

## A preliminary study on bryodiversity of Similipal Biosphere Reserve (Odisha), India

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### Abstract

Similipal Biosphere Reserve is a part of biotic province of Chhotanagpur Plateau. It has a representative ecosystem under Mahanadian biogeographic region. Its biodiversity is an assemblage representation of Western Ghats and North-East India. Regarding bryophytes this area was rather unexplored and the current investigation shows the occurrence of 33 taxa of bryophytes in this biosphere reserve and its neighboring areas. Each species has been enumerated with its ecological and distributional details.

**Key-words:** Bryophyta, Diversity, Similipal Biosphere Reserve, Odisha, India.

### 1. Introduction

Bryophytes are one of the important contributors to the global plant diversity by virtue of being pioneers of terrestrial ecosystem. They represent a somewhat heterogeneous assemblage of plants including liverworts, hornworts and mosses that impart lush greenery, a verdant cover, spongy bed or carpet in every possible habitat. They are the first colonizers of the land habit, on rocks, slopes, hillsides, house walls and old monument remains or as epiphytes on bark of trees, fallen logs, stumps, leaves and forest floor, and also spread as fillers occupying nearly all conceivable habitats. Although their small size, they encompasses major components of the biomass and photosynthetic production in forest ecosystems (Frego, 2007). Bryophytes are also widely used as metal-accumulator and bio-indicators of environment for their unique morphology and anatomical responses as some species are extremely sensitive to pollutants and reveal visible symptoms even in the presence of very minute quantities of pollutants (Alam & Srivastava, 2009, Sahu et al., 2007). They have several biological features making them particularly suited to serve as study organism in macro-evolutionary, population genetics and ecological research. Bryophytes are used in medicines, household purposes, horticulture, agriculture, fuel in industries and as ecological indicators throughout the world (Glime, 2006; Nath & Asthana, 2005). Bryophytes are the second largest group of plants, with about 25,000 species worldwide (Buck & Goffinet, 2000). The plants

are distributed in Eastern and Western Himalayas, South India and Central India (Nath & Asthana, 2005).

Although in India the work of bryophyte's diversity is on a call and most of the well known as well as some less known regions have been explored such as Eastern Himalayas, Western Himalayas, Nilgiri and Palni hills (South India), and Central India (Singh, 1966; Singh 1987; Srivastava, 1998; Parihar et al., 1994; Alam, 2011; Gangulee, 1969-1980). Now it is a requisite to explore those areas of country where exploration regarding bryodiversity is little known. Work is going on this direction also and several regions have been explored recently (Alam et al, 2011; Asthana & Sahu, 2010; Sharma and Alam, 2011). Odisha state, which is still poorly known as far as bryophytes are concerned. Therefore as an initiative attempt, recently Similipal Biosphere Reserve has been selected for exploration which was neglected. Similipal biosphere reserve has a mixed type of vegetation known as Odisha semi-evergreen forests with tropical moist broadleaf forest and tropical moist deciduous forests with dry deciduous hill forest and high level Sal forests (Champion & Seth, 1968). The forest boasts of innumerable medicinal and aromatic plants, which provide a source of earnings for the tribal people.

### **1.1. Topography**

The area lies between 20° 17' to 22° 34' North latitude and 85° 40' to 87° 10' East longitude and at an altitude of 40 meters to 1166 meters above sea level and the average temperatures range between minimum 2°C in winter to a maximum of 48°C in summer having average rain fall 22000 mms (see Fig. 1). Similipal bio reserve is a part of the biotic province of Chhotanagpur Plateau. The Reserve derives its name from the magnificent Simul (Silk Cotton Tree. It has been aptly described as Salmali Saila (the hill of Simul) in the poem 'Usha' written by the famous Oriya poet Laureate, Radhanath Ray. The hills, with their numerous peaks and valleys, rise steeply from the plains of Udala in the south and Baripada in the southeast and extend up to Jashipur in the northwest, Bisnoi in the north and Thakurmunda to the west. Similipal is a representative ecosystem under Mahanadian Biogeographic Region. Its floral and faunal composition has some similarities with elements from the Western Ghats and Northeast India.

The study area concentrates in and around the deep forest pockets of tribal villages which comes under Similipal bioreserve located in Mayurbhanj districts, Odisha India. The localities which were explored include Nawana, Borachaiapani, Bhanjabasa, Palpala, Barhakamuda, Podadiha, Noto, Sarat, Thakurmunda, Gudugudia, Panasia dam, Banibasa, Khadkei, Devkund, Kaptipada, Udala, Joranda, Kaliani, and Meghasini (Behera, 2003; 2006).

The previous and probably the solitary bryo-floristic studies of this region by Dash et al. (2007) reported 22 taxa including both liverworts and hornworts. However that report is sporadic and incomplete because there is no information about the musci. In present investigation an attempt has been made to fill this lacuna. It revealed and enumerates the bryophyte diversity of the area along with author citation followed by the ecological notes on growing area, the locality, altitude, and the collector's name. The collected bryophytes are deposited in Herbarium of Banasthali Vidyapith (BVH).

### **2. Materials and Methods**

In view of the phyto-geographic interest in Similipal Biosphere Reserve, this check list is intended to make available a summary bryophytes reported and recently collected in this area. Collections were made in June 2011 and November, 2011 during field trips to the area. Specimens were collected (by KKB) and preserved and deposited in the Banasthali University Herbarium (BVH). Identification has made using literature and consulting herbarium specimens. This work also includes recent publications of Dash et al. (2007); Dash et al. (2009) and Bapna and Kachroo (2000).

### **3. Results**

**List of taxa****CLASS: JUNGERMANNIOPSIDA Stotler & Crand.-Stotl.,**

ORDER - METZGERIALES R. M. R. M. SCHUST. EMEND SCHLJAK.

**Metzgeriaceae** H. Klinggr.*Metzgeria* Raddi**1. *Metzgeria himalayensis* Kashyap**

Specimen examined: Odisha: Similipal Biosphere Reserve; 786751/2011(BVH)

Ecology: Plants closely creeping, mostly growing in thallose mats on other angiospermic trees.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**Pelliaceae** H. Klinggr.*Pellia* Raddi**2. *Pellia epiphylla* (L.) Corda**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786762/2011(BVH)

Ecology: It is common near streams and ditches and also grows on wet rocks.

Distribution in India: Distributed in Eastern Himalayas, Western Himalayas and Central India (Parihar et al., 1994).

**Pallaviciniaceae** Mig.*Pallavicinia* S. Gray**3. *Pallavicinia lyellii* (Hook.) L. Carruth.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786737/2011(BVH)

Ecology: Plants grows in scattered patches on damp soil.

Distribution in India: Distributed in Eastern Himalayas, South India and Central India (Parihar et al., 1994).

**ORDER-JUNGERMANNIALES H. KLINGGR.****Lophocoleaceae** Vanden Berghen*Lophocolea* (Dumort.) Dumort.**4. *Lophocolea bidentata* (L.) Dumort.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786732/2011(BVH)

Ecology: Plants grows as terricolous in moist and shady condition.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

*Heteroscyphus* Schiffn.**5. *Heteroscyphus argutus* (Nees) Schiffn.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786722/2011(BVH)

Ecology: Occurring in a wide range of habitats but mostly the plants grows as terricolous in moist and shady condition.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**CLASS: MARCHANTIOPSIDA Cronquist, Takht. & W. Zimm.,**

ORDER – MARCHANTIALES LIMPR.

**Targioniaceae** Dumort.*Targionia* L.**6. *Targionia hypophylla* L.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786745/2011(BVH)

Ecology: Plants grows as terricolous in wet and moist soil and soil covered rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**7. *Targionia indica* Udar et A. Gupta**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786759/2011(BVH)

Ecology: Plants grows as terricolous in wet and moist soil and soil covered rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**Cythodiaceae** K. Müll.

*Cyathodium* Kunze

**8. *Cyathodium cavernarum* Kunze**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786759/2011(BVH)

Ecology: Plants grows as terricolous in wet and moist soil in shady places.

Distribution in India: Distributed in Gangetic planes of India (Parihar et al., 1994).

**Aytoniaceae** Cavers

*Asterella* P. Beauv.

**9. *Asterella blumeana* (Nees) Kachroo**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786786/2011(BVH)

Ecology: Plants grows as terricolous in wet and moist soil.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

*Plagiochasma* Lehm. et Lindenb.

**10. *Plagiochasma appendiculatum* Lehm. et Lindenb.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786794/2011(BVH)

Ecology: Plants grows as terricolous in wet and moist soil.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**11. *Plagiochasma intermedium* Lindenb. et Gottsche. in G. L. & N.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786794/2011(BVH)

Ecology: Plants grows as terricolous in wet and moist soil.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

*Reboulia* Raddi

**12. *Reboulia hemisphaerica* (L.) Raddi**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786762/2011(BVH)

Ecology: Plants grows as terricolous in wet and soil covered rocks, also on exposed rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**Dumortieraceae** D. G. Long

*Dumortiera* Nees

**13. *Dumortiera hirsuta* (Sw.) Nees in Reinw. Bl. et Nees**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786790/2011(BVH)

Ecology: Grows as terricolous in wet and soil covered rocks, also on exposed rocks.

Distribution in India: Distributed in Eastern Himalayas, Western Himalayas and South India (Alam and Srivastava, 2009).

**Marchantiaceae** Lindl.

*Marchantia* L. emend Raddi

**14. *Marchantia polymorpha* L.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786742/2011(BVH)

Ecology: Plants grows as terricolous in wet and soil covered rocks, also on exposed rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**15. *Marchantia subintegra* Mitt.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786780/2011(BVH)

Ecology: Grows as terricolous in wet and soil covered rocks, also on exposed rocks.

Distribution in India: Distributed in Eastern Himalayas (Parihar et al., 1994).

**16. *Marchantia palmata* Nees**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786721/2011(BVH)

Ecology: Grows as terricolous in wet and soil covered rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**Conocephalaceae** Müll. Frib. ex Grolle,

*Conocephalum* Wigg.

**17. *Conocephalum conicum*** (L.) Lindb.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786770/2011(BVH)

Ecology: Grows as terricolous in shady wet and soil covered rocks.

Distribution in India: Distributed in Eastern Himalayas and Western Himalayas (Iqbal et al., 2011).

**Ricciaceae** Reichenb.

*Riccia* L.

**18. *Riccia crystalina*** L.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786833/2011(BVH)

Ecology: Plants grows as terricolous on soil and soil covered rocks..

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**19. *Riccia fluitans*** L.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786721/2011(BVH)

Ecology: Grows on extremely wet soil or near water source.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

*Ricciocarpos* Corda

**20. *Ricciocarpos natans*** L.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786835/2011(BVH)

Ecology: Plants grows as terricolous on soil and soil covered rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**Aneuraceae** H. Klinggr.

*Riccardia* S. Gray

**21. *Riccardia levieri*** Schiffn.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786841/2011(BVH)

Ecology: Plants grows as terricolous on soil and soil covered rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Parihar et al., 1994).

**CLASS –ANTHOCEROTOPSIDA DE BARY EX JANCZ. CORR. PROSK.**

ORDER – ANTHOCEROTALES LIMPR. IN COHN

**Anthocerotaceae** (Gray) Dumort. corr. Trevis. emend. Hassel

*Anthoceros* L.

**22. *Anthoceros punctatus*** L.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786770/2011(BVH)

Ecology: Grows as terricolous in shady wet and soil covered rocks.

Distribution in India: Distributed in Eastern Himalayas, Central India and Gangetic plains (Parihar et al., 1994).

**CLASS BRYOPSISIDA ROTHM.**

ORDER POTTIALES M. FLEISCH.

**Pottiaceae** Schimp.

*Anoetangium* Schwagr.

**23. *Anoetangium stracheyanum*** Mitt.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786878/2011(BVH)  
 Ecology: Grows in damp, slightly calcareous crevices and rocks.  
 Distribution in India: Distributed in Eastern Himalayas, Western Himalayas and South India (Lal, 2005).

*Barbula* Hedw.,

**24. *Barbula arcuata* Griff.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786777/2011(BVH)  
 Ecology: Grows in damp, slightly calcareous crevices and rocks, also on exposed rocks.  
 Distribution in India: Well distributed in almost all bryogeographical regions of India (Lal, 2005).  
*Hyophila* Brid.

**25. *Hyophila involuta* (Hook.) Jaeg.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786771/2011(BVH)  
 Ecology: Grows in damp, slightly calcareous crevices and rocks, also on exposed rocks.  
 Distribution in India: Well distributed in almost all bryogeographical regions of India (Lal, 2005).

**ORDER-POLYTRICHALES M. FLEISCH.**

**Polytrichaceae** Schwägr

*Polytrichum* Hedw.

**26. *Polytrichum juniperum* Hedw.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786779/2011(BVH)  
 Ecology: Plant grows on shady as well as exposed rocks.  
 Distribution in India: Only known from western Himalayas (Lal, 2005).

**ORDER-BRYALES LIMPR.**

**Bryaceae** Schwägr.

*Bryum* Hedw.

**27. *Bryum argenteum* Hedw.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786769/2011(BVH)  
 Ecology: Grows in disturbed habitats in very dry soil, also on exposed rocks.  
 Distribution in India: Well distributed in almost all bryogeographical regions of India (Lal, 2005).

**ORDER:FUNARIALES M. FLEISCH.**

**Funariaceae** Schwägr

*Funaria* Hedw.

**28. *Funaria hygrometrica* Hedw.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786755/2011(BVH)  
 Ecology: Grows on bare, disturbed, nutrient-rich soils.  
 Distribution in India: Well distributed in almost all bryogeographical regions of India (Lal, 2005).

**ORDER:DICRANALES H. PHILIB EX M. FLEISCH.**

**Fissidentaceae** Schimp.

*Fissidens* Hedw.

**29. *Fissidens bryoides* Hedw.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786825/2011(BVH)  
 Ecology: Grows on dry limestone and on calcareous dry walls, but occasionally occurs in relatively moist places also.  
 Distribution in India: Well distributed in almost all bryogeographical regions of India (Lal, 2005).

**ORDER- HYPNALES W. R. BUCK ET VITT**

**Sematophyllaceae** Broth.

*Foreauella* Dix. et P. Vard.

**30. *Foreauella orthotheca* (Schwaegr.) Dix. et P. Vard.**

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786875/2011(BVH)  
 Ecology: Grows in wet, peaty soil, ditches, rock crevices etc.  
 Distribution in India: Distributed in Eastern Himalayas, South India and Central India (Lal, 2005).

**Leskeaceae** Schimp

*Herpetineuron* (C. Muell.) Card.

**31. *Herpetineuron toccoae*** (Sull. et Lesq.) Card.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786843/2011(BVH)

Ecology: Grows in disturbed habitats in very dry soil, also on exposed rocks.

Distribution in India: Well distributed in almost all bryogeographical regions of India (Lal, 2005).

**Neckeraceae** Schimp.

*Neckeropsis* Reichdt.

**32. *Neckeropsis exserta*** (Schwaegr.) Broth.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786827/2011(BVH)

Ecology: Grows on dry soil, also on exposed rocks.

Distribution in India: Distributed in Eastern Himalayas, Western Himalayas and South India (Lal, 2005).

*Pinnatella* Fleisch.

**33. *Pinnatella calcutensis*** Fleisch.

Specimen examined: India-Odisha: Similipal Biosphere Reserve; 786827/2011(BVH)

Ecology: Grows on moist and disturbed habitats.

Distribution in India: Distributed in Gangetic plains, Central India and South India. (Lal, 2005).

#### 4. Discussion

A complete checklist has been prepared this list 4 classes have 10 orders which include 33 species belonging to 28 genera distributed to 20 families. Class Bryopsida is most diversified and includes 6 orders, 8 families, 11 genera and 11 species. In this class the most prominent order is Hypnales, includes 3 families, 4 genera and 4 species, followed by Pottiales with most diversified family Pottiaceae with 3 genera and 3 species. However on the basis of habit, the thalloid taxa are predominant with order Marchantiopsida having maximum 16 taxa among them *Marchantia* is most frequent and diversified with 3 species. Class Marchantiopsida is represented by single order Marchantiales, the most prominent order in this regions consists of 8 families, 11 genera and 16 species. Class Jungermanniopsida have two orders Metzgeriales with 2 families and 3 genera and Jungermanniales with single family and 2 genera. While class Anthocerotopsida is least represented with single order Anthocerotales having single family with solitary taxa. The maximum similarities in bryo-diversity is with East Himalayan taxa followed by South India and then with Western Himalayas. The present communication provides 33 recognized taxa which is an updated enumeration of the bryophyte taxa from Similipal Biosphere Reserve and its environs with a hope that further explorations may prove to be highly worthwhile in our understanding of the bryodiversity of the region.

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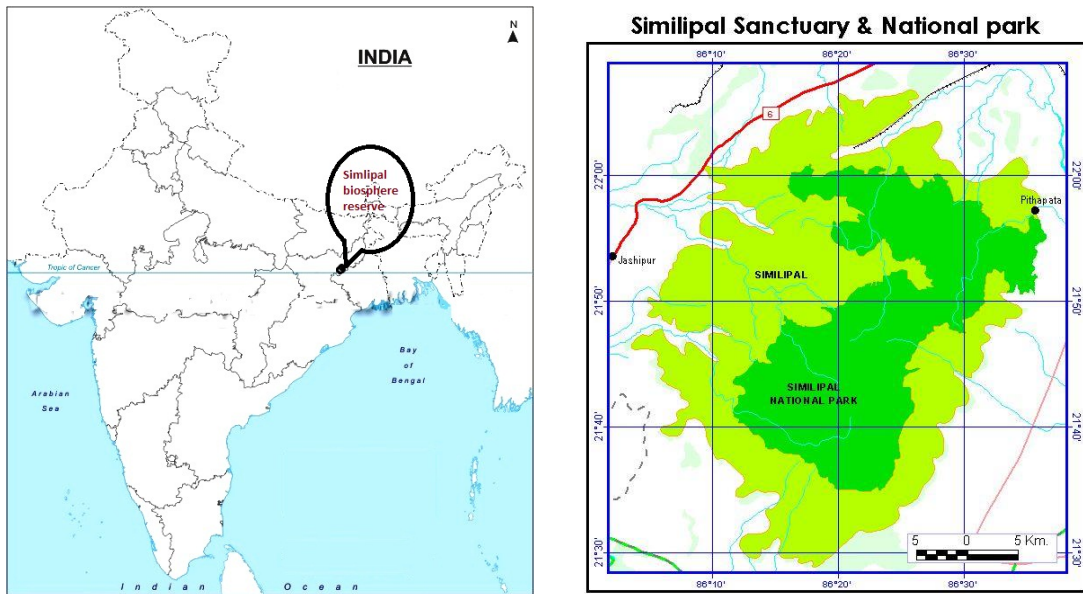


Fig. 1: Location of Similipal Biosphere Reserve