Review

Vascular Epiphytic Medicinal Plants as Sources of Therapeutic Agents: Their Ethnopharmacological Uses, Chemical Composition, and Biological Activities

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Abstract: This is an extensive review on epiphytic plants that have been used traditionally as medicines. It provides information on 185 epiphytes and their traditional medicinal uses, regions where Indigenous people use the plants, parts of the plants used as medicines and their preparation, and their reported phytochemical properties and pharmacological properties aligned with their traditional uses. These epiphytic medicinal plants are able to produce a range of secondary metabolites, including alkaloids, and a total of 842 phytochemicals have been identified to date. As many as 71 epiphytic medicinal plants were studied for their biological activities, showing promising pharmacological activities, including as anti-inflammatory, antimicrobial, and anticancer agents. There are several species that were not investigated for their activities and are worthy of exploration. These epipythes have the potential to furnish drug lead compounds, especially for treating cancers, and thus warrant indepth investigations.

Keywords: epiphytes; medicinal plants; phytochemistry; pharmacology; drug leads

1. Introduction

Epiphytes are plants that grow on other plants and are often known as air plants. They are mostly found in moist tropical areas on canopy tree-tops, where they exploit the nutrients available from leaf and other organic debris. These plants exist within the plantae and fungi kingdom. The term epiphyte itself was first introduced in 1815 by Charles-François Brisseau de Mirbel in “Eléments de physiologie végétale et de botanique” [34]. Epiphytes can be categorized into vascular and non-vascular epiphytic plants; the latter includes the marchantiophyta (liverworts), anthocerotophyta (hornworts), and bryophyta (mosses). The common epiphytes are mosses, ferns, liverworts, lichens, and the orchids. Epiphytes fall under two major categories: As holo- and hemi-epiphytes. While orchids are a good example of holo-epiphytes, the strangler fig is a hemi-epiphyte. Although geological studies have proposed the existence of epiphytes since the pleistone epoch, an epiphyte was first depicted in “the Badianus Manuscript” by Martinus de la Cruz in 1552, which showed the Vanilla fragrans, a hemi-epiphytic orchid, being used by the tribal communities in latin America for fragrance and aroma, usually hung around their neck [34].
Epiphytes have been a source of food and medicine for thousands of years. Since they grow in a unique ecological environment, they produce interesting secondary metabolites that often show exciting biological activities. There are notable reviews on non-vascular epiphytes, bryophyta, regarding their phytochemical and pharmacological activities [35–38]. There are also extensive reviews on epiphytic lichens covering secondary metabolites and their pharmacological activities [39–42]. The only available review on vascular epiphytes related to medicinal uses was focused on Orchidaceae [43]. Therefore, to the best of our knowledge, there is no extensive database of vascular epiphytes regarding their medicinal contribution.

There are 27,614 recorded species of vascular epiphytes belonging to 73 families and 913 genera [44]. Vascular epiphyte species are commonly found in pteridophyta, gymnosperms, and angiosperms plant groups, which are mostly found in the moist tropical areas on canopy tree tops, where they exploit the nutrients available from leaf and other organic debris [45,46]. In this study, information on vascular epiphytic medicinal plant species was collected using search engines (Web of Science, Scifinder Scholar, prosea, prota, Google scholar), medicinal plant books (Plant Resources of South-East Asia: Medicinal and Poisonous Plants [47–49], Plant Resources of South-East Asia: Cryptogams: Ferns and Fern Allies [50], Mangrove Guide for South-East Asia [51], Medicinal Plants of the Asia-Pacific [52], Medicinal Plants of the Guiana [53], Indian Medicinal Plants [54,55], Medicinal Plants of Bhutan [56], Medicinal and aromatic plants of Indian Ocean islands: Madagascar, Comoros, Seychelles and Mascarenes [57]), and the Indonesian Medicinal Plants Database [58]. Scientific names of the epiphytic medicinal plant species were compared against the Plantlist database for accepted names to avoid redundancy [59]. The time-frame threshold for data coverage was from the earliest available data until early 2020. Nevertheless, empirical knowledge regarding traditional medicinal plants was passed through generations using verbal or written communication, with verbal communication highly practiced by remote tribes [60,61]. It is possible that some oral traditional medical knowledge may not be reported and therefore not captured in this review. In this current study, we collected and reviewed 185 epiphytic medicinal plants reported in the literature, covering ethnomedicinal uses of epiphytes, their phytochemical studies and the pharmacological activities. The data collection approach used is presented in Figure 1.

**Figure 1.** Schematic data collection approach.

2. Ethnopharmacological Information of Vascular Epiphytic Medicinal Plants

2.1. Vascular Epiphytic Medicinal Plant Species Distribution within Plant Families

In this component of the study, we collated and analysed 185 of the medicinally used epiphytic plants species using ethnopharmacological information. This data (Table 1) includes the name of species, plant family, areas where the epiphytes are used in traditional medicines, part(s) of the plant being used in medication, how the medicine was prepared, and indications. Of the 185 medicinally used epiphytes, 53 species were ferns (mostly polipodiaceae), with 132 species belonging to the non-fern category. The Orchidaceae family contains the *Dendrobium* genus that contains the highest number of medicinal epiphytes, including 64 orchid species and 20 *Dendrobium* species. The
Orchidaceae epiphytes were the majority of non-fern epiphytes. *Cassytha filiformis* L, *Bulbophyllum odoratissimum* (Sm.) Lindl. ex Wall., *Cymbidium goeringii* Rchb.f., *Acrostichum aureum* Limme, and *Ficus natalensis* Hochst. were the five most popular vascular epiphytic medicinal plants used (Figure 2).

![Figure 2](image-url)

**Figure 2.** Five most popular medicinal epiphytes. (A) *C. filiformis* L. (B) *B. odoratissimum* (Sm.) Lindl. ex Wall. (C) *C. goeringii* (Rchb.f.) Rchb.f. (D) *A. aureum* Limme. (E) *F. natalensis* Hochst.

### 2.2. Distribution of Vascular Epiphytic Medicinal Plant Species by Country

Based on the available records, the data curation and analysis revealed that the Indigenous Indonesians have used 58 diverse epiphytic medicinal plant species throughout the archipelago and have the highest record compared to other tropical countries (Figure 3). China is second and is well known for its traditional medicine, including the use of epiphytes in medicament preparation. This is followed by the Indigenous Indians, with the well-established Ayurveda as a formal record of Indian medicinal plants. The traditional medicinal plant knowledge of Indonesia has been heavily influenced by Indian culture and enriched by Chinese and Arabian traders since the kingdom era [60].

![Figure 3](image-url)

**Figure 3.** Density map showing a number of epiphytic medicinal plant species used by different countries. The number of species used is proportional to colour intensity.

### 2.3. Parts of Vascular Epiphytic Medicinal Plant Species Used in Traditional Medicines

This review determined that leaves were the main plant components used in the traditional medicines (Figure 4). This was expected given they are more easily harvested (without excessive
tools) and processed compared to other plant parts, e.g., the root and stem. As some epiphytes have a small biomass compared to higher trees, the whole plant is commonly harvested in medicament preparation. Interestingly, almost half of epiphytic medicinal plants were ferns, in which the stem-like stipe is prepared for medicine. Without haustoria (a specialised absorbing structure of a parasitic plant), the root and rhizome of epiphytic medicinal plants are easily harvested and prepared.

**Figure 4.** Components of epiphytic plants used in medicinal preparations (represented in percentages). LF: leaf; WP: whole; RT: root; ST: stem, RZ: rhizome; FT: fruit; PdB: pseudobulbs; BK: bark; LT: latex; TB: tuber; PT: pith; SD: seed; SP: spore; BD: buds; BL: bulbs; NT: nutmeg; PD: pedi; PdT: pseudotuber; STh: sheath.

### 2.4. Modes of Preparation and Dosage of Administration of Vascular Epiphytic Medicinal Plant Species in Traditional Medicines

Generally, medicinally active secondary metabolites have a water solubility problem likely related to the lipophilic moieties in their structures [62]. Using boiling water, decoctions are able to increase the yield of secondary metabolites extracted from medicinal plants. Therefore, it is not surprising that decoctions are commonly used in traditional medicine preparations from plants (Figure 5). External applications are also commonly practiced in traditional medicinal therapies, including poultice (moist mass of material), raw, or less processed medicine. Poultices were commonly prepared for skin diseases while a decoction was ingested for internal infectious diseases (i.e., fever).
2.5. Category of Diseases Treated by Vascular Epiphytic Medicinal Plant Species

Interestingly, epiphytes have been used for treating various ailments, including both infectious and non-infectious diseases. Traditional communities described infectious diseases related to skin diseases (wounds, boils, ulcers, abscesses, smallpox) and non-skin diseases (fever, diarrhoea, ulcers, colds, worm infections, and malaria). A total of 54 epiphytic medicinal plant species were prescribed to treat skin diseases while 81 species to treat non-skin infectious diseases (Figure 6).

Hygiene has been a serious issue in traditional communities as it gives rise to infectious diseases. Fever is a common symptom of pathogenic infection and has been treated using medicinal plants, including epiphytes. Hygiene issues are also a common cause of skin disease, wounds, dysentery, and diarrhoea in traditional communities.
3. Phytochemical Composition of Vascular Epiphytic Medicinal Plants

Epiphytes belong to a distinctive plant class as they do not survive in soil and this influences the secondary metabolites present. Epiphytes are physically removed from the terrestrial soil nutrient pool and grow upon other plants in canopy habitats, shaping epiphyte morphologies by the method in which they acquire nutrients [63]. Nutrients, such as nitrogen and phosphorus, are obtained from different sources, including canopy debris (through fall) and host tree foliar leaching [63], the latter influencing canopy soil nutrient cycling [64,65]. In the conversion of sunlight into chemical energy, the epiphyte often uses a specific carbon fixation pathway (CAM: Crassulacean acid metabolism) as a result of harsh environmental conditions [66], making them unique and thus worthwhile for scientific studies.

In the early 20th century, laboratory-based research on epiphytes studied the plant’s production of alkaloids, cyanogenetic, and organic sulfur compounds, with the plants producing limited quantities of these compounds [67]. Common plant steroids, e.g., β-sitosterol, have been shown to be present in 22 different epiphytic medicinal plants (Figure 7). This is possibly due to the function of the steroids as structural cell wall components, giving rise to a wide distribution across plant families and species. A further example of a common plant steroid present is stigmasterol.

Table 2 lists the secondary metabolites identified in epiphytic medicinal plants and details the species, isolated compounds, and provides references. Currently, only 69 species have been phytochemically studied (23 fern and 46 non-fern epiphytes) and 842 molecules have been isolated from these epiphytic plants. Analysis of the literature showed epiphytes were able to produce a range of secondary metabolites, including terpenes and flavonoids, with no alkaloids being isolated from epiphytic fern medicinal plants thus far. β-Sitosterol, a common phytosterol in higher plants, was reported across fern genera. Interestingly, there is one unique terpene produced, hopane, which is commonly called fern sterol. Common flavonoids, such as kaempferol, quercetin, and flavan-3-ol derivatives (catechin), were also reported across the epiphytic ferns. Epiphytic pteridaceae,
Acrostichum aureum Limme, is rich in quercetin [68]. Further analysis showed there were more secondary metabolites reported from non-fern epiphytic medicinal plants than from fern epiphytic medicinal plants, including terpene derivatives, flavonoids, and alkaloids. Included were flavanone, flavone, and flavonol derivatives but no flavan-3-ols were reported in these epiphytes so far. In the non-fern epiphytes, there were more phytochemical studies on orchid genera with additional classes of compounds reported, including penantrene derivatives (flavanthrinin, nudol, fimbriol B) [69,70] from the Bulbophyllum genus and the alkaloid dendrobine from the Dendrobium genus [71]. Therefore, while epiphytes may have limitations in accessing nutrients, adaptation has enabled them to successfully survive these environments. Studies on numerous medicinal epiphytes show that the unique environment does not constrain the plants from producing different types of secondary metabolites. These include terpenes, flavonoids, and alkaloids, especially the non-fern epiphytic medicinal plants.

4. Pharmacological Activities of Vascular Epiphytic Medicinal Plants

The pharmacological activities of medicinal epiphytes are summarised in Table 1, including the plant species, ethnopharmacological indication, and pharmacological test results. The ethnopharmacological uses of each plant are also present for a correlation and comparison with the pharmacological activities. There are a large number of phytochemical studies on the four fern-epiphytes (Stenochlaena palustris (Burm. F.) Bedd., Botrychum lanuginosum Wall.ex Hook & Grev., Pyrrosia petiolosa (Christ) Ching, Psilotum nudum (L.) P. Beauv) without any biological activity testing reported. This occurred to four non-fern epiphytes (Bulbophyllum vaginatum (Lindl.) Rchb.f, Mycanranthes pamea (Lindl.) S.C.Chen & J.J.Wood, Pholidota articulata Lindl., Viscum ovatifolium DC) and non-fern epiphytic medicinal plants. This lack of pharmacological testing limits scientific support for the traditional uses of these plants.

From the 191 collected records of epiphytic medicinal plants, around 71 species were subjected to bioactivity testing, with 25 of these species using crude extract samples. Although this testing represents almost 50% of the species examined, only a few of the pharmacological tests were related to ethnopharmacological claims. Here, we discuss selected species where the outcomes indicated a coherent relationship between bioactivities and traditional claims.

4.1. Infectious Disease Therapy

Research on epiphytes that have been used in infectious disease therapy include in wound healing, dysentery, and skin infections. A study on the methanol extract of Adiantum caudatum L., Mant showed anti-fungal activity against common fungi found in wounds (Aspergillus and Candida species) [72], including Aspergillus flavus, A. spinulosus, A. nidulans, and Candida albicans, with minimum inhibitory concentration (MIC) values of 15.6, 15.6, 31.2, and 3.9 µg/mL, respectively. Gallic acid was one of the bioactive constituents [73]. The methanol extract of Ficus natalensis Hochst (a semi-epiphytic plant) showed anti-malarial activity against Plasmodium falciparum, with an half maximal inhibitory concentration (IC50) value of 41.7 µg/mL, and weak bactericidal activity against Staphylococcus aureus, with an MIC value of 99 µg/mL [74]. These results became preliminary data for confirming its traditional uses as malarial fever therapy and wound healing. Phytochemical studies on Pyrrosia sheareri (Bak.) Ching successfully isolated several compounds and were subjected to antioxidant testing. While this was not in line with the plant’s ethnomedical uses for dysentery therapy [75], one of the isolated constituents was protocatechuic acid, which is known to possess anti-bacterial activity. It implies that the traditional uses of the epiphyte were for bacillary dysentery therapy.

4.2. Non-Infectious/Degenerative Disease-Related Therapy

An exploration on Drynaria species, highly prescribed in bone fracture therapy, successfully isolated flavonoid constituents that induce osteoblast proliferation [76]. Previous studies on Acrostichum aureum Limme failed to show its anti-bacterial activities [77] contrary to its traditional claims in wound management. However, patriscabratine 257 was isolated from the defatted
methanol extract of whole plant of *A. aureum*, and subsequent testing showed it possessed anti-cancer activity in gastric cells and this supported the traditional use of the plant in peptic ulcer therapy [68]. A decoction from the epiphyte *Ficus deltoida* has been used to treat diabetes. A study on the hot aqueous extract of this plant revealed anti-hyperglycemic activity by stimulating insulin secretion up to seven-fold. Furthermore, its activity mechanism was related to both the K⁺-ATP-dependant and -non-dependant insulin secretion pathway [78]. However, further studies are required to identify the constituents responsible for the anti-hyperglycaemic activity.

The Indigenous people of Paraguay have used *Catasetum barbatum* Lindley to topically treat inflammation. Four bioactive compounds were isolated from this species and 2,7-dihydroxy-3,4,8-trimethoxyphenanthrene (confusarin) 595 showed the highest anti-inflammatory activity [79]. The study also revealed the compound to be a non-competitive inhibitor of the H₁-receptor.

From the polypodiaceae family, the rhizome of *Phymatodes scolopendria* (burm.) Ching has been used to treat respiratory disorders. A bioassay-guided phytochemical study on *Phymatodes scolopendria* (Burm. f.) Pic. Serm. isolated 1,2-benzopyrone (coumarin) 209 as a bronchodilator [80].

5. Epiphytic Plant–Host Interactions on Secondary Metabolite Tapping

Secondary metabolite tapping has been an interesting study to reveal the molecular interactions between epiphytes and their host. This interaction was more visible when a physical channel between the two were developed. This channel (haustorium) made an epiphytic plant act as a parasite that enabled the plant to harvest molecular components from the host plant. A study on *Scurulla oortiana* (Korth.) Danser growth in three different host species (*Citrus maxima*, *Persea Americana*, and *Camellia sinensis*) identified three secondary metabolites (quercitrin, isoquercitrin, and rutin) in the *S. oortiana* (Korth.) Danser epiphyte growing on the three hosts [81]. Interestingly, extensive chromatographic and spectroscopic studies discovered that the flavonoids found in the *S. oortiana* (Korth.) Danser were independent of the host plants [81]. Secondary metabolite production in a host plant can also be triggered by the existence of a parasite, as discussed in a study on *Tapirira guianensis* infested by *Phoradendron perrottetii*, in which infested branches produced more tannin compared to non-infested branches, with infestation inducing a systemic response [81].
<table>
<thead>
<tr>
<th>No</th>
<th>Epiphyte species</th>
<th>Location</th>
<th>Part of plants</th>
<th>Preparation and route of administration</th>
<th>Indication (traditional)</th>
<th>Pharmacological testing (modern)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Adiantaceae</strong></td>
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<tr>
<td>1</td>
<td><em>Adiantum caudatum</em> L.</td>
<td>India, Indonesia, Malaysia</td>
<td>LF</td>
<td>Decoction</td>
<td>Cough, heal wound, cold, tumors of spleen, liver and other viscera, skin diseases, bronchitis, and inflammatory diseases [73,82,83]</td>
<td>Antimicrobial (MeOH extract, gram +, -, fungi) [73]</td>
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<tr>
<td></td>
<td><strong>Aspleanceae</strong></td>
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<td>2</td>
<td><em>Asplenium nidus</em> L.</td>
<td>Tahiti, Malaysia, Philippines, Vanuatu, Indonesia</td>
<td>LF, WP</td>
<td>Ointment, decoction, eaten</td>
<td>Headache, hair loss (pounded leaves mixed with coconut oil), ease labor, fever (decoction), contraceptive, depurative, sedative agents. edible food (young leaves), ornament, anti-inflammation, promote blood circulation [84–86]</td>
<td>Antioxidative (MeOH extract, DPPH), tyrosinase inhibiting (MeOH extract, microtitre), antibacterial (MeOH extract) [77]</td>
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<td>3</td>
<td><em>Asplenium macrophyllum</em> Sw.</td>
<td>India</td>
<td>LF</td>
<td>Decoction</td>
<td>As laxative, emetic, diuretic, anthelmintic agent, to treat ophthalmia, jaundice, spleen diseases [85,87]</td>
<td></td>
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<tr>
<td>4</td>
<td><em>Asplenium polydon</em> G. Foster var <em>bipinnatum</em> (Sledge)</td>
<td>India</td>
<td>LF</td>
<td>Decoction, paste</td>
<td>Promote labor, tumor [88]</td>
<td></td>
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<td>5</td>
<td><em>Asplenium serratum</em> L.</td>
<td>Columbia, Peru</td>
<td>na</td>
<td>Not mentioned</td>
<td>Liver problem, stomachache, ovary inflammation [85,89]</td>
<td></td>
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<td></td>
<td><strong>Blechnaceae</strong></td>
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<td>6</td>
<td><em>Stenochlaena palustris</em> (Burm. F.) Bedd.</td>
<td>Indonesia, India</td>
<td>LF, RZ</td>
<td>Eaten, decoction, poultice</td>
<td>Young reddish leaves are used as food, leaves are used to treat fever, skin diseases, throat, and gastric ulcer, as antibacterial, rhizome and leaves are used to treat burns and ulcers, as cooling agent [51,90]</td>
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</tr>
<tr>
<td></td>
<td><strong>Davalliaceae</strong></td>
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<td>7</td>
<td><em>Davallia denticulata</em> (Burm. f.) Mett. ex Kuhn</td>
<td>Malaysia, Indonesia</td>
<td>RT</td>
<td>Decoction</td>
<td>Gout, pain, as tonic [82,91]</td>
<td></td>
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<tr>
<td>No.</td>
<td>Species</td>
<td>Country/Region</td>
<td>Type</td>
<td>Uses and Properties</td>
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<td>8</td>
<td>Araiostegia divaricata (Blume) M. Kato</td>
<td>China, Taiwan</td>
<td>WP</td>
<td>Joint pain [92]</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Anti-psoriasis [93], antioxidant (water extract, DPPH) [94]</td>
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<tr>
<td>9</td>
<td>Davallia parvula Wall. Ex Hook. &amp; Grev.</td>
<td>na</td>
<td></td>
<td>Not mentioned</td>
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<td>Not mentioned [51,95]</td>
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<tr>
<td>10</td>
<td>Davallia solida (G. Forst.) Sw.</td>
<td>Tahiti, Fiji, other Polynesian</td>
<td>WP</td>
<td>Decoction (external and internal)</td>
<td></td>
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<td></td>
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<td></td>
<td>Dysmenorrhea, luochorea, uterine hemorrhage, sore throat, asthma, constipation, fracture, fish sting, promote health pregnancy, as a bath for newborn, anti-microbial [86,96–98]</td>
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<td>Antioxidant (extract, ABTS) [94], antioxidant (DPPH, all isolates) [99], anti-neurotoxicity (extract, Neuro-2a cells, ATCC CCL-131) [100], C-terminal cytosolic domain of P-pg [101], anti-skin aging [102]</td>
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<td>11</td>
<td>Leucostegia immersa Wall. ex C. Presl</td>
<td>Nepal</td>
<td>RZ</td>
<td>Decoction, paste</td>
<td></td>
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<tr>
<td></td>
<td>Gesneriaceae</td>
<td></td>
<td></td>
<td>Boils (paste), constipation (decoction), as antibacterial (paste) [103]</td>
<td></td>
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<tr>
<td>12</td>
<td>Aeschynanthus radicans Jack</td>
<td>Malaysia</td>
<td>LF</td>
<td>Decoction</td>
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<td></td>
<td></td>
<td></td>
<td>Headache [52]</td>
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<td>13</td>
<td>Cyrtandra sp</td>
<td>Indonesia</td>
<td>LF</td>
<td>Poultice</td>
<td></td>
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<td></td>
<td>Hymenophyllaceae</td>
<td></td>
<td></td>
<td>Skin ailments [104]</td>
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<tr>
<td>14</td>
<td>Hymenophyllum polyanthos Sw.</td>
<td>Suriname</td>
<td>WP</td>
<td>Burnt (smoke inhaling), decoction</td>
<td></td>
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<td></td>
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<td></td>
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<td>Dizziness (insanity), pain, cramps [105]</td>
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<td>15</td>
<td>Hymenophyllum javanicum Spreng.</td>
<td>India</td>
<td>WP</td>
<td>Smoke together with garlic and onions</td>
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<td></td>
<td>Headache [88]</td>
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<td>16</td>
<td>Huperzia carinata (Desv. ex Poir.) Trevis</td>
<td>South-East Asia</td>
<td>WP</td>
<td>Ointment</td>
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<td></td>
<td>Lycopodiaceae</td>
<td></td>
<td></td>
<td>Stimulate hair growth [106]</td>
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<td></td>
<td>Anti-acetylcholinesterase (74,75,76, colorimetric Ellman method) [107]</td>
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<td>Cytotoxic activities against HuCCA-1, A-549, HepG2, and MOLT-3 cancer cell lines (81, 79, 77) [110]</td>
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<td>17</td>
<td>Huperzia phlegmaria (L.) Rothm.</td>
<td>South-East Asia, India</td>
<td>WP</td>
<td>Ointment</td>
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<td>Stimulate hair growth, skin diseases [108,109]</td>
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<tr>
<td>18</td>
<td>Huperzia megastachya (Baker) Tardieu</td>
<td>Madagascar</td>
<td>LF</td>
<td>Decoction (infusion)</td>
<td></td>
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<tr>
<td></td>
<td>Huperzia obtusifolia (Sw.) Rothm.</td>
<td>Madagascar</td>
<td>LF</td>
<td>Tonic [111]</td>
<td></td>
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<tr>
<td>19</td>
<td>Nephrolepidaceae</td>
<td>Malaysia</td>
<td>WP</td>
<td>Boiled, eaten</td>
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<tr>
<td></td>
<td>Nephrolepis acutifolia (Desv.) Christ</td>
<td></td>
<td></td>
<td>Food [112]</td>
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<td>No.</td>
<td>Species</td>
<td>Geographic Origin</td>
<td>Part Used</td>
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<td>Extracts/Activity</td>
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<tr>
<td>21</td>
<td><em>Nephrolepis biserrata</em> (Sw.)</td>
<td>Malaysia, Indonesia, Ivory Coast, New Guinea</td>
<td>LF, RZ, WP</td>
<td>Decoction, cooked</td>
<td>Leaves are used to treat boils, blister, abscesses, sores, and cough. Rhizomes are used as edible food [113,114]</td>
<td>Antibacterial (extract) [115]</td>
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<tr>
<td></td>
<td>Schott</td>
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<tr>
<td></td>
<td><em>Oleandraceae</em></td>
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<tr>
<td>22</td>
<td><em>Nephrolepis cordifolia</em> (L.)</td>
<td>India</td>
<td>RZ</td>
<td>Decoction (fresh leaves)</td>
<td>Cough, rheumatism, chest congestion, nose blockage, loss appetites, infection (antibacterial), pinnae is used to treat cough, wounds, jaundice, anti-fungal, styptic, anti-tussive [90]</td>
<td>Antibacterial, anti-fungal (extract fractions aerial part) [116]</td>
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<tr>
<td></td>
<td>C. Presl</td>
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<td></td>
<td><em>Oleandra musifolia</em> (Blume)</td>
<td>Philippines, India</td>
<td>ST</td>
<td>Decoction</td>
<td>Anthelmintic, emmenagogue, antidote (snake bite) [103,117]</td>
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<td></td>
<td>C. Presl</td>
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<td><em>Opiglossaceae</em></td>
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<td>23</td>
<td><em>Botrychum lanuginosum</em> Wall.ex Hook &amp; Grev.</td>
<td>Indonesia, Philippines</td>
<td>LF, RZ</td>
<td>Decoction, paste</td>
<td>Hair treatment (crushed leaves), cough (decoction), rid the first feces (spores), ornament [118]</td>
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<tr>
<td>24</td>
<td><em>Ophioglossum pendulum</em> L.</td>
<td>Indonesia, Philippines</td>
<td>LF</td>
<td>Ointment, decoction.</td>
<td>Smallpox, rashes, gonorrhea, dysentery, tuberculosis, urinary tract infection, headache, cough, gum inflammation, tooth sockets, eczema, coagulate blood [120–123]</td>
<td>Antibacterial, anti-fungal (extracts) [124]</td>
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<td><em>Polypodiaceae</em></td>
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<td>25</td>
<td><em>Pyrosia piloselloides</em> (L.)</td>
<td>Indonesia, Malaysia, China, Philippines, Pacific islands</td>
<td>LF</td>
<td>Decoction (internal), chewed, poultice (external)</td>
<td>Cell activator, skin whitening agent and antioxidant (patent, mixed with other <em>Ophioglossum</em> species) [119], anti-diarrhea (stipe MeOH extract, rabbit jejenum) [119]</td>
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<tr>
<td></td>
<td>M.G. Price</td>
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<tr>
<td>26</td>
<td><em>Drynaria rigidula</em> (Sw.)</td>
<td>Indonesia, Philippines, Treasury Island</td>
<td>LF, RZ</td>
<td>Decoction, chewing</td>
<td>Gonorrhea, dysentery (rhizome, decoction), and seasickness (chewed) [54]</td>
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<tr>
<td></td>
<td>Bedd.</td>
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<td>27</td>
<td><em>Drynaria sparsisora</em> (Desv.)</td>
<td>Indonesia, Philippines</td>
<td>LF, RZ</td>
<td>Decoction, chewing</td>
<td>n-Hexane, dichloromethane and ethyl acetate fractions from both rhizome and leaves of <em>Drynaria rigidula</em> were screened for activity against <em>Plasmodium falciparum</em>, <em>Mycobacterium tuberculosis</em>, vero cells and herpes simplex virus which all extracts showed insignificant activities [125]</td>
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<td></td>
<td>T. Moore</td>
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<td>28</td>
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<td>Page</td>
<td>Plant Name</td>
<td>Country/Region</td>
<td>Part Used</td>
<td>Preparation/Constituent</td>
<td>Medical Uses</td>
<td>Notes</td>
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<td>29</td>
<td>Drynaria roosii Nakaie</td>
<td>China</td>
<td>WP</td>
<td>Decoction</td>
<td>anti-vomiting, snake bite, eye infection [54,104,126]</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>Deficient kidney, invigorate blood, heal wound, stop bleeding [54]</td>
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</tr>
<tr>
<td>30</td>
<td>Drynaria propinqua (Wall. ex Mett.) Bedd</td>
<td>Bhutan, India and Nepal</td>
<td>ST</td>
<td>Pills</td>
<td>Antidote and detoxifier especially when suffering from meat poisoning and other human-made poisons (sbyar-dug) [128]</td>
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<td></td>
<td>Compound 230 was isolated and the biotesting showed the highest stimulation toward UMR 106 cells (osteoblast) by 42.6% at a concentration of 1 µM [127]</td>
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</tr>
<tr>
<td>31</td>
<td>Drynaria quercifolia (L.) J.Sm.</td>
<td>Malaysia, Philippines, Indonesia, India</td>
<td>LF, RZ</td>
<td>Decoction, poultice</td>
<td>Swelling, fever (poultice leaves), haemoptysis, typhoid fever, ulcers, dyspepsia, arthralgia, diarrhea (decoced rhizome), inflammation, anthelmintic, cough, fever, phthisis, poultice of rhizome mixed with Lannea coronandelaica (Houtt.) Merr.) to treat headache, hepatoprotective agent [21, 22, 96]</td>
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<td></td>
<td>Compound 200 from the ethyl acetate fraction to be responsible for good antimicrobial activity [129]</td>
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</tr>
<tr>
<td>32</td>
<td>Lepisorus contortus (Christ) Ching</td>
<td>Bhutan, India, China</td>
<td>LF</td>
<td>Powder</td>
<td>Heals bone fracture, burns, wounds and kidney disorders [130]</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Loxogramme involuta (D. Don) C. Presl</td>
<td>Indonesia</td>
<td>LF, WP</td>
<td>Smoked</td>
<td>Smoked with tobacco [51]</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Loxogramme scolopendria (Bory) Presley</td>
<td>Indonesia</td>
<td>LF</td>
<td>Smoked</td>
<td>Cigarette paper [131]</td>
<td></td>
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<tr>
<td>35</td>
<td>Microsorum fortunei (T. Moore) Ching</td>
<td>Indonesia</td>
<td>WP</td>
<td>Decoction</td>
<td>Diuretic, promote blood circulation [82,84]</td>
<td></td>
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<tr>
<td>36</td>
<td>Microsorum punctatum (L.) Copel.</td>
<td>India</td>
<td>LF</td>
<td>Juice</td>
<td>Diuretic, purgative, wounds [103]</td>
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<tr>
<td>37</td>
<td>Phlebodium aureum (L.) J.Sm</td>
<td>Mexico</td>
<td>RZ</td>
<td>Decoction</td>
<td>Cough, fever, sudorific agents [90]</td>
<td></td>
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<tr>
<td>38</td>
<td>Phymatosorus scolopendria (Burm. f.) Pic. Serm.</td>
<td>South-East Asia, Madagascar</td>
<td>RZ</td>
<td>Fragrance (external), poultice, decoction</td>
<td>Fragrance, gecko bites, accelerate Bronchodilator (341, in vivo) [80]</td>
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<td></td>
<td></td>
<td></td>
<td>Respiratory disorder [51,80]</td>
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<tr>
<td>39</td>
<td>Platycerium coronarium (Mull.) Desv.</td>
<td>Indonesia</td>
<td>LF</td>
<td>Poultice added (salt)</td>
<td>Thyroid edema, scabies [51,132]</td>
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</tr>
<tr>
<td>No.</td>
<td>Species</td>
<td>Origin</td>
<td>Preparation</td>
<td>Use</td>
<td>Other Properties</td>
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<td>40</td>
<td><em>Platycerium bifurcatum</em> (Cav.) C. Chr.</td>
<td>Indonesia</td>
<td>LF</td>
<td>Poultice (salt added)</td>
<td>Thyroid edema, scabies, fever, swelling [100, 101]</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td><em>Pleopeltis macrocarpa</em> (Bory ex Willd.) Kaulf.</td>
<td>South-Africa, Mexico, Guatemala</td>
<td>LF, RZ</td>
<td>Decoction</td>
<td>Sore throat, itches, cough, febrifuge [103,133]</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td><em>Pyrrosia heterophylla</em> (L.) M.G. Price</td>
<td>India</td>
<td>WP</td>
<td>Poultice</td>
<td>Swelling, sprain, pain (cooling agent) [134]</td>
<td></td>
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<tr>
<td>43</td>
<td><em>Pyrrosia lanceolata</em> (L.) Farw.</td>
<td>Malaysia, South-Africa, Mexico</td>
<td>LF, WP</td>
<td>Juice, poultice, decoction</td>
<td>Dysentery, headache, colds, sore throats, itch guard [88,120]</td>
<td></td>
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<tr>
<td>44</td>
<td><em>Pyrrosia lingua</em> (Thunb.) Farw.</td>
<td>Japan, China, Indonesia, Pacific Islands</td>
<td>LF, WP</td>
<td>Decoction</td>
<td>Diuretic, anti-inflammation, analgesic, cough, stomachache, urinary disorder (diuretic agent) [120,135–137]</td>
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<tr>
<td>45</td>
<td><em>Pyrrosia longifolia</em> (Burman f.) C.V. Morton</td>
<td>Indonesia, Pacific Islands</td>
<td>LF</td>
<td>Poultice (cold water)</td>
<td>Ease pains in labor [51,120]</td>
<td></td>
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<tr>
<td>46</td>
<td><em>Pyrrosia petiolosa</em> (Christ) Ching</td>
<td>China, Pacific Islands</td>
<td>LP</td>
<td>Decoction</td>
<td>Urinary tract infections, as diuretic [139]</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td><em>Pyrrosia sheareri</em> (Baker) Ching</td>
<td>China</td>
<td>LF</td>
<td>Decoction</td>
<td>Bacillary dysentery, rheumatism [120,140]</td>
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<tr>
<td>48</td>
<td><em>Psilotum nudum</em> (L.) P. Beauv.</td>
<td>India</td>
<td>LF, SP</td>
<td>Fresh, decoction</td>
<td>Diarrhea (infants), antibacterial, purgative [88]</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td><em>Psilotum niidum</em> (L.) P. Beauv.</td>
<td>South-East Asia, Bangladesh, Fiji, China, Panama</td>
<td>LF, RZ</td>
<td>Eaten, decoction</td>
<td>Wounds, peptic ulcers and boils, worm infections, asthma, constipation, elephantiasis, febrifuge, chest pain, emollients [51,68]</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td><em>Acrostichum speciosum</em> Wild.</td>
<td>South-East Asia</td>
<td>Thatch</td>
<td>[51]</td>
<td></td>
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<tr>
<td>51</td>
<td><em>Taenitis blechnoides</em> (Willd.) Sw.</td>
<td>Malaysia</td>
<td>LF</td>
<td>Decoction</td>
<td>Postnatal protection [145]</td>
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<tr>
<td>Page</td>
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<td>Origin</td>
<td>Part(s)</td>
<td>Use(s)</td>
<td>Activity</td>
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<tr>
<td>52</td>
<td>Selaginella tamariscina (P.Beauv.) Spring</td>
<td>Nepal</td>
<td>WP, SP</td>
<td>Fresh (spore), decoction</td>
<td>Vermillion powder, prolapsed rectum, cough, bleeding piles, amenorrhea, antibacterial [90,146]</td>
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</tbody>
</table>

**Vittariaceae**

<table>
<thead>
<tr>
<th>Page</th>
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<th>Use(s)</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>53</td>
<td>Vittaria elongata Sw.</td>
<td>South-East Asia, Andaman</td>
<td>LF</td>
<td>Decoction</td>
<td>Rheumatism [90]</td>
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</tbody>
</table>

**Non-Fern**

**Araceae**

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<thead>
<tr>
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<tr>
<td>54</td>
<td>Philodendron fragrantissinum (Hook.) G.Don</td>
<td>Guyana, Suriname, Brazil</td>
<td>LF, RT</td>
<td>Decoction, external (leaves)</td>
<td>Inflammation, aphrodisiac, demulcent, diuretic [105]</td>
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**Aralliaceae**

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<thead>
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<th>Page</th>
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<th>Use(s)</th>
<th>Activity</th>
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<tbody>
<tr>
<td>56</td>
<td>Schefflera caudata (Vidal) Merr. &amp; Rolfe</td>
<td>Philippines</td>
<td>WP</td>
<td>Decoction</td>
<td>Tonic for women after birth [150]</td>
</tr>
<tr>
<td>57</td>
<td>Schefflera elliptica (Blume) Harms.</td>
<td>South-East Asia, China</td>
<td>BK, LF</td>
<td>Decoction, chewed, external</td>
<td>Bechic, vulnerary, toothache, aromatic, Antibacterial [151] bath, dropsy [150].</td>
</tr>
<tr>
<td>58</td>
<td>Schefflera elliptifoliola Merr.</td>
<td>Philippines</td>
<td>LF</td>
<td>Decoction</td>
<td>Tonic for woman after birth [150]</td>
</tr>
<tr>
<td>59</td>
<td>Schefflera oxyphylla (Miq.) R.Vig.</td>
<td>Thailand, Malaysia, Indonesia</td>
<td>LF, RT</td>
<td>Decoction</td>
<td>Sedative for frightened child, externally to treat fevers [150]</td>
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</table>

**Asclepiadaceae**

<table>
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<tr>
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<tr>
<td>61</td>
<td>Asclepias sp.</td>
<td>Indonesia</td>
<td>LF, RT</td>
<td>Decoction</td>
<td>Promote blood circulation [104]</td>
</tr>
<tr>
<td>62</td>
<td>Dischidia acuminata Costantin</td>
<td>Vietnam</td>
<td>WP</td>
<td>Decoction</td>
<td>Blenorrhoea, promote urination [52]</td>
</tr>
<tr>
<td>63</td>
<td>Dischidia bengalensis Colebr.</td>
<td>Thailand, India</td>
<td>LT, RT</td>
<td>Latex (external), decoction (tonic)</td>
<td>Anthemintic (ringworm), tonic [152]</td>
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<tr>
<td>64</td>
<td>Dischidia imbricata (Blume) Steud.</td>
<td>Indonesia</td>
<td>LF</td>
<td>Poultice</td>
<td>Gonorrhoea, burns and wounds [58,153]</td>
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<tr>
<td>65</td>
<td>Dischidia major (Vahl) Merr.</td>
<td>India, Thailand, Philippines</td>
<td>LF, RT</td>
<td>Decoction, churned (external),</td>
<td>Peptic ulcer, liver dysfunction (decoked leaves mixed with <em>Hoya kerri</em> Craib leaves and <em>Vanilla aphylla</em> Blume stem), fever</td>
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<td>Biomolecules 2020, 10, 181</td>
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<tr>
<td>Malaysia, Brunei</td>
<td>chewed with areca catechu (root), goiter (crushed leaves mixed with salt), cough (root mixed betel quid), wound and injuries, stomachache [52,154,155]</td>
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<tr>
<td>66</td>
<td>Dischidia nummularia R.Br.</td>
<td>Thailand, Indonesia</td>
<td>LF, LT, WP</td>
<td>Decoction, latex (external)</td>
<td>Wound, gonorrhea, sprue in children, cirrhosis [156]</td>
</tr>
<tr>
<td>67</td>
<td>Dischidia platyphylla Schltr</td>
<td>Philippines</td>
<td>LF</td>
<td>Decoction</td>
<td>Putrefaction [52]</td>
</tr>
<tr>
<td>68</td>
<td>Dischidia purpurea Merr.</td>
<td>Philippines</td>
<td>LF</td>
<td>Crushed leaves mixed with coconut oil applied as external poultice</td>
<td>Eczema, herpes [52,157]</td>
</tr>
<tr>
<td>69</td>
<td>Toxocarpus sp.</td>
<td>Indonesia</td>
<td>LF</td>
<td>Decoction</td>
<td>Headache, fever, nervous system problem [104]</td>
</tr>
<tr>
<td>Balsaminaceae</td>
<td>Impatiens niamniamensis Gilg (semi epiphytic)</td>
<td>Congo</td>
<td>LF</td>
<td>Poultice</td>
<td>Wounds, sores, pain [158]</td>
</tr>
<tr>
<td>70</td>
<td>Cassytha filiformis L</td>
<td>India, Taiwan, China, Vietnam, Malaysia, Philippines, Indonesia, Fiji, Africa, Central America</td>
<td>WP, NT</td>
<td>Decoction</td>
<td>Cough, dysentery, diarrhea, intestinal problems, headache, malaria fever, nephritis, edema, hepatitis, sinusitis, gonorrhea, syphilis, skin ulcer, eczema, prevent haemoptysis. Parasite skin and scalp. Induce lactation (after still birth), promote hair growth, diuretic, vermifuge, laxative agent, saliva blood removal (childbirth) [52,160–162]</td>
</tr>
<tr>
<td>71</td>
<td>Cuscuta australis R.Br.</td>
<td>Indonesia, Vietnam, China</td>
<td>WP, SD</td>
<td>Decoction, poultice</td>
<td>Whole plant: emollient, sedative, sudorific and tonic agents, urinary complaint. The seeds: sedative agent, diabetes, cornea opacity, acne, dandruff [167]</td>
</tr>
<tr>
<td>72</td>
<td>Cuscuta reflexa Roxb.</td>
<td>India</td>
<td>WP</td>
<td>Decoction, poultice</td>
<td>Mixed with the twigs of Vitex negundo L. applied as fomentation on the abdomen of kwarsikor children, fever, itchy [139, 140]</td>
</tr>
</tbody>
</table>
hair growth activity in androgen-induced alopecia [173], anti-inflammatory (murine macrophage cell line RAW264.7), anti-cancer (Hep3B cells by MTT assay) [174], antioxidant (EtOAc extract, DPPH), anti-obesity (EtOAc extract) [175]

| Clusiaceae | 75  | *Clusia grandiflora* Splitg. (hemi epiphyte) | Guyana, Suriname | RT  | Decoction | Aphrodisiac [105] | Antibacterial [176] |
| Clusiaceae | 76  | *Clusia fockeana* Miq. (hemi epiphyte) | Guyana, Suriname | ST(Exudate) | Poultice | Snake bites, ulcers [105] |

| Gesneriaceae | 77  | *Columnnea nicaraguensis* Oerst. | Panama | ST, LF | Decoction, maceration | Fever [177] |
| Gesneriaceae | 78  | *Columnnea sanguinolenta* (Klotzsch ex Oerst.) Hanst. | Panama | ST, LF | Decoction | Dysmenorrhea [177] |
| Gesneriaceae | 79  | *Columnnea tulae* Urb. var. tomentulosa (C.V. Morton) B.D. Morley | Panama | ST | Decoction | Fever [177] |

| Gesneriaceae | 80  | *Drymonia serrulata* (Jacq.) Mart. | Amazon | na | Not mentioned | Eczema [178] |
| Gesneriaceae | 81  | *Drymonia coriacea* (Oerst. ex Hanst.) Wiehler | Amazon | na | Not mentioned | Toothache [178] |

| Loganiaceae | 82  | *Fagraea auriculata* Jack. (semi epiphyte) | Indonesia | ST | Stem for stick [58] | Anti-inflammatory [180] |

<p>| Loranthaceae (parasite) | 83  | <em>Amyema bifurcata</em> (Benth.) Tegh. | Australia | ST, LF | Decoction | Colds, fever, sores [181] |
| Loranthaceae (parasite) | 84  | <em>Amyema quandang</em> (Lindl.) Tegh. | Australia | LF | Decoction | Fever [182] |
| Loranthaceae (parasite) | 85  | <em>Amyema maidenii</em> (Blakely) Barlow | Australia | FT | Decoction | Inflammation in the genital regions [183] |
| Loranthaceae (parasite) | 86  | <em>Dendrophthoe falcata</em> (L.f.) Ettingsh. | India | WP | Decoction | Pulmonary tuberculosis, asthma, menstrual disorders, swellings, wounds, ulcers, strangury, renal and vesical calculi, Wound healing activity was studied, antimicrobial activity and antioxidant activity [185] |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Distribution</th>
<th>Part(s)</th>
<th>Preparation</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>Dendrohthoe frutescens L.</td>
<td>Indonesia, Malaysia</td>
<td>LF, WP</td>
<td>Drink (decoction)</td>
<td>Anti-inflammation, antibacterial [84], aphrodisiac, astringent, narcotic, diuretic [184].</td>
</tr>
<tr>
<td>88</td>
<td>Dendrohthoe incarnata (Jack) Miq.</td>
<td>Malaysia, Indonesia, Vietnam</td>
<td>LF</td>
<td>Poultice</td>
<td>Mixed with Curcuma longa L. and rice to make poultice to treat ringworm [186].</td>
</tr>
<tr>
<td>89</td>
<td>Dendrohthoe pentandra (L.) Miq.</td>
<td>Indonesia, Malaysia, Thailand, Vietnam</td>
<td>LF, WP</td>
<td>Poultice, decoction</td>
<td>Sores, ulcers, other skin infections, protective medicine after childbirth, cough, hypertension, cancer, diabetes, tonsil problem [51, 58, 186, 187].</td>
</tr>
<tr>
<td>90</td>
<td>Taxillus umbellifer (Schult. f.) Danser</td>
<td>Indonesia, Malaysia, Vietnam</td>
<td>RT, LF</td>
<td>Decoction, drink, poultice</td>
<td>Fever, headache, wounds [186]</td>
</tr>
<tr>
<td>91</td>
<td>Erianthemen dregei (Eckl. &amp; Zeyh.) Tiegh.</td>
<td>Southern &amp; Eastern Africa</td>
<td>BK</td>
<td>Mixed with milk</td>
<td>Powdered mixed with milk to treat stomach problems in children [188].</td>
</tr>
<tr>
<td>92</td>
<td>Loranthus globosus Roxb.</td>
<td>Malaysia, Indochina</td>
<td>LF, ST, FT</td>
<td>Poultice (leaves), juice</td>
<td>Headache, expel afterbirth, cough [189]</td>
</tr>
<tr>
<td>93</td>
<td>Loranthus spec div.</td>
<td>Indonesia</td>
<td>WP</td>
<td>Poultice, decoction</td>
<td>Ariola, varicella, diarrhea, ankylostomiasis, morbilli (gagbag), cancer [58]</td>
</tr>
<tr>
<td>94</td>
<td>Macrosolen robinsonii (Gamble) Danser</td>
<td>Vietnam</td>
<td>LF</td>
<td>Decoction</td>
<td>Enlarged abdomen (diuretic tea) [192]</td>
</tr>
<tr>
<td>95</td>
<td>Macrosolen cochinchinensis (Lour.) Tiegh.</td>
<td>Malaysia, Indochina</td>
<td>ST, LF</td>
<td>Decoction, juice, poultice</td>
<td>Expel after birth, headache, cough [192]</td>
</tr>
<tr>
<td>96</td>
<td>Scurrula atropurpurea (Blume) Danser</td>
<td>Indonesia, Philippines</td>
<td>LF, ST, WP</td>
<td>Decoction</td>
<td>Mouthwash (gargled), cancer (breast, throat cancer), cowpox, chickenpox, diarrhea, hookworm, measles, hepatitis, and cancer [193–195].</td>
</tr>
<tr>
<td>97</td>
<td>Scurrula ferruginea (Jack) Danser</td>
<td>Malaysia</td>
<td>LF, WP</td>
<td>Decoction, poultice</td>
<td>Decoated whole plant (mixed with Milletta sericea (Vend.) Wight &amp; Arnott) is used as bathing to relieve malaria, decocted leaves as protective medicine after childbirth, pounded leaves to treat wounds, snake bites [193].</td>
</tr>
<tr>
<td>98</td>
<td>Scurrula parasitica L.</td>
<td>China, Vietnam</td>
<td>WP</td>
<td>Decoction</td>
<td>Swelling, back pains, numbness, soreness of limbs, hypertension, galactagogue, quieting uterus (no contraction), reducing lumbago, bone strengthening, [193]</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Anti-cancer (flavonoids extract, Leukemia cell line HL-60) [199], NF-κB inhibition [199], recovery of cisplatin-induced nephrotoxicity [200], Antioxidant (extracts, DPPH) [201] anti-</td>
</tr>
</tbody>
</table>
cancer (Polysacharide fraction, S180, K562 and HL-60 cell lines, MTT assay) [202], anti-obesity activity using porcine pancreatic lipase assay (EtOH extract, PPL; triacylglycerol lipase, EC 3.1.1.3)[203], neuroprotective activity (168, H2O2-induced oxidative damage in NG108-15 cells)[204], antibacterial (EtOH extract, MRSA) [205]

99  *Viscum aethiopicum* [sic]  Southern & Eastern Africa  LF  Decoction (tea)  Diarrhea [188]

100  *Viscum capense* L.f.  Southern & Eastern Africa  ST, FT  Decoction, external  Wart, asthma, irregular menstruation, hemorrhage [188]

101  *Viscum pauciflorum* L.f.  Southern & Eastern Africa  WP  Decoction  Astringent [188]

102  *Viscum rotundifolium* L.f.  Southern & Eastern Africa  WP  External  Wart [188]

103  *Melastomataceae*  

8  *Medinilla radicans* Blume  LF, RT  Leaves eaten to treat dysentery, adventitious roots applied as poultice to wound, young leaves to skin disorders  Dysentery, wound and skin disorders [153]

104  *Pachycentria constricta* (Bl) Blume  Indonesia  TB  Tubers are boiled and eaten  Hemorrhoids [51,104]

105  *Ficus annulata* Blume  Indonesia  LF, RT  Leaves decoction to treat fever, the root to treat Hansen diseases  Fever and Hansen diseases [195]

106  *Ficus deltoidea* Jack  Indonesia, Malaysia, Thailand  LF, RT, FT  Drink (decoction), ointment  Leucorhea, headache, fever, diabetes, high blood pressure, skin infection, aphrodisiac agent, ornament [104,208–210]  Toxicity (aqueous extract, rats) [211], anti-nociceptive [212], antioxidant (leaves aqueous extracts, redn. power of iron (III), superoxide anion (O2-))
Decocted stem bark to treat gastric and ulcer, latex to treat boils (external), typhoid and fever (internal), decocted bud to treat ulcer, leucorrhoea, Seed as tonic for stomach disorder [184,218–220]

Root was used to treat lumbago, headache, arthritis, cataract and cough, Leaves were used to treat snakes bite, malaria, dysentery, ulcers, wounds and used as septic ears [222]

Diarrhea, hemoroid, rheumatic, anemia, haematura, dysentery, dropsy, galactoge, tonic for impotence, lumbago, anthelmintic agent, externally used to treat carbuncles [210]

Water from the stem for drink, aide the secretion of waste products from the vagina, pain, numbness, stomach ulcer [58,225,226]

Rheumatism, sciatica, neuralgia, beneficial in secondary syphilis and uterine diseases [228]
<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Country of Origin</th>
<th>Parts Used</th>
<th>Use</th>
<th>Properties and Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>113</td>
<td><em>Acriopsis liliifolia</em> (J.Koenig) Seidenf.</td>
<td>Malaysia, LF, RT</td>
<td>Decoction of roots and leaves</td>
<td>Fever [229]</td>
<td>Anti-inflammatory (water extract, rat paw), hepatoprotective (water extract, rat, SGOT-OPT) [231], anti-hyperliposis (rat induced) [232], ameliorative effect (water extract, ovariectomised rat) [233], antioxidant (water extract, DPPH) [234], anti-hyperglycemic (water extract, diabetic rats induced by streptozotocin) [235], anti-cancer (extracts, breast cancer MCF-7 cell) [236], liver regeneration (extract, rat) [237,238], Hepatoprotective (CCl₄ induced rat) anti-inflammatory ([414], lps stimulate mice) [239,240], anti-cancer (polysaccharide water extract, prostate cancer cell line PC3) [241]</td>
</tr>
<tr>
<td>114</td>
<td><em>Anoectochilus formosanus</em> Hayata</td>
<td>Taiwan WP</td>
<td>Decoction</td>
<td>Fever, anti-inflammatory, diabetes, liver disorder, chest and abdominal pain [230]</td>
<td></td>
</tr>
<tr>
<td>115</td>
<td><em>Anoectochilus roxburghii</em> (Wall.) Lindl.</td>
<td>Taiwan, China, Japan WP</td>
<td>Decoction</td>
<td>Fever, snake bite, lung and liver diseases, hypertension, child malnutrition [242]</td>
<td>Hypoglycemic effect ([414], streptozotocin (STZ) diabetic rats) [243], hypoglycemic and antioxidant effects (water extract, alloxan-induced diabetic mice, DPPH) [244]</td>
</tr>
<tr>
<td>116</td>
<td><em>Ansellia africana</em> Lindl.</td>
<td>Southern &amp; Eastern Africa PD, ST, RT</td>
<td>Decoction</td>
<td>Pedi is used to treat cough, the stem is used as aphrodisiac, used as emetic agent [188]</td>
<td></td>
</tr>
<tr>
<td>117</td>
<td><em>Bulbophyllum kwangtungense</em> Schltr.</td>
<td>China, Japan TB</td>
<td>Tonic</td>
<td>To treat pulmonary tuberculosis, promote body liquid production, reduce fever, hemostatic agent [245]</td>
<td>Anti-tumor activities ([456, 457, 458], against HeLa and K562 human tumor cell line) [246]</td>
</tr>
<tr>
<td>No.</td>
<td>Species</td>
<td>Origin</td>
<td>Part(s)</td>
<td>Use(s)</td>
<td></td>
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<tr>
<td>119</td>
<td>Bulbophyllum vaginatum (Lindl.) Rchb.f.</td>
<td>Malaysia</td>
<td>WP</td>
<td>Juice</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Juice of the plant is instilled in the ear to cure earache [160]</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>Catasetum barbatum (Lindl.) Lindl.</td>
<td>Japan, Guiana, Paraguayan</td>
<td>WP</td>
<td>Decoction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Febrifuge, anti-inflammatory [79]</td>
<td></td>
</tr>
<tr>
<td>121</td>
<td>Coelogyne sp</td>
<td>Indonesia</td>
<td>RT</td>
<td>Decoction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Headache, fever [104]</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>Cymbidium aloifolium (L.) Sw.</td>
<td>Thailand, Vietnam</td>
<td>LF</td>
<td>Decoction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Otitis media, colds, irregular periods, arthritis, sores, burns, tonic [252]</td>
<td></td>
</tr>
<tr>
<td>123</td>
<td>Cymbidium canaliculatum R.Br</td>
<td>Australia</td>
<td>PdB</td>
<td>Chewed, poultice</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dysentery, boils, sores, wounds, itschy skin, fractured arms over the break [181,254]</td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>Cymbidium ensifolium (L.) Sw</td>
<td>Taiwan, Vietnam</td>
<td>LF, RT, FL, WP, RT</td>
<td>Decoction</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Diuretic agent (leaves), pectoral agent (root), eye problem (flower), cough, lung, gastrointestinal problems and sedative [252]</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>Cymbidium goeringii (Rchb.f.) Rchb.f.</td>
<td>Japan, China, Korea, Thailand, Vietnam, India</td>
<td>WP</td>
<td>Decoction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hypertension, diuretic agent [255]</td>
<td></td>
</tr>
<tr>
<td>126</td>
<td>Cymbidium madidum Lindl.</td>
<td>Australia</td>
<td>PdB</td>
<td>Chewed</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dysentery [181]</td>
<td></td>
</tr>
<tr>
<td>127</td>
<td>Dendrobium affine (Decne.) Steud.</td>
<td>Australia</td>
<td>PdB</td>
<td>Poultice, external</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Crushed pseudobulbs (sticky) is applied to itchy skins, boils, infected skin lesion, minor burns [181]</td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>Dendrobium aloifolium (Blume) Rchb.f.</td>
<td>South East Asia</td>
<td>LF</td>
<td>Poultice</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Headache [51]</td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>Dendrobium amoenum Wall. ex Lindl.</td>
<td>China</td>
<td>LF</td>
<td>Dried and ground</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Skin diseases [257]</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>Dendrobium chryseum Rolfe</td>
<td>Australia</td>
<td>LF</td>
<td>Decoction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Diabetes [258]</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td><strong>Dendrobium</strong></td>
<td>Country</td>
<td>Derived from</td>
<td>Use</td>
<td>Property</td>
</tr>
<tr>
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</tr>
<tr>
<td>131</td>
<td><em>Dendrobium candidum</em> Wall. ex Lindl.</td>
<td>China</td>
<td>LF Decoction</td>
<td>Diabetes [260]</td>
<td>Inhibitory effect of atropine on salivary secretion (extracts, rabbit) [261], anti-hyperglycemic (extract, streptozotocin-induced diabetic (STZ-DM) rats) [260], antioxidant (polysaccharide, 10-phenanthroline-Fe²⁺-H₂O₃ systems and ammonium peroxydisulfate/N,N,N',N'-tetra-methylethanediamine systems) [262] antioxidant (555, 556, DPPH) [263], antioxidant (558, 559, 560, DPPH) [264], anti-tumor (soluble polysacharride, human neuroblastoma (SH2SY5Y) induced by SPD was observed and analyzed by Hoechst stain method) [265]</td>
</tr>
<tr>
<td>132</td>
<td><em>Dendrobium canaliculatum</em> var. foelschei (F.Muell.) Rupp &amp; T.E.Hunt</td>
<td>Australia</td>
<td>PdB Poultice, external</td>
<td>Chrushed pseudobulbs (sticky) is applied to infected skin and cuts [181]</td>
<td>Antimicrobial [268]</td>
</tr>
<tr>
<td>133</td>
<td><em>Dendrobium crumenatum</em> Sw.</td>
<td>Malaysia, Indonesia</td>
<td>LF, PdT B Leaves pounded, bulbs heated to produce juice and applied as external uses</td>
<td>Acne (leaves), infected ears (pseudotubers) [266,267]</td>
<td></td>
</tr>
<tr>
<td>134</td>
<td><em>Dendrobium chrysanthum</em> Wall. ex Lindl.</td>
<td>China</td>
<td>LF Dried and ground</td>
<td>Skin diseases, immune regulator, anti-pyretic, improve eyesight [269,268]</td>
<td>Anti-inflammation (590, macrophages were harvested from 2-month-old male C57BL/6J mice) [268]</td>
</tr>
<tr>
<td>135</td>
<td><em>Dendrobium densiflorum</em> Lindl.</td>
<td>China</td>
<td>LF Tonic</td>
<td>Promote body fluid production [270]</td>
<td></td>
</tr>
<tr>
<td>136</td>
<td><em>Dendrobium faciferum</em> J.J.Sm</td>
<td>Indonesia</td>
<td>ST Dried</td>
<td>For twist work (craft) [271]</td>
<td></td>
</tr>
<tr>
<td>137</td>
<td><em>Dendrobium fimbriatum</em> Hook.</td>
<td>Japan, China</td>
<td>LF Decoction, paste</td>
<td>Promote body fluid production, set fractured bone (paste) [272]</td>
<td>Antioxidant (water-soluble crude polysaccharide (DFHP), DPPH) [273] Inhibitors of Na⁺, K⁺-ATPase of rat kidney (607, 608) [275], antiplatelet aggregation activity (479, 523, 606, rabbit platelet) [276], antioxidant (DPPH), anti NO production (activated</td>
</tr>
<tr>
<td>138</td>
<td><em>Dendrobium loddigesii</em> Rolfe</td>
<td>China</td>
<td>LF Decoction</td>
<td>Promote body fluid production, reduce fever, nourish the stomach, anti-cancer agent [274]</td>
<td></td>
</tr>
<tr>
<td>Page</td>
<td>Species</td>
<td>Country</td>
<td>Location</td>
<td>Form</td>
<td>Use</td>
</tr>
<tr>
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</tr>
<tr>
<td>139</td>
<td><em>Dendrobium moniliforme</em> (L.) Sw.</td>
<td>China, Taiwan</td>
<td>ST</td>
<td>Decoction dried stem</td>
<td>Anti-pyretic, analgesic, aphrodisiac, stomachic, tonic agents [277] Anti-inflammatory (552, RAW 264.7 cells) [279], hypoglicemic (polisaccharide, mice) [280], antioxidant (polisacharide) [281]</td>
</tr>
<tr>
<td>140</td>
<td><em>Dendrobium moschatum</em> (Buch.-Ham) S.w</td>
<td>Nepal</td>
<td>LF</td>
<td>Juice</td>
<td>Cure earache [282]</td>
</tr>
<tr>
<td>141</td>
<td><em>Dendrobium nobile</em> Lindl.</td>
<td>China, Indonesia</td>
<td>WP</td>
<td>Tonic</td>
<td>Fever, reduce mouth dryness, aphrodisiac, promote body fluid production, nourish stomach, anorexia, lumbago, impotence [266,283–286] Immunomodulatory activity (656, 660, 661, 662, 663, lymphocyte proliferation test MTT test) [287,288], antioxidant (478, 523, 524, 528, 584, 641, 672, 673, 674, DPPH) anti-NO (478, 523, 524, 528, 584, 641, 672, 673, 674, murine macrophage-like cell line RAW 264.7) [289], antioxidant (water-soluble polysaccharide (DNP), DPPH) [290], antimicrobial (Extracts), antitumour (extracts, Dalton’s lymphoma ascites (DLA) cells w), induction of in vitro lipid peroxidation (extracts, TBARS) [291], NO inhibition (475, 523, 542, 632, 633, 634, 665–671, murine macrophage RAW 264.7 cells) [292], anti-tumor (polisacharide extracts, sarcoma 180 in vivo and HL-60) [293]</td>
</tr>
<tr>
<td>142</td>
<td><em>Dendrobium pachyphyllum</em> (Kuntze) Bakh.f.</td>
<td>Indonesia</td>
<td>WP</td>
<td>Decoction</td>
<td>Hydropsy [271]</td>
</tr>
<tr>
<td>143</td>
<td><em>Dendrobium purpureum</em> Roxb.</td>
<td>Indonesia, Malaysia</td>
<td>LF</td>
<td>Crushed and heated to make poultice</td>
<td>Nail fungal infection [266]</td>
</tr>
<tr>
<td>144</td>
<td><em>Dendrobium salaccense</em> (Blume) Lindl.</td>
<td>Indonesia</td>
<td>LF</td>
<td>Fragrance</td>
<td>Fragrance [271]</td>
</tr>
<tr>
<td>145</td>
<td><em>Dendrobium teretifolium</em> R.Br.</td>
<td>South-Pacific Island</td>
<td>LF</td>
<td>Decoction</td>
<td>Severe headache, other pains [294,295]</td>
</tr>
<tr>
<td>146</td>
<td><em>Dendrobium catenatum</em> Lindl.</td>
<td>China</td>
<td>LF</td>
<td>Decoction</td>
<td>Anxiety and panic [296]</td>
</tr>
<tr>
<td>147</td>
<td><em>Dendrobium utile</em> J.J.Sm.</td>
<td>Indonesia</td>
<td>ST</td>
<td>Dried</td>
<td>Twist work [271]</td>
</tr>
<tr>
<td>No.</td>
<td>Species</td>
<td>Origin</td>
<td>Part(s) Used</td>
<td>Preparation</td>
<td>Use(s)</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------</td>
<td>-----------------------------</td>
<td>----------------------------</td>
<td>---------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>148</td>
<td><em>Dichaea muricata</em> (Sw.) Lindl.</td>
<td>Central, South American</td>
<td>LF</td>
<td>Decoction (wash)</td>
<td>Eye infection [285]</td>
</tr>
<tr>
<td>149</td>
<td><em>Eulophia speciosa</em> (R.Br.) Bolus</td>
<td>Indonesia</td>
<td>RT</td>
<td>Decoction</td>
<td>Analgesic [271]</td>
</tr>
<tr>
<td>150</td>
<td><em>Epidendrum strobiliferum</em> Rchb.f.</td>
<td>China, Korea</td>
<td>ST</td>
<td>Infusion, decoction</td>
<td>Analgesic [297]</td>
</tr>
<tr>
<td>151</td>
<td><em>Epidendrum rigidum</em> Jacq.</td>
<td>Mexico, North Sudamerica, Antilles</td>
<td>ST</td>
<td>Infusion, decoction</td>
<td>Replenish body fluid [299]</td>
</tr>
<tr>
<td>152</td>
<td><em>Mycaranthes panaea</em> (Lindl.) S.C.Chen &amp; J.J.Wood</td>
<td>Vietnam, Malaysia</td>
<td>WP</td>
<td>External, medicinal bath</td>
<td>Medicinal bath to treat ague and malaria fever, fractures, bruises, skin complaints, dislocated joint to relieve severe pain, swelling, dislocation and fracture [153,300,301]</td>
</tr>
<tr>
<td>153</td>
<td><em>Eriopsis biloba</em> Lindl.</td>
<td>America</td>
<td>ST</td>
<td>Poultice</td>
<td>Sore gums and mouth membranes [285]</td>
</tr>
<tr>
<td>154</td>
<td><em>Grammatophyllum scriptum</em> (L.) Blume</td>
<td>Indonesia, Thailand</td>
<td>BL, SD, ST</td>
<td>Poultice</td>
<td>Pseudo bulb mixed with curcuma and salt applied to sores and abdomen to expel worms, to treat dropys and aphthae, seeds mixed with food to treat dysentery, aphthae, crushed plant mixed with rice liquor to treat snake bite, scorpions’ and centipedes’ stings [271,302]</td>
</tr>
<tr>
<td>155</td>
<td><em>Jumellea fragrans</em> (Thouars) Schltr.</td>
<td>Madagascar</td>
<td>LF, ST</td>
<td>Decoction</td>
<td>Anti-spasmodic, anti-asthmatic agents, mixed leaves of <em>Ziziphus mauritana</em>, <em>Mussaenda arcuate</em> to treat eczema (decoration), mixed with <em>Eugenia uniflora</em> to treat diarrhea [57]</td>
</tr>
<tr>
<td>156</td>
<td><em>Liparis condylobulbon</em> Rchb.f.</td>
<td>Indonesia</td>
<td>PdB, LF</td>
<td>Chewing, external</td>
<td>Intestinal complaints and constipation. (eastern Sulawesi, ambon), tormina, abscess [271,303]</td>
</tr>
<tr>
<td>157</td>
<td><em>Liparis nervosa</em> (Thunb.) Lindl.</td>
<td>China, Thailand, Malaysia</td>
<td>WP</td>
<td>Decoction, external</td>
<td>Stop internal/external bleeding, treat snake bites [303]</td>
</tr>
<tr>
<td>No.</td>
<td>Species Name</td>
<td>Distribution</td>
<td>Part</td>
<td>Preparation</td>
<td>Uses</td>
</tr>
<tr>
<td>-----</td>
<td>--------------</td>
<td>--------------</td>
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<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>158</td>
<td>Neottia ovata (L.) Bluff &amp; Fingerh.</td>
<td>Spain</td>
<td>TB</td>
<td>Tincture</td>
<td>Stomach diseases [304]</td>
</tr>
<tr>
<td>159</td>
<td>Masdevallia uniflora Ruiz &amp; Pav.</td>
<td>Mexico, south America</td>
<td>WP</td>
<td>Decoction</td>
<td>Facilitate urination (pregnant women), reduce bladder inflammation [285]</td>
</tr>
<tr>
<td>160</td>
<td>Camaridium densum (Lindl.) M.A.Blanco</td>
<td>Mexico</td>
<td>WP</td>
<td>Decoction</td>
<td>Analgesic, relaxant agents [306]</td>
</tr>
<tr>
<td>162</td>
<td>Oberonia lycopodioides (J.Koenig) Ormerod</td>
<td>Malaysia</td>
<td>LF</td>
<td>Poultice</td>
<td>Boils [153,308]</td>
</tr>
<tr>
<td>163</td>
<td>Oberonia mucronata (D.Don) Ormerod &amp; Seidenf.</td>
<td>China, Vietnam</td>
<td>WP</td>
<td>Decoction</td>
<td>Rheumatism, promote blood circulation, inflammation of the bladder/ureter, bruises and fractures, detoxicant, diuretic agent [309]</td>
</tr>
<tr>
<td>164</td>
<td>Erycina pusilla (L.) N.H.Williams &amp; M.W.Chase</td>
<td>Mali</td>
<td>WP</td>
<td>Decoction</td>
<td>Lacerations [285]</td>
</tr>
<tr>
<td>165</td>
<td>Otochilus lancilabius Seidenf.</td>
<td>Bhutan, Nepal, India, China (Tibet), Laos and Vietnam</td>
<td>WP</td>
<td>Pills</td>
<td>Antiemetic, febrifuge for stomach inflammation (bad-tshad), and allays hyperdipsia and dehydration [56]</td>
</tr>
<tr>
<td>166</td>
<td>Phragmipedium pearcei (Rchb.f.) Rauh &amp; Senghas</td>
<td>South America</td>
<td>WP</td>
<td>Decoction</td>
<td>Stomachache [285]</td>
</tr>
<tr>
<td>167</td>
<td>Pholidota articulata Lindl.</td>
<td>Himalaya, Nepal</td>
<td>WP</td>
<td>Whole plant: bone fractures [228]</td>
<td></td>
</tr>
<tr>
<td>Table</td>
<td>Species</td>
<td>Country</td>
<td>Part</td>
<td>Medicinal Use</td>
<td></td>
</tr>
<tr>
<td>-------</td>
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<td>---------</td>
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<td>---------------</td>
<td></td>
</tr>
<tr>
<td>169</td>
<td><em>Renanthera moluccana</em> Blume</td>
<td>Indonesia</td>
<td>WP</td>
<td>Ornament</td>
<td></td>
</tr>
<tr>
<td>169</td>
<td><em>Rhynchostylis retusa</em> (L.) Blume</td>
<td>Himalaya, Nepal, India</td>
<td>LF</td>
<td>Rheumatic, hepaprotective agent</td>
<td></td>
</tr>
<tr>
<td>169</td>
<td><em>Scaphyglottis livida</em> (Lindl.) Schltr.</td>
<td>Mexico</td>
<td>WP</td>
<td>Analgesic, anti-inflammatory agents</td>
<td></td>
</tr>
<tr>
<td>172</td>
<td><em>Vanda tessellata</em> (Roxb.) Hook. ex G.Don</td>
<td>Indonesia, Sri Lanka, Burma</td>
<td>LF, RT, FL</td>
<td>Leaves pounded to make juice, paste, extract (alcoholic) of the root and flower</td>
<td></td>
</tr>
<tr>
<td>173</td>
<td><em>Papilomanthe teres</em> (Roxb.) Schltr.</td>
<td>Indonesia</td>
<td>WP</td>
<td>Ornament</td>
<td></td>
</tr>
<tr>
<td>174</td>
<td><em>Vanilla griffithii</em> Rchb.f.</td>
<td>Indonesia</td>
<td>WP</td>
<td>Edible</td>
<td></td>
</tr>
<tr>
<td>175</td>
<td><em>Vanilla planifolia</em> Jacks. ex Andrews</td>
<td>Indonesia, Mexico</td>
<td>FT, STh</td>
<td>Decoction</td>
<td></td>
</tr>
<tr>
<td>176</td>
<td><em>Piperaceae</em></td>
<td>Peru</td>
<td>WP</td>
<td>Poultice (external), drink (internal)</td>
<td></td>
</tr>
<tr>
<td>177</td>
<td><em>Piper retrofractum</em> Vahl</td>
<td>Indonesia</td>
<td>FT, RT</td>
<td>Drink (decoction)</td>
<td></td>
</tr>
<tr>
<td>178</td>
<td><em>Hydnophytum formicarium</em> Jack</td>
<td>Indonesia, Philippines, Thailand</td>
<td>TB</td>
<td>Poultice, decoction, powder</td>
<td></td>
</tr>
</tbody>
</table>

**Activated macrophages-like cell line, RAW 264.7** [310]
### Myrmecodia tuberosa Jack
- **Origin:** Indonesia
- **Form:** PT (Drink, decocted)
- **Uses:** Swelling, headache [51, 104, 338]

### Myrmecodia pendens Merr. & L.M.Perry
- **Origin:** Papua
- **Form:** PT (Decoction)
- **Uses:** Rheumatism, headache, renal problems, tumor [340]

### Scaphium macropodum (Miq.) Beumée ex K.Heyne (hemi-epiphyte)
- **Family:** Verbenaceae
- **Origin:** Indonesia
- **Form:** RT (Drink, decoction)
- **Uses:** Nervous system problem [104]

### Premna parasitica Blume
- **Family:** Verbenaceae
- **Origin:** Indonesia
- **Form:** LF (Drink, decocted)
- **Uses:** Fever [58]

### Scaphium macropodum (Miq.) Beumée ex K.Heyne (hemi-epiphyte)
- **Family:** Verbenaceae
- **Origin:** Indonesia
- **Form:** PW (Decoction)
- **Uses:** Decoction to treat bronchitis, skin tumour, neuralgia, arthritis and as tonic, sedative, febrifuge, crushed plant to treat cut [341]

### Viscum articulatum Burm.f.
- **Family:** Viscaceae
- **Origin:** Cambodia, India, Taiwan, China
- **Form:** Poultice, decoction
- **Uses:** Toxicity (extract, mice) [342], anti-tumor (820, MTT assay) [343], anti-inflammatory (1234718, superoxide inhibition) [344], cytotoxicity and anti-HIV-1 activity (shown by isolated compounds including 801, 804, 803, 813, 814, 815, 824, 828); MDAMB-435 and Hela cells, HIV-111IB-infected C8166 cells) [345], anti-nephrotoxic (127, gentamicin-induced renal damage in Wistar rats) [346], antioxidant, anti-inflammatory (810, 811, 812, 822, 825, 829, 830, 831, 832, 833, 834, DPPH, NO production and cell viability assay. The murine macrophage cell line RAW264.7) [347], diuretic activity (MeOH extract, male rats) [348], antiepileptic activity (MeOH extract, rat) [349], anti-hypertension (glucocorticoid-induced...
hypertension, \textit{N\textomega-nitro-l-arginine methyl in rats}) [350,351], antioxidant (polisacharide fraction, DPPH) [352]

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant Name</th>
<th>Country</th>
<th>Part(s)</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>184</td>
<td>\textit{Viscum ovalifolium} DC.</td>
<td>Cambodia, Malaysia</td>
<td>LF, WP</td>
<td>Poultice, external Leaves (poultice) to treat neuralgia, as herbal bath to treat fever in children, ash mixed with sulphur, coconut oil to treat pustular itches [353]</td>
</tr>
<tr>
<td>185</td>
<td>\textit{Hedychium ongi cornotum} Griff.</td>
<td>Indonesia</td>
<td>RZ, RT</td>
<td>Drink (decoction) Rhizome is used to treat syphilis; root is used to treat worm [58]</td>
</tr>
</tbody>
</table>

\textbf{Note}: na: not mentioned; ST: stem, PT: pith; TB: tuber; SP: spore; BK: bark; LT: latex; NT: nutmeg; SD: seed; FT: fruit; BD: buds; PD: pedi; PdB: pseudobulbs; FL: flower; PdTB: pseudotuber; BL: bulbs; STh: sheath; WP: whole; LF: leaf; RT: root; RZ: rhizome.
<table>
<thead>
<tr>
<th>No</th>
<th>Epiphyte species</th>
<th>Constituents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Adiantum caudatum</em> L., Mant</td>
<td>16-hentriacontanone 1, 19α-hydroxyferna-7,9(11)-diene 2, 29-norhopan-22-ol 3, 3α-hydroxy-4α-methoxyfilicane 4, 8α-hydroxyfernan-25,7β-olide 5, adiantone 6, filic-3-ene 7, hentriacontane 8, isoadiantone 9, quercetin-3-O-glucoside 10, β-sitosterol 11, β-sitosterol 12 [354–356]</td>
</tr>
<tr>
<td>2</td>
<td><em>Asplenium nidus</em> L.</td>
<td>(-)-epiafzelechin 3-O-β-D-allopyranoside 13, homoserine 14 [357]</td>
</tr>
<tr>
<td>5</td>
<td><em>Davallia solida</em> (G. Forst.) Sw.</td>
<td>18-diene 52, 18-diene 53, 19a-hydroxyfernenes 53, 19α-hydroxyfilic-3-ene 54, 2-C-β-D-glucopyranosyl-1,3,6,7-tetrahydroxyxanthone 55, 2-C-β-D-glucopyranosyl-1,3,6,7-tetrahydroxyxanthone 56, 2-C-β-D-glucopyranosyl-1,3,6,7-tetrahydroxyxanthone 57, 3-O-p-hydroxybenzoylmangiferin 58, 4-O-phenoxybenzoylmangiferin 59, 4-O-β-D-glucopyranosyl-2,6,4′-tri hydroxybenzophenone 60, 4β-carboxymethyl(→)-epicatechin 38, 4β-carboxymethyl(→)-epicatechin methyl ester 39, 4β-carboxymethyl(→)-epicatechin methyl ester 39, 60-O-p-hydroxybenzoylmangiferin 61, eriodictyol 62, eriodictyol-8-C-β-D-glucopyranoside 63, fena-9(11)-64, fern-7-en-19α-ol 65, fern-9(11)-en-19α-ol 66, fern-7 67, bilic-3-ene-19α-ol 68, bilica-3,18,20-triene 69, bilica-3,18-diene 70, icariside E3 71, icariside E5 72, mangiferin 73 [99,101,362,365,366]</td>
</tr>
<tr>
<td>6</td>
<td><em>Huperzia carinata</em> (Desv. ex Poir.) Trevis</td>
<td>carinatums A, B, and C 74, 75, 76 [107]</td>
</tr>
<tr>
<td>7</td>
<td><em>Huperzia phlegmaria</em> (L.) Rothm</td>
<td>14β,21α,29-trihydroxyserrat-3β-yl dihydrocaffeate (lycophlegmarin D) 77, 21α,24-dihydroxyserrat-14-en-3β-yl 4-hydroxyacinamate (lycophlegmarin C) 78, 21β,24,29-trihydroxyserrat-14-en-3β-yl dihydrocaffeate (lycophlegmarin B) 79, 21β,29-dihydroxyserrat-14-en-3α-yl dihydrocaffeate (lycophlegmarin A) 80, 21β-hydroxy-serrat-14-en-3α-yl acetate 82, 8,11,13-abietatriene-3β,12-dihydroxy-7-one (margocilin) 83, 8-deoxy-13-dehydroxyserratine 84, 8-deoxyxserratindine 85, acrifoline 86, annotine 87, annotine 88</td>
</tr>
</tbody>
</table>
8 **Huperzia megastachya** (Baker) Tardieu

dihydrolycypodine 89, epidihydrofawcettidine 90, fawcettidine 91, huperzine A 92, lycoodine 93, lycoflexine 94, lycophlegmarin 95, lycophlegmarine 96, lycophlegmine 97, lycopodine 98, malycorin A 99, malycorns B, C 100, 101, N,N'-dimethylphlegmarine 102, phlegmanol A-E 103–107, phlegmaric acid 108, α-obscurine 109, β-obscurine 110 [110,567–372]

21-epi-serratenediol 111, 21-epi-serratenediol-3-acetate 112, lycovalanol 113, megastachine 114, phlegmanol-D 115, serratenediol 116, serratenediol-3-acetate 117, serratenediol diacetate 118, tohogenol diacetate 119 [373,374]

9 **Nephrolepis biserrata** (Sw.) Schott

Oleandraceae

1f,11α-diacetoxy-11,12-epoxydrim-7-ene 120, 1β,3β,11α-triacetoxy-11,12-epoxydrim-7-ene 121, 1β,6α,11α-triacetoxy-11,12-epoxydrim-7-ene 122, sequoyitol 123 [363,375]

Nephrolepis cordifolia

(L.) C. Presl

Opilioglossaceae

Bettrychum lanuginosum Wall.ex Hook & Grev.

Polypodiaceae

12 **Drynaria roosii** Nakaike

kaempferol 3-O-β-D-glucopyranoside-7-O-α-L-arabinoside 138, (2R)-naringin 139, (2S)-naringenin-7-O-β-D-glucoside 140, kaempferol 3-O-α-L-rhamniosyl-7-O-β-D-glucoside 141, luteolin-7-O-β-D-neohesperidose 142, maitol glucoside 143, (−)-epicatechin 144, 12-O-coffeoyl-12-hydroxydodecyclic acid 145, xanthogalenol 146, naringenin 147, kushennol F 148, sporafallone G 149, kurainone 150, leclianione A 151, 8-phenylkaempferol 152, kaempferol 153, chiratone 154, fern-9(11)-ene 124, tentiacostanol 125, 30-nor-21β-hopan-22-one 131, apigenin 132, β-sitosterol 133, daucosterol 134, luteolin 135, luteolin-7-O-glucoside 136, thuberginol A 137 [378]

Drynaria propinquua

(Wall. ex Mett.) Bedd

Drynaria quercifolia

(L.) J.Sm.

14 (-)-epiafzelidin 196, epifriedelinol 197, β-amyrin 198, β-sitosterol 11, 3-β-D-glucopyranoside 199, 3,4-dihydroxybenzoic acid 200, acetyllupeol 201 [129,385]
15 **Drynaria rigidula** (Sw.) Bedd. Drynaria rigidula is a fern species known for its chemical constituents, which include 
- fern-9(11)ene 202
- hop-22(29)-ene 156
- γ-sitosterol 203
- 3,4-dihydroxybenzoic acid 200
- 4-hydroxybenzoic acid 204
- 4-hydroxyphenyl-1-(2-arabinopyranosyl)-tetrhydro-2H-pyran-3,4,5-triol 205
- 4-hydroxyphenyl-1-tetrahydro-2H-pyran-3,4,5-triol 206
- kaempferitin 207
- 3,5-dihydroxy-flavone-7-O-β-rhamnopyranosyl-4′-O-β-glucopyranoside 208 \[125,386\]

16 **Phymatosorus scolopendria** (Burm. f.) Pic. Serm. Phymatosorus scolopendria is a fern species known for its chemical constituents, which include 
- 1,2-benzopyrone (coumarin) 209 \[80\]

17 **Pyrosera lingua** (Thunb.) Farw. Pyrosera lingua is a fern species known for its chemical constituents, which include 
- diploptene 210
- β-sitosterol 11
- octanordammarane 211
- dammar-18(28),21-diene 212
- (18S)-18-hydroxydammar-21-en 213
- (18R)-18-hydroxydammar-21-ene 214
- (18S)-pyrrsialactone 215
- (18R)-pyrrsialactone 216
- 3-deoxyocotillol 217
- cyclohopenol 218
- cyclohopanediol 219
- hop-22(29)-en-28-al 220
- 24-methylene-9,19-cyclolanost-3β,24-ol 221

18 **Pyrosera petiolosa** (Christ) Ching Pyrosera petiolosa is a fern species known for its chemical constituents, which include 
- diploptene 210
- β-sitosterol 11
- vanillic acid 225
- protocatechuic acid 226
- caffeic acid 227
- 7-O-[6-O-(α-L-arabinofuranosyl)]-β-D-glucopyranosylgossypetin 228
- kaempferol-3-O-β-D-glucopyranoside-7-O-α-L-arabinofuranosyl 230 \[389,390\]

19 **Pyrosera sheareri** (Baker) Ching Pyrosera sheareri is a fern species known for its chemical constituents, which include 
- diploptene 210
- β-sitosterol 11
- vanillic acid 225
- matairesinol 227
- vanillin 73
- fumaric acid 231
- sucrose 232 \[75\]

20 **Psilotum nudum** (L.) P. Beauv. Psilotum nudum is a psilotaceae species known for its chemical constituents, which include 
- apigenin di-C-glycoside 233
- 7,4′,4′-triphenolic acid 234
- hexadecanoic acid 235
- stearic acid 236

21 **Acrostichum aureum** L. Acrostichum aureum is a pteridaceae species known for its chemical constituents, which include 
- quercetin 3-O-β-D-glucoside 245
- ponasterone A 246
- lupeol 247
- friedelin 196
- β-sitosterol 11
- stigmasterol 248
- campesterol 249
- tetracosanoic acid 250
- usoric acid 251
- gallic acid 252
- (2R,3S)-sulfated pterosin C 253
- (2S,3S)-sulfated pterosin C 254
- (2R)-pterosin P 256
- patiscabrate 257
- tetracosane 258
- quercetin-3-O-β-D-glucoside 259
- quercetin-3-O-β-D-glucosyl-(6→1)-α-L-rhamnoside 260
- quercetin-3-O-α-L-rhamnoside 261

22 **Selaginella involvens** (P. Beauv.) Spring Selaginella involvens is a vittariaceae species known for its chemical constituents, which include 
- hexadecanoic acid 263
- stearic acid 264
- β-sitosterol 11
- stigmasteryl 248
- amentoflavone 265
- β-D-glucopyranoside 266
- (3β)-cholest-5-en-3-yl 267
- β-amyrin 198 \[398\]

23 **Vittaria elongate** Sw. Vittaria elongate is a vittariaceae species known for its chemical constituents, which include 
- vittarin-A-F 268–273
- 3-O-acetylindoloid acid 274
- ethyl 3-O-acetylindoloidoate 275
- methyl 4-O-coumaroylquinic 276
- vittariilide-A, B 277, 278
- vittariiflavone 279
- methyl 4-O-cafeoylquinic 280

24 **Impatiens niamniamensis** Gilg Impatiens niamniamensis is a non-fern species known for its chemical constituents, which include 
- a-N,N,N-trimethyltryptophan betaine 294 \[159\]
25 Convolvulaceae
(parasite)

26 Cassytha filiformis L.

- N-(3,4-dimethoxyphenethyl)-4,5-methylenedioxy-2-nitrophenylacetamide 295
- actinodaphnine 296
- cassythine 297
- isoboldine 298
- cassamerine 299
- cassamedine 300
- lysicamine 301
- cathafiline 302
- cathaformine 303
- actinodaphnine 304
- N-methylactinodaphnine 305
- cathafiline 306
- cathaformine 307
- precidentrine 308
- ocoteine 309
- filiformine 310
- (+)-diisoyringaresinol 311
- cathafiline 312
- cathaformine 313
- actinodaphnine 314
- N-methylactinodaphnine 315
- precidentrine 308
- ocoteine 316
- neolitine 317
- dicentine 318
- cassythine (cassythine) 319
- actinodaphnine 320
- 4-O-methylbalanophonin 321
- cassythine 322
- isoboldine 323
- cassythic acid 324
- cassythic acid 325
- neolitine 326
- dicentine 318
- 1,2-methylenedioxy-3,10,11-trimethoxyaporphine 327
- (-)-O-methylflavinatin 328
- (-)-salutaridine 329
- isohamnetin-3-O-β-glucoside 330
- isohamnetin-3-O-rutinoside 331 [164,378,399-403]

27 Cuscuta australis R.Br.

- 4-oxo-acid 7-oxo-kaurene-6α-O-β-D-glucoside 332
- thymidine 333
- caffic acid 228
- p-coumaric acid 334
- caffic-β-D-glucoside 335
- kaempferol 153
- quercetin 336
- astragalin 337
- hyperoside 338
- astragalin 339
- kaempferol 153
- quercetin 336
- β-sitosterol 11
- β-sitosterol 3-O-β-D-xylopyranoside 340 [404-406]

28 Cuscuta reflexa Roxb.

- coumarin 341
- α-amyrin 342
- β-amyrin 198
- α-amyrin acetate 343
- β-amyrin acetate 344
- oleanolic acid 127
- stigmasterol 248
- lupeol 247
- stigmast-5-en-3-O-β-D-glucopyranoside tetraacetate 346
- stigmaster-5-en-3-O-β-D-glucopyranoside 347
- stigmaster-5-en-3-y-acetate 348
- β-sitosterol 11
- 3,5,7,3'-pentalhydroxyflavanone (taxifolin) 349
- 3,5,7,4'-tetrahydroxyflavanone (aromadendrin) 350 [169,407,408]

Clusiaceae

29 Clusia grandiflora Splitg. (hemi epiphyte)

Loganiaceae

30 Fagraea auriculata Jack. (semi epiphyte)

Loranthaceae
(parasite)

31 Dendrophthoe falcata (L.f.) Ettingsh

- 3β-acetoxy-1β-(2-hydroxy-2-propoxy)-11α-hydroxy-olean-12-ene 359
- 3β-acetoxy-11α-ethoxy-1β-hydroxy-olean-12-ene 360
- 3β-acetoxy-1β-hydroxy-11α-methoxy-olean-12-ene 361
- 3β-acetoxy-1β,11α-dihydroxy-olean-12-ene 362
- 3β-acetoxy-1β,11α-dihydroxy-urs-12-ene 363
- 3β-olean-12-ene 11-one 364
- 3β-acetoxy-lup-20(29)-ene 365
- 30-nor-lup-3β-acetoxy-20-one 366
- (20)-3β-acetoxy-lup-29-oic acid 367
- kaempferol-3-O-α-L-rhamnopyranoside 368
- quercetin-3-O-α-L-rhamnopyranoside 369
- gallic acid 252 [410]

32 Loranthus globosus Roxb

(+)-catechin 168
3,4-dimethoxyxycinnamyl alcohol 370
3,4,5-trimethoxyxycinnamylalcohol 371 [190]

33 Macrosolen cochinensis (Lour.) Tiegh.

- orientin 372
- rutin 373
- quercetin-3-O-apiosyl(1→2)-[rhamnosyl(1→6)]-glucoside 374
- vicenin 375 [411]

34 Scurrula atropurpurea (Blume) Danser

- octadeca-8,10,12-trienoic acid 376
- hexadec-8-ynoic acid 377
- hexadec-10-ynoic acid 378
- hexadeca-8,10-diynoic acid 379
- hexadeca-6,8,10-triynoic acid 380
- hexadeca-8,10,12-trienoic acid 381
- (Z)-9-octadecenoic acid 382
- (Z,Z)-octadeca-9,12-dienoic acid 383
- (Z,Z,Z)-octadeca-9,12,15-trienoicacid 384
- octadeca-8,10-dienoic acid 385
- (Z)-octadec-12-ene-8,10-dienoic acid 386
- octadeca-8,10,12-trienoic acid 376
- theobromine 387
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35 *Scurrula ferruginea* (Jack) Danser

glycoside 4’-O-acetyl-quercitrin 394 [412]

36 *Scurrula parasitica* L. Moraceae

(+)-catechin 168 [204]

37 *Ficus pumila* L.


Orchidaceae

38 *Anoectochilus formosanus* Hayata

(6R,9S)-9-hydroxy-megastigma-4,7-dien-3-one-9-O-β-D-glucopyranoside 409, (R)-(+)3,4-dihydroxybutanoic acid γ-lactone 410, 1-O-isopropyl-β-D-glucopyranoside 411, 2-(β-D-glucopyranosylmethoxy)methyl-5-hydroxymethylfurane 412, 3-[(β-D-glucopyranosyloxy)methyl]-3,4-dihydroxybutanoic acid 413, 3-[(β-D-glucopyranosyloxybutanolide (kensinoside) 414, 4-(β-D-glucopyranosyloxy)benzyl alcohol 415, corchoionoside C 416 [416]

39 *Anoectochilus roxburghii* (Blume)

24S-isopropenylcholesterol 417, 5-hydroxy-3’4’7-trimethoxyflavonol-3-O-β-D-rutinoside 418, 7-O-β-D-diglucoside 419, 8-C-β-hydroxybenzylquercetin 420, 8-p-hydroxybenzyl quercetin, 421, aneocotinin 422, campesterol 249, cirsilolin 423, daucosterol 134, ferulic acid 288, isorhamnetin 424, isorhamnetin-3-425, isorhamnetin-3-O-β-D-rutinoside 426, isorhamnetin-7-O-β-D-glucopyranoside 425, isorhamnetin-7-O-β-D-diglucoside 429, kaempferol-3-O-β-D-glucopyranoside 430, kaempferol-7-O-β-D-glucopyranoside 431, p-coumaric 334, p-hydroxybenzaldehyde 432, quercetin 436, quercetin 3-O-β-D-glucopyranoside 433, quercetin 3-O-β-D-glucopyranoside 434, quercetin 3-O-β-D-rutinoside 435, quercetin 7-O-β-glucoside 436, quercetin-7-O-β-D-[6’-O-(trans-feruloyl)]-glucopyranoside 437, sitosterol 438, stigmasterol 248, succinic acid 439, 3’4’7-trimethoxy-3,5-dihydroxyflavone 440, 3-methoxy-p-hydroxybenzaldehyde 441, daucosterol 134, daucosterol 134, ferulic acid 288, isorhamnetin-3-O-β-D-glucopyranoside 442, isorhamnetin-3-O-β-D-glucopyranoside 443, lanosterol 444, methyl 4-β-D-glucopyranosylbutanoate 445, o-hydroxy phenol 446, oleancic acid 447, p-hydroxybenzaldehyde 448, p-hydroxy cinnamic acid 449, p-hydroxybenzaldehyde 452, rutin 437, sorghumol 3-O-E-p-coumarate 450, sorghumol 3-O-Z-p-coumarate 451, stearic acid 264, succinic acid 452, β-D-glucopyranosyl-3-(3R)-hydroxybutanolate 453, β-sitosterol 11 [395-403]

40 *Bulbophyllum kwangtungense* Schltr.


41 *Bulbophyllum odoratissimum* (Sm.) Lindl. ex Wall.

(+)-l-lyoniresinol-3a-O-β-D-glucopyranoside 462, 3,5-dimethoxyphenethyl alcohol 463, 3,7-dihydroxy-2,4,6-trimethoxybenzenanthren 464, 3-acetoxyxyco-23-25-ol 465, 3-methoxy-4-hydroxymethylfuran 466, 3-methoxyphenethyl alc. 4-O-β-D-glucopyranoside 467, 4-hydroxy-3,5-dimethoxybenzaldehyde 468, 4-O-β-D-glucopyranoside 469, 7-hydroxy-2,3,4-trimethoxy-9,10-dihydrophenanthrene 470, batatasin III 471, Bulbophyllanthrone 472, bulbophydrins A, B 473, 474, Coelolin 475, densiflorol B 476, ethyl orsellinat 487, gigantol 478, moscatin 479, p-hydroxyphenylpropionic acid 480, p-hydroxyphenylpropionic methyl ester 481, syringaldehyde 482, syringin 483, tristin 484, vanillic acid 225 [249,250,418–421]
Bulbophyllum vaginatum (Lindl.) Rchb.f.

(±)-syringaresinol 485, (2R*,3S*)-3-hydroxymethyl-9-methoxy-2-(4'-hydroxy-3',5'-dimethoxyphenyl)-2,3,6,7-tetrahydrophenanthro [4,3-b]furan-5,11-diol 486, 2,4-dimethoxyphenanthrene-3,7-diol 487, 3,4,6-trimethoxyphenanthrene-2,7-diol 488, 3,4,6-trimethoxy-9,10-dihydrophenanthrene-2,7-diol 489, 3,4,5-trihydroxy-3'-methoxybibenzyl (tristin) 490, 3,4-dihydroxy-5,5'-dimethoxybibenzyl 491, 3,4-dihydroxybenzoic acid 200, 3,4-dimethoxy-9,10-dihydrophenanthrene-2,7-diol (eianthrindin) 492, 3,4-dimethoxyphenanthrene-2,7-diol (nudol) 493, 3,5-di-methoxy-9,10-dihydrophenanthrene-2,7-diol (6-methoxycoelornin) 494, 3,5-dimethoxybibenzyl-2,7-diol 495, 3'-dihydroxy-5-methoxybibenzyl 496, 4,4',6,6'-tetramethoxy-[1,1'-biphenanthrene]-2,2',3',7',7'-hexol 497, 4,6-dimethoxy-9,10-dihydrophenanthrene-2,3,7-triol 498, 4,6-dimethoxyphenanthrene-2,3,7-triol 499, 4-methoxy-9,10-dihydrophenanthrene-2,7-diol (coelornin) 500, 4-methoxyphenanthrene-2,7-diol (flavanthrin) 501, 4-methoxyphenanthrene-2,3,5-triol (fimbriol B) 502, 9,10-dihydrophenanthrenes 503, dihydroferulic acid 504, Friedelin 196, p-coumaric acid, 334 [69,422,423]

Catasetum barbatum (Lindl.) Lindl.

2,7-dihydroxy-3,4,8-trimethoxyphenanthrene 505 [251]

Cymbidium aloifolium (L.) Sw.

aloifol I 506, aloifol II 507, 6-O-methylcoelornin 508, batatasin III 471, coelornin 475, gigantol, 478, 1-(4'-hydroxy-3',5'-dimethoxyphenyl)-2-(3'-hydroxyphenylethene) 509, 1-(4'-hydroxy-3',5'-dimethoxyphenyl)-2-(4'-hydroxy-3'-methoxyphenyl)ethane 510, 2,7-dihydroxy-4,6-dimethoxy-9,10-dihydrophenanthrene 511, cymbinadin-A 512, cymbinadin B 513 [424-426]

Cymbidium goeringii (Rchb.f.) Rchb.f.

β-sitosterol 11, daucosterol 134, ergosterol 514, gigantol 478, cymbidine A 515 [255,256,427]

Dendrobium amoenum Wall. ex Lindl.

amotin 516, amoenin 517, amoenumin 518, amoeylin, isoamoeylin 519, 3,4'-dihydroxy-5-methoxybibenzyl, 520, 4,4'-dihydroxy-3,3',5-trimethoxybibenzyl (moscatilin) 521 [428-430]

Dendrobium chrysaeum Rolfe

araxerol 522, coumarin 523, moscatilin 523, chrysotobibenzyl 524, chrysotoxin 525, gigantol 478, kaempferol 153, cis-mellilotoside 526, defuscin 527, dendroflorin 528, dengibsin 529, dihydrodromelilotoiside 530, naringenin 147, n-octacosyl ferulate 531, trans-mellilotoside 532 [259,431]

Dendrobium candidum Wall. Ex Lindl.

(1R)-loliolide 533, (1S)-secoisolariciresinol 534, (-)syringaresinol 535, (+)-lyoniresinol-3a-Oβ-D-glucopyranoside 462, (+)-syringaresinol-4-O-β-D-monoglucoside 536, (1'R)-1'-(4-hydroxy-3,5-dimethoxyphenyl) propan-1'-ol 4-O-β-D-glucopyranoside 537, (E)-p-Hydroxycinnamic acid 538, 2,4,7-trihydroxy-9,10-dihydrophenanthrene 539, 2-methoxyphenol-Oβ-D-apiofumosyl(1→2)-β-D-glucopyranoside 540, 3,4-dihydroxy-5,4'-dihydroxymethoxybibenzyl 541, 3-O-methylgigantol 542, 4,4'-dihydroxy-3,5-dimethoxybibenzyl 543, 4,5-dihydroxy-3,3'-dimethoxybibenzyl 544, 4-allyl-2,6-dimethoxyphenylglycoside 545, 4',4'-dihydroxy-5-methoxybibenzyl 546, 5-hydroxymethyl-furaldehyde 547, Adenosine 548, Aducin 549, ciferuloyl-p-hydroxybenzenethyleamine 550, coniferyl alcohol 551, daucosterol 134, defuscin 527, denbinbin 552, dendrocanidin A 553, dendrocanid C 555, dendrocanid D 556, dendrocanid E 557, dendrocanidins F1-E 558-561, dromonilinoside E 562, dromophenol 563, dihydroresveratrol 564, gigantol 478, guanosine 565, hentriacontane 8, heptadecanoic acid 566, hexadecanoic acid 263, icariol A 2,4-O-β-D-glucopyranoside 567, khephuozide 568, leonuriside A 569, naringenin 147, n-octacosyl ferulate 531, N-trans-furaloyl tyramine 570, n-triacontoyl cis-p-coumarate 571, p-hydroxy-phenylpropionic acid 480, sucrose 232, syringaresinol 572, syringaresinol-4,4'-O-bis-β-D-glucoside 573, trans-cinnamomoyl-3-hydroxybenzenethyleamine 574, uridine 575, vanillyl alcohol 576, β-sitosterol 11 [237-239,419,421]

Dendrobium chrysanthum Wall. ex Lindl.

(2S)-cis-cinnamoyl-2-oxopropyrrolidine 577, (2S)-N-trans-cinnamoyl-2-oxopropyrrolidine 578, (β)-lyoniresinol 579, 2,5-dihydroxy-4,9-dimethoxyphenanthrene 580, 4,4'-dihydroxy-3,3',5-trimethoxybibenzyl 581, 7,7-bis-(4-hydroxy-3,5-dimethoxyphenyl)-8,8-dihydroxymethyltetrahydrofur-an-4,5-diol 582, chrysophanol 583, chrysotobibenzyl 524, chrysotobibenzyl 524, chrysotoxin 525, crepidin 584, crepidin 584, dehydrodiconiferyl alcohol 4,4'-d-glucoside 585, dencrysans A, B 586, 587, dencrysid A 588, dencrysid B 589, dencrychosane 590, dencroflorin 528, dengibsin 529, edomin 591, gigantol 478, moscatilin 523, moscatin 523, moscatin 479, phycosin 592, β-sitosterol 11 [226,418,422-425]
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50. **Dendrobium fimбриatum** Hook.  
2-hydroxyethyl cafféate 593, ayapin 594, chrysophanol 583, chrysotobenzyl (l) 595, confusarin 596, crepidatin 584, defuscin 527, denhydroshizukanolide 597, fimbriatone 598, n-dorotacanoid acid 599, n-octacosyl ferulate 531, n-triacetyl cis-p-coumarate 571, physcion 592, rhein 600, scopolin methyl ether 601, β-sitosterol 11 [432,433]

51. **Dendrobium loddigesii** Rolfe  
dendrophenol (4,4'-dihydroxy-3,3',5-trimethoxybenzyl) 563, loddigesinin A-D 602-605, moscatilin 523, moscatilin diacetate 606, moscatin 479, shihunidine 607, shihunine 608, stilbenes 609 [275-277]

52. **Dendrobium moniliforme** (L.) Sw.  
heptacosane 610, 3,4-dihydroxy-4',5-dimethoxy bibenzyl 611, 3,4-dihydroxy-5,4'-dimethoxy benzyl 612, 4-methoxybenzaldehydehye 613, a known alkaloid 6-hydroxynobiletin 614, alkyl 4'-hydroxy-cis-cinnamates 615, alkyl ferulates 616, daucosterol 134, denbinobin 552, denbinobin, alkyl 4'-hydroxy-trans-cinnamates 617, dendoronihilide E 562, ethyl linolenates 618, heptatriacontaneoic acid 619, linoleic acid 620, methyl linolenates 621, moniliformin 622, monilide 623, n-nonacosane 624, n-octacosyl ferulate 531, n-triacetyl p-hydroxy-cis-cinnamate 625, octacosyl hexadecanoate 626, phytorstrols 627, stigmast-4-en-3-one 628, vanillin 293, α-dihydronicotinin 629, β-sitosterol 11 [285,434-438]

53. **Dendrobium moschatum** (Buch.-Ham) S.w  
moscatin 479, moscatilin 523 [254,428-432]

54. **Dendrobium nobile** Lindl.  

24-methylenecycloartenol 676, campesterol 249, pholidotin 677, stigmasterol 248, β-sitosterol 11 [297]

55. **Epidendrum strobiliferum** Rchb.f.  

56. **Myxaranthes panna** (Lindl.) S.C.Chen & J.J.Wood  
Acervatol 687, acervatone 688, flavanthridin 669, flavanthrin 689 [301]

57. **Camptalium densum** (Lindl.) M.A.Blanco  
2,5-dihydroxy-3,4-dimethoxyphenanthrene 690, 2,5-dihydroxy-3,4-dimethoxyphenanthrene 690, 9,10-dihydro-2,5-dihydroxy-3,4-dimethoxyphenanthrene 691, 9,10-dihydro-2,7-dihydroxy-3,4-dimethoxyphenanthrene 692, erianthridin 667, fimbriol-A 693, gymnopusin 694, nudoil 695 [70,445]

58. **Nidema boottii** (Lindl.) Schltr.  
1,5,7-trimethoxy-9,10-dihydrophenanthrene-2,6-diol, 696, 1,5,7-trimethoxyphenanthrene-2,6-diol 697, 2,4-dimethoxyphenanthrene-3,7-diol 488, 9,19-cyclopanostane-24,24-dimethyl-25-en-3β-yl trans-p-hydroxycinnamate 698, aloifol B 507, batatasin III 471, ephemeranthoquinone 700, gigantol 478, liusanthridin 671, liusinidin 701, nedomone 702 [307,446]

59. **Pholidota articulata** Lindl.  
2,7-dihydroxy-3,4,6-trimethoxy 9, 10-dihydrophenanthrene flavid 703, 2,7-dihydroxy-3,4,6-trimethoxy-9,10-dihydrophenanthrene (coeloin) 704, 9, 10-dihydrophenanthrenes 705, coelolin 706, coelogenin 707, flavidin 708, flavidin 709, oxoflavidin 710 [447]
61 Pholidota chinensis Lindl. (E)-2',3',3'-trihydroxy-5-methoxystilbene (pholidotol C) 711, (Z)-3',3'-hydroxy-5-methoxystilbene (pholidotol D) 712, 2,4,7-trihydroxy-9,10-dihydrophenanthrene 539, 2,5-dimethoxy-3,4,5,4'-bis(dimethoxycarbonyl)benzyl 713, 3',4'-dihydroxy-3',5-dimethoxybenzyl 714, 3,4-dihydroxy-3,5-dimethoxyhydrodrolastilbene 715, 4',4'-dihydroxydiphenylmethane 716, 4,5-dihydroxy-2-methoxy-9,10-dihydrophenanthrene 717, 5,3'-dihydroxy-2,3-(methylenedioxy)benzyl 718, 9,10-dihydro-2,4-dihydroxy-7-methoxophenanthrene 719, batatasin III 471, blestranol A 720, blestrin A 721, bulbophyll B 722, cannabidiophenanthrene 723, coelolin 475, coelolin 475, cyclophilolidone 724, cyclophilolidone 725, cyclophilolidone 725, erianthridin 667, euphol 726, flavantherin 727, flavanthrin 727, gymnocpin C 728, hircinol 670, lusianthridin 671, lusianthridin 671, phochinenins A–F 729–734, phochinenins G-L 735–740, pholidotols A–B 741, 742, 3,4-dihydroxy-5-methoxystilbene 743, phoyunnadin D 744, p-hydroxybenzaldehyde 432, p-hydroxybenzyl alcohol 745, protocatechuic aldehyde 746, resveratrol 747, thunbalein 748, thunbalene 749, trans-3,3-dihydroxy-2,5-dimethoxystilbene 750, trans-3-hydroxy-2,3,5-trimethoxystilbene 751, β-daucosterol 752 [310,311,434,435,448,449].

62 Scaphyglottis livida (Lindl.) Schltr. 24,24-dimethyl-9,19-cyclolanosta-9(11),25-dien-3-one (cyclomalonal) 753, 3,4'-dihydroxy-3',4'-trimetoxybenzyl 754, 3,4'-dihydroxy-3',5-dimethoxystilbene 714, 3,7-dihydroxy-2,4,8-trimethoxystilbene 755, 3,7-dihydroxy-2,4,5-dimethoxystilbenonium 756, 5α-lanosta-24,24-dimethyl-9(11),25-dien-3β-ol 757, batatasin III 471, coelolin 475, gigantol 478, nidemín 701 [313,314,446].

63 Papilionanthe teres (Roxb.) Schltr. eucomic acid 758, vandatersides I-III 759–761 [319].

64 Vanda tessellata (Roxb.) Hook. ex G. Don. Oxotessallatin 762 [436].

Piperaceae

65 Peperomia galoides Kunth (+)-epi-a-bisabolol 763, galipiperone 764, grifolic acid 765, grifolin 766, hydroperipiperone 767, piperogalin 768, piperogalone 769 [437,438,450].

66 Piper retrofractum Vahl 28-methylphosphacet-27-en-1-oic acid 770, 3-methyl-5-decanoylpyridine 771, caffeic acid 228, di-methyl 3,4-bis(4-hydroxyphenyl)-1,2-cyclobutanedicarboxylic acid 772, esculetin 773, methyl piperate 774, N-isobutylleucosa,2,4-dienamide 775, p-coumaric acid 334, pipericosalidine 776, piperine 777, piperonaline 778, piperoctadeclalidine 779, retrofractamide-D 780, retrofractamides A, C 781, 782, uracil 783, uridine 575, vinyl 283, vinyl 2'-O-β-D-glucopyranoside 784, β-D-glucopyranoside 266, β-sitosterol 11 [325,330,451–454].

Rubiaceae

67 Hydnophytum formicarium Jack 4-aminoophenyl acetate 785, 7,3',5'-trihydroxyflavone 786, butein 787, butin 788, Isoliquiritigenin 789, protocatechaldehyde 226, stigmast-4-en-3-one 628, stigmasterol 248, β-sitosterol 11 [337,386].

Viscaceae

68 Viscum articulatum Burm.f. (2S)-5,3,4-trihydroxyflavanone 7-O-β-D-glucoside 790, (2S)-homoeodictyol 791, (2S)-homoeodictyol 7-O-β-D-glucoside 792, (25)-naringenin 7-O-β-D-glucoside 793, (2S)-pinocembrin 7-O-[β-D-apiosyl(1→2)]-β-D-glucoside 794, (2S)-pinocembrin 7-O-[β-D-apiosyl(1→2)]-β-D-glucoside (1) 795, (2S)-pinocembrin 7-O-β-D-glucoside 796, (4'-hydroxy-2',3',6',3''-tetramethoxy-1,3-diphenylpropene)-4''-O-β-D- glucopyranoside 797, 1-O-benzyl-[5-O-benzoyl]-β-D-apiofuranosyl(1→2)]-β-D-glucopyranoside 798, 2-deoxy-α-D-inositol 799, 2-phenylethanol 800, 4'-β-D-glucosylxylo-3-hydroxy-benzoic acid 801, 4'-hydroxy-7,3'-dimethoxyflavan-5-O-β-D-glucopyranoside 802, 4-O-cinnamoyl quinic acid 803, 5,3',4'-trihydroxyflavanone-7-O-β-D-glucopyranoside 804, 5,4'-dihydroxyflavanone-7-O-β-D-lucopyranoside 805, 7-O-β-D-glucopyranoside 806, botulin 807, betulin 808, betulinic acid 809, cinnamic acid methyl ester 810, diphenylpropane glycoside 811, eriodictyol 7-O-β-D-glucopyranoside 812, homoeodictyol 7-O-β-D-glucopyranoside 813, homoeriodictyol-7-O-β-D-glucopyranoside 814, homoeriodictyol-7-O-β-D-glucopyranoside-4′-O-β-D-apiofuranoside 815, homoeriodictyol-7-O-β-D-glucopyranoside-4′-O-β-D-apiofuranoside 816, lupenyl
acetate 817, lupeol 247, lupeol acetate 818, lupeol palmitate 819, lupeol stearate 820, lycorin 821, methylparaben 822, naringenin 7-O-β-D-glucopyranoside 823, Oleanolic acid 127, p-hydroxybenzaldehyde 432, p-hydroxy-benzoic acid 824, pinocembrin 825, pinocembrin 7-O-β-D-glucopyranoside 826, pinocembrin-7-O-[cinnamoyl (1→5)-β-D-apiofuranosyl (1→2)]-β-D-glucopyranoside 827, pinocembrin-7-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranoside 828, pinocembrin-7-O-β-D-apiofuranosyl-(1→5)-β-D-apiofuranosyl-(1→2)-β-D-glucopyranoside 829, protocatechuic acid 189, vanillin 293, visartisides A-C 830, 831, 832, visartisides D-F (4–6) 833, 834, 835, viscumitol 836, α-amyrin 342, β-amyrin acetate 837, β-sitosterol 11 [343–347,455–457]

Viscum ovalifolium 3-O-α-L-arabinopyranoyl-hederagenin-28-O-β-D-glucopyranosyl-(1→6)-β-D-glucopyranoside 838, gypsogenic acid 839, hederagenin 840, hederagenin-3-O-α-L-arabinopyranoside 841, hederagenin-3-O-α-L-arabinopyranoyl-(2→1)-O-β-D-glucopyranoside 842, lupeol acetate 818, lupeol palmitate 819, oleanolic acid 127, lupeol stearate 820, β-amyrin 198, β-amyrin acetate 344 [458,459]
6. Conclusions

Epiphytes are the most beautiful vascular plants and contain interesting phytochemicals and possess exciting pharmacological activities. An analysis of the literature revealed 185 epiphytes that are used in traditional medicine, in which phytochemical studies identified a total of 842 secondary metabolites. Only 71 epiphytic medicinal plants were studied for their pharmacological activities and showed promising pharmacological activities, including anti-inflammatory, antimicrobial, and anticancer. Several species were not investigated for their activities and are worthy of exploration, including epiphytes from the Araceae (P. fragantissimum), Aralliaceae (S. caudata, S. elliptica, S. elliptifoliola, S. oxyphylla, S. simulans), and Asclepiadaceae (Asclepias sp., D. acuminate, D. benghalensis, D. imbricate, D. nummularia, D. platyphylla, D. purpurea, Toxocarpus sp) families, in which no phytochemical and pharmacological studies had been reported. These species have been used by Indigenous populations to treat both degenerative and nondegenerative diseases. It is known that there are examples of Indigenous populations living in protected forest reserves (e.g., in Indonesia) where epiphytes are used in their medicine, e.g., some species of Dischidia are used to treat fever, eczema, herpes etc.; these plants have not yet been studied. Therefore, the possibility of responsible bioprospecting exists (in compliance with the Nagoya protocol), which would be invaluable in biodiscovery knowledge as well as in mutual benefit sharing agreements.

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