An updated checklist of vascular epiphytes in the Darjeeling Himalaya, India

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Abstract. The Darjeeling Himalaya, located in eastern part of the Himalaya biodiversity hotspot in India, is known for its diverse vegetation. The varying climatic conditions along the elevational gradient provide suitable habitats for supporting a rich flora in the region. We provide an updated checklist of vascular epiphytes in Darjeeling Himalaya. A total of 239 vascular epiphyte species belonging to 93 genera and 38 families have been recorded from the region, which include holoepiphytes, hemiepiphytes, facultative and accidental epiphytes. Orchidaceae was the largest family with 70 species, followed by Polypodiaceae comprising 42 species. We make available baseline biodiversity information on vascular epiphytes of the study area and provide details on taxonomic diversity and distribution in terms of vegetation types and along the elevational gradient. We also provide photographs to facilitate field identification.

Keywords. Distribution, ferns, inventory, orchids, phenology, taxonomy, vegetation

Introduction
The term “epiphyte” is derived from the Greek words “epi” (upon) and “phyton” (plants) (Kumar et al. 2017). Epiphytes are defined as sessile, non-parasitic organisms that germinate and are structurally dependent on other plants (Zotz et al. 2021; Taylor et al. 2022). They may be categorised into holoepiphytes, hemiepiphytes, facultative, and accidental epiphytes based on life forms (Dawson 1988; Zotz 2005, 2016; Hoeber et al. 2019). Various forms and functions of vascular epiphytes can be found within the same microniche (Derzhavina 2019). The vascular epiphytes comprise around 10% of the world’s total flora and are one of the most ubiquitous life forms in tropical forest canopies (Zotz 2013; Taylor et al. 2022). The common vascular epiphytes are mostly represented by monocots (75%) and eudicots (13%) (Zotz 2013). Angiosperms, such as Orchidaceae, and ferns, such as Polypodiaceae, are mostly epiphytic representing 75% and 89% of the total number of species worldwide, respectively (Taylor et al. 2022). However, some angiosperm families like Asteraceae and Poaceae represent less than 1% and gymnosperms contribute less than 0.2% of all epiphytic forms, while families like Brassicaceae, Euphorbiaceae, and Fabaceae have no epiphytic representatives (Zotz et al. 2021).

Epiphytes are scientifically interesting model organisms in shaping community assembly. They contribute significantly to forest structure and ecosystem functions and provide shelter to diverse flora and fauna (Angellini and Silliman 2014; Méndez-Castro et al. 2018). They play a key role in primary productivity, biomass, litterfall, and maintenance of biodiversity (Gentry and Dodson 1987; Benzing 1995; Barthlott et al. 2001; Muñoz et al. 2003). Additionally, epiphytic abundance greatly impacts forest nutrients and water cycling (Gotsch et al. 2016) and has a considerable contribution to biomass of other plant forms (Zotz 2016). Furthermore, epiphytes also act as an ecological indicator (Benzing 1990) while assessing the effect of deforestation and invasion of secondary vegetation and plantations (Hietz et al. 2006).
Despite their significance, many ecological factors have an impact on epiphytic species diversity patterns (Chawla et al. 2008). Some environmental variables including temperature, wind speed, relative humidity and precipitation are important limiting factors for epiphytic species composition and diversity (Yam et al. 2010; Sanger and Kirkpatrick 2017). Similarly, elevation is another important factor in its spatial distribution (Ding et al. 2016; Ortiz et al. 2019; Barbosa et al. 2020). However, a study on species richness and diversity patterns along an elevational gradient has not been established well (Bhattacharai and Vetaas 2003). With elevation, geographic and climatic conditions also change sharply (Kharkwal et al. 2005; Saiz et al. 2021).

The frequent occurrence of some epiphytic traits such as fleshy leaf and succulent stems (Gobelt et al. 2020), crassulacean acid metabolism photosynthesis (Benzing 1987), aerial roots (Einzmann et al. 2019), or an impounding leaf base (Zotz et al. 2020) suggest that water availability is a significant parameter for epiphytes (Ding et al. 2016; Zuleta et al. 2016). Besides, vegetative growth and spatial distribution of epiphytes are mainly limited by host tree traits (Wagner et al. 2015), including tree architecture (Cardelus and Chazdon 2005; Einzmann et al. 2015) and bark texture, ph, and rugosity (Timsina et al. 2016; Adhikari et al. 2016), diameter (Wang 2016), growth rate (Flores-Palacios and Garcia-Franco 2006), and canopy size (Wagner and Zotz 2020). Concurrently, the habitat provided for other organisms in the complex host canopy aids in enriching biodiversity (Azuma et al. 2022). Vascular epiphytes flourish well in host trees having larger and thicker trunks (Sillett and Pelt 2007). Thus, host tree traits and tree microclimate influence the epiphytic species richness, composition, and abundance (Zotz et al. 1999; Laube and Zotz 2006).

The Himalaya, a remarkably diverse and globally important mountain range, harbours a rich biological diversity and has drawn considerable attention from many researchers (Sharma et al. 2019). The Himalaya provides precious ecosystem services to a large proportion of the population in South Asia (Schild 2016). However, the region is highly vulnerable to climate and land-use changes and other natural and anthropogenic disturbances (Palni and Rawal 2010). Lying in the foothills of the eastern Himalaya, the Darjeeling Himalaya possesses a rich and unique floral diversity distributed in different micro-climatic conditions (Das 1986; Bhujel 1996).

The plant exploration in this region dates back one and half centuries. Sir J.D. Hooker first published the flora of Tonglu (Hooker 1849). Subsequently, list of trees, shrubs, and climbers growing in forests of Darjeeling Himalaya were documented (Gamble 1875, 1896). Furthermore, three volumes of the Flora of Eastern Himalaya describe plants from this region (Hara 1966, 1971; Ohashi 1974). Similarly, another important publication The Flora of Bhutan also enumerated several plant species from this region (Grierson and Long 1983, 1984, 1987, 1991, 1999, 2001; Noltie 1994, 2000; Pearce and Cribb 2002). Some other notable floristic works included phanerogamic plants (Yonzone 1976), a palynological study (Das 1986), dicots (Bhujel 1996), angiospermic climbers (Samanta 1998), tea-garden weeds (Ghosh 2006), characterisation using remote sensing (Rai 2006), monocots (Nolte 2015), orchids (Yonzone 2015), pteridophytes (Thapa 2016), phytosociological studies (Moktan 2017), and a checklist on dicots (Mallick 2020). However, a thorough study on the vascular epiphytic flora from the region is still lacking. No detailed study to date has specifically focused on the vascular epiphytic flora of the region. A comprehensive checklist of vascular epiphytic species along with their host trees will be the starting point in filling this knowledge gap. Therefore, we present a checklist of the vascular epiphytic flora of Darjeeling Himalaya with details on taxonomic information, distribution, and ecology of species. Our study also investigates the species composition and similarity in vascular epiphytic flora between vegetation types. The resulting taxonomic information and details about distribution of vascular epiphytes in the study region may provide a valuable baseline information for future research.

Study Area

The present study was conducted in Darjeeling Himalaya, an integral part of the eastern Himalaya. The region experiences a wide array of climatic and ecological zones representing a unique variety of plants (Das 1995; Basnet et al. 2019). The study area lies in the northernmost zone of the Indian state of West Bengal. The area is bordered by Sikkim, Nepal, and Bhutan in the north, west, and east, respectively. Elevations range from 98 m to 3636 m asl. The northernmost point of the region is the tri-junction near Phalut (27°13.16′N, 88°21.00′E) and the southernmost point is the Phansidewa block (26°27.08′N, 88°22.00′E). The west to east extension lies between Sabarkum near Sandakphu (27°12.00′N, 87°59.50′E) and Todey village along the river Jaldhaka (27°04′N, 88°53′E). There are two national parks and three wildlife sanctuaries with a total forest cover of about 2368 km² (ISFR 2019). There are also several reserved, unreserved, and social forests within the study area.

The vegetation of Darjeeling Himalaya extends from the tropical plain to the subalpine zone and the region is renowned for its high diversity of vegetation in India (Rai and Lama 2016; Caje 2018). The vegetation of the study area has been classified according to altitudinal ranges (Gamble 1875; Cowan and Cowan 1929; Champion 1936; Champion and Seth 1967). Bhujel (1996) later modified the classification to incorporate both climate and elevation as Tropical (TRP, plains to 500 m), subtropical (STR, 500–1200 m), subtemperate (STM, 1200–1850 m), temperate (TMP, 1850–3200 m), and subalpine (SAL, above 3200 m) (Fig. 1).

Due to its distinctive topography and elevational range, the climate in this region varies greatly, with
small microclimatic zones along elevational ranges. The area has four defined seasons: winter from December to February, spring and summer from March to May, monsoon or rainy season from June to August, and autumn from September to November (Bhujel 1996). The average monthly temperature varies from a maximum of 24 °C in August to a minimum of 2 °C in January. The annual precipitation is about 2400 mm. Most places in the region receive the maximum rainfall from June to October (Mandal and Sarkar 2021). July and August are usually the hottest months, while the coldest month is January (Cajee 2018). The relative humidity is highest from June to September (95–100%).

Methods

Data collection. We carried out extensive field surveys from 2019 to 2021 in different forests of the Darjeeling Himalaya at lower to higher elevations. During our field surveys, around 25 plots, each 30 × 30 m, were employed in each vegetation type to sample individual host trees. However, vascular epiphytes were sampled on a plotless basis, based on the presence of epiphytic species on individual host trees (Wolf et al. 2009).

During the surveys, we focussed on the forest understory and on the dominant host tree to locate vascular epiphytes. Specimens were photographed and collected in the field. In some cases, an expert local tree climber helped to collect the specimens. The specimens at the inner crown zone of host trees were recorded using Vanguard Spirit XP 8 x 42 binoculars. Our voucher specimens were processed using standard methodology (Jain and Rao 1977). We also noted the phenological status of each species in the field during pre-monsoon, post-monsoon, and winter seasons, excluding higher elevational zones. We identified our specimens using the relevant literature (Hara 1966, 1971; Ohashi 1972; Grierson and Long 1983, 1984, 1987, 1991, 1999, 2001; Pearce and Cribb 2002; Fraser-Jenkins 2008; Kholia 2010; Fraser-Jenkins et al. 2017, 2018, 2021). Lloyd Botanical Garden Herbarium and Calcutta University Herbarium (CUH) were also consulted for identifications. We consulted World Flora Online (WFO 2022) for current nomenclature and taxonomic authorities. The threat status of the recorded taxa was obtained from ThreatSearch (BGCI 2022). Mounted and labelled herbarium exsiccates were deposited in the Calcutta University Herbarium (CUH). The elevation and location of each study site were recorded with a Garmin eTrex H hand-held GPS receiver. The map of the study area was produced in QGIS Madeira v. 3.20 (QGIS 2022) and Venn diagram was prepared in R v. 4.1.1 using ggVennDiagram function (R Core Team 2013).

Taxonomic and nomenclatural curatorship. The classification proposed in APG IV (2016) and PPG I (2016) was followed for the arrangement of angiosperm and pteridophytic families, respectively. The recorded species are listed in Table 1 with details of family, life form, phenology/fertile period, vegetation types, geographic distribution, and voucher number. Vascular epiphytes were classified into different categories holoepiphytes (no contact to the ground), facultative (can grow both on host tree and ground), accidental (for plants that occasionally grow as epiphytes), and hemiepiphytes (for those plants that germinate in tree crown but latter establish a
Table 1. List of vascular epiphytes from the study area. Life form: Hol (Holoepiphytes); Hem (Hemiepiphytes); Fac (Facultative epiphyte); Acc (Accidental epiphyte). Vegetation types: TRP (Tropical); STR (Subtropical); STM (Subtemperate); TMP (Temperate); SAL (Subalpine). Geographic distribution: SEA (Southeast Asia); SAM (South America); NAM (North America); NAF (North Africa); AUS (Australia); EA (Eastern Asia); SAF (South Africa); NEU (Northeast Europe); EH (Eastern Himalaya); CAF (Central Africa); CAM (Central America).

<table>
<thead>
<tr>
<th>Family</th>
<th>Taxon</th>
<th>Life form</th>
<th>Phenology/fertile period</th>
<th>Vegetation types</th>
<th>Geographic distribution</th>
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<td>SEA, EA</td>
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<td>SEA</td>
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<td>TRP, STM</td>
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<td>Dioscorea bulbifera L.</td>
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<td>TRP, STM</td>
<td>SEA, SAM, SSA</td>
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<td>Acampe rigida (Buch.-Ham. ex Sm.) P.F.Hunt</td>
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<td>TRP</td>
<td>SEA</td>
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<td>TRP</td>
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<td>Agrostophyllum myrianthum King &amp; Pantl.</td>
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<td>SEA</td>
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<td>STR, STM, TMP</td>
<td>SEA</td>
<td>CUH 20237</td>
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<td>TRP</td>
<td>Indo-Bhutan</td>
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<td>STM, TMP</td>
<td>Indo-Bhutan</td>
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<td>STR, STM, TMP</td>
<td>SEA</td>
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<td>STR, STM</td>
<td>SEA, EA</td>
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<td>STR, STM, TMP</td>
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<td>Coelogyne barbata Lindl. ex Griff.</td>
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<td>SEA, SAF</td>
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<td>SEA, SAM, NAM, NEU</td>
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<td>STR, STM, TMP</td>
<td>SEA, NAM</td>
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<td>TRP, STM</td>
<td>SEA, SAM, NAM, NEU</td>
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<td>TMP, SAL</td>
<td>SEA</td>
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<td>STR, STM, TMP</td>
<td>SEA, NAM</td>
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<td>TRP, STM</td>
<td>SEA, NAM, SAM</td>
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<td>TRP</td>
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<td>Mar–Jun</td>
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<td>SEA, NAM, NEU</td>
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<td>Vegetation types</td>
<td>Geographic distribution</td>
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<td>STR; STM</td>
<td>SEA; CAM</td>
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<td>STM; TMP</td>
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<td>SEA; CAM</td>
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<td>SEA; CAM</td>
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<td><em>Ampelocissus sikimensis</em> (M.A.Lawson) Planch.</td>
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<td><em>Hepetispermum tanglense</em> (C.B.Clarke) H.Schaeff. &amp; S.S.Renner</td>
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<td><em>Begonia flaviflora</em> Harms</td>
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<td><em>Eurynymus viburnoides</em> Prain</td>
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<td><em>Dendrophthoe granulata</em> (Hook.f. &amp; Thomson ex A.D.C.) A.N.Henry &amp; B.Roy</td>
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<td>Apr–May</td>
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<td><em>Embelia frondosa</em> (King ex Gamble) D.G.Long</td>
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<td>Jun–Nov</td>
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<td>Taxon</td>
<td>Life form</td>
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<td>Geographic distribution</td>
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<td>STR; STM; TMP</td>
<td>SEA; SAM; Nam; Ne; Caf</td>
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<td>Dryopteridaceae</td>
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<td>CUH 20293</td>
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<td>Nephrolepidae</td>
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<td>Arthromeris lehmannii (Mett.) Ching</td>
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<td>Drynia mollis Bedd.</td>
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<td>STM; TMP</td>
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<td>STR; STM</td>
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<td>STR; STM</td>
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<td>Microsorum membranaceum (D.Don) Ching</td>
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<td>STR; STM; TMP</td>
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<td>SEA; SAF; CAM</td>
<td>CUH 20260</td>
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<td>SEA</td>
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<td>STR; STM; TMP</td>
<td>SEA</td>
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<td>STR; STR</td>
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<td>Jul-Oct</td>
<td>TRP; STR; STM</td>
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<td>SEA</td>
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<td></td>
<td>Pityrosia purpurea (C.Presli) Hovenkamp</td>
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<td>Jul-Oct</td>
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connection with the ground) (Klein et al. 2022).

Results

We documented 239 species of vascular epiphytes belonging to 93 genera and 38 families (Table 1). Epiphytic angiosperms represented 70% of the species richness (166 spp.), while the remaining species (30%; 72 spp.) were epiphytic ferns. Monocotyledons were the most diverse group (92 spp.) compared to dicotyledons (74 spp.). Based on the life forms, holoepiphytes (160 spp.) were dominant representing 67% of the total species, of which orchids were dominant. Hemiepiphytes (22 spp.) accounted for 22% of the total species, with the family Piperaceae predominant. The other life forms were facultative (31 spp.) and accidental (25 spp.) representing 13% and 11% of the total species, respectively (Fig. 2A).

Of the total 38 families, Orchidaceae was the largest family, with 70 epiphytic species in 22 genera and representing 29% of all species (Fig. 2B). Among these, there were large genera such as Bulbophyllum Thouars (with 15 spp.), Dendrobium Sw. (14 spp.), Coelogyne Lindl. (7 spp.), and Cymbidium Sw. (6 spp.). Within the family Orchidaceae, there was only one species that grew as either an epiphyte or a lithophyte (e.g., Coelogyne cristata Lindl.). Another most important family in terms of epiphytic species was the fern family Polypodiaceae, with 42 epiphytes in 10 genera and representing 17% of all species. Lepisorus (J.Sm.) Ching (8 spp.) was the most species-rich genus, followed by Gonioplyphlebium (Blume) C.Presl and Loxogramme (Blume) C.Presl with six species in each genus. Another family with high number of species was Apocynaceae. Approximately, 15 species were epiphytic, with Hoya R.Br. (12 spp.) having the most species. Almost all the species in the Apocynaceae were holoepiphytes in growth form, except for Dischidia bengalensis Colebr., which was facultative. A large proportion of species in the Ericaceae (10 spp.) were found on both trees and rocks. Species of Agapetes Don ex G.Don and Vaccinium L. in the Ericaceae were common. The 11 epiphytic species of Gesneriaceae, especially in Aeschynanthus Jack and Lysionotus D.Don, are almost entirely holoepiphytes, whereas species like Didymocarpus albicyclus C.B.Clarke, D. aromaticus Wall. ex D.Don, and Henckelia pumila (D.Don) A.Dietr. were accidental epiphytes. Slightly fewer species were found within families like Acanthaceae, Commelinaceae, Oleandraceae and Rubiaceae with only two species each, while the least abundant families were Araliaceae, Asteraceae, Nephrolepidae and Rosaceae each with single species. Almost all members of Araceae were either hemiepiphytes or grow facultatively or accidentally as epiphytes. Similarly, two species of Dioscoreaceae namely Dioscorea belophylla (Prain) Voigt ex Haines and D. bulbifera L., were found to be accidental epiphytes. Most of the species listed in Table 1 representing eight families Araliaceae, Asteraceae, Commelinaeae, Pittosporaceae, Ranunclaceae, Lardizabalaceae, and Zingiberaceae were not true epiphytes, but accidental or facultative (Figs. 5–7).

The second most important epiphytic families in terms of species number were the fern families Pteridaceae and Aspleniaceae each with seven species. Vittaria J.E.Sm. and Asplenium L. were the most dominant genera. Some members of Aspleniaceae, like Asplenium

![Figure 2. A. Life forms of vascular epiphytes. B. Dominant families showing number of species and genus.](image-url)
falcatum Lam., A. planicaule Wall. ex Mett., A. laciniatum D.Don, A. tenuifolium D.Don, and A. nidus L., were facultatively epiphytic. Oleandraceae are mostly lithophytes, but two species, Oleandra pistillaris (Sw.) C.Chr. and O. wallichii (Hook.) C.Presl, occasionally grew on the lower tree trunks. Elaphoglossum stelligerum (Wall. ex Baker) T.Moore ex Salomon, belonging to Dryopteridaceae, was found to be growing accidentally as an epiphyte.

**Distribution and composition in vegetation types.**
The number and percentage in the Venn diagram depict the unique and shared number of monocots (Fig. 4A), eudicots (Fig. 4B), and ferns and lycophytes (Fig. 4C).
4C) in different types of vegetation. The highest percentage of similarity in the composition of epiphytic monocots, eudicots, and ferns and lycophytes were 22%, 29%, and 33%, respectively. Among the different vegetation types, STR, STM, and TMP comprise almost the same vascular epiphytic species, whereas TRP and SAL did not share single species. The composition of the vascular epiphytes in the different vegetation types is given below.

**Tropical vegetation (TRP)**

Figure 3A–C

Within the tropical vegetation, vascular epiphytes were established on some common phorophytes *Callicarpa vestita* Wall. ex C.B.Clarke, *Lagerstroemia parviflora* Roxb., *Duabanga grandiflora* Walp., *Shorea robusta* Gaertn., *Tetrameles nudiflora* R.Br. and *Mallotus repandus* (Rottler) Mull.Arg. Some orchids like *Papilionanthe teres* (Roxb.) Schltr, *Dendrobium amoenum* Wall. ex Lindl. and *Panisea uniflora* (Lindl.) Lindl. was most common in this zone. Some ferns were frequent, especially *Asplenium falcatum* Lam., *Drynaria quercifolia* (L.) J.Sm., *Loxogramme porcata* M.G.Price, *Microsorum punctatum* (L.) Copel. Species like *Scindapsus officinalis* (Roxb.) Schott and *Hoya acuta* Haw. were observed only in this vegetation type.

**Subtropical vegetation (STR)**

Figure 3D–F

The vegetation zone was dominated by host trees like *Bridelia retusa* (L.) A.Juss, *Sterculia villosa* Roxb. ex Sm., *Ostodes paniculata* Blume, *Terminalia bellirica* (Gaertn.) Roxb., *Diploknema butyracea* (Roxb.) H.J.Lam, *Wrightia stikkimensis* Gamble, and *Senna siamea* (Lam.) H.S.Irwin & Barneby. Among the recorded species, frequent epiphytic orchids were *Aerides multiflora* Roxb., *Acampe rigida* (Buch.-Ham. ex Sm.) P.F.Hunt, *Bulbophyllum crassipes* Hook.f., *Dendrobium plicatilis* Lindl., and *Cymbidium bicolor* Lindl. Species of Araceae, like *Rhaphidophora hookeri* Schott and *R. decursiva* (Roxb.) Schott, were most common, as were the ferns *Pyrosia costata* (Wall. ex C.Presl) Tagawa & K.Iwats. and *P. mannii* (Giesenh.) Ching.

**Subtemperate vegetation (STM)**

Figure 3G–I

The main host tree species were *Ficus auriculata* Lour., *F. nerifolia* Sm., *Engelhardia spicata* Lechen ex Blume, *Macaranga denticulata* (Blume) Mull. Arg., *Cryptomeria japonica* (Thunb.ex Life), and *Schima wallichii* (DC.) Korth. The most common epiphytes in this area were *Bulbophyllum affine* Wall. ex Lindl., *Uncifera obtusifolia* Lindl., *Cymbidium eburneum* Lindl., *Huperzia eburnea* Lindl., *Hoya arnottiana* Wight, *H. obcordata* Hook.f., and *H. lanceolata* subsp. *bella* (Hook.) D.H.Kent. Some epiphytic ferns were frequent, especially *Microsorum cuspidatum* (D.Don) Tagawa, *Huperzia squarrosa* (G.Forst.) Trevis., *Hymenophyllum tenellum* D.Don, and *Davallia bullata* Wall.

**Temperate vegetation (TMP)**

Figure 3J–L


**Subalpine vegetation (SAL)**

Figure 3M–O

Annotated list. The materials examined for all the vascular epiphytes recorded in the study area are given below, including brief information on taxonomic, ecological, phenological, and global distribution for the 25% of the total species recorded.

Piperaceae Giseke

*Peperomia heyneana* Miq.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahanadi; 26°52’57″N, 088° 19’13″E; alt. 1296 m; 29.VIII.2020; Rai & Moktan 0318 leg.; CUH 20201.

**Identification.** Holoepiphyte. Plant creeping or erect herb, glabrous throughout, 15.5–38.5 cm. Leaves thin, 2–3 × 1–2.5 cm, broadly ovate, apex acute, base cordate, 5-veined from base. Inflorescence spikes, terminal, 3.5–5 cm.

**Global distribution.** India, Bhutan, China, Indonesia, Malaysia, Philippines, Thailand, Vietnam (POWO 2022).

**Ecology.** Common in TRP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from May to September.

*Peperomia pellucida* (L.) Kunth

**Figure 6I**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088° 16′00″E; alt. 550 m; 29.VIII.2019; Rai & Moktan 0233 leg.; CUH 20176.

**Identification.** Holoepiphyte. Plants forming clumps, 5.5–18.5 cm, stolon present. Stems many-branched at the base, ribbed, glabrous or pubescent. Leaves dense opposite or whorl of 4 fleshy obovate, uniform in size 6.0–11.5 × 5.5–10.0 mm leaf blade broadly elliptical to suborbicular, base and apex rounded, 3-veined from the base. Petiole 0.9–2.0 mm pubescent. Inflorescence spikes, terminal and axillary, 1.5–5.0 cm. Filaments short, ovary ovoid, stigma capitates, pubescent. Fruit drupe, ellipsoid, tapering apex.

**Global distribution.** Southeast Asia, Central America, South America, South Africa, Australia (POWO 2022).

**Ecology.** Common in STR, STM, and TMP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from February to July.

*Piper attenuatum* Buch.-Ham. ex Miq.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50’00″N, 088° 16’00″E; alt. 550 m; 15.III.2019; Rai & Moktan 0008 leg.; CUH 20118.

*Piper chuvya* Hunter ex C.DC.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Runghbull; 26°59’19″N, 088° 16’18″E; alt. 2040 m; 28.IX.2020; Rai & Moktan 0481 leg.; CUH 20248.

*Piper longum* L.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47′00″N, 088° 14′25″E; alt. 400 m; 20.IX.2020; Rai & Moktan 0556 leg.; CUH 20332.

*Piper mullesua* Buch.-Ham. ex D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Babukhola; 26°55′03″N, 088° 20′27″E; alt. 1900 m; 05.V.2021; Rai & Moktan 0577 leg.; CUH 20332.

*Piper pedicellatum* C.DC.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50’00″N, 088° 16’00″E; alt. 550 m; 12.VI.2021; Rai & Moktan 0592 leg.; CUH 20335.

*Piper peepuloides* Roxb.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50’00″N, 088° 16’00″E; alt. 550 m; 29.VIII.2019; Rai & Moktan 0233 leg.; CUH 20275.

*Piper suipigua* Buch.-Ham. ex D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Senchal; 27°00’16″N, 088° 15′36″E; alt. 2200 m; 04.IV.2021; Rai & Moktan 0556 leg.; CUH 20248.

Araceae Juss.

*Colocasia affinis* Schott

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahanadi; 26°57’16″N, 088° 18′59″E; alt. 1700 m; 03.IX.2020; Rai & Moktan 0348 leg.; CUH 20210.

**Ecology.** Common in TRP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from May to September.

*Pothos scandens* L.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Babukhola; 26°55’03″N, 088° 20′27″E; alt. 1900 m; 05.V.2021; Rai & Moktan 0577 leg.; CUH 20332.

Araceae Juss.

*Colocasia affinis* Schott

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Tindharia; 26°51’11″N, 088° 19′59″E; alt. 860 m; 24.VIII.2019; Rai & Moktan 0206 leg.; CUH 20332.

*Pothos scandens* L.
West Bengal, Darjeeling, Lower Mamring; 26°56′34″N, 088°19′52″E; alt. 1400 m; 20.IX.2020; Rai & Moktan 0416 leg.; CUH 20252.

*Remusatia pumila* (D.Don) H.Li & A.Hay

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°56′34″N, 088°19′52″E; alt. 1400 m; 20.IX.2020; Rai & Moktan 0416 leg.; CUH 20252.

*Rhaphidophora calophylla* Schott

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bagora; 26°58′22″N, 088°18′40″E; alt. 2300 m; 30.VIII.2019; Rai & Moktan 0240 leg.; CUH 20181.

*Rhaphidophora decursiva* (Roxb.) Schott

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 27.IX.2020; Rai & Moktan 0451 leg.; CUH 20265.
Rhaphidophora glauca (Wall.) Schott

Figure 6)

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°56′34″N, 088°19′52″E; alt. 1400 m; 26.IX.2020; Rai & Moktan 0432 leg.; CUH 20261.

Identification. Hemiepiphytes. Stem 0.5–1.0 cm in diameter. Leaf blade ovate in outline, symmetric, acuminate, base truncate, oblique or shallowly cordate 10.5–35.0 × 6.5–22.0 cm, irregularly and asymmetricaly pinnately cut, leaflet 2–5 per side, petiole 8–34 cm, sheath at leaf base, pulvinus indistinct. Peduncle long, thin, apex curved, 9.5–23.0 cm. Spathe oblong-ovate, acuminate, pale yellow, 7.5–13.0 × 2.0–8.0 cm. Spadix 5.0–9.0 × 0.6–1.5 cm. Filament flat. Stigma flat, sessile, circular or elliptical.


Ecology. Common in STM and TMP and usually found in the trunk zone.

Phenology. Flowering and fruiting period from September to May.

Rhaphidophora hookeri Schott

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1100 m; 03.VII.2019; Rai & Moktan 0081 leg.; CUH 20132.
Scindapsus officinalis (Roxb.) Schott

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47′00″N, 88°14′25″E; alt. 400 m; 23.IX.2020; Rai & Moktan 0430 leg.; CUH 20259.

Dioscoreaceae R.Br.

Dioscorea belophylla (Prain) Voigt ex Haines

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02′17″N, 88°21′41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0368 leg.; CUH 20222.

Dioscorea bulbifera L.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, One Block; 26°56′22″N, 88°19′04″E; alt. 1900 m; 09.IV.2021; Rai & Moktan 0547 leg.; CUH 20311.

Orchidaceae Juss.

Acampe rigida (Buch.-Ham. ex Sm.) P. f.Hunt

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pancabari; 26°50′00″N, 88°16′00″E; alt. 550 m; 24.VIII.2019; Rai & Moktan 0224 leg.; CUH 20311.

Aerides multiflora Roxb.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sukna; 26°47′00″N, 88°
Agrostophyllum myrianthum King & Pantl.
Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088° 18′59″E; alt. 1700 m; 06.IV.2021; Rai & Moktan 0542 leg.; CUH 20306.

Agrostophyllum planicaule (Wall. ex Lindl.) Rchb. f.
Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bagora; 26°58′22″N, 088° 18′40″E; alt. 2300 m; 28.VIII.2019; Rai & Moktan 0226 leg.; CUH 20306.

Agrostophyllum stipulatum subsp. bicuspidatum (J.J.Sm.) Schuit.
Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088° 20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0396 leg.; CUH 20306.

Bulbophyllum affine Wall. ex Lindl.
Material examined. INDIA – EASTERN HIMALAYA •
Bulbophyllum appendiculatum (Rolfe) J.J.Sm.

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Rungbull; 26°59′26″N, 88°16′19″E; alt. 2040 m; 30.X.2020; Rai & Moktan 0489 leg.; CUH 20306.

Bulbophyllum cauliflorum (Hook.f.)

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 88°16′00″E; alt. 550 m; 02.XI.2020; Rai & Moktan 0411 leg.; CUH 20250.

Bulbophyllum careyanum (Hook.) Spreng

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 88°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0502 leg.; CUH 20290.

Bulbophyllum crassipes Hook.f.

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Sonada; 26°58′18″N, 88°16′57″E; alt. 1900 m; 09.IV.2021; Rai & Moktan 0553 leg.; CUH 20315.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mungpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0270 leg.; CUH 2019I.

Identification. Holoepiphyte. Rhizome thick. Pseudobulbs conical, 4.5–3.5 cm, covered with swollen sheaths, 0.5–1.0 mm thick. Leaf oblong, obtuse to mucronate, 6.0–13.5 × 1.0–3.5 cm. Inflorescence racemose, lateral from pseudobulb base, many-flowered, peduncle thick, short, flower 0.8 cm long, greenish to golden spotted with purple, calyx obovate to elliptical acute, corolla narrowly elliptical acute. Lip simple, yellowish gold or purplish red, column slender, white, stelidia short and triangular.


Ecology. Common in TRP, STR, and STM and usually found in the trunk zone.

Phenology. Flowering and fruiting period from September to December.

Bulbophyllum gamblei Hook.f.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02′17″N, 088°21′41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0366 leg.; CUH 20221.

Bulbophyllum helenae (Kuntze) J.J.Sm.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 07.VII.2021; Rai & Moktan 0602 leg.; CUH 20343.

Bulbophyllum hirtum (Sm.) Lindl. ex Wall.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 05.IV.2020; Rai & Moktan 0527 leg.; CUH 20302.

Bulbophyllum leopardinum (Wall.) Lindl. ex Wall.

Figure 5E

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Senchal; 26°58′50″N, 088°13′48″E; alt. 2200 m; 22.IX.2020; Rai & Moktan 0425 leg.; CUH 20256.

Bulbophyllum odoratissimum (Sm.) Lindl. ex Wall.

Figure 5H

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1400 m; 02.IX.2020; Rai & Moktan 0331 leg.; CUH 20208.

Identification. Holoepiphyte. Plant creeping, slender rhizome. Pseudobulbs cylindric, erect, smooth, 1.8–2.5 × 0.2–0.7 cm. Leaf 1, oblong-elliptical to oblong-lanceolate, petiolate, 6–10 × 1–2 cm. Inflorescence 1- or 2-capitate, basal from pseudobulb base, many-flowered, flowers 0.5–1.0 cm, white tipped with yellow. Lip white to pale orange, calyx lanceolate, acuminate, column yellow, ovate, obtuse, column stout, foot short. Anther ovate, pollinia yellowish.


Ecology. Common in STM and TMP and usually found in the trunk zone.

Phenology. Flowering and fruiting period from July to October.

Bulbophyllum reptans (Lindl.) Lindl. ex Wall.

Figure 6F

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gairibans; 27°02′53″N, 088°01′48″E; alt. 2600 m; 05.V.2021; Rai & Moktan 0531 leg.; CUH 20304.

Identification. Holoepiphyte. Plant with slender rhizome 1.0–2.5 mm. Pseudobulbs obpyriform, flattened, 1.5–2.5 × 1.0–1.7 cm Leaf single, linear-oblong, subacute, obliquely notched, 6.5–13.5 × 1.0–1.5 cm. Inflorescence 1- or 2-racemose, basal from pseudobulb, few-flowered, calyx and corolla yellowish green, spotted with purple, ovate-oblong, obtuse. Lip simple, 4.0–4.5 × 1.0–1.5 cm, yellowish green with red margin. Column 2 triangular with projecting wings, stelidia filiform.


Ecology. Common in STM and TMP, and usually found in the trunk zone.

Phenology. Flowering and fruiting from August to October.
Bulbophyllum rolfei (Kuntze) Seidenf.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0499 leg.; CUH 20287.

Bulbophyllum roseopictum J.J.Verm., Schuit. & de Vogel

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bagora; 26°58′22″N, 088°18′40″E; alt. 2300 m; 13.III.2019; Rai & Moktan 0004 leg.; CUH 20114.

Bulbophyllum wallichii Rchb. f.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Senchal; 26°58′42″N, 088°13′38″E; alt. 2200 m; 22.IX.2020; Rai & Moktan 0424 leg.; CUH 20114.

Coelogyne barbata Lindl. ex Griff.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rungbull; 26°59′26″N, 088°16′19″E; alt. 2040 m; 30.X.2020; Rai & Moktan 0488 leg.; CUH 20114.

Coelogyne corymbosa Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Maney Bhanjyang; 26°59′15″N, 088°07′14″E; alt. 1920 m; 05.IV.2021; Rai & Moktan 0523 leg.; CUH 20114.

Coelogyne cristata Lindl.

Figure 5K

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Latpanchar; 26°54′52″N, 088°24′16″E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0197 leg.; CUH 20114.

Identification. Facultative epiphyte. Plant with stout rhizome. Pseudobulbs cylindrical-ovoid, smooth, 4.0–6.5 × 2.0–3.5 cm, leaves 2, linear-lanceolate, acute, sessile, 14.0–25.0 × 1.5–2.5 cm. Inflorescence heteranthous, pendent, 1- or 2-capitate, 3–10-flowered, flowers white, calyx elliptical-oblong, subacute, corolla elliptical-oblong, acute. Lip 4.5–3.5 cm, 3-lobed, white with yellow keels. Column curved white, long, winged. Anther oblong to ovate. Pollinia 4.

Global distribution. India, Bhutan, Bangladesh, Nepal, Tibet (POWO 2022).

Ecology. Common as epiphytes and lithophytes in STR, STM, and TMP and usually found in the trunk zone.

Phenology. Flowering and fruiting period from February to September.

Coelogyne fimbriata Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Makaibari; 26°52′18″N, 088°16′03″E; alt. 1390 m; 20.IX.2020; Rai & Moktan 0405 leg.; CUH 20245.

Coelogyne flaccida Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1400 m; 02.VII.2019; Rai & Moktan 0077 leg.; CUH 20130.

Coelogyne occultata Hook.f.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0499 leg.; CUH 20287.

Coelogyne punctulata Lindl.

Figure 6A

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0395 leg.; CUH 20236.

Identification. Holoepiphyte. Plant 10.5–29.0 cm long. Pseudobulbs subpyriform, sheathed, 3.5–6.5 cm long. Leaves 2, lanceolate, acute, petiolate, 14.0–20.0 × 2.0–3.5 cm. Inflorescence heteranthous, 5- or 6-flowered, peduncle 5–9 cm, rachis 5–6 cm, zigzag. Flowers white, sepals similar, oblong-lanceolate, obtuse, petals linear-lanceolate, obtuse. Lip 2.5–3.5 cm, 3-lobed, white. Column long, winged.

Global distribution. India, Bhutan, China, Myanmar, Vietnam (POWO 2022).

Ecology. Common in STM and TMP, and usually found in the trunk zone.

Phenology. Flowering and fruiting period from October to January.

Cymbidium aloifolium (L.) Sw.

Figure 6H

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mungpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0255 leg.; CUH 20187.

Identification. Holopshiphyte. Plant 29–95 cm tall. Pseudobulbs ovoid, 5.5 × 2.5 cm, smooth, flattened. Leaves 4 or 5, oblong, obtuse to emarginate, coriaceous, 30.5 × 95.0 cm. Inflorescence many-flowered, peduncle sheathed, rachis long, flower pale yellow cream, maroon-veined, callus yellow, calyx mucronate, erect, oblong, obtuse, corolla elliptical obtuse-acute, lip 1.5–2.0 × 1.0–1.5 cm, 3-lobed, erect. Column curved, winged at apex. Anther subquadrate. Pollinia 2.


Ecology. Common in TRP, STR, and STM, and usually found in the trunk and inner crown zone.
Phenology. Flowering and fruiting period from April to July.

Cymbidium bicolor Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47′00″N, 088° 14′25″E; alt. 400 m; 20.IX.2020; Rai & Moktan 0407 leg.; CUH 20247.

Cymbidium eburneum Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°50′00″N, 088° 16′25″E; alt. 400 m; 20.IX.2020; Rai & Moktan 0407 leg.; CUH 20247.

Cymbidium elegans Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47′00″N, 088° 14′25″E; alt. 400 m; 20.IX.2020; Rai & Moktan 0407 leg.; CUH 20247.

Identification. Holoeephyte. Plant 40.0–73.5 cm tall. Pseudobulbs subovoid. Leaves 43.5–79.0 × 2–2.5 cm, linear-elliptical, distichous, acuminate-obtuse. Inflorescence 20- to 36-flowered. Flower creamy yellow, bell-shaped, pendulous, floral bract small, sepals and petals similar, sepals obovate-lanceolate, petals linear-lanceolate. Lip triangular, 3.5–4.0 cm, 3-lobed, Column winged. Pollinia 2.

Global distribution. India, Bhutan, China, Myanmar, Nepal, Thailand (POWO 2022).

Ecology. Common in STM and TMP, and usually found in the inner crown zone.

Phenology. Flowering and fruiting period from March to August.

Dendrobium amoenum Wall. ex Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47′00″N, 088° 14′25″E; alt. 400 m; 23.IX.2020; Rai & Moktan 0428 leg.; CUH 20258.

Dendrobium aphyllum (Roxb.) C.E.C. Fisch.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Tindharia; 26°51′11″N, 088° 19′59″E; alt. 860 m; 24.VIII.2019; Rai & Moktan 0221 leg.; CUH 20167.

Dendrobium bicameratum Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Latpanchar; 26°54′52″N, 088° 24′16″E; alt. 1120 m; 26.III.2019; Rai & Moktan 0613 leg.; CUH 20349.

Dendrobium chrysanthum Wall. ex Lindl.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088° 20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0397 leg.; CUH 20238.

Identification. Holoeiphyte. Plant pendulous, 55–95 cm tall. Stem straight sometimes wavy, yellowish beneath. Leaves distichous, elliptical to lanceolate, acute to acuminate, veined. Inflorescence lateral, 2- to 4-flowered, peduncle attenuate. Flowers 2.5 × 3.0 cm, golden yellow, fleshy, calyx subequal, dorsal sepal oblong-elliptical to ovate, lateral sepal falcate, corolla elliptical-ovate, obtuse. Lip 1.5–2.3 × 2.0–2.5 cm, simple, spotted with deep purple, column with short foot. Another dome-shaped, pollinia 4.


Ecology. Common in STR, STM, and TMP, and usually found in the trunk zone.

Phenology. Flowering and fruiting period from July to November.

Dendrobium crepidatum Lindl. & Paxton

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47′00″N, 088° 14′25″E; alt. 400 m; 20.IX.2020; Rai & Moktan 0417 leg.; CUH 20253.
Dendrobium denudans D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mungpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 11.VIII.2019; Rai & Moktan 0129 leg.; CUH 20147.

Dendrobium longicornu Lindl.

**Figure 6G**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0500 leg.; CUH 20288.

**Identification.** Holophryste. Plant 15.5–47.0 cm long. Stem erect, sheathed. Leaves 5–14, 3.5–7 × 1.2–2 cm, oblong-lanceolate, subacute, emarginated. Inflorescence axillary, solitary-flowered, flower 3–4 cm, white, bract small lanceolate, calyx ovate-lanceolate, acuminate, corolla ovate-lanceolate, acute. Lip 2.0–3.0 × 2.0–2.5 cm, 3-lobed, white with yellow lamellae, margins entire; column 0.4–0.5 cm long. Anther dome-shaped. Pollinia 4.

**Global distribution.** India, Bhutan, Nepal, Thailand, Myanmar (POWO 2022).

**Ecology.** Common in STR, STM, and TMP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from August to December.

Dendrobium moschatum (Banks) Sw.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02′16″N, 088°21′41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0369 leg.; CUH 20223.

**Identification.** Holophryste. Stem 27.0–49.5 cm, clustered, sheathed. Leaves 6–14, 5.4–10.0 × 1.5–3.0 cm, oblong, sessile, distichous, emarginated. Inflorescence lateral, 3- to 6-flowered. Flower whitish flower, 5.5–7.5 cm, floral bract tubular, sepals oblong-lanceolate, obtuse, petals ovate-oblong, obtuse, undulate. Lip simple, 3.0–3.5 × 2.5–3.0 cm, white with pale-yellow patches, ovate-oblong, entire. Column short. Anther white. Pollinia 4.

**Global distribution.** India, Bhutan, Nepal, Thailand, Myanmar, Tibet (POWO 2022).

**Ecology.** Common in TRP, STR, and STM, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from May to August.

Dendrobium nobile Lindl.

**Figure 6E**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1400 m; 03.IX.2020; Rai & Moktan 0351 leg.; CUH 20211.

**Identification.** Holophryste. Plant 7–12 cm tall. Pseudobulbs conical, sheathed. Leaves 2–4, 4.0–7.0 × 0.5–1.0 cm, linear-oblong, sessile, jointed. Inflorescence solitary, terminal, 6- to 15-flowered. Flower greenish yellow with purple stripe, 1.0–1.5 cm, floral bract linear lanceolate, dorsal sepal lanceolate, acute, lateral sepal linear-lanceolate, acute. Lip 4.0–5.5 × 2.5–4.0 cm, dark purple with pale-green tip. Column broad and long. Anther suborbicular. Pollinia elongate.

**Global distribution.** India, China, Myanmar, Nepal, Tibet (POWO 2022).

**Ecology.** Common in STM and TMP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from March to August.

Dendrobium pachyphyllum (Kuntze) Bakh. f.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chaitypani; 26°54′05″N, 088°17′49″E; alt. 1924 m; 12.VIII.2019; Rai & Moktan 0149 leg.; CUH 20153.

**Identification.** Holophryste. Pseudobulbs 3.0–3.5 × 1.0–2.0 cm, ovoid, sheathed. Leaves 2, 7.5 × 1.5–3.0 cm, oblong-elliptical. Inflorescence solitary. Flower 2.1–3.0 cm, green, floral bract lanceolate, dorsal sepal ovate, lateral sepal falcate, subacute. Lip 1.0–2.0 × 1.0–1.5 cm, 3-lobed, side lobes orbicular. Column curved, toothed. Anther obtuse-ovate. Pollinia 4.

**Global distribution.** India, Bhutan, China, Myanmar, Nepal, Tibet (POWO 2022).

**Ecology.** Common in TMP and STM, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from September to March.

Dendrobium plicatile Lindl.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 01.IX.2019; Rai & Moktan 0250 leg.; CUH 20184.

**Identification.** Holophryste. Pseudobulbs conical, sheathed. Leaves 2–4, 4.0–7.0 × 0.5–1.0 cm, linear-oblong, sessile, jointed. Inflorescence axillary, solitary-flowered, flower 3–4 cm, white, bract small lanceolate, calyx ovate-lanceolate, acuminate, corolla ovate-lanceolate, acute. Lip 2.0–3.0 × 2.0–2.5 cm, 3-lobed, white with yellow lamellae, margins entire; column 0.4–0.5 cm long. Anther dome-shaped. Pollinia 4.

**Global distribution.** India, Bhutan, Nepal, Thailand, Myanmar (POWO 2022).

**Ecology.** Common in STR, STM, and TMP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from August to December.

Dendrobium porphyrochilum Lindl.

**Figure 5A**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gairibans; 27°02′53″N, 088°01′48″E; alt. 2600 m; 05.IV.2021; Rai & Moktan 0533 leg.; CUH 20305.

**Identification.** Holophryste. Plant 7–12 cm tall. Pseudobulbs conical, sheathed. Leaves 2–4, 4.0–7.0 × 0.5–1.0 cm, linear-oblong, sessile, jointed. Inflorescence lateral, 3- to 6-flowered. Flower greenish yellow with purple stripe, 1.0–1.5 cm, floral bract linear lanceolate, dorsal sepal lanceolate, acute, lateral sepal linear-lanceolate, acute. Lip 4.0–5.5 × 2.5–4.0 cm, dark purple with pale-green tip. Column broad and long. Anther suborbicular. Pollinia elongate.

**Global distribution.** India, China, Myanmar, Nepal, Tibet (POWO 2022).

**Ecology.** Common in STM and TMP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from March to August.

Dendrobium rotundatum (Lindl.) Hook.f.

**Figure 5B**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sukhia; 27°59′47″N, 088°10′07″E; alt. 2150 m; 03.IV.2021; Rai & Moktan 0521 leg.; CUH 20297.

**Identification.** Holophryste. Pseudobulbs 3.0–3.5 × 1.0–2.0 cm, ovoid, sheathed. Leaves 2–4, 4.0–7.0 × 1.5–3.0 cm, oblong-elliptical. Inflorescence solitary. Flower 2.1–3.0 cm, green, floral bract lanceolate, dorsal sepal ovate, lateral sepal falcate, subacute. Lip 1.0–2.0 × 1.0–1.5 cm, 3-lobed, side lobes orbicular. Column curved, toothed. Anther obtuse-ovate. Pollinia 4.

**Global distribution.** India, Bhutan, China, Myanmar, Nepal, Tibet (POWO 2022).

**Ecology.** Common in TMP and STM, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from September to March.
**Dendrobium transparens** Wall. ex Lindl.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 24.VIII.2019; Rai & Moktan 0208 leg.; CUH 20165.

**Eria coronaria** (Lindl.) Rchb. f.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 08.IV.2021; Rai & Moktan 0545 leg.; CUH 20309.

**Gastrochilus affinis** (King & Pantl.) Schltr.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0501 leg.; CUH 20289.

**Gastrochilus calceolaris** (Buch.-Ham. ex Sm.) D.Don

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Third Mile; 27°00′39″N, 088°17′34″E; alt. 2150 m; 04.IX.2019; Rai & Moktan 0286 leg.; CUH 20193.

**Liparis resupinata** Ridl.

Figure 5J

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Senchal; 26°58′50″N, 088°13′48″E; alt. 2200 m; 04.IV.2019; Rai & Moktan 0564 leg.; CUH 20193.

**Liparis viridiflora** (Blume) Lindl.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02′17″N, 088°21′41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0358 leg.; CUH 20217.

**Oberoniae marginata** King & Pantl.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahanadi; 26°52′57″N, 088°19′13″E; alt. 1296 m; 29.VIII.2020; Rai & Moktan 0315 leg.; CUH 20198.

**Oberonia pachyrachis** Rchb. f. ex Hook.f.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagon; 26°56′42″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0394 leg.; CUH 20235.

**Otochilus albus** Lindl.

Figure 5C

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bagora; 26°58′22″N, 088°18′40″E; alt. 2300 m; 13.III.2019; Rai & Moktan 0006 leg.; CUH 20116.

**Otochilus fuscus** Lindl.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Latpanchar; 26°54′52″N, 088°24′16″E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0196 leg.; CUH 20235.

**Otochilus lancilabius** Seidenf.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Senchal; 26°58′50″N, 088°13′48″E; alt. 2200 m; 04.IV.2019; Rai & Moktan 0564 leg.; CUH 202323.

**Global distribution.** India, Bangladesh, Myanmar, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

**Phenology.** Flowering and fruiting period from June to July.

**Papilionanthe teres** (Roxb.) Schltr

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 29.VIII.2020; Rai & Moktan 0313 leg.; CUH 20196.

**Panisea uniflora** (Lindl.) Lindl.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47′00″N, 088°14′25″E; alt. 400 m; 20.IX.2020; Rai & Moktan 0406 leg.; CUH 20246.

**Papilionanthe acervata** (Lindl.) Schltr

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 29.VIII.2020; Rai & Moktan 0313 leg.; CUH 20196.
Pinalia spicata (D.Don) S.C.Chen & J.J.Wood

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 1550 m; 29.VIII.2020; Rai & Moktan 0314 leg.; CUH 20197.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02′17″N, 088°21′41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0359 leg.; CUH 20218.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gorkhey; 27°11′15″N, 088°04′22″E; alt. 2800 m; 17.X.2021; Rai & Moktan 0612 leg.; CUH 20348.

**Identification.** Holophiphyte. Plant 6–10 cm tall. Pseudobulbs ovoid-conical. Leaf single, 16.8–24.5 × 2.5–4 cm, oblanceolate, acute, during anthesis absent. Inflorescence 1- or 2-flowered, peduncle sheathed. Flower white, 5.5–6.5 cm, floral bract obovate, sepals white, dorsal sepal oblong-lanceolate. Lip 4.0–7.5 × 2.5–4.0 cm, 3-lobed, whitish yellow with yellowish-brown stripes and spots on disc, emarginated. Column 3.0–3.5 cm long, winged. Anther ovate. Pollinia 4.

**Global distribution.** India, Bhutan, China, Myanmar, Nepal, Thailand (POWO 2022).

**Ecology.** Less frequent in TMP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from January to April.

Pleione humilis (Sm.) D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02′17″N, 088°21′41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0359 leg.; CUH 20218.

**Identification.** Holophiphyte. Herb. Plant 8.5–19.0 cm tall. Pseudobulbs contracted above into a beak. Leaf single, 6.8–18.5 × 3.5–5.0 cm, elliptical-lanceolate, acuminate, petiolate, sheathed. Inflorescence 1- or 2-flowered, peduncle sheathed. Flower purple, 4.5–6 cm, floral bract elliptical sepals similar. Lip 4.0–6.5 × 3.5–4.5 cm, 3-lobed, layered with yellow on disc, elliptic. Column 3.6–4.5 cm long, slender. Anther whitish. Pollinia 4.

**Global distribution.** India, Bhutan, Bangladesh, China, Myanmar, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

**Ecology.** Common in STR and STM and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from May to September.

Pleione praecox (Sm.) D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mungpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0269 leg.; CUH 20190.

**Identification.** Holophiphyte. Stem pendulous, covered by leaf sheaths, 11.5–29.0 cm long. Leaves distichous, apex obliquely 2-lobed, coriaceous, sessile, 10–34 × 1–3 cm. Inflorescence many-flowered, peduncle 3-sheathed, 6.5–9.0 cm long, rachis glabrous, floral bracts ovate, acute. Flower 1.5–4.0 cm, sepals and petals white with a few light purple dots, dorsal sepal elliptical obtuse, lateral sepal obliquely ovate, obtuse. Lip light purple, white at apex, spur white, 1.4–6.5 × 2.0–3.5 cm. Column 0.3–0.5 cm long, Anther ovoid. Fruit ellipsoid.

**Global distribution.** India, Bhutan, Bangladesh, China, Myanmar, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

**Ecology.** Common in STR and STM and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from May to September.

Porpax elwesii (Rchb. f.) Rolfe

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Latpanchar; 26°54′52″N, 088°16′13″E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0191 leg.; CUH 20160.

Porpax filiformis (Wight) Schuit., Y.P.Ng & H.A.Pedersen

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gayabari; 26°54′52″N, 088°16′13″E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0191 leg.; CUH 20160.

**Identification.** Holophiphyte. Stem stout, covered by leaf sheaths, 12–32 cm long, roots piercing through leaf sheaths. Leaves recurved, apex 3-dentate, coriaceous,
8.0–14.0 × 0.5–2.0 cm. Inflorescence 3- to 6-flowered, peduncle, sheathed, 2.5–6.0 cm long, floral bracts ovate-triangular, obtuse. Flower 4.5–5.0 cm, sepals and petals greenish yellow, dorsal sepal incurved, oblong, obtuse, lateral sepal similar. Lip fleshy, golden-yellow to white, 2.0–2.5 × 1.0–1.5 cm. Column 0.5–0.6 cm long. Anther ovoid. Fruit not observed.

Global distribution. India, Bhutan, China, Myanmar, Nepal, Thailand (POWO 2022).

Ecology. Common in TRP and STR, and usually found in the trunk zone.

Phenology. Flowering and fruiting period from April to August.

**Vandopsis undulata** (Lindl.) J.J.Sm.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Tadka; 27°02′17″N, 088° 21′41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0357 leg.; CUH 20216.

Asparagaceae Juss.

**Maianthemum fuscum** (Wall.) LaFrankie

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gorkhey; 27°11′15″N, 088° 04′22″E; alt. 2800 m; 17.X.2021; Rai & Moktan 0611 leg.; CUH 20347.

**Polygonatum brevistylum** Baker

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rajahatta; 26°57′20″N, 088° 17′36″E; alt. 2037 m; 07.IX.2020; Rai & Moktan 0601 leg.; CUH 203421.

**Polygonatum oppositifolium** (Wall.) Royle

Figure 7F

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Loleyaon; 27°00′20″N, 088° 32′30″E; alt. 1670 m; 04.IX.2020; Rai and Moktan 0352 leg.; CUH 20212.

Identification. Facultative epiphyte. Rhizome branched 1.0–1.2 cm, thick. Stem glabrous 40–80 cm. Leaves many, opposite, sub leathery with distinct cross veins, lanceolate to narrowly elliptical-acuminate to caudate, 5.5–12.0 × 1.5–5.0 cm, petiole short 0.2–1.0 cm. Scale leaves triangular to oblong. Intermediate leaf is sometimes present. Inflorescence 3- to 8-flowered, Peduncle pendulous 1.2–2.5 cm, pedicels short, 0.8–1.9 cm, stiff. Flowers white, tubular, tube 8.2–12.0 mm, lobes 3.5–4.6 mm. Filaments papillose, sometimes smooth proximally. Anthers acute, bases long, slightly divergent. Fruit capsule, red, globose.

Global distribution. India, Bhutan, Bangladesh, China, Nepal, Myanmar (POWO 2022).

Ecology. Common in TMP and STM, and usually found on rock surfaces.

Phenology. Flowering and fruiting period from April to August.

**Polygonatum punctatum** Royle ex Kunth

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088° 18′59″E; alt. 1700 m; 04.IV.2019; Rai & Moktan 0057 leg.; CUH 20212.

Commelinaceae Mirb.

**Cyanotis cristata** (L.) D.Don

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′22″N, 088° 18′40″E; alt. 2300 m; 30.VIII.2019; Rai & Moktan 0236 leg.; CUH 20178.

**Floscopa scandens** Lour.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088° 24′16″E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0180 leg.; CUH 20155.

Zingiberaceae Martinov

**Cautleya spicata** (Sm.) Baker

Figure 6L

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Latpanchar; 26°54′52″N, 088° 24′16″E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0180 leg.; CUH 20155.

Identification. Facultative epiphyte. Leafy shoot, 35–43 cm. Leaves 4–7, 5.5–18.0 × 2.0–3.5 cm, lanceolate, caudate, sessile. Inflorescence 5–12 cm, bracts reddish, unilaterally split, petals oblong, rounded, 2.0–2.5 cm. Lip bilobed, filament short. Fruit capsule, red, globose.

Global distribution. India, Bhutan, China, Myanmar, Nepal (POWO 2022).

Ecology. Common in STR and STM, and usually found on lower trunk zone.

Phenology. Flowering and fruiting period from May to September.

**Globba clarkei** Baker

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rajahatta; 26°57′20″N, 088° 17′36″E; alt. 2037 m; 07.IX.2020; Rai & Moktan 0371 leg.; CUH 20224.

**Globba multiflora** Wall. ex Baker

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N,
Hedychium ellipticum Buch.-Ham. ex Sm.

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Mahanadi; 26°52’57″N, 088° 19’13″E; alt. 1296 m; 21.IX.2019; Rai & Moktan 0198 leg.; CUH 20163.

Hedychium griffithianum Wall.

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Latpanchar; 26°54’52″N, 088° 24’16″E; alt. 1210 m; 22.IX.2019; Rai & Moktan 0190 leg.; CUH 20159.

Papaveraceae Juss.

*Dactylicapnos scandens* (D.Don) Hutch.

**Figure 7K**

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Sonada; 26°58’18″N, 088° 16’57″E; alt. 1900 m; 07.VII.2021; Rai & Moktan 0598 leg.; CUH 20339.

**Identification.** Hemiepiphyte. Plant up to 3.5 m. Leaves ternate, 2 or 3, leaflets 0.8–3.0 × 0.5–2.0 cm, ovate-elliptical, apex acute-obtuse, base cuneate. Inflorescence racemes, 8- to 10-flowered, bracts lanceolate, 0.5–1.2 cm. Sepals 0.3–0.5 cm, triangular. Petals yellow, nectariferous glands present, hooked at apex. Fruit ovoid, 1.5–2.0 × 0.5–0.8 cm.

**Global distribution.** India, Bhutan, China, Korea, Nepal, Thailand, Vietnam (POWO 2022).

**Ecology.** Common in TMP.

**Phenology.** Flowering and fruiting period from June to September.

Lardizabalaceae R.Br.

Holboellia angustifolia Wall.

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Sonada; 26°58’18″N, 088° 16’57″E; alt. 1900 m; 07.VII.2021; Rai & Moktan 0604 leg.; CUH 20344.

Clematis buchananiana DC.

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Bagora; 26°58’22″N, 088° 18’40″E; alt. 2300 m; 28.VIII.2019; Rai & Moktan 0228 leg.; CUH 20172.

Elaatostema lineolatum Wight

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Takdah; 27°02’17″N, 088° 21’41″E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0356 leg.; CUH 20215.

Pilea microphylla (L.) Liebm.

**Material examined.** INDIA – Eastern Himalaya • West Bengal, Darjeeling, Bagora; 26°58’22″N, 088° 18’40″E; alt. 2300 m; 30.VIII.2019; Rai & Moktan 0242 leg.; CUH 20182.
**Pilea scripta** (Buch.-Ham. ex D.Don) Wedd.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Latpanchar; 26°54'52"N, 088°24'16"E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0176 leg.; CUH 20154.

**Pilea ternifolia** Wedd.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°00'06"N, 088°14'35"E; alt. 2200 m; 10.VIII.2019; Rai & Moktan 0101 leg.; CUH 20138.

**Herpetospermum tonglense** (C.B.Clarke) H.Schaef. & S.S.Renner

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Tonglu; 27°01'48"N, 088°05'33"E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0495 leg.; CUH 20285.

**Begonia flaviflora** Hara

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mungpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 11.VIII.2019; Rai & Moktan 0146 leg.; CUH 20152.

**Begonia hatacoa** Buch.-Ham.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°00′04″N, 088°14′39″E; alt. 2200 m; 10.VIII.2019; Rai & Moktan 0107 leg.; CUH 20141.

**Euonymus viburnoides** Prain

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 10.IV.2021; Rai & Moktan 0561 leg.; CUH 20322.

**Dendrotrophe granulata** (Hook.f. & Thomson ex A.DC.) A.N.Henry & B.Roy

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088°18′59″E; alt. 1700 m; 11.IV.2021; Rai & Moktan 0557 leg.; CUH 20319.

**Embelia frondosa** (King ex Gamble) D.G.Long

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0404 leg.; CUH 20244.

**Santalaceae** R.Br.

**Dendrotrophe granulata** (Hook.f. & Thomson ex A.DC.) A.N.Henry & B.Roy

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0404 leg.; CUH 20244.

**Agapetes auriculata** (Griff.) Benth. & Hook.f.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1100 m; 03.VII.2019; Rai & Moktan 0082 leg.; CUH 20133.

**Agapetes incurvata** (Griff.) Sleumer

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088°18′59″E; alt. 1700 m; 11.IV.2021; Rai & Moktan 0568 leg.; CUH 20327.

**Agapetes saligna** (Hook.f.) Benth. & Hook.f.

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 10.IV.2021; Rai & Moktan 0561 leg.; CUH 20322.

**Agapetes serpens** (Wight) Sleumer

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Senchal; 26°58′50″N, 088°13′48″E; alt. 2200 m; 10.IV.2021; Rai & Moktan 0557 leg.; CUH 20319.

**Agapetes smithiana** Sleumer

*Material examined.* INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rangbull; 26°59′26″N, 088°16′19″E; alt. 2040 m; 28.IX.2020; Rai & Moktan 0483 leg.; CUH 20277.

**Identification.** Facultative epiphyte. Plant similar to *Agapetes serpens*, but leaf elliptical to obovate, 1.2–3.5 × 0.5–1.8 cm, apex rounded, base cuneate. Flower solitary,
corolla yellow, pedicels 0.3–0.5 cm. Fruit not observed.

**Global distribution.** India, Bhutan, Nepal (POWO 2022).

**Ecology.** Common as epiphytes and mesophytes in STM and TMP and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from June to September.

**Rhododendron vaccinioides Hook.f.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gorkhey; 27°11′15″N, 088°04′22″E; alt. 2800 m; 18.X.2021; Rai & Moktan 0615 leg.; CUH 20351.

**Vaccinium dunalianum Wight**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 10.VI.2021; Rai & Moktan 0581 leg.; CUH 20333.

**Vaccinium nummularia Hook.f. & Thomson ex C.B.Clarke**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gorkhey; 27°11′15″N, 088°04′22″E; alt. 2800 m; 18.X.2021; Rai & Moktan 0614 leg.; CUH 20350.

**Vaccinium retusum (Griff.) Hook.f. ex C.B.Clarke**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, One Block; 26°56′22″N, 088°19′08″E; alt. 1900 m; 06.IV.2021; Rai & Moktan 0544 leg.; CUH 20308.

**Vaccinium vacciniaceum (Roxb.) Sleumer**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0259 leg.; CUH 20188.

**Rubiaceae Juss.**

**Mycetia longifolia (Wall.) Kuntze**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sixth Mile; 27°01′48″N, 088°19′24″E; alt. 1963 m; 04.IV.2021; Rai & Moktan 0520 leg.; CUH 20298.

**Neohymenopogon parasiticus (Wall.) Bennet**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0398 leg.; CUH 20239.

**Apocynaceae Juss.**

**Ceropegia meyeri Decne.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′23″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0558 leg.; CUH 20320.

**Dischidia bengalensis Colebr.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Munpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0558 leg.; CUH 20320.

**Neohymenopogon parasiticus (Wall.) Bennet**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sixth Mile; 27°01′48″N, 088°19′24″E; alt. 1963 m; 04.IV.2021; Rai & Moktan 0520 leg.; CUH 20298.

**Apocynaceae Juss.**

**Ceropegia meyeri Decne.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′23″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0558 leg.; CUH 20320.

**Dischidia bengalensis Colebr.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Munpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0558 leg.; CUH 20320.
**Hoya acuta Haw.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 28.VIII.2019; Rai & Moktan 0234 leg.; CUH 20177.

**Hoya arnottiana Wight**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahanadi; 26°52′57″N, 088°19′13″E; alt. 1296 m; 29.VIII.2020; Rai & Moktan 0312 leg.; CUH 20195.

**Hoya bella Hook.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Latpanchar; 26°54′52″N, 088°24′16″E; alt. 1120 m; 22.VIII.2019; Rai & Moktan 0183 leg.; CUH 20157.

**Identification.** Holoepiphyte. Plant pendulous. Stem stout. Leaves dark green above, paler below, elongate, rhomboid to ovate-lanceolate, 1.0–5.5 × 0.5–2.0 cm, apex acute to acuminate, base cuneate, 1.0–2.0 mm thick, fleshy and coriaceous, petiole 1.0–4.5 mm. Inflorescence umbel, peduncle long and stout, 1.0–1.5 cm, pedicel 1.0–1.5 cm. Flowers white broad sometimes with a pink to crimson centre, calyx lobes lanceolate, 2.0–3.0 × 0.8–1.2 mm, corolla glabrous outside, papillose, lobes triangular, staminal coronal scales short rounded or elliptical white or crimson. Fruit not observed.

**Global distribution.** India, Bangladesh, Bhutan, China, Hainan, Laos, Myanmar, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

**Ecology.** Common as epiphytes in STR and STM, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from August to October.

**Hoya edeni King ex Hook.f.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0403 leg.; CUH 20243.

**Hoya fusca Wall.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Third Mile; 27°00′39″N, 088°17′34″E; alt. 2150 m; 11.VIII.2019; Rai & Moktan 0132 leg.; CUH 20149.

**Identification.** Holoepiphyte. Stem stout. Leaves fleshy, linear to oblong, 9.5–21.0 cm, apex acuminate, base cuneate, petiole 0.8–2.5 cm long stout. Inflorescence terminal sessile umbel. Flower yellow-brown with a cream centre, peduncle 2–3.5 cm, short and stout, pedicel 1–2 cm thick and fleshy, calyx lobes ovate to ovate-oblong, rounded, 2–3 mm, glabrous, corolla glabrous outside, pubescent inside, lobes triangular-ovate, acute 3.5–4.0 mm. Staminal coronal scales short and thick. Follicles straight and slender.

**Global distribution.** India, Bangladesh, Bhutan, China, Hainan, Laos, Myanmar, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

**Ecology.** Common as epiphytes in STM and TMP, and usually found in the trunk zone.

**Phenology.** Flowering and fruiting period from August to October.

**Hoya lanceolata Wall. ex D.Don**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0399 leg.; CUH 20240.

**Hoya latifolia G.Don**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02′17″N, 088°21′21″E; alt. 1900 m; 17.VI.2021; Rai & Moktan 0596 leg.; CUH 20337.

**Hoya linearis Wall. ex D.Don**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088°18′59″E; alt. 1700 m; 11.IV.2021; Rai & Moktan 0569 leg.; CUH 20328.

**Hoya longifolia Wall. ex Wight**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088°18′59″E; alt. 1700 m; 11.IV.2021; Rai & Moktan 0569 leg.; CUH 20328.

**Hoya obcordata Hook.f.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahanadi; 26°52′57″N, 088°19′13″E; alt. 1296 m; 29.VIII.2020; Rai & Moktan 0317 leg.; CUH 20200.

**Hoya polyneura Hook.f.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahanadi; 26°52′57″N, 088°19′13″E; alt. 1296 m; 29.VIII.2020; Rai & Moktan 0317 leg.; CUH 20200.

**Hoya serpens Hook.f.**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1100 m; 04.IV.2019; Rai & Moktan 0040 leg.; CUH 20124.

Aeschynanthus acuminatus Wall. ex A.DC.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 09.IV.2021; Rai & Moktan 0551 leg.; CUH 20313.

Identification. Holoepiphyte. Stem 1.5–2.0 m long. Leaves fleshy, opposite, ovate, 5.5–11.0 × 2.0–4.5 cm, apex acuminate, base rounded, petiole 0.1–1.5 cm long. Inflorescence cyme, 3- to 5-flowered, peduncle 1.5–5.0 cm long, pedicel 1.0–2.5 cm, calyx lobes lanceolate-elliptical 1.5–3.0 × 0.4–0.8 cm, corolla glabrous outside, pubescent inside, 4–5 cm long, upper lip erect, lower lip 3-lobed, crimson or scarlet. Stamens far-exserted, disc annular. Fruit 12–15 cm long.

Global distribution. India, Bhutan, China, Hainan, Myanmar, Nepal (POWO 2022).

Ecology. Common as epiphytes in STR, STM, and TMP, and usually found in the trunk zone.

Phenology. Flowering and fruiting period from July to October.

Codonanthe devosiana Lem.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sukhia; 27°59′47″N, 088°10′07″E; alt. 2150 m; 03.IV.2021; Rai & Moktan 0519 leg.; CUH 20296.

Didymocarpus albicalyx C.B.Clarke

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Tindharia; 26°51′11″N, 088°19′59″E; alt. 860 m; 24.VIII.2019; Rai & Moktan 0222 leg.; CUH 20168.

Didymocarpus aromaticus Wall. ex D.Don

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chimney; 26°58′22″N, 088°18′40″E; alt. 2300 m; 07.IX.2020; Rai & Moktan 0480 leg.; CUH 20274.

Henckelia pumila (D.Don) A.Dietr.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 10.IV.2021; Rai & Moktan 0555 leg.; CUH 20317.

Identification. Holoepiphyte. Stem 1–1.5 m long. Leaves fleshy, opposite, elliptical 3.5–16.0 × 1.2–5.5 cm, apex acuminate, base cuneate, margin serrate, petiole 0.4–1.5 cm long. Inflorescence cyme, many-flowered, calyx lobes lanceolate, light yellowish orange, tube 2–4 mm long, corolla orange or orange-scarlet pubescent outside, 2.4–3.5 cm long, tube curved and inflated. Stamens far-exserted, disc annular. Fruit 12–20 cm long.


Ecology. Common in STR, STM, and TMP, and usually found in the trunk zone.

Phenology. Flowering and fruiting period from July to October.
Phenology. Flowering and fruiting period from July to October.

Acanthaceae Juss.

Thunbergia coccinea Wall. ex D.Don

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°00′06″N, 088°14′35″E; alt. 2200 m; 10.VIII.2019; Rai & Moktan 0115 leg.; CUH 20142.

Thunbergia lutea T.Anderson

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mungpoo; 26°58′23″N, 088°22′10″E; alt. 1114 m; 11.VIII.2019; Rai & Moktan 0128 leg.; CUH 20146.

Lamiaceae Martinov

Premna corymbosa Rottler & Willd.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 29.VIII.2019; Rai & Moktan 0229 leg.; CUH 20173.

Premna interrupta Wall. ex Schauer

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 10.IV.2021; Rai & Moktan 0565 leg.; CUH 20324.

Asteraceae Bercht. & J.Presl

Senecio buimalia Buch.-Ham. ex D.Don

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°16′00″E; alt. 1100 m; 03.VII.2019; Rai & Moktan 0091 leg.; CUH 20136.

Pittosporaceae L.Br.

Pittosporum napaulense (DC.) Rehder & Wilson

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088°20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0392 leg.; CUH 20234.

Huperzia hamiltonii (Spreng.) Trevis.

Figure 8A

Material examined. INDIA – EASTERN HIMALAYA-West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0498 leg.; CUH 20286.


Ecology. Common in STM, TMP, and SAL, and usually found in the trunk zone.

Phenology. Fertile period from July to October.

Araliaceae Juss.

Aralia leschenaultii (DC.) J.Wen

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0492 leg.; CUH 20282.

Huperzia phlegmaria (L.) Rothm.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Senchal; 26°58′50″N, 088°13′48″E; alt. 2200 m; 04.IV.2021; Rai & Moktan 0498 leg.; CUH 20299.

Identification. Holoepiphyte. Plant pendulous, 10.5–44.0 × 0.5–1.5 cm long, stout, dichotomously forked. Microphylls linear, oblong, obtuse apex, base decurrent, margin wavy, indistinct midrib. Sporophyll like vegetative leaves. Sporangia in the axil of sporophyll, yellowish.


Ecology. Common in STR and STM, and usually found in the trunk zone.

Phenology. Fertile period from July to October.

Huperzia squarrosa (G.Forst.) Trevis.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahanadi; 26°52′57″N, 088°19′13″E; alt. 1296 m; 29.VIII.2020; Rai & Moktan 0316 leg.; CUH 20199.
Hymenophyllaceae Mart.

**Hymenophyllum badium** Hook. & Grev.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gairibans; 27°02′53″N, 088° 01′48″E; alt. 2600 m; 02.XI.2020; Rai & Moktan 0494 leg.; CUH 20284.

**Hymenophyllum exsertum** Wall. ex Hook.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mungpoo; 26°58′23″N, 088° 22′10″E; alt. 1114 m; 02.IX.2019; Rai & Moktan 0252 leg.; CUH 20186.

**Hymenophyllum simonsianum** Hook.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, One Block; 26°56′22″N, 088° 19′08″E; alt. 1900 m; 06.IV.2021; Rai & Moktan 0543 leg.; CUH 20307.

**Hymenophyllum tenellum** D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rungbull; 26°59′26″N, 088° 16′19″E; alt. 2040 m; 28.IX.2020; Rai & Moktan 0471 leg.; CUH 20271.

Pteridaceae E.D.M.Kirchn.

**Antrophyum coriaceum** (D.Don) Wall. ex T. Moore

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bagora; 26°58′22″N, 088° 16′19″E; alt. 2040 m; 28.IX.2020; Rai & Moktan 0471 leg.; CUH 20271.

**Vittaria elongata** Sw.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gumbagaon; 26°56′43″N, 088° 20′34″E; alt. 1300 m; 10.IX.2020; Rai & Moktan 0401 leg.; CUH 20241.

**Vittaria himalayensis** Ching

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°16′57″E; alt. 1900 m; 08.IV.2021; Rai & Moktan 0546 leg.; CUH 20310.

**Vittaria ophiopogonoides** Ching

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°58′18″N, 088°16′57″E; alt. 1900 m; 08.IV.2021; Rai & Moktan 0546 leg.; CUH 20310.

Aspleniaceae Newman

**Asplenium ensiforme** Wall. ex Hook. & Grev.

**Figure 9I**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088° 18′59″E; alt. 1700 m; 11.IV.2021; Rai & Moktan 0570 leg.; CUH 20329.

**Identification.** Holoepiphyte. Lamina 5.5–36.0 cm, simple, ovate-lanceolate, entire, coriaceous, acuminate. Rhizome erect, scaly, scales black, lanceolate. Stipe small, winged, veins obscure and forked. Sori brown, linear, indusium toothed.

**Global distribution.** India, Bhutan, China, Myanmar, Nepal, Sri Lanka, Taiwan, Vietnam (POWO 2022).

**Ecology.** Common in STM and TMP and usually found in the trunk zone.

**Phenology.** Fertile period from June to September.

**Asplenium lacinatum** D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chimney; 26°58′22″N, 088° 18′40″E; alt. 2300 m; 07.IX.2020; Rai & Moktan 0375 leg.; CUH 20227.

**Asplenium nidus** L.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088°18′59″E; alt. 1700 m; 11.IV.2021; Rai & Moktan 0570 leg.; CUH 20329.

**Asplenium phyllitidis** D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bankhabari; 26°50′00″N, 088°
**Asplenium planicaule** Wall. ex Mett.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rungbull; 26°59′26″N, 088°16′19″E; alt. 550 m; 29.VIII.2019; Rai & Moktan 0230 leg.; CUH 20174.


**Global distribution.** India, Bhutan, China, Japan, Korea, Myanmar, Nepal, Thailand, Vietnam (POWO 2022).

**Ecology.** Common in TRP and STR, and usually found in the trunk zone and inner crown zone.

**Phenology.** Fertile period from June to November.

**Dryopteridaceae** Herter

**Elaphoglossum marginatum** T.Moore

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Gurudum; 27°07′14″N, 088°03′25″E; alt. 1924 m; 03.XI.2020; Rai & Moktan 0510 leg.; CUH 20293.

**Identification.** Accidental epiphyte. Fronds dimorphic. Sterile fronds; lamina broad, lanceolate, 11.5–13.0 × 1.0–1.5 cm, subcoriaceous, acuminate, stipe 2.5–3.8 cm, scaly. Fertile fronds; lamina thick, 7.4–12.0 × 1.5–2.5 cm, linear, acute, coriaceous, stipe 2.5–4.0 cm. Veins distinct, forked. Sori globose, brown, scattered densely on the fertile lamina. Rhizome erect, creeping, scaly.

**Global distribution.** India, Bhutan, China, Myanmar, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

**Ecology.** Rare in STR, STM, and TMP, and usually found in the trunk zone and rock surfaces.

**Phenology.** Fertile period from August to November.
Oleandraceae Ching ex Pic.Serm.

**Oleandra pistillaris** (Sw.) C.Chr.

Figure 9E

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chimney; 26°58′22″N, 088°18′40″E; alt. 2300 m; 07.IX.2020; Rai & Moktan 0376 leg.; CUH 20228.

**Identification.** Facultative epiphyte. Fronds simple, 11.5–39.5 × 2.5–4.5 cm. Lamina linear-lanceolate, serrate margin, glabrous, apex caudate, base cuneate. Veins distinct, forked. Stipe pubescent, 1.5–3.5 cm long, rigid. Sori globose, brown, in two rows, near to costa, indusiate. Rhizome wide, creeping, scaly, margin with hair.

**Global distribution.** India, Bhutan, China, Myanmar, Nepal, Philippines, Vietnam (POWO 2022).

**Ecology.** Common as epiphytes and lithophytes in STR, STM, and TMP, and usually found in the trunk zone and on rock surfaces.

**Phenology.** Fertile period from August to October.

**Oleandra wallichii** (Hook.) C.Presl

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rangbull; 26°59′26″N, 088°16′19″E; alt. 2040 m; 28.IX.2020; Rai & Moktan 0476 leg.; CUH 20273.

**Araiostegia dareiformis** (Hook.) Copel.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 15.III.2019; Rai & Moktan 0009 leg.; CUH 20119.

**Araiostegia multidentata** (Wall. ex Hook.) Copel.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1400 m; 02.VII.2019; Rai & Moktan 0076 leg.; CUH 20129.

**Davallia bullata** Wall.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chimney; 26°58′22″N, 088°18′40″E; alt. 2300 m; 07.IX.2020; Rai & Moktan 0382 leg.; CUH 20231.

**Davallia pulchra** D.Don

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°0′06″N, 088°14′35″E; alt. 2200 m; 10.VIII.2019; Rai & Moktan 0102 leg.; CUH 20205.

**Arthromeris himalovata** Fraser-Jenk. & Kandel

Figure 8C

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 17.X.2021; Rai & Moktan 0606 leg.; CUH 20346.

**Identification.** Holoepiphyte. Lamina oblong, 20.5–42.0 × 11.0–20.5 cm, both abaxial and adaxial surfaces pubescent. Pinnae in 3–5 pairs, up to 7.0–8.5 × 2.0–4.0 cm, oblong-lanceolate, acuminate, sessile, base round. Stipe glabrous, Sori large, orbicular, scattered in many rows along costa. Rhizome long, creeping, covered with whitish bloom, 4–5 mm in diameter.

**Global distribution.** India, Bhutan, China, Myanmar, Nepal, Vietnam (POWO 2022).

**Ecology.** Common in higher elevations and usually found in the trunk zone.

**Phenology.** Fertile period from June to November.

**Arthromeris lehmannii** (Mett.) Ching

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0504 leg.; CUH 20291.

**Arthromeris wallichiana** (Spreng.) Ching

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°0′06″N, 088°14′35″E; alt. 2200 m; 10.VIII.2019; Rai & Moktan 0102 leg.; CUH 20205.

**Drynaria mollis** Bedd.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°59′26″N, 088°16′19″E; alt. 2040 m; 02.XI.2020; Rai & Moktan 0437 leg.; CUH 20263.

**Drynaria propinqua** (Wall. ex Mett.) J.Sm.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0504 leg.; CUH 20291.

**Drynaria quercifolia** (L.) J.Sm.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 17.X.2021; Rai & Moktan 0606 leg.; CUH 20346.
• West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 24.VIII.2019; Rai & Moktan 0232 leg.; CUH 20175.

**Goniophlebium amoenum** (Wall. ex Mett.) Bedd.  
**Figure 9J**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chimney; 26°58′22″N, 088°18′40″E; alt. 2300 m; 07.IX.2020; Rai & Moktan 0380 leg.; CUH 20230.

**Identification.** Holoepiphyte. Frond pinnate, 42.0–62.5 × 18.0–20.5 cm, ovate-lanceolate, thick. Pinnae in 18–30 pairs, simple, oblong-lanceolate, margin serrated, apex acuminate. Stipe castaneous, 11.5–23 cm. Veins distinct. Sori round, brown, on either side of the costa. Rhizome wide, creeping, covered with scales, 0.5–0.6 cm in diameter.

**Global distribution.** India, Bhutan, China, India, Myanmar, Nepal (POWO 2022).

**Ecology.** Common in STM and TMP, and usually found in the trunk zone.

**Phenology.** Fertile period from August to November.

**Goniophlebium argutum** (Wall. ex Hook.) Bedd.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chimney; 26°58′22″N, 088°18′40″E; alt. 2300 m; 07.IX.2020; Rai & Moktan 0379 leg.; CUH 20229.

**Goniophlebium hendersonii** (Atk.) Bedd.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Chitrey; 26°55′55″N, 088°18′06″E; alt. 2510 m; 02.XI.2020; Rai & Moktan 0506 leg.; CUH 20292.

**Goniophlebium lachnopum** (Wall. ex Hook.) Bedd.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Lower Mamring; 26°58′17″N, 088°22′16″E; alt. 1400 m; 30.VIII.2020; Rai&Moktan 0325 leg.; CUH 20203.

**Goniophlebium microrhizoma** (C.B. Clarke ex Baker) Clarke ex Bedd.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°00′06″N, 088°14′35″E; alt. 2200 m; 10.VIII.2019; Rai & Moktan 0124 leg.; CUH 20144.

**Goniophlebium subamoenum** (C.B. Clarke) Bedd.

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rajahatta; 26°57′20″N, 088°17′36″E; alt. 2037 m; 09.IV.2021; Rai & Moktan 0554 leg.; CUH 20316.

**Identification.** Holoepiphyte. Fronds monomorphic, 10.0–12.5 × 2.0–3.5 cm. Lamina lanceolate or elliptical 5.5–11.5 × 2.0–3.0 cm, dried lamina leathery, apex acuminate, base cuneate. Stipe short, 1.0–1.8 cm. Veins slightly visible. Sori orbicular, in one row on each side of main vein. Rhizome creeping, greenish.

**Global distribution.** India, Bhutan, China, India, Myanmar, Nepal, Taiwan, Thailand, Vietnam (POWO 2022).

**Ecology.** Less frequent in TMP, and usually found in the trunk and inner crown zones.

**Phenology.** Fertile period from March to July.

**Lepisorus contortus** Ching

**Figure 8D**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bagora; 26°58′22″N, 088°18′40″E; alt. 2300 m; 13.III.2019; Rai & Moktan 0001 leg.; CUH 20113.

**Identification.** Holoepiphyte. Fronds 11.0–12.5 × 1.0–1.5 cm. Lamina simple, linear to elliptical-lanceolate, apex acuminate, base attenuate, rachis raised on upper side. Stipe straminaceous, 1.5–3.0 cm. Veins hidden. Sori round, brown, median on either side of the rachis. Rhizome wide, creeping, covered with scales, 0.2–0.4 cm in diameter.

**Global distribution.** India, Bhutan, China, India, Myanmar, Nepal (POWO 2022).

**Ecology.** Common in TMP and STM, and usually found in the trunk zone.

**Phenology.** Fertile period from August to November.

**Lepisorus loriformis** Ching

**Figure 8L**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Kanyakatta; 27°04′13″N, 088°01′05″E; alt. 2300 m; 02.XI.2020; Rai & Moktan 0493 leg.; CUH 20283.

**Identification.** Holoepiphyte. Frond simple, 16.5–63.5 × 1.0–2.0 cm. Lamina simple, linear, apex acuminate, subcoriaceous. Stipe 1.5–4.5 cm. Veins hidden. Sori round, brown, submarginal, exindusiate. Rhizome long, creeping, covered with scales, 2.5–4.5 cm in diameter.

**Global distribution.** India, Bhutan, China, India, Myanmar, Tibet (POWO 2022).

**Ecology.** Common in TMP and usually found in the trunk zone.

**Phenology.** Fertile period from August to November.

**Lepisorus loriformis** Ching

**Figure 8L**

**Material examined.** INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°00′06″N, 088°14′35″E; alt. 2200 m; 10.VIII.2019; Rai & Moktan 0124 leg.; CUH 20144.
Lepisorus mehrae Fraser-Jenk.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Bagora; 26°58′22″N, 088°18′40″E; alt. 2300 m; 13.III.2019; Rai & Moktan 0005 leg.; CUH 20115.

Identification. Holoepiphyte. Herb. Fronds simple, 26.0–36.0 × 1.5–4.0 cm. Lamina linear-lanceolate, both sides attenuated. Stipe 2.5–3.0 cm, pale green. Veins distinct, reticulate. Sori round, large, arranged on either side of the rachis, exindusiate, light brown. Rhizome creeping, thick and scaly, 0.5–1.0 cm in diameter.

Global distribution. India, Bhutan, Nepal (POWO 2022).

Ecology. Common in STM and TMP and usually found in the trunk zone.

Phenology. Fertile period from July to November.

Lepisorus normalis (D.Don) C. f.Zhao, R.Wei & X.C.Zhang

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Sonada; 26°58′18″N, 088°16′57″E; alt. 1900 m; 07.VII.2021; Rai & Moktan 0599 leg.; CUH 20340.

Identification. Holoepiphyte. Lamina simple, 28.0–42.0 × 3.5–4.0 cm, lanceolate, base attenuate, apex caudate-acuminate, mid-vein raised on abaxial side, flat adaxially. Veins hidden. Stipe short, indistinct. Sori golden brown, globose, linear between mid-vein to frond margin, exindusiate. Rhizome erect, short, and scaly.

Global distribution. India, Bhutan, China, India, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

Ecology. Common in STR, STM, and TMP, and usually found in the trunk zone.

Phenology. Fertile period from August to October.

Lepisorus scolopendrium (Ching) Mehra & Bir

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling Chimney; 26°58′22″N, 088°18′40″E; alt. 2300 m; 13.III.2019; Rai & Moktan 0007 leg.; CUH 20117.

Identification. Holoepiphyte. Lamina simple, 28.0–42.0 × 3.5–4.0 cm, lanceolate, base attenuate, apex cudadate-acuminate, mid-vein raised on abaxial side, flat adaxially. Veins hidden. Stipe short, indistinct. Sori golden brown, globose, linear between mid-vein to frond margin, exindusiate. Rhizome erect, short, and scaly.

Global distribution. India, Bhutan, China, India, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

Ecology. Common in STR, STM, and TMP, and usually found in the trunk zone.

Phenology. Fertile period from August to October.

Microsorum cuspidatum (D.Don) Tagawa

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50′00″N, 088°16′00″E; alt. 550 m; 20.IX.2020; Rai & Moktan 0485 leg.; CUH 20279.

Identification. Facultative epiphyte. Lamina simple, 48.0–72.0 × 23.5–29.5 cm. Lateral pinnae in 13–26 pairs, apex tapering, base cuneate, linear-lanceolate, 9.0–21.5 × 2.0–3.0 cm, stalked. Veins distinct. Stipe glabrous, articulated, 19.0–39.5 cm, grooved. Sori brown, globose, large, exindusiate, located in one row on either side of costa. Rhizome creeping, fleshy, 5.5–9.0 mm in diameter.
Global distribution. India, Bhutan, China, India, Nepal, Thailand, Tibet, Vietnam (POWO 2022).

Ecology. Common as epiphytes, lithophytes and mesophytes in STR, STM and usually found in the trunk.

Phenology. Fertile period from August to December.

Microsorum membranaceum (D.Don) Ching
Figure 8B

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Rangbull; 26°59'26"N, 088°16'19"E; alt. 2040 m; 28.IX.2020; Rai & Moktan 0475 leg.; CUH 20272.

Identification. Facultative epiphyte. Lamina simple, 21.0–62.0 × 5.0–8.5 cm, apex acute, base decurrent, margin entire. Veins reticulate, distinct. Stipe winged, 1.0–5.5 cm, grooved. Sori brown, globose, scattered in many rows on abaxial surface. Rhizome thick, creeping, 0.3–0.9 cm in diameter.


Ecology. Common in STR, STM, and usually found in the trunk zone.

Phenology. Fertile period from August to December.

Pyrrosia costata (Wall. ex C.Presl) Tagawa & K.Iwats.
Figure 8G

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Panighatta; 26°47'00"N, 088°14'25"E; alt. 400 m; 23.IX.2020; Rai & Moktan 0431 leg.; CUH 20260.

Identification. Holoepiphyte. Fronds monomorphic, 17.0–61.5 × 4.5–7.0 cm. Lamina simple, lanceolate, green, apex caudate, margin entire. Veins reticulate. Stipe winged, 1.0–0.3 cm. Sori brown, globose, scattered on the adaxial side. Rhizome short, creeping, 0.3–0.5 cm in diameter.


Ecology. Common in TRP and STR, and usually found in the trunk zone.

Phenology. Fertile period from July to September.

Pyrrosia lanceolata (L.) Farw.
Figure 8E

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Pankhabari; 26°50'00"N, 088°16'00"E; alt. 550 m; 20.IX.2020; Rai & Moktan 0409 leg.; CUH 20249.

Identification. Fronds monomorphic, 5.5–11.5 × 0.3–1.5 cm. Lamina simple, narrow, lanceolate, green, apex obtuse, base attenuate, margin entire, upper surface glabrous. Main vein flat on both adaxial and abaxial sides. Stipe winged, 0.6–1.0 cm. Sori globose to subglobose. Rhizome thin, creeping, scaly.


Ecology. Common in TRP and STR, and usually found in the trunk zone.

Phenology. Fertile period from July to December.

Pyrrosia mannii (Giesenh.) Ching
Figure 9B

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Takdah; 27°02'17"N, 088°21'41"E; alt. 1900 m; 04.IX.2020; Rai & Moktan 0355 leg.; CUH 20214.

Identification. Holoepiphyte. Fronds subdimorphic. Sterile fronds: lamina 8.0–19.0 × 2.0–24.0 cm, apex acuminate-caudate, base attenuate, stipe 2–28 cm. Fertile fronds: lamina wide, 5.4–20.0 × 0.5–2.5 cm, stipe 1.5–22.0 cm. Sori globose, golden brown, scattered densely on the adaxial side. Rhizome wide, creeping, scaly, 0.5–0.8 cm in diameter.


Ecology. Common as epiphytes and lithophytes in STR, STM, and TMP, and usually found in the trunk zone and rock surfaces.

Phenology. Fertile period from July to October.

Pyrrosia nuda (Giesenh.) Ching

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Ghoom; 27°00'06"N, 088°14'35"E; alt. 2200 m; 10.IX.2019; Rai & Moktan 0104 leg.; CUH 20140.

Identification. Facultative. Fronds subdimorphic. Sterile fronds: lamina 8.0–19.0 × 2.0–24.0 cm, apex acuminate-caudate, base attenuate, stipe 2–28 cm. Fertile fronds: lamina wide, 5.4–20.0 × 0.5–2.5 cm, stipe 1.5–22.0 cm. Sori globose, golden brown, scattered densely on the adaxial side. Rhizome wide, creeping, scaly, 0.5–0.8 cm in diameter.


Ecology. Common as epiphytes and lithophytes in STR, STM, and TMP, and usually found in the trunk zone and rock surfaces.

Phenology. Fertile period from July to October.
16°00′E; alt. 550 m; 27.IX.2020; Rai & Moktan 0441 leg.; CUH 20264.

Pyrrosia porosa (C.Presl) Hovenkamp

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahaldiram; 26°55′03″N, 088° 20′27″E; alt. 1900 m; 05.V.2021; Rai & Moktan 0573 leg.; CUH 20331.

Selliguea ebenipes (Hook.) S.Linds.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Mahaldiram; 26°55′03″N, 088° 20′27″E; alt. 1924 m; 02.IX.2020; Rai & Moktan 0329 leg.; CUH 20207.

Selliguea griffithiana (Hook.) Fraser-Jenk.

Material examined. INDIA – EASTERN HIMALAYA • West Bengal, Darjeeling, Upper Mamring; 26°57′16″N, 088°13′48″E; alt. 2200 m; 22.IX.2020; Rai & Moktan 0427 leg.; CUH 20257.

Discussion

Our study makes a significant contribution towards understanding the vascular epiphytic richness in the Darjeeling Himalaya. Within this area, there has been few vascular epiphytic inventories (i.e., Sen 1963; Ghosh and Saha 2013), and these have been limited in scope by being restricted to a certain area. Sen (1963) reported 34 species of epiphytic flowering plants belonging to 22 genera from the region, but this is low compared to our study. However, it is of interest that Hoya linearis Wall. ex D. Don, Lysionotus serratus D. Don, Neohymenopogon parasiticus (Wall.) Bennet, Peperomia heyneana Miq., Polygonatum oppositifolium (Wall.) Royle, and Vaccinium retusum (Griff.) Hook.f. ex C.B.Clarke still occur in the study area. Ghosh and Saha (2013) carried out a preliminary survey from the upper montane tropical forests of Darjeeling Himalaya and reported 88 species, which, again, is far less than in our study. Results of these earlier studies and our own suggest that orchids are the most dominant epiphytic species in the region. Our study revealed that Agapetes D.Don ex G.Don, Vaccinium L., and Aeschynanthus Jack were some of the most frequently occurring genera, which supports the findings by Ghosh and Saha (2013).

Furthermore, Thapa (2016) recorded about 50 species of epiphytic fern, fewer species than we report here. However, our findings are consistent with Thapa (2016) in showing that Polypondiaceae is the most diverse and largest family. Mallick (2020) reported dicotyledons as the most dominant plant group in Darjeeling Himalaya, whereas we found that monocotyledonous vascular epiphytes were more diverse. Our study also revealed some endemic species such as Cymbidium eburneum Lindl., Agapetes incurvata (Griff.) Sleumer, and Thunbergia lutea T. Anderson, which have been earlier reported (Gogoi et al. 2012; Deori 2020; BSI 2022). Our results show that species richness declines with increased elevation. This may be due to altitudinal variation, uneven topography, more extreme climatic conditions (Timsina et al. 2021), stunted vegetation (Kromer et al. 2005), or a decrease in soil fertility (Halbritter 2018). However, vascular epiphytes are more strongly associated with mid-elevational zone or temperate forests, as these forests are characterised by larger trees which offer more suitable habitat for epiphytes (Hansen et al. 2010).

The orchids Bulbophyllum leopardinum (Wall.) Lindl. ex Wall. and Pleione humilis (Sm.) D.Don are Critically Endangered (BGCI 2022). Similarly, Agrostophyllum myrianthum King & Pantl., Bulbophyllum reptans(Lindl.) Lindl. ex Wall., B. odoratissimum (Sm.) Lindl., Pleione praecox (Sm.) D.Don, Vandopsis undulata (Lindl.) J.J.Sm. were sparsely populated. The orchids Aerides multiflora Roxb., Cymbidium erythraeum Lindl., Dendrobium bicameratum Lindl., Gastrochilus
calceolaris (Buch.-Ham. ex Sm.) D.Don, Porphax elwesi (Rchb.f.) Rolfe, Uncifera obtusifolia Lindl. were found to be rare. Other epiphytes, such as Holboellia angustifolia Wall., Hoya serpens (Hook. f.), Herpetospermum tonglense (C.B.Clarke) H.Schaef. & S.S.Renner and Polygonatum oppositifolium (Wall.) Royle, were least common. Among epiphytic ferns, Huperzia hamiltonii (Spreng.) Trevis, is Endangered, while Elaphoglossum marginatum T.Moore, Huperzia pulcherrima (Wall. ex Hook. & Grev.) Pic.Serm., and Vittaria flexuosa Fee are Vulnerable (BGCII 2022).

We also recorded epiphytes that are known to have potential as ethnomedicines, such as Cauleyia spicata (Sm.) Baker, which is traditionally used against (Wall.) ex Lindl. as an (Wall.) L. for sore throats (C.Presl) Hovenkamp for treatment of (L.) Copel. for (Sathiyaraj et al. 2015). Despite their significance, many epiphytic species are under severe threat due to unsustainable harvesting by locals, ethno-medicine practitioners, and commercial collectors. Apart from human interference, overexploitation, deforestation, habitat destruction, and climate change are some notable threats to vascular epiphytes in the region (Yon et al. 2020). Epiphytic ferns also possess medicinal properties, such as Drynaria quercifolia (L.) Sw. (paralysis), Acampe rigidia (Buch.-Ham. ex Sm.) P.F.Hunt (jaundice), Papilionanthe teres (Roxb.), Schitr (anti-fertility medicine), Coelogyne cristata Lindl. (phytalexin), and Dendrobium chrysanthum Wall. ex Lindl. as anti-inflammatory, and Aerides multiflora Roxb. for the treatment of rheumatism (Singh et al. 2012; Rahamtulla et al. 2020). Epiphytic ferns also possess medicinal value, such as Drynaria quercifolia (L.) J.Sm. as a blood anticoagulant, Microsorum punctatum (L.) Copel. for its anti-inflammatory and antibacterial properties, Pyrrosia porosa (C.Presl) Hovenkamp for treatment of injuries, and P. lanceolata (L.) Farw. for sore throats (Sathiyaraj et al. 2015). Despite their significance, many epiphytic species are under severe threat due to unsustainable harvesting by locals, ethno-medicine practitioners, and commercial collectors. Apart from human interference, overexploitation, deforestation, habitat destruction, and climate change are some notable threats to vascular epiphytes in the region (Yon et al. 2017; Kull et al. 2016; Rahamtulla et al. 2018). Orchids have also been widely used as traditional medicines. Bulbophyllum leopardinum (Wall.) Lindl. ex Wall. has been used for the treatment of bone fractures, Cymbidium aloifolium (L.) Sw. (paralysis), Acampe rigidia (Buch.-Ham. ex Sm.) P.F.Hunt (jaundice), Papilionanthe teres (Roxb.), Schitr (anti-fertility medicine), Coelogyne cristata Lindl. (phytalexin), and Dendrobium chrysanthum Wall. ex Lindl. as anti-inflammatory, and Aerides multiflora Roxb. for the treatment of rheumatism (Singh et al. 2012; Rahamtulla et al. 2020). Epiphytic ferns also possess medicinal value, such as Drynaria quercifolia (L.) J.Sm. as a blood anticoagulant, Microsorum punctatum (L.) Copel. for its anti-inflammatory and antibacterial properties, Pyrrosia porosa (C.Presl) Hovenkamp for treatment of injuries, and P. lanceolata (L.) Farw. for sore throats (Sathiyaraj et al. 2015). Despite their significance, many epiphytic species are under severe threat due to unsustainable harvesting by locals, ethno-medicine practitioners, and commercial collectors. Apart from human interference, overexploitation, deforestation, habitat destruction, and climate change are some notable threats to vascular epiphytes in the region (Yon et al. 2017; Kull et al. 2016; Rahamtulla et al. 2020). Biodiversity conservation requires balancing the needs of people and long-term sustenance within the natural habitats, which requires implementation of effective conservation measures. It is imperative to develop awareness programmes, future monitoring, population studies, and collaborative research for the conservation of these valuable species.

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