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A new entomopathogenic species, *Hymenostilbe furcata*, parasitic on a hemipteran nymph in northern Thailand

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Abstract—*Hymenostilbe furcata* sp. nov., parasitic on a hemipteran nymph in a northern Thailand forest is described and illustrated. Its morphology is compared with that of other species with forked denticles.

Key words—hyphomycete genus

Introduction

The entomopathogenic hyphomycete genus *Hymenostilbe* was introduced by Petch (1931) to accommodate *H. muscarium* Petch, a species parasitic on dipteran insects. It was described as having cylindrical synnemata covered by a hymenium-like layer of conidiogenous cells (Samson & Evans 1975). It was later found to be the anamorph of *Cordyceps forquignonii* Quél. (Petch 1948). *Hymenostilbe* species can be distinguished from *Akanthomyces* species, also parasitic on insects and spiders, as the conidia of *Akanthomyces* form in chains on phialides, while those of *Hymenostilbe* are solitary, polyblastic and form on a denticle (Petch 1932c, Mains 1950, Samson & Evans 1975). *Akanthomyces*

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and *Hymenostilbe* produce synnemata that are more or less cylindrical and often are somewhat attenuated towards the apex. In *Hymenostilbe* the synnemata are composed of more or less parallel, longitudinal hyphae, usually forming a compact bundle. The longitudinal hyphae produce conidiogenous cells at their ends, especially in the upper portions of the synnemata. Most of the conidiogenous cells, however, are produced either as lateral cells or frequently as terminal cells of short lateral branches produced along the entire length of the outer hyphae of the synnemata. This results in a hymenial layer that covers the surface of the synnemata. In most species there is abundant production of conidiogenous cells resulting in a compact hymenial layer. In some species the conidiogenous cells are scattered and well separated from each other (Mains 1950).

Samson & Evans (1975) reviewed *Hymenostilbe* accepting nine species and excluding 11 doubtful species. *Hymenostilbe* species parasitize arachnids and dipteran, orthopteran and hymenopteran insects. *Hymenostilbe longispora* Samson & H.C. Evans is commonly found on several ant species of the subfamilies Ponerinae and Myrmicinae. *H. ghanensis* Samson & H.C. Evans was collected on a spider. Several species of *Hymenostilbe* have been associated with a *Cordyceps* teleomorph. For instance, *H. dipterigena* Petch is the anamorph of *Cordyceps dipterigena* Berk. & Broome (Petch 1932a), *H. nutans* Samson & H.C. Evans is the anamorph of *C. nutans* Pat. and *H. fragilis* Petch is the anamorph of *C. uleana* Henn. (Petch 1932b). Three species of *Hymenostilbe* have been recorded in Thailand; *H. ventricosa* Hywel-Jones was rarely found as an entomopathogen of cockroach nymphs (Hywel-Jones 1995), while *H. aurantiaca* Hywel-Jones was found on formicine ants in the same location as *C. cf. myrmecophila* Ces. (Hywel-Jones 1996).

Based on the previous records and distinctive morphological characteristics, the fungus described in this paper is accommodated in *Hymenostilbe* as a new species.

Materials and methods

A general survey of entomopathogenic fungi was carried out in northern Thailand forests from May to October 2005. The collection sites included in this survey were Mushroom Research Centre (MRC), Doi Suthep National Park, Mokfa Waterfall and Toung Jaw Village, Chiang Mai. Soils, litter, herbaceous plants, and tree leaves were examined for dead insects, which were collected and transported the same day to the laboratory in plastic containers for identification and isolation. Conidial isolations were made on potato dextrose agar (PDA). The holotype is deposited in Thai Mycological Association Herbarium (TMAH).

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Taxonomic description

Hymenostilbe furcata Aung, J.C. Kang, Z.Q. Liang, Soyong & K.D. Hyde sp. nov.

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FIGURES 1-2

Synnemata multiplicata, oriunda corpa, alba, cylindrica, 10-14 mm longa, 94-120 µm crassa. Cellulae conidiogenae 5-18 × 3.5-6.5 µm, polyblasticae, clavata vel cylindrica, sursum denticulis furcatis 0.6-2.4 µm longis dense obtectae. Conidia solitaria, levia, hyalina, fusiformis, 8.5-15 µm longa, 3- 4.5 µm crassa.

Etymology: The species name refers to the forked sterigmata-like projections from the conidiogenous cells.

Holotype: Thailand, Chiang Mai, Mae Taeng, T. Pa Pae, Bahn Pha Daeng, 128 Moo 3, Mushroom Research Centre, from hemipteran nymph (Hemiptera) attached to the underside of a leaf in forest, 25 June 2005, Ohnmar Myo Aung TMAH 0002.

Synnemata slender, 10-14 mm long, 94-120 µm wide, arising from head and thorax of insect, cylindrical, white; central core of parallel hyphae composed of cells 3-55 × 2.5-4 µm; covered by an outer hymenium-like layer of conidiogenous cells with basal cells 7.5-20 × 2.5-5 µm. Conidiogenous cells 5-18 × 3.5-6.5 µm, polyblastic, clavate or cylindrical, apically with 2-7 furcellate denticles, 0.6-2.4 µm. Conidia 8.5-15 × 3- 4.5 µm, solitary, smooth, hyaline, fusiform.

Unfortunately, attempts to culture *H. furcata* on agar were unsuccessful.

Discussion

Species in the entomopathogenic genus *Hymenostilbe* are rarely encountered in the tropics (Hywel-Jones 1995). *Hymenostilbe furcata* was collected only once on a hemipteran nymph in the rain forests in Thailand. It can be separated from *H. sulphurea* and *H. nutans*, which also occur on hemipteran insects, by the creamy white synnemata and the two to seven, forked denticles on the conidiogenous cells. *Hymenostilbe sulphurea* Samson & H.C. Evans has sulphur-yellow synnemata and subglobose to ellipsoidal, rough-walled conidia, while *H. furcata* has smooth, fusiform conidia. *Hymenostilbe nutans* has fusoid conidia but they are smaller than those of *H. furcata* (6-10 × 3.2-4 µm vs. 8.5-15 × 3-4.5 µm). The conidiogenous cells of *H. furcata* are clavate or cylindrical while those of *H. nutans* are cylindrical, apically pointed and the denticles are crowded at the apex. The conidiogenous cells of *H. furcata* are 5-18 µm long × 3.5-6.5 µm wide, whereas those of *H. nutans* are 15-24 µm long × 4.5-6.5 µm wide. Those of *H. sulphurea* are cylindrical to clavate, 15-25 × 5-6.5 µm and the denticles are crowded at the apex (Samson & Evans 1975).

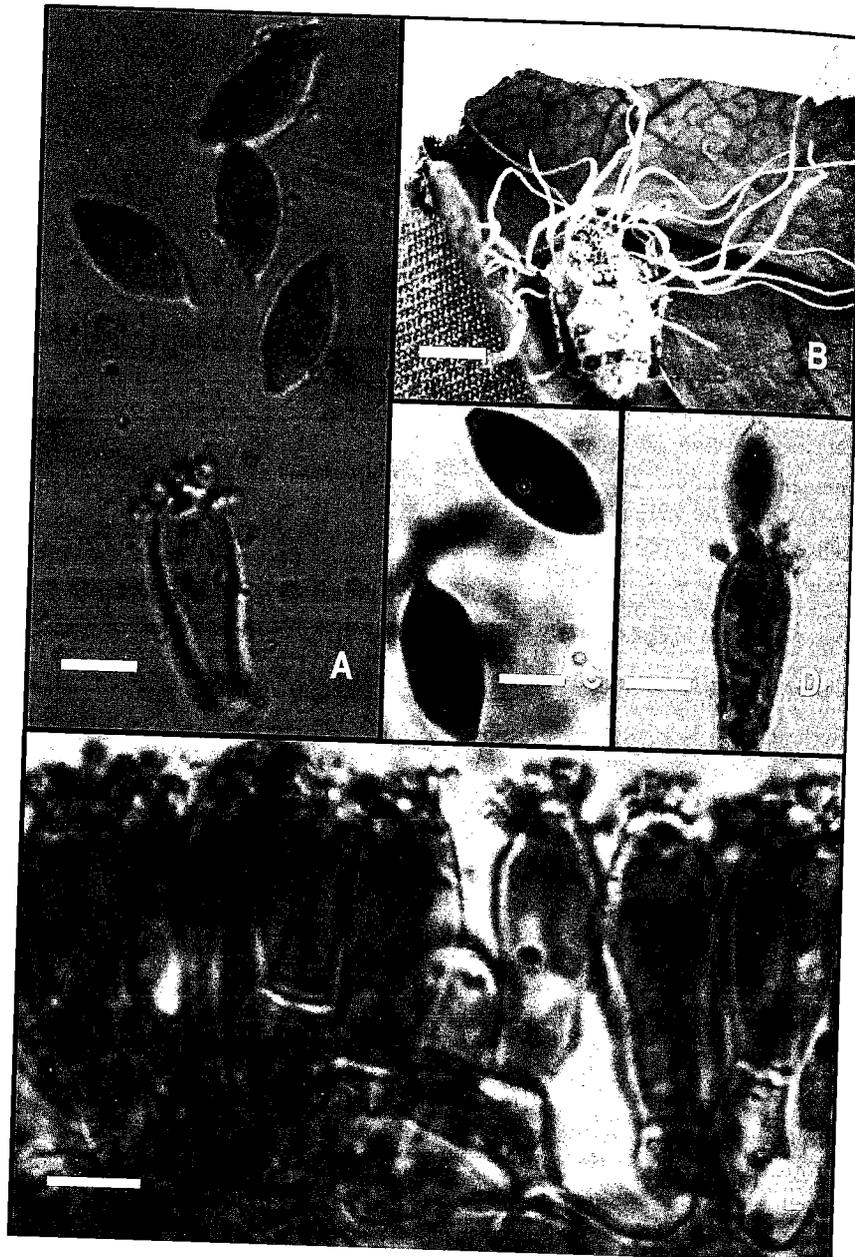


Fig.1: *Hymenostilbe furcata* (from holotype). A. Detached conidia. B. Infected hemipteran insect with synnemata. C. Conidia. D. Conidiogenous cell with forked denticles and conidium. E. Conidiogenous cells forming a hymenium-like layer. Scale bars: A, C, D & E = 5 μ m, B = 5 mm.

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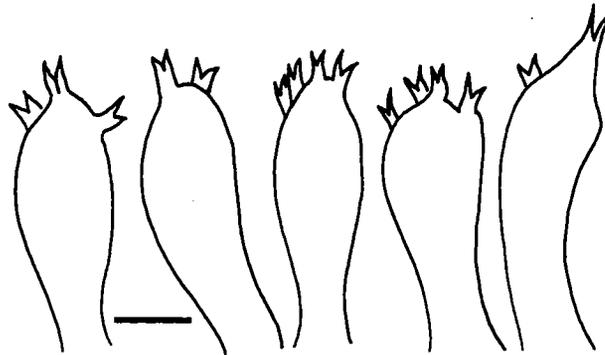


Fig. 2: Conidiogenous cells of *Hymenostilbe furcata* (from holotype).
Scale bar = 5 μ m.

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B. Infected hemipteran denticles and conidium.
D & E = 5 μ m, B = 5 mm.