Moss Flora of Palni Hills (Tamil Nadu), India- A Checklist

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Abstract
The current investigations provide the current status of mosses of Palni hills. The occurrence of 54 taxa of mosses has been recorded in Kodaikanal and neighbouring areas. Of which 12 taxa are new to the Palni hills which indicates the potential of this region in nourishing the bryo-diversity.

Key Words
Palni hills, Bryophyta, Mosses, Diversity.

Introduction
Mosses are a much evolved group of bryophytes with about 17,000 species under 3 subclasses, 4 orders, 89 families and about 900 genera across the world (Richardson, 1981; Vitt, 1984). They have a unique place between lower non-vascular cryptogams and vascular cryptogams. They colonize the bare soil surface thus a key in initiating ecosystem as a pioneer in ecological succession. A number of mosses evolve in response to special ecological, morphological and physiological adaptations to demanding environmental conditions in which the other group of plants generally fail to survive. These mosses also tend to be highly specific for particular microenvironment.
Palni hills, located in the Eastern branch of Western Ghats (Hot spot of biodiversity), have received insufficient attention for bryological studies though it provide conducive environment for the abundant prevalence of these non-vascular cryptogams. The past bryofloristic studies in the area are fragmentary and far from satisfactory (see Foreau, 1931, 1961, 1964; Udar, 1976, Gangulee, 1969-80, Alam and Srivastava, 2009). Many taxa described previously are stated to be not traceable even in their original locations and our knowledge about the present status of each species is not clearly known, hence an attempt has been made to provide up to date information about the existing status of musci diversity of Palni hills.
The earlier record of mosses of western ghats is based on contributions of Montagne (1842) in "Cryptogamme Nilgheriensis" and C. Muller (1853, 1854). Beside these the other significant work on this region includes Mitten (1859), Brotherus (1989), Bruehl (1931), Noguchi (1958), Wadhwa

(1969), Vohra et al (1982); Ellis (1989), Manju et al (2008), Verma et al (2011). The area of interest of these workers was basically the Nilgiri hills, Kerala and Karnataka. Palni hills have been somewhat neglected and the work was largely on the hepatic diversity as Chopra (1975) listed 40 species of liverworts from various localities of Palni hills chiefly based on collections made by Rangachariar, Father Foreau, Mrs. Robinson and Rupinat between 1916-1934. However, Foreau (1931, 1961, 1964) listed some moss taxa from these hills. Lal (2005) also provided a checklist of Indian mosses which also include taxa from Western Ghats. Recently Alam and Srivastava (2009) provide first ever record of liverworts from Palni hills but there is no consolidated record of moss flora of this region. The present work is an attempt to fill this lacuna and it has based on recent exhaustive collections during 2008-2010. Investigations during last few years on several exhaustive collections and surveys made by the authors and their associates provide the first authentic record of the moss diversity occurring in this region.

The areas explored include Kodaikanal, Shembaganur, Silver Cascade, Tiger Shola, Palangi, Attuvampatti and Periakulum, having variable topography and microclimate, with much diversified taxa in the region.

The taxonomic criteria used in recognition of genera and species are based on morphological features employed by different workers (Frahm, 1983; Ninh, 1984; Allen, 1999; Virtanen, 2000).

Topography

Palni hills, comes under Dindigul district of Tamil Nadu, India, and is a part of Eastern Ghats, lying between 10°12’ - 10°15’N latitude and 77°26’ - 77°33’E longitude (Figs. 1-2). The area shows an altitudinal range of 360-2550m. It extends in a North-east - South-west streak in Indian peninsula covering an area of about 75,000 sq. km with an average width of 200 km in the North and 100 km in South. It extends over a length of 1750 km between Mahanadi and Vaigai river along the East coast. Mahanadi basin marks the northern edge of the Eastern Ghats while the southern edge is the Nilgiri hills. The weather varies over the range, but much of the plateau receives an average of more than 1500 mm of rainfall annually, with not more than four dry months. In the higher areas mean day temperature in the coolest months is below 17°C (Alam and Srivastava, 2009).

List of mosses occurring in Palni hills:

A. ORDER HYPNALES (M. Fleisch.) W. R. Buck & Vitt.

I. Meteoriaceae Kindb.

a. ***Diaphanodon*** Renauld & Cardot

1. *Diaphanodon procumbens* (C. Muell.) Ren. & Cord.

b. ***Meteorium*** (Brid.) Dozy & Molk.

2. *Meteorium brevirameum* (C. Muell.) Broth.

c. ***Aerobryidium*** M. Fleisch

3. *Aerobryidium punctlatum* (C. Muell.) Dixon

4. *Aerobryidium filamentosum* (Hook.) Fleish.

II. Entodontaceae Kindb.

d. Entodon Müll. Hal

5. *Entodon plicatus* C. Muell.

e. ***Erythrodontium*** Hampe

6. *Erythrodontium julaceum* (Schwaegr.) Par.

III. Pterobryaceae Kindb.

f. ***Floribundaria*** M. Fleisch.

7. *Floribundaria floribunda* (Doz. et Molk) Fleish.

g. ***Meteoriopsis*** Broth.

8. *Meteoriopsis squarrosa* (Hook.) Fleish.

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h. ***Symphysodon*** Dozy & Molk.
9. *Symphysodon perrottetii* Mont.
IV. Miyabeaceae Enroth et al.
i. ***Homaliadelphus*** Dixon & P. de la Varde
10. *Homaliadelphus targionianus* (Mitt.) Dix. &Verd.
V. Neckeraceae Schimp.
j. ***Neckera*** Hedw.
11. *Neckera goughiana* Mitt.
12. *Neckeropsis exserta* (Scwaegr.) Broth.Neckeraceae
VI. Sematophyllaceae Broth.
k. ***Sematophyllum*** Mitt.
13. *Sematophyllum caespitosum* (Hedw.) Broth.
14. *Sematophyllum subhumile* (C. Muell.) Fleish.
VII. Hylocomiaceae M. Fleisch.
l. ***Thamnium*** C. Muell.
15. *Thamnium schmidii* (C. Muell.) Jaeg.
VIII. Thuidiaceae Schimp
m. ***Thuidium*** Bruch & Schimp.
16. *Thuidium cymbifolium* Doz. *et* Molk.
17. *Thuidium glaucinum* (Mitt.) Bosh. *et* Lac.
IX. Hypnaceae Schimp.
n. ***Isopterygium*** Mitt.
18. *Isopterygium albescens* (Hook.) Jaeg.
19. *Isopterygium serrulatum* Fleish.
X. Stereophyllaceae W. R. Buck & Ireland
o. ***Entodontopsis*** Broth.
20. *Entodontopsis wightii* (Mitt.) W.R. Buck & Ireland.
B. ORDER BRYALES Limpr.
XI. Bartramiaceae Schwägr.
p. ***Bartramia*** Hedw.
21. *Bartramia dicranacea* C. Muell.
22. *Bartramia leptodonta* Wils.
q. ***Breutelia*** (Bruch & Schimp.) Schimp
23. *Breutelia dicranacea* (C. Muell.) Mitt.
r. ***Philonotis*** Brid.
24.*Philonotis pseudofontana* (C. Muell..) Jaeg.
XII. Bryaceae Schwägr.
s. ***Anomobryum*** Schimp.
25. *Anomobryum schmidii* (C. Muell.) Jaeg.
t. ***Brachymenium*** Schwägr.
26. *Brachymenium bryoides* Hook. *ex* Schwaegr.
27. *Brachymenium buchananii* var. *cuspidatum*
u. ***Bryum*** Hedw.
28. *Bryum alpinum* With.
XIII. Mniaceae Schwägr.
v. ***Mielichhoferia*** Nees & Hornsch.
29. *Mielichhoferia schmidii* C. Muell.
x. ***Mnium*** Hedw.
30. *Mnium shynehophorum* Hook.
y. ***Pohlia*** Hedw.
31. *Pohlia flexuoasa* W.J. Hook.

C. ORDER HOOKERIALES M. Fleisch.
XIV. Hypopterygiaceae Mitt.
z. **Hypopterygium** Brid.
32. Hypopterygium tenellum C. Muell.
D. ORDER ORTHOTRICHALES Dixon
XV. Orthotrichaceae Arn.
aa. ***Ulota*** D. Mohr
33. *Ulota schmidii* (C.Muell.) Mitt.
ab. ***Zygodon*** Hook. & Taylor
34. *Zygodon cylindrocarpus* C. Muell.
ac.**Macromitrium** Brid.
35. *Macromitrium nilgherrense* C. Muell.
E. ORDER GRIMMIALES M. Fleisch.
XVI. Ptychomitriaceae Schimp.
ad. ***Ptychomitrium*** Fürnr.
36. *Ptychomitrium tortula* (Harrey) Jaeg.
XVII. Ptychomitriaceae Schimp.
ae. ***Ptychomitrium*** Fürnr.
37. *Ptychomitrium tortula* (Harrey) Jaeg.
F. ORDER DICRANALES H. Philib. ex M. Fleisch.
XVIII. Ditrichaceae Limpr.
af. ***Ditrichum*** Hampe
38. *Ditrichum heteromallum* (Hedw.) Hamp.
ag. ***Pleuridium*** Rahb.
39. *Pleuridium denticulatum* (C. Muell.) Mitt.
XIX. Fissidentaceae Schimp.
ah***. Fissidens*** Hedw.
40. *Fissidens ceylonensis* var. *ceylonensis*
41.*Fissidens ceylonicus* Dozy et al.
42. Fissidens *wilsoni* Mont.
43. *Fissidens anomalus* Mont.
XX. Dicranaceae Schimp.
ai. ***Campylopodium*** (Müll. Hal.) Besch.
44.*Campylopodium nodiflorum* C. Muell.
aj.***Campylopus*** Brid.
45. *Campylopus introflexus* (Hedw.) Brid.
XXI. **Leucobryaceae** Schimp.
ak. ***Leucobryum*** Hampe
46. *Leucobryum nilgherense* C. Muell.
G. ORDER POLYTRICHALES M. Fleisch.
XXII. Polytrichaceae Schwägr.
al. ***Pogonatum*** P. Beauv.
47. *Pogonatum aloides* (Hedwig.) Palisot Beauv.
H. ORDER POTTIALES M. Fleisch.
XXIII. Pottiaceae Schimp.
am. ***Bryoerythrophyllum*** P.C. Chen
48. *Bryoerythrophyllum recurvistrum* (Hedw.) Chen
an. ***Hyophila*** Brid.
49. *Hyophila involuta* (Hook.) Jaeg.
50. *Hyophila kurziana* Gang.
ao. ***Trichostomum*** Bruch.

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51. *Trichostomum orthodontum* (Mitt.) Broth.

I. ORDER FUNARIALES M. Fleisch.

XXIV. Funariaceae Schwägr.

ap. ***Funaria*** Hedw.

52. *Funaria hygrometrica* Hedw.

aq. ***Entosthodon*** Schwägr.

53. *Entosthodon perrottatii* C. Muell.

ar. ***Physcomitrium*** (Brid.) Brid.,

54. *Physcomitrium curgens* Broth.

New records for Palni hills:

1. *Bryoerythrophyllum recurvistrum* (Hedw.) Chen
2. *Ditrichium heteromallum* (Hedw.) Hamp.
3. *Entodontopsis wightii* (Mitt.) W.R. Buck & Ireland.
4. *Erythrodontium julaceum* (Schwaegr.) Par.
5. *Floribundaria floribunda* (Doz. et Molk) Fleish.
6. *Hyophila kurziana* Gang.
7. *Isopterygium serrulatum* Fleish.
8. *Neckeropsis exserta* (Scwaegr.) Broth.
9. *Pohlia flexuoasa* W.J. Hook.
10. *Sematophyllum humile* (Mitt.) Broth.
11. *Sematophyllum caespitosum* (Hedw.) Broth.
12. *Thuidium glaucinum* (Mitt.) Bosh. *et* Lac.

Discussion

The study eventually revealed the occurrence of 9 orders, 25 families, 43 genera and 54 species. The order Hypnales is most diversified with 10 families having 15 genera and 20 species followed by order Dicranales with 6 families (7 genera and 10 species) and order Bryales is next to them consisting of 3 families (9 genera and 11 species). Out of 54 taxa 12 are new to Palni hills. The most prominent family is Pottiaceae Schimp. (3 genera and 4 species) followed by Orthotrichaceae Arn. (3 genera and 3 species). Genus *Fissidens* Hedw. having the maximum 4 species (Figs. 3-4). Interestingly the moss flora of Palni hills has significant similarities with the Nilgiri hills (Verma et al, 2011) exhibiting similar environmental conditions and microclimate as well as niche. The study revealed that Palni hills is a remarkable place for diversity of mosses and need further exploration in future also that would provide some more interesting results.

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FIGURE 1: MAP OF SOUTH INDIA

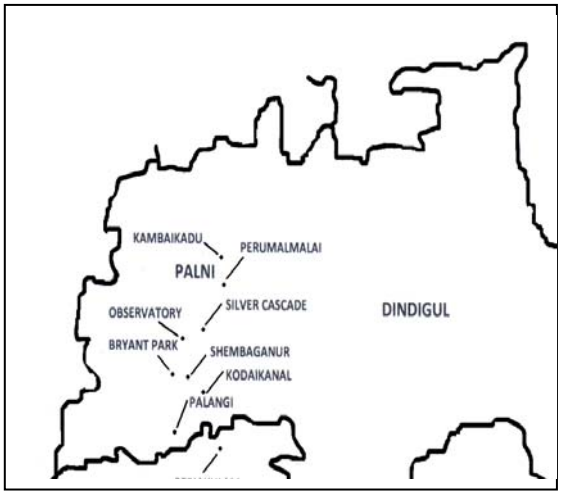

FIGURE 2: MAP OF PALNI HILLS SHOWING BRYO-RICH LOCATIONS

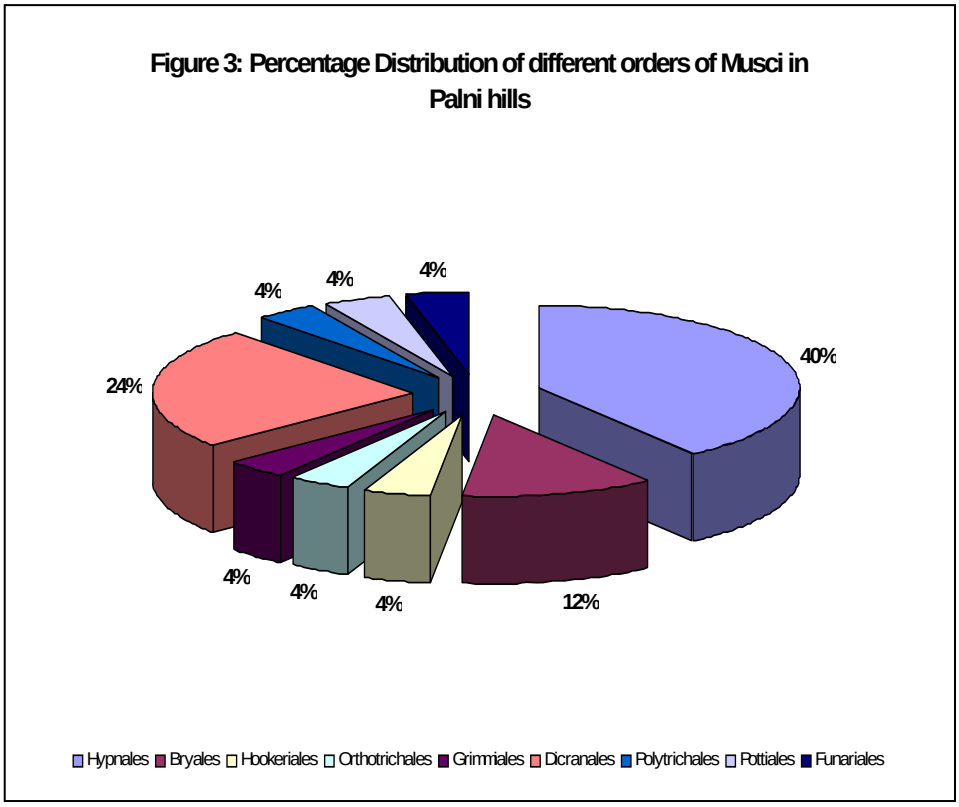

Fig. 4: Representation of different orders of Musci in Palni hills