TAXONOMIC STUDY OF LICHENS OF PHULCHOWKI HILLS, LALITPUR DISTRICT (KATHMANDU VALLEY)

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Abstract: The lichens were collected from different altitudinal gradient ranges from 1500-2700 m. above sea level of Phulchowki hill. They were identified on the basis of their morphological, anatomical and chemical studies (colour reaction, thin layer chromatography and microcrystallography). A total of thirty-two species of lichens were identified which comprises nine families and ten genera. Among them family Parmeliaceae was largest one which comprises ten species.

Key words: Lichens; Crustose; Foliose; Fructicose.

INTRODUCTION:

There are about twenty thousands species of lichen in the world according to the estimation of Zahlbruckner (1922-1940), Lamb (1963) and Rogers (1977). Sharma (1995) estimated two thousand species of lichen in Nepal representing ten percent of the total lichens of the world. Sharma (1995) enumerated four hundred sixty five species of lichens in Nepal. Bania (1996) enumerated ninety-nine species of lichens from Shivapuri and Sikes. Likewise Pathak (1998) enumerated fifty-two species of lichens from Hetauda and Dang. Devkota (1999) enumerated fifty-five species of lichens from Namobuddha, Kavrepalanchok. Even though Nepal is rich in lichen flora, but most part of which remain lichenologically unexplored. It is felt that it is an important to make complete study on plant kingdom, so this study may contribute little support in this connection.

The objective of this research is taxonomic study of lichens found in Phulchowki hill.

MATERIALS AND METHODS:

Materials were collected from Phulchowki hill during January 2005. Lichens were collected by sampling 10m×10m quadrat and 5m×5m sub-quadrat (Vetaas, 1997). Different samples of lichens growing on different substrata of each stand were collected separately. Herbaria of collected specimens were prepared according to methods given by Nash et al. (1993).

Lichen specimens collected during study period were identified in laboratory of Central Department of Botany, T. U. Kirtipur. Each specimen was identified in respect of their morphology, anatomy, colour reaction, thin layer chromatography, microcrystallography and cross checking of authentic samples deposited in Central Department of Botany. To identify each genus and species the key to Macro lichens (Awasti, 1988) and the key to Microlichens (Awasti, 1991) have been consulted.

Key to families

1. a. Thallus crustose, granular, leprose……. Chrysothricaceae
1. b. Thallus otherwise ........................................... 2
2. a. Thallus squamulose, foliose or ribbon like to distinctly foliose ............................................................. 3
2. b. Thallus fructicose, erect, prostrate to pendulous+-rounded in cross section or strap shaped ........................................ 6
3. a. Photobiont blue green alga .................................. 4
3. b. Photobiont green alga ...................................... 5
4. a. Thallus gelatinous, usually blackish homoiomerous ectocarticated or corticated by 1-2 layers of cells spores transversely septate to muriform.......................... Collemataceae
4. b. Thallus non-gelatinous, large lobed, spores transversely septate, lower surface eocarticated, often veined, apothecia situated dorsally on finger like lobules, spores transversely septate .......................................................... Peltigeraceae
5. a. Thallus usually small and narrow lobed, closely adpressed to the substratum ................................................. Physiaceae
5. b. Thallus broad lobed, loosely attached to the substratum ............................................................... Parmeliaceae
6. a. Thallus dimorphic with horizontal squamulose (sometimes absent) primary thallus and erect secondary podetia or pseudopodetia secondary thallus .......................................... 7
6. b. Thallus otherwise ............................................... 8
7. a. Pseudopodetia solid, with sqamules on it, spores transversely septate to muriform.......................... Stereocaulaceae
7. b. Podetia hollow with sqamules on the surface ........................................................................ Cladoniaceae
8. a. Thallus radial in cross-section, longitudinal axis without central cords ........................................ Ramalinaceae.
8. b. Thallus radial in cross-section, longitudinal axis with central cord ........................................ Usneaceae

Key to the Species
1. a. Thallus crustose, granular, leprose, yellow crust .................................................. Chrysothrix chlorina
1 b. Thallus otherwise ............................................................. 2
2. a. Thallus foliose ................................................................. 3
2 b. Thallus fructicose ............................................................... 25
3. a. Thallus homoiomerous ..................................................... 4
3 b. Thallus heteromorous ......................................................... 7
4. a. Thallus lacking tomentum of multicellular hyphal hairs, spores muriform, apothecia stipitate on short tubular stalk .................. Leptogium resupinans
4 b. Thallus with tomentum of multicellular hyphal hairs, spores muriform .................................................. 5
5. a. Thallus tomentose on upper surface (same surface as apothecia) lower surface smooth, lobes 3-6 mm. with apothecia sub-pedicellate ........................................ Leptogium delavayi
5 b. Thallus tomentose on lower surface ........................................ 6
6. a. Whitish stiff trichomes present on thalline exciple, thallus grey-brown to brown-black ........................................ Leptogium trichophorum
6 b. Trichomes absent on thalline exciple, thallus pale to dark grey ........................................ Leptogium indicum.
7 a. Thallus corticated only on upper surface, photobiont blue green alga, apothecia vertical, erect … Peltigera polydactyla.
7 b. Thallus corticated on both surface or only on upper surface, photobiont green alga ........................................ 8
8. a. Thallus corticated on both surfaces, pycnidia present ........................................ 9
8 b. Thallus corticated on both surface or only on upper surface, pycnidia absent ........................................ 19
9 a. Pycnidia marginal, spores thick walled, more than 10 cm. Long, apothecia perforate, marginally ciliate, rhizinae simple to bifurcate ........................................ Parmelia thomsonii
9 b. Pycnidia laminal or unknown, spores simple or septate apothecia imperforate, much variable in size of lobes and colour of thallus ........................................ 10
10 a. Thallus distinctly pseudocyphellate, lower surface with black rhizinae up to the edge of the lobes, medulla KC red (salazinic acid present) ........................................ Parmelia sulcata
10 b. Thallus lacking pseudocyphellae ...................................... 11
11 a. Rhizinae present throughout the lower surface of the thallus ........................................ 12
11 b. Rhizinae restricted in central part, a broad marginal area lacking rhizinae ........................................ 13
12 a. All or most of rhizinae dichotomously branched, medulla KC ........................................ Parmelia flexilis
12 b. All rhizinae simple or squarrosely branched ........................................ 18
13 a. Thallus isidiate ................................................................. 14
13 b. Thallus lacking isidia ....................................................... 15
14 a. Margins of lobes ciliate ........................................ Parmelia wallichiana
14 b. Margins of lobes lacking cilia ........................................ Parmelia tinctorum
15 a. Thallus pustulate ............................................................ 16
15 b. Thallus lacking pustules, medulla KC red … Parmelia nilgherensis
16 a. Margins of lobes lacking cilia ........................................ Parmelia reticulata
16 b. Margins of lobes ciliate ................................................... 17
17 a. Medulla K+ (salazinic acid present) … Parmelia stippea
17 b. Medulla K (salazinic acid absent) ……. Parmelia santae-angeli
18 a. Lower surface naked or with long scattered rhizinae ........................................ Parmelia cirrhata
18 b. Lower surface uniformly rhizinate, rhizinae short marginal ........................................ Parmelia nepalensis
19 a. Thallus sub-orbicular, appressed to substratum, lower cortex present or absent ........................................ 20
19 b. Thallus ribbon like or rosulate, attached to substratum by basal or central parts, lower cortex absent ........................................ 24
20 a. Thallus corticated on both surface, rhizinae on lower surface and margin ........................................ 21
20 b. Thallus lacking lower cortex, rhizinae absent on lower surface but present along the margin, apothecia punctate ........................................ Heterodermia punctifera
21 a. Thallus isidiate, sorediate ........................................ 22
21 b. Thallus lacking isidia and soredia, apothecia up to 7 mm. diam., margin crenulate to lacinulate …….. Heterodermia diademata
22 a. Thallus with sub-isidial, marginal squamules becoming sorediate, apothecia rare … Heterodermia dissecta
22 b. Thallus sorediate, isidia absent, medulla K+, yellow ........................................ 23
23 a. Soralia capitate on lateral branches, apothecia up to 8 mm. diam., laciniae 1.5 mm … Heterodermia speciosa
23 b. Soralia capitate on lateral branches, apothecia up to 3 mm. diam., marginally sorediate …….. Heterodermia pseudospeciosa
24 a. Thallus ribbon like, linear with black rhizinae along margin ........................................ Heterodermia leucomea
24 b. Thallus rosulate, lobes sub erect, spatulate, white cilia absent on the upper surface …… Heterodermia incana
25 a. Thallus, podetia or pseudopodetia solid ........................................ 26
25 b. Thallus, podetia hollow center ........................................ 29
26 a. Thallus dimorphic with horizontal squamulose (some-
26. b. Thallus otherwise ........................................... 27
27. a. Thallus pseudocyphellate ....................... Usnea thomsonii
27. b. Thallus lacking pseudocyphellae ................... 28
28. a. Thallus isidiate, lacking soredia ........ Usnea aciculifera
28. b. Thallus lacking isidia and soredia ...... Usnea orientalis
29. a. Prominent part of thallus podetial in nature, with or
squamules ................................................................. 30
29. b. Prominent part of thallus podetial in nature, lacking
squamules ................................................................. 30
30a. Podetia lacking cups, podetia soredia ........ Cladonia
coniocraea
30b. Podetia with cups, podetia esorediate ....... Cladonia
ramulosa
31. a. Thallus much flattened longitudinally veined, palmitably
lacinate ................................................................. Ramalina sinensis
31. b. Thallus narrow, ribbon like, less than 1mm. wide
.............................................................................. Ramalina usnea

Enumeration of the species

Thallus foliose, photobiont blue-green algae, muscicolous, corticated only on upper side, apothecia marginal, spores hyaline.

Chemical constituents – Tenuionin and Dolichorrhizin.

Distribution: - Nepal and India.

Specimen examined: - Phulchowki hill (1600m, CKB8; 1800m, CKB9; TUCH).

Thallus corticolous, foliose, loosely adnate to the substratum, large maculate thallus, 3-18cm. across, ciliate, cilia 1-3mm long, simple, isidia absent, lower surface wrinkled, black, sparsely rhizinate in groups, rhizinae slener, simple, 4-8mm wide, medulla white, apothecia large, usually plenty, upto 16mm. in diam, imperforate, disc brown, smooth, ascii 8-spored, spores hyaline.

Chemical constituents: - Atranorin, Alectoronic acid α-collaticolic acid.

Distribution: - Nepal (Sikles, Kathmandu), India and Pakistan.

Specimen examined: Phulchowki hills (1750m, CKB13; 1900m, CKB24; 2000m, CKB105; TUCH)

Thallus corticolous, foliose, loosely adnate to the substratum sub erect to pendulous, grey to dark grey, 4-9cm. in size, margin ciliate, cilia simple to branched, isidia and soredia absent, lower side black in older part, pale brown to brown near the apices, rhizinate, rhizinae simple, squarrose branched to dichotomously, apothecia lamiinal shortly stalked, disc brown to dark brown, asci 8-spored, spores hyaline and simple.

Chemical constituents: - Atranorin, Salacinic acid and protolichisterinic acid.

Distribution: - Nepal (Sikles, Shivapuri,) India, Pakistan.

Specimen examined: - Phulchowki hill (1600m, CKB8; 1800m, CKB9; TUCH)

Thallus corticolous, foliose, grey. Closely to loosely adnate to the substratum, large maculate thallus, 3-18cm. across, ciliate, cilia 1-3mm long, simple, isidia, soredia absent, lower surface wrinkled, black, sparsely rhizinate in groups, rhizinae simpler, simple, 4-8mm wide, medulla white, apothecia large, usually plenty, upto 16mm. in diam, imperforate, disc brown, smooth, ascii 8-spored, spores hyaline.

Chemical constituents: - Atranorin, Alectoronic acid α-collaticolic acid.

Distribution: - Nepal (Sikles, Kathmandu), India and Pakistan.

Specimen examined: Phulchowki hills (1750m, CKB13; 1900m, CKB24; 2000m, CKB105; TUCH)

Thallus corticolous, foliose, loosely adnate to the substratum, 4-16cm. in diam,, mineral grey to dark grey, laciniate lobate, lobes rotund, imbricate, 4-8mm wide, ciliate, cilia 1-2mm long, sparse, upper surface with distinct maculate, sorediate, lower surface black towards center and brownish towards periphery, rhizinae sparse in group, apothecia lamiinal, upto 5mm in diam, disc dark brown, imperforated, ascii 8-spored, spores hyaline and simple.

Chemical constituents: - Atranorin, Salacinic acid.

Distribution: - Nepal and India

**Parmeliaceae**

Thallus corticolous or terricolous, foliose, loosely adnate to the substratum, 2-4 cm. in size, thick ash grey to dark grey, lobes 5-20 mm. wide sub-arbicular to orbital margin, ciliate, simple to bifurcate, 2-3 mm. long, tapering, upper surface plane, emaculate, smooth, sorediate, lower surface blackish, minutely wrinkled, rhizinate, thallus sterile.

**Chemical constituents:** - Gyrophoric acid and Atranorin.

**Distribution:** - Nepal (Shivapuri, Namobuddha) and India.

**Specimens examined:** - Phulchowki hills (1800 m, CKB55, CKB56; 1900 m, CKB68, CKB70; TUCH)


**Parmeliaceae**

Thallus corticolous, foliose, loosely to closely adnate to substratum, ashy grey to grey, lobes 5-10 cm. wide margin entire to wavy, eciliate, isidiate, isidia simple, isidia in the central part of the thallus, lower side minutely wrinkled, rough, black, sparsely rhizinate in the central part, marginal, about 10 mm wide zone, apothecia not seen in the observed specimen.

**Chemical constituents:** - Atranorin and Lecanoric acid.

**Distribution:** - Nepal and India.

**Specimen examined:** - Phulchoki hills (1550 m, CKB11, CKB14; 1700 m, CKB54, CKB59; TUCH).


**Parmeliaceae**

Thallus corticolous or saxicolous, foliose, loosely adnate to the substratum, 4-6 cm. in size, margin entire, ciliate, cilia simple, usually on notches, dark grey to whitish grey, rounded margin, isidiate, isidia denser towards the central parts upper surface smooth to shiny, apothecia not seen in examined specimens.

**Chemical constituents:** - Atranorin and Salacinic acid.

**Distribution:** - Nepal, Eastern Himalayas and India.

**Specimen examined:** - Phulchowki hills (1850 m, CKB80; 1900 m, CKB88; TUCH)


**Parmeliaceae**

Thallus corticolous, foliose, loosely attached to the substratum, roseate form, 5-11 cm. in diam. bluish grey, irregularly lobate, upper surface dull, smooth, maculate lobe apices, pseudocyphellate, sorediate, lower side black, densely rhizinate up to the margin, rhizinal papillae along the margin, simple rhizinae, apothecia absent in all the specimens examined.

**Chemical Constituents:** Atranorin, Salacinic acid and Protocetraric acid.

**Distribution:** - Nepal, India and Pakistan.

**Specimens examined:** - Phulchowki (2100 m, CKB105; TUCH).


**Parmeliaceae**

Thallus corticolous, foliose, loosely adnate to the substratum, roseate form, 5-11 cm. in diam. bluish grey irregularly lobate, upper surface dull, smooth, large, whitish grey, rotund, margin entire, eciliate, emaculate, isidiate, isidia in the central part of the thallus, lower side minutely wrinkled rough, black, apothecia not seen in the observed specimen.

**Chemical constituents:** - Atranorin and Salacinic acid.

**Distribution:** - Nepal (Kathmandu, Kavrepalanchok) and India.

**Specimens examined:** - Phulchowki hill (2200 m, CKB160; TUCH)


Thallus corticolous, foliose, closely adnate to the substratum, margin crenate, whitish grey lead grey to ashy grey, irregularly sinuate, lobes irregular, lobes 2-5 mm. wide, margin eciliate, crenate, upper surface smooth, isidiate, soredia absent, lower surface pale to blackish, densely rhizinate up to the margin, rhizinae dichotomously branched, apothecia common, laminal, sessile, 2-5 mm. in diam. adnate, asci 8-spored, spores hyaline.

**Chemical constituents:** Atranorin and protolichesterinic acid.

**Distribution:** - Nepal and India.

**Specimen examined:** - Phulchowki hill (1700 m, CKB80; TUCH)


Having primary squamules irregularly incised lobe, podetia cylindrical, tapering apically with pointed ends.

**Chemical constituents:** - Fumarprotocetraric acid.  
**Distribution:** - Nepal, India and Bhutan

**Specimens examined:** - Phulchowki hills (1600m, CKB45; 1800m, CKB65; TUCH)


Having persistent primary squamules, irregularly lobed, podetia cup bearing, simple, cylindrical and branched irregularly.

**Chemical constituents:** - Fumarprotocetraric acid.  
**Distribution:** - Nepal, India and Pakistan.

**Specimens examined:** - Phulchowki hill (1650m, CKB38; TUCH)


Thallus loosely attached to the substratum, grayish white, lobes dichotomously to irregularly branched isidia, soredia absent, laciniate, laciniae 0.5-2mm wide, apothecia common, laminal, sub sessile to sessile, 2-7mm in diam. margin entire to crenate, crowded in the center or scattered.

**Chemical constituents:** - Atranorin and Zeorin.  
**Distribution:** - Nepal, India, China and sub alpine region of the world.

**Specimen examined:** - Phulchowki hills (1600m. CKB36, CKB37; 1850m, CKB92; TUCH).


Thallus mineral greyish, closely appressed to the substratum, lobes dichotomously to irregularly branched, upper surface smooth, microphyllous, lobes and isidia marginal, dense in older parts, rhizinae sparse, black. 1.5-2mm long.

**Chemical constituents:** - Atranorin, Zeorin, Salacinic acid and Norstictic acid.  
**Distribution:** - Nepal, India, China, Pakistan and subtropical to temperate region of the world.

**Specimen examined:** - Phulchowki hill (1500m. CKB1, CKB2; 1600m, CKB28; TUCH)


Thallus whitish grey, attached centrally to the substratum; foliose laciniate, laciniae 1-2.5mm apothecia wide, sub erect, upper surface smooth, isidia and soredia absent, marginal, shortly stalked, constricted at the base, 1-6mm in diam. margin distinct, crenate to lobulate.

**Chemical constituents:** - Atranorin and Zeorin.  
**Distribution:** - Nepal, India, Pakistan and China.

**Specimens examined:** - Phulchowki hills (2300m, CKB190, TUCH).


Thallus mineral grey, loosely attached to the substratum, lobes dichotomously branched, sometime sorediate, rhizinate, and rhizinae along margins only, simple to squarrosely branched, apothecia not seen in observed specimens.

**Chemical constituents:** - Atranorin, Zeorin, Salacenic acid.  
**Distribution:** - Nepal and tropical and temperate region of the world.

**Specimen examined:** - Phulchowki hills (1800m. CKB90, TUCH).

Thallus corticolous, foliose, closely adnate to the substratum 2-3cm. in size mineral grey to grey, margin wavy to lobulate, upper surface smooth, marginally soraliate lower surface white to light brown, rhizinate, rhizinae squarrosely branched, thallus sterile.

Chemical constituents: - Atranorin, Zeorin and Salacinic acid.

Distribution: - Nepal, India, China and Japan.

Specimens examined: - Phulchowki hill (1950m CKB110; TUCH).


Thallus whitish grey, closely appressed to the substratum, occurring in small orbicular patches, 3-4cm.across, lobes dichotomously to irregularly branched, discrete, margin notched, apothecia common, crowded in older part, punctiform.

Chemical Constituents: - Atranorin, Zeorin and Norstictic acid.

Distribution: - Nepal, China, India and tropical regions of Himalayas.

Specimen examined: -Phulchowki hill (1550m CKB16, TUCH).


Thallus whitish grey sub orbicular, closely appressed to the substratum, almost to the lobe ends, ashy grey, corticated on both surface, apothecia laminal, sessile, 2-6mm. in diam, disc brown, asci clavate.

Chemical constituents: Atranorin and Zeorin.

Distribution: - Nepal, India and temperate regions of Himalayas.

Specimens examined: - Phulchowki hills (2600m, CKB200; 2650m, CKB215; TUCH).


Thallus corticolous, fruticose, decumbent to pendulous, 5-10cm. long, greenish yellow to brown, attached to the substratum by a basal disc, basal disc rounded, 3-4mm in diam. branching sub- sympodial, convergent and more or less parallel, terete, tapering, lateral branchlets usually absent, very rarely few, apothecia absent.

Chemical constituents: Usnic acid and Stictic acid.

Distribution: - Nepal, India, China and Japan.

Specimens examined: - Phulchowki hill (1750m, CKB82; TUCH).


Thallus corticolous, fruticose, erect upto 12cm. tall, greenish grey to yellowish grey, densely branched, branching sympodial, tapering, lateral branchlets sparse to dense, axis solid, terete soredia, isidia, pseudocyphellae absent, apothecia upto 6mm.in diam.

Chemical constituents: - Usnic acid and Salacinic acid.

Distribution: - Nepal, India, Bhutan, Central America and Japan.

Specimen examined: - Phulckowki hill (1650m, CKB83; TUCH).


Thallus corticolous, erect, 5-7cm tall, dark brown to black; basal disc blackish, upto 10mm. in diam, branching sympodial, main branches upto 3mm. in diam, slightly tapering, lateral branchlets dense, densely papillate, densely, pseudocyphellate, white, isidia and soredia absent, cortex double layered, apothecia terminal, 5-8mm. in diam.

Chemical constituents: Usnic acid and Stictic acid complex.

Distribution: - Nepal, India and Bhutan.

Specimen examined: - Phulchowki hill (2700m, CKB245; TUCH).


Thallus erect to sub pendulous, solid esorediate to sub pendulous, narrow laciniate or ribbon like thallus, nerves distinct, less than 1mm. broad, spirally twisted, pseudocyphellae streak-like and longitudinally parallel, apothecia 0.5mm. diam.

Chemical constituents: - Sekikaic acid.

Distribution: - Nepal and India.

Specimen examined: -Phulchowki hill (1700m, CKB62; 1950m, CKB132; TUCH).

Ramalinaceae.
Thallus erect to sub pendulous, firmly attached to the substratum by narrow basal disc, pale grey to greenish grey, branching lateral, main branches flattened, strap shaped to sinuate, secondary branching lateral, upper surface uneven longitudinally and partly reticately wrinkled isidia, soredia pseudocyphellae absent, apothecia 2-7mm

Chemical constituents: - Usnic acid.
Distribution: - Nepal, India, China, Japan and Pakistan.
Specimen examined: Phulchowki hill (1600, CKB22; TUCH).

Pseudopodetia sorediate, upto 5cm. tall, robust, rigid, cephalodia subglobose to pyriform in outline, corrugate on surface, with well developed gelatinized cortical tissue, sub globose to pyriform in outline.

Chemical constituents: - Atranorin and Lobaric acid.
Distribution: - Nepal, Bhutan and India.
Specimen examined: -Phulchowki hill (1500m, CKB6; TUCH).

Chemical constituents: - No lichen substances.
Specimens examined: - Phulchowki hill (1800m. CKB95; TUCH).

Collemataceae
Thallus foliose, up to 3cm. in size, ashy grey when dry, olive green when wet loosely attached to the substratum, lobes 3-6mm. wide, submarginal to laminar, constricted at base to shortly pedicellate, 0.5-1.5mm. in diam. disc reddish brown, ascus 8-spored.

Chemical constituents: - No lichen substances.
Distribution: - Nepal, India, Bolivia and east Africa.
Specimens examined: - Phulchowki hill (1900m, CKB114; 2100m. CKB123; TUCH).

RESULTS AND DISCUSSION:
Thirty-two specimens of lichens (foliose and fructicose) were found in present study. These species belong to ten genera in which genus Parmelia consists of maximum number of species (ten species) where as three genera consist of only one species each. Similarly these lichen flora studied consist of nine families in which family Parmeliaceae was largest.

In conclusion Phulchowki hill is rich in lichen flora especially of foliose and fructicose form. Between these two forms, foliose forms are found in large amount. Among them genus

Chemical constituents: - Atranorin and Lobaric acid.
Distribution: - Nepal, Bhutan and India.
Specimen examined: -Phulchowki hill (1500m, CKB6; TUCH).


Chemical constituents: - Calyan and Vulpinic acid.
Specimen examined: -Phulchowki hill (2700m, CKB220; TUCH).

Chemical constituents: - No lichen substances.
Specimens examined: - Phulchowki hill (1800m. CKB95; TUCH).

32. Leptogium trichophorum Mull Arg. Flora 72: 505. 1889; Bania et al., Environ. & Agr. 1(2): 51, 2001; Collemataceae
Thallus foliose, up to 5cm in size, loosely attached to the substratum, grey brown to brown black when dry, dark olivaceus green when wet, isidia soredia absent, apothecia sub marginal to laminal, sessile 0.5-2mm in diam asci laminal, dense trichomes on thalline exciple.

Chemical constituents: - No lichen substances.
Distribution: - Nepal, India, Philippines and widely distributed in eastern Asia.
Specimens examined: - Phulchowki hill (1750m CKB76; TUCH).
*Parmelia* was largest which includes ten species. Genera *Parmelia*, *Chrysothrix*, *Peltigera* and *Stereocaulon* contain single species each.

**REFERENCES:**


