



**Short communication**

## New addition to lichen flora of Uttar Pradesh, India

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[Accepted: 11 March 2016]

[Cite as: Gupta N, Gupta V & Dwivedi SK (2016) New addition to lichen flora of Uttar Pradesh, India. *Tropical Plant Research* 3(1): 153–156]

The lichen taxa collected from Uttar Pradesh are documented in different checklist, floristic, monographic and revisionary studies (Awasthi, 1980, 1988, 1991, 2000, 2007, Srivastava, 2004, Dubey *et al.* 2007, Singh & Sinha 2010, Karakoti *et al.* 2014, Gupta *et al.* 2015). Recently Nayaka & Upreti (2013) analyzed the status of lichen diversity in Uttar Pradesh which revealed the occurrence of 135 species belonging to 46 genera and 25 families.

This state represented three distinct phytogeographical regions. The transitional belt running along the entire length of the state of Uttarakhand and country of Nepal is called the “Terai” and ‘Bhabhar’ area and have thick forest cover, swamps and marshes. The Gangetic plain elongates the area from east to west is the most fertile as well as agricultural land. The southern fringe of the Gangetic Plains is demarcated by the Vindhya Hills and Plateau exhibit strong ground and low hills. Most of the central region of the state of Uttar Pradesh is most fertile and utilized for agriculture from the ancient time. The region is devoid of forest, however, mango orchards are quite common and provide suitable habitat for many lichen taxa to colonize.

The present investigation is carried out with an aim to document the lichen diversity pattern in mango orchards of Gangetic plain. Three districts of this phytogeographical zone *viz.* Faizabad, Ambedkar Nagar and Raebareli have been selected to conduct the present study. The identification of the lichen samples collected revealed occurrence of five species as new addition to the lichen flora of the state.

The mango orchards in and around Tanda Thermal Power plant, Ambedkar Nagar (lies between coordinates 26°33'00" N and 82°39'00" E); Feroz Gandhi Unchahar National Thermal Power Plant Corporation, Raebareli (between coordinates 25°49' to 26°36' N and 100°41' to 81°34' E and Faizabad district (situated at the latitude 26°47'N and longitude 82°12' E) was surveyed for collection of lichens.

The collected specimens were identified by their morphological, anatomical and chemical characters and specimens were preserved in the herbarium of CSIR-National Botanical Research Institute, Lucknow (LWG). The LABOMED dissecting microscope was used for external morphology study while LEICA ATC 2000 compound microscope was used for microscopic anatomical details. The samples were mounted in water, 10% KOH and Lugol's solution. Measurements of asci and ascospores were made on material examined in KOH. The colour test and Thin layer chromatography (TLC) of acetone extracts was performed using solvent system A and C, followed by Orange *et al.* (2001), Culberson (1972) and Walker and James (1980). The microscopic measurements were based on mature ascomata and are recorded for their minimum and maximum values.

### Species description

1. *Anisomeridium subnexum* (Nyl.) R.C. Harris, *More Florida Lich.* (New York):150. 1995. (Fig. 1A)

≡ *Arthopyrenia subnexa* (Nyl.) Müll. Arg. *Hedwigia*. 30: 188. 1891. (Monoblastiaceae)

Thallus corticolous, crustose, yellow-grey, smooth, shining sometimes powdery, endophloeodal. Ascomata solitary, 0.25–0.45 (0.50) mm diam., (0.10–) 0.15–0.20 mm high, convex- hemispherical, globose completely covered with thallus or naked around ostiole and black; ostiole indistinct, plane or sometimes slightly depressed; centrum I-; pseudoparaphyses branched, anastomosed; asci cylindrical clavate, 8-spored (90–) 100–16×15–22 µm, uniseriate or rarely biseriate; ascospore colourless, 1-septate, 23–27×(7–) 9–11 µm, oblong-ellipsoid, both cells equal in size, slightly constricted at septum, epispore to 1 µm thick. Pycnidia not seen. Thallus K-, C-, KC-, P-, no lichen substance upon TLC.

**Remarks:** Hue (1892) reported this species from Andaman and Nicobar Islands and later recorded from Madhya Pradesh and Karnataka (Upreti and Pant, 1993). The species is rare in the area, as it is known from a single locality from the outskirts of the district Faizabad.

**Specimen Examined:** Faizabad district: Azamgarh road, Purabazar, Barauli, on tree trunk of *Mangifera indica*, 19<sup>th</sup> March, 2014, V. Gupta. 014-022614 (LWG).

**2. *Arthothelium chiodectoides*** (Nyl.) Zahlbr., *Cat. Lich. Univ.* 2: 122. 1922.

(Fig. 1B)

≡ *Arthonia chiodectoides* Nyl. *Flora* 52: 72. 1869. (Arthoniaceae)

Thallus corticolous, crustose, most of the part endophloeodal, 88–166 µm thick; ascomata yellowish brown to dark blackish-brown, K-, punctuate, aggregated, covered with effuse thalline layer or naked; epithecium dark blackish-brown; hymenium pale brown 100–185 µm tall, I+ blue; hypothecium dark blackish-brown; asci butinicate, obovate to pyriform; paraphysoids profusely branched and anatomosed, strongly coherent; ascospore 8/ascus, hyaline, muriform, ovate to oblong, transversely 7 to 9-septate, vertically 1 to 3-septate, upper most cell larger, undivided, 28–36×3–5 µm.

Chemistry: No chemical tested. Triterpenes detected upon TLC.

**Remarks:** This species is reported from Arunachal Pradesh, Goa, Himachal Pradesh, Karnataka, Maharashtra, Sikkim and West Bengal. This species colonize on the bark of *Mangifera indica*, *Azadirachta indica* and *Litchi chinensis*. Now, for the first time it is reported from Uttar Pradesh.

**Specimens Examined: Faizabad district: Azamgarh road:** Rajepur, on tree trunk of *Mangifera indica*, 19<sup>th</sup> March, 2014, V. Gupta. 014-022610 (LWG); Purabazar, Jilla ka Purwa, on tree trunk of *Mangifera indica*, 19<sup>th</sup> March, 2014, V. Gupta. 014-022615 (LWG). **Sultanpur road:** Khanpur, 6 km. away from the city, on bark of *Litchi chinensis*, 20<sup>th</sup> March, 2014, V. Gupta. 014-022656 (LWG); Bikapur, Sukan rai ka purwa, on bark of *Mangifera indica*, 20<sup>th</sup> March, 2014, V. Gupta. 014-022659 (LWG). **Gonda road:** Nawabganj, Ghuse ka purwa, on tree trunk of *Mangifera indica*, 21<sup>st</sup> March, 2014, V. Gupta. 014-022707 (LWG); Birapur, on bark of *Azadirachta indica*, 21<sup>st</sup> March, 2014, V. Gupta. 014-022708 (LWG). **Raebareli road:** Ranibazar, Roadside, on tree trunk of *Mangifera indica*, 22<sup>nd</sup> March, 2014, V. Gupta. 014-022731 (LWG); Barun bazaar, Mahaveer Mishra ka purwa, on tree trunk of *Mangifera indica*, 22<sup>nd</sup> March, 2014, V. Gupta. 014-022740 (LWG).

**3. *Bacidia medialis*** (Tuck. ex Nyl.) Zahlbr., *Denschr. Kaiserl. Akad. Wiss., Wien, Math.- Naturwiss. Kl.* 83: 127. 1909.

(Fig. 1C)

≡ *Lecidea medialis* Tuck. Zahlbruckner's *Cat. Lich. Univ.* 4: 221. (Ramalinaceae)

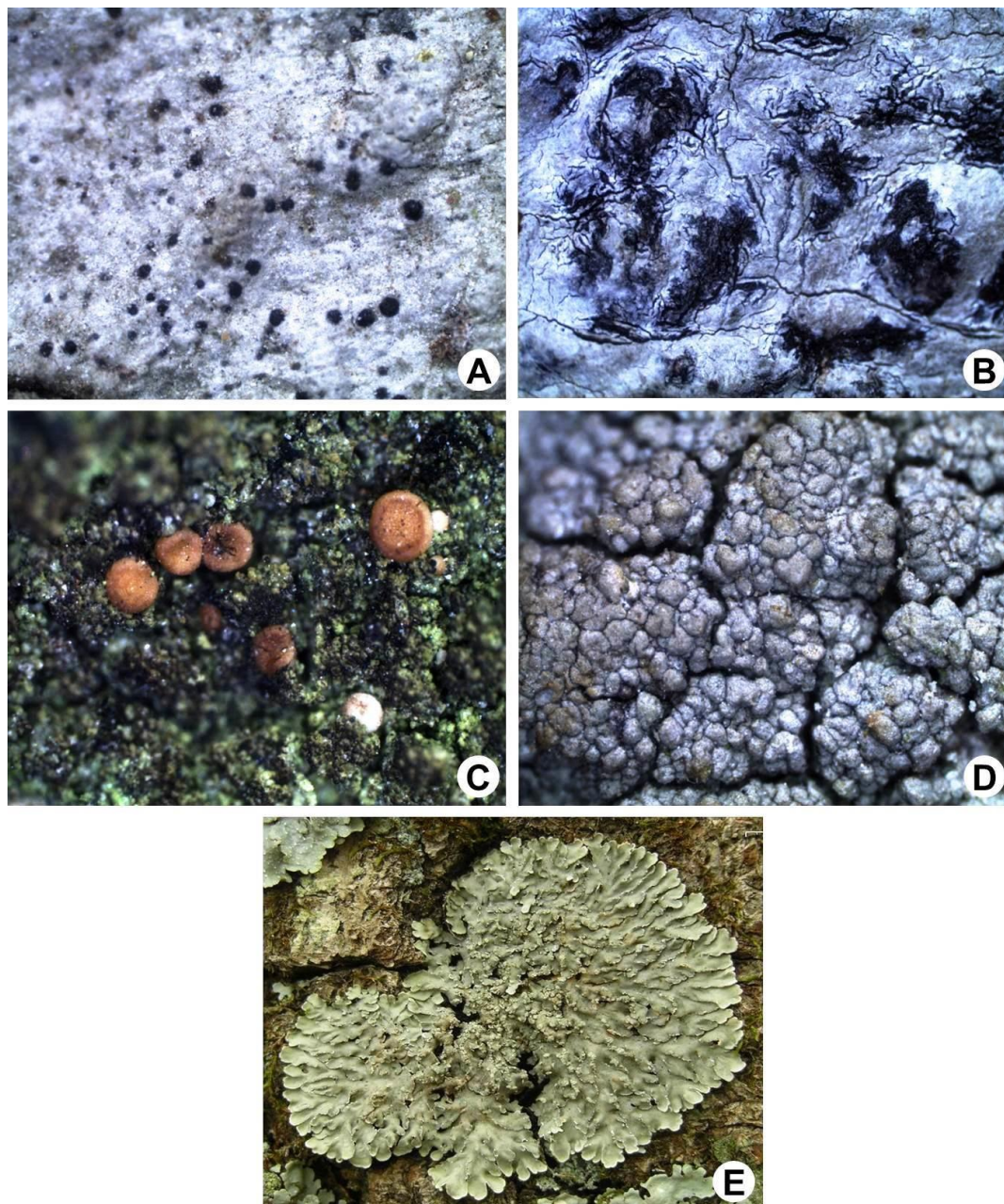
Thallus corticolous, crustose effuse, rough, cracked, granulose-furfaraceous, greyish brown to grey, 50–70 µm thick, Apothecia constricted at base, 0.2–0.5 mm in diam., over mature apothecia sometimes split up into lobes, sometime glomerulose aggregation of 3–4 apothecia, disc yellow brown, brown to red brown, plane to convex, epruinose, margin entire, distinct, pale yellow to pale brown and later excluded exciple colourless to pale, 36–70 µm thick at margin, K- epithecium colourless to pale brown, 10–12 µm thick, K-; hymenium 40–70 µm thick, I+ blue than vinose red; hypothecium colourless to pale yellow, 16–30 µm thick, K; spores rod shaped with both end rounded, rarely one ends narrower than the other, transversely (1-)3–5 septate, 16–32×2.4–3.2 µm; paraphyses simple to branched, thickened at apices. Thallus K-, C-, KC-, P-, no lichen substance upon TLC.

**Remarks:** This species is also known from Himanchal Pradesh, Kerala, Lakshadweep, Orissa, Tamil Nadu and West Bengal plains. The lichen species grows on the bark of *Mangifera indica* and *Artocarpus heterophyllus*.

**Specimens Examined: Faizabad district: Azamgarh road:** Bhikhapur, Shankargarh bazaar, on bark of *Mangifera indica*, 19<sup>th</sup> March, 2014, V. Gupta. 014-022604 (LWG); Darshan nagar, Sirsanda, on tree trunk of *Mangifera indica*, 19<sup>th</sup> March, 2014, V. Gupta. 014-022611 (LWG); Purabazar, Madna, on bark of *Artocarpus heterophyllus*, 19<sup>th</sup> March, 2014, V. Gupta. 014-022631 (LWG); Sarai Rasi, on bark of *Artocarpus heterophyllus*, 19<sup>th</sup> March, 2014, V. Gupta. 014-022632 (LWG). **Sultanpur road:** Near J.N.V., Dhabha Semar, on bark of *Mangifera indica*, 20<sup>th</sup> March, 2014, V. Gupta. 014-022651 (LWG); Bikapur, Burma, on bark of *Ficus racemosa*, 20<sup>th</sup> March, 2014, V. Gupta. 014-022665 (LWG); Bikapur, Sukan rai ka purwa, on bark of *Artocarpus heterophyllus*, 20<sup>th</sup> March, 2014, V. Gupta. 014-022666 (LWG). **Gonda road:** Birapur, on bark of *Mangifera indica*, 21<sup>st</sup> March, 2014, V. Gupta. 014-022710 (LWG). **Raebareli road:** Usroo, on bark of *Mangifera indica*, 22<sup>nd</sup> March, 2014, V. Gupta. 014-022728 (LWG); Barun, Vill- Kiharan, on tree trunk of *Mangifera indica*, 22<sup>nd</sup> March, 2014, V. Gupta. 014-022744 (LWG); Barun, Roadside, on bark of *Madhuca longifolia*, 21<sup>st</sup> March, 2014, V. Gupta. 014-022745 (LWG). **Lucknow road:** Near Sohawal, Masoomganj, on



bark of *Mangifera indica*, 23<sup>rd</sup> March, 2014, V. Gupta. 014-022790 (LWG); Raunahi, on tree trunk of *Mangifera indica*, 23<sup>rd</sup> March, 2014, V. Gupta. 014-022791 (LWG).



**Figure 1.** Lichen thallus of different species: **A**, *Anisomeridium subnexum* (Nyl.) Zahlbr.; **B**, *Arthothelium chiodectoides* (Nyl.) Zahlbr.; **C**, *Bacidia medialis* (Tuck.) Zahlbr.; **D**, *Pertusaria granulata* (Ach.) Müll. Arg.; **E**, *Pyxine sorediata* (Ach.) Mont.

**4. *Pertusaria granulata*** (Ach.) Müll. Arg., *Flora, Regensburg*. 68 (12): 259. 1885. **(Fig. 1D)**  
 ≡ *Porina granulata* Ach., *Syn. Meth. Lich.*: 112. 1814. (Pertusariaceae)

Thallus corticolous, verrucose whitish grey to greenish grey, fertile verrucae with perithiceoid apothecia, fertile verrucae; constricted at base; verrucose on surface, asci and spores not seen as the ascocata are immature. Thallus K+ yellow, C-, KC-, P-; Atranorin and Perlatolic acid detected upon TLC.

**Remarks:** The species was previously reported from Karnataka, Kerela and Tamil Nadu. It is rare in the area, as it is collected from a single locality in the outskirts of the district growing on *Mangifera indica*.

**Specimens Examined:** **Faizabad district: Raebareli road:** Masodha, Kadipur. on bark of *Mangifera indica*, 22<sup>nd</sup> March, 2014, V. Gupta. 014-022756 (LWG).

**5. *Pyxine sorediata*** (Ach.) Mont. in Sagra, *Hist. Phys. Cuba*, Bot. Pl. Cell. 2: 188. 1842. **(Fig. 1E)**  
 ≡ *Lecidea sorediata* Ach., *Syn. Meth. Lich.* : 54. 1814. (Physciaceae)

Thallus corticolous, foliose; lobes 1.0–2.0 mm broad, pearl- white to light grey or dull yellow, branching sub dichotomous, tightly or loosely adnate to the substrate; pseudo-cyphellae well developed along the margins but rare on the lamina; pruina restricted to the lobe tips; soredia coarse, grey. Medulla yellow or light yellow, the soralia which may be on marginal isidia- like lobules. Apothecia very rare, internal stipe colourless to pale brown, K-; ascospores 12–17×6–8 µm. Thallus

K+ yellow; medulla, K-, Pd-, triterpenes at 4-5 detected upon TLC.

**Remarks:** The species is known from Arunachal Pradesh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Manipur, Nagaland, Sikkim, Tamil Nadu, Uttarakhand and West Bengal. The species is rare as it is known from two different localities in the outskirts of Tanda and near to Unchahar thermal power plants growing on *Mangifera indica*.

**Specimens Examined:** Ambedkar Nagar district, Tanda thermal power plant, Rajesultanpur road, Ismailpur beldaha, Heerapur, on bark of *Mangifera indica*, 02<sup>nd</sup> April, 2015, N. Gupta 015-031723 (LWG); Raebareli district, Unchahar thermal power plant, Manirampur, on tree trunk of *Mangifera indica*, 13<sup>th</sup> August, 2013, N. Gupta. 013-023711 (LWG).

#### ACKNOWLEDGEMENTS

The authors are thankful to the Head, Department of Environmental Science, BBAU, Lucknow, Director, CSIR-NBRI, Lucknow for providing laboratory facilities and Dr. D. K. Upreti, Head, Lichenology Laboratory, CSIR-National Botanical Research Institute, Lucknow for the identification of lichen taxa. One of the authors (Namita Gupta) is grateful to University Grant Commission, New Delhi for financial support by providing Junior Research Fellowship.

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