

## Liverwort and Hornwort of Borail Wild Life Sanctuary, Assam, India.

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**Abstract.** A preliminary study has been made for Borail Wild Life Sanctuary, Assam, India. A total of 25 species of liverwort (Marchantiophyta) and one species of hornwort (Anthocerotophyta) have been enumerated. Of these, *Frullania berthoumieuii* is new to India, *Caudalejeunea reniloba* new to North East India, 13 species new to Assam and 11 species are reported for the first time from Borail WLS. *Folioceros paliformis* is rediscovered after its type.

### Introduction

Borail Wild Life Sanctuary located at Southern Part of Assam in Cachar and N.C. Hill district and lies between 24°55'53''-25°05'52'' N latitude and 92°27'40''-93°04'30'' E longitude. The altitude ranging between 55-755 m above mean sea level. It spreads over 326.24 sq. kms. The annual average rainfall and temperature ranges from 2500-4000 mm and 9.2°C to 36.2°C respectively; where as the Humidity varies from 62% to 83%.

The vegetation of the area predominantly of tropical wet-evergreen to tropical semi-evergreen type (Champion & Seth, 1968). The species like *Actinodaphne obovata*, *Amoora rohituka*, *Dipterocarpus turbinatus*, *Duabanga grandiflora*, *Dysoxylum alatum*, *Lagerstroemia flos-reginae*, *Mesua ferrea*, *Mangifera indica*, *Sterculia villosa*, *Quercus semiserrata*, *Callicarpa arborea*, *Castanopsis lancaefolia*, *Holarrhena antidysenterica*, *Macaranga indica*, *Bauhinia purpurea*, *Xerospermum glabratum*, *Mallotus albus*, *Ficus auriculata*, *Schima wallichii*, *Saurauia roxburghii*, *Dipterocarpus turbinatus*, *Albizia procera*, *Gmelina arborea*, *Macaranga denticulata*, *Mallotus nepalensis*, *M. roxburghianus*, *Phyllanthus embelica*, *Ficus bengalensis* etc forming a thick vegetation of the area which provide a natural home for the growth and development of several epiphytic and epiphyllous liverworts over there. As far as a systematic study of the sanctuary is concerned, only a report on angiospermic plants (Dutta et al., 1974) is available. There is no report of liverwort and hornwort is available, thus this work is fast attempt to provide information on this group of plant.

### Materials and Methods

During the intensive field exploration (2010-2012) to Borail Wild Life Sanctuary, one of the author (HAB) have collected several epiphyllous, epiphytic and terrestrial populations of liverwort and hornwort. The specimens were first dried in blotting papers, then preserved in brown paper packets. Species were identified by consultation with latest monographs and revisions. The studied specimens were deposited in Cryptogamic Section of Herbarium of Botanical Survey of India, Shillong (ASSAM). The species are arranged alphabetically in the enumeration.

### Result and Discussion

The present study of Borail Wild Life Sanctuary reveled the occurrence of 26 species belonging to 19 genera and 12 families. Out of these *Frullania berthoumieuii* is new report for India;

*Caudalejeunea reniloba* and *Cololejeunea furcilibulata* are reported for the first time from North East India; *Aneura pinguis*, *Archilejeunea minutilobula*, *Bazzania tridens*, *Cololejeunea ceratilibula*, *Folioceros paliformis*, *Heteroscyphus argutus*, *H. hyalinus*, *Lejeunea tuberculosa*, *Leptolejeunea balansae*, *Lopholejeunea sikkimensis*, *Radula acuminata*, *Riccardia multifida*, *Solenostoma tetragonum* are reported for the first time from Assam, whereas *Cololejeunea lanciloba*, *C. latilobula*, *C. trichomanis*, *Dumortiera hirsuta*, *Frullania muscicola*, *Lejeunea anisophylla*, *Marchantia subintegra*, *Microlejeunea ulicina*, *Pallavicinia lyellii*, *Riccia glauca* and *R. huebeneriana* are reported for the first time from Borail WLS. *Folioceros paliformis* is rediscovered after the type collection. Out of 26 species enumerated in the present article, 11 species are terrestrial, 5 epiphytic, 5 epiphyllous and 5 are either epiphyllous or terrestrial or epiphytic or terrestria and epiphytic both. *Heteroscyphus hyalinus* and *Leptolejeunea balansae* are the dominant taxa in the study area.

## TAXONOMIC ENUMERATION

### MARCHANTIOPHYTA

1. ***Aneura pinguis*** (L.) Dumort., Comm. Bot. 115. 1822. *Jungermannia pinguis* L., Sp. Pl. 1136. 1753. [Aneuraceae].

*Specimen examined:* Terrestrial, growing in association with *Heteroscyphus hyalinus* Kalain Range, Near Khasia Punjee, 16.02.2012, H. A. Barbhuiya 124368.

*Distribution:* This species is earlier reported from Himachal Pradesh (Singh & Singh, 2009; Kashyap, 1929 as *A. indica* Steph. ex Kashyap), Karnataka (Chopra 1938b as *A. indica*), Madhya Pradesh (Singh & Kaul, 2001), Punjab (Singh et al., 2006), Maharashtra (Joshi & Biradar, 1984 as *Riccardia indica*), Tamil Nadu (Srivastava & Udar, 1976), Sikkim (Long & Grolle, 1990), Uttarakhand (Singh & Singh, 2007), Sikkim (Long & Grolle, 1990), West Bengal (Srivastava & Udar, 1976) in India and also from other part of the world. This is reported here for the first time from Assam.

2. ***Archilejeunea minutilobula*** Udar & U.S. Awasthi, Geophytology 11: 77. 1981. [Lejeuneaceae].

*Specimen examined:* Terrestrial, growing in association with *Heteroscyphus hyalinus*, *Riccardia multifida*, Kalain Range, 15 No Hill, 10.11.2011, H. A. Barbhuiya 124402a.

*Distribution:* This is an endemic species, earlier reported from Arunachal Pradesh (Das & Singh, 2007), Maharashtra and Tamil Nadu (Udar & Awasthi, 1981). This is reported here for the first time from Assam.

3. ***Bazzania tridens*** (Reinw., Blume & Nees) Trevis., Mem. Reale Ist. Lombardo Sci. Ser. 3., Cl. Sci. Mat. 4: 415. 1877. *Jungermannia tridens* Reinw., Blume & Nees in Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12: 228. 1824. [Lepidoziaceae].

*Specimen examined:* Terrestrial, Kalain Range, Near Khasia Punjee, 16.02.2012, H. A. Barbhuiya 124370.

*Distribution:* This species is earlier reported from Arunachal Pradesh (Singh, 1996), Manipur (Singh et al., 2010), Meghalaya, Sikkim (Sharma & Srivastava, 1993), Tamil Nadu (Daniels, 2010) and West Bengal (Sharma & Srivastava, 1993) in India and also from other part of the world. This is reported here for the first time from Assam.

4. ***Caudalejeunea reniloba*** (Gottsche) Steph., Sp. Hepat. 5: 16. 1912. *Phragmicoma reniloba* Gottsche in Gottsche et al., Syn. Hepat. 301. 1844. [Lejeuneaceae].

*Specimen examined:* Epiphytic, Kalain Range, Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124365.

*Distribution:* This species is earlier reported from Andaman & Nicobar (Joshi et al., 1989), Karnataka (Udar et al., 1982 as *C. pluriplicata*), Kerala (Pocs et al., 2007) in India and also from other part of the world. It is reported here for the first time from North East India.

5. **Cololejeunea ceratilobula** (P.C.Chen) R.M.Schust. in Beih. Nova Hedwigia 9: 179. 1963. *Leptocolea ceratilobula* P.C. Chen in Feddes Repert. Spec. Nov. Regni Veg. 58: 49. f. 18. 1955. [Lejeuneaceae].

*Specimen examined:* Epiphyllous, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124405.

*Distribution:* This species is earlier reported from Arunachal Pradesh, Tamil Nadu (Asthana & Srivastava, 2003) in India and also from other part of the world. This is reported here for the first time from Assam.

6. **Cololejeunea lanciloba** Steph.in Hedwigia 34: 250. 1895. [Lejeuneaceae].

*Specimen examined:* Epiphyllous, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124411. Epiphytic, Near Malidar, 10.09.2010, *H. A. Barbhuiya* 118734, 118738.

*Distribution:* This species is reported from Andaman & Nicobar Island (Joshi et al., 1989), Assam (Barukial et al., 2002), Kerala (Manju et al., 2009), Maharashtra (Joshi & Biradar, 1984), Meghalaya (Singh & Nath, 2007), Manipur (Singh et al., 2010), Tamil Nadu (Daniels, 2010) in India and also from other parts of the world. This is reported here for the first time from Borail WLS.

7. **Cololejeunea latilobula** (Herzog) Tixier, Bryophyt. Biblioth. 27: 156. 1985. *Leptocolea latilobula* Herzog in Handel-Mazzetti, Symb. Sin. 5: 54. 1930. [Lejeuneaceae].

*Specimen examined:* Epiphyllous, growing in association with *Cololejeunea trichomanis*, Near Kalaincherra, 08.10.2011, *H. A. Barbhuiya* 124444b. Epiphytic, Near Malidar, 10.09.2010, *H. A. Barbhuiya* 118739.

*Distribution:* This species is earlier reported from Arunachal Pradesh (Dey et al., 2009), Assam (Barukial et al., 2002), Chattishgrah (Kapoor et al., 2010), Karnataka, Kerala, Meghalaya, Manipur, Madhya Pradesh (Asthana & Srivastava, 2003), Sikkim (Singh et al., 2008), Tamil Nadu, Uttarakhand (Asthana & Srivastava, 2003), West Bengal (Dey et al., 2009) in India and also from other part of the world. This is reported here for the first time from Borail WLS.

8. **Cololejeunea trichomanis** (Gottsche) Steph. in Hedwigia 34: 252.1895. *Lejeunea trichomanis* Gottsche in Abh. Naturwiss. Vereine Bremen 7: 362. 1882. [Lejeuneaceae].

*Specimen examined:* Epiphyllous, growing in association with *Cololejeunea latilobula*, Near Kalaincherra, 08.10.2011, *H. A. Barbhuiya* 124444a; Kalain Range, Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124373, 124374.

*Distribution:* This species is earlier reported from Arunachal Pradesh, Assam Karnataka (Asthana & Srivastava, 2003), Meghalaya (Singh & Nath, 2007), Manipur (Singh et al., 2010), West Bengal (Zhu & Long, 2003) in India and also from other part of the world. This is reported here for the first time from Borail WLS.

9. **Dumortiera hirsuta** (Sw.) Nees, Nova Acta Phys.-Med Acad. Caes. Leop.-Carol. Nat. Cur. 7: 410. 1825. *Marchantia hirsuta* Sw., Prodr. Fl. Ind. Occid. 145. 1788. [Marchantiaceae].

*Specimen examined:* Terrestrial, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124401; growing in association with *Riccardia multifida*, *Heteroscyphus hyalinus*, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124410; Kalain Range, Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124366.

*Distribution:* This species is earlier reported from Arunachal Pradesh (Srivastava & Sharma, 1987), Assam (Barukial, 2011), Chattishgarh (Lal & Parihar, 1979), Goa (Pathak et al., 2007), Himachal Pradesh (Kashyap, 1929), Jammu & Kashmir (Langer & Tanwir, 2002), Kerala (Nair et al., 2006), Meghalaya (Srivastava & Sharma, 1987), Manipur (Singh et al., 2010), Madhya Pradesh (Pande & Srivastava, 1952), Orissa (Dash & Saxena, 2009), Sikkim (Singh et al., 2008), Tamil Nadu (Srivastava & Sharma, 1987), Uttarakhand (Kashyap, 1929), West Bengal (Srivastava & Sharma, 1987) in India and also from other part of the world. This is reported here for the first time from Borail WLS.

10. **Frullania muscicola** Steph. in Hedwigia 33: 146. 1894. [Frullaniaceae].

*Specimen examined:* Epiphytic, Near Malidar, 10.09.2010, H. A. Barbhuiya 118735.

*Distribution:* This species is earlier reported from Arunachal Pradesh (Singh, 1996), Assam (Robinson, 1964), Himachal Pradesh (Singh & Singh, 2009), Manipur (Singh et al., 2010), Meghalaya (Singh & Nath, 2007), Chattishgarh (Lal & Parihar, 1979), Tamil Nadu (Daniels, 2010), Uttarakhand (Kashyap & Chopra, 1932), West Bengal (Chopra, 1938a) in India and also from other part of the world. This is reported here for the first time from Borail WLS.

11. **Frullania berthoumieuii** Steph. Hedwigia 33: 140. 1894. [Frullaniaceae].

*Specimen examined:* Epiphytic, growing in association with *Lejeunea tuberculosa*, *Lopholejeunea sikkimensis*, Kalain Range, 15 No Hill, 10.11.2011, H. A. Barbhuiya 124409.

*Distribution:* This is reported here for the first time from India earlier reported from Nepal, Myanmar, Thailand and Philippines (Hattori, 1974). The species is allied to *F. muscicola*, another species from the area in colouration of plant, shape of leaf-lobe and stylus structure. However *F. muscicola* differs by having galeate leaf lobule and usually distantly arranged bis-bifid underleaves. The leaf-lobules are saccate, underleaves imbricate to contiguous, shallowly (1/4-1/3) bilobed in *F. berthoumieuii* (Hattori, l.c.)

12. **Heteroscyphus argutus** (Nees, Reinw. & Blume) Schiffn. in Oesterr. Bot. Z. 60: 172. 1910. *Jungermannia arguta* Nees, Reinw. & Blume, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. [Hepat. Jav.]. 12: 206. 1825. [Geocalycaceae].

*Specimen examined:* Epiphytic, growing in association with *Lejeunea tuberculosa*, *Lopholejeunea sikkimensis*, Kalain Range, 15 No Hill, 10.11.2011, H. A. Barbhuiya 124412b. Terrestrial or growing on wood logs Kalain Range, Near Khasia Punjee, 16.02.2012, H. A. Barbhuiya 124357, 124363, 124367.

*Distribution:* This species is earlier reported from Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Sikkim, Tamil Nadu, Uttarakhand and West Bengal (Srivastava & Srivastava, 2002) in India and also from other part of the world. This is reported here for the first time from Assam.

13. **Heteroscyphus hyalinus** (Steph.) S.C.Srivast. & A. Srivast., Indian Geocalycaceae 118. 2002.

*Lophocolea hyalina* Steph. in Bull. Soc. Roy. Bot. Belgique 38: 254. 1899. [Geocalycaceae].

*Specimen examined:* Lithophytic, Kalain Range, 15 No Hill, 10.11.2011, H. A. Barbhuiya 124404. Growing on wood logs, Kalain Range, 15 No Hill, 10.11.2011, H. A. Barbhuiya 124413, 124415. Terrestrial, Kalain Range, Near Khasia Punjee, 16.02.2012, H. A. Barbhuiya 124358.

*Distribution:* This species is earlier reported from Arunachal Pradesh (Dey et al., 2009), Manipur (Singh et al., 2010), Meghalaya (Singh & Nath, 2007), Sikkim, West Bengal (Srivastava & Srivastava, 2002) in India and also from other parts of the world. This is reported here for the first time from Assam.

14. **Lejeunea anisophylla** Mont. in Ann. Sci. Nat. Bot. sér. 2, 5: 116. 1861. [Lejeuneaceae].

*Specimen examined:* Growing on wood logs in association with *Heteroscyphus hyalinus*, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124415.

*Distribution:* This species is earlier reported from Andaman Islands (Singh et al., 2010), Arunachal Pradesh (Dey et al., 2009), Assam (Barukial et al., 2002), Meghalaya (Singh & Nath, 2007), Manipur (Singh et al., 2010), Sikkim (Dey et al., 2009) in India and also from other parts of the world. This is reported here for the first time from Borail WLS.

15. **Lejeunea tuberculosa** Steph., Sp. Hepat. 5: 790. 1915. [Lejeuneaceae].

*Specimen examined:* Epiphytic, growing in association with *Frullania berthoumieuii*, *Lopholejeunea sikkimensis*, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124409b.

*Distribution:* This species is earlier reported from Arunachal Pradesh (Dey et al., 2009), Kerala (Nair et al., 2005), Meghalaya (Singh & Nath, 2007), Manipur (Singh et al., 2010), Sikkim (Mizutani, 1971), Uttarakhand (Mizutani, 1971), Tamil Nadu (Daniels, 2010), West Bengal (Mizutani, 1971) in India and also from other parts of the world. This is reported here for the first time from Assam.

16. **Leptolejeunea balansae** Steph. in Hedwigia 35: 105. 1896. [Lejeuneaceae].

*Specimen examined:* Epiphyllous, Kalain Range, Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124375, 124371, 124372.

*Distribution:* This species is earlier reported from Andaman Islands (Awasthi, 1986), Arunachal Pradesh (Dey et al., 2009), Kerala (Pocs et al., 2007), Manipur (Singh et al., 2010), Sikkim (Singh et al., 2008), Tamil Nadu (Daniels, 2010), West Bengal (Dey et al., 2009) in India and also from other parts of the world. This is reported here for the first time from Assam.

17. **Lopholejeunea sikkimensis** Steph., Sp. Hepat. 5: 87. 1912. [Lejeuneaceae].

*Specimen examined:* Epiphytic, Near Malidar, 10.09.2010, *H. A. Barbhuiya* 118736. Lithophytic, Kalain Range, Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124369; Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124416.

*Distribution:* This species is earlier reported from Chattishgarh (Lal & Parihar, 1979), Karnataka, Kerala, Manipur, Meghalaya, Uttarakhand, Tamil Nadu, West Bengal (Awasthi et al., 2000), Jammu & Kashmir (Langer & Tanwir, 2002) in India and also from other parts of the world. This is reported here for the first time from Assam.

18. **Marchantia subintegra** Mitt. in J. Proc. Linn. Soc., Bot. 5: 125. 1861. [Marchantiaceae].

*Specimen examined:* Terrestrial, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124417.

*Distribution:* This species is earlier reported from Arunachal Pradesh, Assam (Bischler, 1989), Manipur (Singh et al., 2010), Sikkim, West Bengal (Amakawa in Hattori, 1966 as *Marchantia papulosa* Amak.) in India and also from other parts of the world. This is reported here for the first time from Borail WLS.

19. **Microlejeunea ulicina** (Taylor) Steph. in Hedwigia 29: 88. 1890. *Jungermannia ulicina* Taylor in Trans. & Proc. Bot. Soc. Edinburgh 1: 115. 1844. [Lejeuneaceae].

*Specimen examined:* Epiphytic, Near Malidar, 10.09.2010, *H. A. Barbhuiya* 118737.

*Distribution:* This species is earlier reported from Assam (Barukial, 2011), Kerala (Srivastava & Sharma, 2000), Manipur (Singh et al., 2010), Meghalaya (Mizutani, 1971), Tamil Nadu (Chopra, 1938b), West Bengal (Mizutani, 1971) in India and other parts of the world. This is reported here for the first time from Borail WLS.

20. **Pallavicinia lyellii** (Hook.) Carruth, Nat. Arr. Brit. Pl. 1: 685, 775 [errata]. 1821. *Jungermannia lyellii* Hook., Brit. Jungerm. t. 77. 1816. [Pallaviciniaceae].

*Specimen examined:* Terrestrial, Kalain Range, Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124355, 124359; East Block, 10.12.2010, *H. A. Barbhuiya* 118743.

*Distribution:* This species is earlier reported from Assam (Srivastava, 1961), Karnataka (Pande & Srivastava, 1953 as *P. canara* Steph.), Kerala (Pande & Srivastava, 1953 as *P. canara* Steph.), Meghalaya (Singh & Nath, 2007), Madhya Pradesh (Pande & Srivastava, 1953 as *P. canara* Steph.), Tamil Nadu (Montagne, 1842 as *Diplolaena crispata*), West Bengal (Schiffner, 1899 as *P. indica*) in India and also from other parts of the world. This is reported here for the first time from Borail WLS.

21. **Radula acuminata** Steph., Sp. Hepat. 4: 230. 1910. [Radulaceae].

*Specimen examined:* Epiphyllous, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124406, 124414.

*Distribution:* This species is earlier reported from Arunachal Pradesh (Singh, 1996), Manipur (Singh et al., 2010), Meghalaya (Udar & Kumar, 1984), Sikkim (Dey et al., 2009) in India and also from other parts of the world. This is reported here for the first time from Assam.

22. **Riccardia multifida** (L.) Gray in Nat. Arr. Brit. Pl. 1: 684. 1821. *Jungermannia multifida* L., Sp. Pl. 1136. 1753. [Aneuraceae].

*Specimen examined:* Terrestrial, growing in association with *Archilejeunea minutilobula*, *Heteroscyphus hyalinus*, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124402b. Growing on wood logs in association with *Heteroscyphus hyalinus*, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124412a.

*Distribution:* This species is earlier reported from Maharashtra (Srivastava & Udar, 1976), Sikkim (Mitten, 1861), Tamil Nadu (Daniels, 2010), West Bengal (Srivastava & Udar, 1976) in India and also from other parts of the world. This is reported here for the first time from Assam.

23. **Riccia glauca** L., Sp. Pl.: 1139. 1753. [Ricciaceae].

*Specimen examined:* Terrestrial, Near Kalaincherra, 08.10.2011, *H. A. Barbhuiya* 124446.

*Distribution:* This species is earlier reported from Assam (Kachroo, 1954), Orissa (Dash & Saxena, 2009) in India and also from other parts of the world. This is reported here for the first time from Borail WLS.

24. **Riccia huebeneriana** Lindenb., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 18: 504d. "1836" 1837. [Ricciaceae].

*Specimen examined:* Terrestrial, Near Kalaincherra, 08.10.2011, *H. A. Barbhuiya* 124445.

*Distribution:* This species is earlier reported from Assam (Kachroo, 1954 as *R. kashyapii* Kachroo), Karnataka (Srivastava, 1964), Kerala (Udar & Jain, 1984), Madhya Pradesh, Sikkim (Srivastava, 1964), Uttar Pradesh (Sinha et al., 1990), West Bengal (Srivastava, 1964) in India and also from other parts of the world. This is reported here for the first time from Borail WLS

25. **Solenostoma tetragonum** (Lindenb.) R.M.Schust. ex Vána et D.G. Long in Nova Hedwigia 89: 509. 2009. *Jungermannia tetragona* Lindenb., Bot. Zeit. (Berlin) 6: 462. 1848. [Jungermanniaceae].

*Specimen examined:* Terrestrial, Kalain Range, Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124360, 124361, 124362, 124364; Growing in association with *Solenostoma tetragonum*, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124403b.

*Distribution:* This species is earlier reported from Meghalaya (Singh & Nath, 2007), Sikkim (Udar & Kumar, 1983), Uttarakhand (Amakawa, 1968), West Bengal (Long & Grolle, 1990) in India and also from other parts of the world. Vána (1973a,b) reported the species from erstwhile Assam (present Meghalaya). Hence present work comprises its first authentic collection from State of Assam.

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**ANTHOCEROTOPHYTA**

26. **Folioceros paliformis** D. K. Singh in Bull Bot. Surv. India 29: 176. 1987. [Anthocerotaceae].  
*Specimen examined:* Terrestrial, growing in association with *Solenostoma tetragonum*, Kalain Range, 15 No Hill, 10.11.2011, *H. A. Barbhuiya* 124403a; Near Khasia Punjee, 16.02.2012, *H. A. Barbhuiya* 124356.

*Distribution:* This is an endemic species, established by Singh (1987) on the basis of collection made in 1982 from Prope Tipi, West Kameng district of Arunachal Pradesh. The species could not be collected again since its original collection, neither from type locality nor from elsewhere. However a detail description was provided by Asthana & Sivastava (1991) based on type only. Hence the present collection extended its range of distribution from Arunachal Pradesh to Assam. It is also interesting to note that the occurrence of this species in Assam reveals its rediscovery after a gap of 30 years and constitute second authentic collection after its type.

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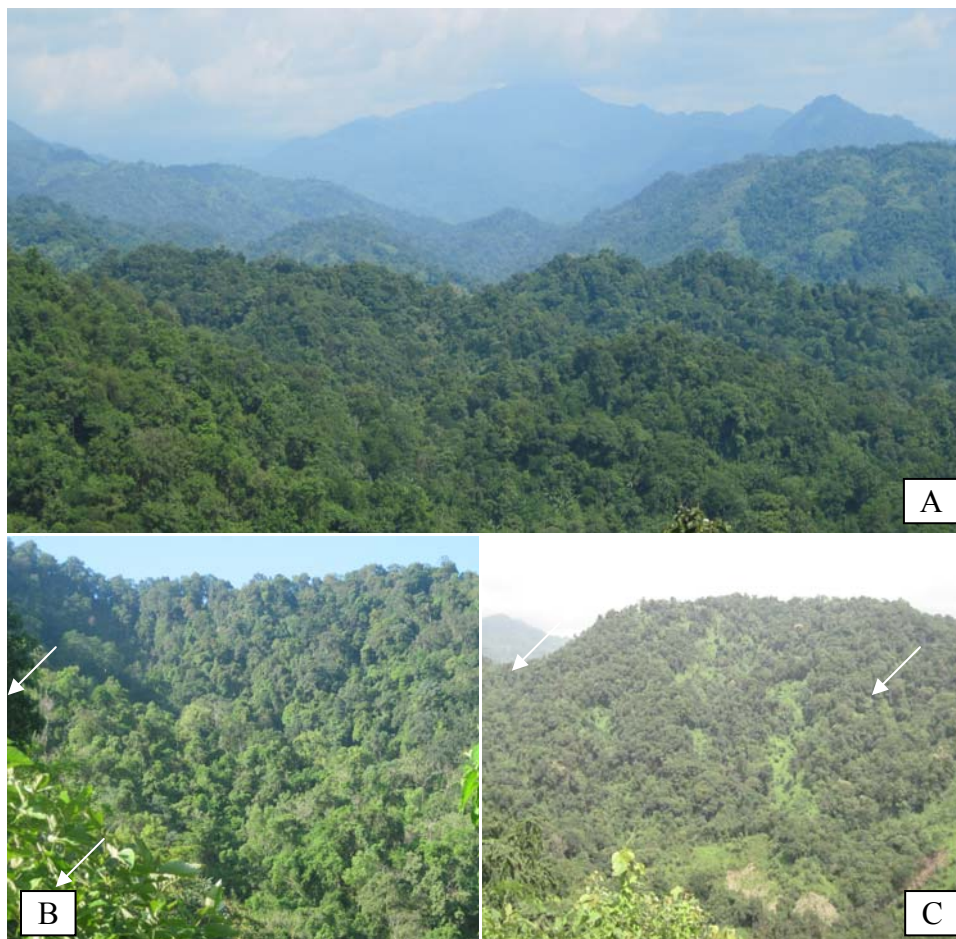
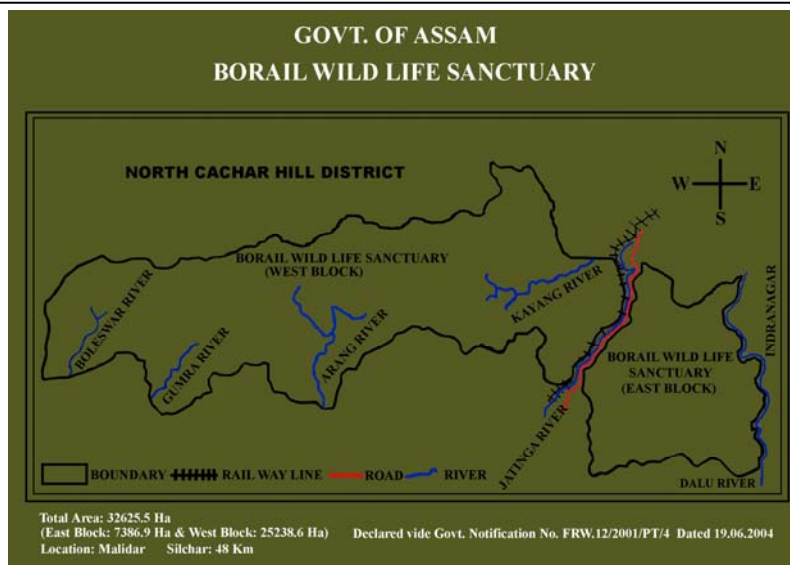
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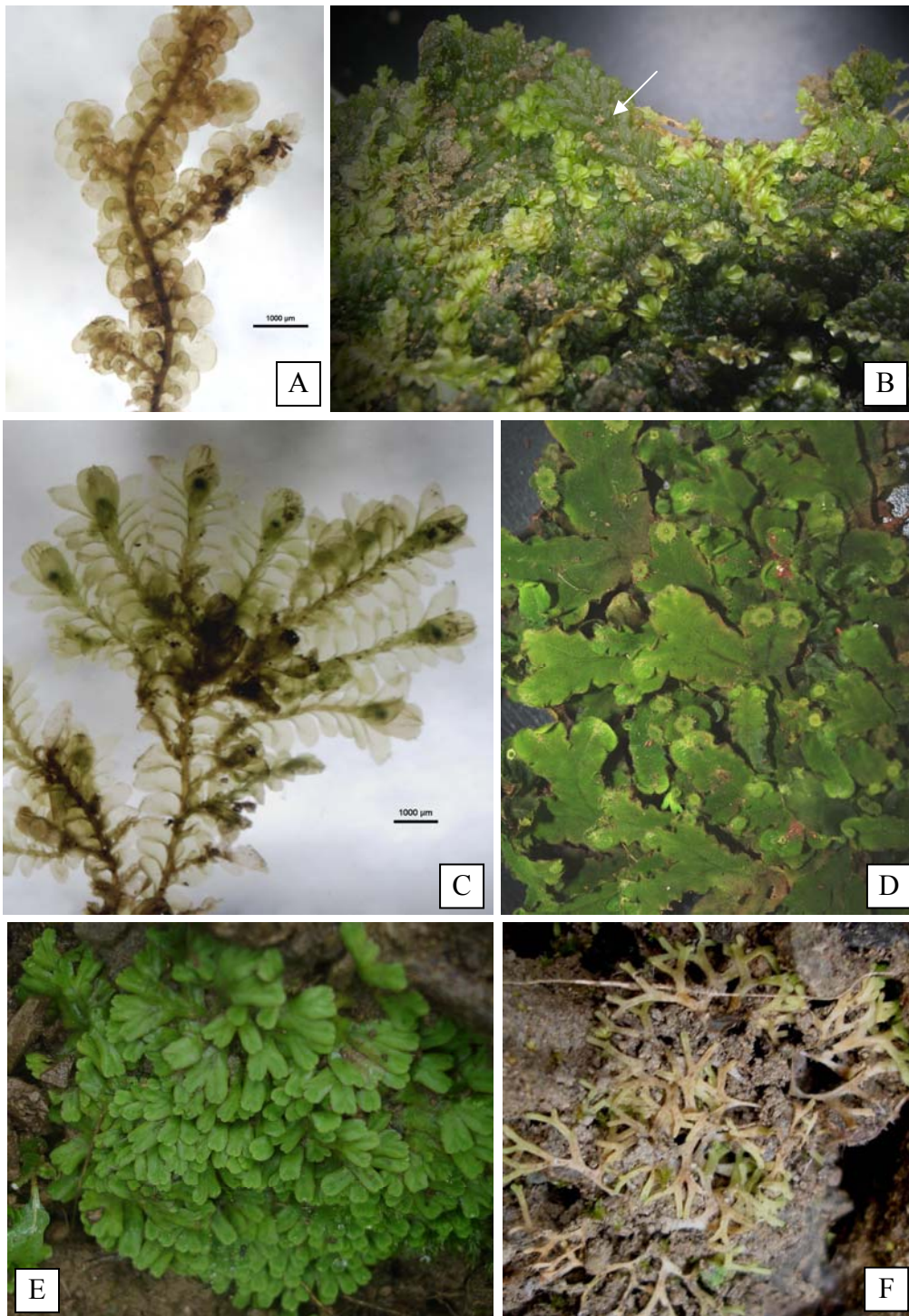


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**Fig.1:** A. A view of Borail Hill Ranges. B. A view of Tropical Wet Evergreen forest. C. A view of Tropical Semi-Evergreen forest (arrows indicating collection sites).



**Fig. 2:** A. *Frullania berthoumieui* (new report for India). B. *Folioceros paliformis* (collected after type; arrow indicating PF). C. *Caudalejeunea reniloba* (new to NE India). D. *Dumortiera hirsuta*. E. *Riccia glauca*. F. *Riccia huebeneriana*