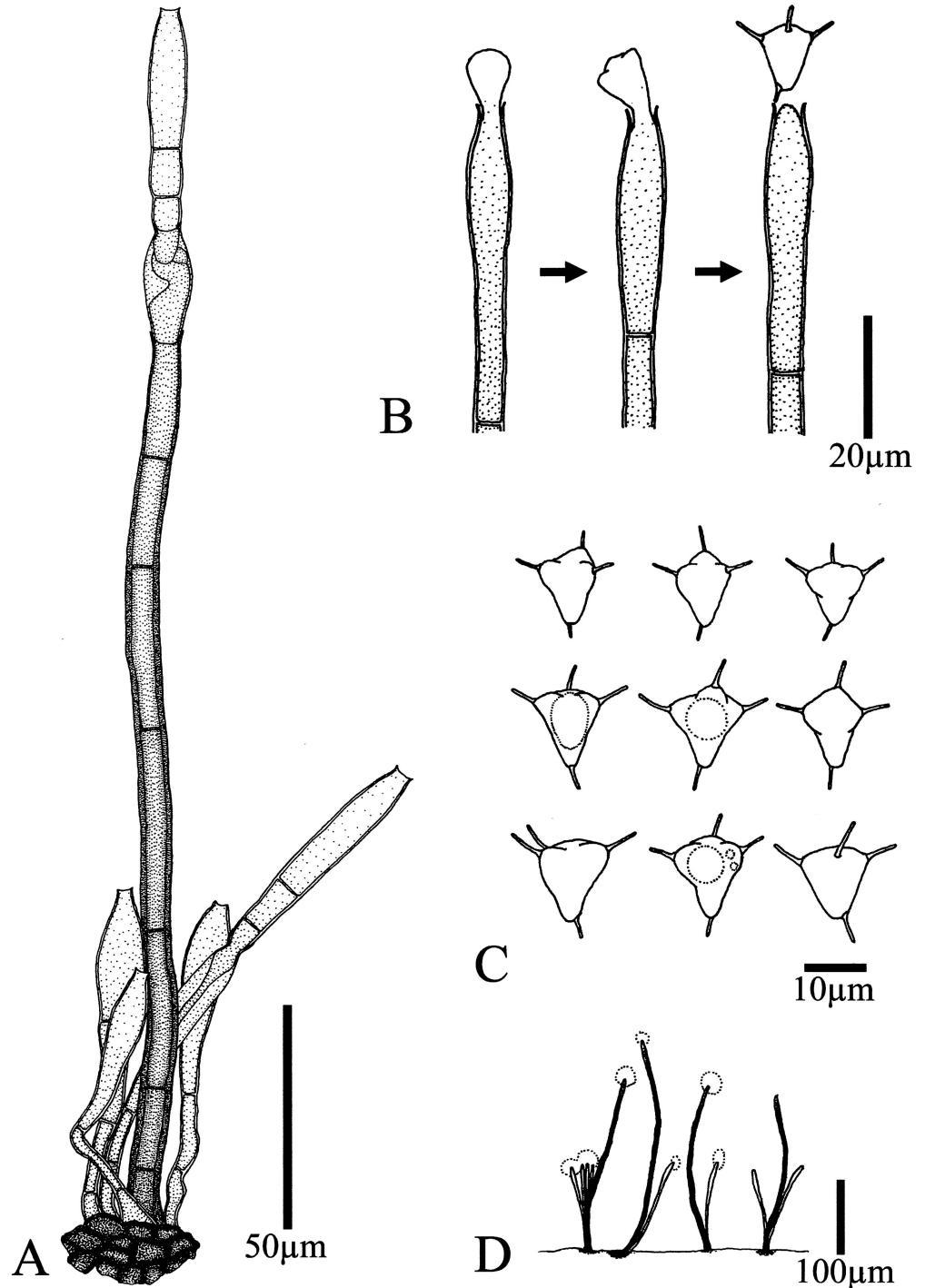
Coloniae in substrato naturali inconspicuae. Mycelium superficiale vel immersum, ex hyphis ramosis septatis subhyalinis vel pallide brunneis 1–3 µm latis compositum. Stromata superficialia vel partim immersa, subglobosa, atro-brunnea, pseudoparenchymatica, 15–42.5 µm alta, 20–35 µm lata. Conidiophora macronematica, mononematica, ex stromate enascentia vel ex hypha vegetativa formata, biformia; longiconidiophora singularia vel fasciculata, erecta, recta vel flexuosa, cylindrica, crassitunicata, laevia, 5–15-septata, atro-brunnea et versus apicem pallescentia, percurrenter prolifera, 137.5–270 µm longa, 5–6.5 µm lata ad basim, sursum leviter attenuata: breviconidiophora fasciculata cum conidiophoris longis, recta vel flexuosa, cylindrica vel clavata, tenuitunicata, laevia, 4–7-septata, pallide brunnea vel pallide cinereo-flava, percurrenter prolifera, 55–120 µm longa, 2.5–5 µm lata ad basim, 3.5–6.5 µm lata infra cellulam conidiogenam. Cellulae conidiogenae monophialidicae, integratae, cylindricae, terminales, rectae vel leviter flexuosae, pallide brunneae vel pallide cinereo-flavae, 25–42.5 µm longae, 6–10 µm latae, cum collaretti apicali 1–2 µm longo, 2.5–4.5 µm lato. Conidia acrogena, solitaria, tetrahedralia, unicellularia, hyalina vel subhyalina, 8–13 µm longa, 8–12.5 µm lata, 3 angulis protuberantibus et basi leviter truncata circa 2.5 µm lata praedita, in angulo omni setula hyalina 2.5–5 µm longa praedita, basi setula hyalina 1–3 µm longa praedita.

Colonies on the natural substratum inconspicuous but appearing as a white conidial mass when sporulation occurs. Mycelium superficial or immersed, composed of branched and septate subhyaline to pale brown hyphae 1–3 µm wide. Stromata superficial or partly immersed, subglobose, dark brown, pseudoparenchymatous, 15–42.5 µm high, 20–35 µm wide. Conidiophores macronematous, mononematous, arising from the stroma or formed from the vegetative hypha, of two forms. Long conidiophores single or in 2–3 groups, erect, straight or flexuous, cylindrical, thick-walled, smooth, 5–15-septate, dark brown and paler toward the apex, proliferating percurrently, 137.5–270 µm long, 5–6.5 µm wide at the base, tapering slightly toward the apex. Short

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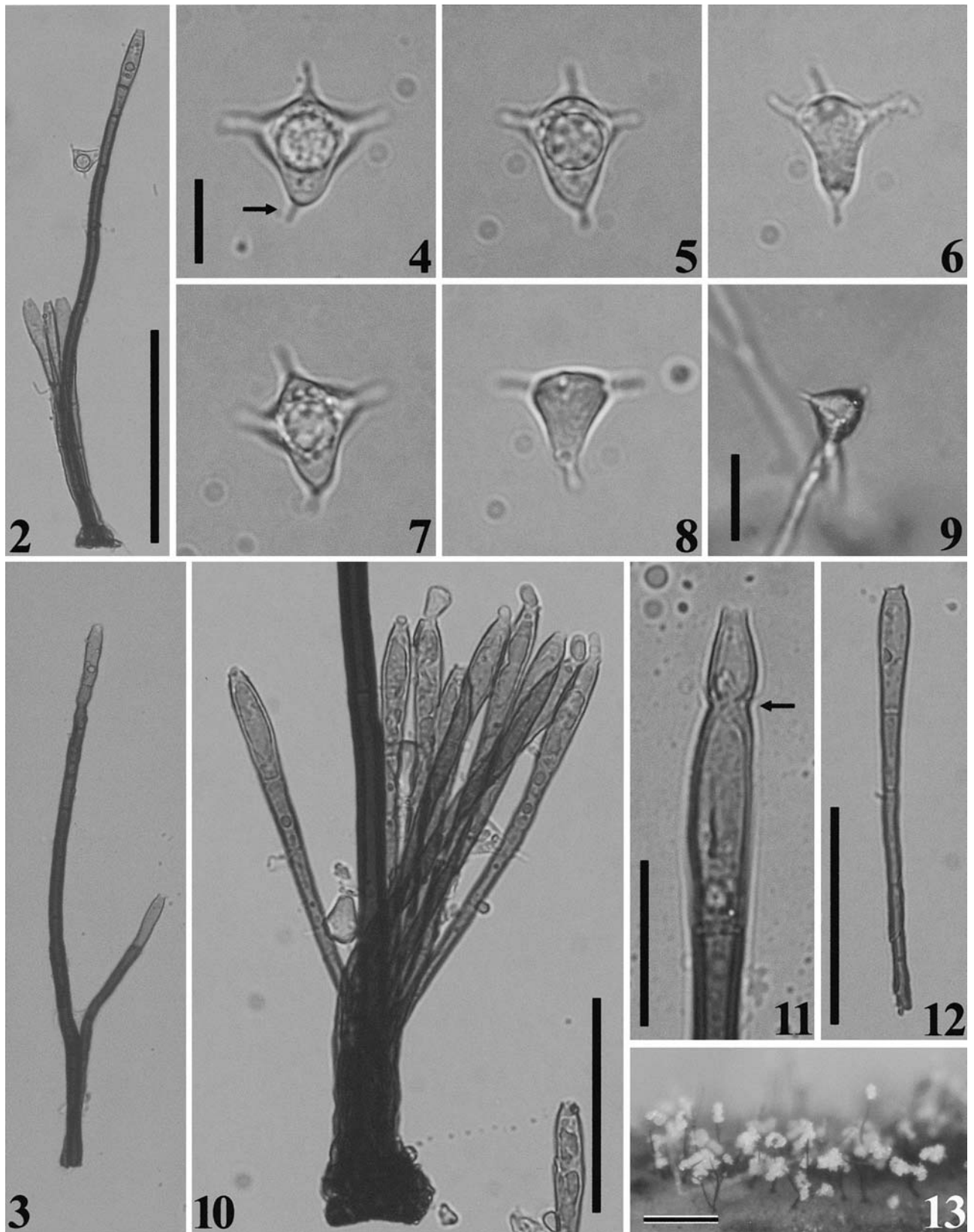
Fig. 1. *Phialosporostilbe gregariclava*. **A** Long conidiophore and short conidiophores arising from stroma. **B** Conidial development from conidiogenous cells. **C** Conidia. **D** Conidiophores with white globose conidial masses. (**A**, **C**, **D** Holotype; **B** HHUF 28226)



conidiophores usually in 2–10 groups together with long conidiophores, straight or flexuous, cylindrical to clavate, thin-walled, smooth, 4–7-septate, pale brown to pale grayish-yellow, proliferating percurrently, 55–120 µm long, 2.5–5 µm wide at the base, 3.5–6.5 µm wide beneath the conidiogenous cell. Conidiogenous cells monophtalidic, integrated, cylindrical, terminal, straight or slightly flexuous, pale brown to pale grayish-yellow, 25–42.5 µm long, 6–10 µm wide at the widest part, usually with a 1- to 2-µm-deep, 2.5- to 4.5-µm-wide collarette at the apex.

Conidial mass formed on tip of the conidiophore, subglobose or amorphous, white, up to about 50 µm in diameter. Conidia acrogenous, solitary, tetrahedral, unicellular, hyaline or subhyaline, sometimes having a large drop of liquid inside the cell, 8–13 µm long, 8–12.5 µm across at the widest part, with three slightly protuberant corners and a slightly truncate, about 2.5-µm-wide base, bearing a hyaline 2.5- to 5-µm-long, 0.5-µm-wide setula at each corner and a 1- to 3-µm-long setula at a point adjacent to the base.

Teleomorph: unknown.



Figs. 2–13. *Phialosporostilbe gregariclava* (holotype). **2** Long conidiophore and short conidiophores. **3** Long conidiophores. **4–8** Conidia bearing distal setulae and basal setula (*arrow*). **9** Germinating conidium on water agar (WA). **10** Fascicled short conidiophores at the base of long conidiophore. **11** Percurrent proliferation of long

conidiophore through the collarette (*arrow*) of a phialide. **12** Short conidiophore. **13** Conidiophores with white conidial masses on natural substratum. *Bars* **2, 3** 100 μ m; **4–8** 10 μ m; **9, 11** 20 μ m; **10, 12** 50 μ m; **13** 250 μ m

Table 1. Synopsis of described *Nawawia* and *Phialosporostilbe* species including *P. gregariiclava*

Species	<i>N. dendroidea</i>	<i>N. filiformis</i>	<i>N. nitida</i>	<i>P. setosa</i>	<i>P. turbinata</i>	<i>P. gregariiclava</i>
Conidiophores	Synnemata; 350–800 × 25–50 µm Cylindrical	Solitary; 90–280 × 5–7 µm Cylindrical ^a ;	Solitary; 25–75 × 4–6.5 µm Doliiform;	Synnemata; 140–440 × 13–30 µm Cylindrical to cylindrical-clavate; 22–45 × 5–7 µm Inconspicuous	Synnemata; 150–320 × 10–13 µm Cylindrical, lageniform or spatulate; 18–35 × 4.7–5.2 µm –	Long 137.5–270 × 5–6.5 µm; Short 55–120 × 2.5–5 µm Cylindrical; 25–42.5 × 6–10 µm 1–2 × 2.5–4.5 µm
Conidiogenous cells	Conspicuous and slightly convergent	20–40 × 5–7 µm Distinct ^b	15–28 × 10–12 µm 4–7 × 8–11.5 µm	–	–	–
Collarette	–	–	–	–	–	–
Conidia	–	–	–	–	–	–
Size (µm)	10–12 × 8–10	13–18 × 14–18	29–35 × 20–26	Tetrahedral; 5–7.5 Drop-shaped; 2–3.5 –	8.5–11.5 × 7–8 –	8–13 × 8–12.5 –
Basal width (µm)	1.5–2.5	1.5–2.5	3.5–4	–	–	About 2.5
Appendages	3(–4) distal; 4–8 × 0.5 µm	3(–4) distal; 15–34 µm	3–4 distal; 38–74 × 1–2 µm	3 distal and 1 basal	3 distal and sometimes 1 basal ^c	3 distal; 2.5–5 × 0.5 µm 1 basal; 1–3 × 0.5 µm
Reference	Hyde et al. (1996)	Kuthubutheen et al. (1992)	Kuthubutheen et al. (1992)	Bhat and Kendrick (1993)	Mercado and Mena (1985)	Present study

^a Interpreted from plate 41 in Nawawi (1973)^b Nawawi (1973)^c Bhat and Kendrick (1993)

Etymology: from Latin *gregarius* and *clava*, in reference to the fasciculate claviform conidiophores of this fungus.

Holotype: on dead culms of *Sasa nipponica*, Shiretoko mountain pass, Rausu, Menashi-gun, Hokkaido (145°06' E, 44°03' N) 740m a.s.l., Sept. 8, 2003, K. Tanaka and S. Hatakeyama (HHUF 28190), deposited in the Herbarium of the Faculty of Agriculture and Life Science, Hirosaki University, Fungi (HHUF).

Other materials examined: on dead culms of *Sasa kurilensis*, Matsuo, Iwate-gun, Iwate-Pref. (140°55' E, 39°56' N), Aug. 17, 2003, Y. Ooki (HHUF 28189); on dead culms of *S. nipponica*, Notsukehuren Park, Bekkai, Notsuke-gun, Hokkaido (145°14' E, 43°31' N), Sept. 8, 2003, K. Tanaka and S. Hatakeyama (HHUF 28191). Culture: MAFF 239277 from holotype. Dried culture specimen: grown on straws of *Oryza sativa* L., Dec. 2, 2003, from MAFF 239277 (HHUF 28226).

Cultural characteristics: Conidia germinated by producing one or more germ tubes on water agar (WA) at 20°C in a 12-h photoperiod with fluorescent light in 2 days. Colonies on potato dextrose agar were lanose, white (1A1) or gray (1D1) at the center, velvety and white (1A1) toward the margin, 35–38mm in diameter in 20 days, diffusing yellow (2A8) pigment in the medium. Sporulation occurred abundantly at the margin of V-8 juice agar (V8A) discs placed on WA at 20°C in a 12-h photoperiod in 10 days. On rice straw agar (Tanaka and Harada 2003), small numbers of conidiophores with conidia were produced on the rice straw in 20 days.

On the V8A discs submerged in sterile distilled water, the fungus produced numerous conidia within 10 days and made the water muddy by the conidia in 20 days.

Notes: The genus *Phialosporostilbe* was erected by Mercado and Mena (1985) based on *P. turbinata* Mercado & J. Mena. Since then, the secondary species, *P. setosa* Bhat & W.B. Kendrick, was described (Bhat and Kendrick 1993), and this genus consists of the two species. The genus *Phialosporostilbe* resembles the genus *Nawawia* Marvanová because of having similarities in conidial morphology (colorless, tetrahedral shape, and presence of appendages) and monophialidic conidiogenesis (Wu and McKenzie 2003). The synopsis of described *Nawawia* and *Phialosporostilbe* species including the new fungus is shown in Table 1. These two genera may be congeneric (Hyde et al. 1996) and need a serious reassessment (Bhat and Kendrick 1993).

Although we support the opinion of Hyde et al. (1996), it is proper that the present species is assigned to *Phialosporostilbe* for the time being, because both genera are still accepted as separate, and further our fungus has a conidial basal setula that is found in *Phialosporostilbe* species but not in three described *Nawawia* species, *N. filiformis* (Nawawi) Marvanová, *N. nitida* Kuthub., G.M. Liew & Nawawi, and *N. dendroidea* K.D. Hyde, Goh & Steinke (Nawawi 1973; Marvanová 1980; Kuthubutheen et al. 1992; Hyde et al. 1996).

The two types of conidiophores and a conidial basal setula of the present species are stable features because these were repeatedly confirmed in cultural observations. *Phialosporostilbe gregariiclava* differs from previously

described *Phialosporostilbe* species, synnematous *P. turbinata* and *P. setosa*, by having the two types of mononematous conidiophores and larger conidia (Table 1). Microconidia, such as seen in *P. setosa*, were not found in our fungus. *Nawawia dendroidea* has similar size conidia ($10\text{--}12 \times 8\text{--}10\ \mu\text{m}$; Hyde et al. 1996) as compared with this fungus ($8\text{--}13 \times 8\text{--}12.5\ \mu\text{m}$), but the former has synnematous conidiophores and its conidia are lacking a basal appendage (see Table 1).

Phialosporostilbe gregariclava produced conidia abundantly on V8A colony disks submerged in sterile distilled water, in spite of the fact that it was originally collected on land in the mountains. The Shiretoko mountain pass, type locality of this species, is a foggy location in summer (Editorial Committee of the History of Rausu Town 1970). In this environmental condition, the fog and dew on the host plant might supply this fungus with water by which the conidia could easily be dispersed. Therefore, it may adapt to any aquatic habitats as a terrestrial aquatic hyphomycetes (Ando 1992). The hosts of *P. gregariclava*, *P. setosa*, and *P. turbinata* are *Sasa*, *Ochlandra*, and *Arthrostylidium*, respectively. These plants all belong to Bambusaceae, and therefore the new species also has some ecological similarities with already known *Phialosporostilbe* species.

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