

Additions to the cryptogamic lichen biota from the Republic of India from Tamil Nadu

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Research Article

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Abstract

The population diversity of lichen species was studied by the family multiplicity in different sites from various lichen growth forms from the Eastern Ghats, Western Ghats, and the Coastal regions of Sedhu Samuthra, Coramantal and Madras Marina in Tamil Nadu state of the Indian Republic. There are 3,005 lichen taxa and subspecies known from the Indian subcontinent. So far, 938 species have been discovered within the geographical boundaries of Tamil Nadu, making it the state with the second-highest diversity of cryptogamic lichens. This collection was found to contain 150 species from 65 genera, among which 41 species were introduced for the state, regional, and national lichen biota. From the ten substrata, Corticolous was the most adhesive and adorable habitat for lichen(s) growth, with 149 taxa, followed by Lignicolous (143), and the fewest lichen species were grown on Lichenicolous (10) and Foliicolous (09). About the study, we include 3 species that were new records for Indian country, 11 species that are new to the Tamil Nadu State lichen biota, 15 species for the Western Ghats biodiversity hotspot, 12 species for Southern India, and Marine lichens. 16 species were new to the Megamalai Tiger Reserve Forest from Cumbum valley. Among the collected species, the common (vernacular) name of the lichen(s) was included. Due to the richness and abundance of natural diversity, the population ecosystem must be explored using artificial intelligence and technology-based customised studies for the benefit of future generations' learning and research.

Introduction

Biological organisms are classified based on their physical and chemical apparatuses using binomial nomenclature (Murariu 1745). Carolus Linnaeus coined the term "lichen" (Aikin 1777). His student and lichenology's father proposed lichen dictionaries and systematic studies (Linnaeus 1753; Acharius 1803; Gray 1821; Koerber 1855). Based on classical approaches, the organisms classified by biologists and biochemists belong to the fungal kingdom (Lindsay 1859; Nylander 1864; Lindsay 1872; Vainio 1890; Peirce 1900). William Nylander introduced the classification under the groups of crustose, foliose, and fruticose (Schneider 1904; Lindau 1923; Zahlbruckner 1926). So far, 29,000 lichen-forming fungal species have been reported from 1753 to 2020 (Lücking et al. 2021). The systematic standards were used to describe a lichen compendium (Awasthi 1957; **Ahmadijian 1967**; Hale 1974). In India, Paulney hills (Kodaikanal) and the Himalayas were distributed with lichens in even density (Awasthi 1981). The lichen flora of British India contained 447 Indian species during the subcontinent's independence (Biswas 1947). The collaboration is explored with 1310 taxa in the Catalogue of Lichens of India, Sri Lanka, and Pakistan (Awasthi 1965). The updated checklist of the country's political boundaries with micro- and macro-lichens included 2303 taxa as of 2010 (Singh and Sinha 2010). So far, approximately 3005 lichen species from 84 families and 468 genera have been distributed across eight lichenogeographical regions (**Sinha 2021**; Rajaprabu et al. 2021; Rajaprabu and Ponmurugan 2022). Among 28 states, Tamil Nadu is the second-most lichen species-populated state ever, which is due to a large track of Western and Eastern Ghats and conducive climatic conditions (Dalip Kumar et al. 2015). Lichens have been discovered from the Indian Ocean to the Kanchenjunga peak, not only in large numbers but also for their potential to benefit ecosystems. Lichenological research and related studies in India, with ongoing support from members of the Indian Lichenological Society for lichen systematics and population studies (Sanjeeva and Dalip Kumar 2021). Countless consecutive lichens each year, harvested from different mountains and territories around the world and used for organisational and industrial production purposes, naturally lead to the extinction of lichens. In addition, various conservation strategies have been put in place to protect the forest and other endangered species of lichens from natural disasters and prevent extinction. The most important part of this is to fix it through the artificial development of endophytes and lichen diversity and to raise awareness about it.

Diversity And Distribution Of Lichens

Lichens are interdependent creatures consisting of symbiotic fungi and algal photosynthetic organisms (Acharius 1798). Ascomycetes (90%), anamorphic fungi, and Basidiomycetes comprised this cryptogam group (Lücking et al. 2021). The most common photobionts in lichens are green (phycobionts) and blue-green algae (Cyanobacteria or cyanobionts). Eukaryotic and prokaryotic photosynthetic partners were also found in the lichen thallus. Among the twenty thousand lichens, around 90% of them were green algae only; the remainder are cyanobacterial species. Photosynthetic partners have not been reported yet, with 40 genera and 15 blue-green algal species reported so far (Hawksworth 1990). Parasitic lichens are one of the ridiculously widespread groups of lichenized fungi in an ecosystem. Linnaeus pioneered the systematic enumeration of lichen diversity in India. However, in the twentieth century, lichen exploration was interacting through Sangam types of literature (Hurd-Mead 1933; Gilbert 2000). One of the

primary colonizers' lichens was contributing to soil formation through the secretion of a wide array of secondary metabolites and the developmental pressure of lichen thalli on rocks and stones.

Materials And Methods

Study area

The periodic surveys had been conducted in different agroclimatic regions such as the Southern Western Ghats, the Northern Eastern Ghats, the coastal regions of the Indian Ocean, and the Bay of Bengal in Tamil Nadu, India, which covered both terrestrial and coastal ecosystems. The seasonal fluctuations in lichen growth ranges were studied from December 2017 to December 2021. The areal or spatial classification of lichens' distribution was determined based on their diversity (Fig. 1). To assess lichen population diversity and density, including individual genus and species richness, the selected agroclimatic regions were classified based on the nature of habits and habitats (Map 1 and Annexure Table 1).

Table 1
Area-wise description of the study area in Tamil Nadu state with respect to lichen population distribution

S. No	Study area	English name	Type of Landscape	Specification	Latitude (North)	Longitude (East)	Altitude (meters Above mean Sea level)	Total area (Sq. Km)
1.	Nilgiris hills	Blue Mountain	Tropical evergreen forest	Nilgiris Biosphere Reserve (NBR)	10°38' to 11°49'	76°0' to 77°15'	900 to 2,636	2,552.50
2.	Maruthamalai hills	Termilnalia Hill	Dry deciduous and mixed type of forest	Bolampatti Reserve Forest	11°03'55.8" to 11°01'27.5"	76°54'25.6" to 76°46'24.7"	350 to 1,150	152.35
3.	Valparai (Annamalai hills)	Tail Mountain, Poonachimalai	Tropical evergreen forest	Anamalai Tiger Reserve	10°13' to 10°31'	76°52' to 77°23'	800 to 2,287	958.59
4.	Paulney hills	Kodaikanal	Tropical evergreen forest	Forest conservation area, Tourist point	10°08'07.6" to 10°28'53.5"	77°18'10.7" to 77°45'26.5"	750 to 2,533	2,068
5.	Megamalai hills	Green Valley, Cloud mount	Tropical evergreen forest	Megamalai Tiger reserve forest, Sriviliputhur squirrel sanctuary	9°32'05.1" to 9°46'10.6"	77°22'06.1" to 77°35'08.6"	650 to 2,250	269.10
6.	Sirumalai hills	Little mountain	Tropical evergreen forest	Artificially created lake, Sanjeevani Hills, Agastya Puram (Monk Agastya), Silver Hills	10°12'14.1" to 10°14'33.1"	78°07'33.6" to 77°54'32.3"	800 to 1600	200
7.	Servarayan hills	Eastern Hills	Tropical forest	One of the old coffee plantations, Orchidarium and sanatorium	11°50'34.1" to 11°50'58.1"	78°13'01.0" to 78°13'56.8"	605 to 1,650	400
8.	Kolli hills	Sidhar Hills, Monk's hill	Tropical forest	Ariyur Shola, silver-oak estates, Wil life fauna with many endangered species such as Python molurus and more	11°11'54.2" to 11°24'49.9"	78°16'42.8" to 78°29'16.2"	700 to 1,400	280
9.	Madras Marina Beach Coastal area	Bengal Coast	Seashore area	Andhra Pradesh coastal line to Mahabalipuram	13°18'19.5" to 12°36'56.0"	80°12'17.6" to 80°21'38.8"	0 to 120	2,750
10.	Rameshwaram Coastal area	Sedhu Samudra	Seashore area	Island (Gandhamathana Parvatham, Dhanushkodi, Kachchatheevu) southernmost Island of the Indian Ocean	9°08'54.7" to 9°16'39.7"	79°12'11.2" to 79°27'04.9"	0 to 85	100.05

Collection, Identification, And Deposition Of Voucher Lichen Specimens

Lichen samples were collected from ten different agroclimatic zones in Tamil Nadu, India, for the present study on various living and non-living substrates covering different habits and habitats using secateurs, a stainless-steel knife, a chisel, and a hammer. The collected lichen materials were packed in handmade paper covers and relocated from fields to a laboratory for further analysis (Ahmadjian 2012). The collected lichen samples were examined with respect to morphology, anatomy, biochemical tests (colour spot tests), and thin layer chromatography (TLC) analysis. Morphological characters of lichen specimens were studied under a dissecting microscope (MSZ-TR), and the photographs were taken with the help of a Canon Cyber-shot camera. Lichen thalli and apothecia (fruiting body) hand-cut sections were made and mounted in distilled water and KOH (potassium hydroxide) mounts, and measurements of asci, ascospores, and conidia were undertaken as per the procedure of Orange et al. (2001). The colour spot tests were made on the thallus, medulla, and cortex using 5% KOH solution, undiluted commercial bleach, and paraphenylene diamine (0.5 g) dissolved in ethanol (5 ml). Lugol's iodine solution, with and without pre-treatment with KOH, was focused on the medulla. A few of the lichen specimens were examined under the UV cabinet with a 254 nm wavelength for identification (Awasthi 2007).

The lichen substances were determined using micro-crystallography techniques and TLC methods, in which relative frequency (*Rf*) classes and their values were calculated (Culberson and Kristinsson 1970). The classification of lichens and their *taxa* was followed by the methods of Schneider (1905). The classification of lichens from the genus to species level was confirmed by the Species Fungorum and Index Fungorum websites. The nomenclature of lichen species was followed by a comparison in the Index of Fungi, Faces of Fungi, and Mycobank (Sanjeeva and Dalip Kumar 2021). The chemo-syndromic analysis of lichen samples was confirmed by accessing LIAS metabolite techniques (Lücking et al. 2021). All the collected lichen samples were air dried and stored in herbarium sample packs as per the procedure of Obermayer (2002). The identified lichen voucher specimens were deposited as herbarium samples at the National Cryptogamic Herbaria (LWG), Lichenological Laboratory, National Botanical Research Institute, Lucknow, Uttar Pradesh, India, and the Lichen Herbarium, Biomedical Research Laboratory, Department of Botany, Bharathiar University in Coimbatore, Tamil Nadu, India, for future reference as repository specimens.

Identification Of Lichen Photobionts

The various growth forms of lichens were studied based on morphological, anatomical, and biochemical methods at study areas in terms of genus and species richness. Anatomical sections of lichen thalli, apothecia, and other superficial propagules embedded in the thallus were sectioned using scalpel blades and razors. A transverse section of anatomical parts of lichen thalli was placed under the microscope with an enormous amount of distilled water to assess the association of phycobionts and mycobionts (Ahmadjian 1967). Using currently available keys and published research articles, the morphological characteristics and colour of lichen thalli aided in their identification. The diameter of mature algal cells and texture of algal filaments (phycobionts), including fungal (mycobiont) characteristic features, were documented using a Leica storeroom microscope attached to a Zeiss camera. The photobionts of all the lichens were isolated and cultured in PG11 algal medium, which subsequently identified them up to genus level (Tscheramak-Woess 1989).

Statistical analysis

The results were expressed as the mean SD in each group. The significance of differences between groups, treatments, and replications was determined using one-way ANOVA in PAST3 software (Gomez and Gomez 1984). Graphical images were predicted in Raw Graph 2, an online statistical programme.

Results

Diversity of Lichens in Tamil Nadu State, India

The lichen sample collections were made from different ecosystems such as the Western Ghats, Eastern Ghats, and coastal regions (Madras Marina Beach and Rameswaram) of Tamil Nadu, India, for the present study from the period of November 2017 to December 2021, covering living and non-living substrates. Periodically, the survey of lichen distribution in terms of species richness was conducted in ten different localities with the guidance of tribal people and the Forest Department of the Tamil Nadu State Government. The lichen species occurred on different living and non-living substrates, as habitat occurrence was shown in Table 2

and Fig. 2. The results indicated that there was a positive correlation between lichen distribution and the nature of lichen adherence and host specificity.

Table 2

shows the distribution of lichens in different habitats in Tamil Nadu's Eastern Ghats, Western Ghats, and Coastal Ecosystems.

S. No	Substrate specificity	Nature of Habitat	Nos. of Lichens	Lichen species of Occurrence (%)
1.	Rock and stone	Saxicolous	69	46.00
2.	Soil	Terricolous	35	23.33
3.	Tree trunk	Corticolous	149	99.33
4.	Twigs	Ramicolous	117	78.00
5.	Leaves	Foliicolous	09	06.00
6.	Mosses	Muscicolous	23	15.33
7.	Stripped bark	Lignicolous	143	95.33
8.	Other species of lichen	Lichenicolous	10	06.67
9.	Unusual substrates or manmade artefacts.	Plasticolous	35	23.33
		Metallicolous	28	18.66

All the lichen samples have been mentioned with their common names, of which a few were indicated by their generic names (Figs. 3 and 4). Only two lichen species, *Tephromela atra* and *Trypethelium eluteriae*, lacked regional or common names as of today. The results indicated that lichen samples collected from various experimental sites had different species richness and family-wise diversity present in both living and non-living substrates. The observations on lichen distribution and habitat richness showed that all lichen species have grown in the corticolous and lignicolous habitats of the Western Ghats and Eastern Ghats ecosystems of Tamil Nadu, India. Apart from that, unusual substrates such as plastic (plasticolous) and ferric (metallicolous) components supported the growth of lichens due to their good adhesive capacity, tolerance ability, and substrate specificity. Around 150 of the identified lichens belonged to the Corticolous genus. Lignicolous lichens numbered around 143, while Ramicolous lichens numbered around 117. The most lichen populations were found in Lichenicolous (6.67%) and Folicolous (6.0%).

Muscicolous, the other cryptogamic habitat, was recorded with 15.33% (23 species), which is less than the natural habitats, Saxicolous (49%, 69 species), and Terricolous (23.33%, 35 species). Plasticolous and ferricolous, two unusual non-living manmade substrates, were identified as 35 and 26 taxa, respectively, in tropical and subtropical areas such as Cloud Mount, Paulney Hills, and Little Mount in both the Eastern and Western Ghats. There were 150 lichen species from different types of lichen thalli collected from various ecosystems, of which the largest number of collections were made from the crustose with 66 species, the foliose with 55 species, and the fruticose with 19 species (Table 3). Six species of leprose lichen, three species of squamulose lichen, and two species of fibrous lichen were among the lichens found. Within the foliose growth forms, only five cyanolichens were observed, all belonging to the Collemataceae family. The results were further recorded that, referring to the habits and lichen species richness based on Alexander Zahlbruckner's classical taxonomy, Lecanorals had the highest number of 59 lichen species, followed by 32 in Caliciales and 24 in Ostropales, in a total of ten orders. The observation indicated that one Candalariales, two Trypetheliales, and each of the five species in the following orders—Pyrenulales, Pertusariales, and Teloschistales—were illustrated. There were nine species of Peltigerales and eight species of Arthoniales identified at the experimental sites. They were classified according to family, and there was a total of 26 families, with the Parmeliaceae having the most (32 lichen species) and the Graphidaceae having the least (18 lichen species). Moderately, a total of 12 lichen species were counted in Ramalinaceae and Physciaceae members, seven in Lecanoraceae, five each in Pyrenulaceae, Teloschistaceae, and Collemataceae, and four each in Stereocaulaceae, Pertusariaceae, and Arthoniaceae in the experimental sites. The results also showed that each of the 12 lichen species in Ramalinaceae and Physciaceae members was counted moderately: seven lichen species in Lecanoraceae; five each in Pyrenulaceae, Teloschistaceae, and Collemataceae; and four each in Stereocaulaceae, Pertusariaceae, and Arthoniaceae. Figure 5 illustrated that, based on generic lichen taxonomy, out of a total of 66 genera, the maximum number of species richness recorded was *Graphis* (15), followed by

Parmotrema (12), *Ramalina* (8), *Pyxine* (7), and *Lecanora* (6) species. The other lichen genera, such as *Dirinaria*, *Leptogium*, and *Usnea*, had five species each. *Heterodermia*, *Pertusaria*, and *Pyrenula* exhibited four species each, and *Lepraria* and *Bulbothrix* had only three species each. The results further showed that a sum of 16 lichen families had two species richnesses, and 37 lichen genera had only one species each.

Table 3
shows the abundance of lichens in the Western and Eastern Ghats ecosystems of Tamil Nadu, India.

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
1.	<i>Allographa hossei</i> (Vain.) Lücking & Kalb.	Scribble Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
2.	Ⓞ <i>Allographa polystriata</i> (Makhija, A. Dube) Lücking & Kalb.	Scribble Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
3.	§ <i>Amandinea submontana</i> Marbach	Button Lichen	Caliciaceae	Caliciales	Cr	Co	Paulney Hills
4.	<i>Anthracotheicum macrosporum</i> (Hepp) Müll. Arg.	Wart Lichen	Pyrenulaceae	Pyrenulales	Cr	Co	Sirumalai
5.	Ⓞ <i>Arthonia redingeri</i> Grube	Comma Lichen	Arthoniaceae	Arthoniales	Cr	Co	Sirumalai
6.	<i>Arthonia subvelata</i> Nyl.	Dot Lichen	Arthoniaceae	Arthoniales	Cr	Co	Sirumalai
7.	Ⓞ <i>Arthothelium nigrescens</i> Makhija & Patw.	Comma Lichen	Arthoniaceae	Arthoniales	Cr	Co	Sirumalai
8.	§ <i>Bacidia laurocerasi</i> (Delise ex Duby) Zahlbr.	Dotted Lichen	Ramalinaceae	Lecanorales	Cr	Co	Maruthamalai
9.	<i>Bacidia millegrana</i> (Taylor) Zahlbr.	Dotted Lichen	Ramalinaceae	Lecanorales	Cr	Co	Sirumalai
10.	<i>Baculifera curtisii</i> (Tuck.) Marbach	Pimple Lichen	Mycocaliciaceae	Caliciales	Cr	Co	Maruthamalai
11.	<i>Baculifera micromera</i> (Vainio) Marbach	Spotted Button Lichen	Caliciaceae	Caliciales	Cr	Co	Maruthamalai
12.	§ <i>Bellemeria cinereorufescens</i> (Ach.) Clauzade & Roux	Rust Lichen	Teloschistaceae	Teloschistales	Cr	Sa	Maruthamalai
13.	<i>Buellia pleiotera</i> Malme	Disc Lichen	Caliciaceae	Caliciales	Cr	Co	Sirumalai
14.	<i>Bulbothrix isidiza</i> (Nyl.) Hale.	Ruffle Lichen	Parmeliaceae	Lecanorales	Fo	Co	Sirumalai
15.	§ <i>Bulbothrix setschwanensis</i> (Zahlbr.) Hale.	Ruffle Lichen	Parmeliaceae	Lecanorales	Fo	Co	Sirumalai
16.	<i>Bulbothrix tabacina</i> (Mont. & Bosch) Hale	Ruffle Lichen	Parmeliaceae	Lecanorales	Fo	Sa	Megamalai
17.	§ <i>Candelaria concolor</i> (Dicks.) Stein	Orange Wall Lichen	Candelariaceae	Candelariales	Fo	Pl	Megamalai
18.	§ <i>Canoparmelia owariensis</i> (Asahi) Elix	Stone Lotus	Parmeliaceae	Lecanorales	Fo	Sa	Megamalai
19.	<i>Canoparmelia texana</i> (Tuck) Elix & Hale	Tree Lotus	Parmeliaceae	Lecanorales	Fo	Co	Megamalai
Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils							
Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and Pl-Plasticolous							
New records: Ⓞ-New to India, §-New to Southern India, Ⓞ-New to Tamil Nadu, §-New to Western Ghats.							

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
20.	<i>Chrysothrix candelaris</i> (L.) Laundon	Gold Dust Lichen	Chrysothricaceae	Arthoniales	Lr	Co	Megamalai
21.	Ⓢ <i>Chrysothrix chlorina</i> (Ach.) Laundon	Mustard Powder Lichen	Chrysothricaceae	Arthoniales	Lr	Co	Megamalai
22.	<i>Cladonia cartilaginea</i> Müll. Arg.	Cup Lichen	Cladoniaceae	Lecanorales	Sq	Te	Sirumalai
23.	<i>Cliostomum griffithii</i> (Sm.) Coppins	Pore Lichen	Ramalinaceae	Lecanorales	Cr	Co	Megamalai
24.	§ <i>Coenogonium lutum</i> (Dicks) Kalb & Lucking	Smoothy Scrub Lichen	Coenogoniaceae	Ostropales	Fi	Co	Maruthamalai
25.	<i>Cratiria lauri-cassiae</i> (Fée) Marbach	Button Lichen	Caliciaceae	Caliciales	Cr	Sa	Megamalai
26.	<i>Cratiria obscurior</i> (Stirton) Marbach & Kalb.	Button Lichen	Caliciaceae	Caliciales	Cr	Co	Maruthamalai
27.	<i>Cresponea proximata</i> (Nyl.) Egea & Torrente	Warty Button Lichen	Opegraphaceae	Arthoniales	Cr	Co	Maruthamalai
28.	<i>Crocadia aurata</i> (Sm. Ex Ach.) Vain	Gold Speckle Belly Lichen	Lobariaceae	Peltigerales	Fo	Co	Paulney Hills
29.	Ⓢ <i>Cryptothecia polymorpha</i> Makhija & Patw.	Wreath Lichen	Arthoniaceae	Arthoniales	Cr	Co	Sirumalai
30.	<i>Diorygma hieroglyphicum</i> (Pers.) Staiger & Kalb	Scribble Lichen	Graphidaceae	Ostropales	Cr	Co	Megamalai
31.	<i>Diorygma junghunii</i> (Mont & Bosch.)	Scribble Lichen	Graphidaceae	Ostropales	Cr	Co	Megamalai
32.	<i>Dirinaria aegilita</i> (Afz. In Ach)	Froast Lichen	Caliciaceae	Caliciales	Fo	Co	Sirumalai
33.	<i>Dirinaria applanata</i> (Fée) D.D. Awasthi	Common Froast Lichen	Caliciaceae	Caliciales	Fo	Co	Megamalai
34.	<i>Dirinaria confluens</i> (Fr.) D.D. Awasthi	Froast Lichen	Caliciaceae	Caliciales	Fo	Sa	Megamalai
35.	<i>Dirinaria consimilis</i> (Stirt.) D.D. Awasthi.	Common Froast Lichen	Caliciaceae	Caliciales	Fo	Co	Megamalai
36.	<i>Dirinaria picta</i> (Sw.) Clem. & Shear	Froast Lichen	Caliciaceae	Caliciales	Fo	Co	Maruthamalai
37.	§ <i>Dolichousnea longissima</i> (Ach.) Articus	Lengthy Hair Lichen	Parmeliaceae	Lecanorales	Fr	Co	Megamalai
38.	Ⓢ <i>Dolichousnea trichodeoides</i> (Vain. ex Motyka) Articus	Common Beard Lichen	Parmeliaceae	Lecanorales	Fr	Co	Maruthamalai

Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils

Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and Pl-Plasticolous

New records: Ⓢ-New to India, §-New to Southern India, Ⓢ-New to Tamil Nadu, §-New to Western Ghats.

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
39.	<i>Glyphis cicatricosa</i> Ach.	Warty Script Lichen	Graphidaceae	Ostropales	Cr	Co	Megamalai
40.	Ⓞ <i>Glyphis scyphulifera</i> (Ach.) Staiger	Spotted Script Lichen	Graphidaceae	Ostropales	Cr	Co	Maruthamalai
41.	§ <i>Graphina platycarpa</i> (Eschw.) Zahlbr.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Maruthamalai
42.	<i>Graphis ajarekarii</i> Patw. & C.R. Kulk.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Megamalai
43.	<i>Graphis anfractuosa</i> var. <i>anfractuosa</i> (Eschw.) Eschw.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
44.	§ <i>Graphis argentia</i> Makhija & Adaw.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Valparai
45.	<i>Graphis assimilis</i> Nyl.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
46.	Ⓞ <i>Graphis aurita</i> Eschw	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Megamalai
47.	§ <i>Graphis chlorotica</i> A. Massal.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Maruthamalai
48.	<i>Graphis cincta</i> (Pers.) Aptroot.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
49.	<i>Graphis duplicata</i> Ach.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Maruthamalai
50.	§ ^v <i>Graphis elegans</i> (Borrer ex Sm.) Ach.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
51.	§ <i>Graphis furcata</i> Fée	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
52.	§ <i>Graphis gonimica</i> Zahlbr.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
53.	§ <i>Graphis handelii</i> Zahlbr	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Maruthamalai
54.	§ <i>Graphis pseudoserpens</i> Chaves	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Maruthamalai
55.	Ⓞ <i>Graphis pyrrhocheiloides</i> Zahlbr.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Megamalai
56.	<i>Graphis scripta</i> (L.) Ach.	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Megamalai
57.	<i>Gyalolechia bassiae</i> (Ach.) Søchting, Frödén & Arup	Gold Jewel Lichen	Teloschistaceae	Teloschistales	Cr	Sa	Maruthamalai
58.	Ⓞ <i>Haematomma collatum</i> (Stirt.) C.W. Dodge	Blood Stain Lichen	Lecanoraceae	Lecanorales	Cr	Co	Megamalai
59.	<i>Hafellia curatillae</i> (Malme) Marbach	Eyeball Lichen	Caliciaceae	Caliciales	Cr	Co	Megamalai

Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils

Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and Pl-Plasticolous

New records: Ⓞ-New to India, §-New to Southern India, Ⓞ-New to Tamil Nadu, §-New to Western Ghats.

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
60.	<i>Heterodermia comosa</i> (Eschw.) Follm. & Redon	Shield Spoon Lichen	Physciaceae	Caliciales	Fr	Mu	Megamalai
61.	<i>Heterodermia diademata</i> (Taylor) D.D. Awasthi	Shield Arc Lichen	Physciaceae	Caliciales	Fo	PI	Megamalai
62.	<i>Heterodermia dissecta</i> (Kurok.) D.D. Awasthi.	Shield Lichen	Physciaceae	Caliciales	Fo	Co	Megamalai
63.	<i>Heterodermia incana</i> (Stirton.) D. D. Awasthi	Shield Lichen	Physciaceae	Caliciales	Fo	Co	Megamalai
64.	§ <i>Hyperphyscia adglutinata</i> (Flörke) H. Mayrhofer & Poelt	Wreath Lichen	Physciaceae	Caliciales	Fo	Co	Sirumalai
65.	<i>Hypotrachyna exsecta</i> (Taylor) Hale.	Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	Co	Megamalai
66.	<i>Hypotrachyna neodissecta</i> (Hale) Hale	Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	PI	Megamalai
67.	<i>Lecanora albella</i> (Pers.) Ach.	Rim Lichen	Lecanoraceae	Lecanorales	Cr	Co	Sirumalai
68.	<i>Lecanora chlarotera</i> Nyl	Rim Lichen	Lecanoraceae	Lecanorales	Cr	Co	Megamalai
69.	<i>Lecanora helva</i> Stizenb.	Rim Lichen	Lecanoraceae	Lecanorales	Cr	Fe	Sirumalai
70.	<i>Lecanora of chlarotera</i> Nyl	Rim Lichen	Lecanoraceae	Lecanorales	Cr	Co	Megamalai
71.	<i>Lecanora of cinereofusca</i> H. Magn	Rim Lichen	Lecanoraceae	Lecanorales	Cr	Co	Sirumalai
72.	<i>Lecanora perplexa</i> Brodo	Rim Lichen	Lecanoraceae	Lecanorales	Cr	Li	Maruthamalai
73.	<i>Lepra leucosorodes</i> (Nyl.) I. Schmitt, B.G. Hodk. & Lumbsch	White Spot Lichen	Stereocaulaceae	Lecanorales	Le/ Cr	Fe	Megamalai
74.	<i>Lepraria caesiaalba</i> (B. de Lesd.) J.R. Laundon.	Dust Lichen	Stereocaulaceae	Lecanorales	Le	Te	Sirumalai
75.	§ <i>Lepraria ecotricata</i> (J.R. Laundon) Kukwa	Olive Green rust	Stereocaulaceae	Lecanorales	Le	Fo	Paulney hills
76.	<i>Lepraria incana</i> (L.) Ach	Olive Green rust	Stereocaulaceae	Lecanorales	Le	Sa	Sirumalai
77.	<i>Leptogium austroamericanum</i> (Malme) C.W. Dodge.	Jelly Lichen	Collemataceae	Peltigerales	Fo	Co	Megamalai
78.	<i>Leptogium burnetiae</i> Dodge	Skin Lichen	Collemataceae	Peltigerales	Fo	Co	Maruthamalai
79.	<i>Leptogium cyanescens</i> (Ach.) Körb.	Jelly Lichen	Collemataceae	Peltigerales	Fo	Co	Sirumalai
80.	<i>Leptogium denticulatum</i> Nyl	Skin Lichen, Stretched Jelly skin	Collemataceae	Peltigerales	Fo	Sa	Megamalai

Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils

Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and PI-Plasticolous

New records: ©-New to India, §-New to Southern India, ®-New to Tamil Nadu, \$-New to Western Ghats.

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
81.	<i>Leptogium marginellum</i> (Sw.) Gray	Soil Warm Lichen	Collemataceae	Peltigerales	Fo	Mu	Megamalai
82.	<i>Leucodermia boryi</i> (Fée) Kalb	Old Lady Hairy Lichen	Physciaceae	Caliciales	Fr	Co	Megamalai
83.	<i>Leucodermia leucomelos</i> (L.) Kalb	Bushy Shrub Lichen	Physciaceae	Caliciales	Fr	Te	Megamalai
84.	<i>Lobaria retigera</i> (Bory) Trev.	Lung Lichen	Lobariaceae	Peltigerales	Fo	Co	Megamalai
85.	§ <i>Malmidea granifera</i> (Ach.) Kalb, Rivas Platas & Lumbsch	Warted Disc Lichen	Malmidaeaceae	Lecanorales	Cr	Co	Megamalai
86.	<i>Mischoblastia oxydata</i> A. Massal.	Pimple Lichen	Physciaceae	Caliciales	Cr	Sa	Paulney Hills
87.	<i>Myelochroa aurulenta</i> (Tuck.) Elix & Hale	Stone Flower	Parmeliaceae	Lecanorales	Fo	Sa	Megamalai
88.	<i>Myelochroa xantholepis</i> (Mont & Bosch)	Tree Lotus	Parmeliaceae	Lecanorales	Fo	Co	Sirumalai
89.	<i>Neobrownliella cinnabarina</i> (Ach.) S.Y. Kondr, Elix & Hale	Fire Dot Lichen	Teloschistaceae	Teloschistales	Cr	Sa	Megamalai
90.	<i>Notoparmelia erumpens</i> (Kurok.) A. Crespo, Ferencová & Divakar.	Shield Lichen	Parmeliaceae	Lecanorales	Fo	Co	Maruthamalai
91.	<i>Ochrolechia subpallidescens</i> Versegghy, Beih.	Crabs eye Lichen	Ochrolechiaceae	Pertusariales	Cr	Co	Maruthamalai
92.	<i>Parmelinella wallichiana</i> (Taylor.) Elix & Hale	Lead Lichen	Parmeliaceae	Lecanorales	Fo	Sa	Sirumalai
93.	<i>Parmotrema andinum</i> (Müll. Arg.) Hale	Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	Co	Sirumalai
94.	<i>Parmotrema austrosinense</i> (Zahlbr.) Hale	Scatter-Rug Lichen	Parmeliaceae	Lecanorales	Fo	Co	Paulney Hills
95.	<i>Parmotrema cooperi</i> (J. Steiner & Zahlbr.) Sérus.	Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	Co	Paulney Hills
96.	<i>Parmotrema crinitum</i> (Ach.) M. Choisy	Scatter-Rug Lichen	Parmeliaceae	Lecanorales	Fo	Co	Paulney Hills
97.	<i>Parmotrema cristiferum</i> (Taylor) Hale.	Ruffle Lichen	Parmeliaceae	Lecanorales	Fo	Co	Sirumalai
98.	<i>Parmotrema hababianum</i> (Gylen.) Hale	Ruffle Lichen	Parmeliaceae	Lecanorales	Fo	Co	Sirumalai
99.	<i>Parmotrema indicum</i> Hale	Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	Sa	Sirumalai

Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils

Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and Pl-Plasticolous

New records: ©-New to India, §-New to Southern India, ®-New to Tamil Nadu, \$-New to Western Ghats.

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
100.	§ <i>Parmotrema melanothrix</i> (Mont.) Hale	Rock-Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	Sa	Megamalai
101.	<i>Parmotrema praesorediosum</i> (Nyl.) Hale	Ruffle Lichen	Parmeliaceae	Lecanorales	Fo	Sa	Sirumalai
102.	<i>Parmotrema reticulatum</i> (Taylor.) Choisy	Crack Ruffled Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	Co	Megamalai
103.	<i>Parmotrema subsumptum</i> (Nyl.) Hale.	Scatter-Rug Lichen	Parmeliaceae	Lecanorales	Fo	Co	Megamalai
104.	<i>Parmotrema tinctorum</i> (Despr. ex Nyl.) Hale	Stone Flower	Parmeliaceae	Lecanorales	Fo	Sa	Megamalai
105.	Ⓞ <i>Peltigera praetextata</i> (Flörke ex Sommerf.) Zopf	Scaly Dog Lichen	Peltigeraceae	Peltigerales	Fo	Mu	Sirumalai
106.	<i>Pertusaria cinchonae</i> Müll. Arg.	Pore Lichen	Pertusariaceae	Pertusariales	Cr	Co	Paulney Hills
107.	<i>Pertusaria endoxantha</i> Vain.	Wart Lichen	Pertusariaceae	Pertusariales	Cr	Co	Megamalai
108.	<i>Pertusaria leucostoma</i> (Ach.) A. Massal.	Pore Lichen	Pertusariaceae	Pertusariales	Cr	Co	Sirumalai
109.	<i>Pertusaria splendens</i> D.D. Awasthi	Wart Lichen	Pertusariaceae	Pertusariales	Cr	Co	Sirumalai
110.	Ⓞ <i>Phaeographis caesiodisca</i> Staiger	Script Lichen	Graphidaceae	Ostropales	Cr	Co	Sirumalai
111.	<i>Phyllopsora furfuracea</i> (Pers.) Zahlbr.	Scale Lichen	Ramalinaceae	Lecanorales	Sq	Te	Sirumalai
112.	<i>Phyllopsora nemoralis</i> Timdal & Krog.	Scale Lichen	Ramalinaceae	Lecanorales	Sq	Te	Sirumalai
113.	<i>Physcia caesia</i> (Hoffm.) Fűrnr.	Rosette Lichen	Physciaceae	Caliciales	Fo	Sa	Sirumalai
114.	<i>Polyblastidium japonicum</i> (M. Satô) Kalb	Scrub Lichen	Physciaceae	Caliciales	Fo	Sa	Paulney Hills
115.	§ <i>Polyblastidium microphyllum</i> (Kurok.) Kalb.	Scrub Lichen	Physciaceae	Caliciales	Fo	Co	Valparai
116.	<i>Polymeridium refertum</i> (Stirt.) Aptroot	Pimple Lichen	Trypetheliaceae	Trypetheliales	Cr	Co	Megamalai
117.	<i>Pseudocyphellaria argyracea</i> (Bory ex Delise) Vain	Speckle Belly Lichen	Lobariaceae	Peltigerales	Fo	Co	Megamalai
118.	<i>Pyrenula adacta</i> Fée	Wart Lichen	Pyrenulaceae	Pyrenulales	Cr	Co	Sirumalai

Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils

Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and Pl-Plasticolous

New records: Ⓞ-New to India, §-New to Southern India, Ⓞ-New to Tamil Nadu, §-New to Western Ghats.

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
119.	<i>Pyrenula astroidea</i> (Fée) R.C. Harris.	Wart Lichen	Pyrenulaceae	Pyrenulales	Cr	Co	Sirumalai
120.	<i>Pyrenula cryptothelia</i> (Müll. Arg.) Aptroot & Etayo.	Wart Lichen	Pyrenulaceae	Pyrenulales	Cr	Co	Sirumalai
121.	© <i>Pyrenula subglabrata</i> (Nyl.) Müll.Arg.	Wart Lichen	Pyrenulaceae	Pyrenulales	Cr	Co	Maruthamalai
122.	<i>Pyxine austroindica</i> D. D. Awasthi	Yellowish Pyxine Lichen	Caliciaceae	Caliciales	Fo	Co	Maruthamalai
123.	® <i>Pyxine coccifera</i> (Fée) Nyl.	Pinkish Rosette Lichen	Caliciaceae	Caliciales	Fo	Co	Maruthamalai
124.	<i>Pyxine cocoes</i> (Sw.) Nyl	Shield Cartilage Lichen	Caliciaceae	Caliciales	Fo	Co	Sirumalai
125.	<i>Pyxine petricola</i> Nyl	Cartilage Lichen	Caliciaceae	Caliciales	Fo	Co	Paulney Hills
126.	§ <i>Pyxine philippina</i> Vain.	Rosette Cartilage Lichen	Caliciaceae	Caliciales	Fo	Sa	Sirumalai
127.	<i>Pyxine reticulata</i> (Vain.) Vain	Rosette Lichen	Caliciaceae	Caliciales	Fo	Co	Megamalai
128.	<i>Pyxine subcinerea</i> Stirt.,	Rosette Lichen	Caliciaceae	Caliciales	Fo	Co	Sirumalai
129.	<i>Ramalina conduplicans</i> Vain.	Stone Cauliflower	Ramalinaceae	Lecanorales	Fr	Co	Sirumalai
130.	§ <i>Ramalina hossei</i> Vain	Strap Lichen	Ramalinaceae	Lecanorales	Fr	Co	Megamalai
131.	<i>Ramalina inflata</i> (Hook. f. & Taylor) Hook.f. & Taylor.	Strap Lichen	Ramalinaceae	Lecanorales	Fr	Co	Megamalai
132.	<i>Ramalina nervulosa</i> (Müll. Arg.) Abbayes	Strap Lichen	Ramalinaceae	Lecanorales	Fr	Co	Megamalai
133.	<i>Ramalina pacifica</i> Asahina.	Strap Lichen	Ramalinaceae	Lecanorales	Fr	Co	Sirumalai
134.	<i>Ramalina pollinaria</i> (Westr.) Ach	Strap Lichen	Ramalinaceae	Lecanorales	Fr	Co	Megamalai
135.	<i>Ramalina sinensis</i> Jatta	Strap Lichen	Ramalinaceae	Lecanorales	Fr	Co	Maruthamalai
136.	<i>Ramalina subpusilla</i> (Nyl.) Krog & Swinse	Strap Lichen	Ramalinaceae	Lecanorales	Fr	Co	Megamalai
137.	<i>Remototrachyna flexilis</i> (Kurok.) Divakar & A. Crespo.	Cartilage Lichen	Parmeliaceae	Lecanorales	Fo	Co	Sirumalai
138.	§ <i>Rinodina mackenziei</i> Räsänen	Black Eyeball Lichen	Physciaceae	Caliciales	Cr	Co	Maruthamalai

Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils

Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and Pl-Plasticolous

New records: ©-New to India, §-New to Southern India, ®-New to Tamil Nadu, \$-New to Western Ghats.

S. No	Lichen <i>taxa</i>	Common Name	Family	Order	Habit	Habitat	Locality
139.	<i>Rinodina sophodes</i> (Ach.) Massal	Orange Cake Button Lichen	Physciaceae	Caliciales	Cr	Co	Paulney Hills
140.	<i>Synarthonia inconspicua</i> (Stirt.) Van den Broeck & Ertz.	White Warm Lichen	Incertae sedis	Arthoniales	Cr	Co	Sirumalai
141.	<i>Teloschistes flavicans</i> (Sw.) Norman	Golden Hair Lichen	Teloschistaceae	Teloschistales	Fr	Co	Megamalai
142.	<i>Tephromela atra</i> (Huds.) Hafellner.	Na	Tephromelataceae	Lecanorales	Cr	Co	Sirumalai
143.	<i>Trypethelium eluteriae</i> Spreng.	Na	Trypetheliaceae	Trypetheliales	Cr	Co	Sirumalai
144.	<i>Usnea aciculifera</i> Vain.	Cylindrical Green Warm Lichen	Parmeliaceae	Lecanorales	Fr	Co	Sirumalai
145.	<i>Usnea inermis</i> Motyka	Grey Hair Lichen	Parmeliaceae	Lecanorales	Fr	Co	Megamalai
146.	<i>Usnea rubicunda</i> Stirt	Red Beard Lichen	Parmeliaceae	Lecanorales	Fr	Sa	Megamalai
147.	<i>Usnea stigmatoides</i> G. Awasthi	Beard Lichen	Parmeliaceae	Lecanorales	Fr	Te	Maruthamalai
148.	<i>Usnea undulata</i> Stirt	Beard Lichen	Parmeliaceae	Lecanorales	Fr	Co	Megamalai
149.	<i>Xanthoparmelia congensis</i> (J. Steiner) Hale	Rock-Shield Lichen	Parmeliaceae	Lecanorales	Fo	Sa	Maruthamalai
150.	<i>Xanthoria parietina</i> (L.) Th. Fr	Sunburst Lichen, Orange Wall Lichen	Teloschistaceae	Teloschistales	Fo	Sa	Megamalai
Habit: Fo-Foliose, Fr-Fruticose, Cr-Crustose, Le-Leprose, Sq-Squamulose and Fi-Fibrils							
Habitat: Sa- Saxicolous, Co-Corticolous, Te-Terricolous, Mu-Muscicolous, Fo-Folicolous, Li-Lignicolous, (Unusual substrates) Fe-Metallicolous and Pl-Plasticolous							
New records: ©-New to India, §-New to Southern India, ®-New to Tamil Nadu, \$-New to Western Ghats.							

Adding To Or Creating New Records For Tamil Nadu'S Regional Cryptogamic Biota

So far, 3006. lichen species distributions in India have been documented. Based on the results of this study, four lichen species were added to the national lichen flora database: *Cryptothecia polymorpha* Makhija & Patw., *Dolichousnea trichodeoides* (Vain. ex. Motyka) Articus, *Haematomma collatum* (Stirt.) C.W. Dodge, and *Pyrenula subglabrata* (Nyl.) Müll.Arg. A total of 12 lichen species were discovered in southern India, 10 of which were new to the Tamil Nadu lichen database, 10 in the Eastern Ghats region, and 14 in the Western Ghats. The documentation showed that as of date, around 14 lichen species were new additions to the regional cryptogamic flora.

Additional lichen records have been added to India's national, state, and regional cryptogram lists.

Nationally listed species were studied from both the Western and Eastern Ghats ecosystems' Megamalai and Sirumalai hills. The observations showed a state-wide list of *Allographa polystriata* (Makhija, A. Dube, Adaw, & Chitale) Lücking & Kalb., *Arthonia redingeri* Grube, *Arthothelium nigrescens* Makhija & Patw, and *Phaeographis caesiodisca* Staiger at Sirumalai Hills. At Marudhamalai Hills, *Chrysothrix chlorina* (Ach.) Laundon, *Glyphis scyphulifera* (Ach.) Staiger, *Graphis aurita* Eschw, and *Graphis pyrrocheiloides*

Zahlbr were all discovered. *Graphis pyrrocheiloides* and *Pyxine coccifera* (Fée) Nyl were discovered in the southern Western Ghats' Megamalai Hills. In the Western Ghats, the hitherto unlisted *Amandinea submontana* Marbach, *Bacidia laurocerasi* (Delise ex Duby) Zahlbr., *Canoparmelia owariensis* (Asahi) Elix, and *Graphina platycarpa* (Eschw.) Zahlbr. Chaves, *Lepraria ecotricata* (J. R. Laundon) Kukwa, and *Parmotrema melanothrix* (Mont.) Hale were observed in the Maruthamalai hills belonging to the Western Ghats of Tamil Nadu, India. *Coenogonium lutum* (Dicks) Kalb & Lucking, *Cresponea proximata* (Nyl.) Egea & Torrente, and *Malmidea granifera* (Ach.) Räsänen was also discovered at Suruli waterfall in the Cumbum Valley near Megamalai hills of the Southern Western Ghats, 70 years after the Western Ghats survey. *Arthonia subvelata* Nyl., *Buellia pleiotera* Malme, *Graphis ajarekarii* Patw. & C.R. Kulk., *Hypotrachyna exsecta* (Taylor) Hale, *Phyllopsora furfuracea* (Pers.) Zahlbr., and *Phyllopsora nemoralis* Timdal. In the South Indian lichen catalogue, *Bellemerea cinereorufescens* (Ach.) Clauzade & Roux; *Bulbothrix setschwanensis* (Zahlbr.) Hale; and *Bulbothrix tabacina* (Mont. & Bosch) Hale, *Graphis Argentina*, Makhija & Adaw, and *Pyxine Philippines* Vain, *Dolichousnea longissima* (Ach.) Articus, and *Ramalina hossei* were also observed from the Marudhamalai hills, as were *Candelaria concolor* (Dicks.) Stein, *Graphis chlorotica* A. Massal, and *Hyperphyscia adglutinata* (Flörke) H. Mayrhofer & Poelt. *Polyblastidium microphyllum* (Kurok) Kalb was also discovered for the first time in the Meghamalai Hills. The details of lichen species and their accession numbers are given in 4nd Table.

Table 4
New records of lichens in the Tamil Nadu Lichen flora database New to India

S. No	Lichenized fungal Taxa	Accession Number
1	<i>Dolichousnea trichodeoides</i> (Vain. Ex Motyka) Articus	19-36096
2	<i>Haematomma collatum</i> (Stirt.) C.W. Dodge	19-36110
3	<i>Pyrenula subglabrata</i> (Nyl.) Müll.Arg.	19-36053

New to Southern India

S. No	Lichenized fungal Taxa	Accession Number
1.	<i>Bellemerea cinereorufescens</i> (Ach.) Clauzade & Roux	19-36024
2.	<i>Bulbothrix setschwanensis</i> (Zahlbr.) Hale.	17-30486
3.	<i>Bulbothrix tabacina</i> (Mont. & Bosch) Hale	19-36025
4.	<i>Candelaria concolor</i> (Dicks.) Stein	19-36085
5.	<i>Dolichousnea longissima</i> (Ach.) Articus	19-36095
6.	<i>Graphis argentia</i> Makhija & Adaw.	17-30498
7.	<i>Graphis chlorotica</i> A. Massal.	17-30499
8.	<i>Graphis elegans</i> (Borrer ex Sm.) Ach.	17-30476
9.	<i>Hyperphyscia adglutinata</i> (Flörke) H. Mayrhofer & Poelt	19-36076
10.	<i>Polyblastidium microphyllum</i> (Kurok.) Kalb.	19-36037
11.	<i>Pyxine philippina</i> Vain.	17-31152
12.	<i>Ramalina hossei</i> Vain	19-36093

New to Tamil Nadu

S. No	Lichenized fungal Taxa	Accession Number
1.	<i>Allographa polystriata</i> (Makhija, A. Dube, Adaw. & Chitale) Lücking & Kalb.	17-31126
2.	<i>Arthonia redingeri</i> Grube	17-30481
3.	<i>Arthothelium nigrescens</i> Makhija & Patw.	17-30483
4.	<i>Chrysothrix chlorina</i> (Ach.) Laundon	19-36083
5.	<i>Glyphis scyphulifera</i> (Ach.) Staiger	19-36015
6.	<i>Graphis aurita</i> Eschw	19-36017
7.	<i>Graphis pyrrocheiloides</i> Zahlbr.	19-36079
8.	<i>Peltigera praetextata</i> (Flörke ex Sommerf.) Zopf	19-36072
9.	<i>Pyxine coccifera</i> (Fée) Nyl.	19-36059
10.	<i>Phaeographis caesiodisca</i> Staiger	17-03046

New to Western Ghats

S. No	Lichenized fungal Taxa	Accession Number
1.	<i>Amandinea submontana</i> Marbach	19-36062
2.	<i>Bacidia laurocerasi</i> (Delise ex Duby) Zahlbr.	19-36063
3.	<i>Canoparmelia owariensis</i> (Asahi) Elix	19-36097
4.	<i>Coenogonium lutum</i> (Dicks) Kalb & Lucking	19-36026
5.	<i>Cresponea proximata</i> (Nyl.) Egea & Torrente	19-36029
6.	<i>Graphina platycarpa</i> (Eschw.) Zahlbr.	19-36021
7.	<i>Graphis furcata</i> Fée	17-30500
8.	<i>Graphis gonimica</i> Zahlbr.	19-36019
9.	<i>Graphis handelii</i> Zahlbr	19-36080
10.	<i>Graphis pseudoserpens</i> Chaves	19-36022
11.	<i>Lepraria ecotricata</i> (J.R. Laundon) Kukwa	19-36058
12.	<i>Malmidea granifera</i> (Ach.) Kalb, Rivas Platas & Lumbsch	19-36045
13.	<i>Parmotrema melanothrix</i> (Mont.) Hale	19-36086
14.	<i>Rinodina mackenziei</i> Räsänen	19-36060

All the identified lichen specimens were deposited with a voucher number in the National Herbarium (LWG), Council of Scientific & Industrial Research (CSIR-NBRI), National Botanical Research Institute, Lucknow, Uttar Pradesh, India.

Description Of The New Records

Amandinea submontana **Marbach**, Biblioth. Lichenol. 74: 105 (2000).

Thallus corticolous, crustose, grey to ochraceous, thick, areolate; photobiont *Trebouxia*. Prothallus absent. Apothecia 0.1–0.3 mm in diam., sessile; disc flat, epruinose; margin distinct, black. Exciple blackish brown, up to 60 µm thick. Epithymenium brown, K negative. Hymenium hyaline, not interspersed with oil globules, up to 100 µm high. Hypothecium dark brown. Asci 8- spored. Ascospores brown,

13–15 × 3–5 µm, uniseptate, septa thin. Pycnidia not seen. **Chemistry:** Thallus K + yellow, C–, KC + yellow, P–, UV–; **TLC:** Atranorin (Fig. 6A, a1 and a2).

Remarks

New to Southern India.

Rinodina mackenziei Räsänen, Arch. Soc. Zool. Bot. fenn. Vanamo 6(no. 2): 84 (1952).

The thallus crustose, corticolous, rarely on saxicolous. Up to 4 cm broad, black-spotted, prothallus bright green to dark brown, apothecia present, tiny, bud-like structured, 0.1–0.3 mm diam., brown to blackish, hymenium black, needle-shaped, 6–6.5 mm lengthy, Spores size: 14.05×5.72 µm; 15.65×6.05 µm; 16.08×6.88 µm (Fig. 4). **Chemistry:** I + Blue. **TLC:** Norstictic acid, connorstictic acid (Fig. 6B and b1).

Remarks

New to Western Ghats.

Pyxine coccifera (Fée) Nyl., Mém. Soc. Imp. Sci. Nat. Cherbourg 5: 108 (1858).

= *Parmelia coccifera* Fée, Essai Crypt. Exot. (Paris): 126 (1825) [1824].

Thallus foliose, corticolous, loosely attached with a lichen, bark; 0.5 to 1 cm wide, 5–10 mm broad, thallus olive green colour on the wet condition and grey in dry state, lobes greyish, faint yellow on the medulla, isidiate, cylindrical, marginal soralia present, numerous, pink colour, 0.5–1.25 mm, dactyls absent; pseudocyphellate, vivid red coloured, rhizines absent, Apothecia absent.

Chemistry: K + Violet to purple, UV–. **TLC:** Atranorin and Pyxiferin (Fig. 6C).

Remarks

New to Tamil Nadu.

Rinodina sophodes (Ach.) A. Massal., Ric. auton. lich. crost. (Verona): 14 (1852).

= *Lichen sophodes* Ach., Lich. suec. prodr. (Linköping): 67 (1799) [1798].

Thallus crustose, corticolous, up to 3 cm wide, light green coloured. Verrucose areolate; Prothallus dark. Apothecia present, many, rotund. orange coloured outline and red inside. The upper part of the hymenium is yellow to brown. Spores *Mischoblastiomorph*. Wall irregularly thick, 0.45–0.75 µm, spore size: 17.56×11.53; 19.46×10.29 µm. **Chemistry:** Cortex I + Blue. **TLC:** Salazinic acid at *Rf* class 2; Stictic acid, Norstictic at *Rf* class 4 (Fig. 6D). **Remarks:** New to Tamil Nadu.

Diorygma hieroglyphicum (Pers.) Staiger & Kalb. in Kalb *et al.*, *Symb. bot. upsal.* 34(no. 1): 151 (2004). = *Opegrapha hieroglyphica* Pers., Ann. Wetter. Gesellsch. Ges. Naturk. 2: 16 (1811) [1810].

Thallus corticolous, crustose, graphidaceous, brownish-black. Concave, rough, cracked, lirellae, lirellate apothecia, branched, many, oblong, immersed, slightly narrow discs covered with white Purina. 1.25×0.25, 1.75×0.35, 2.5×0.45 mm, Exciple divergent, non-carbonized, hyphal layer brownish on a lateral part, exciple margin with a thallus layer. Epithecium 10–20 µm tall, distinctly developed, covered with a thick hyaline brown colour layer, granula of 10–20 µm tall. Hymenium 80–160 µm high, I + violet-blue; Paraphyses hyaline, with the thick wall, c. 1–1.5 µm wide, with branched and anastomosed tips; Asci hyaline, elongate, monosporous; Spores hyaline, oblong, muriform, the peripheral cells have the same size with the central ones, 16–35×6–10 µm (locular), 70–130×25–45µm (Fig. 6E). **Chemistry:** K + yellow, I + violet, UV–. **TLC:** Salazinic acid at *Rf* class 2; Stictic acid, Norstictic at *Rf* class 4.

Remarks

New to Tamil Nadu.

Discussion

Lichens are a non-flowering lower group of plants in which algae and fungi are symbiotically associated and are found in both terrestrial and marine ecosystems. It has been documented that the Asian continent accounts for 40% of lichen distribution. Nearly 1/3 of the lichen species population was recorded in India due to the presence of large, interconnected hilly regions that are hotspots, like the Western and Eastern Ghats. The Northern Himalaya has the most species diversity due to the variety of habitation environments. The Western Ghats, which contain nearly 1500 lichen taxa, were the second most diverged area. In this regard, Tamil Nadu state was declared the second-richest, populated with many cryptogams, including lichens. Several studies conducted in major tourist destinations and botanical gardens revealed that the population of lichen diversity is notable in different places and during different climatic seasons (Balaji and Hariharan 2004; Rajesh and Dalip Kumar 2020). A total of 150 lichen species were documented and submitted as voucher specimens at the CSIR-National Botanical Research Institute, Uttar Pradesh, India, for references of which lichen specimens were collected from several places across India. A lichen herbarium was established at the Department of Botany, Bharathiar University, Coimbatore, Tamil Nadu, in which around 300 lichen specimens were deposited. The large number of samples were collected and identified from the Nilgiris and Megamalai hills, with 81.3% and 84.6%, respectively (Rajaprabu et al. 2021). In comparison, revisionary studies were conducted for additional richness and population losses. Earlier, those areas were discovered and described as lichen hot spots by Awasthi (1991) and Sanjeeva and Dalip Kumar (2011), which revealed that most of them were found with the foliose and fruticose lichen varieties. In those areas, the diversity of corticolous and saxicolous lichens was greater. The leprose variety of the *Chrysothrix* genus was very common in every study zone in all seasons. There is no arguing about the richness of its diversity. The highest density of crustose lichen was found at lower altitudes, such as Maruthmalai (18 species) and Servarayan Hills (15 species). Meanwhile, fructose levels are lower and foliose levels are moderate.

Lichenicolous Fungi And Lichenized Fungal Diversity From Three Lichenogeographical Regions Of Tamil Nadu

The Megamalai Hills of the southern Western Ghats have a variety of forests; some are evergreen, while others are moist and dry deciduous with scrubs in nature. Earlier in 2011, 99 lichen species were studied (Sanjeeva et al. 2001), with 74 of them belonging to the Corticolous substrata. There are a few new records in our collection of 127 taxa, including *Pyrenula subglabrata* (Nyl.) Müll. Arg. (Rajaprabu et al. 2021) and *Haematomma collatum* (Stirt.) C.W. Dodge (Rajaprabu and Ponmurugan 2022). Earlier, only one terricolous lichen was found; in this study, it was found with three taxa, namely, *Lepraria caesioalba* (B. de Lesd.) J.R. Laundon, *Leucodermia leucomelos* (L.) Kalb., and *Usnea stigmatoidea* G. Awasthi. Even though plasticoleous lichens were discovered on the highest peak mountain in this study as well as seashore areas, the first record for southern India was a notice, namely *Candelaria concolor* (Dicks.) Stein from Paulney Hills, *Heterodermia diademata* (Taylor) D.D. Awasthi from Maruthmalai, and *Hypotrachyna neodissecta* (Hale) Hale from Megamalai. Omnicolous *H. diademata* from Nepal and *Candelaria concolor* were discovered on man-made substrates earlier this year. Plastics are thought to be hazardous not only to the environment, but also to the ecosystem. While it provides an appropriate habitat for lichen growth, the lichen's colonisation process on substrates is aided and progresses progressively due to the penetration of rhizines into the substrate. Lichens, like Saxicolous and Corticolous, may be capable of degrading the substrate into small particles (Upadhyay et al. 2020). The lichens and lichenicolous fungal list were available with 596 species, and the page was made open source for all (Balaji and Hariharan 2007). In 2013, 103 lichen species were reported in the southern Western Ghats, in the central part of Maruthmalai's neighborhood, part of the Boluvam Patti region (Balaji and Hariharan 2013). Ingle et al. (2016) conducted a 50-hectar permanent population study in the Mudumalai forest ranges and reported on 36 species. Lichens have been discovered from the Indian Ocean to the Kanchenjunga peak, not only in large numbers but also for their potential to benefit ecosystems (Dalip Kumar et al. 2015). Lichenological research and related studies in India, with ongoing support from members of the Indian Lichenological Society for lichen systematics and population studies (Sanjeeva and Dalip Kumar 2021).

Lobaria pulmonaria and *Usnea longissima* were classified under the group of mosses with the names *Pulmonaria bryoni* and *Brian muscus*, respectively; they were studied during the Pre-Linnaean period, and the preserved samples were maintained at the EnTibi Herbarium (ca. 1542–1544) of the Naturalis Biodiversity Centre at Leiden, located in the Netherlands (Stech et al. 2018). Lichen-forming fungal species were balanced between conceptual and practical considerations, including phylogenomic and phenotypic differences, resulting in 52 Physcia. It was discovered to be a graphidaceous thallus with 505 different molecular species. In Chennai, Tamil Nadu, India, the Indian Institute of Madras and Madras Christian College studied the abundance of corticolous lichens in manmade tropical dry evergreen forests in regular mobility estates in a periodic jointture (Balaji and Hariharan 2013). Matina Campus was explored with 30 species at the University of Mindanao in the Philippines (Medina and Carreon 2018). The

Maslak Campus of Istanbul Technical University, located in Saryer, Turkey, was enumerated with 23 species. National parks in Thailand comprise 161 taxa; in Turkey, 188 taxa; an iris flora with 360 lichen species before 1850 to 1900; and an updated taxonomy with 570 species in 1998 (Mitchell 1998). 85 corticolous species from 5 different landforms of the American Midland were identified in the arboreal lichen vegetation of Arizona (south-eastern part) (Brodo and Irwin 2001). North-Eastern Brazil's locality of the Atlantic rain forest was endorsed for a study of the corticolous crustose lichens for environmental parameters related to the species composition, which depended on the phorophyte specificity and lichen communities. Even though single species of host substrata were also studied in Norway, regularising the large-gauge survey of dispersal and ecologically common epiphytic lichens on *Pinus sylvestris* trees resulted in their recording (Bruteig 1993). The Western Ghats' hottest hotspots of biological diversity diverged with a high degree of endemic taxa of both macro and micro lichen biota, making it one of the 34 UNESCO World Heritage Sites (Pullaiah et al. 2016).

Conclusion

The rediscovery of the selected areas led to developmental and biodiversity fluctuations. The loss of population was determined by the lichen density in both Megamalai and Kolli hills; a recent assessment of lichen in Sirumalai Mountain was ignored in these selected ten areas. The maximum population was observed in Megamalai and the Nilgiris. The least amount was collected from Bharathiar University in Maruthamalai, Coimbatore, and both coastal marine ecosystems along the Madras Marina coast and Sedhu Samudra in Rameshwaram. The loss of biodiversity must be regulated, and species protection needs to improve. Using artificial intelligence may lead to discovering the species density and having it digitalized for a virtual herbarium, including monitoring through the drone facility for each host species in and around the terrestrial and marine zones. In the study areas, ethnolichenological knowledge, the potential of lichens, and their uses will be discovered.

Declarations

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Conflict of Interest

Both authors do not have any conflicts of interest.

References

1. Acharius E (1798) *Lichenographiae svecicae prodromus*. DG Björn, Lincopiae
2. Acharius E (1803) *Methodus qua omnes detectos lichenes: secundum organa carpomorpha ad genera, species et varietates redigere atque observationibus illustrare* (1). impensis FDD Ulrich, typis CF Marquard
3. Ahmadjian V (2012) *The lichens*. Elsevier, Academic Press. United States of America
4. Ahmadjian V (1967) *The lichen symbiosis*. John Wiley & Sons. Blaisdell, Waltham, Toronto, London
5. Aikin J (1777) *An essay on the application of natural history to poetry*. W. Eyres
6. Awasthi DD (1957) A new species of *Parmelia* from Kodaikanal, South India. *Curr Sci* 26(4):123–124
7. Awasthi DD (1981) The typification of *Roccella montagnei*. *Bryologist*, 216–219
8. Awasthi DD (1965) Catalogue of lichens from India, Nepal, Pakistan, and Ceylon. *Beihefte zur Nova Hedwigia*, Heft 17. Verlag von J. Cramer, Weinheim

9. Awasthi DD (1991) A Key to the Microlichens of India, Nepal, and Sri Lanka. *Bibliotheca lichenologia band 40*. Bishen Singh Mahendra Pal Singh, Dehra Dun. India.1-285
10. Awasthi DD (2007) A compendium of the macrolichens from India, Nepal, and Sri Lanka. Bishen Singh Mahendra Pal Singh, Dehra Dun.India.1–385
11. Balaji P, Hariharan GN (2004) Lichen Diversity and its distribution pattern in tropical dry evergreen forest of Guindy National Park (GNP), Chennai. *Indian forester* 130(10):1155–1168
12. Balaji P, Hariharan GN (2007) *In vitro* antimicrobial activity of *Parmotrema praesorediosum* thallus extracts. *Res J Bot* 2:54–59
13. Balaji P, Hariharan GN (2013) Diversity of Macrolichens in Bolampatti II Forest Range (Siruvani Hills), Western Ghats, Tamil Nadu, India. *ISRN Biodiversity*
14. Biswas K (1947) The lichen flora of India. *J Royal Asiatic Soc Bengal Sci* 13:75–113
15. Brodo IM, Sharnoff SD, Sharnoff S (2001) Lichens of north America. Yale University Press, New Haven, pp 411–413
16. Bruteig IE (1993) Large-scale survey of the distribution and ecology of common epiphytic lichens on *Pinus sylvestris* in Norway. *Ann Bot Fennici* 30:161–179
17. Culberson CF (1969) Chemical and Botanical Guide to Lichen Products. The University of North Carolina Press, Chapel Hill, p 628
18. Dalip Kumar U, Rajesh B, Sanjeeva N (2015) Lichenology: current research in India. *Plant biology and biotechnology*, New Delhi: Springer India, 1:263–280. DOI:10.1007/978-81-322-2286-6_10
19. Gilbert O (2000) *Lichnenologica 40. J. Cramer*, Berlin-Stuttgart *Lichens*. Harper Collins Publishers, Harlequin, United Kingdom
20. Gomez KA, Gomez AA (1984) Statistical procedures for agricultural research. John wiley & sons
21. Gray SF (1821) A Natural Arrangement of British Plants. 1(ed). London
22. Hale ME Jr (1974) The Biology of Lichens, 2 edn. Edward Arnold, (ed) London
23. Hawksworth DL (1990) The long-term effects of air pollutants on lichen communities in Europe and North America. *The Earth in transition: patterns and processes of biotic impoverishment*. Cambridge University Press, Cambridge, pp 45–64
24. Hurd-Mead KC (1933) An Introduction to the History of Women in Medicine (Part I): I. Medical Women before Christianity. *Annals of Medical History* 5(1):1
25. Ingle KK, Sanjeeva N, Suresh HS (2016) Lichens in 50 ha permanent plot of Mudumalai Wildlife Sanctuary, Tamil Nadu, India. *Trop Plant Res* 3(3):694–700. 10.22271/tpr.2016.v3.i3.091
26. Koerber GG (1855) *Systema Licheniim Germaniae*. *Breslau*
27. Lindau G (1923) *Die Flechten*. Berhn
28. Lindsay WL (1859) Memoir on the Spermogones and Pycnides of Filamentous, Fruticulose and Foliose Lichens. *Trans. Roy. Soc. Edin*
29. Lindsay WL (1872) Memoir on the Spermogones and Pycnides of Crustaceous Lichens. *Trans. Linn. Soc*
30. Linnaeus C (1753) *Species Plantarum*, 2 vols. Impensis Laurentii Salvii, Holmiae, Stockholm, p 1200
31. Lücking R, Leavitt SD, Hawksworth DL (2021) Species in lichen-forming fungi: balancing between conceptual and practical considerations, and between phenotype and phylogenomics. *Fungal Divers* 109(1):99–154. <https://doi.org/10.1007/s13225-021-00477-7>
32. Medina MND, Carreon HG (2018) Lichens and Bryophytes in the University of Mindanao Matina Campus, Davao City, Philippines. *Univ Mindanao Int Multidisciplinary Res J* 3:1–7
33. Gaurav Kumar M, Sanjeeva N, Dalip Kumar U (2020) Distribution, biomonitoring, and conservation studies of pyrenocarpous lichens in India. *G-Journal of Environmental Science and Technology* 7(5):54–59
34. Mitchell ME (1998) Reporting the Irish lichen flora. *Glasra* 3:1850–1900
35. Murariu D (1745) Carl von Linné's birth–founder of the binomial nomenclature. *Noesis* 2:74
36. Nylander W (1864) *Lichenes. France*. E. Martinet., Michigan State University press. France pp 1-586
37. Obermayer W (2002) Management of a lichen Herbarium. *Protocols in Lichenology*. Springer, Berlin, Heidelberg, pp 507–523
38. Orange A, James PW, White FJ (2001) Microchemical methods for the identification of lichens. Twayne Publishers. British Lichen Society, London, pp 1–86

39. Peirce GJ (1900) The relation of fungus and alga in lichens. *Am Nat* 34(400):245–253
40. Pullaiah T, Krishnamurthy KV, Bir B (2016) *Ethno botany of India. Eastern Ghats and Deccan, vol 1.* CRC - Apple Academic Press, New Delhi, p 149
41. Rajaprabu N, Ponmurugan P (2022) A new record of bloodstain lichen (*Haematomma*) from Southern Western Ghats to the Indian biota. *Feddes Repertorium* 133(2):122–127. <https://doi.org/10.1002/fedr.202100023>
42. Rajaprabu N, Ponmurugan P, Mishra GK (2021) A new record of pyrenocarpous lichen to the Indian biota. *J Threatened Taxa* 13(1):17607–17610. <https://doi.org/10.11609/jott.6885.13.1.17607-17610>
43. Rajesh B, Dalip Kumar U (2020) Lichen Allelopathy: An Agricultural Prospect. *Int J Plant Environ* 6(01):01–08. <https://doi.org/10.18811/ijpen.v6i01.01>
44. Sanjeeva N, Dalip Kumar U (2011), May An inventory of lichens in Uttar Pradesh through bibliographic compilation. In: *National Conference on Earth's Living Treasure, Uttar Pradesh State Biodiversity Board*
45. Sanjeeva N, Dalip Kumar U (2021) History and Development of Lichen Research in India. In: Satyanarayana T, Deshmukh SK, Deshpande MV (eds) *Progress in Mycology.* Springer, Singapore
46. Sanjeeva N, Dalip Kumar U, Divakar PK (2001) Distribution and diversity of lichen in Meghamalai Wildlife Sanctuary, Kambam district, Tamil Nadu, India. *Biol Mem* 27(2):51–58
47. Schneider A (1904) *A Guide to the Study of Lichens.* Knight and Millet Publications, United Kingdom
48. Schneider A (1905) The classification of lichens. *Torrea* 5(5):79–82
49. Singh KP, Sinha GP (2010) *Indian lichens: An annotated checklist.* Botanical Survey of India, Allahabad (Central region), Bishen Singh Mahendra Pal Singh, Dehra Dun. India
50. Sinha GP (2019) In: Sanjeeva N, Joseph S, Gaurav Kumar M In (eds) *Workshop Manual: Field based hands-on training on lichen systematics.* CSIR- National Botanical Research Institute. Lucknow, Uttar Pradesh, India, pp 7–24
51. Stech M, van Andel T, Aptroot A, Bertin A, Stefanaki A (2018) Bryophytes and lichens in 16th-century herbaria. *J Bryology* 40(2):99–106. <https://doi.org/10.1080/03736687.2018.1447304>
52. Tschermak-Woess E (1989) The Algal Partner. In: Galun M (ed) *Handbook of Lichenology, vol 1.* CRC Press, Boca Raton, Florida, pp 39–94
53. Tschermak-Woess E (1989) Developmental studies in trebouxoid algae and taxonomical consequences. *Plant Syst Evol* 164(1):161–195
54. Upadhyay S, Bisht K, Chandra K (2020) Further Additions to the Plasticolous Lichens from India. *Natl Acad Sci Lett* 43(7):647–649
55. Vainio EA (1890) Étude sur la classification naturelle et la morphologie des lichens du Brésil. *J Simelius* 7:1–247
56. Watson W (1929) The classification of lichens. *New Phytol* 28(1):1–36. <https://www.jstor.org/stable/2428040>
57. Zahlbruckner AV (1926) Lichenes (Flechten). B. Spezieller Teil. *Die natürlichen Pflanzenfamilien* 8:61–270

Map 1

Map 1 is available in the Supplementary Files section.

Figures

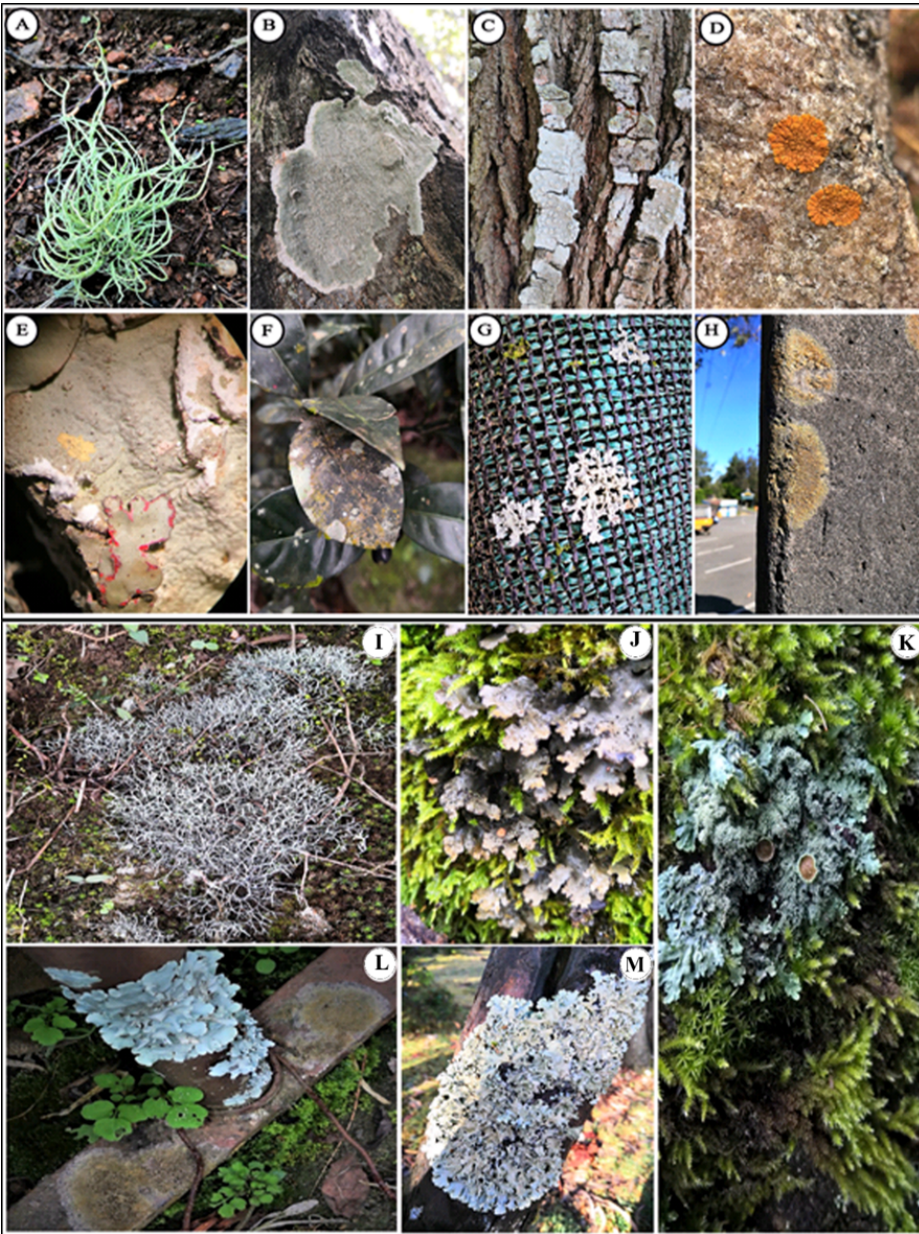


Figure 1

Lichen habitats in Tamil Nadu's Eastern Ghats, Western Ghats, and Coastal Ecosystem.

[A: Terricolous, B: Corticolous, C: Lignicolous, D: Saxicolous, E: Lichenicolous, F: Folicolous, G: Plasticolous, H: Cemetricolous, I: Terricolous, J and K: Muscicolous, L: Ferricolous and M: Corticolous]

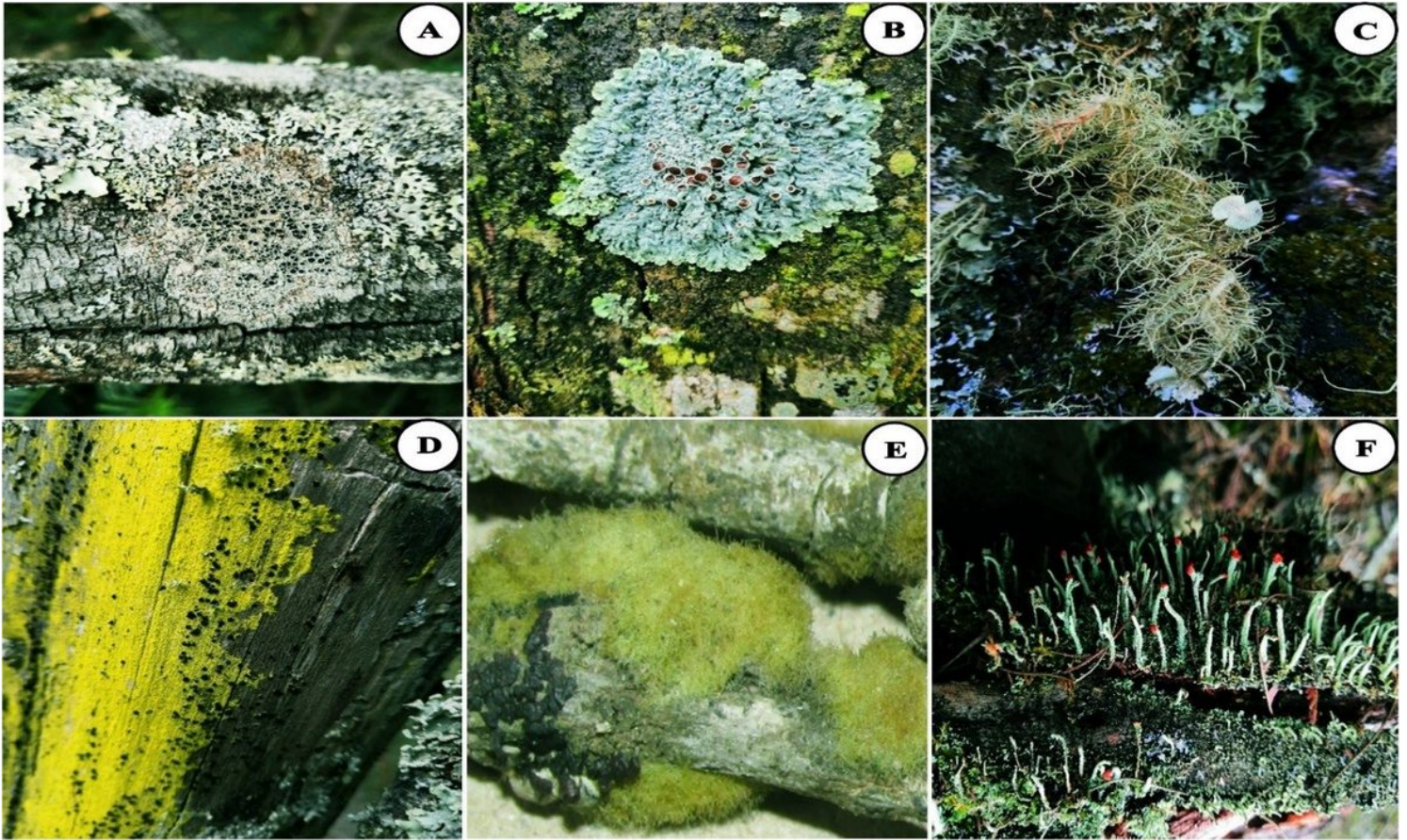


Figure 2

Lichen samples collected in Tamil Nadu, India, from the southern-western Ghats and the northern-eastern Ghats.

[A: Crustose, B: Foliose, C: Fruticose, D: Leprose, E: Fibrils and F: Squamulose]

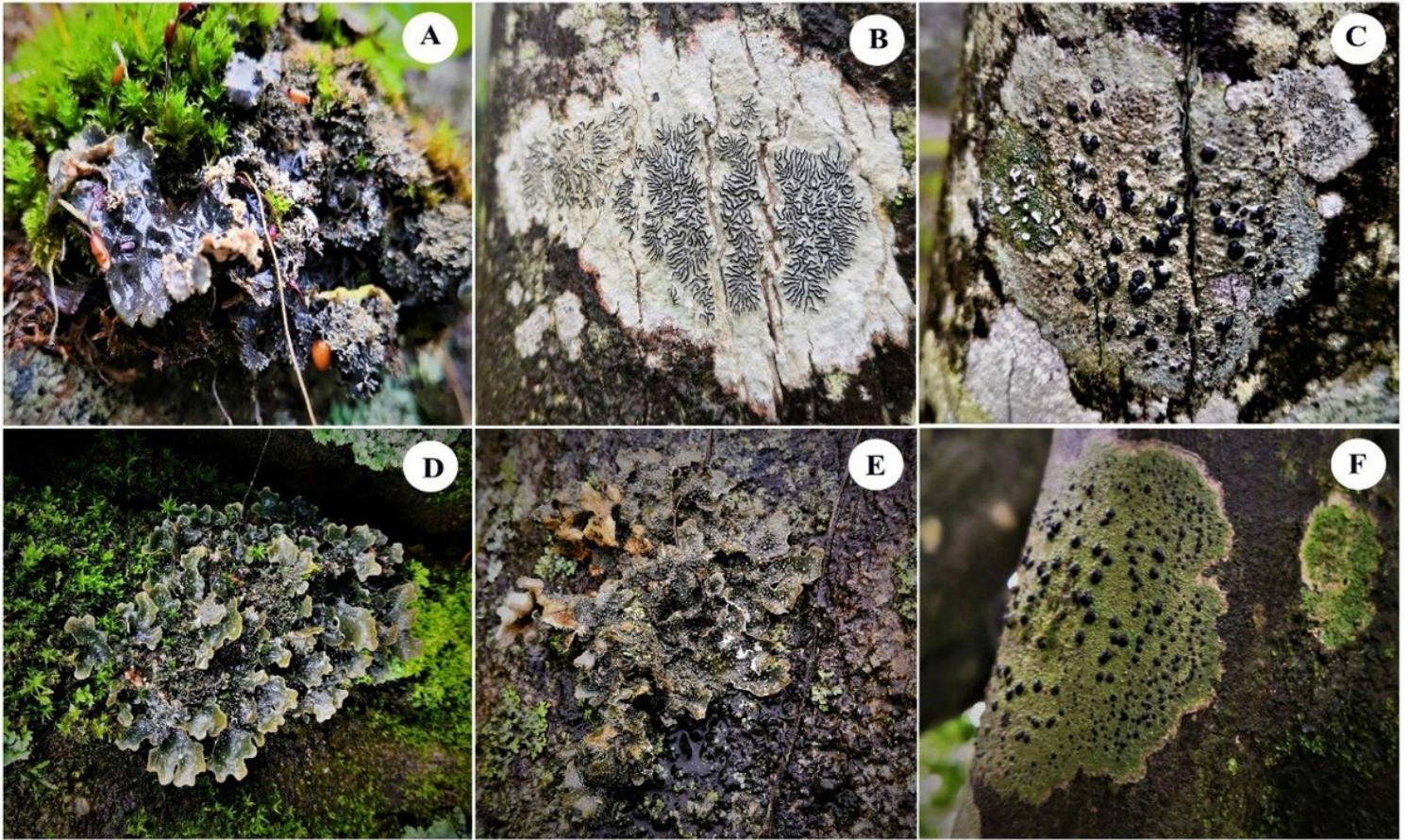


Figure 3

Common names of the lichens distributed at Megamalai, a part of the Southern Western Ghats of Tamil Nadu, India.

[A: Dog lichen / Pelt Lichen, B: Script lichen, C: Pore lichen, D: Gold Speckle Belly Lichen, E: Wreath Lichen and F: Pimple Lichen]

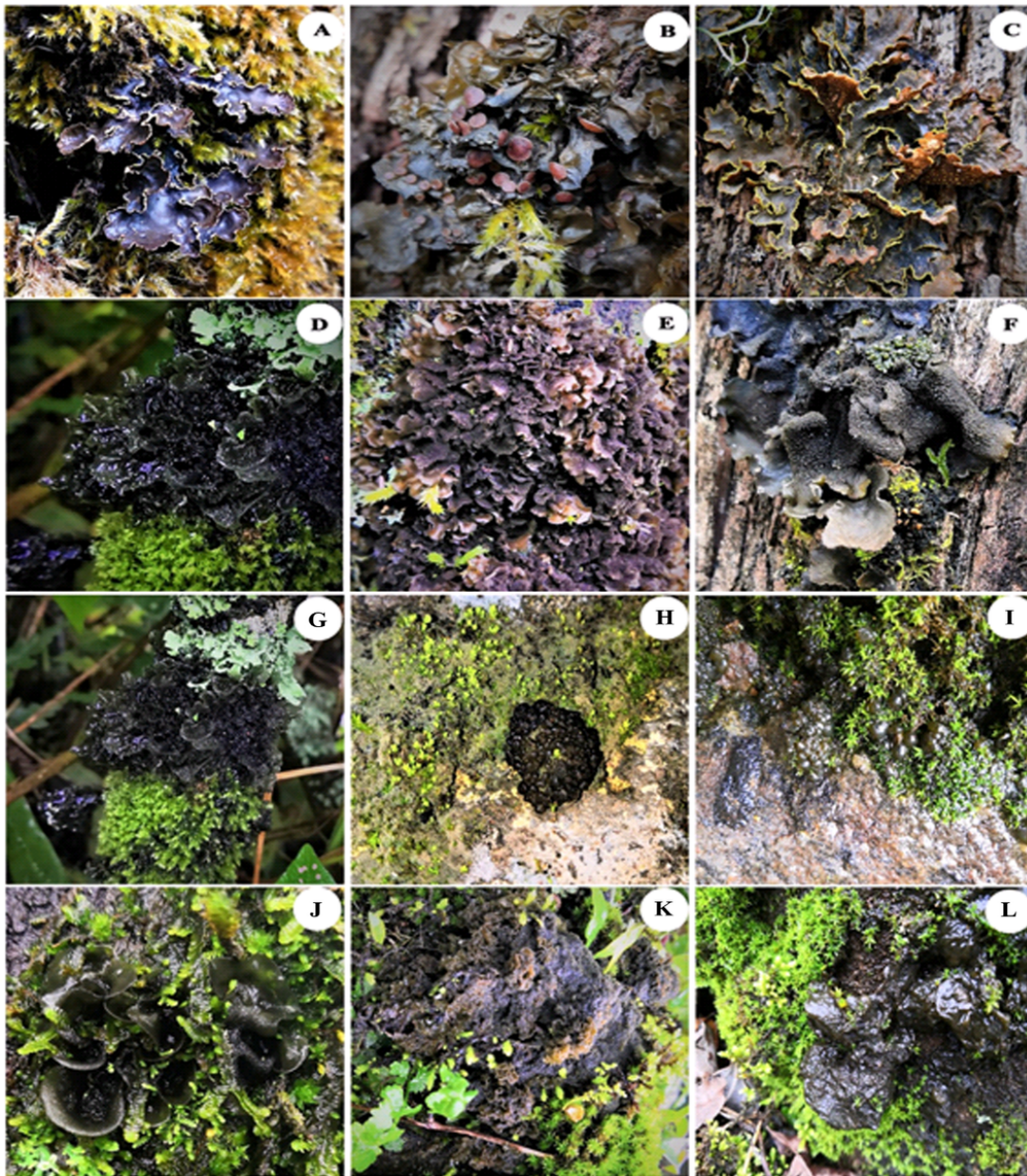


Figure 4

Distribution pattern of Cyanolichens (Jelly and Skin Lichens) from Tamil Nadu's Paulney and Megamalai Hills.

[A: *Pseudocyphellaria argyracea* (Bory ex Delise) Vain (Speckle Belly Lichen), B: *Leptogium denticulatum* Nyl (Skin Lichen), C: *Crocadia aurata* (Sm. Ex Ach.) Vain (Gold Speckle Belly Lichen), D and G: *Leptogium austroamericanum* (Malme) C.W. Dodge (Skin Lichen), E and K: *Leptogium marginellum* (Sw.) Gray (Soil Warm Lichen) and F and L: *Leptogium cyanescens* (Ach.) Körb (Jelly lichen) and H and I: *Leptogium spp.* (Skin and Pulp Lichens)]

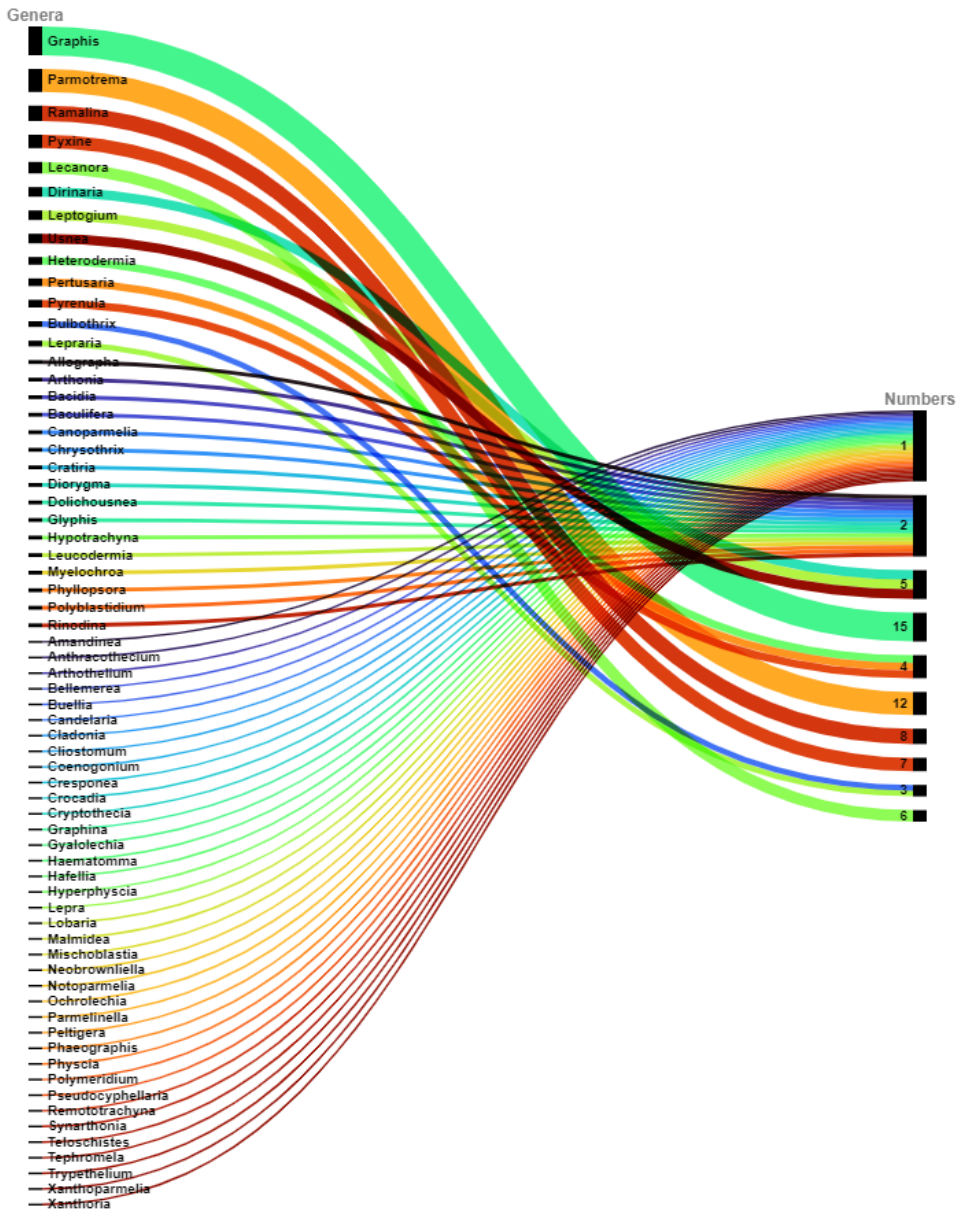


Figure 5

depicts the generic population of the identified lichen species in Tamil Nadu's Eastern and Western Ghats ecosystems.

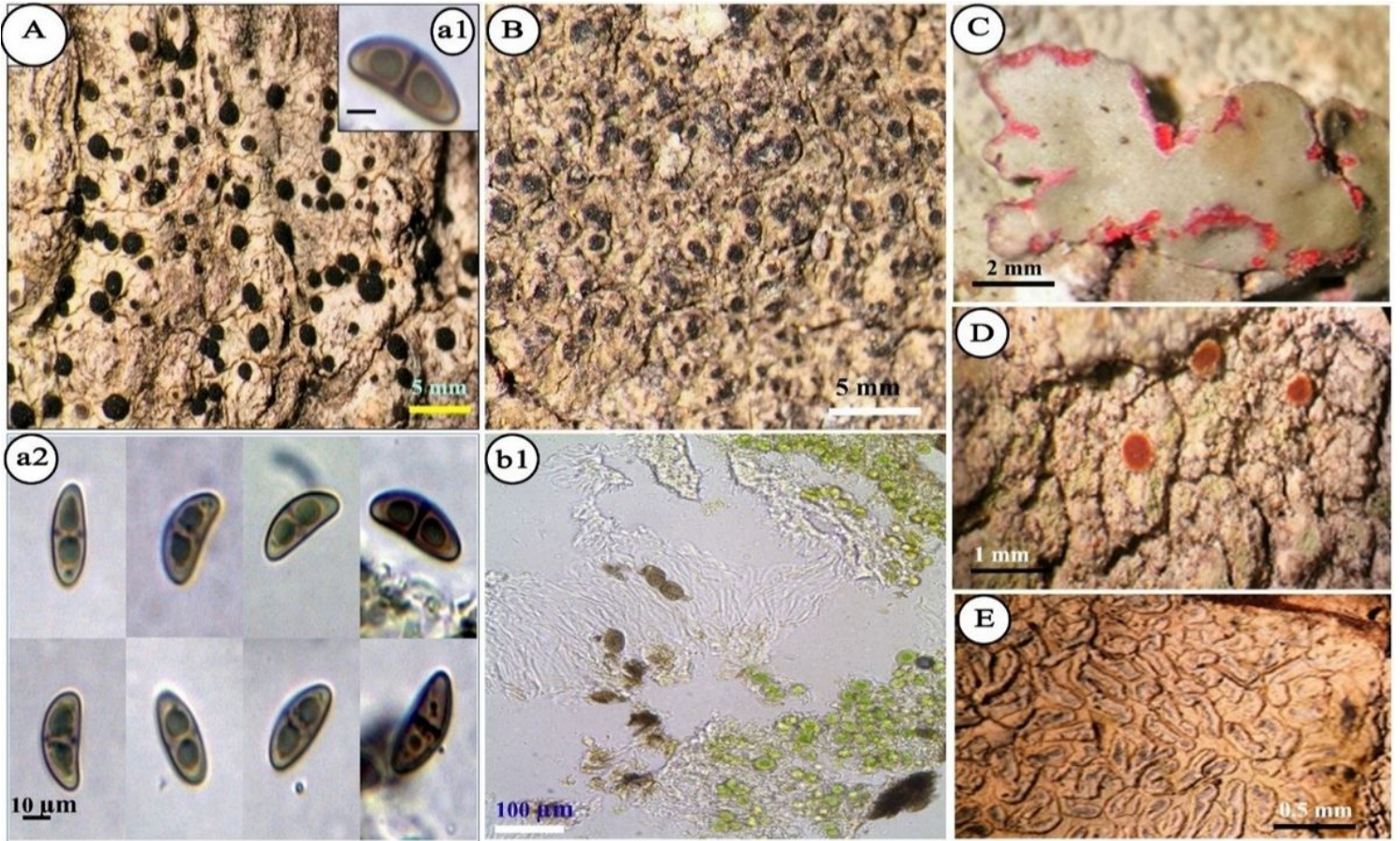


Figure 6

Additional records of regional and state lichen flora in Tamil Nadu, India

[A: *Amandinea submontana* Marbach), B: *Rinodina mackenziei* Räsänen, b1: Anatomical section of apothecia, C: *Pyxine coccifera* (Fée) Nyl., D: *Rinodina sophodes* (Ach.) Massal and E: *Diorygma hieroglyphicum* (Pers.) Staiger & Kalb.]

Supplementary Files

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- [MAP1.png](#)