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Usnea baileyi (Stirt.) Zahlbr, a new record for Karnataka, India

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ABSTRACT

Usnea baileyi (Stirt.) Zahlbr, a new record for Karnataka, India, is described. This is characterized by the corticolous thallus with isidia, hollow central axis and red pigmented medulla.

INTRODUCTION

Lichens are known to humans for hundreds of years finding a place in their daily life either being consumed as food materials or sources of drugs to cure diseases (Malhotra *et al*. 2007; Upreti *et al*. 2005; Zambare and Christopher 2012). One such lichen genus *Usnea* belongs to family Parmeliaceae, which is a popular fruiticose lichen represented by almost 300 species around the globe (Ohmura 2012). According to Singh and Sinha, 60 species of *Usnea* has been reported from India (Singh and Sinha 2010). Temperate and high altitude regions in Northern India, such as Eastern and Western Himalaya along with the Western Ghats are lichen biodiversity hotspots in the country (Upreti *et al*. 2005). *Usnea* is the fifth largest lichen genera in India which is mostly found growing on varieties of trees (corticolous) and rarely on rocks (saxicolous). First Monograph on this genus was published by Motyka in 1938, where genus *Usnea* was divided into 6 subgenera (*Lethariella* Motyka, *Chlorea* (Nyl.) Motyka, *Protousnea* Motyka, *Neuropogon* (Nees & Flot.) Motyka, *Euusnea* Jatta. and *Eumitria* (Stirt.) Motyka), later most of which became independent genera (Motyka 1938). The presence of the central axis is one of the most important identifying anatomical features of this genus. Anticancer compound usnic acid is universally found in *Usnea* species (Trease and Evans 1983; Zugic *et al*. 2016). In our search for *Usnea* samples for an ongoing bioprospection study in Karnataka, we found *U. baileyi,* which turned out to be a first report of the species from the state. Previously *U. sinensis* Mot, *U. eumitrioides* Mot. and *U. aciculifera* Vain has been reported from Karnataka (Vinayaka *et al*., 2012). This article gives an account of a new distributional report on *U. baileyi*.

MATERIAL AND METHODS

The lichen thalli were collected in the month of June 2018 from Western Ghats region of Karnataka (Muthodi Road, Chikmaglur, Karnataka, India, Altitude: 1076 ± 5.7 mt, GPS: 13° 22.997′ N, 75° 39.162′ E). Thalli were found hanging from a toddy palm (*Borassus flabellifer*) growing on the roadside. For identification of lichen sample, morphological and anatomical features were analyzed using a stereo-zoom microscope (Leica S8 APO, Germany) and compound microscope (Leica DM 500, Germany), respectively. In addition to morpho-anatomical features, chemical characteristics of thallus were tested by spot tests and thin-layer chromatography (TLC) employing solvent system A, i.e., toluene: dioxane: acetic acid (180:45:5) (Orange *et al*. 2001). TLC plate was also observed under UV to check the presence of fluorescent compounds if any. Horizontal and longitudinal sections were examined to calculate C:M:A (cortex: medulla: axis) ratio. The detailed taxonomic analysis was carried out at CSIR-National Botanical Research Institute (NBRI), Lucknow, following

Awasthi (Awasthi 2007). Identified samples were preserved in the herbarium of CSIR-NBRI, Lucknow (LWG).

Taxonomic Treatment

Thallus fruticose, corticolous, suberect to pendulous, to 13 cm in length, greenish grey, dichotomously branched, diam. 1.32 mm; % C:M:A: 1.6:1.5:6.8; transversally cracked at intervals; fibrils, pseudocyphallae and isidia present; soredia absent; central axis tubular (centrally hollow) (Figure1); medulla red-pigmented; apothecia absent.

Chemistry

Cortex and medulla K+ red, C-, P+ orange, UV-salazinic, norstictic, usnic acid, and unknown substance at R_f class 5 detected in TLC.

U. baileyi is a rich source of various phytochemicals including several secondary metabolites like depsides, depsidones, and xanthones (Din *et al*. 2010; Ramesh *et al*. 1994; Yang *et al*. 1973). Recently, two new compounds bailexanthone and bailesidone have also been reported from *U. baileyi* (Van Nguyen *et al*. 2018).

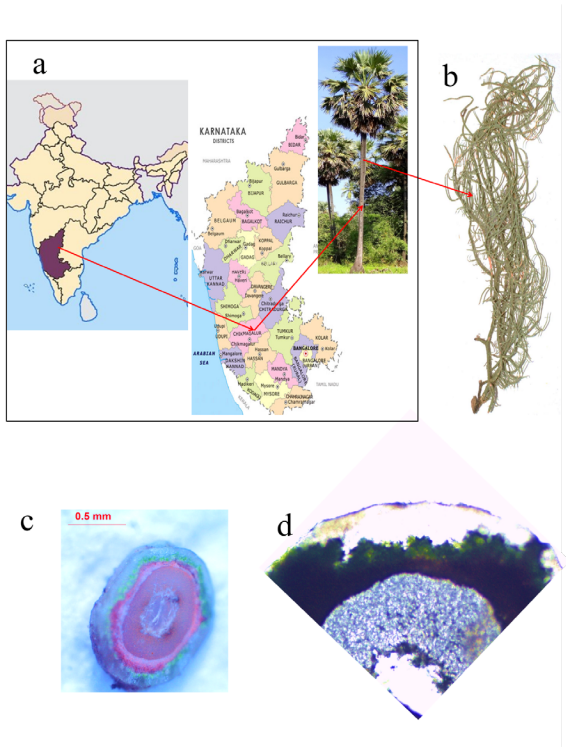

Figure 1 *U. baileyi* (Stirt.) Zahlbr. **a**. map location of the toddy palm *B. flabellifer* from which *Usnea baileyi* (Stirt.) Zahlbr was collected, **b**. *U. baileyi* (Stirt.) Zahlbr habit, **c**. cross section in stereoscopic zoom in (scale 0.5 mm), **d**. microscopic (10X) view of the thallus showing green algal layer within cortex in close association with red pigmented layer in medullar region and hollow central axis

Remarks

Being corticolous in nature, *U. bailey* is parallel to most of the other *Usnea* sp. in its habitat. Similar to *U. baileyi*, other *Usnea* sp. from tropical Andes and Galapagos islands region have been reported to contain red-orange pigmentation in the medullar region (Truong *et al*. 2011). The invariable presence of red pigmentation has also been observed in *Usnea* sp. like *U. fragilis* Stirt. and *U. austro-indica* G. Awasthi (Shukla 2015). As mentioned by Alix *et al*. (1984), pigment imparting molecules in *U. baileyi* are bisxanthones (like eumitrin). A thicker and hollow axis is present in *U. baileyi* (present investigation); similar observation has been made in a study by Truong *et al*. (2013), where % CMA of 3.5/1.5/90 in case of *U. antillarum* (Vain.) Zahlbr confirms the presence of wider axis in *Usnea* spp. Salazinic and norstictic acid have been traced in the medulla of eumitrioid species *U. subflaveola* (Truong *et al*. 2013), while usnic acid which imparts the yellow-green color to thallus is present in all the *Usnea* species e.g., *U. baileyi (*this study) and *U. implicita* (Stirt.) Zahlbr (Ohmura, 2001).

Ecology and Distribution

This species was found growing on the trunk of the toddy palm tree from the Chikmagalur district of Karnataka. Earlier, the species was known from Arunachal Pradesh, Assam, Kerala, Manipur, Meghalaya, Nagaland, Sikkim, Tamil Nadu (Nilgiri and Palni Hills), West Bengal (Darjeeling district) states of India, China, Indonesia, Japan, Malaysia, Papua New Guinea, Taiwan, Thailand, Nepal, Central and South America, Africa, Philippines, and Australia (Singh and Sinha 2010). This is a new report for Karnataka.

Specimen examined

India, Karnataka, Chikamaglur, elev. 1076 m, N13°22.997′; E75°39.162′, the bark of toddy palm, 07 June 2018, *Swati Joshi s.n*. Acc. No. 35532 (LWG).

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