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The epiphytic plant community of Amedzofe: The highest human settlement in Ghana

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Abstract
Epiphytes are organisms that grow upon a living plant for support and are not parasites; they are usually independent of the host plant for water and nutrition. Worldwide, the diversity of epiphytic plants is estimated to be nearly 10 % of all vascular plant species; including gymnosperms, angiosperms, and ferns. This study attempted to assess and document the epiphytes distributions on the highest human settlement, Amedzofe in Ghana. This is to serve as a baseline information against which future studies of epiphytes in this area vis-a- vis other areas may be compared as indicator of Environmental Health. Individual tree stands were counted for observation and the different types of epiphytes identified using Standard Botany Guide. In all eleven different types of epiphytes have been identified and include *Asplenium nidus, Campylocentrum micrantum, Drynaria quercifolia,* Folios Lichen, *Microgramma lycopodioides, Microsorum pustulatum,* Moss, *Nephrolepis exaltata, Sarcochilus sp., Rhipsalis baccifera* and *Platycerium staghorn* at elevations of 677meters above sea level. Growing on trees, their fate is tied to that of their hosts and they are threatened by the loss of tropical forests. Being sensitive to disturbance and microclimate, and because of their importance for tropical forest ecology, epiphytes may serve as indicators or guides for careful management. Such data are important to manage environments in a way that minimises negative effects on living things. The study concludes that Amedzofe has special weather conditions which promotes the growth of a variety of epiphytes.

Keywords: epiphytes, community, amedzofe, vascular plants, species, facultative

Introduction

Epiphytes are plants that are established on other plants, which they use as a substrate for growth, but without extracting any water or nutrient resources from them (Benzing, 1990) [4]. Epiphytes grow on the bark surface of trees, taking advantage of the physical support offered by trunk, branches and twigs as these reach upwards above the ground. They are photosynthetic organisms, which means that they produce their own food using energy from sunlight and basic raw materials (carbon dioxide, water, and nutrients), and they do not parasitize the tree on which they grow. Rather, epiphytes use trees as a scaffold, and this has proven to be an ingenious and ecologically successful strategy (Christopher *et. al*., 2015) [9].

By growing on the outer surface of structurally dominant trees, epiphytes avoid competition for space and the limitations of shading in the ground layer of forests; however, epiphytes must overcome the difficulties associated with an existence away from the soil environment, including restricted access to water, leading to periods of desiccation, and limited availability of essential nutrients. Nevertheless, a tremendous diversity of plants and fungi is adapted to the epiphytic environment and can be found in forests across the planet forming an above-ground ecosystem of awe-inspiring complexity (Christopher *et. al.*, 2015) [9]. Epiphytes are a visible reminder that a forest is comprised of more than trees, which create the obvious structure. Forty percent of all known terrestrial species are associated with forest canopies, and 10% of all vascular plant species are epiphytes (Ozanne *et al*., 2003) [35] including the celebrated orchids and ferns which adorn tropical forests.

Equally impressive, though less widely known, are the cryptogamic lichens, mosses and liverworts which are dominant on tree trunks and in the canopy of higher latitude temperate and boreal forests. Lichens, mosses and liverworts are 'poikilohydric', meaning they do not actively regulate their water status using a specialised vascular system such as the xylem and phloem of vascular plants. Instead, they respond directly to ambient environmental conditions, rehydrating when water is available and withstanding tissue desiccation during dry periods. It is this flexibility to adjust to rapid changes in the local environment, and a tolerance of environmental extremes, which make lichens, mosses and liverworts well suited to the epiphytic way of life (Lang *et al*., 1976, 1986: Kranner *et al*., 2008) [24, 27].

Epiphytes are a taxonomically heterogeneous group, composed of over 28,000 species belonging to 84 plant families, and representing an important proportion of the world's flora (Benzing 1990; Kress 1989) [4, 26]. Both vascular and non-vascular plants (e.g., mosses and liverworts; (Sequiera & Kumar 2008) [38]. are represented within this diverse group. Most epiphytes are angiosperm (24,748 species), within which the Orchidaceae (18,814 species) and the Bromeliaceae (1,170 species) are the plant families with the largest number of epiphytes (Zotz, 2013) [41]. The highest diversity of epiphytes is generally found in humid tropical habitats, such as cloud forests and tropical rain forests, especially those in the neotropics (Benzing, 1990; Gentry & Dodson 1987; Nieder *et al*., 2001) [4, 15, 34, 32]. However, temperate humid and tropical dry forests may also hold large numbers of epiphytes (Gentry & Dodson, 1987; Hietz & Hietz-Seifert, 1995) [15, 19].

Epiphytes are important in maintaining the ecosystem function of woodlands, and also provide an indicator of environmental health. Lichen, moss and liverwort epiphytes

are representative of an extremely diverse assemblage of small organisms (including a bewildering array of fungi, algae, and bacteria) which perform important functions in maintaining healthy and resilient ecosystems. It is also known in general terms that epiphytes play an important ecosystem role in regulating forest food webs, and in water and nutrient cycles. A mosaic of cryptogamic epiphytes increases the range of contrasting microhabitats on a tree. This positively affects the biomass and diversity of tree dwelling invertebrates, with implications across the food-web, e.g. by providing an increased food resource for forest birds. Cryptogamic epiphytes also efficiently capture atmospheric water, and act like a sponge to store and release this moisture relatively slowly into the forest system. Likewise, they capture and process atmospheric sources of nutrients which are limiting to plant productivity, such as nitrogen, performing an important role in the forest nutrient cycle. There is therefore strong evidence for a significant role of cryptogamic epiphytes in maintaining healthy forests and woodlands (Shorrocks *et al*., 1991) [39]. Despite the small-scale at which these functions operate when measured for individual organisms or within their communities, the net consequences cumulatively scale upwards and are of relevance to human society (Christopher *et. al*. 2015) [9]. The United Kingdom's National Ecosystem Assessment – which provided a landmark examination of the health of Britain's ecosystems and the services they provide to society – emphasised that the importance of maintaining healthy communities of these small organisms far exceeds our practical understanding of their ecology (NEA 2011).

Cryptogamic epiphytes are indicators of environmental pollution. They have been used to indicate negative impacts on the environment resulting from the burning of fossil fuels, including the release of sulphur dioxide (SO_2) and associated acid rain, as well as excess nitrogen associated with traffic, and fertilisers and animal waste from intensive farming (Hawksworth, 1971; Hawksworth & Rose, 1970) [16, 17]. Air pollution has negative human health impacts, and lichen epiphytes can provide a broad index of environmental quality that has implications for human society (Cislaghi & Nimis, 1997) [10]. Epiphytes can also be used to interpret landscape ecology not just in terms of pollution, but as indicators for habitat structure and quality, providing a means to determine the biodiversity value of important conservation sites.

Benzing (1989; 1990; 2004) [4, 5, 6]. and Nadkarni *et al*., (2001) [32]. classified epiphytes into three functional guilds;

1. Obligate Epiphytes: Those epiphytes that occur almost exclusively as epiphytes.
2. Facultative Epiphytes: They are epiphytes that occur epiphytically and on the forest floor.
3. Accidental Epiphytes: These are epiphytes that are almost exclusively rooted to the forest floor.

Given the importance of epiphytes to forest biodiversity and ecosystem function, and their usefulness as indicators of environmental health, it is of considerable human concern that epiphytic species are threatened across the globe because of climate change and other human activities. Thus, there is a need to assess the epiphyte biodiversity and species compositions to various locations. Acquiring knowledge about the epiphyte population and diversity is very helpful in decision making. However, in Ghana, there is still limited knowledge on epiphyte population and diversity. Thus, this study attempted to assess and document the epiphytes distributions on the highest human settlement, Amedzofe in Ghana. This is to serve as a baseline information against which future studies of epiphytes in this area vis-a- vis other areas may be compared as indicator of Environmental Health.

Methodology

Description of the Study Area

The study area is situated in Yingor, Volta, Ghana and its geographical coordinates are 6° 51' 0" North, 0° 26' 0" East and its original name (with diacritics) is Amedzofe as shown in Figure 1. Amedzofe has a high humidity, with thick forest canopy and tree trunks are rich in epiphytic plant communities which is ideal for classification and could serve as a baseline data for further research. The climate of the area is controlled by the southwest monsoon winds and the dry harmattan winds from the Atlantic Ocean and the Sahara Desert respectively. The basin has a bi-modal rainfall regime with mean temperature ranging from 22 to 32 °C while annual rainfall of the lower plains averages about 1100–1300 mm and approaches 1400–1600 mm in the higher ranges. Average mean humidity for Amedzofe is between 70 and 96% (0600 h) and between 53 and 87% at 1500 h (WRC 2011). Amedzofe is the highest human settlement in Ghana and located at an altitude of 677 metres, (3275 feet) above sea level. It is located between Ho and Hohoe in the Ho - West District of the Republic of Ghana. Amedzofe is one of the seven towns that make up Avatime with the rest being Gbadzeme, Fume, Dzokpe, Biakpa, Dzogbefeme and Vane. The people of Amedzofe or Avatime speak Siya or Sideme and Ewe. The weather is very cold and the land is undulating resulting in a lot of muddy places which supports the growth of rice. Other food and cash crops that are grown includes yam, cocoyam, plantain, banana, cocoa, coffee, cashew and pear. Amedzofe can boast of Mountain Gemi and the Amedzofe waterfall and Canopy.

Sampling

Field sampling of epiphytes was designed to capture the different types of epiphytes on the lower and upper bole, canopy and twig communities at the sites. Field sampling was done in July, 2021. For quantitative records, the most common sampling method was individual trees. Individual tree stands were counted for observation and the different types of epiphytes identified using Standard Botany Guide (e.g Common Epiphytes and lithophytes of Belize) and other Plant Reference Manuals (Balick, Nee, Atha, 2000; Christopher *et. al.* 2015; Holst *et al*. 2019) [9, 20].

Results and Discussion

This study employed Benzing (1989; 1990; 2004) [4, 5, 6]. and Nadkarni *et al*. (2001) [32]. classification of epiphytes. Benzing (1989; 1990; 2004) [4, 5, 6]. and Nadkarni *et al*. (2001) [32] classified epiphytes into three functional guilds:

1. Obligate Epiphytes: Those epiphytes that occur almost exclusively as epiphytes.
2. Facultative Epiphytes: They are epiphytes that occur epiphytically and on the forest floor.
3. Accidental Epiphytes: These are epiphytes that are almost exclusively rooted to the forest floor

In this study therefore, 11 facultative epiphytes were identified in the study area and their detailed characteristics are shown in Table 1 below:

Fig 1: Map of the study area

Table 1

No	Description	Image
1	**Asplenium nidus: The bird's nest fern** This fern is a native of tropical Africa, Australia and tropical Asia. Asplenium nidus either grow terrestrially on the ground, or epiphytically on the trees. Sometimes they grow on rocks (Piggott, 1988) [36]. The sword-shaped fronds grow from the centre of the plant to form an inverted cone. The fronds are very long approximately 50-120cm, and 10-20cm wide, also the leaves or fronds are light green, often crinkled, with a smooth-edged blade and a black midrib that is obvious. The sporangia develop in clusters called sori, covered by an elongated indusium on the back of the fronds. It has roots for absorption of water and minerals from the soil (Koh, 2009) [23]. In terms of size this alters according to the habitat (Piggott, 1988) [36]. This species was located on a number of tree trunks in the study sites. They may be well distributed because of favorable conditions such as humid climate, forest, suitable phorophytes and temperature (mean, 22 to 32 °C) and presence of seed dispersers etc.	 Figure 1. *Asplenium nidus*
2	***Campylocentrum micranthum*** This comprises monopodial, epiphytic plants, ranging from elongated, distichously leafy, suberect to pendent, often branching stems to abbreviated, acaulescent, condensed stems bearing non-photosynthetic scales. Roots are cylindrical or flattened ranging from 1 to 4mm in diameter with green or yellowish tips, often chlorophyllous inside developing along the stem opposite to the leaves. Roots can be basal and they usually anchor the plant to the substrate. The presence of aeration complexes in photosynthetic roots acting as cortical stomatal complexes may be important in the evolution of the leafless habit. Stems are elongated in leafy species or very reduced and inconspicuous in in leafless species. They have distichous meristems producing leaves, roots and inflorescences. Elongated leafy stems are covered by amplectent, tubular, leaf sheaths subtending the leaves. Remarkable variations in leaf shape and size are present in the genus. Leafy species have well developed conduplicate leaves which may be coriaceous as in *C. micranthum* or subcoriaceous as in *C. panamense*. Inflorescences are distichous and produced along the stem opposite to the leaves. They develop just below the emerging point of roots and several inflorescences can develop simultaneously from the same individual. Flowers can be distichous-like or second-like. After flowering, they remain photosynthetic	 Figure 2*: Campylocentrum micranthum*

	and are persistent until they become dry. They are unicolor, white, whitish or yellowish (Bogarín and PuPulin, 2011) [7]. This species of epiphytes develop well in Brazil, South America, Costa Rica etc because of favourable environmental conditions such as tropical wet forest or tropical moist forest and they are found mainly associated with secondary vegetation, in open disturbed areas, gardens and pastures which is similar to what is pertaining in Amedzofe.	
3.	**Drynaria quercifolia** Aglaomorpha quercifolia (Drynaria quercifolia), kjlb; commonly known as the oakleaf fern or oakleaf basket fern, is a species of Aglaomorpha in the family Polypodiaceae. It is a large species with deeply pinnatifid foliage fronds. The nest fronds resemble the leaves of oaks, hence the common name. The sori are either scattered or arranged in two regular rows in between the secondary veins. (Barbara Joe Hoshizaki; Robbin Craig Moran (2001) [2]. Drynaria quercifolia or more commonly known as the Oak-leaf fern is a "basket fern" belonging to the Polypodiaceae family. The reason for its common name of "oak leaf" as the nest fronds resemble the leaves of Oaks. They are a terrestrial fern found among rocks in crevices, shelves or in the soil among boulders also epiphytic on tree trunks in open forests and rainforests. Drynaria quercifolia is native to Western Australia as well as India, Southeast Asia, Malaysia, Indonesia, the Philippines and New Guinea. This species of fern is characterized particularly by having "wooly" rhizomes. The Rhizomes are 2cm thick and wooly. The scales are a dark brown to ginger in color and are 20-25mm long and 0.7-2.5mm wide and soft. Stipes are winged at the base and lamina are not separated into distinct leaflets. The sori are round and circular in shape and spores are 37.5-55um long, 22.5-37.5um wide. Fronds are both fertile and sterile. The veins are prominent and easily visible (Flora base). Drynaria quercifolia reproduces through spores, is not poisonous but is used frequently as a medicine in many cultures and has many medicinal purposes. Its presence in Amedzofe could be as a result of suitable phorophytes, very humid climate, high rainfall and other suitable environmental factors.	 Figure 3: *Drynaria quercifolia*
4.	**Foliose lichen** Foliose lichen is one of a variety of lichens, which are complex organisms that arise from the symbiotic relationship between fungi and a photosynthetic partner, typically algae. This partnership allows lichen to live in diverse climates that can range from cold, dry mountains to wet, warm valleys. Lichens develop quite slowly with recorded growth rates of 0.01–27mm/year depending on the species. Their lifespan averages between 30 and 60 years (Armstrong & Bradwell 2011). Lichens have a main body part called the thallus, which is composed of hyphae, and houses the cortex and medulla. The cortex contains the photosynthetic cells while the medulla allows for gas exchange and makes up the bulk of the lichen's thallus. There are three main types of lichens: crustose, foliose, and fruticose. Foliose lichen are characterized by flattened leafy thalli, and an upper and lower cortex. Many have numerous layers, which are stratified, and aid in identifying different types. Foliose lichens attach to surfaces by hyphae in the lower cortex with smaller root like structures called rhizines (, Irwin M. 2001) [21]. Lichens play an important role environmentally. They provide a food source for many animals such as deer, goats, and caribou, and are used as building material for bird nests. Some species can even be used in antibiotics. They are also a useful indicator of atmospheric pollution level. (Daniel and Nicholas, 2015) [13]. Since they are very sensitive to atmospheric pollution, their abundance may be as a result of the very pristine environment.	 Figure 4: Foliose lichen
5.	**Microgramma lycopodioides** It is an epiphytic fern plant having long-creeping, thin, rhizome with reddish-brown scales and often climbing on tree trunks. The leaves are alternate, simple, oblong-elliptic, glabrous and semidimorphic. Also, the base is acute, margin entire, apex acute to obtuse-rounded; sori circular, abaxial, without indusia. It belongs to the genus Microgramma and family Polypodiaceae (Holst *et al*., 2019) [20].	 Figure 5: *Microgramma lycopodioides*

6.	**Microsorum pustulatum** It is an epiphytic, terrestrial, creeping or climbing fern. Rhizomes are scaly and long-creeping, 3–11 mm diameter. Rhizome scales are clathrate, ovate, 3–7 mm long, 1–2 mm wide, mostly appressed but with the tips sometimes squarrose, blackish-brown and entire. The Fronds are 45–750 mm long. Also, the stipes are 10–350 mm long, pale to chocolate brown, glabrous or with very scattered scales. In addition the laminae are very varied, from undivided or variously lobed to deeply 1-pinnatifid; undivided laminae (fertile) narrowly elliptic, 35–220 mm long, 6–30 mm wide, or (sterile) longer and broader, up to 260 mm long and 70 mm wide; lobed or pinnatifid laminae (fertile) are ovate to elliptic or broadly ovate to broadly elliptic, 50–425 mm long, 35–350 mm wide, or (sterile) up to 420 mm long and 300 mm wide; lamina extending 5–40 mm below the lowest lobe, bright glossy green, coriaceous, glabrous or with scattered scales on the costae. Lamina lobes (fertile) are in 1–15 pairs, 25–185 mm long, 4–30 mm wide, or (sterile) less numerous and wider, in up to 10 pairs and up to 60 mm wide; straight, acute to acuminate, margins entire or wavy, widest about the middle. Again, veins are reticulate, forming 2–3 series of areoles between costa and lobe margin; hydathodes conspicuous on adaxial surface of lamina. Sori round or rarely elliptic, 2.5–5 mm wide, impressed into lamina forming low bulges on adaxial surface, in 1 row either side of costa, medial or closer to the lobe margin; paraphyses absent; exindusiate (Brownsey and Perrie, 2015) [8].	 Figure 6: *Microsorum pustulatum*
7.	**Moss** Botanically, mosses are non-vascular plants in the land plant division Bryophyta. They are small (a few centimeters tall) herbaceous (non-woody) plants that absorb water and nutrients mainly through their leaves and harvest carbon dioxide and sunlight to create food by photosynthesis. (Mathews, Daniel (1994) [30]; Pojar and MacKinnon (1994) [37]. They differ from vascular plants in lacking water-bearing xylem tracheids or vessels. As in liverworts and hornworts, the haploid gametophyte generation is the dominant phase of the life cycle. This contrasts with the pattern in all vascular plants (seed plants and pteridophytes), where the diploid sporophyte generation is dominant. Mosses reproduce using spores and have no flowers. The individual plants are usually composed of simple leaves that are generally only one cell thick, attached to a stem that may be branched or unbranched and has only a limited role in conducting water and nutrients. Although some species have conducting tissues, these are generally poorly developed and structurally different from similar tissue found in vascular plants (Ligrone, Duckett and Renzaglia, 2000) [29]. They can be distinguished from liverworts (Marchantiophyta or Hepaticae) by their multi-cellular rhizoids. Spore-bearing capsules or sporangia of mosses are borne singly on long, unbranched stems, thereby distinguishing them from the polysporangiophytes, which include all vascular plants. The spore-bearing sporophytes (i.e. the diploid multicellular generation) are short-lived and dependent on the gametophyte for water supply and nutrition. Also, in most mosses, the spore-bearing capsule enlarges and matures after its stalk elongates, while in liverworts the capsule enlarges and matures before its stalk elongates (Pojar and MacKinnon (1994) [37]. Its growth here may be due to the high humidity and high rainfall which favours their growth.	 Figure 7: Moss
8.	***Nephrolepis biserrata*** The plant is epiphytic, lithophytic, or terrestrial and the rhizome is stout, erect with tan to orange scales continuing to base of rachis. The Leaves are divided once and Its stipes are grayish brown and 10–50 cm × about 4 mm in size, with brownish-green, papery lamina that are 14–30 cm wide × 0.7–2 m in length. Its indusium is circular with round sori. The leaf apex has developing bud and belongs to the Family Nephrolepidaceae (Bruce *et al*., 2019) [20]. The extensive growth over here could also be as a result of favourable phorophytes, high rainfall and the montane forest which are suitable for its growth.	 Figure 8*: Nephrolepis biserrata*

9. **Sarcochilus sp.**

Orchids in the genus Sarcochilus are epiphytic or lithophytic monopodial herbs with fibrous stems and long, relatively broad leaves folded lengthwise and arranged in two ranks. The flowers are scented, resupinate and arranged on an unbranched flowering stem, each flower on a short thin stalk. The sepals and petals are free from and similar to each other except that the petals are usually smaller than the sepals. The labellum is hinged to the column and has three lobes. The side lobes are relatively large and upright, sometimes curving inwards. The structure of the middle lobe varies between species (Jones, 2006; Jones, Hopley, Duffy, 2010) [12, 22]. Sarcochilus, commonly known as butterfly orchids or fairy bells is a genus of about twenty species of flowering plants in the orchid family, Orchidaceae. Most species are epiphytes but a few species only grow on rocks or in leaf litter. Orchids in this genus usually have short stems, leaves arranged in two rows and flowers arranged along unbranched flowering stems. Most species are endemic to Australia but some are found in New Guinea and New Caledonia ((Jones, 2006; Jones, Hopley, Duffy, 2010) [12, 22].

Figure 10: *Sarcochilus* sp.

10. **Rhipsalis baccifera**

This is a graceful, pendent epiphyte with branches growing to several meters long (Bruce *et al*., 2019) [20]. It is found at elevations between sea level and 1,700 metres. Rhipsalis baccifera is an epiphytic or saxicolous cactus, usually growing on trunk or branches of large trees, hanging in large clusters in a wide variety of habitats comprising low and medium elevation forests, rain forest, riverine forests and mangrove tidal swamp. It also grows in humus on shady rocks. Rhipsalis baccifera (also known as Mistletoe cactus or Spaghetti cactus) has long thread-like stems and numerous creamy-white flowers followed by mistletoe-like fruits. It forms large hanging clusters, 1 to 4 metres long (occasionally up to 9 meters). Like most cacti it has succulent stems, however in R. baccifera, these are weak, slender, narrow and pendent. It shows considerable polymorphism as a result of the existence of lots of geographically isolated populations and can be divided into numerous subspecies (Barthlott & Taylor, 1995; Cota-Sánchez, & Bomfim-Patrício, 2010) [3, 11].

Stems are articulated, of indeterminate growth, very much branched dichotomously, or spirally, growing from tips of other branches, generally in pairs but sometimes in whorls of 6 or 8. The stems are weak and pendent 1-4 (or more) metres long; branches when young, cylindrical, slender, not dimorphic, terete, sometimes producing aerial roots, 3-6 mm in diameter, light green, joints 10 to 20cm long, rarely up to 50cm. Flowers are borne laterally in winter or spring, solitary, small (5-10 mm in diameter), greenish in bud, sometimes subtended by a single bristle; petals 2 mm. long, cream-coloured; stamens borne on disk. The fruits are naked, spheric, translucent, mistletoe-like, white or flesh-coloured (sometimes red), maturing a few days after flowering, globose, 5-8 mm. in diameter. The fruits are also edible, with a soft sweet taste (Barthlott & Taylor, 1995; Cota-Sánchez, & Bomfim-Patrício, 2010) [3, 11].

Figure 10: *Rhipsalis baccifera*

11. **Platycerium staghorn**

Platycerium is a genus of about 18 fern species in the polypod family, Polypodiaceae. Ferns in this genus are widely known as staghorn or elkhorn ferns due to their uniquely shaped fronds. This genus is epiphytic and is native to tropical and temperate areas of South America, Africa, Southeast Asia, Australia, and New Guinea (Hennipman, 1982) [18].

Platycerium sporophytes (adult plants) have tufted roots growing from a short rhizome that bears two types of fronds, basal and fertile fronds. Basal fronds are sterile, shield or kidney shaped and laminate against the tree and protect the fern's roots from damage and desiccation. In some Platycerium species the top margin of these fronds forms an open crown of lobes and thereby catches falling forest litter and water.

Fertile fronds bear spores on their undersurface, are dichotomous or antler shaped and jut out or hang from the rhizome. The spores are born in sporangia clustered in large sori that are usually positioned on the lobes or at the sinus between frond lobes.

Some species of Platycerium are solitary having only one rhizome. Other species form colonies when their rhizomes branch or when new rhizomes are formed from root tips. If the conditions are right the spores will germinate naturally on surrounding trees. Platycerium gametophytes are a small heart-shaped thallus. Platycerium have diverged into four natural groups. Several Platycerium are strongly adapted to xeric conditions and the drought tolerating mechanism Crassulacean Acid Metabolism has been reported for P. veitchii. (Kreier, Hans-Peter; Schneider, Harald (2006) [25]. The conditions for it growth and proliferation here in Amedzofe may not be different from that of the other species mentioned above.

Figure 11: *Platycerium staghorn*

Conclusion

Amedzofe is a biologically diverse area with all kinds of species of organisms ranging from animals to plants perhaps due to the unique geographical location and environmental conditions. This study identified a total of eleven facultative epiphytic species namely *Asplenium nidus, Campylocentrum micrantum, Drynaria quercifolia,* Folios Lichen, *Microgramma lycopodioides*, *Microsorum pustulatum,* Moss, *Nephrolepis exaltata, Sarcochilus sp., Rhipsalis baccifera* and *Platycerium staghorn*. This number of epiphytic species were significant in the face of increasing destruction of forests by anthropogenic activities and serves as baseline data upon which future research in this mountainous area may be compared since, they are indicators of environmental health. A number of factors may contribute to this area holding this numbers of epiphytes; a combination of (a) humid climate, caused by high rainfall (1400–1600 mm), and (b) presence of high-elevation forests, create the ideal niche for proliferation of epiphytes at this elevation. Temperature (mean, 22 to 32 °C), substrate and water availability may also play vital roles in the survival of the epiphytes at this altitude.

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