



## A REVIEW OF THE FERNS OF BARAK VALLEY, ASSAM, INDIA

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### ABSTRACT

Beddome (1892), in his monumental work on the ferns of British India, first time separately mentioned Cachar and Sylhet Districts as the places of occurrence of 25 species of ferns. Almost hundred years after Beddome's work, there have been spark of new enthusiasm among scholars to record pteridophytes of different districts of Barak Valley in Southern Assam of India. In the last twenty years, many publications have been made which accounted large number of pteridophytes from the valley.

An attempt has been made to determine the valid status of ferns found in Barak Valley by making a consolidated review of different species which have been reported so far from the area by various workers during the last century. Here, each species has been appended with its place of occurrence along with the name(s) of author who reported it. However, in case of repetition of works within a small gap of time, name of authors, who reported later, have not been included under individual species. After checking and filtering of all the nomenclatural aspects of a total of 159 species, including two varieties, in 65 genera under 37 families, have been finally presented here as the fern flora of the Barak Valley. In some cases, where further work is necessary to clear confusion, it has been indicated stating reasons for the same.

**Key words :** Fern, Barak Valley, Assam, India.

### INTRODUCTION

Barak Valley comprising of three districts, viz. Karimganj, Hailakandi and Cachar is placed in southern part of the state of Assam, India. Originally, these were part of the Bengal Province of the then British India. In 1874, Cachar (including Hailakandi) and Sylhet district of present Bangladesh (including Karimganj) were annexed to Assam. At the time of partition of India in 1947, Sylhet joined East Pakistan (now Bangladesh) but Karimganj, a small part of Sylhet district remained in India with Cachar and Hailakandi to form the present Barak Valley, an area of 6941.2 sq. km. and was named after the name of its main flowing river, the Barak.

The work on Indian pteridophytes was first initiated by Roxburgh in 1814. Later Beddome (1883, 1892); Clarke (1880) and Hope (1903a,b, 1904) worked on then. After partition of the then British India in the second half of 20th century several scientists made remarkable contributions to Indian pteridology (Bir 1976a,b, 1977a,b, 1979, 1983; Kachroo 1953, 1975; Panigrahi 1960, 1968; Panigrahi and Choudhury 1961, 1962; Panigrahi and Patnaik, 1961a,b; Handique and Konger 1986; Barua *et al.* 1989; Bir *et al.* 1989; Kachroo *et al.* 1989; Vasudev *et al.* 1990 and Borthakur *et al.*, 2000). Recently, Pasha and Uddin (2007) reviewed the pteridophytic research done in Bangladesh.

Beddome, in his final publication (1892), reported a total of 25 species of pteridophytes from the then Cachar District and Sylhet District of Assam. Almost 100 years after Beddome's work, Bhattacharya (1990, 1994) reported 27 species of ferns from Karimganj district. After that, Bhattacharya (1990) conducted a survey and reported a

total of 84 species (+1 variety) belonging to 49 genera distributed over 32 families from Karimganj only. Dutta Choudhury and Bhattacharya (1994, 1996) reported *Dipteris wallichii* from some new localities of Barak Valley. Chowdhury (2005) in his checklist for Assam included 355 species of pteridophytes, of which only 09 species of ferns are categorically mentioned as present in the Valley.

The ferns of Hailakandi District of the Valley have been studied by Bhattacharya and Bora (1994) and Dutta Choudhury and Bhattacharya (1997). Then a survey of pteridophytic flora of Cachar District was conducted by Bhattacharya *et al.* (1998) who reported 62 species (+2 varieties) belonging to 42 genera in 28 families. According to them the most dominant families were Polypodiaceae and Thelypteridaceae. Bhattacharya and Sharma (2002) reported 26 species of pteridophytes from Assam University Campus of Cachar District. Later, Das and Bhattacharya (2002) reported 53 species of pteridophytes from Cachar District alone, but almost all these species have been reported earlier by Bhattacharya *et al.* (1998) from the same District. It is important to note that most of these the ferns were found earlier in adjoining Districts of N.C. Hills, Cachar and Hailakandi (Bhattacharya *et al.*, 1995; Dutta Choudhury and Bhattacharya, 1997). It may also be pointed out here that Dutta Choudhury (1997) reported fern flora of Duhalia Hills which was known for luxuriant fern vegetation in Karimganj District. Bhattacharya (2009) listed 151 species of Pteridophytes in Barak Valley that have been mentioned in the earlier literatures.

Nath and Bhattacharya (2002) reported 32 species of pteridophytes from this area, out of which 22 species had

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not been reported from the valley earlier. The other 10 species were either less frequently reported or reported after a long gap. Later on Sen and Bhattacharya (2006) reported additional 3 new species from Assam. Further, 24 species were reported, of which 14 were new records from the valley, and others were new records from one or the other district of Barak Valley (Sen and Bhattacharya, 2007). Finally, Dey *et al.* (2009) reported 1 new species from Barak Valley.

Several works have also been done on the ecological aspects and conservation of pteridophytes of Barak Valley. Das and Bhattacharya (2002) reported a few threatened pteridophytes of the Valley. Bhattacharya *et al.* (2003) made ecological studies of Pteridophytes of Barak Valley and reported 15 epiphytes, 54 terrestrials, 3 climbers and 5 aquatic and wetland dwellers. Nath *et al.* (2004) reported 18 species of pteridophytes which are found as lithophytes on brick and rock constructions of Barak Valley.

Thus, it is evident from the above mentioned reports that in recent years there have been several publications on fern and fern-allies of Barak Valley. But all of these are mostly fragmentary and repetitive in nature. Some nomenclatural anomalies and incorrectness also prevails which creates lots of confusion about the full understanding of the status of the ferns of the area. Therefore, it became essential to review and consolidate various works to determine the total number of valid species of ferns of Barak Valley. Recently Dutta Choudhury (2009), dealt with certain other aspects like ethnobotanical uses of fern and fern-allies, conservation issues in addition to enumeration of species. Here, they reported only 108 species (actually, less than that because some synonyms have been treated as separate species). Thus, this book also does not provide the actual status of ferns of Barak Valley.

An attempt has been made here to determine the number of ferns found in Barak Valley by making a consolidated review of the different species of ferns which have been reported so far from the Valley by various workers from time to time.

## MATERIALS AND METHODS

The study area, Barak Valley, covers about 7,000 sq. km. of land situated approximately within 24.80' - 20.04'N Latitude and 93.15' - 90.44'E Longitude. It is situated in the east-southernmost part of Assam state of India, now divided into three districts, *viz.* Karimganj in the north, Hailakandi in the middle and Cachar in the south. The valley is surrounded in the north by North Cachar Hill district of Assam, in the south Mizoram state, in the east by Manipur state and in the west by Tripura state of India and partly by Bangladesh.

The valley is characterized by high humidity. The rainy season is from May to August. Average annual rainfall is above 4,000 mm. The eastern part is comparatively high elevated, about 50m than the east. The highest altitude of hill is about 300m. But, most of the valley is about 35m above the msl. The soil is mostly alluvial to laterite type. The

temperature ranges from 10°C to about 32°C. The pH of soil ranges from 4.5-6.0. The climate is of tropical, warm and humid type. Geologically the valley exhibits succession of Tertiary sediments. The forest is tropical semi-evergreen type, intersected mostly by bamboo forests and tea gardens.

For this investigation the literatures so far published on ferns of the area from Roxburgh (1814) to present time were consulted. Field observations, collections and investigations were also taken into consideration for enumeration of taxa. The enumerated taxa are presented under families as per the system of classification proposed by Pichi-Sermolli (1977). Here, each taxon has been appended with its place of occurrence along with the name(s) of author who reported it in the recent past. However, in case of repetition of works within a small gap of time, name of authors have not been included under individual species. For up-to-date nomenclature some recent literatures (Hovenkamp *et al.* 1998, Chanda 2000, Freser-Jenkins 2008) have been followed. The valid species names are presented in bold face after every accession. For correct citation of the author of the taxa, Brummitt and Powell (1996) has been followed.

## ENUMERATION OF TAXA

### Helminthostachyaceae

1. *Helminthostachys zeylanica* (L.) Hook.  
Cachar (Bhattacharya *et al.*, 1998), Hailakandi (Chowdhury, 2005), Karimganj (Bhattacharya *et al.*, 2002 and Chowdhury, 2005).

### Ophioglossaceae

2. *Ophioglossum reticulatum* L.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).

### Angiopteridaceae

3. *Angiopteris evecta* (Frost.) Hoffm. [= *Angiopteris helferiana* C. Presl]  
Cachar (Bhattacharya *et al.*, 1998), Hailakandi (Dutta Choudhury & Bhattacharya, 1997), Karimganj (Bhattacharya, 1994; Bhattacharya *et al.*, 2002; and Bhattacharya, 2009).

### Christenseniaceae

4. *Kaulfussia aesculifolia* Blume [= *Christensenia aesculifolia* (Blume) Maxon]  
Cachar (Beddome, 1892; and Chowdhury, 2005).

### Gleicheniaceae

5. *Dicranopteris linearis* (Burm. f.) Underw.  
Hailakandi (Dutta Choudhury & Bhattacharya, 1997), Karimganj (Bhattacharya *et al.*, 1994 and Bhattacharya *et al.*, 2002).
6. *Dicranopteris linearis* (Burm. f.) Underw. var. *altissima* Holttum, *Dicranopteris linearis* (Burm. f.) Underw. var. *montana* Holttum (= *Dicranopteris taiwanensis* Ching & P.S.Chiu)  
Cachar (Bhattacharya *et al.*, 1998).

**Loxogrammeaceae**

7. *Loxogramme involuta* (D. Don) C. Presl  
Karimganj (Bhattacharya *et al.*, 2002)

**Polypodiaceae**

8. *Arthromeris wallichiana* (Sprengel) Ching  
Cachar (Bhattacharya *et al.*, 1998). [It is a north-western Himalayan plant, so it needs confirmation.]
9. *Drymoglossum heterophyllum* (L.) Trimen [= *Pyrrhosia heterophylla* (L.) Price]  
Karimganj (Bhattacharya, 1994), Hailakandi (Dutta Choudhury & Bhattacharya, 1997).
10. *Drymoglossum piloselloides* C. Presl [= *Pyrrhosia piloselloides* (L.) Price]  
Karimganj (Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
11. *Lepisorus contortus* (Christ) Ching  
Karimganj, (Nath and Bhattacharya, 2002).
12. *Lepisorus excavates* (Bory) Ching [= *Lepisorus scolopendrium* (Ching) Mehra & Bir]  
Cachar (Bhattacharya *et al.*, 1998). [L. excavatus is an African species, erroneously applied for *L. scolopendrium*.]
13. *Leptochilus axillaris* (Cav.) Kaulf.  
Karimganj (Bhattacharya *et al.*, 2002).
14. *Gymnopteris variabilis* Hook. [= *Leptochilus decurrens* (Blume) Copel.]  
This species has been reported as *Paraleptochilus decurrens* (Blume) Copel. from Hailakandi by Borthakur *et al.* (2000) and as *Gymnopteris variabilis* Hook. from Cachar by Beddome (1892).
15. *Colysis hemionitidea* (Wall. ex Mett.) C. Presl [= *Leptochilus decurrens* (Blume) subsp. *hemionitideus* (C. Presl) Fraser-Jenk.]  
Cachar (Bhattacharya *et al.*, 1998).
16. *Colysis pedunculata* (Hook. & Gerv.) Ching [= *Leptochilus pedunculatus* (Hook. & Gerv.) Fres.-Jenk.]  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).
17. *Kaulina pteropus* (Blume) B.K. Nayar, *Microsorium pteropus* (Blume) B.K. Nayar [= *Leptochilus pteropus* (Blume) subsp. *minor* (Bedd.) Fraser-Jenk.]  
This species has been reported as *Kaulina pteropus* from Cachar by (Bhattacharya *et al.*, 1998) and Karimganj by Bhattacharya *et al.* (2002). But, *Kaulina pteropus* (Blume) B.K. Nayar and *Microsorium pteropus* (Blume) B.K. Nayar have been erroneously reported as separate species from Cachar by Dutta Choudhury *et al.*, (2009).
18. *Microsorium membranaceum* (D. Don) Ching  
Karimganj (Bhattacharya *et al.*, 2002).
19. *Microsorium punctatum* (L.) Copel.  
Karimganj (Bhattacharya, 1994), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
20. *Microsorium superficiale* (Blume) Ching  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
21. *Phymatopteris crenatopinnata* (C.B. Clarke) Pic. Serm. [= *Pichisermolia crenatopinnata* (C.B. Clarke) Fras.-Jenk.]  
Cachar (Borthakur *et al.*, 2000).
22. *Phymatosorus lucidus* (Roxb. ex Griff.) Pic. Serm. [= *Phymatosorus cuspidatus* (D. Don) Pic. Serm.]  
This species has been reported as *Phymatosorus cuspidatus* (D. Don) Pic. Serm. from Karimganj (Nath and Bhattacharya, 2002) and Cachar (Sen and Bhattacharya, 2007) while as *Phymatosorus lucidus* (Roxb. ex Griff.) Pic. Serm. from Karimganj (Bhattacharya *et al.*, 2002). Dutta Choudhury *et al.* (2009) included both *P. lucidus* and *P. cuspidatus* in their list as separate species. From their description it seems that they described the same plant under two names.
23. *Platyserium alcicorne* Desv.  
Cachar (Borthakur *et al.*, 2000). The natural place of occurrence of this species is far away from this area. It occurs in places of Manipur, adjacent to Barak Valley. Therefore, this report needs further confirmation that it does not pertain to any cultivated plant.
24. *Pleopeltis longissima* Blume; *Phymatosorus longissimus* (Blume) Pic.-Serm. [= *Microsorium rubidum* (Kunze) Copel.]  
Syllhet (Beddome, 1892).
25. *Goniophlebium amoenum* (Wall. ex Mett.) J. Sm. [= *Polypoides amoena* (Wall. ex Mett.) Ching]  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Dutta Choudhury *et al.*, 2009).
26. *Pyrrhosia adnascens* (Sw.) Ching  
Cachar (Bhattacharya *et al.*, 1998, Borthakur *et al.*, 2000), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Karimganj (Bhattacharya, 1994, Bhattacharya *et al.* 2002).
27. *Niphobolus flocculosus* (D. Don) Spreng [= *Pyrrhosia flocculosa* (D. Don) Ching]  
Syllhet (Beddome, 1892).
28. *Pyrrhosia lanceolata* (L.) Farw.  
Cachar (Borthakur *et al.*, 2000).
29. *Pyrrhosia heteractis* (Mett. ex. Kuhn) Ching [= *Pyrrhosia lingua* (Thunb.) Farw.]  
Karimganj (Bhattacharya *et al.*, 2002), Cachar (Bhattacharya *et al.*, 1998).
30. *Pyrrhosia mollis* (Kunze) Ching [= *Pyrrhosia porosa* (C. Presl) Hovenkamp]  
Hailakandi (Dutta Choudhury & Bhattacharya, 1997).
31. *Niphobolus nummulariaefolius* J. Sm. [= *Pyrrhosia nummulariaefolia* (Sw.) Ching]  
Cachar (Beddome, 1892).
32. *Pyrrhosia subfurfuracea* (Hook.) Ching  
Hailakandi (Borthakur *et al.*, 2000).

**Dipteridaceae**

33. *Dipteris wallichii* (R. Br.) T. Moore

Cachar (Beddome, 1892, Dutta Choudhury & Bhattacharya, 1994, Bhattacharya *et al.*, 1998, Chowdhury, 2005), Sylhet (Beddome, 1892), Hailakandi (Dutta Choudhury & Bhattacharya, 1996, Chowdhury, 2005) and Karimganj (Bhattacharya, 2009).

#### Drynariaceae

34. *Drynaria propinqua* (Wall. ex Mett.) J. Sm.  
Karimganj (Bhattacharya *et al.*, 2002).
35. *Drynaria quercifolia* (L.) J. Sm.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).
36. *Drynaria sparsisora* (Desv.) T. Moore  
Karimganj (Bhattacharya *et al.*, 2002). [Not found in India but Sri Lanka (Fres.-Jenk., 2008), so it needs further confirmation].

#### Lygodiaceae

37. *Lygodium flexuosum* (L.) Sw.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).
38. *Lygodium japonicum* (Thunb.) Sw.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).
39. *Lygodium microphyllum* (Cav.) R.Br.  
Karimganj (Nath & Bhattacharya, 2002) and Cachar (Nath & Bhattacharya, 2002).
40. *Lygodium polystachyum* Wall. ex Moore  
Cachar (Nath and Bhattacharya, 2002).

#### Cheilanthaceae

41. *Cheilanthes albomarginata* C.B. Clarke [= *Aleuritopteris albomarginata* (C.B. Clarke) Ching]  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002).
42. *Cheilanthes chrysophylla* Hook. [= *Aleuritopteris chrysophylla* (Hook.) Ching]  
Karimganj (Bhattacharya *et al.*, 2002).
43. *Cheilanthes argentea* (Gmel.) Kunze.  
Cachar (Bhattacharjee and Sharma, 2002).
44. *Cheilanthes varians* (Hook.) Wall. [= *Cheilanthes belangeri* (Bory) C. Chr.]  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998, Chowdhury, 2005).
45. *Cheilanthes farinose* (Frossk.) Kaulf. [= *Aleuritopteris bicolor* (Roxb.) Freser-Jenk.]  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).
46. *Cheilanthes tenuifolia* (Burm.f) Sw.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).

#### Cryptogrammeae

47. *Onychium siliculosum* (Desv.) C. Chr.  
Karimganj (Bhattacharya, 1994; Bhattacharya *et al.*, 2002; Nath & Bhattacharya, 2002) and Cachar (Nath & Bhattacharya, 2002).

#### Pteridaceae

48. *Pteris biaurita* L.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).
49. *Pteris cretica* L.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Cachar (Bhattacharya *et al.*, 1998) and Hailakandi (Dutta Choudhury & Bhattacharya, 1997).
50. *Pteris ensiformis* Burm.f.  
Karimganj (Bhattacharya *et al.*, 2002), Cachar (Bhattacharya *et al.*, 1998).
51. *Pteris grevilleana* Wall. ex J. Agardh  
Karimganj (Sen and Bhattacharya, 2007), Cachar (Beddome, 1892, Bhattacharya *et al.*, 1998) and Sylhet (Beddome, 1892).
52. *Pteris longipinnula* Wall. ex J. Agardh [= *Pteris cadieri* C. Chr.]  
Karimganj (Sen and Bhattacharya, 2007), Cachar (Beddome, 1892) and Sylhet (Beddome, 1892).
53. *Pteris multifida* Poir.  
Karimganj (Sen and Bhattacharya, 2007).
54. *Pteris pellucida* C. Presl  
Cachar (Nath & Bhattacharya, 2002) and Karimganj (Nath & Bhattacharya, 2002).
55. *Pteris quadriaurita* Retz.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
56. *Pteris semipinnata* L.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
57. *Pteris stenophylla* Wall. ex Hook. & Grev.  
Karimganj (Sen and Bhattacharya, 2007). [It is the north-west and central Indian plant; it looks very similar to *P. cretica*, so the species needs further confirmation.]
58. *Pteris vittata* L.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).

#### Adiantaceae

59. *Adiantum capillus-veneris* L.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Nath & Bhattacharya, 2002).
60. *Adiantum caudatum* L.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Nath & Bhattacharya, 2002).
61. *Adiantum flaballulatum* L.  
Hailakandi (Borthakur *et al.*, 2000), Cachar (Bhattacharya *et al.*, 1998) and Sylhet (Beddome, 1892).
62. *Adiantum philippense* L.  
Karimganj (Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).

### Hemionitidaceae

63. *Hemionitis arifolia* (Burm. f.) T. Moore  
Karimganj (Bhattacharya *et al.*, 2002, Nath & Bhattacharya, 2002), Hailakandi (Nath & Bhattacharya, 2002) and Cachar (Nath & Bhattacharya, 2002).
64. *Pityrogramma calomelanos* (L.) Link  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).

### Vittariaceae

65. *Vittaria elongata* Sw.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
66. *Vittaria scolopendrina* (Bory) Thwaites  
Cachar (Chowdhury, 2005).
67. *Vittaria zosterifolia* Willd.  
Cachar (Nath and Bhattacharya, 2002).

### Taenitidaceae

68. *Taenitis blechnoides* (Wall.) Sw.  
Sylhet (Beddome, 1892).

### Parkeriaceae

69. *Ceratopteris thalictroides* (L.) Brongn.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002) and BarakValley (Nath and Bhattacharya, 2002).

### Marsileaceae

70. *Marsilea minuta* L.  
Karimganj (Bhattacharya *et al.*, 2002) and Hailakandi (Dutta Choudhury & Bhattacharya, 1997).

### Hymenophyllaceae

71. *Mecodium polyanthus* (Sw.) Copel. [= *Hymenophyllum tenellum* D.Don]  
Cachar (Bhattacharya *et al.*, 1998).
72. *Trichomanes auriculatum* Blume [= *Vandesboschia auriculata* (Blume) Copel.]  
This species has been reported from Cachar as *Trichomanes auriculatum* by Beddome (1892) and as *Vandesboschia auriculata* by Nath & Bhattacharya (2002).
73. *Vandesboschia javanicum* Blume [= *Trichomanes javanicum* (Blume) = *Cephalomenes javanicum* Blume]  
Karimganj (Sen & Bhattacharya, 2007).

### Cyatheaceae

74. *Alsophila glauca* J. Sm. [= *Cyathea brunoniana* (Wall. ex Hook.) C.B. Clarke & Baker]  
This species has been reported as *Cyathea brunoniana* from Karimganj (Bhattacharya *et al.*, 2002) and as *Alsophila glauca* from Sylhet and Cachar (Beddome, 1892).
75. *Cyathea contaminans* (Wall. ex Hook.) Copel.  
Karimganj (Dutta Choudhury, 1997), Hailakandi (Dutta Choudhury & Bhattacharya, 1997), Cachar (Bhattacharya *et al.*, 1998, Chowdhury, 2005). [This report may be a case of mistaken identity. The

present authors while not negating the earlier report feels that further study should be carried out to confirm the presence of this species in BarakValley.]

76. *Cyathea gigantea* (Wall. ex Hook.) Holttum  
Karimganj (Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997, Chowdhury, 2005) and Cachar (Bhattacharya *et al.*, 1998).
77. *Cyathea henryi* (Baker) Copel.  
Cachar (Bhattacharjee & Sharma, 2002), Karimganj (Chowdhury, 2005). [This has been written as *Cyathea hamraji*, may be a mistake by Bhattacharjee & Sharma (2002).]
78. *Cyathea spinulosa* Wall. ex Hook.  
Hailakandi (Dutta Choudhury & Bhattacharya, 1997). [This report also needs further investigation to confirm it.]

### Dennstaedtiaceae

79. *Microlepia hookeriana* (Wall. ex Hook.) C. Presl  
Cachar (Sen & Bhattacharya, 2007) and Sylhet (Beddome, 1892).
80. *Microlepia pilosula* (Wall.) C. Presl [= *Microlepia villosa* (D.Don) Ching]  
Karimganj (Sen & Bhattacharya, 2007).
81. a. *Microlepia speluncae* (L.) T.Moore  
Karimganj (Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury and Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
- b. *Microlepia speluncae* var. *pubescens* (Wall. ex C.B. Clarke) Sledge  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002).

### Lindsaeaceae

82. *Lindsaea ensifolia* Sw.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
83. a. *Sphenomeris chinensis* (L.) Maxon [= *Odontosoria chinensis* (L.) J. Sm.]  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury and Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
- b. *Sphenomeris chinensis* (L.) Maxon var. *teunifolia* (Sw.) C.Chr. [= *Odontosoria chinensis* (L.) J. Sm. var. *teunifolia*]  
Cachar (Bhattacharya *et al.*, 1998). [There is no such var. *tenuifolia* under *O. chinensis* but a variety under *Sphenomeris* (*Odontosoria chausan* (L.) Masan. Later on the var. *tenuifolia* uplifted to a species, now named as *Odontosoria tenuifolia* (Lam.) J.Sm. But, this is a south Indian sp. which needs confirmation of its occurrence in this NE India].

### Thelypteridaceae

84. *Ampelopteris prolifera* (Retz.) Copel.  
Throughout BarakValley (Nath & Bhattacharya, 2002).
85. *Amphineuron immersum* (Blume) Holttum [= *Thelypteris immersa* (Blume) Ching]  
Karimganj (Bhattacharya *et al.*, 2002).

86. *Amphineuron opulentum* (Kaulf.) Holttum  
Karimganj (Nath & Bhattacharya, 2002), Hailakandi (Borthakur *et al.*, 2000, Nath & Bhattacharya, 2002).
87. *Christella semisagittata* (Roxb. ex Griff.) Holttum [= *Thelypteris semisagittata* (Roxb.) Morton]  
Karimganj (Sen & Bhattacharya, 2007).
88. *Christella subpubescens* (Blume) Holttum [= *Thelypteris subpubescens* (Blume) K. Iwats.]  
Karimganj (Bhattacharya *et al.*, 2002).
89. *Cyclosorus sagittifolius* (Blume) Ching  
This fern has been reported from Karimganj by Bhattacharya *et al.*, (2002) and so also by Dutta Choudhury *et al.*, (2009). The report made by Bhattacharya *et al.*, (2002) relates to another species. The name is still included in the list because there is another report which the present authors could not check. [This species is Malayan and Indonesian and never reported from Indian sub-continent. So, it needs confirmation.]
90. *Macrothelypteris torresiana* (Gaud.) Ching [= *Thelypteris torresiana* (Gaud.) Alston]  
Karimganj (Bhattacharya *et al.*, 2002), Hailakandi, Dutta Choudhury *et al.*, (2009).
91. *Nephrodium truncatum* C. Presl. [= *Pneumatopteris truncata* (Poir.) Holttum]  
Syllhet (Beddome, 1892).
92. *Meniscium cuspidatum* Blume [= *Pronephrium cuspidatum* (Blume) Holttum]  
Syllhet (Beddome, 1892).
93. *Pronephrium lakhimpurens* (Rosenst.) Holttum [= *Thelypteris lakhimpurensis* (Rosenst.) K. Iwats.]  
Karimganj (Sen and Bhattacharya, 2007) and Cachar (Bhattacharya *et al.*, 1998).
94. *Pronephrium parishii* (Bedd.) Holttum [= *Thelypteris parishii* (Bedd.) Panigrahi]  
Karimganj (Nath and Bhattacharya, 2002) and Cachar (Nath & Bhattacharya, 2002).
95. *Meniscium triphyllum* Sw., *Pronephrium triphyllum* (Sw.) Holttum; *Thelypteris triphylla* (Sw.) K. Iwats.  
This species has been reported as *Meniscium triphyllum* Sw. from Cachar (Beddome, 1892) while the same species has been reported as *Pronephrium triphyllum* (Sw.) Holttum from Karimganj (Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Beddome, 1892, Bhattacharya *et al.*, 1998).
96. *Pseudocyclosorus falcilobus* (Hook.) Ching [= *Thelypteris falciloba* Hook.]  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Dutta Choudhury *et al.*, 2009).
97. *Spherostephanos unitus* (L.) Holttum  
Cachar (Bhattacharya *et al.*, 1998).
98. *Christella dentata* (Forssk.) Brownsey & Jermy [= *Thelypteris dentata* (Forssk.) John.]  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).
99. *Thelypteris glanduligera* (Kunze) Ching  
Cachar (Sen & Bhattacharya, 2007).
100. *Cyclosorus interruptus* (Willd.) H.Ito, *Cyclosorus gongyloides* (Schkuhr) Link [= *Thelypteris interrupta* (Willd.) K. Iwats.]  
This species has been reported as *Cyclosorus gongyloides* from Cachar (Bhattacharya *et al.*, 1998); while Bhattacharya *et al.*, (2002) reported *Cyclosorus interruptus* and *Cyclosorus gongyloides* as two separate species from Karimganj. Dutta Choudhury *et al.*, (2009) repeated the same mistake.
101. *Pronephrium nudatum* (Roxb. ex Griff) Holttum [= *Thelypteris nudata* (Roxb.) Morton]  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
102. *Christella papyracea* (Bedd.) Holttum [= *Thelypteris papyracea* (Bedd.) Holttum]  
Karimganj (Sen & Bhattacharya, 2007).
103. *Christella parasitica* (L.) H. Lev. [= *Thelypteris parasitica* (L.) Tardiau]  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998, Borthakur *et al.*, 2000).
104. *Trigonospora ciliata* (Wall. ex Benth.) Holttum  
Cachar (Nath & Bhattacharya, 2002).
105. *Trigonospora loyalii* Panigrahi & Sarn. Singh  
Karimganj (Sen & Bhattacharya, 2006). This species needs further study for confirmation.

#### Aspleniaceae

106. *Asplenium falcatum* Lam. [= *Asplenium polyodon* G. Frost.]  
Karimganj (Nath & Bhattacharya, 2002) and Cachar (Nath & Bhattacharya, 2002).
107. *Asplenium finlaysonianum* Wall. ex Hook.  
Karimganj (Nath & Bhattacharya, 2002) and Cachar (Sen & Bhattacharya, 2007).
108. *Asplenium longissimum* Blume  
Syllhet (Beddome, 1892).
109. *Asplenium macrophyllum* (Sw.) Hook.  
Hailakandi (Dutta Choudhury & Bhattacharya, 1997) [This sp. is far from Indian sub-continent, probably misapplied to *A. finlaysonianum*]
110. *Asplenium nidus* L.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998, Chowdhury, 2005).
111. *Asplenium nitidum* Sw.  
Cachar (Beddome, 1892).
112. *Asplenium pellucidum* Lam.  
Karimganj (Nath & Bhattacharya, 2002).
113. *Asplenium unilaterale* Lam.  
Cachar (Bhattacharya *et al.*, 1998).

### Athyraceae

114. *Diplazium bentamense* Blume  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Beddome, 1892).
115. *Diplazium mioense* Sing & Panigrahi [= *Diplazium dilatatum* Blume]  
Cachar (Bhattacharya *et al.*, 1998) and Karimganj (Sen & Bhattacharya, 2006).
116. *Diplazium dolichosorum* Copel. [= *Diplazium. forrestii* (Ching ex Z.R. Wang) Fraser-Jenk.]  
Karimganj (Sen & Bhattacharya, 2006). [Not present in India, Phillippino species.]
117. *Diplazium donianum* (Mett.) Tardiue  
Karimganj (Nath & Bhattacharya, 2002).
118. *Diplazium esculentum* (Retz.) Sw.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).
119. *Diplazium polypodioides* Blume  
Cachar (Dutta Choudhury *et al.*, 2009).

### Hypodemataceae

120. *Hypodematum crenatum* (Forssk.) Kuhn  
Karimganj (Bhattacharya *et al.*, 2002).

### Aspidiaceae

121. *Ctenitopsis fusipes* (Wall. ex Bedd.) Ching; *Pleocnemia membranifolia* Bedd [= *Tectaria fucipes* Wall. ex (Bedd) C.Chr.]  
This species has been reported as *Pleocnemia membranifolia* C. Presl from Cachar (Beddome, 1892) while the same species has been reported as *Ctenitopsis fusipes* (Wall. ex Bedd.) Ching from Cachar and Karimganj by Bhattacharya *et al.*, (1998) and Bhattacharya *et al.*, (2002) respectively.
122. *Heterogonium pinnatum* (Copel.) Holttum  
Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998, Dutta Choudhury *et al.*, 2009). [It is believed to be an Andaman sp. which needs confirmation about its availability in Eastern India].
123. *Pleocnemia winitii* Holttum [= *P. submembranacea* (Hayata) Tagawa & K.Iats.]  
Karimganj (Nath and Bhattacharya, 2002).
124. *Tectaria coadunata* (Wall. ex Hook. & Grev.) C. Chr.  
Karimganj (Sen & Bhattacharya, 2007).
125. *Tectaria decurrens* (C.Presl) Copel. [= *Aspidium decurrens* C.Presl]  
This species has been reported as *Tectaria decurrens* from Karimganj (Sen & Bhattacharya, 2007) and as *Aspidium decurrens* from Cachar (Beddome, 1892).
126. *Tectaria griffithii* (Baker) C. Chr.  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002).
127. *Tectaria heterosora* (Baker) Ching [= *Tectaria heterocarpa* (Bedd.) Morton]  
Karimganj (Sen and Bhattacharya, 2007).  
\* [*Tectaria heterophylla* : Cachar (Bhattacharya and

Sharma, 2002), There is no such species in India, Probably a misapplied name of *T. heterocarpa* or *T. polymorpha*. This name could not be found in any standard literature.]

128. *Tectaria variolosa* (Wall. ex Hook.) C. Chr. [= *Tectaria impressa* (Fee) Holttum]  
Karimganj (Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998, Borthakur *et al.*, 2000).
129. *Tectaria leuzeana* (Gaud.) Copel. [= *Pleocnemia leuzeana* (Gaud.) C. Presl]  
This species has been reported from Cachar as *Pleocnemia leuzeana* (Gaud.) C.Presl. by Beddome (1892) and as *Tectaria leuzeana* (Gaud) Copel. by Chowdhury (2005).
130. *Tectaria macrodonta* (Fee) C. Chr. [= *Tectaria coadunata* (Wall. ex Hook. & Grev.) C. Chr.]  
Karimganj (Sen & Bhattacharya, 2007).
131. *Tectaria polymorpha* (Wall. ex Hook.) Copel.  
Hailakandi (Dutta Choudhury & Bhattacharya, 1997).
132. *Tectaria subconfluens* (Bedd.) Ching  
Karimganj (Bhattacharya *et al.*, 2002). [It is a far-east Asian plant and Sri Lankan sp., needs further confirmation.]
133. *Tectaria subtriphylla* (Hook. & Arn.) Copel.  
Karimganj (Bhattacharya *et al.*, 2002).
134. *Tectaria vasta* (Blume) Copel.  
Cachar (Nath & Bhattacharya, 2002).

### Peranemataceae

135. *Peranema cyatheoides* D. Don  
Karimganj (Bhattacharya *et al.*, 2002).

### Dryopteridaceae

136. *Dryopteris chrysocoma* (Christ) C.Chr.  
Karimganj (Bhattacharya *et al.*, 2002) and Hailakandi (Dutta Choudhury & Bhattacharya, 1997).
137. *Dryopteris sparsa* (Buch.-Ham. ex D. Don) Kuntze  
Karimganj (Sen & Bhattacharya, 2007).
138. *Polystichum auriculatum* (L.) C. Presl [= *Nephrolepis biserrata* (Sw.) Schott]  
Karimganj (Bhattacharya, 1994).
139. *Polystichum biaristatum* (Blume) T. Moore  
Cachar (Sen & Bhattacharya, 2007). [It is a South Indian and Sri Lankan sp.; may not be NE Indian plant! So, it needs further confirmation].

### Bolbitidaceae

140. *Bolbitis costata* (C. Presl) Ching  
Karimganj (Sen and Bhattacharya, 2007).
141. *Bolbitis heteroclita* (C. Presl) Ching [= *Gymnopteris flagellifera* Sw.]  
This species has been reported as *Gymnopteris flagellifera* from Cachar (Beddome, 1892) and as *Bolbitis heteroclita* from Karimganj (Bhattacharya *et al.*, 2002).
142. *Bolbitis subsimplex* (Fee) Ching  
Karimganj (Sen & Bhattacharya, 2007). [There is no such sp. in South Asia, probably and error of some other sp.!]

143. *Egenolfia bipinnatifida* J. Sm. [= *Bolbitis costulata* (Hook.) Fraser-Jenk.]  
Karimganj (Bhattacharya *et al.*, 2002).
144. *Egenolfia sinensis* (Bak.) Maxon [= *Bolbitis sinensis* (Baker) K. Iwats.]  
Cachar (Nath & Bhattacharya, 2002). Karimganj (Sen and Bhattacharya, 2007).
145. *Egenolfia vivipara* (Hook.) C. Chr. [= *Bolbitis nudiflora* (Bory) Fraser-Jenk.; *Egenolfia appendiculata* (Willd.) J. Sm. spp. *vivipera*]  
Cachar (Nath & Bhattacharya, 2002), throughout Barak Valley (Nath & Bhattacharya, 2002).

#### Nephrolepidaceae

146. *Nephrolepis cordifolia* (L.) C. Presl  
Karimganj (Bhattacharya, 1999).
147. *Nephrolepis hirsutula* (G. Forst.) C. Presl  
Karimganj (Nath & Bhattacharya, 2002).
148. *Nephrolepis volubilis* J. Sm. [= *N. radicans* (Burm.f) Kuhn]  
Sylhet (Beddome, 1892).

#### Davalliaceae

149. *Davallia bullata* Wall. ex Hook. [= *D. trichomanoides* Blume]  
Cachar (Nath & Bhattacharya, 2002) and Karimganj (Nath & Bhattacharya, 2002).
150. *Davallia divaricata* Blume [= *Ariostegia divaricata* (Blume) Kato]  
Cachar (Dutta Choudhury, 2009). [It is a South Indian and Sri Lankan plant (Fraser-Jenk., 2008), so it needs further confirmation!]
151. *Davallia griffithiana* Hook.  
Karimganj (Sen & Bhattacharya, 2007).
152. *Davallia solida* (G. Frost) Sw.  
Karimganj (Dey *et al.*, 2009).
153. *Humata repens* (L.f.) Diels [= *Davallia repens* (L.f.) Kuhn.]  
Karimganj (Bhattacharya, 1994, Bhattacharya *et al.*, 2002).
154. *Leucostegia immersa* (Wall. ex Hook.) C. Presl [= *Leucostegia truncata* (D. Don.) Fraser-Jenk.]  
Cachar (Bhattacharya *et al.*, 1998), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Karimganj (Bhattacharya *et al.*, 2002).

#### Blechnaceae

155. *Blechnum orientale* L.  
Karimganj (Bhattacharya, 1994, Borthakur *et al.*, 2000, Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).

#### Stenochlaenaceae

156. *Stenochlaena palustris* (Burm. f.) Bedd.  
Karimganj (Bhattacharya *et al.*, 2002), Common (Nath & Bhattacharya, 2002).

#### Azollaceae

157. *Azolla pinnata* R. Br.  
Karimganj (Bhattacharya *et al.*, 2002), Hailakandi (Dutta Choudhury & Bhattacharya, 1997) and Cachar (Bhattacharya *et al.*, 1998).

#### Salvaniaceae

158. *Salvania cucullata* Roxb. ex Bory  
Karimganj (Bhattacharya *et al.*, 2002).
159. *Salvania natans* (L.) All.  
Karimganj (Bhattacharya *et al.*, 2002) and Cachar (Bhattacharya *et al.*, 1998).

## DISCUSSION

It is evident from this review that at least 159 species, one subsp. and two varieties, in 65 genera under 37 families, of true ferns are growing in Barak Valley area. The largest family is Polypodiaceae (25 spp.), followed by Thelypteridaceae (22 spp.), Aspidiaceae (14 spp.), Pteridaceae (11 spp) and Aspleniaceae (8 spp), covering about 40% of the total enumerated species. *Pteris* and *Tectaria* are the largest genera having 11 species each followed by *Asplenium* (8 spp.), *Pyrrosia* (8 spp.) and *Bolbitis* (6 spp.), covering about 33% of the total species. There are 15 families having only one genus and species. The most common and dominant species belongs to the genera *Pteris*, *Tectaria*, *Diplazium*, *Stenochlaena*, *Marsilea*, *Salvinia*, *Azolla*, *Cheilanthes*, *Lygodium* and *Adiantum*. The rare species are under *Dryopteris*, *Bobitis*, and *Hypodematum*. Except one cultivated species (*Platyterium alcicorni*), all other species grow naturally. Most of the species are terrestrial, except a few which are epiphytic. The common epiphytic species are *Pyrossia adnescens*, *Microsorium punctatum* and *Drynaria quercifolia*. Only 5 species are found to be truly aquatic (*Salvinia cucullata*, *S. natans*, *Azolla*, *Ceratopteris* and *Marsilea*). The genera very common in disturbed areas are *Pteris*, *Adiantum*, *Thelypteris* and *Cheilanthes*. Few species require further confirmation of their existence in the area.

Although, this list shows a good representation of the fern genera of North and North-Eastern Indian or Himalayan region, yet it is clear that a poor number of many of the large genera, like *Leptochilus*, *Loxogramme*, *Hymenophyllum*, *Trichomanes*, *Microlepia*, *Athyrium*, *Dryopteris* and *Polystichum* have been documented. This indicated that some more species are yet to be reported from Barak Valley. Especially the taxa under *Polystichum*, *Leptochilus*, *Trichomanes* and *Hymenophyllum* need special attention to find their more representatives. From the available literatures it is expected that some more species are to be added and the final number would be around 200 species of true ferns from this region.

This study is an outcome of about 200 years of past research on this plant group. It was Roxburgh, the then Superintendent of Calcutta Botanic Garden, who first initiated fern research from this area. In his *Hortus Bengalensis* (1814), he mentioned only two species from



the then Sylhet area collected by M.R. Smith in 1811. These were again mentioned in his famous *Flora Indica*, posthumously published later by Roxburgh and Griffith (1844). Then Hooker and Gravile (1827-1831) published their *Icones Filicum* where they mentioned 2 species of ferns in Vol.I and 4 species in Vol.II from Sylhet region. But, the great effort of the ferns of this area was by Wallich, when he was in charge of the Superintendent of the Calcutta Botanic Garden. He visited several times in this region in between 1815 and 1829 and collected a good number of ferns which forms the nucleus of the fern research of this area. But, he could not publish any of his findings. His collections are mostly housed at Kew in Wallich-Kew Herbarium and listed in *Wallich Catalogue*. An investigation unveils 24 species of ferns which were listed from Sylhet region alone. After a long gap, Clarke visited several times in this area between 1868 and 1886, when he was serving as the Superintendent of Calcutta Botanic Garden and then as the School Inspector of Assam-Bengal Province. An investigation (Mirza, 2000) indicated that about 15 species of ferns were collected from the then Sylhet alone by him. One of those collections was from Karimganj (Clarke 6985, 12.05.1868), part of the then Sylhet district. Finally, it was Beddome who assembled all the ferns of the then British India and published a comprehensive treatise (1883, 1892), where he mentioned that 16 ferns are available in Cachar District and 13 in Sylhet District. All this historical events indicated that large number of illustrative investigators were attracted to this place and collected many ferns, most of which are deposited in many European and American herbaria. More information about the ferns from Barak Valley is expected to be added, if these are searched.

Following many administrative and political changes since 1947, the present form of Barak Valley area became the place of interest to researchers working in different fields. After about 100 years of gap in fern research, some local fern enthusiasts rejuvenated and organized research in this area and published a good number of research papers. In some cases new findings are added gradually despite many repeated enumeration of taxa. But, in some cases illegitimate names, erroneous identification and author's citations of the taxon and misapplied names lead to confusion and hindrance for smooth research. In this paper we have tried to filter and abolish many of such anomalies and confusions, as far as possible. The nomenclature is updated with the standard citation of the authors of the taxon for the first time. This review or census list will help various researchers as the sound basis for further work on the ferns of Barak Valley.

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