BULL. BOT. SURV. INDIA
Vol. 38. Nos. 1-4: pp.46-54, 1996

ON A COLLECTION OF MOSSES FROM ARUNACHAL PRADESH

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A B S T R A C T

82 species of mosses have been collected from Arunachal Pradesh. *Brachythecium formosanum* Tak., *B. wichurae* (Broth.) Par. and *Hypnum macrogynum* Besch. are new records for India. 7 species : *Brachymenium sikkimense* Ren. et Card., *Brachythecium buchananii* (Hook.) Jaeg. var. *cuspidiferum* (Mitt.) Gangulee et Vohra, *Brotherella nictans* (Mitt.) Broth., *Dicranodontium capillifolium* (Dix.) Tak. *Ectropothecium ramuligerum* Dix., *Taxithelium laeviusculum* Dix., and *Trichosteleum stereodontoides* Broth. ex Gangulee, known so far only by the type material, have been collected for the first time since then. 48 species and 11 genera are additions to Arunachal Pradesh.

INTRODUCTION

Arunachal Pradesh, also known as the land of the rising sun, is the eastern most Himalayan state of India. With an area of 83740 sq. kms (Hajra *et al.*, 1996), it is largest in size in the entire North-East region known for the richness of its floristic diversity.

Arunachal Pradesh is phytogeographically very important. A large number of East and South-East Asiatic species and also some genera extend their range to this state and the neighbouring Nagaland. It's proximity to Burma (Myanmar), Bhutan and Tibet, facilitates migration from three directions : East, West and North respectively ; due to similarity in the climatic conditions in the areas contiguous to those countries.

The entire North-East is also known for active speciation. It has been considered as a centre of origin for genera like *Symphyodon* Mont. Two of the species of this genus are endemic to Arunachal Pradesh.

Although poorly explored, based on existing material, 12% of the species, including one genus *Ortholimnobium* Dix. are endemic to this state only.

Arunachal Pradesh is located between 91° 40" to 97° 15" E and 26° 40" to 29° 25" N. The precipitation is high (2086 to 2972 mm annually) and occurs almost throughout the year. 61.54% of the area is under forest and the forests are dense. The forests extend from 300 m at foot hills to above 4000 m. The forests are of varied types. They are semi-evergreen to evergreen at lower altitudes to temperate forests at higher elevations (Hajra *et al*, 1996).

Arunachal Pradesh is one state, where still vast areas are under undisturbed forests. Such forests are suitable habitats for those corticolous species which prefer low light regime. This state needs to be explored further, for such species.

Although floristically important, the mosses of this state were unkown till Dixon (1914) published an account of the mosses of Abor Hills. This was

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Date of receipt : 3.10.96. Date of acceptance : 19.5.97.

based on the collections made by Burkill during the years 1911 and 1912. Subsequent to this, Bor during the years 1933 to 1936, made a collection from Aka Hills. These were also published by Dixon (1939).

Among the more recent collectors, Mudgal, from Botanical Survey of India, while in search of *Coptis teeta,* made a collection from Mishmi Hills and Debang Valley, during the year 1981. Some of these were reported by Vohra (1983).

Others, who made note worthy collections are R.S. Rao (Siang in 1958) and Panigrahi (Kameng in 1957 ; Kalaktang and Seargaon in 1958). These collections are present in the herbarium.

Based on the above material, 158 species are so far recorded (Gangulee, 1969-1980). Among them 19 taxa are endemic to this state, which includes one genus : *Ortholimnobium* Dix. But vast areas still remain unexplored and their number is likely to rise considerably, as more and more collections are available.

During the months of Oct.-Nov., 1995, Mr. B.D. Kar, co-author of this paper visited Arunachal Pradesh. He collected mostly in W. Kameng and Tawang Districts and also some adjoining areas. Altogether 138 numbers, comprising 82 species were collected. These collections were very rewarding.

Out of the 82 species enumerated, 3 species: *Brachythecium formosanum* Tak., *B. wichurae* (Broth.) Par. and *Hypnum macrogynum* Besch. are new records for India. 48 species, including 11 genera, are additions to Arunachal Pradesh moss flora. 7 species, which may be considered rare or threatened, have been collected for the first time, since they were first described. These are : *Brachymenium sikkimense* Ren. et Card., *Brachythecium buchananii* (Hook.) Jaeg. var. *cuspidiferum* (Mitt.) Gangulee et Vohra, *Brotherella nictans* (Mitt.) Broth., *Dicranodontium capillifolium* (Dix.) Tak., *Ectropothecium ramuligerum* Dix., *Taxithelium laeviusculum* Dix., and *Trichosteleum stereodontoides* Broth. ex Gangulee. Among them *Brotherella nictans* (Mitt.) Broth., the type of which is by Hooker from Sikkim, has also been subsequently reported once from Nepal. The remaining are known from their types only.

Species of East or South-East Asiatic distribution, extending their range to Arunachal are : *Brotherella falcata* (Doz et Molk.) Fleisch., *Ectropothecium dealbatum* (Reinw. et Hornsch.) Jaeg., *Glossadelphus bilobatus* (Dix.) Broth. The former two were once reported earlier also from Arunachal Pradesh, while the latter has also been once collected from Nagaland.

The genera, which are being reported for the first time from Arunachal Pradesh are : *Aerobryidium* Fleisch., *Brachymenium* Schwaegr., *Brachythecium* B.S.G., *Campylopus* Brid., *Glossadelphus* Fleisch., *Hymenostylium* Brid., *Hypnum* Hedw., *Meteorium* (Brid.) Doz. et Molk., *Oxystegus* (Limpr.) Hilp., *Pterobryopsis* Fleisch., and *Rhytidiadelphus* (Limpr.) Warnst.

In this paper, all the 82 species belonging to 48 genera and 22 families have been enumerated with field notes and distribution data. New reports from Arunachal Pradesh are preceded by asterisk. The families are arranged according to Brotherus (1924, 1925). Genera and species are arranged alphabetically. The material is deposited in CAL.

SPHAGNACEAE

Sphagnum sp.

Tawang to Shella Pass, 4000 m, on ground and slopes, 6.11.1995, *Kar* 68583. 68589.

DICRANACEAE

* **Campylopus involutus** (C. Muell.) Jaeg.

Bomdila, 2300 m, on rocky wall, 29.10.1995, *Kar* 68542.

Distrib. : Darjeeling, Nilgiris, (New to Arunachal Pradesh) : Indonesia.

* **C. latinervis** (Mitt.) Jaeg.

Bomdila, Khaitum Rahung forest, 3000 m, on rocky wall, 30.10.1995, *Kar* 68565.

Distrib. : Sikkim, Darjeeling, Nilgiris, (New to Arunachal Pradesh) ; E. Nepal, Sri Lanka.

* **C. richardii** Brid.

Khupi, 1350 m, on rock, 15.11.1995, *Kar* 68634, 68635 ; Bomdila, 2300 m, on rocky wall, 29.10.1995, *Kar* 68536, 68537.

Distrib. : W. Himalaya, Darjeeling, Sikkim, Chhotanagpur, Nilgiris, Palnis, E. Ghats, (New to Arunachal Pradesh) ; Sri Lanka, S. E. Asia, New Guinea, Hawaii, Tahiti, Sandwich Isls, C. & S. America.

Dicranella heteromala (Hedw.) Schimp.

Near Gumfa, 3000 m, on soil, 4.11.1995, *Kar* 68577.

Distrib. : Himalaya ; Caucasus, C. Asia, Amur, Korea, Japan. E. Tibet, N. & C. Africa, N. C. & S. America.

*** Dicranodontium caespitosum** (Mitt.) Par.

Bomdila, Khaitam Rohung Forest, 3000 m, on rock, 30.10. 1995, *Kar* 68552.

Distrib. : W. Himalaya, Sikkim, Darjeeling, (New to Arunachal Pradesh) ; E. Nepal, Yunnan.

D. capillifolium (Dix.) Tak.

Bigger forest, 3000 m, on ground, *Kar* 68579; Dirang to Kalaktang, 2000 m, 7.11.1995, *Kar* 68590.

Distrib. : Endemic to Arunachal Pradesh ; so far known only from type material.

Dicranum kashmirense Bioth.

Shergaon, 1900 m, on tree trunks and rocks, 11-13.11.1995, *Kar* 68606, 68609A, 68630.

Distrib. : Kashmir, Arunachal Pradesh. This species has disjunct distribution.

*** D. loriforme** Mitt.

Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68618, 68621A : Shergaon, 1950 m, on ground, 13.11. 1995, *Kar* 68623.

Distrib. : Kashmir, Darjeeling, Sikkim, Meghalaya, Nagaland, (New to Arunachal Pradesh) ; E. Nepal, Bhutan.

FISSIDENTACEAE

Fissidens areolatus Griff.

Shergaon, 1900 m, 11.11.1995, *Kar* 68603.

Distrib. : Darjeeling, Sikkim, Meghalaya, Arunachal Pradesh, Garo Hills ; E. Nepal, S. E. Asia.

***F. sylvaticus** Griff.

Tipi to Sesa, 300-600 m, on ground, 25-26.10.1995, *Kar* 68508, 68511, 68514.

Fissidens sp.

Kalaktang, Douzi forest, 1000 m, 9.11.1995, *Kar* 68594.

LEUCOBRYACEAE

Leucobryum bowringii Mitt.

Dirang, Doanbu forest, 2600 m, on rock, 2.11.1995, *Kar* 68564.

Distrib. : Meghalaya, Arunachal Pradesh, Palnis ; Sri Lanka, S. E. Asia.

***L. nilghiriense** C. Muell.

Khupi, 1350 m, 15.11.1995, *Kar* 68638.

Distrib. : Darjeeling, Sikkim, Meghalaya, Manipur, Nilgiris, Palnis, (New to Arunachal Pradesh) ; E. Nepal, Bhutan, Sri Lanka, S.E. Asia.

POTTIACEAE

*** Barbula constricta** Mitt.

Tipi to Sesa, 900 m, 27.10.1995, *Kar* 68522 ; Bomdila, 2300 m, 29.10.1995, *Kar* 68543 ; Kalaktang, Denzing forest, 1000 m, 9.11.1995, *Kar* 68601 ; Shergaon, 1900 m, 11-13.11.1995, *Kar* 68611. 68628.

Distrib. : Western Himalaya, Darjeeling, (New to Arunachal Prades) ; E. Nepal, Upper Burma (Myanmar) N. & S. China, Japan, Java, Philippines.

***Hydrogonium javanicum** (Doz. et Molk.) Hilp.

Tipi to Sesa, 300 m, 25.10.1995, on ground *Kar* 68502.

Distrib. : W. Himalaya, N. Bengal, Upper Assam (New to Arunachal Pradesh) ; Sri Lanka, China, Vietnam, Philippines, Indonesia, Celebes.

***Hymenostylium aurantiacum** Mitt.

Kalaktang, Denzi forest, 1000 m, 8.11.1995, *Kar* 68593.

Distrib. : W. Himalaya, Darjeeling, Sikkim, W. Ghats, (New to Arunachal Pradesh) ; W. Tibet, E.

Nepal, China, Burma (Myanmar), Philippines.

***Oxystegus cylindricus** (Brid.) Hilp.

Bomdila, 2300 m, on rocky wall, 29.10.1995, *Kar* 68537A.

Distrib. : W. Himalaya, Darjeeling, Sikkim, Meghalaya, Nagaland, S. India, (New to Arunachal Pradesh) ; E. Nepal, Sri Lanka, Myanmar, C. Asia, China, Japan, Africa, Europe, America.

Semibarbula orientalis (Web.) Wijk et Marg.

Tipi, 300 m, on rock, 25.10.1995, *Kar* 68509.

Distrib. : Throughout India, from Plains to 2000 m ; S.E. Asia, C. & S. Africa, Oceana.

FUNARIACEAE

Funaria hygrometrica Hedw.

Tawang District, near Gumfa, 300 m, on soil, 4.11.1995, *Kar* 68578 ; Morsing, 2000 m, 12.11.1995, *Kar* 68613.

Distrib. : Cosmopolitan.

BRYACEAE

***Brachymenium exile** (Doz. et Molk.) Bosch et Lac.

Derang, Lish Basti forest, 1600 m, on soil, 1.11.1995, *Kar* 68560.

Distrib. : W. Himalaya, Darjeeling, Nagaland, S. India, (New to Arunachal Pradesh) ; E. Nepal, Sri Lanka, S.E. Asia.

***B. microstomum** Harv.

Derang, Lish Basti forest, 1600 m, on soil, in shade, 1.11.1995, *Kar* 68555, 68563 ; Kalatang forest, 1100 m, 8.11.1995, *Kar* 68592.

Distrib. : Orissa, (New to Arunachal Pradesh) ; E. Nepal.

*** B. sikkimense** Ren. et Card.

Derang, Lish Basti forest, 1600 m, on soil, in shade, 1.11.1995, *Kar* 68556.

Distrib. : Darjeeling, (New to Arunachal Pradesh).

Note : This species was so far known from the type material only.

Bryum argenteum Hedw.

Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68616.

Distrib. : Throughout India, in hilly places ; Cosmopolitan.

***B. billardieri** Schwaegr.

Khupi, 1350 m, 15.11.1995, *Kar* 68633.

Distrib. : W. Himalaya, Sikkim, Nilgiris, Palnis, (New to Arunachal Pradesh) ; E. Nepal, Bhutan, Sri Lanka, S.E. Asia, Australia, New Zealand, New Caledonia, Europe, America, Africa, Fiji, Hawaii.

*** B. porphyroneuron** C. Muell. var. **erythrinum** (Mitt.) Fleisch.

Kalaktang forest, 1100 m, 8.11.1995, *Kar* 68592.

Distrib. : Garhwal, Sikkim, Meghalaya, Coorg, Nilgiris, (New to Arunchal Pradesh) ; Sri Lanka, Java, Sumatra.

***Pohlia minor** Schliesoh. ex Schwaegr. ssp. **acuminata** (Hopp. et Hornsch.) Wijk. et Marg.

Derang, Lish Basti forest, 1600 m, on soil, 1.11.1995, *Kar* 68558.

Distrib. : Mussoorie, Darjeeling, Sikkim, (New to Arunachal Pradesh) ; E. Nepal, Bhutan, Japan, Europe, N. America.

MNIACEAE

***Mnium cuspidatum** Hedw.

Gumfa, 3000 m, on rock, 4.11.1995, *Kar* 68575.

Distrib. : Kashmir, Himachal Pradesh, Kumaon, (New to Arunachal Pradesh) ; Bhutan, Korea, Japan, China, Manchuria, C. Asia, Caucasus, Europe, N. America, N. Africa.

***M. integrum** Bosch et Lac.

Tipi to Sesa, 900 m, on ground 27.10.1995, *Kar* 68525.

Distrib. : W. Himalaya, Sikkim, Darjeeling, (New to Arunachal Pradesh) ; E. Nepal, S.E. Asia, Europe.

***Mnium japonicum** Lindb.

Bigger forest, 3000 m, on boulder, 5.11.1995, *Kar* 68582.

Distrib. : N.W. Himalaya, (New to Arunachal Pradesh) ; E. Nepal, China, Japan.

M. rostratum Schrad.

Shergaon, 1900 m, 11.11.1995, *Kar* 68608.

Distrib. : Throughout Himalayas, Nilgiris, Palnis ; Nepal, Bhutan, Sri Lanka—widely distributed in both the hemispheres.

BARTRAMIACEAE

Bartramia halleriana Hedw.

Bomdila, Khaitam Rahung forest, 3000 m, on rock, 30.10.1995, *Kar* 68553, 68554.

Distrib. : W. Himalaya, Sikkim, Darjeeling, Arunachal Pradesh, Nagaland ; Bhutan—widely distributed in the colder regions of both the hemispheres.

***Philonotis falcata** (Hook.) Mitt.

Tipi, 300 m, 24.10.1995, *Kar* 68501.

Distrib. : W. Himalaya, Darjeeling, Meghalaya, Nilgiris, (New to Arunachal Pradesh) ; Bhutan, S.E. Asia, S. Africa, Europe, N. America, Hawaii.

*** P. turneriana** (Schwaegr.) Mitt.

Tipi to Sesa, 900 m, on ground, 27.10.1995, *Kar* 68528 ; Kalaktang, 1000 m, 9.11.1995, *Kar* 68595, 68598, 68599.

Distrib. : W. Himalaya, Darjeeling, Meghalaya, (New to Arunachal Pradesh) ; E. Nepal, Bhutan, China, Hongkong, Taiwan, Japan, Sri Lanka, Java, Philippines, Hawaii.

ORTHOTRICHACEAE

***Macromitrium moorcroftii** (Hook. et Grev.) Schwaegr.

Tipi to Sesa, 600 m, on ground 26.10.1995, *Kar* 68519 ; Shergaon, 1950 m, on rock, 13.11.1995, *Kar* 68629.

Distrib. : Kumaon, Darjeeling, Meghalaya, Coorg, (New to Arunachal Pradesh) ; E. Nepal, Myanmar, Yunnan.

TRACHYPODACEAE

Trachypodopsis crispatula (Hook.) Fleisch.

Bomdila, 2300 m, on ground, 29.10.1995, *Kar* 68533 ; Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68614 ; Tipi to Sesa, 900 m, on boulder, 27.10.1995, *Kar* 68520A.

Distrib. : Himalays, Palnis, Andaman Isls ; Sri Lanka, Myanmar, Thailand, Cambodia, Laos, Indonesia, Celebes, Philippines, Taiwan, Yunnan, Mauritius, C. America, C. & S. Africa, Madagaskar.

PTEROBRYACEAE

***Pterobryopsis auriculata** Dix.

Tipi to Sesa, 600 m, on ground, 26.10.1995, *Kar* 68512.

Distrib. : Assam, Palnis, (New to Arunachal Pradesh) ; E. Nepal.

METEORIACEA

***Aerobryidium filamentosum** (Hook.) Fleisch.

Bomdila, 2300 m, on rock, 29.10.1995, *Kar* 68535.

Distrib. : Garhwal, Kumaon, Darjeeling, Meghalaya, Nilgiris, Palnis, Coorg, (New to Arunachal Pradesh) ; Nepal, Bhutan, Yunnan, Setschwan, Myanmer, Thailand, Vietnam, Sri Lanka, Indonesia, Philippines.

Barbella cubensis (Mitt.) Broth.

Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68615.

Distrib. : Darjeeling, Arunachal Pradesh, Meghalaya, Coorg, Palnis ; E. Nepal, Bhutan, Sri Lanka, Mayanmar, Yunnan, Taiwan, Japan, Philippines, N. Borneo, Australia, New Caledonia, Cuba, C. America.

***B. pendula** (Sull.) Fleisch.

Bomdila, Khaitam Rahung forest, 3000 m, on rock, 30.10.1995, *Kar* 68551 ; Shergaon, 1900 m, 11.11.1995, *Kar* 68605.

Distrib. : Darjeeling, Palnis, (New to Arunachal Pradesh) ; Nepal, Sri Lanka, S.E. Asia, N. America, Oceana.

***Meteorium buchananii** (Brid.) Broth.

Bigger forest, 3000 m, 5.11.1995, *Kar* 68581 ; Bomdila, 2300 m, on rock 29.10.1995, *Kar* 68531A.

Distrib. : Garhwal, Kumaon, Sikkim, Nagaland, Manipur, Nilgiris, Palnis, (New to Arunachal Pradesh) ; E. Nepal, Bhutan, Yunnan, Sri Lanka, N. Vietnam.

***M. helminthocladum** (C. Muell.) Fleisch.

Dirang, Doanbu forest, 2600 m, on rock, 2.11.1995, *Kar* 68569.

Distrib. : Darjeeling, Meghalaya, (New to Arunachal Pradesh) ; Nepal, Bhutan, Sri Lanka, Yunnan, Schensi, Taiwan, Japan, N. Vietnam.

Floribundaria floribunda (Doz. et Molk.) Fleisch.

Tipi to Sesa, 600 m, on ground, 26.10.1995, *Kar* 68510A. 68516, 68517.

Distrib. : Mussoorie, E. Himalaya, Palnis, Coorg ; Sri Lanka, S.E. Asia, New Guinea, Australia, C. & S. Africa, Madagasar, Polynesia.

Papillaria fuscescens (Hook.) Jaeg.

Tipi to Sesa, 900 m, on boulder 27.10.1995, *Kar* 68520 ; Kalaktang forest, 1000 m, 9.11.1995, *Kar* 68597.

Distrib. : E. Himalaya, Nilgiris, Palnis, Coorg ; Sri Lanka, Myanmar, Yunnan, Thailand, Laos, Indonesia, Philippines.

Meteoriopsis reclinata (C. Muell.) Fleisch.

Tipi to Sesa, 900 m, on boulder, 27.10.1995,*Kar* 68520.

Distrib. : Himalayas, S. India ; S. E. Asia, New Guinea, Australia.

NECKERACEAE

Homaliodendron scalpellifolium (Mitt.) Fleisch.

Bomdila, Khaitam Rohung forest, 3000 m, 30.10. 1995, *Kar* 68547 ; Dirang, Doanbu forest, 2600 m, on rock, 2.11.1995, *Kar* 68571 ; Shergaon, 1950 m, on ground, 13.11.1995, *Kar* 68624.

Distrib. : Darjeeling, Arunachal Pradesh, Nagaland, Meghalaya ; Nepal, Sri Lanka, S.E. Asia, New Guinea, New Caledonia.

Thamnobryum sp.

Shergaon, 1950 m, on rocks, 13.11.1995, *Kar* 68626.

THUIDIACEAE

Thuidium cymbifolium (Doz. et Molk.) Doz. et Molk.

Tipi to Sesa, 600 m, on ground, 26,10.1995,*Kar* 68510, 68521 ; Tawang, near Gumfa, 3000 m, on rock, 4.11.1995, *Kar* 68576 ; Kalaktang, Denzi forest, 1000 m, 9.11.1995, *Kar* 68600A ; Shergaon, 1900 m, on tree trunk, 11-13.11.1995, *Kar* 68607, 68631.

Distrib. : Throughout India ; S.E. Asia, New Guinea, Australia, Oceana.

BRACHYTHECIACEAE

***Brachythecium** sp.

Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68617.

***Brachythecium** sp.

Bomdila, 2300 m, on rock, 29.10.1995, *Kar* 68534.

***Brachythecium buchananii** (Hook.) Jaeg. var.

cuspidiferum (Mitt.) Gangulee et Vohra.

Tawang to Shella Pass, 4000 m, 6.11.1995, *Kar* 68588 ; Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68622.

Distrib. : Sikkim, Darjeeling. Meghalaya, (New to Arunachal Pradesh) ; endemic.

***B. formosanum** Tak.

Morsing , 2000 m, on rock, 12.11.1995, *Kar* 68619.

Distrib. : Taiwan, Nepal ; (New to India).

***B. wichurae** (Broth.) Par.

Dirang, Lish Basti forest, 1600 m, on soil, 1.11.1995, *Kar* 68557.

Distrib. : Yunnan, Japan, Nepal ; (New to India).

Eurhynchium dumosum (Mitt.) Jaeg.

Bomdila, Khaitam Rahung forest, 3000 m, on trees 30.10.1995, *Kar* 68550.

Distrib. : Sikkim, Darjeeling, Meghalaya, Arunachal Pradesh ; Nepal ; endemic to E. Himalaya.

Rhynchostegium hookeri Jaeg.

Tipi to Sesa, 600 m, on forest humus, 26.10.1995, *Kar* 68518.

Distrib. : Sikkim, Darjeeling, Arunachal Pradesh ; Sri Lanka.

***R. vagans** (Harv.) Jaeg.

Tipi to Sesa, 900 m, on ground, 27.10.1995,*Kar* 68527, 68529B ; Kalaktang, in forest, 1000 m, 9.11.1995, *Kar* 68596, 68600.

Distrib. : Dehra Dun, Garhwal, Sikkim, Darjeeling, Coorg, Palnis, (New to Arunachal Pradesh) ; Nepal, Sri Lanka, Myanmar, Thailand, Laos, Taiwan, Japan, Ceram, Philippines, Indonesia. Hawaii.

ENTODONTACEAE

***Entodon flavescens** (Hook.) Jaeg.

Dirang, Lish Basti forest, 1600 m, on soil, 1.11.1995, *Kar* 68559, 68561 ; Tawang, Gumfa, 3000 m, on soil, 4.11.1995, *Kar* 68574 ; Morsing 2000 m, on rock 12.11.1995, *Kar* 68619A.

Distrib. : W. Himalaya, Sikkim, Darjeeling, Assam, Meghalaya, Andaman Islands, S. India (New to Arunachal Pradesh) ; Nepal, Bhutan, China, Korea, Japan, Philippines.

SEMATOPHYLLACEAE

Brotherella falcata (Doz. et Molk.) Fleisch.

Tipi, 300 m, on rock, 25.10.1995,*Kar* 68505.

Distrib. : Arunachal Pradesh ; Taiwan, Java, Borneo, Celebes.

Note : It is second collection from India. Earlier collection by Bor was also from Arunachal Pradesh.

***B. nictans** (Mitt.) Broth.

Bomdila, Khaitam Rohung forest, 3000 m, on rock, 30.10.1995, *Kar* 68546.

Distrib. : Sikkim, (New to Arunachal Pradesh) ;

Note : A rare species. Apart from type, which is from Sikkim by Hooker, there is only one more collection from Nepal.

***Glossadelphus bilobatus** (Dix.) Broth.

Tipi to Sesa, 900 m, on ground, 27.10.1995,*Kar* 68529.

Distrib. : Nagaland, (New to Arunachal Pradesh) ; Sri Lanka, Moluccas.

Note : This is a second collection from India. Earlier collection is from Nagaland by McCann.

Taxithelium laeviusculum Dix.

Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68621.

Distrib. : Endemic to Arunachal Pradesh.

Note : So far known by its type, which is by Bor, also from Arunachal Pradesh.

***Trichosteleum stereodontoides** Broth. ex Gangulee

Dirang, Doanbu forest, 2600 m, on rock, 1.11.1995, *Kar* 68570.

Distrib. : Darjeeling, (New to Arunachal Pradesh).

Note : So far known by the type only.

Wijkia penicillata (Mitt.) Crum

Tawang to Shella Pass, 4000 m, on ground, 6.11.1995, *Kar* 68585.

Distrib. : Endemic to E. Himalaya.

***W. tanytricha** (Mont.) Crum

Bomdila, 3000 m, Khaitam Rohung forest, on rock, 30.10.1995, *Kar* 68549.

Distrib. : Sikkim, Darjeeling, (New to Arunachal Pradesh) : Bhutan, Vietnam, Java, Sumatra.

HYPNACEAE

Ectropothecium cyperoides (Hook.) Jaeg.

Tipi to Sesa, 600 m, on ground, 26.10.1995, *Kar* 68511A, in association with *Fissidens sylvaticus* Griff.

Distrib. : Garhwal, Assam, Arunachal Pradesh, Nagaland, S. India ; E. Nepal, Java, Sumatra, Celebes, Oceanic Islands.

Ectropothecium dealbatum (Reinw. et Hornsch.) Jaeg.

Tipi, 300 m, on rock, near stream, 25.10.1995, *Kar* 68507 ; Tipi to Sesa, 600 m, on forest humus, 26.10.1995, *Kar* 68518A, in association with *Rhynchostegium hookerii* Jaeg.

Distrib. : Arunachal Pradesh ; Indonesia, Philippines.

Note : This is the second report from India, Earlier collection by Bor was also from Arunachal Pradesh only.

E. ramuligerum Dix.

Tipi to Sesa, 900 m, on tree trunk, 27.10.1995, *Kar* 68524.

Distrib. : Arunachal Pradesh.

Note : It was so far known from Type only.

***Hypnum imponens** Hedw.

Bomdila, 2300 m, on rocky surface, 29.10.1995, *Kar* 68531 ; Shergaon, 1900, 11-13.11.1995, *Kar* 68609, 68610, 68627.

Distrib. : Kashmir, Sikkim, (New to Arunachal Pardesh) ; Japan, C. Asia, Europe, Azores, N. America.

****H. macrogynum** Besch.

Shergaon, 1990 m, 11.11.1995, *Kar* 68604.

Distrib. : E. Nepal, Myanmar, Yunnan, Setschwan, Taiwan ; New to India.

***H. sikkimense** Ando

Dirang, 1600 m to 2600 m, on soil and rock, 1-2.11.1995, *Kar* 68559A, 68572 ; Tawang, Bigger forest, 3000 m, on rock, 5.11.1995, *Kar* 68580 ; Morsing, 2000 m, on rock, 12.11.1995, *Kar* 68620.

Distrib. : Sikkim, (New to Arunachal Pradesh) : Nepal, Bhutan.

***Isopterygium elegans** (Brid.) Lindb.

Tipi to Sesa, 900 m, on ground, 27.10.1995, *Kar* 68529A.

Distrib. : Simla, (New to Arunachal Pradesh) ; E. Nepal,Caucasus, Europe, N. America, Africa.

Note : This is second report from India.

Taxiphyllum taxirameum (Mitt.) Fleisch.

Kalaktang, Danzi forest, 1000 m, on ground, 9.11.1995, *Kar* 68594.

Distrib. : Himalayas, Palnis, Coorg, Sri Lanka, S.E. Asia, N. America, Mexico, Guatemala, Northern South America, Australia.

Vesicularia montagnei (Bel.) Broth.

Tipi, 300 m, 25.10.1995, *Kar* 68504 ; Tipi to Sesa, 900 m, on trees, 27.10.1995, *Kar* 68530 ; Kalaktang, Denzin forest, 1000 m, 9.11.1995, *Kar* 68602.

Distrib. : W. Himalaya, Arunachal Pradesh, Bengal Plains ; Bangladesh, Sri Lanka, China, Thailand, Vietnam, Philippines, Indonesia, Australia.

RHYTIDIACEAE

***Rhytidiadelphus triquetrus** (Hedw.) Warnst.

Dirang, Doanbu forest, 2600 m, on rock, 2.11.1995, *Kar* 68569A, in association with *Meteorium helminthocladum* (C. Muell.) Fleisch.

Distrib. : W. Himalaya, (New to Arunachal Pradesh) ; Bhutan, China, Japan, Turkey, Siberia, Caucasus, Europe, North America.

HYLOCOMIACEAE

Macrothamnium macrocarpum (Ren. et Card.) Fleisch.

Khupi, 1350 m, on rock, 15.11.1995, *Kar* 68632.

Distrib. : Himalayas (Kumaon Eastwards, Nilgiris, Palnis ; Sri Lanka, Myanmar, Yunnan, Taiwan, Japan, Thailand, Philippines, Indonesia, Hawaii.

POLYTRICHACEAE

Pogonatum aloides (Hedw.) P.- Beauv.

Tipi to Sesa, 600 m, on ground 26.10.1995, *Kar* 68513, 68515 ; Bomdila, 2300 m, on rocks, 29.10.1995, *Kar* 68532 ; Dirang, Doanbu forest, 2600 m, on rock, 2.11.1995, *Kar* 68567, 68573.

Distrib. : Himalayas, W. Ghats, Nilgiris ; Sri Lanka, Thailand, Vietnam, Japan, Siberia, Europe, N. America, N. & C. Africa.

***Pogonatum contortulum** (Brid.) Lesq.

Shergaon, 1950 m, on ground, 13.11.1995, *Kar* 68625.

Distrib. : Meghalaya, Manipur, (New to Arunachal Pradesh) ; E. Nepal, Sylhet, Korea, Siberia, Sakhalin, Japan, N. America.

***P. himalayanum** Mitt.

Bomdila, 2300 m, on rock, 29.10.1995, *Kar* 68540 ; Tawang to Shela Pass, 4000 m, on ground, 6.11.1995, *Kar* 68584.

Distrib. : W. Himalaya, Darjeeling, Sikkim, Nilgiris, (New to Arunachal Pradesh) ; E. Nepal, S.E. Tibet, Japan.

***P. microstomum** (Schwaegr.) Brid.

Bomdila, 3000 m, Khaitam Rohung forest, on rock, 30.10.1995, *Kar* 68544.

Distrib. : W. Himalaya, Darjeeling, Sikkim, Meghalaya, Nagaland, S. India, (New to Arunachal Pradesh) ; Sri Lanka, China, Taiwan, Tonkin, Philippines.

***P. perichaetiale** (Mont.) Jaeg.

Bomdila, 2300 m, on rock, 29.10.1995, *Kar* 68539, 68537A.

Distrib. : W. Himalaya, Darjeeling, Sikkim, Nilgiris, (New to Arunachal Pradesh) ; E. Nepal, Bhutan, China.

Pogonatum sp.

Khupi, 1350 m, 15.11.1995, *Kar* 68637.

Pogonatum sp.

Khupi, 1350 m, 15.11.1995, *Kar* 68636.

ACKNOWLEDGEMENTS

The authors express their gratitude to Dr. P.K. Hajra, Director, Botanical Survey of India, for encouragement and help and for providing research facilities. They are deeply indebted to Dr. D.K. Singh, Deputy Director, BSI, Northern Circle, Dehra Dun for allowing us to make use of the laboratory and library of the Northern Circle, and finally to Sri B. ghosh, Botanist, BSI, Calcutta, for organizing the exploration work.

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