NOTE

Saxicoloous species of the lichenized fungal genus *Porina* (Ascomycota; Porinaceae) new records and a key to species in Thailand

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ABSTRACT: Species of the genus *Porina* can grow on various substrates, including siliceous rocks. This study focuses on saxicolous species, including two new records for Thailand; *P. leptalea* and *P. nucula*. Ten species of *Porina* were found in Thailand and a key to the identification of the species is provided.

KEY WORDS: Asia, *Porina bellendenica*, *Porina guentheri*, *Porina leptalea*, *Porina mastoidea*, *Porina nucula*, Saxicolous.

INTRODUCTION

The genus *Porina* belongs to the family Porinaceae occurring worldwide, but with a center of diversity in tropical rainforest regions. Species of the genus can grow on different substrates such as rock, bark and leaves (Lücking, 1996; 2004; 2008; Lücking and Malcolm, 1997; Lücking and Vezda, 1998; McCarthy, 1993, 1994, 1999, 2003, 2013; McCarthy and Kantavilas, 1993; McCarthy and Malcolm, 1997; Vongshewarat et al., 1999; Santesson, 1952). Saxicolous species of *Porina* are known from numerous localities in both hemipheres (McCarthy, 1993, 1999; Vongshewarat et al., 1999). In Thailand eight saxicolous *Porina* species were reported (Aptroot et al., 2007; Buaruang et al., 2017; Boonpragob et al., 1998; McCarthy 1999; Wolseley et al., 2002). In our study we found two additional species not previously recorded from Thailand and a key to the identification of saxicolous species occurring in Thailand is provided.

MATERIALS AND METHODS

This study is mainly based on new collections made by the first author deposited in MSUT and F. Sections of thalli and perithecia were cut using a razor blade and examined in water, a solution of KOH, and Lugol’s solution using a ZEISS Axioscope 2 plus compound microscope. Measurements of algae, thallii hyphae, paraphyses, involucrellum, exciple and ascospores were made at by 400 and by 1000 magnifications. Chromatography (HPTLC) was performed with the standard solvent systems A and C (Culberson 1972; Arup et al., 1993).

RESULTS AND DISCUSSION

Two species of *Porina* are new records for Thailand; *P. leptalea* and *P. nucula*. *Porina leptalea* is distinguished by having 3-septate ascospores and dull orange-brown to red brown perithecia. *Porina nucula* is rarely found on rocks and can be recognized by its 9-septate, 65–70 µm long ascospores. Saxicolous species occurring in Thailand can be identified using the following key.

Key to the species of genus *Porina* in Thailand

1a. Ascospores muriform, narrowly ellipsoid to fusiform, 45 by 80 µm long ……………………………………… 2. *P. eminentior*
1b. Ascospores transversely septate …………………………………… 2.
2a. Ascospores 3-septate ……………………………………… 3.
3a. Perithecia hemispherical to subglobose, 0.15–0.25 mm diam., dull orange-brown to red brown ………………… 5. *P. leptalea*
3b. Perithecia 0.25–0.35 mm diam., greenish black … 8. *P. siamensis*
4a. Ascospores 5–9-septate …………………………………… 5.
4b. Ascospores 15–septate, 32–56 µm long, perithecia in verrucae ……………………………………… 1. *P. bellendenica*
5b. Ascospores 9-septate, 32–83 by 18–16 µm, perithecia immersed in hemispherical to subglobose ………………… 7. *P. nucula*
6a. Ascospores 6.5–20 µm wide …………………………………… 7.
6b. Ascospores 3.5–7.5 µm wide ………………………… 8.
7a. Ascospores 50–70 µm long with thick gelatinous sheath ……………………………………… 6. *P. mastoidea*
7b. Ascospores 28–56 µm long without gelatinous sheath …………………………………………………………… 10. *P. wolseleyae*
8a. Perithecia 0.4–0.8 mm diam, verrucae convex to hemispherical, thallus rimose to areolate with isidioid structures ………… 9. *P. tetracerae*
8b. Perithecia 0.2–0.4 mm diam, hemispherical to subglobose, thallus without isidia ……………………………………… 9.
9a. Perithecia semi–immersed, concolorous with or paler than the perithecial apex ……………………………………… 4. *P. kansriae*
9b. Perithecia superficial, black, apex round, exposed perithecia ……………………………………… 3. *P. guentheri*

TAXONOMIC TREATMENT

1. *Porina bellendenica* Müll.Arg., Hedwigia 30: 56 (1891) Figs. 1A–B

A description of this species is found in Wolseley et al., (2002).
Fig. 1. Morphology of saxicolous *Porina* in Thailand. A and B: *Porina bellendenica*, C and D: *Porina guentheri*, E. and F: *Porina leptalea*, G and H: *Porina mastoidea*, scale bar = 1 mm.
Secondary chemistry: No lichen substance detected by HPTLC.

Distribution: Found only once in a dry evergreen forest, at 191 m.

Specimen examined. Thailand. Uttaradit Province, Lablae district, Mae Phun waterfall, 17°43′51″N, 99°58′38″E, dry evergreen forest, on sandstone, 14 Jun. 2016, Naksuwankul 11990 (MSUT).

   Descriptions can be found in Wolseley et al., (2002) and Aptroot et al., (2007).

3. Porina guentheri (Flot.) Zahlbr., Cat. Lich. Univ. 1: 384 (1922)
   Figs. 1C–D
   A description was provided by Aptroot et al., 2007.
   Secondary chemistry: No lichen substance detected by HPTLC.
   Distribution: Found in a lower montane rainforest, at 1,365 m.
   Specimen examined. Thailand. Loei Province, Phu Rua district, Phu Rua National Park, natural trail, 17°51′39″N, 101°39′64″E, Alt. 1,365 m, lower montane rainforest, 14 Jun. 2016, Naksuwankul 10039 (MSUT).

   A description was given by McCarthy 1999.

   Figs. 1E–F
   Ascospores 3-septate, 17.5–25 by 3.75–5 μm, without gelatinous sheath, perithecia hemispherical to subglobose, 0.15–0.25 mm diam., dull orange-brown to orange-red brown, exposed perithecia.
   Secondary chemistry: No lichen substance detected by HPTLC.

   Figs. 1G–H
   A description can be found in Wolseley and Aguirre–Hudson 1997a, 1997b; Boonpragob et al., 1998; and Wolseley et al., 2002.
   Secondary chemistry: No lichen substance detected by HPTLC.
   Distribution: Dry evergreen forest, between 450 and 1,202 m.
   Specimen examined. Thailand. Phitsanulok Province, Nakhon Thai district, Romklao-Pharadon waterfall, 16°59′49″N, 101°1′44″E, Alt. 1,202 m, lower montane rainforest, 8 Oct. 2016, Naksuwankul 11980 (MSUT). Loei Province: Phu Rua district, Phu Rua National Park, natural trail, 17°51′39″N, 101°39′64″E, Alt. 1,365 m, lower montane rainforest, on sandstone rock, 14 Jun. 2016, Naksuwankul 10032 (MSUT). Si Sa Ket Province: Khaanharalak district, Khao Phra Wihan National Park, natural trail to Phu La Or waterfall, 14°77′98″N, 101°61′21″E, Alt. 450 m, dry evergreen forest, on sandstone rock, 8 Jun. 2016, Naksuwankul 10075 (F), Naksuwankul 10082-10086 (MSUT).

   Figs. 2A–B
   A description can be found in Wolseley and Aguirre–Hudson 1997a, 1997b; Boonpragob et al., 1998; and Wolseley et al., 2002.
   Secondary chemistry: No lichen substance detected by HPTLC.
   Distribution: Dry evergreen forest and lower montane rainforests, between 840 and 1,360 m.
   Specimens examined. Thailand. Phrae Province, Tat Mok National Park, Tat Mok waterfall (Mae Khaem waterfall), 18°33′N, 101°28′E, Alt. 840 m, dry evergreen forest, on sandstone, 18 Jun. 2016, Naksuwankul 12001 (MSUT). Nan Province: Pua district, Doi Phu Kha National Park, Silaphet waterfall, 19°19′79″N, 101°08′13″E, Alt. 1,830 m, lower montane rainforest, on sandstone, 15 Jun. 2016, Naksuwankul 12020 (MSUT).

Fig. 2. Morphology of saxicolous Porina in Thailand. A and B: Porina nucula, scale bar = 1 mm.
   The description was provided by McCarthy 1999.

   A description of this species can be found in Boonpragob et al., (1998) and Wolseley et al., (2002).

10. **Porina wolseleyae** P.M. McCarthy, Lichenologist 31: 244 (1999)
    For a description see McCarthy (1999).

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**LITERATURE CITED**


