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A Report on Some Lichens New to Ranchi, Jharkhand, India

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ABSTRACT

The present work describes the occurrence of five lichen species from Ranchi, Jharkhand for the first time. The species belong to four families (Caliciaceae, Parmeliaceae, Teloschistaceae, Chrysotrichaceae) and represents four growth forms of lichens found growing on rock and trees. These species are *Dirinaria consimilis*, *Parmotrema reticulatum*, *Caloplaca cinnabarina*, *Chrysothrix candelaris* and *Parmoterma tictorum*. Brief morpho-taxonomic details of all the five species have been dealt with their ecology and distribution.

1. Introduction

There is a large number flora and fauna in our living world, Lichen is one of them [1]. It is a composite organism consisting of a fungus and a photosynthetic alga or blue-green alga (cyanobacteria) which lives in partnership [2]. The photosynthetic partner manufactures food for the whole lichen and the fungus provides a stable, protective environment for alga [3]. The fungus forms the main body of the lichen, and in most cases, the alga lies sandwiched between upper and lower fungal layers [4]. Lichen are widely used as environmental Bio-Indicator. Lichen provide warming signal before several damages occur on ecosystem and health [5].

Ranchi is the capital of the state of Jharkhand situated at 23°22' E with average elevation of 651 m above sea level. Ranchi has a hilly topography and its dense tropical forest. The state of Ranchi is covered with 139 Sq.Km dense forest which providing suitable niche for luxuriant growing of epiphytes, Lichen, Mosses, Pteridophytes on tree trunks and branches. The state of Jharkhand lies between latitude 22°00'– 24°37' N and longitude 83°5' –87°01' E and tropical dry deciduous forests. According to satellite data of Oct.-Dec. 2006, the forests cover is 28.72% of state's geographic area. The climate of the district is warm and humid. Three distinct seasons are felt during the year. Rainy season (mid of June till October), winter (mid of October to February) and summer (March to mid of June). The annual rainfall is varying from 1420 mm to 1450 mm. The average temperature ranges from 37 °C to 19 °C. Hills, serene environment of dense forest, picturesque river valleys and mountain peaks with ancient shrines are further characteristic features of the district [6].

2. Experimental Methods

The lichen samples were collected from surveying different locality and habitat of Ranchi, Jharkhand during the year 2015 to 2016 (Fig. 1). The collection and curation of lichen specimens for herbarium preparation by standard method of Awasthi. They were identified by studying their external and internal morphology following the key of Awasthi [7].

Colour reaction on the thallus and apothecia were tested by colour spot test. The colour tests were carried out on cortex and medulla of the thallus. Thin layer chromatography (TLC) was done. Finally the lichen substances were identified following the procedures of Orange [8, 9] Identified lichen specimens are housed at the Herbarium, University Department of Botany, Ranchi University, Ranchi.



Fig. 1 Map of the study area (Ranchi, Jharkhand, India)

3. Results and Discussion

The present study enumerates the five lichen species first time reported as new additions to the lichen flora of Ranchi, Jharkhand. *Dirinaria consimilis*, *Parmotrema reticulatum*, and *Chrysothrix candelaris* grow on bark of trees at height 5-6 feet, 7-8 feet and 5-6 feet respectively. *Parmoterma tictorum* and *Caloplaca cinnabarina* have Saxicolous growth form, while *Parmotrema reticulatum* have a foliose growth. *Dirinaria consimilis*, *Caloplaca cinnabarina*, *Chrysothrix candelaris* belong to the family Caliciaceae, Teloschistaceae, and Chrysotrichaceae respectively while *Parmotrema reticulatum*, *Parmoterma tictorum* belongs to the family Parmeliaceae. The brief species description of each species with their ecology and distribution is mentioned below.

3.1 *Dirinaria consimilis* (Stirt.) Family- Caliciaceae [10]

Specimen examined: July 2015, at the height of 5-6 feet on bark of *Pongamia* tree. (23°38'37.50" N 85°32'38.27" E) Boreya Kanke, No.RU/Bot/Li001 (Fig. 2). Isidia and soredia are absent, 4–12 cm corticous thallus wide, lobate. Lobes, are convex but often concave towards the tips, 0.5-2.0 mm wide, upper surface grey, Medulla white in the upper part, Lower surface black in the centre, pale brown at the margins. Hypothecium dark brown to brown, Spot tests - Cortex K+ yellow, C-, KC-, P+ yellow; medulla K-, C-, KC-, P-, This species usually occurs on monsoon. This species is characterized by presence of sekikaic acid and the dactyls that burst open to become granulose and sorediate. Substrate and ecology- grows on bark, wood or rocks.

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Fig. 2 Image of *Dirinaria consimilis* sample



Fig. 3 Image of *Parmotrema reticulatum* sample

3.2 *Parmotrema reticulatum* (Nysl.) Family- Parmeliaceae [11]

Specimen examined: August 2015, Tegore Hill Ranchi on the lower of the hill, (23°27'37.76" N 85°30'134.21" E) Ranchi, Jharkhand, No. RU/Bot/Li002 (Fig. 3). *Parmotrema reticulatum* is a foliose thalli, Corticolous or saxicolous 15 cm, Lobes 4-10 mm wide, ciliate, upper surface grey to darker, densely white maculate, maculate eventually reticulately fissured; soralia either capitates on short lacinules of palmate lobes or marginal to sub-marginal on rounded or involute lobes, Lower surface: centrally black, marginal zone white mottled or brown and nude or lower side black, rhizinate upto the margin, medulla white. Apothecia are rare, perforate ascospores presence of sekikaic acid. Spot test: medulla K+ yellow turning red, C-, P+ orange-red. Secondary metabolites is salazinic acid and consalazinic acids. Substrate and ecology: on trees also on rocks.

3.3 *Caloplaca cinnabarina* (Ach.) Family- Teloschistaceae [12]

Specimen examined: September 2015, Tagore Hill, Ranchi, Jharkhand (23°40'26.76" N 85° 33'77.47" E). Saxicolous, No. RU/Bot/Li003 (Fig. 4).



Fig. 4 Image of *Caloplaca cinabarina* sample

Thallus is crustose, margin abrupt at edge or slightly lobed or notched, without elongated lobes. Prothallus are absent, smooth surface, cortex are 14-28 μm thick, granules absent, margin present but not proper, epihymenium golden in colour, K+ red, H-, 10% N hymenium: hyaline 40-55 μm tall, paraphyses not swollen or 1-2 tip cells slightly swollen, not branched or with few branches, subhymenium hyaline, asci are cylindrical, 8-spored ascospores: hyaline, 2 locules, ellipsoid, 4 μm , isthmus 3 μm . Pycnidia totally immersed, ostiole orange. Spot tests: margin of apothecia K+ red; thallus K+ red, H-, 10% N, Secondary

metabolites: parietin, fallacinal, emodin, teloschistin, and parietinic acid. Substrate and ecology: on non-calcareous rocks.

3.4 *Chrysothrix candelaris* (L.) Family- Chrysothricaceae [13]

Specimen examined: July 2016, Ranchi, Jharkhand. (23°40'12.56" N 85° 33'81.31" E) Substratum, on the bark of *Ficus virens* tree at height 5-6 feet. No. RU/Bot/Li004 (Fig. 5).



Fig. 5 Image of *Chrysothrix candelaris* sample

Thallus is crustose, unstratified in thick specimens, surface are bright yellow in colour, often with an orange or greenish tinge, composed of a mass of fine soredia, 12-30 μm , Medulla usually not evident, in thick thalli sometimes indistinctly present, yellow superficial disc: pale orange, often yellow-pruinose margin is thin, ecorticate, exciple is poorly developed, epihymenium is hyaline: hyaline, hymenium, up to 40 μm tall (including epihymenium); paraphysoides: 1-1.5 μm wide, richly intertwined in epihymenium; hypothecium is colorless, poorly developed asci clavate, 8-spored, Spot tests: K- or K+ orange, sometimes darkening to red-black, C, KC-, P- or P+ orange. Substrate and ecology: on bark, wood, stone in dry and shaded microhabitats.

3.5 *Parmotrema tictorum* (despr.ex. nyl.) Family- Parmeliaceae [14]

Specimen examined: August 2016, Tegore hill Ranchi, Jharkhand (23° 36'42.56" N 85°28'42.42" E). saxicolous, lower of the hill. No. RU/Bot/Li005 (Fig. 6).



Fig. 6 Image of *Parmotrema tictorum* sample

Thallus is foliose, loosely adnate, 3-20 cm, lobate, lobes are subirregular, elongate, slightly imbricate, plane, separate, 10-20 mm wide; apices: rotund, becoming crenate and dissected with age, ciliate, cilia up to 2.0 mm long, upper surface: gray, smooth, dull centrally, shiny marginally, emaculate, finely reticulately cracked with age, simple isidia to coralloid branched, frequently very dense, sometimes apically ciliate, common, laminal to marginal; soredia and pustulae are absent, medulla is white with continuous algal layer, lower surface black with brown naked zone peripherally, rhizines are simple, disc are brown, usually imperforate, Spot tests : upper cortex K+ yellow, C-, KC-, P-, medulla K-, C+ red, KC+ red, P-, Secondary metabolites: upper cortex with atranorin and chloroatranorin; medulla with lecanoric acid (major). Substrate and ecology: usually on trees in open habitats, rarely on rocks.

4. Conclusion

Ranchi is potential area for the growth of Lichens, but there are less scientific studies in this field, so it is urgent to explore identification and Documentation the species of lichen for their proper conservation and equitable biological resources.

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