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Diversity and Ecology of Forest Ecosystems

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The butterfly fauna (Lepidoptera: Papilionoidea) of Liberia

PhD dissertation

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NYILATKOZAT

Alulírott **Sáfián Szabolcs** jelen nyilatkozat aláírásával kijelentem, hogy az **The butterflies (Lepidoptera: Papilionoidea) of Liberia** című PhD értekezésem önálló munkám, az értekezés készítése során betartottam a szerzői jogról szóló 1999. évi LXXVI. törvény szabályait, valamint a Roth Gyula Erdészeti és Vadgazdálkodási Tudományok Doktori Iskola által előírt, a doktori értekezés készítésére vonatkozó szabályokat, különösen a hivatkozások és idézések tekintetében.¹

Kijelentem továbbá, hogy az értekezés készítése során az önálló kutatómunka kitétel tekintetében témavezetőmet, illetve a programvezetőt nem tévesztettem meg.

Jelen nyilatkozat aláírásával tudomásul veszem, hogy amennyiben bizonyítható, hogy az értekezést nem magam készítettem, vagy az értekezéssel kapcsolatban szerzői jogsértés ténye merül fel, a Soproni Egyetem megtagadja az értekezés befogadását.

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36. § (1) Nyilvánosan tartott előadások és más hasonló művek részletei, valamint politikai beszédek tájékoztatás céljára – a cél által indokolt terjedelemben – szabadon felhasználhatók. Ilyen felhasználás esetén a forrást – a szerző nevével együtt – fel kell tüntetni, hacsak ez lehetetlennek nem bizonyul.



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Preface

Torben Larsen, author of the book “Butterflies of West Africa”, one of the foremost researchers of the African butterfly fauna told me once that the book “The butterflies of Liberia” by Fox *et al.* (1965) contains only approximately half of Liberia’s estimated butterfly fauna and he truly regretted that he was not able to visit the country due to long civil conflict in the area, as he believed there should be many interesting species hiding in Liberia. It also amazed me to read that half of West Africa’s remaining forests are found in Liberia’s 96 000 km², and forest habitats still cover about 40% of the country. It was therefore obvious to say yes, when Professor John F. Oates, a recognised primate ecologist and conservationist, then biodiversity program coordinator for the Putu Iron Ore Mining Inc. contacted me if I am interested to conduct a butterfly survey as part of the baseline biodiversity assessment in their licence area. During two field surveys in 2010 and 2011 I have met an unbelievable richness of butterflies in the Putu Range, including a few undescribed species and many new country records, realising how right Torben Larsen was, but also realising, how unique the butterfly fauna of the so called Liberian subregion appears, if studied in depth and looked at in the context of the butterflies of West Africa. Since 2010, I had the chance to return to Liberia on multiple occasions, each trip covered different localities to study, and I had the opportunity to survey the majority of main habitat types of Liberia from the lowland hyperwet forest of the Gola Forest National Park via coastal savannah and swamp forests of Lake Piso to the unique upland and sub-montane forests of Putu Range and the Nimba Mountains. The knowledge I gained during these field trips were supplemented by data collected in the first half of the 20th century and were summarized in the book “The Butterflies of Liberia” by Fox *et al.* (1956) and consultation with other lepidopterists, who worked in Liberia and the neighbouring Ivory Coast, Guinea and Sierra Leone. I also consulted, or on many occasions I just listened to scientists of various fields, as their knowledge helped me understanding the fauna and vegetation types of Liberia and even some butterfly food plant species. All data collected from the various resources supplemented by my own personal field observations were amalgamated into this monograph, which is presented as a PhD dissertation below. I hope this work will be a useful contribution towards better understanding of the fauna of Liberia and the Liberian subregion and toward the protection of many of Liberia’s unique and species-rich habitats.

1. Introduction

Earth is experiencing the sixth extinction event (Eldredge 2001, Kolbert 2014), which – as evidence shows – is a result of the cumulated effects of human activities since the dispersal of *Homo sapiens* of approximately 100 000 years ago through the industrial revolution to the present technological advancement. The main components are environmental pollution, urbanisation, deforestation and destruction of other natural habitats as the ever-growing human population is slowly taking over the entire planet (Ceballos *et al.* 2015).

To understand the processes and to target the mitigation of human footprint, we urgently need to understand the key ecosystems including the 25 identified biodiversity hotspots (Mittermeier *et al.* 2001) as entire biomes could disappear before we even begin to understand their biological composition. Although insects account for almost 60% of all described species (Stork 1988), knowledge on their communities is extremely limited and their importance has been marginalized until very recently, when the spotlight was directed on the global pollination crisis by various authors (e.g., Steffan-Dewenter *et al.* 2005, Kluser & Peduzzi 2007, Tylianakis 2013). For the above-mentioned reasons, the importance of checklists and understanding of species distribution is growing rapidly, as they serve as important tools for assessment of biodiversity and risk of extinction and contribute to the identification of key ecosystems and other areas of outstanding conservation importance (Purvis *et al.* 2000).

National checklists of any invertebrate groups or actually any animal groups except primates, large mammals or the avifauna are scarce in West Africa. Comprehensive list on the butterfly fauna exists only for four countries The Gambia, Guinea-Bissau, Ghana and surprisingly for Liberia, but only the former three are recent (Bivar-de-Sousa *et al.* 2008, Consciência *et al.* 2008, 2009, Larsen *et al.* 2007, Mendes *et al.* 2007a, 2007b, 2008, César *et al.* 2010, Penney 2009). Despite the massive work done by collectors and lepidopterists over the last two centuries, a lot more to be done to uncover the butterfly diversity in West Africa. Although 78 butterfly taxa unknown to science have been discovered in West Africa during Torben Larsen's 35 years of research for his book by him and his colleagues (Fee & Collins 2015), during the field work for the present research program in Liberia the number of new discoveries continued to grow. These data contribute to the better understanding of the butterfly fauna of West Africa and the biogeography of butterflies in one of the least known subunits of the region.

Hypotheses

Beyond presenting an updated checklist that contains all butterfly species previously recorded from Liberia and a few more predicted to occur in the country based on the vast number of biotic information collected for one decade, and also on comprehensive review of previous studies and literature data, a further aim is to understand the diversity and biogeography of the butterfly fauna of Liberia through finding answers to the following hypotheses:

1. Liberia and in the broader context the Liberian subregion encompass approximately half of all rainforest remaining in the Upper Guinean forest zone, covering over 4 000 000 hectares. These forests are predicted to harbour a butterfly diversity, generally richer than the surrounding forest areas (e.g. Ghana, eastern Ivory Coast, central and southwestern Guinea), as indicated by preliminary data available and some of the previously found endemic and restricted-range species.

2. The large and intact lowland forest areas in Liberia and the isolated mountains could still host unrevealed diversity of butterflies which include previously undiscovered and scientifically undescribed species.

3. A considerable proportion of the newly discovered butterfly taxa are expected to be narrowly distributed and thus endemic to the Liberian subregion, due to its unique biogeographical setting, but also by the diverse topography of the subregion, including some of the highest isolated mountainous areas in West Africa.

4. Despite the relative intactness of the two major forest blocks in Liberia, vast areas of land have been utilized for agriculture of various intensity. This, alongside the urban and infrastructural development, opened up the closed canopy forest, allowing potential dispersal of ubiquitous and savannah butterflies across the country. However, it is hypothesized that the special geographical position and humid macroclimate prevents the influx of masses of species from the northern savannah belt, and Liberia continues to maintain a true forest butterfly fauna with low proportion of other ecological elements.

5. All previously highlighted hypotheses support the recognition and a more precise redefinition of the Liberian subregion (previously referred to as Liberia subregion or Liberia forest region based mostly on data of plants and vertebrate animals), a currently vaguely defined biogeographical sub-unit of the Upper Guinean forest zone.

2. General overview of the literature and history of butterfly research

2.1. Overview of the literature on butterflies in West Africa

Historic records

Butterfly research in West Africa began in the time of Carl Linné's classical descriptive science. Actually, the first West African butterflies (e.g. *Papilio nireus*, *Colotis euipepe*, *Acraea zetes*) were described by Linné in his famous "Systema Naturae X." (Linnaeus 1758) as pointed out by Larsen (2005). Collected butterfly material usually arrived in Europe on the ships from the African colonies. As these ships stopped regularly on the western coast, many collecting localities were misattributed to the location of the ship's original port of departure. This is why the majority of butterflies collected in today's Western Cameroon and Nigeria's Cross River Loop are all recorded with labels "Calabar" or "Old Calabar", which was the main port in the Bight of Bonny or Bight of Biafra Colony. Another classic "locus typicus" is "Sierra Leone", which was the last stop of British ships on mainland Africa before heading Europe. Many of Drury's material certainly arrived from present day Sierra Leone but definitely from West Africa west of the Dahomey Gap, since many species, described in his volumes (Drury, 1773, 1782), later proved to be endemic to the Upper Guinean forest zone (e.g. *Pseudacraea hostilia*, *Euphaedra perseis*). The holotype of the largest African butterfly – *Papilio antimachus* Drury, 1782 also originates from Sierra Leone and was described also by Drury. Butterfly collecting in West Africa intensified with the expansion of colonies during the 19th century and considerable emphasis was placed on natural history research on the African continents. Even colonial officials or missionaries became interested in collecting specimens of wildlife in Africa, sending vast amount of material to European museums. By the publication of the first comprehensive work by Aurivillius (1898), approximately 1600 butterfly species were already known from the continent, which is about 40% of what is known today, but just two decades later this reached over 2000 species in the African volume of Seitz (Aurivillius 1925). The publication of Seitz induced a boom in butterfly research in Africa. Between 1925 and 1952, when Peters (1952) summarized the species known from the continent, not less than 446 papers and books have been published on African butterflies, although the majority dealt with the East and South African fauna, (www.abdb-africa.org, Bibliography Database). Butterfly research in West Africa was intensified only in the late 1950s and the 1960s, when Boorman started publishing a series of papers about Nigerian butterflies, describing selected groups in each volume (Boorman & Roche 1957, 1959, Boorman 1961, 1965, 1973). Parallel to Boorman's work, Fox and his colleagues compiled their book on Liberian butterflies, which became the most comprehensive publication on the butterfly fauna of a West African country (area, colony) at the time (Fox *et al.* 1965). In 1968 Larsen published his first paper on butterfly migration in Nigeria, which was the beginning of a new era of butterfly research in West Africa (Larsen 1968). Between his first publication and the completion of his comprehensive book on West African butterflies, Larsen wrote, or was involved in writing of more than 200 scientific papers, research reports and book chapters; many

of these were dealing with various aspects of West African butterflies, including their taxonomy, ecology, also with behavioural studies and conservation of butterfly habitats. Larsen has completed his book on the Kenyan butterflies in 1991, covering the entire fauna of more than 800 butterfly species (Larsen 1991), and at the same time he started his project to compile and present all available knowledge on West African butterflies in a single book. His work was published almost 15 years later in two volumes in November 2005 with detailed descriptions and the summary of knowledge of almost 1500 butterfly species occurring between western Cameroon and the shores of Senegal and Mauritania (Larsen 2005).

Recent research

The publication of Larsen's "West Africa" book quickly became a tool for identification, but it also provided relevant information about each species for further ecological work and for conservation. It basically triggered a series of fine scale faunistic research work, with several papers published from various West African countries, presenting the butterfly fauna of single smaller areas or occurrence data of high geographical accuracy for selected groups of butterflies for larger areas or annotated checklists of smaller areas of even for countries (e.g. Bivar-de-Sousa *et al.* 2008, Consciência *et al.* 2008, 2009, Larsen *et al.* 2007, 2009, Mendes *et al.* 2007a, 2007b, 2008, César *et al.* 2010, Sáfián *et al.* 2009, 2012, Coache *et al.* 2017, Tennent & Russel 2015, 2019). The easy access of information about many aspects of butterflies also led to the intensification of ecological studies in West Africa. Many recent ecological research programs were inspired by Larsen's work using the book for identification (Bossart & Opuni-Frimpong 2009, Bossart *et al.* 2006, Elbers & Bossart 2009, Sáfián & Larsen 2009, Tropek & Konvička 2009, Sáfián *et al.* 2010), and young generation African scientists also became interested in butterfly ecology after the publication of the book (Oduro & Aduse-Poku 2007, Sundufu & Dumbuya 2008). Butterflies became a new toolkit of international conservation organisations to assess biological diversity, as they became relatively easy to record-detect and represent a species rich group, which, apart from dragonflies (Dijkstra & Vick 2004, Clausnitzer *et al.* 2012), is probably the only invertebrate group that could be used in assessments of biological value of a West African natural area (Larsen 2006). Conservation International added butterflies to their West African Rapid Assessment (RAP) program resulting in better understanding of the butterfly fauna of high nature value areas in Ghana (McCullough *et al.* 2007, 2008) and Guinea (Wright *et al.* 2006). The importance of inclusion of butterflies in biodiversity surveys also increased, as butterfly data are now regularly demanded for the baseline data collection for the establishment of new protected areas or for gazettelement of national parks in West Africa (Belcastro & Larsen 2006, Brattström 2010, Sáfián 2010, 2012, Sáfián *et al.* 2020c) and for other conservation projects (Sáfián & Warren 2010). Taxonomic research on West African butterflies also accelerated recently, partially induced by the publication of Larsen (2005), as several new butterfly genera were highlighted in taxonomic revisions (Libert 2010, 2014, 2016, 2020,

Richardson 2019, 2020) and numerous new species and subspecies were described in recent papers, all with reference to Larsen's comprehensive work (e.g. Collins & Larsen 2008, Larsen 2009, 2012, 2013a, 2013b, Larsen *et al.* 2009, Mitter *et al.* 2011, Pyrcz *et al.* 2011, 2013, Sáfián 2015a, 2015b, Sáfián & Collins 2014, 2015, Sáfián *et al.* 2013, 2015a, 2015b, 2019, 2020a).

2.2. Overview of the literature on butterflies and history of butterfly research in Liberia

Historic records

The list of literature dealing with Liberian butterflies is not long. Apart from a few early papers that published checklists from collecting trips (e.g. Büttikofer 1890), or describing new species e.g. *Bicyclus dekeyseri* Condamin, 1958 (Condamin, 1958), there is only one major work on the butterflies of Liberia, compiled by Fox *et al.* (1965). This book summarised the knowledge on the butterfly species known to occur in Liberia by the time, including their taxonomic status and natural history. Also, a few new taxa were described in this book, most of them still stand as valid: *Evena niji* (Fox, 1965), *Euriphene amicia gola* Fox, 1965, *Euptera zowa* Fox, 1965. In the time of publication, it was a pioneer work, since no comprehensive checklist summarizing butterflies in any West African country has been previously compiled and published. It contained short descriptions and records of 475 species, compiled from various Lepidoptera collections, especially the large materials, collected during the early 20th century by various amateur insect collectors (e.g. American missionaries and WWII military officers), and were subsequently deposited in the Natural History Museum, London or in the Carnegie Museum, Pittsburgh. Fox and colleagues' work includes rather accurate locality records collected from publications and also all specimen records collected personally by Richard M. Fox and his wife between 1954 and 1959. Based on his extensive studies Larsen (2005) pointed out that Liberia's forests should host approximately 750-780 butterfly species, which was a prediction 40% higher than the actual species richness recorded by Fox *et al.* (1965). It is quite clear from their checklist that many of the key biodiversity areas, such as Sapo National Park or the Nimba Mountains (as identified recently by conservation authorities and international conservational organisations) were not, or only very briefly visited by Fox or other collectors in the past, and thus many rare species and habitat specialists remained hidden.

Surveys in Sapo National Park and the Nimba Mountains

More systematic research on the butterfly fauna began only after the complete cessation of the long civil conflict in 2003, when conservationists and researchers returned to Liberia and protection of the most species-diverse habitats became also a political priority. Sapo National Park received much of attention even before the conflicts (it was gazetted in 1981), as it is the

second largest protected forest area in West Africa next to Ivory Coast's Taï National Park. Sapo is a stronghold of Forest Elephants, Pygmy Hippopotamus, Western Chimpanzee and several other primate species (Anderson *et al.* 1983, Barnes & Dunn 2002, Collen *et al.* 2011). In 2008 and 2010 two expeditions were organised by the Fauna and Flora International to collect data on the butterfly fauna of Sapo. The first one resulted in 159 species, collected by Stephen Georgiadis, an amateur Lepidopterist and donor of Fauna and Flora International (FFI). Although no scientific report was produced after the trip, Georgiadis has sent his specimens to Torben Larsen for identification and the butterfly records were incorporated into the Liberian butterfly database based on Larsen's list (pers. com.) Georgiadis also found a species, which was identified as new to science and described as *Anthene georgiadisi* Larsen, 2009 (now *Neurellipes georgiadisi*) by Larsen (2009). After Fox *et al.* (1965) this was the first new butterfly described from Liberia. Georgiadis' short visit was followed by a two-week butterfly diversity survey conducted by Oskar Brattström of the Zoological Museum of Cambridge University, UK in November-December 2009. Brattström was working in the northern section of the park and recorded 244 butterfly species, including thirty-three new country records (Brattström 2010). The specimens collected by Brattström were deposited in the scientific collection of the African Butterfly Research Institute (ABRI), Nairobi and his data were revised for this work, resulting in omission of *Mimeresia cellularis* (Kirby, 1890) and *Euphaedra mariaechristinae* Hecq & Joly, 2003 from the checklist. Still, these two expeditions to Sapo already demonstrated how under-recorded the butterfly fauna was in Liberia, especially in remote areas.

Boireau (2009) has visited the Liberian part of the Nimba Mountain during two field expeditions in 2008 to survey the butterfly and moth diversity as part of the baseline biodiversity surveys for mining exploration by ArcelorMittal, Liberia. He surveyed mostly the East Nimba Nature Reserve (ENNR) and Mount Tokadeh in the Western Range. Both areas were previously affected by mining activities in the 1960-80s by LAMCO, a Swedish-American mining company, which actively mined iron ore in the Nimba Mountains, causing much of damage to the forest habitats once covered the main Nimba ridgeline in Liberia. Boireau collected approximately 279 butterfly species; unfortunately, many of them remained unidentified and others could easily have been misidentified, thus leaving his data partially unreliable. Despite this, Boireau provided important distribution data on many species, including the first Liberian records of the submontane specialists *Uranotauma belcastroi* Larsen, 1997, *Vanessula milca angustifascia* Joicey & Talbot, 1928 and *Hypolimnas aubergeri* Hecq, 1987, and the second record of *Geritola subargentea continua* Libert, 1999 from West Africa, also one of the few Guinea savannah-transition species *Liptena ferrymani bigoti* Stempffer, 1964. Beside Boireau, Ben Phalan, a British ornithologist also recorded butterflies occasionally in the Liberian Nimba, mostly through digital capture. Phalan was actually the first person to record the IUCN red-listed *Papilio antimachus* Drury, 1782 from the Liberian parts of the Nimba Mountains in 2009 and the first Liberian record of the local and crepuscular skipper *Katreus johnstoni* (Butler, 1888) (Phalan 2010).

Sáfián's expeditions and data collecting 2010-2020

From December 2010 onward, the author participated various field expeditions and biodiversity surveys, which resulted in further data of interest, building up a solid base for this dissertation. The Putu Range, previously known only from a few old records (e.g. Penoke) by Fox *et al.* (1965) was extensively surveyed in December 2010, January and April 2011 and in November-December 2012. During the three field surveys 484 butterfly species were recorded and positively identified, more than in Fox *et al.*'s entire checklist (Sáfián 2011). Among many new country records, four taxa were confirmed as new to science: *Liptena neiltennanti* Sáfián, 2021, *Cephetola praecox* Sáfián, 2021, *Pilodeudorix putu* Sáfián, 2015, *Triclema melambrotus* ssp.n. The Gola National Forest was surveyed during a trans-boundary conservation program “Across the River”, which was targeted to link up the protected forests in the Liberian Gola area to the recently established Gola Rainforest National Park in eastern Sierra Leone. The author surveyed three Liberian localities in the Gola National Forest in January-February 2011, recording 354 butterfly species. Among these, three proved new to science: *Iridana kollariki* Sáfián, 2014, *Geritola pacifica* Sáfián & Libert, 2015, *Parasiomera alfa* Sáfián, 2015, while another 16 were new country records additional to those found in Putu (Sáfián 2013). The author first visited the Nimba area in February 2012, when he surveyed the Western Range as part of ArcelorMittal, Liberia's Environmental and Social Impact Assessment for the Phase 2 iron ore mining project. During the survey, two butterfly species collected were proved new to science: *Aphnaeus mirabilis* Sáfián & Collins, 2013 and *A. nimbaensis* Sáfián & Libert, 2013 (Sáfián *et al.* 2013), *Iridana hypocala* Eltringham, 1929 was also recorded for the first time in West Africa, west of the Dahomey Gap. Recognising how the butterfly fauna of the Nimba Mountains was in further need of study, Sáfián returned to the area in 2013, spending almost five months with field studies covering both the wet and the dry seasons. A total of 375 species were recorded during the wet season survey in 2013, including three species new to science *Aslauga larseni* Sáfián, 2015, *Cephetola wingae* Sáfián, 2015, *Stempfferia katikae* Sáfián, 2015, and many species, which have not been previously recorded from Liberia. The dry season survey revealed 420 butterfly species, adding another three species unknown to science: *Stempfferia michelliberti* Sáfián, Warren-Gash & Belcastro 2021, *Pilodeudorix mano* Sáfián, 2015, *Pilodeudorix intermedia* Sáfián, 2015 and a number of new country records (Sáfián 2014a). Sáfián's research trips had to be suspended during the ebola crisis in 2014 for over two years, but he returned for further research trips in 2016 and 2017 in the Nimba Mountains. These visits continued to add new country records, such as *Anthene agumatsa* Libert, 2010, *Iolaus menas* Druce, 1890, *I. scintillans* Aurivillius, 1905 and *Gomalia elma* (Trimen, 1862) (Sáfián previously unpublished). Three research expeditions were also organised by the African Natural History Research Trust, UK between November 2017 and February 2018 and November-December 2018, collecting butterfly data from previously unvisited sites, such as the Foya Proposed Protected Area, the Wologizi and Wonegizi Mountains in north-western Liberia and the Krahn-Bassa Proposed Protected Area in Sinoe County. Not surprisingly, the number of recorded species continued to grow during these

expeditions, although the new findings now required significantly more time and effort. Still, another undescribed taxon, now named as *Cephetola wologizi* Sáfián, 2021 was collected, also a number of species not even expected to be found in Liberia: *Iridana agneshorvathae* Collins, Larsen & Sáfián, 2008 (previously found only in Ghana and most recently in Benin) (Sáfián & Coache 2020), *Pilodeudorix mera*, a species previously known from a single mountain in Ivory Coast in West Africa, *Bicyclus uniformis* (Bethune-Baker, 1908), a species of wet forest in West Africa, the extremely rare skipper *Ortholexis dimidia* (Holland, 1896) and another one *Bettonula bettoni nimba* (Collins & Larsen, 2000), which was previously believed to be a Nimba endemic species. Two crepuscular skippers, *Pteroteinon capronnieri* (Plötz, 1879) and *Leona maracanda* (Hewitson, 1876), captured at moth light – were also added as new records to Liberia.

Sáfián returned to Liberia in February 2020 for a proposed brief visit, which was involuntarily extended due to emergency lockdown during the COVID pandemic. He did opportunistic collecting in the Nimba area and in the Sapo National Park, resulting in four additional new country records: *Azanus moriqua* (Wallengren, 1857) (Sáfián 2020b) and *Pseudaletis subangulata* Talbot, 1935 with exact locality data from the Nimba Mountains, and *Meza mabea* (Holland, 1894) and *Pseudaletis agrippina warrengashi* Libert, 2007 from Sapo National Park.

3. Materials and methods

3.1. The study area

3.1.1. Physical geography

Liberia is situated in West Africa, covering approximately 96 300 km² between the latitudes 11°29'56.68"W and 7°31'53.02"W along the 550 km long Atlantic coast. The country is bordered by the Moa and the Mano Rivers in the west and by the Cavalla River in the east. The northern borders are geologically less well defined and are running through rather rugged terrain south of the towns of Gueckédou, Macenta and N'zérékoré in Guinea, then across the high range of the Nimba Mountains and south of Danané and Toulépleu further east in Ivory Coast. The majority of the country lies in the lowland zone, ranging between the sea level and 400 m. However, the western half of Liberia has scattered hilly areas, which do not reach the upland zone (e.g. Bomi Hills, Mount Swa) at 700-750 m. The Putu Range, an isolated low mountain in eastern Liberia is unique with its highest peaks reaching over 700 m. The landscape becomes more mountainous towards northwest, and this area should already be considered part of the Guinea Highlands. Several peaks reach over 800 m and scattered mountains, reaching higher than 1000 m are also present. However, only two areas could be considered as truly mountainous, The Nimba Mountains in the north, which reaches to 1370 m on the Liberian side, but has its highest peak on the border between Guinea and Ivory Coast (Mont Nimba or Mont Richard-Molard) reaching 1752 m. The other high mountain range in Liberia lies further northwest and is usually referred to as Wologizi Mountains with the highest peak Mount Wutewe, reaching approximately 1400 m (different values appear on various maps). Including those that border the country, Liberia has six major rivers, all flowing from the north in a direction more or less perpendicular to the coastline. From west to east these are: Mano, Lofa, St. Paul's, St. Johns, Cestos and Cavalla. The climate of Liberia is tropical, with 27°C mean annual temperature, and with the highest annual rainfall in West Africa (west of the Cameroon-Nigerian border). The precipitation still varies significantly between the coastline and the north (Figure 1). The south is being the wettest with over 5000 mm of annual rainfall, while in the northwest it could remain below 2000 mm. The precipitation pattern also defines the seasons, as the majority of the rain falls between early May and the end of October, in a well pronounced rainy season. The dry season normally begins in mid November and lasts until late March, mid April with a Harmattan (or cold) season between mid December, end of February, when the northerly "Harmattan" wind blows constantly, carrying vast amount of Sahara dust. Biogeographically, Liberia is covered entirely by the vaguely defined Liberian subregion (or Liberia forest region) in the Upper Guinean forest zone. The boundaries and the main features of the subregion are discussed in detail in chapter 4.4.3.

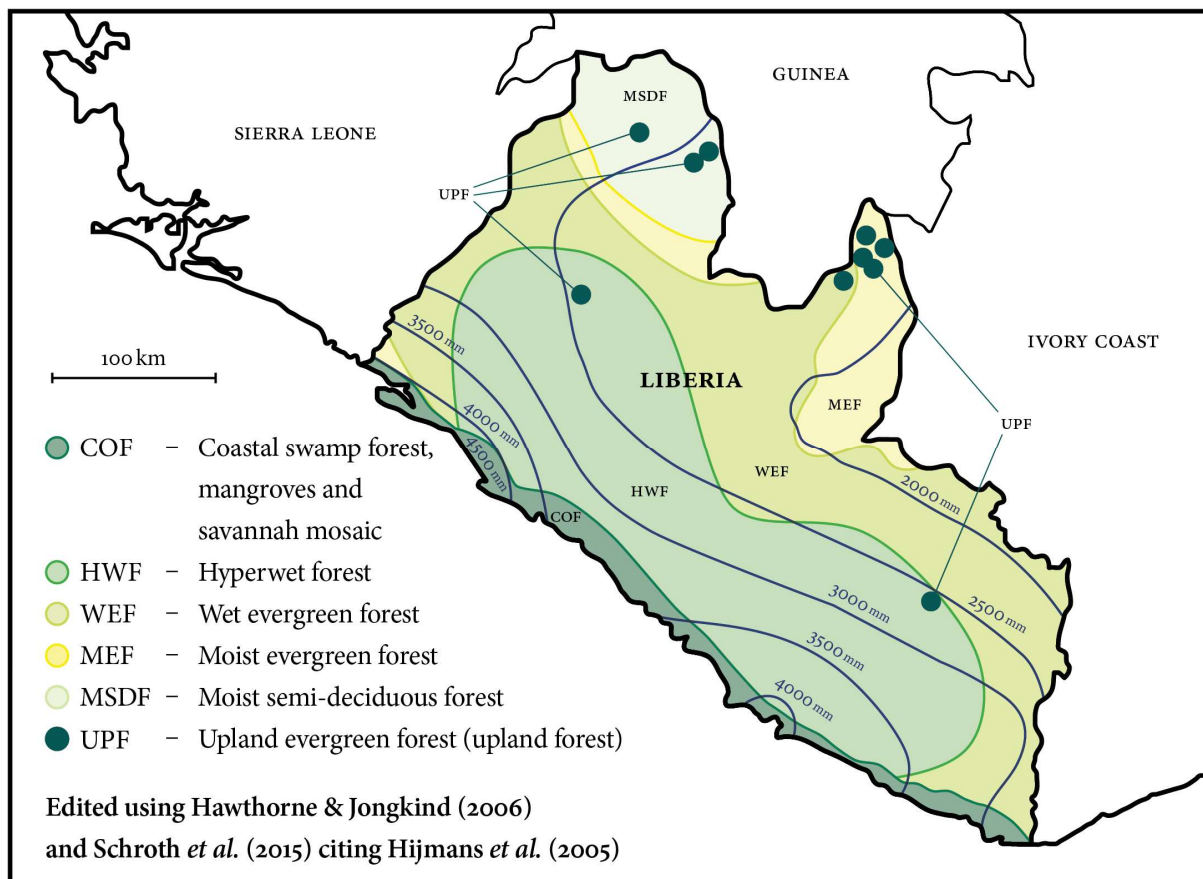


Figure 1. Vegetation zones in Liberia with the precipitation isohyets based on Hawthorne & Jongkind (2006) and Schroth *et al.* (2015) citing Hijmans *et al.* (2005).

3.1.2. Vegetation of Liberia

Originally, over 90% of the country was covered with rainforest (cc. 9 200 000 hectares). However, natural (or semi-natural) extrazonal savannah land occurred along the coastline, as well as on the top of some granite rock mountains in the north-west. Mangrove swamps used to dominate in a narrow belt along the coastline and in the lagoon. Unfortunately, in the last decade the landscape has been dramatically transformed, and the forest is now divided into two major forest blocks in the west and the east, separated by a densely populated area, dominated by settlements, plantations and other agricultural land. The mangroves were largely cut for development or fuelwood. Still, natural habitats cover over 40% (4 300 000 hectares) of the country, and Liberia today has about 50% of the total remains of the once extensive Upper Guinean forest zone stretching between southern Senegal and eastern Ghana.

Main natural habitat types

The zonation of Liberian forest and the precipitation isohyets are illustrated on Figure 1. compiled using literature sources (Hawthorne & Jongkind 2006, Schroth *et al.* 2015 citing Hijmans *et al.* 2005). However, it is important to explain that these zones were established on the basis of limited biotic data and could show inconsistency with maps found in other literature sources. As an example, the Gola Forests in Sierra Leone are referred to as moist evergreen forest by White (1972) and Cole (1993) repeated also by Klop *et al.* (2008) with reference to the presence of moist semi-deciduous forest but in Hawthorne & Jongkind (2006) the Gola Forests appear in the wet evergreen zone, furthermore Poorter *et al.* (2004) include the entire area that encompasses the Gola Forests in the hyperwet forest zone. Although the various subtypes of lowland forest are discussed in the description below only collectively, they are more highlighted in the ecological classification of butterflies (chapter 3.3.2) and also explained in more detail in chapter 4.3.1.

Lowland Forest

The lowland rainforests of Liberia still cover approximately 40% of the country, divided into various subtypes according to annual precipitation and tree species composition (Poorter *et al.* 2004). The forests in the south-southwest belong to hyperwet forest (Figure 2). This category was recently introduced to describe the wettest types of lowland forests of Liberia and Sierra Leone (Poorter *et al.* 2004), which differs from other forest types in tree composition and receive over an annual rainfall of 3000 mm. The forests change to wet evergreen, moist evergreen, moist semi-deciduous and dry semi deciduous along the precipitation gradient from southwest to northeast, although the latter is not represented in Liberia (Poorter *et al.* 2004), as the boundary lies north of the administrative border of Liberia. These forests are characterized by multiple canopy layers, including an emergent canopy with outstanding emergent trees and very dense undergrowth, and host incredible diversity of vascular plants and animals, including many endangered and/or endemic animal species. Lowland forests collectively host nearly 700 species of Liberia's butterflies, including a high proportion of Liberian subregion endemics (see in detail in chapter 4.3.1 and 4.4.1).



Figure 2. Hyperwet lowland rainforest on the border between Liberia and Sierra Leone (Moro River)(Photo: Annika Hillers).

Upland forest (upland evergreen forest)

The upland evergreen forests in West Africa cover only a small area (Hall & Swaine 1976, 1981). In Ghana, they occur in two low mountainous regions, the Atewa Range and the Tano Ofin Forest Reserve, usually above 500 metres (McCullough *et al.* 2007). Upland forests are present also on Mount Péko, on Mount Tonkoui and on other scattered mountains in Ivory Coast (although no information on the vegetation was found) and as recently discovered, upland forest occurs also in the Putu Range in eastern Liberia. Structurally, upland evergreen forests are similar to lowland forests, but they are usually denser in epiphytes due to higher annual rainfall and continuous presence of mist, resulting also a less pronounced dry season (Figure 3). They are characterized by higher species diversity and the presence of special upland elements in the flora and fauna, which are usually missing from lowland forests and these, therefore have very patchy distribution (e.g. tree ferns, *Rubus* spp.). West African upland forests harbour a remarkably high diversity of butterflies, as described by Larsen (2005, 2007), also by Sáfián (2012), usually with presence of a number of restricted range or narrowly endemic species.



Figure 3. Morning mist and regular rainfall set the unique climate of the upland forests of the Putu Range, which harbours a number of endemic species (Photo: Erika Zakar).

Submontane forest

Only very little information was found about the character of the Liberian submontane forests, and the boundary and differences between upland forest and submontane forest is unclear. However, Coe & Curry-Lindahl (1965) briefly describe the ‘mist-forests’ or ‘Parinari forests’ of the Nimba Mountains, which replace upland forests above 900 m which altitude is also referred to as the cloud line (Figure 4). These forests have a single high canopy with no emergent trees, with *Parinari excelsa* being the dominant tree species. A second lower canopy with smaller trees and scattered shrubs in the shrub layer is also present but the undergrowth is not dense. According to personal observations, this forest type usually appears above 1000-1100 m and reaches on the slopes above 1400 m (on the Guinean-Ivorian side of the Nimba Mountains) with gallery forest in the often-narrow gullies stretching up to above 1600 m asl. Although the diversity of butterflies is generally lower in submontane forests, a few unique species are associated with this forest type: e.g. *Uranothauma belcastroi*, *Vanessula milca angustifascia*, *Mylothris boireaui* (they occasionally also descend into the upland zone).

unique habitat type, which is certainly of ecological interest. The species composition and the turf height vary according to soil conditions but the woodland is dominated by a single tree species, *Neocarya macrophylla* (Sabine), which is a widespread and common fire-resistant tree in the West African savannah zone (Geerling 1985) (Figure 5). So far only a single real savannah butterfly was recorded from the coastal savannah: *Eicochrysops dudgeoni*, but the coastal savannah is unique to host a high richness of Epitolini (Lycaenidae, Lipteninae), which, everywhere else in West Africa are typical forest dwelling species. The main reason for this unique occurrence is the unique mesoclimate of the area. All Epitolini develop in myrmecophilous relationship with arboreal *Crematogaster* ants, which usually place their nests on the tree bark, in rainforest, always above the lower canopy level. The low *Neocarya* trees grow in a network, very similar to the network of emergent trees in the rainforest, and the high humidity, typical in rainforest is provided by the proximity of water in the coastal savannah both from the Atlantic Ocean and Lake Piso, the largest sweet/brackish water lake in Liberia with an area of 103 km². Among several commoner Epitolini, *Geritola frankdaveyi* was bred from caterpillar, collected from the bark of a *Crematogaster* ant-infested *N. macrophylla* tree (Sáfián 2015c).



Figure 5. Coastal savannah with *Neocarya macrophylla* (Sabine) Prance ex F.White trees near Lake Piso (Photo: Szabolcs Sáfián).

Mangrove forest and swamp

Mangrove is the only halophyte plant association, where trees and shrubs are the dominant vegetation along tropical and subtropical coastlines, depending on the regular inundation of saline sea water. It used to cover a narrow belt along Liberia's costs, in confluences and lagoons

(Ball 1996, Alongi 2002); however, mangrove forests and swamps have largely disappeared due to human activities. The remnants of the forests are still threatened, as the density of human population (similarly to other West African countries) is among the highest in Liberia. The mangroves are characterised by a few dominant saline tolerant tree species and a single, relatively low canopy layer and sparse shrub layer. Herbs are virtually missing from mangrove forests due to regular inundation and high concentration of saline salt. Mangroves are of high conservation concern as a high number of shore birds are associated with this habitat type, also the mangrove belt is a nesting area for various species of sea turtles (Lutz & Musick 1996). Despite the role of mangroves in the coastal ecosystems, no butterfly species in West Africa west of the Dahomey Gap are strictly associated with mangrove vegetation, and thus mangroves are not included in further discussions in the present work.



Figure 6. Interior of young secondary forest (secondary growth) at the foothills of the Nimba Mountains, dominated by pioneer tree species, such as *Musanga cecropioides* R.Br. (*M.smithii* R.Br.)(Photo: Ádám Kőrösi).

Modified and converted habitats

Degraded secondary forest (secondary growth)

Due to permanent human activities from the 19th century, only a small proportion of natural forest areas could be determined as primary forest in Liberia. As tropical hard wood always had

high export value, large forest areas have been heavily logged or even clear-felled by various logging companies, particularly during the times of the civil conflict, when such activities could be carried out uncontrolled by authorities. With the growth of human population further forest areas have been converted into agriculture land by the traditional shifting agriculture. A large proportion of these areas have been abandoned during the civil conflicts, and forest could regenerate forming younger or older stands of natural secondary growth. These secondary forest areas are usually without tall canopy and dominated by a few, fast growing pioneer tree species: e.g. *Musanga cecropioides*, *Terminalia ivorensis*, *Ceiba pentandra* (Figure 6). In other cases, many timber trees were harvested out of the forest stands, leaving a tall open canopy, formed by a few species, which had no timber value, or which could not be harvested by the old chainsaws: *Lophira alata* (Figure 7). In either case secondary forests or secondary growth provide important habitat for many forest butterflies, as the regenerating thick shrub layer and the quickly closing forest canopy are able to maintain forest microclimate and caterpillars of many butterflies actually feed on smaller trees and bushes rather than foliage of high canopy emergent trees.

Secondary savannah grassland

In the forest zone secondary savannah grassland could develop only where the original soil structure was physically damaged (removed), or after initial damage, the topsoil was washed off by the heavy rains uncovering the laterite foundation, and no woody plants could regenerate. These grasslands usually cover usually smaller, rather isolated areas around towns and villages, but they found also along roads and industrial areas. A special, rather species-rich grassland formation is found in the Nimba Mountains, where sub-montane secondary grassland could develop in larger extent on bare mineral surface after extensive mining for decades in the 1960-80s (Figure 9) (Poilecot, 2015).

Secondary grasslands could also develop due erosion caused by natural processes, in Lofa County, many rocky granite hills are barren or covered only by grassy caps, probably cleared by occasional landslides.

The majority of the savannah species recorded in Liberia was found only in these secondary grasslands, including *Ypthima impura*, *Phalanta phalanta aethiopica*, *Junonia chorimene*.

Agricultural land, plantations

Over 4 000 000 hectares are in permanent agricultural use in Liberia (FAO 2010). This includes the so-called shifting agriculture areas, where a relatively smaller portion of land is utilised by a family for a few years as crop farms, than abandoned for soil regeneration, forming a mixture of young farm bush, younger secondary growth and utilised farms.

These farms often host butterflies associated with open habitats, as they can find their foodplants, and also nectar source, in these enclaves, where the main crops are cassava, maize, or various vegetables (cabbage, beans, pepper) and fruits (pineapple) (Figure 8).



Figure 7. The only emergent tree species remained in a heavily logged secondary forest in the Gola Forest National Park is Ekki or Iron tree (*Lophira alata* Banks ex C.F.Gaertn) in Liberia, which, according to local people, was simply too hard to be felled by the old-technology chainsaw (Photo: Annika Hillers).



Figure 8. The practice of slash and burn agriculture destroys large forest areas; the forest butterfly fauna disappears completely and is quickly replaced by ubiquitous species and dwellers of more open habitats (Photo: Ádám Kőrösi).

Coffee and cocoa are important cash-crops and plantations are often found near larger forest blocks, where the humid climate required is maintained by the proximity of forest, also by the presence of shading trees left to protect the plantations. They can harbour relatively rich forest butterfly fauna, especially those live in the canopy on forest trees, climbers or epiphytes. The butterfly fauna of the large-scale industrial plantations is much poorer, especially in the extensive rubber and oil-palm plantations, where the undergrowth is cleared periodically by manual work, also by applying herbicides. The most commonly observed species in agricultural land are either associated with degraded forest vegetation or scrub, such as *Ypthima doleta*, *Junonia terea*, *Ariadne enotrea* or are ubiquitous and are able to survive in a wide range of habitats: *Papilio demodocus*, *Junonia oenone*, *J. sophia*, *Zizeeria knysna*.



Figure 9. Secondary grassland after mining in the submontane zone of the Nimba Mountains (Photo: Szabolcs Sáfián).

3.1.3. Fauna of Liberia

For obvious reasons, Liberia's marine and aquatic fauna is not discussed here. Liberia's terrestrial fauna is associated almost entirely with rainforest. All common large forest mammals are present in the extensive lowland areas: Forest elephant (*Loxodonta cyclotis*), Forest Buffalo (*Syncerus caffer nanus*) and Bongo (*Tragelaphus eurycerus*) are still widely distributed in the lowland areas, as well as Western Chimpanzee (*Pan troglodytes verus*) and several other primate species, such as Olive Colobus (*Procolobus verus*), Western Red Colobus (*Procolobus badius*) or the Liberian subregion endemic Diana Monkey (*Cercopithecus diana*) (Barrie *et al.* 2007, Blanc *et al.* 2007, Grubb *et al.* 2003, Oates *et al.* 2008). One of Liberia's most symbolic mammals is the Pigmy Hippopotamus (*Choeropsis (=Hexaprotodon) liberiensis*), which is strictly endemic to the Liberian subregion. It was also reported from the Niger Delta, but the Nigerian population represented a distinct subspecies and was hunted to extinction in the 20th century (Eltringham 1993). The Liberian population is also severely fragmented, and the species received endangered (EN) status on IUCN's red list (www.iucnredlist.org). Liberia is also home for ungulates of restricted range, including Zebra Duiker (*Cephalophus zebra*) and Jentink's Duiker (*C. jentinki*). Both inhabit lowland forests and are threatened by overhunting and deforestation (Peal & Kranz 1990). The bird fauna counts almost 700 species, including those migrating from Europe or from other parts of Africa. The endemic Liberian Greenbul (*Phyllastrephus leucolepis*) and the Upper Guinean White-necked Picathartes (*Picathartes gymnocephalus*) are among the most endangered species of African lowland rainforests, while Nimba Flycatcher (*Melaenornis annamarulae*) and Blue-moustached Bee-eater (*Merops mentalis*) have more patchy distribution, as they are confined to submontane or upland habitats in West Africa. The CITES listed Timneh Grey Parrot (*Psittacus timneh*) (formerly African Grey Parrot) is still widespread and relatively common in lowland Liberia (Borrow & Demey 2001). Despite its richness (e.g. Parker 1936, Loveridge 1941) only very little recent literature information is available of the herpetofauna of Liberia. Even the existing publications deal with the fauna of smaller areas (Hillers & Rödel 2007) or discuss a single taxon of conservation importance (Sandberger *et al.* 2010) of mainly amphibians. Even less is known about the invertebrates, apart from the old work of Jonhston (1906), who tried to compile the known invertebrates and the previous work on the butterfly fauna of Liberia by Fox *et al.* (1965), the invertebrate fauna of Liberia remains largely unknown.

3.2. Data collecting and Field methods

Literature data

During the extensive review of the available literatures on Liberian butterflies (see chapter 2 in detail), all records were digitised and incorporated into a database using various versions of Microsoft Excel from 7 to Microsoft Office 365. The backbone of the database was formed from the records listed in Fox *et al.* (1965), but many recent, very accurate distribution records were incorporated from the survey reports by Boireau (2009), Brattström (2010), Phalan (2010) and Sáfián (2011, 2013, 2013, 2014a). Previously unpublished specimen data from the collections of Stephen Georgiadis, Jens Lund (FFI Liberia) and Steve C. Collins (ABRI) were also added.

Field data

Field data collected by Sáfián and various field assistants were also incorporated into the Liberian butterfly database. The dates of field trips and survey localities are as follow in chronological order: Putu Range - December 2010 – January 2011, Gola National Forest (now Gola Forest National Park – February 2011, Putu Range – April 2011, Nimba Mountains (Western Range) – February 2012, Putu Range, Sapo National Park, Mount Swa – November-December 2012. Nimba Mountains (ENNR) – August-October 2013, Lake Piso – November 2013, Nimba Mountains (ENNR) – November 2013-January 2014, November-December 2015, December 2016, March-April 2017, September 2017, Foya Forest Proposed Protected Area, Wologizi Mountains, Nimba Mountains (ENNR), Lake Piso Multiple Resource Reserve, Krahn-Bassa Proposed Protected Area, Putu Range – November 2017-February 2018, Wologizi Mountains, 2018, Wonegizi Proposed Protected Area – March 2019, Grebo-Krahn National Park – April 2019, Nimba Mountains and other localities in Nimba County – February-August 2020, Sapo National Park – December 2020.

During the various field surveys the following methods were used to collect butterfly data:

Field observations and specimen capture using conventional butterfly net

Butterfly specimens were observed and identified in the field during both random and semi-selective sampling. In many cases easily identifiable species did not require capture of specimens, although species belonging to various groups were necessary to capture with butterfly net for correct identification (Figure 10). Various specimens have also been photographed in the field for identification. Semi-selective sampling involved visits of various micro-habitats, which are known to be favoured by various butterfly groups. Mud-puddling sites were frequently visited for butterflies seeking moisture or intaking dissolved minerals. Hilltops are frequented by many butterfly groups (e.g. *Iolais* spp., *Charaxes* spp.). *Crematogaster* infested ‘ant-trees’ were identified and inspected for adults of Liptenins (Lycaenidae) many of

which are known to display around the trees or in a nearby open area. Caterpillars of some species are also found on the tree trunk of ant-trees. Flowers of various plants attract butterflies in the blooming season. Regular visits of flowering bushes of the introduced and invasive *Chromolaena odorata* (L.) King and Robinson in forest edges revealed over 100 species during the recent surveys in Liberia, including rarities and new country records (Sáfián in prep.).

Bait-trapping

Baited trapping is among the most commonly used field methods to capture the so-called “fruit-feeding butterflies” (e.g. Fermon *et al.* 2000, Molleman *et al.* 2006, Bossart & Opuni-Frimpong 2009, Sáfián *et al.* 2010, Maicher *et al.* 2018). Fruit-feeding butterflies belong exclusively to the family Nymphalidae and without trapping many species are very difficult to record, as they either stay deep in the thick forest undergrowth (many Adoliadini) or live in the canopy of rainforest (like genera *Charaxes*, *Apaturopsis*, *Euptera*) from where they rarely descend to ground level. Trap data could also be used for quantitative analysis, depending on the design of the study. During data collection, a self-developed net-trap, modified from IKEA’s Fångst toy storage net/hanging net (<https://www.ikea.com/gb/en/p/ikea-ps-fangst-hanging-storage-w-6-compartments-turquoise-60462248/>) was used. The traps were produced from the net, cutting it half, allowing the production of two traps. The separators between compartments were removed, the entry holes on its side were covered and a horizontal gap near the bottom of trap to was opened to allow entry of butterflies. This gap is also used to handle trapped specimens and to place and handle the bait (Figure 11). The most commonly used bait was fermented banana puree, but a mix of other fruits (e.g. pineapples, mangoes) and occasionally rotten fish were also used.

Light trapping

A comprehensive study of the butterfly fauna of an Afrotropical country, should not exclude the use of artificial light, as many butterflies have crepuscular habits (e.g. *Melanitis leda*), some skippers could even be considered partially nocturnal (e.g. *Zophopetes* spp.). During the recent surveys, moth lamp (using 125W mercury vapour, 250W blended or 85-105W energy saving bulbs) with white sheets were set in order to collect various groups of Lepidoptera, including butterflies, wherever electricity sources were available (mains or generator). Portable cold cathode UV light-equipped traps run from 12V dry gel batteries or from Li-ion power banks were also used extensively in 2017, 2018 and 2019. Using moth light and traps revealed over ten butterfly species not recorded from Liberia by any other methods (see notes at the species account in the annotated checklist) and many other species, otherwise rarely observed were captured at moth light.



Figure 10. Capture of butterflies with conventional butterfly net in the Putu Range (Photo: Erika Zakar).



Figure 11. Modified IKEA Fångst trap set in the understorey to capture fruit-feeding butterflies. The bait is mashed-fermented banana or a mash of mixed fruits, occasionally rotten fish (Photo: Szabolcs Sáfián).

Table 1. Summary of recent field expeditions and the methods of recording butterfly data. Data source: peach colour background: Sáfián's own data or local assistants, identified by Sáfián, light green background: recent field collecting by other researchers. Field methods: N – General collecting using conventional butterfly net. FB – Fruit-baited trapping, LT – Light trapping, BR – caterpillar breeding.

Dates in chronological order	Survey locality	Duration of survey	Field method(s)	Author of data	Data source
February 2008	Sapo National Park	3 days	N	Stephen Georgiadis, Torben B. Larsen	Stephen Georgiadis, Torben B. Larsen pers. comm.
November - December 2009	Sapo National Park	2 weeks	N, FB	Oskar Brattström	Report (Brattström, 2010)
December 2010 - January 2011	Putu Range	1 and a half months	N, FB, LT, BR	Szabolcs Sáfián, Erika Zakar	Report (Sáfián)
February 2011	Gola National Forest	2 weeks	N, FB, LT, BR	Szabolcs Sáfián	Report (Sáfián 2012)
April 2011	Putu Range	1 month	N, FB, LT, BR	Szabolcs Sáfián, Martin Strausz	Report (Sáfián)
November - December 2012	Putu Range	1 month	N, FB, LT	Szabolcs Sáfián, Robert Tropek	Report
November 2012	Sapo National Park	2 weeks	N, FB, LT	Szabolcs Sáfián, Robert Tropek	Report
December 2010 - January 2011	Mount Swa	10 days	N, FB	Szabolcs Sáfián, Robert Tropek	Report
February - March 2012	Nimba Mountains	6 weeks	N, FB	Szabolcs Sáfián, Martin Strausz	Report (Sáfián & Larsen 2012)
August - October 2013	Nimba Mountains	2 months	N, FB, LT	Szabolcs Sáfián, Ádám Kőrösi	Report (Sáfián 2014)
November 2013	Lake Piso	1 week	N, FB	Szabolcs Sáfián, Ágnes Horváth	unpublished data det. Sáfián
November 2013 - January 2014	Nimba Mountains	2 months	N, FB, LT	Szabolcs Sáfián, Ágnes Horváth	Report (Sáfián 2014)
January 2014	Lake Piso	1 week	N	Steve C. Collins, Stephen Georgiadis, Szabolcs Sáfián	unpublished data det. Sáfián
November - December 2015	Nimba Mountains	1 month	N	Szabolcs Sáfián	unpublished data det. Sáfián
December 2016 - January 2017	Nimba Mountains	1 month	N	Szabolcs Sáfián	unpublished data det. Sáfián
March 2017	Nimba Mountains	1 month	N, FB	Szabolcs Sáfián, Gábor Simonics	unpublished data det. Sáfián
November 2017	Foya Proposed Protected Area	2 weeks	N, FB, LT	Szabolcs Sáfián, Marios Aristophanous, Lydia Smith, Gábor Simonics	Internal report (SCNL) det. Sáfián
November - December 2017	Wologizi Mountains	2 weeks	N, FB, LT	Szabolcs Sáfián, Marios Aristophanous, Lydia Smith, Gábor Simonics	Sáfián <i>at al.</i> 2020
January 2018	Lake Piso	2 weeks	N, FB, LT	Szabolcs Sáfián, Gábor Simonics	unpublished data det. Sáfián
January 2018	Krahn-Bassa Proposed Protected Area	2 weeks	N, FB, LT	Szabolcs Sáfián, Michael Geiser, Gábor Simonics	Internal report WCF (Sáfián 2018)
February 2018	Putu Range	2 days	N	Szabolcs Sáfián, Michael Geiser, Gábor Simonics	unpublished data det. Sáfián
November - December 2018	Wologizi Mountains	1 month	N, FB, LT	Szabolcs Sáfián, Gábor Simonics	Sáfián <i>at al.</i> 2020
March 2019	Wonegizi Nature Reserve	3 weeks	N, FB, LT	Szabolcs Sáfián, Gábor Simonics	Sáfián <i>at al.</i> 2020
April 2019	Grebo-Krahn National Park	10 days	N, FB, LT	Rolland Warner	unpublished data det. Sáfián
June 2020	Gbedin Falls	1 week	N, FB	Szabolcs Sáfián, Moses Darpay	unpublished data det. Sáfián
March - November 2020	Yekepa, Nimba Mountains	Opportunistic collecting	N, FB	Szabolcs Sáfián	unpublished data det. Sáfián
July 2020	Zortapa, Nimba Mountains	1 week	N	Szabolcs Sáfián	unpublished data det. Sáfián
December 2020	Sapo National Park	2 weeks	N, FB	Szabolcs Sáfián	unpublished data det. Sáfián

Identification

The identification of the majority of species did not require external sources. However, determination of difficult or rarely recorded species required help from various literature sources, as well as visits to reference collections. The comprehensive book of Larsen (2005) contains colour illustrations and morphological descriptions of most species captured during the field surveys, although since its publication a few taxonomic groups have been revised, and these revisional works by Libert (2005, 2009, 2010, 2014, 2016) also proved very useful for identification. A few species found during the field surveys have not been previously recorded from West Africa or proved unknown to science. These could not have been identified without communication with experienced taxonomists of various groups and/or experienced field scientist specialized in African fauna, namely Steve C. Collins, Claudio Belcastro, Oskar Brattström, Haydon Warren-Gash, Torben B. Larsen, Michel Libert. Many specimens were identified in the scientific reference collection of the African Butterfly Research Institute, Nairobi, Kenya (ABRI), which hosts the most comprehensive butterfly collection for Sub-Saharan Africa. A few further specimens were identified through viewing voucher material in the Natural History Museum, London, UK (NHM), Royal Museum for Central Africa, Tervuren, Belgium (MRAC) and the Nature Education Centre, Jagiellonian University, Kraków, Poland (CEP-MZUJ). Dissection of male genitalia supported the identification of various species in the genera: *Ornipholidotos*, *Eresiomera*, *Liptena*, *Cephetola*, *Geritola*, *Stempfferia*, *Pilodeudorix*, *Leptotes*, *Ypthima*, *Paracleros*. Collaboration with the above-mentioned institutions was particularly useful for the identification and description of new taxa collected. Genitalia dissection methods slightly varied but they followed those described in detail in Sáfián (2015, 2018, 2020), Sáfián & Collins (2015) and Sáfián *et al.* (2019, 2020a, 2020b, 2020d)

Depositories of collected voucher specimens

Reference specimens of most butterfly species collected, were later pinned and spread for identification. The majority of specimens collected between 2010 and 2020 were deposited in the ABRI collection, samples of Adoliadini were also sent to CEP-MZUJ. All specimens collected during field trips between November 2017 and February 2018, also in November-December 2018 and March 2019 were deposited in the museum of the African Natural History Research Trust, Leominster, UK (ANHRT), where the author's reference collection is now also stored. All specimens were legally collected and exported with permission by the Forestry Development Authority of Liberia (FDA).

3.3. Data processing and analysis

3.3.1. Systematics and nomenclature

The first version of systematics and nomenclature used in the systematic account largely followed the comprehensive work “Butterflies of West Africa” by Torben B. Larsen (2005), who provided a unified and updated checklist of West African butterflies. However, many recent taxonomic changes appeared since its publication, and therefore the concept was changed to follow the most recent system of higher taxonomy and order of genera of African butterflies by Williams (2015) and the most recent updates on HesperIIDae by Cong *et al.* (2019) and Zhang *et al.* (2020). Numerous other changes were applied at species and subspecies level, e.g. *Telipna semirufa* – *T. semirufa ivoiriensis* (Libert 2005), *Zinina antanossa* – *Z. otis antanossa* (Yago *et al.* 2008) or in other cases even to generic level, e.g. *Euxanthe eurinome* – *Charaxes eurinome* (Aduse-Poku *et al.* 2009), *Melphina noctula* – *Noctulana noctula* (Larsen 2012), *Ceratrachia semilutea* – *Ceratricula semilutea* (Larsen 2013), *Elymniopsis bammakoo* – *Elymniias bammakoo* Wei *et al.* (2017). Moreover, the revisions of *Anthene* s.l. (Libert 2010) and *Celaenorrhinus* s.l. (Libert 2014) led to the change of both specific and generic names of numerous species, as the original genus has been divided into multiple newly established or reinstated genera: *Anthene*, *Neurellipes*, *Triclema* and *Monile* (Libert, 2010) and *Celaneorrhinus*, *Scopulifera*, *Bettonula* and *Apallaga* (Libert 2014). Most recently some West African *Liptena* species were moved to *Obania* or to the newly established *Helenia* (Libert 2021). In extreme cases disagreement over taxonomic status of butterfly taxa caused rapid changes. *Pseudaletis subangulata* was downgraded to subspecies rank, with the combination *P. zebra subangulata* by Libert (2007) but its status was soon reinstated as ‘bona species’ by Bouyer (2013).

Several species were added to the Liberian checklist as newly described. In most cases their names are written as they originally appear in the paper e.g. *Euriphene taigola* Sáfián & Warren-Gash, 2009, *Aphnaeus mirabilis* Sáfián & Collins, 2013 (Larsen *et al.* 2009, Sáfián *et al.* 2013). Despite strong effort of the author and colleagues, some newly found species are still in the process of description. They appear here either as a “confer (close form) – cf.” of a closely related species, or in advanced case of preparation, mentioned with a given manuscript name with reference to the respective manuscripts in preparation, in which their description is proposed for publication.

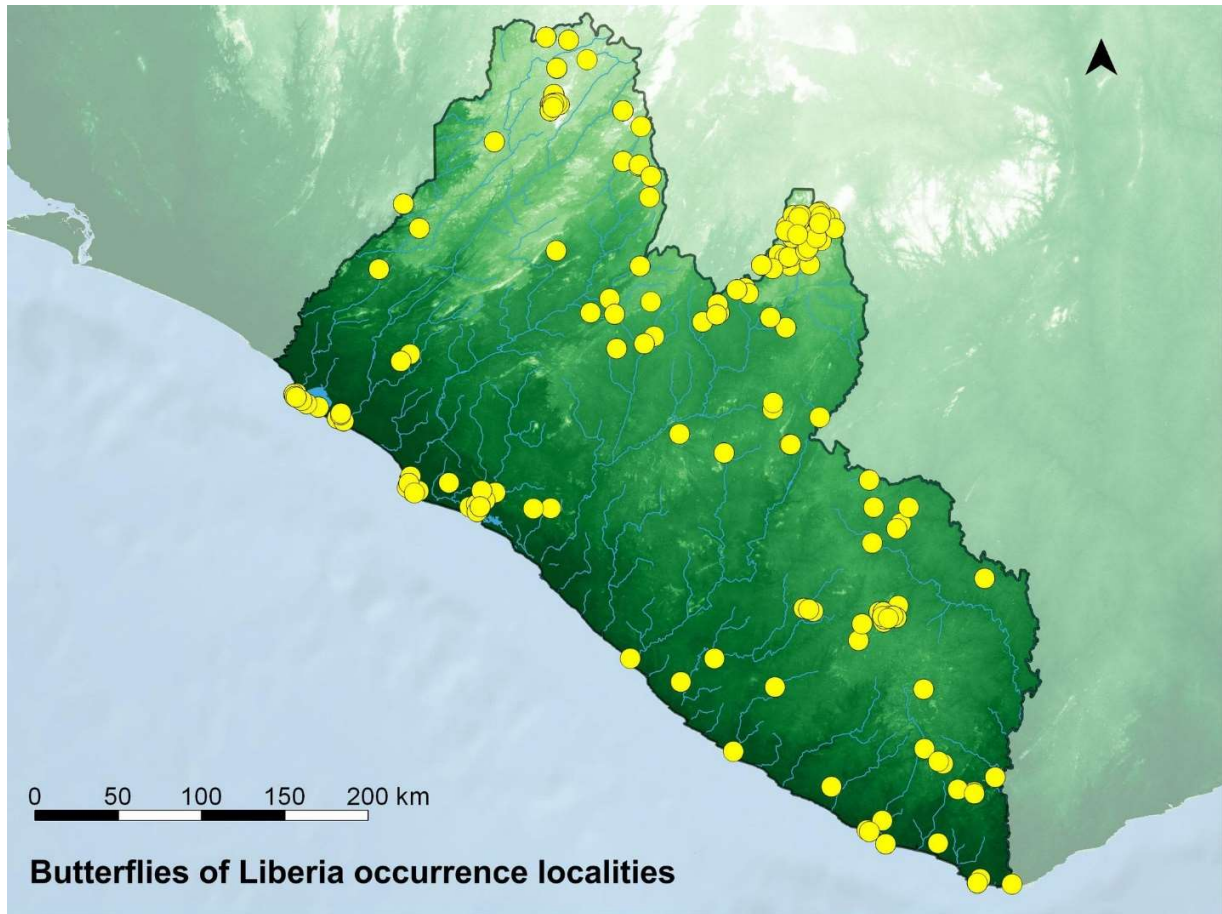


Figure 12. Butterfly localities (cumulative) with valid distribution record.

Species richness and accumulation

Species richness and accumulation were estimated with rarefaction, using data from the self-assembled Liberian butterfly database, where dates of publication or collection of old data were available, as well as the more accurate collecting dates for the recent records. The prediction of species richness of butterflies of Liberia was modelled by fitting Michaelis-Menten asymptotic mathematical function to the species accumulation curve. (Gotelli & Colwell 2011).

Distribution data and locality maps

Distribution data originate from both literature and field collecting. All traceable records have been entered in a basic data sheet in Microsoft Excel (various versions) software, converted into a MySQL database through an automatic conversion program 'alienPhoenix', which runs on Java platform. During the conversion, all geographic coordinate in different formats were transformed to WGS84 decimal degrees, all non-value information was sorted out and deleted and typing errors were corrected. The various data sources were also categorised to enable

display of records in different colours on the map. The corrected MySQL database was again converted into csv format to be recognised by QGIS 2.4 open source geoinformation analytic program, in which all distribution maps were processed and exported into high resolution images (Appendix II). Apart from the csv database layer, the following layers were used to display the occurrence maps: NaturalEarth raster (base map), Liberia coloured DEM model (ASTER GDEM v2), 30mx30m grid (<http://www.jspacesystems.or.jp/ersdac/GDEM/E/4.html>). Administrative borders and hydrography: <http://www.diva-gis.org/gdata>. All programs used are of open source and free access from the Internet. Geographical coordinates for incomplete records were tracked with the help of Google Earth freeware GIS program, in cases when no exact localities could be found, the record was simply omitted from the list, so occurrence maps for species with no geo-referenced records were not produced (e.g. *Precis frobeniusi*, *Pardaleodes xanthopeplus*). This is also indicated at the species' annotation in the main text. Only a single species, *Papilio zalmoxis*, was illustrated with questioned records, as the original data mentions locality (Condamin & Roy 1963), but it was not repeated in the comprehensive work of Fox *et al.* (1965), nor the species was found during the recent surveys. For a few species-groups (e.g. *Neptis agatha*-group, *Neptis nysiades*-group), revisions changed the system after the publication of the book Butterflies of Liberia by Fox *et al.* (1965). In these cases, all older records in the publication became unreliable, however in some case those records are still illustrated on the maps with reference to the unreliability of the old records in the systematic account. The map illustrating all localities with valid occurrence record is presented on Figure 12. At each species reference is given to the respective map plate number (e.g. PLATE XIX). All locality data are also available online with free access on the African Butterfly Database (www.abdb-africa.org).

3.3.2. Ecological classification

The ecological classes used in this work have been established by Larsen (1994), who categorised all Ghanaian butterflies according to their habitat use, with an improved version published in Larsen (2006) adapted by Sáfián (2012), who also added further West African taxa. The butterfly taxa are not necessarily confined exclusively to the habitat types mentioned in the classes, but they are centred on the habitat, being more common or more widely distributed in their respective ecological class, compared to other classes. Apparently, there are species with narrower ecological tolerance, and many appear to be more restricted to special micro-habitats within their classes. These do not normally occur outside of their respective class, and reference to this is also found in the species description. Larsen's classification has proven very useful to assess butterfly communities and habitats during various works (Sáfián *et al.* 2009, Sáfián 2012b, Sáfián *et al.* 2020c), and with using the classification it was possible to indicate habitat quality at finer scale (Sáfián *et al.* 2010). The abbreviations of the ecological classes are used in chapter 4.3.1 and on Figure 22.

Categories

WEF – ‘**wet forest species**’ species is centred, but not exclusively restricted to wetter types of forest. These butterfly species are usually of narrow ecological tolerance and cannot survive habitat degradation.

MEF – a species is centred, but not exclusively restricted to ‘**mesophilous forest**’. These species are normally referred to as occurring in various types of forest in the systematic account and are of rather broad ecological tolerance, surviving also some level of habitat degradation.

ALF – a species occurring in “**all types of rainforest**”, also in riverine vegetation, occasionally in dense savannah. Most species in this group are of broad ecological tolerance, surviving also some level of habitat degradation.

DRF – ‘**dry forest species**’ are centred in drier, but not exclusively restricted to drier types of forest. These butterfly species usually occur also in the forest-savannah transition zone

UPF – ‘**upland and sub-montane forest species**’ are centred and are usually restricted to unique upland and/or sub-montane rainforests. Most species are of extraordinarily little ecological tolerance to habitat degradation. This category does not appear in Larsen’s original classification (Larsen 2006, as the few upland specialists occurring in Ghana have been classified to ‘WEF’.

GUI – ‘**Guinea savannah species**’ are usually occur in the southern, wooded savannah zone, but many species are of broad ecological tolerance and they could therefore appear in the forest-savannah transition zone, or in secondary grasslands, also in open degraded land in the forest zone.

SUD – ‘**Sudan savannah species**’ are usually found in the southern grassy savannah zone and other arid areas. They usually have rather narrow ecological tolerance, they do not therefore normally occur in secondary grasslands or open degraded land in the forest zone, apart from a few with migratory tendencies.

UBQ – ‘**ubiquitous species**’ have very wide ecological tolerance and they could therefore occur in a very wide range of habitats including forests, savannah, degraded agricultural land and even urban areas. Many of them are very common or have tendency to migrations.

The category ‘**SPEC**’, which covers butterflies with ‘**special habitat requirements**’ (often wetlands or swampy areas) by Larsen (2006) was not found appropriate in present work and was excluded.

Various species are known only from a few localities with little information on their habitat use. They fall in the category ‘**insufficiently known**’ – **INS**.

3.3.3. Biogeographical classification based on the distribution pattern

As the distribution pattern of butterflies has not been previously established for most African species, distribution or biogeographic classes and categories were needed to be introduced. Distribution data of each taxon was obtained from the Afrotropical Butterfly Database (www.abdb-online.org), which used multiple literature and collection sources to provide at least country level distribution of all African taxa. Species was used as classification unit in the majority of taxa, however, on several occasions, subspecies were also considered as a unit, where a distinct (in many cases disjunct) distribution was observed in West Africa, especially when a taxon is restricted to the Upper Guinean forest zone. Categories for species outside of Liberia were not established, this classification is restricted only to the species positively recoded in Liberia. The abbreviations of the biogeographical categories are used in chapter 4.4.2 and on Figure 23.

COS - Cosmopolitan species. These taxa are distributed also extensively outside of Africa, covering most of the Palaearctic and the Indo-Australian Regions. None of the few African cosmopolitan butterflies actually occur in the Neo-tropical Region.

PAN - Pan-African species. These taxa are distributed throughout Sub-Saharan Africa from Mauritania to the eastern Coast, the Horn of Africa, in some cases even to Southern Arabia in the northeast. They are always present in Southern Africa and some of them occur on one or more of the Malagasy Islands. Many species have also very wide ecological tolerance, being home in all sorts of habitats, although pan-African species with more restricted ecological needs are also known (pan-African forest species). They usually have rather patchy distribution, and the species is represented by various subspecies in different subregions. Various pan-African species are distributed also beyond the continent, occurring in the Mediterranean and in Asia Minor, whereas a few are also widely distributed in Asia. For these species, an additional group could have been established, but for practical reasons they were kept within the pan-African category with notes in the discussion.

EQS - Equatorial savannah species. Widely distributed savannah-dwelling species fall into this category (they usually occur from Senegal or Mauritania to Kenya or Ethiopia in the east and reaching Tanzania, Angola or northern Zambia in the south), in many cases the range forms a narrower or wider belt edging the equatorial forest zone. Many of them also have the ability to breed in degraded, open habitats in the equatorial forest zone.

EQU - Guineo-Congolian or Equatorial forest species. These taxa are essentially forest-dwelling, forest-associated or occurring in semi-degraded forest areas (e.g. developing on forest trees or bushes but could survive in more open habitats), and are widely distributed through the Equatorial forest zone between Basse-Casamance in Southern Senegal to western Uganda or north-western Tanzania in the east, Angola or Northern Zambia in the south. Many of these species also occur in some of the eastern outlier forests in Central Uganda, Western Kenya or South Sudan.

WAF - West African forest species. Although West Africa is not recognized as a biogeographical unit, this category had to be established for taxa, whose distribution cover forest areas across biogeographical sub-units between Western Cameroon and Senegal, provided that they occur on both sides of the Dahomey Gap and are not therefore endemic to the Upper Guinean forest zone. As some works treat the Sanaga River in Western Cameroon the eastern boundary of West Africa, all butterflies could be categorised as West Africa, which are distributed from Western Cameroon to Central Ghana and beyond. The eastern boundary of the distribution of several taxa does not actually reach Cameroon, since the River Cross and the Niger also serve as biogeographical boundaries, and for many taxa, the eastern distribution limits are unclear.

WAS - West African savannah species. A low proportion of species occurring in Liberia have a distribution pattern in a narrow savannah zone from Senegal to northern Cameroon. They are considered as West African savannah species, which are only rarely occur further south in the forest-savannah transition or in the forest zone proper.

UPG - Upper Guinean endemics. These taxa have relatively wide distribution across multiple subregions in the Upper Guinean forest zone between Basse-Casamance in south-western Senegal and the Togo Mountains (Volta Region in Ghana and Western Togo) or the River Volta in Eastern Ghana. Some taxa even occur in the relict forests in the Dahomey Gap but not further east.

LIB - Liberian subregion endemics. These species have a rather narrow distribution between central-eastern Sierra Leone and north-eastern Guinea to the Sassandra River in western Ivory Coast. A smaller proportion of species also occur in western Ghana, especially in the southwest, where precipitation is locally higher. Still these species are considered as Liberian subregion endemics, if they do not occur further east in central Ghana, as they ecologically fit in the group and the actual eastern boundary of the subregions is rather unclear.

WES - Western subregion endemics; the distribution of a low proportion of species and subspecies occurring in Liberia is centred further west in Guinea or Guinea-Bissau. These species only marginally occur in Liberia, while they are more widely distributed further west of

the Liberian subregion. Although the Western transitional subregion has not been previously established formally, for practical reasons, the above-mentioned species are categorised in this group.

END - Narrowly endemic species; a number of butterfly taxa occurring in Liberia are known to be restricted to a relatively small area or to a geographic feature. These are usually the mountainous areas in Liberia, namely the Putu Range, the Nimba Mountains and the Wologizi Mountains. Most species, previously believed to be narrowly endemic to the Nimba Mountains were first recorded in the Guinean and/or Ivorian parts of Nimba, but recent records indicate that these upland forest specialists also occur in other mountainous areas in the Guinea Highlands within the Liberian subregion (e.g. Mount Tonkoui or Mount Péko in Ivory Coast, the Simandou Mountains or Ziama Forest in Guinea).

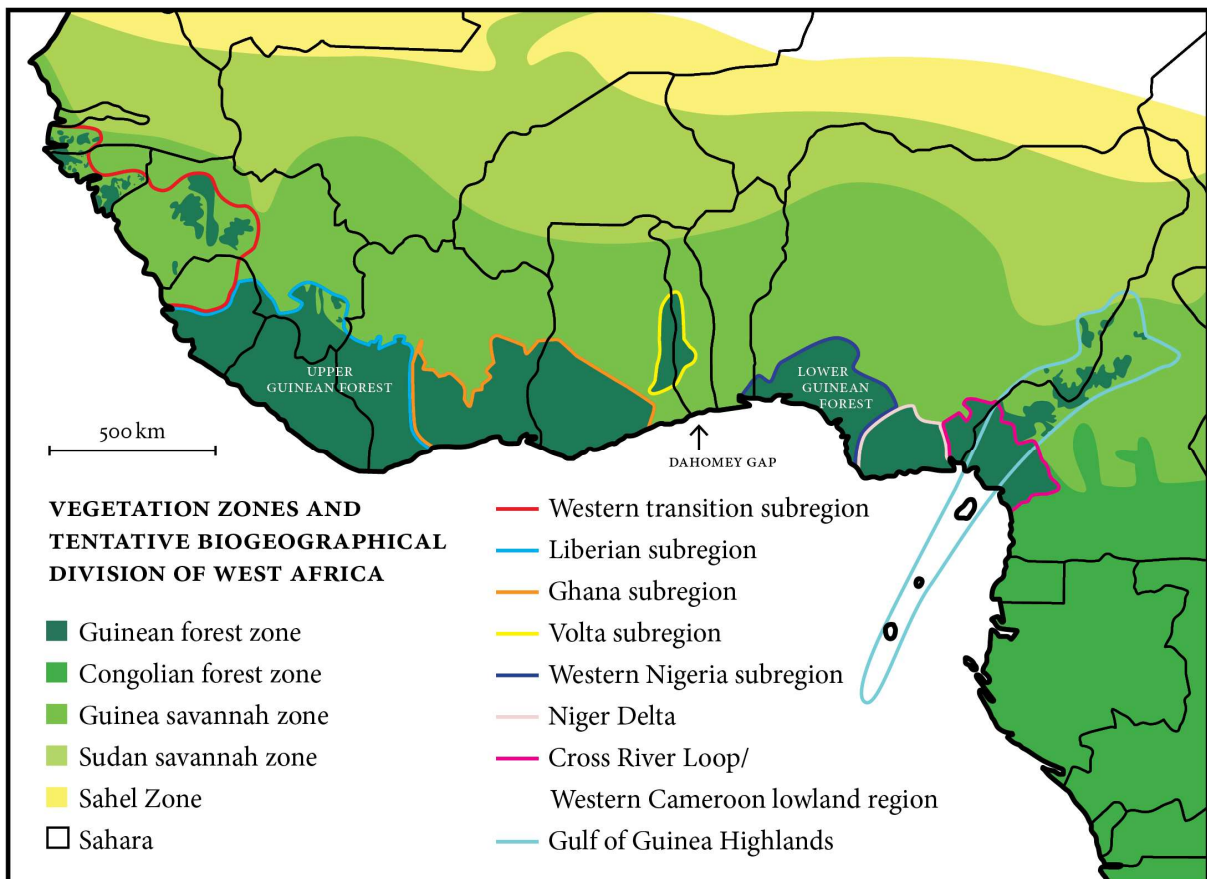


Figure 13. Vegetation zones and tentative biogeographical division of West Africa for butterflies modified from White (1983) using Larsen (2005), Steele (2007), Frazão-Moreira (2016) and own data.

3.3.4. Supplementary map for the butterfly distributions and the biogeographical division of West Africa

For easier navigation between the ecological classes and distribution patterns and to present the current understanding of biogeography of butterflies, two maps are presented presenting the forest types in Liberia and the vegetation zones and tentative biogeographical division of West Africa (Figures 13, 24). The maps were produced based on the original map of White (1983) corrected and further modified also using satellite images published via Google Earth Pro freeware GIS, biogeographic descriptions and butterfly data from Larsen (2005) and also Sáfián's own data. The Guinean and Congolian forest zones as highlighted separately on the map collectively, refer to the Guineo-Congolian forest zone or equatorial forest zone (EQU). The Guinea savannah zone, also referred to as wooded savannah or open woodland savannah zone is a broad vegetation zone that stretches across Africa, north of the equatorial forest zone, including the so-called (forest-savannah) transition zone (GUI). The vegetation becomes sparser with extensive open grasslands in the Sudan savannah zone (SUD). The two savannah zones, including also the narrow arid Sahel zone as a transition towards the desert of the Sahara form the equatorial savannah zone (EQS). Both ecologically and biogeographically, the Dahomey Gap is an organic part of the equatorial savannah zone, and this tongue of savannah stretching southwards to the Atlantic coast forms a significant ecological barrier to the dispersal of forest butterfly species and is also recognized a biogeographical limit (both in the east and in the west, separating the once continuous Upper Guinean and the Lower Guinean forests. The Dahomey Gap also encloses the isolated enclave of forests of the Togo Mountains also referred to as the Volta biogeographical subregion. Considering butterfly distributions, the Zambezian woodlands (e.g. Miombo) could also be considered as part of the equatorial savannah zone, because multiple savannah-dwelling species are found also east and south of the equatorial forest zone, however the vegetation is very different from the West African savannah and biogeographically the southern savannahs are part of the Zambezian Domain of the Sudano-Zambezian Region (Werger & Coetzee 1978).

4. Results and discussion

4.1. Taxonomic novelties

Numerous taxa recorded during the present study could not at the first place be identified to species or subspecies level from the available literature and author's reference collection. This led to further investigation of their specific status involving study of literature and extensive museum collections (see details in chapter 3.2). As a result, 23 taxa have been identified as undescribed (twenty species and three subspecies). A large proportion of the new taxa have since been described in various scientific publications either by the author (Sáfián 2015a, 2015b, 2017) or in collaboration with other specialists (Sáfián & Collins 2015, Sáfián *et al.* 2013, 2015a, 2015b, 2019, 2020a, 2020d), or have been accessed by taxonomists for further work through the ABRI collection (e.g. Libert, 2010, 2014). Others are submitted for publication or the descriptions are still in preparation (see Sáfián *et al.* in prep). The list of the newly described taxa with a short description and further information about their status are as follow in taxonomic order. A number of taxa have been described from a single sex and description of the opposite previously unknown sex was also recorded and documented as a result of the field work in Liberia (Sáfián *et al.* 2019, Sáfián 2020a). The taxonomic novelties are illustrated on Figures 14, 15.

Eagris tetrastigma lomana Belcastro & Sáfián, 2020

The males of the newly described subspecies differed from those of *E. tetrastigma subolivescens* (Holland, 1892), distributed in West Africa east of the Liberian subregion, by a firm black marginal line and more yellow underside, with no consistent genitalia differences found. *E. tetrastigma lomana* is widely distributed in the Liberian subregion in lowland and upland forest (Sáfián *et al.* 2020a).

Andronymus fenestra Belcastro & Sáfián 2019

The species was first found by Claudio Belcastro in western Ivory Coast near the Liberian border in 1991, however it remained undescribed for a long time, until more material became available for examination, collected in Liberia and Sierra Leone. Only a single specimen is known from Liberia, which was collected in lowland rainforest at the foothills of the Nimba Mountains (Sáfián *et al.* 2019). Surprisingly, four females collected recently in Ghana were located in the ABRI collection by Steve Collins, from the extreme south-west and two upland localities (Atewa Range, Tano Ofin) *A. fenestra* could still be treated as Liberian subregion endemic with disjunct occurrences in Ghana. It is a western vicariant of the Congolian *A. fenestrella* Bethune-Baker, 1908.

Gorgyra ziama Belcastro & Sáfián, 2020

The taxon was first recognized in Larsen's uncompleted work on African skipper butterflies (unpublished manuscript). It is close to the Congolian rainforest species *G. kalinzu* Evans, 1949 with a 2000 km gap between their distributions. *G. ziama* seems to be genuinely restricted to the Liberian subregion, occurring in both lowland and upland forest (Sáfián *et al.* 2020a).

Mesoxantha liberiana sp. n. (manuscript name)

The species was first recognised as new after a field survey to Sierra Leone (Sáfián 2010), but its specific status could not be confirmed due to unavailability of sufficient comparative material. Further two male specimens were collected in Liberia on Mount Swa and in the fringing lowland forest at the Nimba Mountains (Sáfián 2014a). When the Sierra Leonean and Liberian material was examined alongside series of specimens from populations of *Mesoxantha ethosea* (Drury, 1782) across its distribution, it turned out that further, previously unrecognised or misinterpreted taxa are involved in this genus. It was decided to describe these new taxa (including *Mesoxantha liberiana* sp.n.) in a revisional note that covers the entire genus (Sáfián *et al.* in prep.).

Telchinia pseudepaea ziama Belcastro, Boireau & Sáfián, 2020

The newly described subspecies differs from the nominate one consistently by the broad black outer half of the hindwing upperside, but no genitalia differences were found. *T. pseudepaea ziama* is distributed in a well-defined area in the Guinea Highlands, probably in pre-montane and upland rainforest (Sáfián *et al.* 2020d).

Aslauga larseni Sáfián, 2015

The species belongs to a small group of butterflies in the genus *Aslauga* (subgenus *Egumbia*), which are usually found in hilly country in the savannah-forest transition, and all seem to be of restricted range. After capture of the first specimen in August 2013, it was immediately recognised as new, as no similar species appeared in the revision by Libert (1994). The type series and a further male were all captured on a single mountain top in the East Nimba Nature Reserve (Nimba Mountains), while a second female was captured on Mount Gangra (Western Nimba). The species is considered as narrowly endemic to the Nimba Mountains.

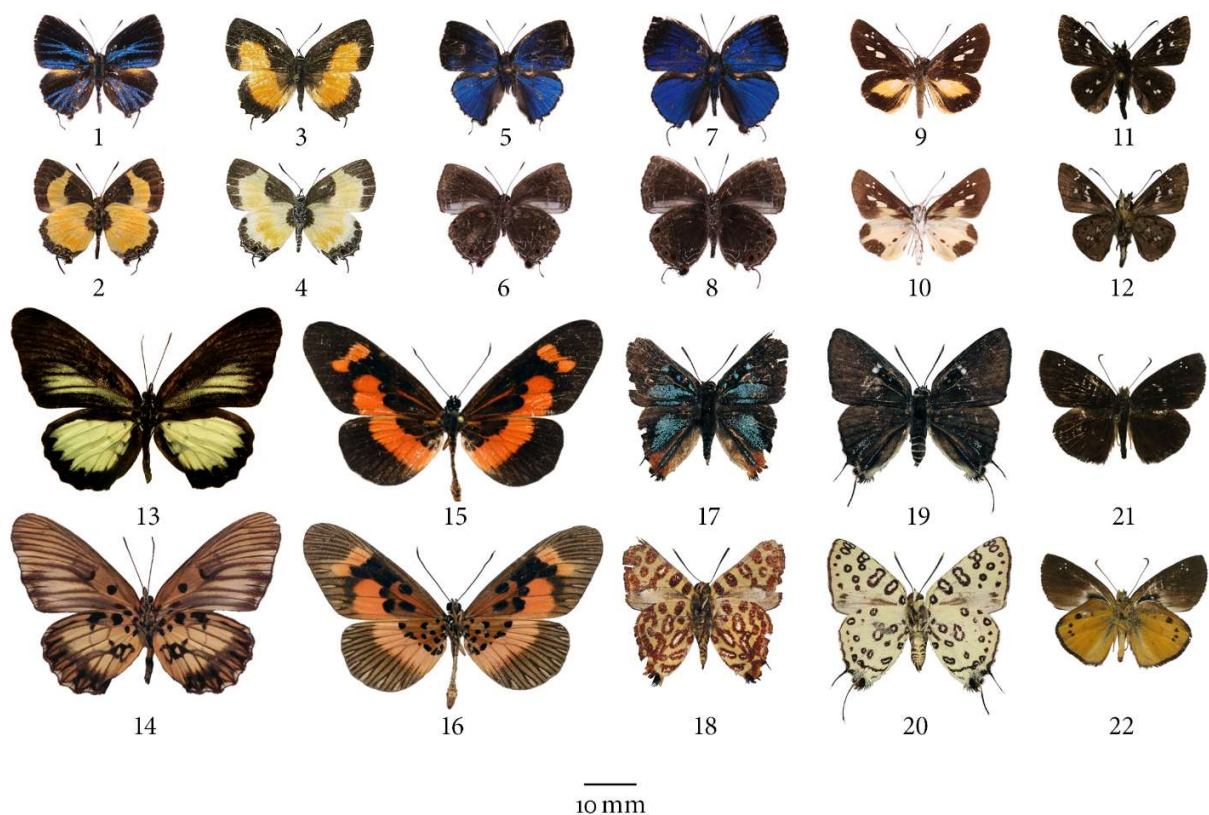


Figure 14. New taxa found during and/or described during the study: 1-2. *Pilodeudorix mano* Sáfián, 2015 (holotype); 3-4. *Pilodeudorix mano* Sáfián, 2015 female (Nimba Mountains); 5-6. *Pilodeudorix putu* Sáfián, 2015 (holotype); 7-8. *Pilodeudorix intermedia* Sáfián, 2015 (holotype); 9-10. *Andronymus fenestra* Belcastro & Sáfián, 2019 (paratype); 11-12. *Gorgyra ziama* Belcastro & Sáfián, 2020 (holotype); 13-14. *Mesoxantha liberiana* sp n. Sáfián manuscript name (holotype); 15-16. *Telchinia pseudepaea ziama* Belcastro, Boireau & Sáfián, 2020 (paratype); 17-18. *Aphnaeus nimbaensis* Sáfián & Libert, 2013 (holotype); 19-20. *Aphnaeus mirabilis* Sáfián & Collins, 2013 (holotype); 21-22. *Eagris tetrastigma lomana* Belcastro & Sáfián, 2020 (paratype).

Parasiomera alfa Sáfián, 2015

The species was recognised as new at the first in comparison with its sister, *Parasiomera* (= *Eresiomera*) *paradoxa* (Schultze, 1917). All closely related taxa were later moved to a newly erected genus: *Parasiomera* Sáfián & Collins, 2015, where *P. alfa* was also described. The species is most probably associated with hyper-wet lowland forests in Liberia and thus should be considered as endemic to the Liberian subregion (Sáfián & Collins 2015).

Liptena neiltennanti Sáfián, 2021

A single female specimen of small species in the „white group” (sensu Stempffer *et al.* 1974) of *Liptena* was collected in the upland forest of the Putu Range. It was tentatively identified as *L.* cf. *batesana* Bethune-Baker, 1926 but the group is complex and the specific status needed further investigation, which revealed further complications in the group. What is clear even from a single specimen that the Liberian populations are certainly different from those in Central Africa. The Liberian taxon is almost certainly not conspecific with the Western Nigerian *L. ilaro* Stempffer, Bennett & May, 1974, as the latter is believed to be endemic to Western Nigeria (Larsen 2005), where the drier forest habitats differ significantly from the upland area of Putu. As the Liberian species is known from a single female specimen, it was found inadequate to describe the species until female genitalia of all closely related species are studied. It might prove very difficult, as presently no female specimens of *L. ilaro* are known to exist in collections (Sáfián in prep.).

Micropentila cf. *brunnea* (Kirby, 1887)

The species was first identified by Belcastro and Larsen from southwestern Ghana, who intended to describe it, but Larsen’s untimely death prevented the publication of the species. The manuscript is now prepared for publication by Sáfián and Belcastro with new material available also from Liberia.

Cephetola praecox Sáfián, 2021

The species is closely related to the newly described taxon, *C. obscuralis* Libert, 2020 but differs from it by features of the male genitalia. The males were observed displaying early in the morning at 7.30, when very few butterflies are actually active. They were flying up and down at high speed along a tree trunk on Mount Jideh Ridge in the Putu Range. As the site was rather inaccessible, only one specimen could be captured. The species could prove unique to upland forest habitats in the Liberian subregion (Sáfián *et al.* 2021).

Cephetola wologizi Sáfián, 2021

Two males were captured displaying at around 9.30 on a hilltop on the Belegizi ridge in the Wologizi Mountains in upland rainforest (Sáfián *et al.* 2020c). From the silvery grey pattern on the hindwing underside the species was originally believed to be closely related to *C. aureliae* Libert, 1999 but examination of male genitalia ruled out relationship between the two and no

other similar species are known. *C. wologizi* could prove unique to upland forest habitats in the Liberian subregion (Sáfián *et al.* 2021).

Cephetola wingae Sáfián, 2015

The species was described from a small series of male specimens collected in upland forest in the Nimba Mountains in 2013 (Sáfián 2015b). The first female was captured in the Wologizi Mountains in November 2017 in similar habitat (Sáfián 2020a).

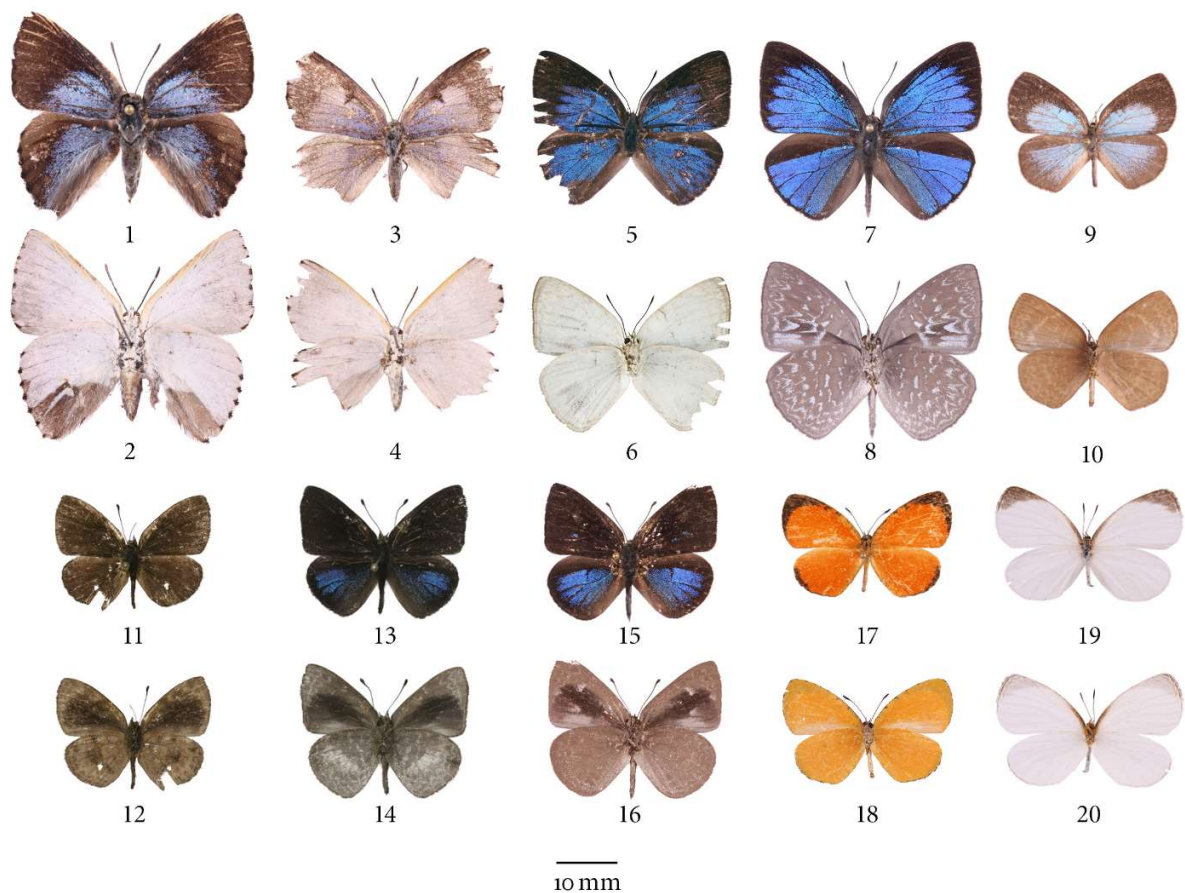


Figure 15. New taxa found during and/or described during the study: 1-2. *Aslauga larseni* Sáfián, 2015 (holotype); 3-4. *Aslauga larseni* Sáfián, 2015 (paratype); *Geritola pacifica* Sáfián & Libert, 2015 (holotype); *Stempfferia katikae* Sáfián, 2015 (holotype); *Stempfferia michelliberti* Sáfián, Warren-Gash & Belcastro, 2021 (holotype); 11-12. *Cephetola praecox* Sáfián, 2021 (holotype); 13-14. *Cephetola wologizi* Sáfián, 2021 (holotype); 15-16. *Cephetola wingae* Sáfián, 2015 (holotype); 17-18. *Parasiomera alfa* Sáfián, 2015 (holotype); 19-20. *Liptena neiltennanti* Sáfián, 2021 (holotype).

Geritola pacifica Sáfián & Libert, 2015

The species was described from a male holotype supplemented by another male paratype in the description. Both were caught in lowland hyperwet forest, the holotype in Gola National Forest and the paratype in Sapo National Park (Sáfián *et al.* 2015a). A further colony was later discovered in the Foya Proposed Protected Area, a lowland forest adjacent to Gola National Forest in the north, where the first females were also collected (Sáfián 2020a). The northernmost records were found in the Wologizi Mountains in upland forest, interestingly, the species was not recorded further north in the Wonegizi Mountains or in the adjacent Zيامa Massif in Guinea (Sáfián *et al.* 2020c), neither from other hilly areas with upland forest (Putu Range, Nimba Mountains). Some other butterfly species associated with hyperwet lowland forests are also missing from the higher ground of the Guinea Highlands. *G. pacifica* is not necessarily rare where it occurs, but could be very local, displaying around and-infested tree-trunks on hilltops inside dense forest early in the afternoon.

Stempfferia katikae Sáfián, 2015

The species was originally collected in upland forest in the Nimba Mountains. After its description (Sáfián 2015b), male specimens were also collected in upland forest in the Wologizi Mountains (Sáfián *et al.* 2020c). *S. katikae* is probably endemic to the Liberian subregion with upland affinities.

Stempfferia michelliberti Sáfián, Warren-Gash & Belcastro, 2021

During a field survey a single female specimen, close to *S. zelza* was captured at Coldwater, Nimba Mountains in January 2014. It differed from the female of *S. zelza* in various characters (e.g. ground colour, missing cell-closing spot), which led to further investigation of its specific status. A male *S. zelza* collected by Haydon Warren-Gash in Ivory Coast was found in the ABRI collection, which differed from 'real' *S. zelza* by its ground colour. Personal communication with Warren-Gash revealed that a small series of males, identical to the one in ABRI and two females identical to the one collected by Sáfián are found in his collection. Another male specimen was collected in Sierra Leone by Claudio Belcastro and more recently two males were captured in the Zيامa Forest in the Forest Region of Guinea (Sáfián *et al.* 2021).

Aphnaeus mirabilis Sáfián & Collins, 2013

This unique species is known only from the female holotype, but is very distinct, and its specific status was in no doubt. The specimen was captured on the edge of a lowland forest in a swamp,

while imbibing dissolved minerals from wet soil during an extreme dry season in February 2012, a very unusual behaviour for female butterflies. Its closest relatives are East African (Sáfián *et al.* 2013).

Aphnaeus nimbaensis Sáfián & Libert, 2013

The holotype was collected on the summit of Mount Gangra, hill-topping at 14.00 (Sáfián *et al.* 2013). Following its habit, the species was also captured on Mount Beeton and in the East Nimba Nature Reserve. Wings of a male were found in upland forest in the Wologizi Mountains. The species is probably endemic to the Liberian subregion with upland affinities.

Iolaus jadwigae Sáfián, 2017

A single male specimen of this *Iolaus* was captured by Erika Zakar, field assistant to Sáfián in December 2013 in the upland forest of the Putu Range. It was first believed to belong to *Iolaus theodori* Stempffer, 1970, however, comparison with the extensive material of *Iolaus* stored in ABRI revealed that the specimen cannot be assigned to any described species and was described in Sáfián (2017).

Iolaus liberiana Sáfián, 2017

Three females and a male of this species were collected in extreme dry season in February 2012 in the Nimba Mountains (Western Range). It was first believed to be a subspecies of *Iolaus parasilanus*, but examination of male genitalia revealed that the specimens belonged to a new species, which was described in Sáfián 2017. The species is so far known from the Nimba Mountains and is treated as narrowly endemic, occurring in lowland forests around the Nimba. Since its description doubts were raised that the species might be conspecific with *I. alexanderi* Warren-Gash, 2003, but a taxonomic revision is needed to clarify this issue.

Cupidesthes cf. *robusta* Aurivillius, 1895

A single male specimen was captured in the mosaic of coastal forest and savannah in the Lake Piso area by Josiane Goosens and Steve C. Collins of ABRI in January 2014. It was identified as separate from *C. robusta* Aurivillius, 1895 by Sáfián, who also found an additional specimen that originates from coastal swamp forest of Western Nigeria (Lekki Swamp) (Leg.: Robert Warren). As its status need further investigation, the species will be later described by Sáfián and Collins.

Triclema melambrotus liberiana ssp. n. (manuscript name)

This small and inconspicuous butterfly was previously recorded only in Central Africa (Libert 2010), until a series of specimens were captured on hilltops in the Putu Range in upland forest. Although the Liberian population does not differ from the Central African one in external characters, the minor differences in male genitalia and the extreme disjunction justify the recognition of it as a distinct subspecies, which will be later described by Sáfián.

Pilodeudorix mano Sáfián, 2015

The species is closely related to *P. mimeta* (Karsch, 1895), but has a strikingly different yellow-brown underside in both sexes (Sáfián *et al.* 2015b). It was described from a male holotype, which was collected in the upland forest zone in the Nimba Mountains. More recently, a series of males were collected near the type locality and also in the Guinean Nimba Mountains in similar habitat. In November 2018, the species was also found in the Wologizi Mountains in upland forest and Claudio Belcastro (pers. com.) has also communicated a record found in the upland zone of the Zياما Forest in Guinea. All occurrences clearly indicate upland affinities and the species could be genuinely limited the upland forests of the Guinea Highlands (Sáfián 2020a, Sáfián *et al.* 2020c).

Pilodeudorix putu Sáfián, 2015

A small series of this small-sized *Pilodeudorix* near *P. aurivilliusi* was collected in the Putu Range in upland forest. A single specimen was later caught on the ridge of Mount Bele (Blei), the southernmost mountain of the Nimba Mountains. The species is probably endemic to the Liberian subregion with upland affinities (Sáfián *et al.* 2015b).

Pilodeudorix intermedia Sáfián, 2015

The species is very similar but is intermediate in size between *P. putu* and *P. aurivilliusi*. It was recorded from three upland forest localities in Liberia (Putu Range, Nimba Mountains). It is sympatric with *P. putu* and *P. aurivilliusi* and is probably endemic to the Liberian subregion with upland affinities (Sáfián *et al.* 2015b).

4.2. Diversity

4.2.1. Species richness and accumulation

In the publication *Butterflies of Liberia* by Fox *et al.* (1965) **475** species of butterfly were listed as positively recorded and identified, including a few taxa newly described. However, the first butterfly records appeared long time before the publication of this work, as shorter and longer species lists were published by various authors (see citations in chapter 2.2).

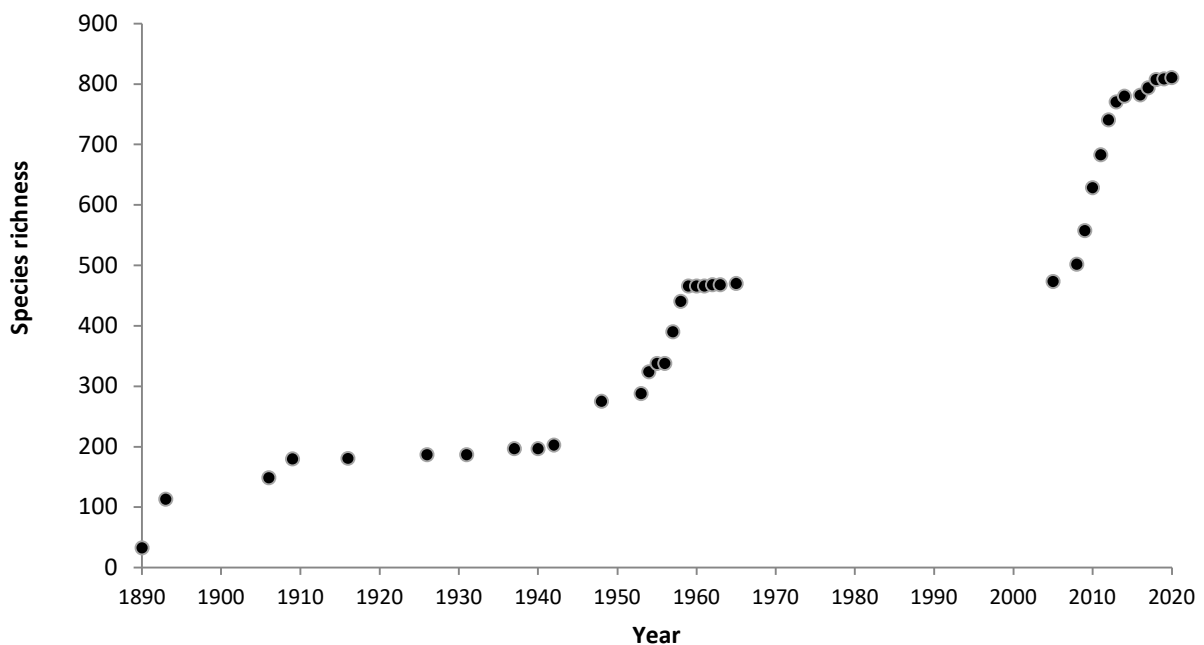


Figure 16. Species accumulation of the butterflies of Liberian and sampling intensity in the different time periods.

Fox *et al.* (1965) actually collected and summarized all available information from previous sources, which were integrated in the digital database to model species accumulation, intensity of research and estimate and predict species richness. From incorporated the data, it is clear that before the 1950s intensity of butterfly research was low and recording was opportunistic. Most collections were carried out by researchers visited Liberia for other purposes and collected butterflies only occasionally. During his expeditions Büttikofer (1890) contributed with the first butterfly records to the Liberian fauna already in 1890, presenting **90** positively identified species. His list grew to **124** in Jonhston (1906), where Büttikofer's material was re-listed, identified by Sharpe. Only a few species have been added to the checklist during the first half of the 20th century, until Dekeyser's expedition in 1948, which aimed to uncover the natural history of Liberia. Apparently, there was a sudden increment of the recorded species richness, when Dekeyser's expedition returned from Liberia carrying a rich butterfly material, which was

distributed to various experts for determination. With the publication of Dekeyser's data, the checklist grew by over 100 additional species (Stempffer 1950, Picard 1950, Condamin 1951, Berger 1954). The recorded species richness reached well over **300**, when Stempffer & Bennett (1956) published records of further Lycaenidae, collected by Peters (the collection is in the Natural History Museum, London (NHM)). The systematic recording of butterflies by Fox and colleagues between 1954 and 1959 made a significant contribution to the butterfly fauna, as their surveys, added over a hundred species to the list. Moreover, they examined and compiled other museum records for their book, reaching **475** positively recorded and identified species at the time of publication (Fox *et al.* 1965). Surprisingly, virtually no butterflies have been recorded between the end of the 1960s and the beginning of the civil turmoil in the early 1990s, and for quite an understandable reason, no research was possible during the violent civil conflicts until the middle of the first decade in the 21st century. The last recent research period was really intensive in terms of butterfly studies, as more than 300 new species records have been added to the fauna between 2008 and 2014. By the end of January 2014, the checklist of butterflies in Liberia contained **782** species positively recorded and identified. Between 2015 and 2020 further data collecting resulted in finding of another **35** species, previously not recorded from Liberia. A new *Neptis* species, *N. morosopsis* Richardson, 2020 described on the basis of molecular data was also found in Liberia (Richardson 2020), increasing the number of positively recorded species (but excluding the three further subspecies also occurring in Liberia) to **818**.

Table 2. Prediction of species richness in Liberia with extrapolation of the rarefaction curve.

Number of sampling events	23	30	40	50	100
Predicted species richness	746,8	767	784,5	795,3	818

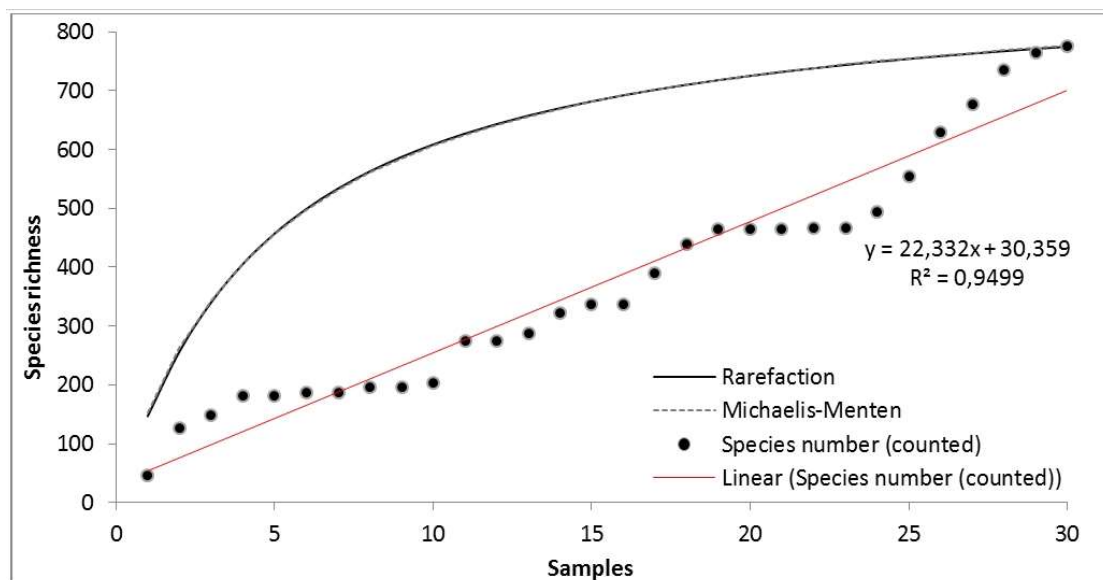


Figure 17. Species accumulation including all samples in the analysis (1890-2014).

The sampling intensity and species accumulation could be followed also on Figure 16, where the two steep sections of the graph show the intensive recording by Fox *et al.* (1965) and the recent recording by Sáfián (2012a, 2012b, 2014a and previously unpublished data) and other recent surveys (Boireau 2009, Brattström 2010 and unpublished data by Stephen Georgiadis, Jens Lund and Steve Collins 2008-2014). Unfortunately, due to irregular sampling periods and intensity the species accumulation does not show a regular pattern, and even, when dates were left out of the variables, replaced by sampling events, the pattern shows a rather linear accumulation as the rarefaction curve does not fit on the values (Figure 17). According to the linear correlation (steepness of the linear function \pm standard deviation, slope \pm SE) the species accumulation is 22.3 ± 1.0 species/sampling event ($r^2=0.95$, $F=531.44$, $p=0.0000$) if all events until 2014 are included. However, when old records were excluded from the analysis, the rarefaction curve could be fit on the data, approaching asymptote (Figure 18). By extrapolation of the rarefaction curve, further species are predicted (Figure 19, Table 1), although the increment will not exceed 10%. This prediction, however, is biased by the fact that out of the positively recorded 782 species by 2014, only 754 could be included in the analysis as records of several species were omitted due to insufficient information, and the actual species richness is certainly higher, confirmed by numerous new records by Sáfián *et al.* (2020c) and predicted from list of species missing, but almost certainly occurring in Liberia (see 4.2.3). Fox *et al.* (1965) also tried to estimate species richness in Liberia, mostly by adding butterfly species to the list, have not been recorded in Liberia but were found in the neighbouring countries. As it is now known, their estimate of 729 species has long been exceeded, so as Larsen's (2005) maximum estimate of 775 species, and his estimates were generally based on much more field experience and on extensive general knowledge of the butterflies in West Africa. A significant bias in their estimates was caused by the incredibly high number of undescribed taxa, which were apparently beyond predictions.

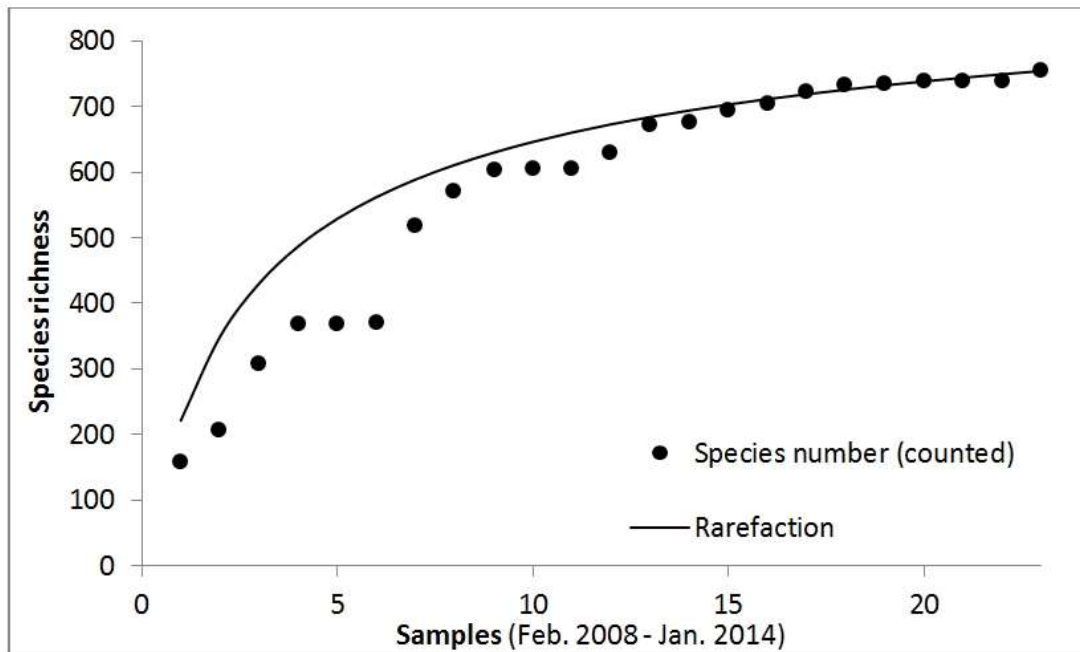


Figure 18. Species accumulation including only recent samples (2008-2014).

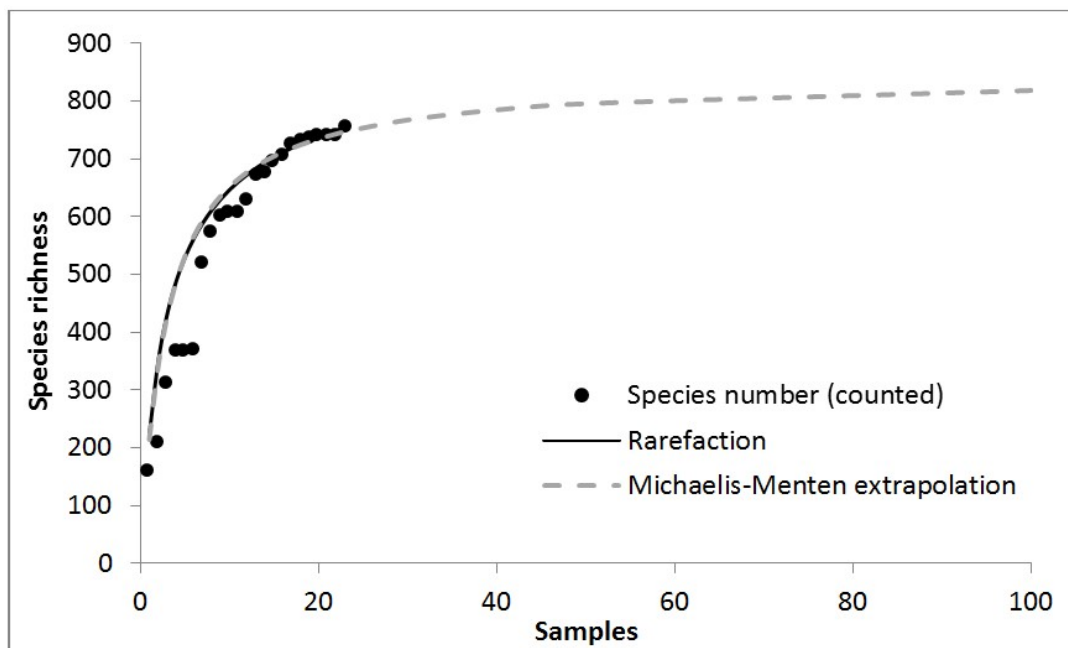


Figure 19. Species accumulation and prediction of species richness from 23 samples (actual) to 100 samples (predicted)(see also table 2).

4.2.2. The Liberian butterfly diversity in a broader West African context

To understand the real ecological and conservation value of Liberia's butterfly diversity, it needs to be examined through a wider geographical context in comparison with Larsen (2005, 2006b), also Belcastro & Larsen (2009), Sáfián (2012) and Sáfián (2014b). The 818 species positively recorded in Liberia accounts for approximately 50% of all butterflies known from West Africa (including the forests at the Nigeria-Cameroon border in Lower Guinea. This area harbours the highest diversity of butterflies in the region with over 1000 species recorded, because of overlap between the West African and Central African faunas. The 818 taxa recorded from Liberia indicates a unique richness from a country of the area of only 96 000 km². The fact that 86% - 705 species (see chapter 4.3.1) of all butterflies recorded inhabit forest habitats makes this richness even more extreme, as Liberia harbours virtually 75% of all forest butterflies occurring in West Africa west of the Dahomey Gap (Upper Guinean forest). The diversity of forest species in Liberia is higher than in Ghana – where the butterfly fauna is best known in entire West Africa (Figure 20). Although only 34% of Ghana was covered by forest habitats, in size, the forested area was almost equal to that of Liberia, moreover, the Ghanaian forests stretch across three recognized biogeographical subregions, including the Volta subregion (Togo Mountains), the Dahomey Gap (with a few outlier forest areas) and the Ghana subregion (Larsen 2005). The Ghanaian fauna also contains a few Liberian faunal elements, which are mainly restricted to the extreme south-west of the country, while a few also occur in at least on of the two existing upland forest localities of the Atewa Range and Tano Ofin. (Figure 24).

The estimated local diversities in Ghana's individual forests were well summarized in Larsen (2006b) with further data in Larsen *et al.* (2007, 2009). They estimate the local butterfly richness between 500 and 650 in a single forest area of substantial size in good condition, depending mainly on locality. In contrary, Sáfián (2014a) estimated the species richness of the Liberian Nimba Mountains reaching 700 species with 644 species positively recorded and identified, the same as for the Gola Forests on the border of Liberia and Sierra Leone (Belcastro & Larsen 2009, Sáfián 2012b). In Ghana, only the area of the Atewa Range has an estimated diversity of 700 species, which is outstanding in the Ghana subregion and is explained by the presence of unique upland forest at higher altitude (Larsen 2007). The immediate areas further east of Ghana are significantly poorer in butterflies, since the savannah land of the Dahomey Gap lacks most forest species (Larsen 2005) and the isolated relict forests are far too small to maintain an intact forest butterfly community (Fermon *et al.* 2001). The checklist of the butterflies of Benin in the Dahomey Gap lists 470 species including all savannah butterflies (Coache *et al.* 2017). No checklists and study-based diversity estimates are available from Ivory Coast. Larsen (2005) only mentions Banco Forest (at Abidjan) with a rough estimate of hosting 400 butterfly species, but the general diversity of a larger forest should certainly be higher as both Ankasa and Bia National Parks on the Ivorian border of Ghana harbour an estimated species richness to exceed 600 with Bia approaching 670 species (Larsen 2006b). Tai National Park in western Ivory Coast was mentioned to be of “very high levels of biodiversity” with no figures given (Larsen 2005),

but the area should already be considered to be part of the Liberian subregion (see details in chapter 4.3.3). The butterfly diversity drops significantly further west of the Liberian subregion, as the forest areas are increasingly broken up by open habitats and are considerably smaller in size. This probably would not apply to the Western Peninsular Mountains near Freetown and the Tingi and Loma Mountains in Sierra Leone, which could still be considered as mountainous areas part of the Liberian subregion. Further west in the isolated smaller forest areas of south-eastern Guinea and the Fouta Djallon are much poorer in butterflies compared to any other forest areas further east (Larsen 2005, Sáfián pers. obs.). The outlier forests of Guinea-Bissau and the Basse Casamance in Senegal represent a significantly impoverished version of the Upper Guinean rainforests in terms of butterfly fauna (Bivar-de-Sousa *et al.* 2008, Consciência *et al.* 2008, 2009, Larsen 2005, Mendes *et al.* 2007a, 2007b, 2008).

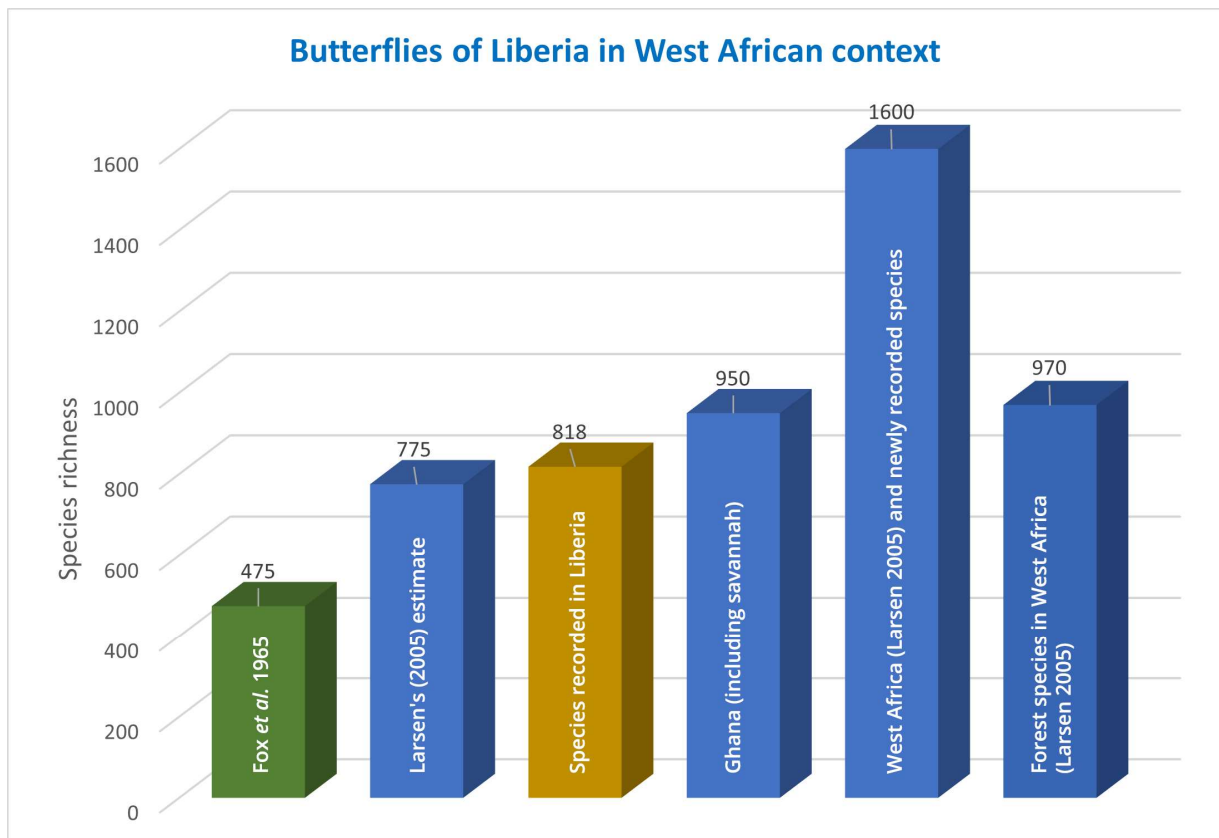


Figure 20. The recorded butterfly diversity in Liberia by 2020 in a West African context.

4.2.3. Systematic account (annotated checklist of the Butterflies of Liberia)

Present checklist of Liberian butterflies contains 818 species (821 taxa with the three species, which are represented by more than a single subspecies in the country). This is an increment of 66% since Fox *et al.* (1965) (Figure 20). A number of species were recorded near the state border of Liberia (in a zone within 30-60 km) in eastern Sierra Leone, in the Forest Region of Guinea (Guinée Forestière) and western Ivory Coast, under ecological and habitat conditions which indicate that they almost certainly occur also in Liberia, and some of them will prove restricted and thus endemic to the Liberian subregion. These include *Bicyclus mesogenina* Grünberg, 1912, *Charaxes pythodoris davidi* Plantrou, 1973, *Charaxes jolybouyeri* Vingerhoedt, 1998, *Junonia cymodoce* (Cramer, 1777), *Cymothoe adela* Staudinger, 1890, *Pseudaletis* sp., *Pseudaletis richardi* Stempffer, 1952, *Pilodeudorix hugoi* Libert, 2004, *Neurellipes helpsi* (Larsen, 1994), *N. ferenczi* Libert, 2010, *N. mirellae* Belcastro & Libert, 2010 (Claudio Belcastro pers. com., Larsen 2005, Libert 2007, 2010, Sáfián 2012b, Sáfián *et al.* 2020c, Florczyk *et al.* in prep.).

FAMILY PAPILIONIDAE Latreille [1802]

Genus *Graphium* Scopoli, 1777

Graphium angolanus baronis (Ungemach, 1932)

PLATE I

The subspecies *G. angolanus baronis* is distributed in the equatorial savannah zone (**EQS**), found mostly in wooded savannah areas (**GUI**), but as a strong flier in can appear in various open habitat types, including degraded and urban land. In Liberia it is generally rare, as the butterfly migrates southward from northern savannahs into the forest zone only in the dry season, when it can establish temporary colonies, especially along the coast. It might breed permanently in the savannah areas near Lake Piso.

Graphium tynderaeus (Fabricius, 1793)

PLATE I

Guineo-Congolian forest species (**EQU**), occurring both in wetter lowland and upland forests (**WEF**) and secondary growth throughout the country. It is among the commonest forest *Graphium* in Liberia with many old and recent records. Males are often seen at water, they also actively hill-top in the afternoon hours on forested summits.

Graphium latreillianus latreillianus (Godart, 1819)

PLATE I

The nominate subspecies is restricted to the Upper Guinean forest zone (**UPG**) and occurs in wet to hyperwet forests (**WEF**). It is widespread but rather rare in Liberia with only two old and a number of recent records. In dry season, males are attracted by muddy spots, they were also observed hill-topping on forested summits.

Graphium rileyi Berger, 1950

PLATE I

Upper Guinean endemic forest species (**UPG**), which is very rare and is probably local in Liberia, presently known only from the Gola National Forest. A few males were recorded from a single mud-puddling spot among *G. latreillianus* and *G. polícenes* (Sáfián 2012b). It is also rare in throughout its entire range with upland affinities in Ghana (Atewa Range), locally also in wet lowland forests (**WEF**) in Ivory Coast (Larsen 2005).

Graphium leonidas leonidas (Fabricius, 1793)

PLATE I

Pan-African (**PAN**) ubiquitous (**UBQ**) species, which occurs in all habitat types including forests, gallery forest, dense woodland-savannah, but can be found also in degraded habitats, such as agricultural land and gardens. Widespread and not rare in Liberia, with various old and recent records.

Graphium illyris illyris (Hewitson, 1873)

PLATE I

The nominate subspecies is restricted to the Upper Guinean forest zone (**UPG**) and occurs in wet to hyperwet forests (**WEF**). It has little tolerance for habitat degradation and is seems to be local and rare in Liberia, recorded only from a few specimens in upland forests of the Putu Range and the Nimba Mountains.

Graphium polícenes polícenes (Cramer, [1775])

PLATE I

Pan-African species (**PAN**), which inhabits all types of forest (**ALF**). It is widespread and very common in Liberia with many old and recent records.

Graphium antheus (Cramer, [1779])

PLATE I

Pan-African species (**PAN**), which occurs in various drier forest types, parklands and wooded savannah habitats (**ALF**). It is rather rare in Liberia with only a few recent records and does not possibly enter large blocks of wetter closed canopy forests.

Genus *Papilio* Linnaeus, 1758

Papilio antimachus antimachus Drury, 1782

PLATE II

The nominate subspecies is Guineo-Congolian (**EQU**), which is distributed patchily in West Africa (Larsen 2005), being more widespread and common in Central Africa (vande Weghe 2010). Although the butterfly is very rare and local in the Ghana subregion of the Upper Guinean forest zone, it seems to be commoner and more widely distributed in the Liberian subregion with

numerous recent records from Liberia (Nimba Mountains, West Nimba, Wologizi Mountains, Mount Swa, Tappita, Putu Range, Foya Proposed Protected Area, Lake Piso) (Sáfián 2011, 2014a, Sáfián *et al.* 2020c). *P. antimachus antimachus* is usually associated with wet lowland forest (**WEF**), but it also ascends to the upland and submontane regions, as males regularly hill-top on the highest peaks (Sáfián 2013b). Both sexes normally stay in the canopy of high forest, only males can be seen at ground level, where they occasionally intake minerals from wet soil (Larsen 2005). *P. antimachus* is listed on IUCN's Red List as Data Deficient (DD) (www.iucnredlist.org).

Papilio zalmoxis Hewitson, 1864

PLATE II

Guineo-Congolian forest species (**EQU**), which is distributed patchily in West Africa in wetter types of forest (**WEF**) (Larsen 2005), being more widespread and common from Eastern Nigeria towards Central Africa. The species is exceedingly rare in the Upper Guinean forest zone with no confirmed recent records from the Ghana and only one from the Liberian subregion: Tai National Park (Larsen 2005). There are old specimen records from the Nimba Mountains, which also seem genuine (Condamin & Roy 1963).

Papilio dardanus dardanus Brown, 1776

PLATE II

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all sorts of forest habitats (**ALF**), including degraded secondary habitats, riverine gallery forest, parks and dense woodland-savannah. It can also establish colonies in *Citrus* plantations as the larvae also feed on cultivated orange and other *Citrus* (Rutaceae) trees. *P. dardanus* is widespread and usually common in Liberia.

Papilio phorcas phorcas Cramer, [1775]

PLATE II

The nominate subspecies is West African (**WAF**) and is rather patchily distributed in the Ghana subregion of the Upper Guinean forest zone. It is widespread and usually common in Liberia's forests (**ALF**), degraded forests and secondary growths.

Papilio horribilis Butler, 1874

PLATE II

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**) in good condition. It is usually rare in the Ghana subregion, but becomes widespread and more common in the lowland forest of Liberia. The adult butterflies tend to stay in the canopy but males occasionally descend to ground level to drink from muddy spots, especially in the dry season.

Papilio chrapkowskoides nurettini Koçak, 1983

PLATE II

The subspecies *P. chrapkowskoides nurettini* is Guineo-Congolian (**EQU**) with considerable tolerance for habitat degradation. Widespread and common in lowland forests (**MEF**) and secondary growth – fallow farmbush throughout Liberia.

Papilio sosia sosia Rothschild & Jordan, 1903

PLATE II

The nominate subspecies is West African (**WAF**), which occurs in all types of forest (**ALF**). It is widespread but not common in Liberia with only a few old and recent records.

Papilio nireus nireus Linnaeus, 1758

PLATE II

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all sorts of forest habitats (**ALF**), riverine gallery forest and occasionally dense woodland-savannah. *P. nireus* is widespread and usually common species in all lowland forests in Liberia, including secondary growth and degraded, open woodlands. Similarly to *P. dardanus*, it can also establish colonies in *Citrus* plantations as the larvae also feed on cultivated orange and other *Citrus* (Rutaceae) trees.

Papilio menestheus menestheus Drury, 1773

PLATE III

The nominate subspecies is West African (**WAF**) and occurs in various types of forest (**MEF**). It is widespread and not rare in Liberia with several old and recent records.

Papilio demodocus demodocus Esper, [1798]

PLATE III

The nominate subspecies is pan-African (**PAN**) and ubiquitous (**UBQ**). It can occur in virtually all habitat types including forests, gallery forest, dense woodland-savannah, but can be found also in degraded habitats such as agricultural land and gardens. Its main foodplants are various *Citrus* (Rutaceae) species, including cultivars, so it can basically breed, wherever orange, grapefruit or tangerine trees are planted.

Papilio cyproeofila cyproeofila Butler, 1868

PLATE III

The nominate subspecies is West African (**WAF**), which occurs in various types of forest (**MEF**). It is widespread and common in Liberia, with many old and recent records.

Papilio zenobia Fabricius, 1775

PLATE III

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is widespread and common in Liberia, with many old and recent records.

Papilio cynorta Fabricius, 1793

PLATE III

Guineo-Congolian forest species (**EQU**), which is widespread in lowland forests (**MEF**) throughout West Africa including the Liberian subregion. Adults fly mostly in the darker forest interior.

FAMILY HESPERIIDAE Latreille, 1809

Genus *Coeliades* Hübner, [1818]

Coeliades chalybe chalybe (Westwood, 1852)

PLATE III

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**), also in secondary growth. It is widespread but not common in Liberia, with several old and recent records.

Coeliades libeon (Druce, 1875)

PLATE III

Pan-African (**PAN**) savannah (**GUI**) species, which regularly migrates and therefore, it could occur in all types of habitat (Larsen 2005). It is known from a couple of old and two recent records (Putu Range) in Liberia.

Coeliades forestan forestan (Stoll, [1782])

PLATE III

The nominate subspecies is Pan-African (**PAN**), ubiquitous (**UBQ**) and can occur in all types of habitats. It is widespread and very common in Liberia, with numerous old and recent records.

Coeliades pisiistratus (Fabricius, 1793)

PLATE IV

Pan-African (**PAN**) forest species, which occurs in all types of forest (**ALF**), also in secondary growth and shrub. It is widespread but much rarer than *C. forestan* in Liberia, with only a few recent records.

Coeliades hanno (Plötz, 1879)

PLATE IV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread but not common in Liberia, with a single old and only a few recent records.

Genus *Pyrrhiades* Lindsey & Miller, 1965

Pyrrhiades lucagus (Cramer, 1777)

PLATE IV

The species is distributed from the Dahomey Gap to Liberia (**UPG**) in a narrow belt along the coast, where it inhabits dry coastal forest, woodland and scrub (**DRF**). Curiously, it also occurs in northern Ghana (Gambaga Escarpment), where its habitat is Guinea savannah (Larsen 2005). It is probably rare or at least local in Liberia's eastern coast, where it was recorded over a hundred years ago.

Genus *Pyrrhochalcia* Mabille, 1904

Pyrrhochalcia iphis iphis (Drury, 1773)

PLATE IV

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**ALF**), also in secondary growth and occasionally in coastal shrubland. It is widespread and locally common in Liberia, with numerous old and recent records.

Genus *Eagris* Guénéée, 1862

Eagris denuba (Plötz, 1879)

PLATE IV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Eagris decastigma decastigma Mabille, 1891

PLATE IV

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, known only from a few recent records (Putu Range, Sapo National Park).

Eagris tigris liberti Collins & Larsen, 2005

PLATE IV

The subspecies *E. tigris liberti* is widely distributed in the Guineo-Congolian forest zone (**EQU**). It occurs in wetter types of forest (**WEF**) in good condition. *E. tigris liberti* is very rare in Liberia, with only a single record from the Gola National Forest (Sáfián 2013).

Eagris subalbida subalbida (Holland, 1893)

PLATE V

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, known only from a few recent records from the Putu Range, Gola National Forest and Sapo National Park.

Eagris hereus quaterna (Mabille, 1890)

PLATE V

The subspecies *E. hereus quaterna* is West African (**WAF**), which occurs in various types of forest (**MEF**). It is rare in Liberia, known only from a few recent records from the Putu Range, Sapo National Park and the Nimba Mountains.

Eagris tetrastigma lomana Belcastro & Sáfián, 2020

PLATE V

The newly described subspecies *E. tetrastigma lomana* is endemic to the Liberian subregion (**LIB**) and occurs in wetter types of forest (**WEF**), occasionally in secondary growth. It is rare in Liberia, with only a few recent records from the Putu Range, Sapo National Park, the Nimba Mountains and the Wologizi Mountains (Sáfián *et al.* 2020a).

Genus *Procampta* Holland, 1892

Procampta rara Holland, 1892

PLATE V

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is very rare in Liberia, with only a single old and a few recent records from the Putu Range and the Nimba Mountains.

Genus *Calleagris* Aurivillius, [1925]

Calleagris lacteus dannatti (Ehrmann, 1893)

PLATE V

The subspecies *C. lacteus dannatti* is West African (**WAF**) and occurs in wetter types of forest (**WEF**), especially riverine forests in good condition (Larsen 2005). It can also appear near rivers in the forest-savannah transition and in coastal swamp forests. It is rather widespread, but not common in Liberia, with only a couple of old and several recent records.

Calleagris landbecki (Druce, 1910)

PLATE V

Guineo-Congolian forest species (**EQU**), which occurs only in wetter types of forest (**WEF**) in good condition. It is usually very rare in West Africa with only a few scattered records. *C. landbecki* was recorded as new to Liberia recently from the Gola National Forest (Sáfián 2013)

and it was found common in the lowland forests in the Nimba Mountains (Western Range) in February-March 2012 (Sáfián & Larsen 2012) and has not been seen since.

Genus *Tagiades* Hübner, [1819]

Tagiades flesus (Fabricius, 1781)

PLATE V

Pan-African species (**PAN**), which occurs in all types of forest (**ALF**), also in woodlands, riverine gallery forests, and dense scrub. It can occur also in degraded forest habitats and urban parklands and gardens. It is widespread and very common in Liberia with many old and recent records.

Genus *Abantis* Hopffer, 1855

Abantis lucretia lucretia Druce, 1909

PLATE V

The nominate subspecies is Guineo-Congolian (**EQU**), which inhabits various types of forest (**MEF**) in good condition. It is rather rare throughout its distribution. In Liberia it was found only in the Nimba Mountains (Western Range: Gbapa, Mount Beeton) in both lowland and upland forest.

Abantis elegantula (Mabille, 1890)

PLATE VI

Guineo-Congolian species (**EQU**), with unclear eastern limit of its distribution. It is very rare throughout its range and was not known from Liberia until the recent first records from the Nimba Mountains (Western Range: Gbapa, Mount Beeton). In Liberia it was found both in wet lowland forest and on hilltops covered by upland forest, but the distribution elsewhere is centred on drier types of forest (**DRF**).

Abantis tanobia Collins & Larsen, 2005

PLATE VI

Upper Guinean endemic species (**UPG**), which, assessed from the few available records, inhabits wet forests in good condition (**WEF**). Previously it was recorded only from Ghana and was not expected to occur in Liberia. The first Liberian specimen is a male, which was captured hill-topping among *A. elegantula* males in the Nimba Mountains (Western Range)(Sáfián 2014a). Further male specimens were found under similar conditions in the East Nimba Nature Reserve, while one of them was observed nectaring on the invasive *Chromolaena odorata* (Lin). The species was found also in the Putu Range in January 2018.

Abantis ja usheri Collins & Larsen, 2008

PLATE VI

The subspecies *A. ja usheri* is endemic to the Upper Guinean forest zone (**UPG**). It is probably associated with upland forest habitats (**UPF**), as it was found only in Ghana's Atewa Range, the hills near Bibiani, western Ghana (Larsen 2005) and in the upland forests of the Putu Range in Liberia.

Genus *Ortholexis* Karsch, 1895

Ortholexis holocausta (Mabille, 1891)

PLATE VI

Guineo-Congolian species (**EQU**), which inhabits wet and hyperwet forests (**WEF**) in good condition. It is known only from an old (Fox *et al.* 1965) and a recent record (Sáfián 2013) in Liberia, but it will eventually be found in other lowland forests in good condition (e.g. Sapo National Park), as specimens are known also from western Ivory Coast (Taï National Park) (Larsen 2005).

Ortholexis dimidia (Holland, 1896)

PLATE VI

Guineo-Congolian species (**EQU**), which inhabits wet and hyperwet forests (**WEF**) in good condition. The presence of the species was expected in Liberia, since both sexes were caught in the Gola Rainforest National Park, Sierra Leone in November 2008 (Sáfián 2010). The first Liberian specimen, a male was captured in the Wologizi Mountains in a deep river valley in Maranthaceae thicket early in the morning in November 2018, while another male was attracted to light in the nearby Wonegizi Mountains in March 2019 (Sáfián *et al.* 2020c).

Ortholexis hollandi (Druce, 1909)

PLATE VI

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet lowland forests (**WEF**) in good condition. It is known only from a few recent records in Liberia, from the Gola National Forest, the Putu Range (male specimen captured at light), the Wologizi Mountains and the ENNR. The males display on hilltops between 18.00 and 19.00, where they patrol in small clearings high (6-10 m) at high speed, never settling.

Genus *Katreus* Watson, 1893

Katreus johnstoni (Butler, 1888)

PLATE VI

Guineo-Congolian forest species (**EQU**), which inhabits wetter forests (**WET**) in good condition. It was first recorded in Liberia from a photograph taken in the Nimba Mountains (Mount Tokadeh, Western Range) (Phalan 2010), and more recently a few specimens were

captured in the Wologizi Mountains between 600-900 m, but it should occur also in other forests, including lowland localities.

Genus *Celaenorrhinus* Hübner, [1819]

Celaenorrhinus maesseni Berger, 1976

PLATE VI

C. maesseni was recently elevated to species rank from the West African subspecies of *C. proxima* by Libert (2014). The species is distributed between Guinea and Western Cameroon (**WAF**), occurring in various types of forest (**MEF**). It is not common in Liberia, with only a few scattered old and recent records.

Celaenorrhinus plagiatus Berger, 1976

PLATE VII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is not common in Liberia, with only a few scattered recent records.

Genus *Scopulifera* Libert, 2014

Scopulifera sagamase tropeki Libert, 2014

PLATE VII

The population found in Liberia represents an endemic subspecies (**LIB**), which – according to our limited knowledge – inhabits wetter lowland and upland forests (**WEF**). It was recently recorded from the Putu Range from upland forest in Liberia, and was subsequently found in Sapo National Park, on Mount Swa (Sáfián 2011, 2012) and in the Foya Proposed Protected Area (Sáfián unpublished).

Genus *Bettonula* Libert & Larsen, 2014

Bettonula bettoni nimba (Collins & Larsen, 2000)

PLATE VII

The taxon is listed in Larsen (2005) as *Celaenorrhinus nimba*, which was that time known only from the holotype captured near Yealé village in Ivory Coast on the Liberian border in the Nimba Mountains. In his revision, Libert (2014) has moved *C. bettoni* into the genus *Bettonula* (originally established but never published by Berger), and *C. nimba* was reassigned as a subspecies of *Bettonula bettoni*. Although it was expected to be found in the Liberian Nimba Mountains (where it should occur), the first Liberian record came from the Wologizi Mountains, where a fresh female was captured by Gábor Simonics on the Elephant Ridge in November 2018, shortly followed by another one by Sáfián from a river valley near Rosewood Camp (Sáfián *et al.* 2020c). *B. bettoni nimba* is probably a pre-montane, upland species (**UPF**) that could be found patchily in the Guinea Highlands (**END**).

Genus *Apallaga* Strand, 1911

Apallaga leona Berger, 1975

PLATE VII

Upper Guinean forest species (**UPG**), which occurs in wetter types of forest (**WEF**). It is not common, with only a few scattered recent records in Liberia.

Apallaga galenus (Fabricius, 1793)

PLATE VII

The ‘*galenus*-clade’ sensu Libert (2014) is very complex and for a long time all very similar species were recorded under the omnibus name *Celaenorrhinus galenus*. Libert (2014) identified four species in the complex from West Africa, three of them are also confirmed from Sáfián’s recent records in Liberia, old records of Fox *et al.* (1965) might pertain to either species in the *galenus*-clade. *A. galenus* is restricted to the Upper Guinean and Lower Guinean forests (**WAF**) and is known to inhabit all types of forest (**ALF**), including secondary growth and wooded farmland.

Apallaga belcastroi Libert, 2014

PLATE VII

A newly described species in the ‘*galenus*-clade’, which – according to present knowledge – is restricted to wet lowland forests (**WEF**) of the Liberian subregion (**LIB**) (Type locality: Guma Valley, Freetown, Sierra Leone). Recent records indicate that the species is rather widespread in Liberia, known from Lake Piso, Gola National Forest, the Putu Range and the Nimba Mountains (Libert 2014).

Apallaga galkasa Libert, 2014

PLATE VII

A newly described species in the ‘*galenus*-clade’, which – according to present knowledge – is restricted to Upper Guinean forest zone (**UPG**). It seems to be widely distributed within its range and occurs in wetter types of forest (**WEF**). In Liberia, it is confirmed only from a few specimens collected recently in the Putu Range (Libert 2014) and in the Wologizi Mountains (Sáfián *et al.* 2020c).

Apallaga ankasa ankasa (Collins & Larsen, 2005)

PLATE VII

The nominate subspecies is endemic to the Upper Guinean forests (**UPG**) and inhabits wetter types of forest (**WEF**) in good condition. It is very rare throughout its range with only a few records from Ghana, Ivory Coast, Liberia and Sierra Leone. The only Liberian records are from Mount Ghi in the Putu Range (Sáfián 2012a) and the Wologizi Mountains (Sáfián *et al.* 2020c).

Apallaga confusa occidentalis Libert, 2014

PLATE VIII

A. confusa is a newly described species in the ‘*meditrina*-clade’, the subspecies *occidentalis* is restricted to the Liberian subregion (**LIB**). It is known only from wetter types of forest (**WEF**) in good condition, in Liberia, it was recorded from the Putu Range, Mount Swa and the Nimba Mountains (Western Range) (Libert 2014).

Apallaga perconfusa Libert, 2014

PLATE VIII

A newly described species in the ‘*meditrina*-clade’, which – according to present knowledge – is restricted to the Liberian subregion (**LIB**). It is known only from a few confirmed recent records from eastern Sierra Leone, the Liberian Nimba Mountains, Western Range (Mount Tokadeh, Mount Gangra) all from wetter types of forest (**WEF**) (Libert 2014).

Apallaga vicariana Libert, 2014

PLATE VIII

A newly described species with type locality near the Liberian border in Sierra Leone (Libert 2014). In Liberia, it is known from a single recent record collected in the Wologizi Mountains (**LIB**). (Sáfián *et al.* 2020c). The species is probably found only in wetter types of forest in good condition (**WEF**).

Apallaga safiani Libert, 2014

PLATE VIII

A newly described species (Libert 2014), which is probably restricted to wet forests (**WEF**) of the Liberian subregion (**LIB**) in good condition. In Liberia it was found only recently in the Grebo-Krahn National Park, on Mount Swa, in the Nimba Mountains and in the Wologizi Mountains, displaying on hilltops (Sáfián 2014a).

Genus *Eretis* Mabille, 1891

Eretis lugens (Rogenhofer, 1891)

PLATE VIII

The species has a wide distribution in the drier savannah zone from West Africa to Kenya in the east and Zambia in the south (**EQS**). It is a savannah butterfly (**GUI**), which is not normally seen in forest areas. It has, however, a few old records from Liberia, which are confirmed by recently collected specimens from the upland and submontane zones of the Nimba Mountains, where it flies in secondary grasslands and along the edge of sub-montane forests.

Eretis plistonicus (Plötz, 1879)

PLATE VIII

West African species (**WAF**), which occurs at forest edges and in clearings in all types of forest (**ALF**). It was recorded only recently in Liberia, in the Putu Range and the Nimba Mountains.

Eretis melania Mabille, 1891

PLATE VIII

The species has a wide distribution from West Africa to Kenya in the east and Zimbabwe in the south (**EQS**). It is a savannah butterfly (**GUI**), which can also penetrate the forest zone, appearing in disturbed, open habitats. *E. melania* is known only from three recent records in Liberia from the Nimba Mountains and Lake Piso. Larsen (2005) also mentions it, without exact locality.

Genus *Sarangesa* Moore, [1881]

Sarangesa tertullianus (Fabricius, 1793)

PLATE VIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread and common in Liberia, with several old and recent records.

Sarangesa majorella (Mabille, 1891)

PLATE IX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), also in degraded secondary forest. It is rare in Liberia, with only a few old and recent records (Lake Piso, Nimba Mountains).

Sarangesa thecla thecla (Plötz, 1879)

PLATE IX

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth, occasionally also in degraded agricultural land with some tree cover and young farmbrush. It is widespread and not rare in Liberia, with several old and recent records.

Sarangesa bouvieri (Mabille, 1877)

PLATE IX

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth, occasionally also in degraded agricultural land with some tree cover and young farmbrush. It is widespread and not rare in Liberia, with a few old and several recent records.

Sarangesa brigida brigida (Plötz, 1879)

PLATE IX

The nominate subspecies is West African (**WAF**), which occurs in various types of forest (**MEF**) and secondary growth. It is rather rare in Liberia, with only three recent records (Putu Range, Sapo National Park, Nimba Mountains).

Genus *Triskelionia* Larsen & Congdon, 2011

Triskelionia tricerata (Mabille, 1891)

PLATE IX

The species was recently moved from *Sarangesa* into the newly established genus *Triskelionia* (Larsen & Congdon 2011). It is widely distributed in the Guineo-Congolian forest zone (**EQU**), occurring in various types of forest (**MEF**). *T. tricerata* is known only from a few recent records in Liberia, all collected in the Nimba Mountains, except a single record from Wolala Forest an old-grown coastal forest patch near Lake Piso.

Genus *Gomalia* Moore, 1879

Gomalia elma (Trimen, 1862)

PLATE IX

Pan-African (**PAN**) savannah and savannah-forest transition species (**GUI**), which occasionally penetrates disturbed, open areas in the forest zone. Only a single specimen was collected in the Nimba Mountains (ENNR) by Gábor Simonics in December 2016. It was flying along the forest edge in the lowlands near Yekepa.

Genus *Spialia* Swinhoe, [1912])

Spialia spio (Linnaeus, 1764)

PLATE IX

Pan-African (**PAN**) savannah species (**GUI**), which can occasionally appear in degraded habitats in the forest zone. It is very rare in Liberia, with only three recent records (Yekepa, Putu Range, Lake Piso)

Genus *Ernsta* Grishin, 2020

Ernsta ploetzi occidentalis (de Jong, 1977)

PLATE IX

The subspecies *E. ploetzi occidentalis* is West African (**WAF**), which occurs in drier forests (**DRF**), forest edges and disturbed areas in the forest zone. It has scattered, mostly recent records from Liberia.

Genus *Astictopterus* Felder & Felder, 1860

Astictopterus anomoeus (Plötz, 1879)

PLATE X

Upper Guinean endemic forest species (**UPG**), which inhabits clearings or gaps in wet forest (**WEF**). It was recorded from a few places in Liberia: old records from Monrovia, Ganta and a few recent ones from the Nimba Mountains (Western Range) (Sáfián 2014a).

Genus *Isoteinon* Felder & Felder, 1862

Isoteinon abjecta (Snellen, 1872)

PLATE X

Equatorial savannah species (**EQS**), which inhabits forest-savannah transitions and dense wooded savannah (**GUI**), occasionally degraded areas in rainforest. In Liberia the species was known only from a single old record from Zorzor (Fox *et al.* 1965), while it was recently discovered in the Nimba Mountains (ENNR) (Sáfián 2014a), where its presence was suspected due to former records from the Guinean side of the Nimba (Larsen 2005).

Genus *Prosopalpus* Holland, 1896

Prosopalpus debilis (Plötz, 1879)

PLATE X

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), also in secondary growth and occasionally in degraded agricultural land with some tree cover. It is rather rare in Liberia, known from a small series of old records and a single one from the Putu Range.

Prosopalpus styla Evans, 1937

PLATE X

Guineo-Congolian forest species (**EQU**), which occurs in swampy habitats in various types of forest (**MEF**), also in secondary growth, occasionally in swamps in the savannah zone. It is widely distributed but local in Liberia, known only from a few recent records.

Prosopalpus saga Evans, 1937

PLATE X

Guineo-Congolian forest species (**EQU**), which occurs in semi-open gaps in wetter types of forest (**WEF**), or along forest roads. It is rare in Liberia, with only a few recent records from the Putu Range, the Gola National Forest and the ENNR.

Genus *Gorgyra* Holland, 1896

Gorgyra aretina (Hewitson, 1878)

PLATE X

Guineo-Congolian forest species (**EQU**), which inhabits all types of forest (**ALF**). It is rather rare in Liberia, with only a couple of old and few recent records.

Gorgyra heterochrus (Mabille, 1890)

PLATE X

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**). It is widespread and not rare in Liberia, with several old and recent records.

Gorgyra mocquersii Holland, 1896

PLATE X

Guineo-Congolian forest species (**EQU**), which inhabits all types of forest (**ALF**). It is widespread, but not common in Liberia, with a few old and several recent records.

Gorgyra aburae (Plötz, 1879)

PLATE XI

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is rare in Liberia, with a single old and a couple of recent records.

Gorgyra ziama Belcastro & Sáfián, 2020

PLATE XI

An essentially Liberian subregion endemic species (**LIB**), which seems to be widespread in the forests of Liberia, Guinea and Sierra Leone (**WEF**), but it is small and easy to overlook, and its size is probably the main reason, why the species was overlooked for so long. The first specimens were found in Zياما Forest, Guinea by Claudio Belcastro, who has found it also in the Gola Forest in Sierra Leone (Sáfián *et al.* 2020a). The first Liberian records were found among unidentified material collected by Sáfián in the Putu Range in 2010, while other specimens were collected more recently on Mount Gangra in the Nimba Mountains and in the Wologizi Mountains (Sáfián *et al.* 2020c).

Gorgyra bina Evans, 1937

PLATE XI

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**). It is widespread and not rare in Liberia, with a few old and several recent records.

Gorgyra sola Evans, 1937

PLATE XI

Guineo-Congolian forest species (**EQU**), which inhabits wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only a single old and a few scattered recent records.

Gorgyra afikpo Druce, 1909

PLATE XI

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**) in good condition. It is very rare in Liberia, with only three recent record from Mount Swa, Lake Piso and the Wonegizi Mountains.

Gorgyra diversata Evans, 1937

PLATE XI

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**) and secondary growth. It is easy to overlook for its small size, but could also be rather rare in Liberia, with a single old and a few recent records.

Gorgyra bule Evans, 1937

PLATE XI

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**). It is known only from two recent records in Liberia, the first specimen was caught in secondary forest near Lake Piso, while the second one was recorded at the Gbedin Falls, on the St. John's River on the Guinean border. *G. bule* is probably more widely distributed but is rare.

Gorgyra minima Holland, 1896

PLATE XI

Guineo-Congolian forest species (**EQU**), which is centred on dry forest (**DRF**) and forest-savannah transition. It sometimes occurs in degraded secondary growth. *G. minima* is very rare in Liberia, with only a couple of old records and a pair captured in copula near Lake Piso in January 2018.

Gorgyra sara Evans, 1937

PLATE XII

Guineo-Congolian forest species (**EQU**), which inhabits all types of forest (**ALF**) and secondary growth. It is rather rare in Liberia, with a single old and only three recent records.

Gorgyra subfacatus (Mabille, 1890)

PLATE XII

Considering present knowledge, *G. subfacatus* is a West African forest species (**EQU**), which inhabits all types of forest (**ALF**) and secondary growth. It is rare in Liberia, with a single old and a couple of recent records.

Gorgyra pali Evans, 1937

PLATE XII

Guineo-Congolian forest species (**EQU**), which inhabits wetter types of forest (**WEF**). It is not rare in Liberia, with several recent records.

Genus *Gyrogra* Lindsey & Miller, 1965

Gyrogra subnotata (Holland, 1894)

PLATE XII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**), occasionally also in secondary growth. It is rather rare in Liberia, with only a few recent records. A single specimen was caught at light in lowland forest at the foothills of the Nimba Mountains.

Genus *Teniorhinus* Holland, 1892

Teniorhinus watsoni Holland, 1892

PLATE XII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It seems to be widespread and rather common in Liberia, with several old and recent records.

Teniorhinus ignita (Mabille, 1877)

PLATE XII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It seems to be widespread and rather common in Liberia, with several old and recent records.

Genus *Ceratruchia* Butler, 1870

Ceratruchia phocion phocion (Fabricius, 1781)

PLATE XII

The nominate subspecies is West African (**WAF**), which inhabits various types of forest (**MEF**). It is locally common near streams, swamps and other wetter areas with dense undergrowth. Widespread in Liberia, with several old and recent records.

Ceratrachia crowleyi Riley, 1925

PLATE XII

Liberian subregion endemic (**LIB**), which reaches Ghana's south-western wet evergreen forests in the east. It occurs also in Ankasa National Park in western-south-western Ghana a disjunct occurrence from its main distribution area. Other species with their distribution centred on Liberia have similar range (e.g. *Euriphene veronica*, *Euptera dorothea warrengashi*) see also in the discussions in 4.4.3. The species occurs in hyperwet lowland forests (**WEF**) of Liberia, where it is usually common.

Ceratrachia nothus nothus (Fabricius, 1787)

PLATE XIII

The nominate subspecies seems to be restricted to the Liberian subregion (**LIB**), also occurring in south-western Ghana. It inhabits wetter types of forest (**WEF**) in good condition. It is widespread and rather common in Liberia, with several old and recent records.

Note: the subspecific division between the nominate subspecies and ssp. *enatia* (Karsch, 1893) is unclear, as the Ghanaian populations are rather clinal in appearance (Larsen unpublished).

Genus *Argemma* Grishin, 2019

Argemma argyrosticta (Plötz, 1879)

PLATE XIII

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**) in good condition. It seems to be very rare in Liberia, with only a few records from the Putu Range, Mount Swa and the Wologizi Mountains.

Note: the taxon currently recognized as *A. argyrosticta enta* represents a distinct species (Larsen unpublished)

Argemma maesseni Miller, 1971

PLATE XIII

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**). It is very rare in Liberia, with only a few recent records from the Putu Range, the Nimba Mountains and the Wologizi Mountains.

Genus *Ceratricula* Larsen, 2013

Ceratricula semilutea (Mabille, 1891)

PLATE XIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with a single old but several recent records.

Genus *Pardaleodes* Butler, 1870

Pardaleodes incerta murcia (Plötz, 1883)

PLATE XIII

The subspecies *P. incerta murcia* is widely distributed in and along the Guineo-Congolian forest zone (**EQU**), occurring usually in dry forests, forest-savannah transition, penetrating slightly into the savannah zone in riverine forests (**DRF**). It sometimes also occurs in degraded forest habitats. It is not rare in Liberia, with scattered old and recent records.

Pardaleodes edipus (Stoll, 1781)

PLATE XIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), mostly in forest edges and clearings, also in secondary growth, even in degraded agricultural land in the forest zone. It is among the commonest butterflies in Liberia, with many old and recent records.

Pardaleodes sator sator (Westwood, 1852)

PLATE XIII

The nominate subspecies is West African (**WAF**), which occurs in various types of forest (**MEF**) and secondary growth. It is widespread and very common in Liberia with many old and recent records.

Pardaleodes tibullus tibullus (Fabricius, 1793)

PLATE XIII

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with many old and several recent records.

Genus *Hollandus* Larsen & Collins, 2015

Hollandus xanthopeplus Holland, 1892

NOT ILLUSTRATED

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is known only from a single old record in Liberia, with no specific locality, although it was recorded also on the Liberian border in Ivory Coast at the foothills of Nimba Mountains (Yéalé) by Haydon Warren-Gash (Larsen 2005).

Genus *Xanthodisca* Aurivillius, [1925]

Xanthodisca rega (Mabille, 1889)

PLATE XIV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Genus *Xanthonymus* Grishin, 2019

Xanthonymus astrape (Holland, 1892)

PLATE XIV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is quite rare in Liberia, with a single old and a few recent records.

Genus *Rhabdomantis* Holland, 1896

Rhabdomantis galatia (Hewitson, 1868)

PLATE XIV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with several old and recent records.

Rhabdomantis sosia (Mabille, 1891)

PLATE XIV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It seems to be very rare in Liberia with only a single old (Ganta) and a couple of recent records (Gola National Forest, Nimba Mountains).

Genus *Osmodes* Holland, 1892

Osmodes laronia (Hewitson, 1868)

PLATE XIV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth, usually near swamps. It is rather widespread and not rare in Liberia, with only a few old and several recent records.

Osmodes omar Swinhoe, 1916

PLATE XIV

Guineo-Congolian forest species (**EQU**), which is centred on in drier types of forest (**DRF**) and secondary growth. It is rare in Liberia, with only a couple of old and a few recent records.

Osmodes lux Holland, 1892

PLATE XIV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rather rare in Liberia, with only a couple of old and few recent records.

Osmodes thora (Plötz, 1884)

PLATE XIV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth. It is rather rare in Liberia, with a few old and only a couple of recent records.

Osmodes distincta Holland, 1896

PLATE XV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rather widespread but not common in Liberia, with a couple of old and several recent records.

Osmodes adon (Mabille, 1890)

PLATE XV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. In Liberia, it is known only from a couple of recent records from the Putu Range (Sáfián 2011) and the Wologizi Mountains (Sáfián *et al.* 2020c).

Osmodes adosus (Mabille, 1890)

PLATE XV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rather widespread in Liberia, with a couple of old and several recent records.

Osmodes lindseyi occidentalis Miller, 1971

PLATE XV

The subspecies *occidentalis* is endemic to the Upper Guinean forest zone (**UPG**) and occurs in various types of forest (**MEF**) and secondary growth. It is rather rare in Liberia, with a couple of old and a few recent records.

Osmodes costatus Aurivillius, 1896

PLATE XV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) and secondary growth. It is rare in Liberia, with only a few recent records from the Putu Range, Sapo National Park and Gola National Forest.

Genus *Parosmodes* Holland, 1896

Parosmodes lentiginosa (Holland, 1896)

PLATE XV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is very rare in Liberia, known only from a single old (Kpain) and a couple of recent records (Putu Range).

Genus *Osphantes* Holland, 1896

Osphantes ogowena ogowena (Mabille, 1891)

PLATE XV

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, known only from a single record from the Putu Range.

Genus *Acleros* Mabille, 1885

Acleros ploetzi Mabille, 1889

PLATE XV

Pan-African forest species (**PAN**), which occurs in all types of forest (**ALF**), dense woodlands, also in riverine forests and urban parks and gardens. It is widespread and common in Liberia, with numerous old and recent records.

Acleros mackenii olaus (Plötz, 1884)

PLATE XVI

The subspecies *olaus* is Guineo-Congolian (**EQU**), which occurs in all types of forest (**ALF**), also dense woodlands, riverine forests, occasionally in degraded farmbush in the forest zone. It is not common in Liberia, with only a few old (Harbel) and a few recent (Nimba Mountains) records.

Acleros nigrapex Strand, 1913

PLATE XVI

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It is not common in Liberia, known only from a single old and several scattered recent records.

Genus *Paracleros* Berger, 1978

Paracleros placidus (Plötz, 1879)

PLATE XVI

Certain identification requires dissection of male genitalia for the majority of species in the genus and old records listed by Fox *et al.* (1965) are therefore not reliable. Considering present knowledge *P. placidus* is endemic to the Upper Guinean forest zone (**UPG**), including the Togo Mountains. It occurs in various types of forest and secondary growth (**MEF**). It was found recently in the Gola National Forest, Sapo National Park, Putu Range and the Nimba Mountains, the latter two records were confirmed by genitalia (gen. det.: Larsen).

Paracleros biguttulus (Mabille, 1890)

PLATE XVI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth. It has only a few records from Liberia: Larsen (2005) without locality, Nimba Mountains (2 specimens)(Sáfián 2014a). The recent records were confirmed by dissection of male genitalia (gen. det.: Larsen).

Paracleros substrigata (Holland, 1893)

PLATE XVI

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is known from two recent records from Liberia (Nimba Mountains), one is a typical female, while the male was confirmed with dissection of male genitalia (gen. det.: Larsen).

Paracleros maesseni Berger, 1978

PLATE XVI

Considering present knowledge, the species in West African (**WAF**), which occurs in various types of forest (**MEF**) in good condition. It is known only from a few recent records in Liberia (Putu Range, Wologizi Mountains), but the identification was not confirmed by dissection of male genitalia.

Genus *Semalea* Holland, 1896

Semalea pulvina (Plötz, 1879)

PLATE XVI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is rather widespread and not rare in Liberia, with a few old and several recent records.

Semalea sextilis (Plötz, 1886)

PLATE XVI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is rare in Liberia, with only a single old and another recent record.

Semalea atrio (Mabille, 1891)

PLATE XVII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is rather rare in Liberia, with only a few recent records.

Semalea arela (Mabille, 1891)

PLATE XVII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread but not common in Liberia, with a few old and several recent records.

Genus *Hypoleucis* Mabille, 1891

Hypoleucis ophiusa ophiusa (Hewitson, 1866)

PLATE XVII

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth. It is widespread and rather common in Liberia, with several old and recent records.

Hypoleucis tripunctata tripunctata Mabille, 1891

PLATE XVII

Considering present knowledge, the nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**), where it occurs in various types of forest (**MEF**) and secondary growth. It is rather widespread but not common in Liberia, with several old and recent records.

Hypoleucis sophia Evans, 1937

PLATE XVII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, with only two records from the Putu Range.

Genus *Meza* Hemming, 1939

Meza indusiata (Mabille, 1891)

PLATE XVII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It is rare in Liberia, with only a single old (Ganta) and a few recent (Nimba Mountains) records.

Meza meza (Hewitson, 1877)

PLATE XVII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth, where it flies in clearings and forest edges, also in degraded open forest. It is widespread and common in Liberia, with many old and recent records.

Meza mabea (Holland, 1894)

PLATE XVII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in West Africa, known only from a handful of records (Larsen 2005). The first Liberian specimen was collected in the bufferzone of the Sapo National Park in December 2020.

Meza leucophaea bassa Lindsey & Miller, 1965

PLATE XVII

The subspecies *bassa* is West African (**WAF**), which occurs in various types of forest (**MEF**). It is rather rare in Liberia, with only a few old and two recent records.

Meza elba (Evans, 1937)

PLATE XVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather rare in Liberia, with only a few scattered recent records.

Meza mabillei (Holland, 1893)

PLATE XVIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is rather rare in Liberia, with only a single old and a few scattered recent records.

Meza cybeutes volta Miller, 1971

PLATE XVIII

The subspecies *volta* is West African (**WAF**), which occurs in all types of forest (**ALF**) and secondary growth. It is not common in Liberia, with only a few scattered recent records.

Genus *Paronymus* Aurivillius, [1925]

Paronymus xanthias xanthias (Mabille, 1891)

PLATE XVIII

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in wetter types of forest (**WEF**). It seems to be widespread but rare in Liberia, with scattered recent records.

Paronymus ligora (Hewitson, 1876)

PLATE XVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rare in Liberia, with only two records from the Sapo National Park and near Gbedin Waterfall on St. John's River on the Guinean border.

Paronymus nevea (Druce, 1910)

PLATE XVIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rather rare in Liberia, known only from a few recent records.

Genus *Andronymus* Holland, 1896

Andronymus neander neander (Plötz, 1884)

PLATE XVIII

The nominate subspecies is pan-African (**PAN**), which occurs in all types of forest (**ALF**), also in forest-savannah transition and riverine forests. It tends to migrate during occasional population explosions and for that reason the validity of the subspecies *tomasi* Riley, 1928 is in doubt. *A. neander neander* is rather rare in Liberia, known from a few old and a single recent record.

Andronymus caesar caesar (Fabricius, 1793)

PLATE XVIII

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth. It is widespread and not rare in Liberia, with several old and recent records.

Andronymus hero Evans, 1937

PLATE XIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread and not rare in Liberia, with several old and recent records.

Andronymus helles Evans, 1937

PLATE XIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It is rather widespread but not common in Liberia, with a few old and several recent records.

Andronymus evander (Mabille, 1890)

PLATE XIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread but not common in Liberia, with a few old and several recent records.

Andronymus fenestra Belcastro & Sáfián, 2019

PLATE XIX

A very recently described Liberian subregion endemic species (**LIB**), with a disjunct occurrence in Ghana. All known specimens were collected in wet lowland forest (**WEF**) except in Ghana, where two specimens were recorded in the upland evergreen forest of Atewa Range. Only a single record is known from Liberia (Coldwater, Nimba Mountains) (Sáfián *et al.* 2019).

Genus *Zophopetes* Mabille, [1904]

Zophopetes ganda Evans, 1937

PLATE XIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is known only from a few recent records (Sapo National Park, Putu Range, Lake Piso) in Liberia, the Putu specimen was caught at light. It might not be rare but is rarely seen due to its crepuscular (or at least occasionally nocturnal) habit.

Zophopetes cerymica (Hewitson, 1867)

PLATE XIX

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), also in more open habitat in the coastal zone, wherever palm trees occur. It can also establish colonies in urban parks and gardens, where ornamental palms were planted. Although known only from a few old and recent records, *Z. cerymica* is probably widespread and not rare in Liberia, as the butterfly is rarely seen due to its crepuscular (and at least occasionally nocturnal) habit.

Genus *Gamia* Holland, 1896

Gamia buchholzi (Plötz, 1879)

PLATE XIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is quite secretive and adults are active at dusk and dawn but is probably also very rare in Liberia with a single record known from the foothills of the Nimba Mountains.

Gamia shelleyi (Sharpe, 1890)

PLATE XX

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rather rare in Liberia, with only a few recent records (Sapo National Park, Putu Range, Kpatawee Falls).

Genus *Artitropa* Holland, 1896

Artitropa comus (Stoll, 1782)

PLATE XX

Guineo-Congolian forest species (**EQU**), which is rarely seen due to its crepuscular habit. It probably breeds widely in various lowland forests (**MEF**), wherever its larval foodplants (*Dracaena* spp.) occur. The species is known only from a single old and a few new records (Nimba Mountains, Lake Piso, Monrovia) in Liberia, but is certainly more widely distributed. In Monrovia several empty pupal cases were found on ornamental *Dracaena* plants in gardens by Sáfíán.

Genus *Mopala* Evans, 1937

Mopala orma (Plötz, 1879)

PLATE XX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is very rare in Liberia, with only a single old (Harbel) and three recent records (Putu Range, Lake Piso, Nimba Mountains).

Genus *Gretna* Evans, 1937

Gretna waga (Plötz, 1886)

PLATE XX

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is known only from a few old and recent records in Liberia, but is probably not very rare, rather more difficult to find. Adults are normally active at dusk and dawn, hiding in the dark forest undergrowth during the day.

Gretna carmen Evans, 1937

PLATE XX

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, with only three recent records (Putu Range, Nimba Mountains and Wologizi Mountains), but is also difficult to find, as adults are normally active at dusk and dawn, hiding in the dark forest undergrowth during the day. All three specimens were caught at dawn near campsites, when adults were attracted to sweat or other substances on tents and dirty clothes.

Gretna cylinda (Hewitson, 1876)

PLATE XX

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is rare in Liberia, known only from a few old and recent records, but is probably also difficult to find, as adults are normally active at dusk and dawn, hiding in the dark forest undergrowth during the day.

Gretna lacida (Hewitson, 1876)

PLATE XX

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, known only from a couple of old and two new records (Foya Proposed Protected Area).

Gretna dargei Larsen & Collins, 2014

PLATE XX

Recently described Guineo-Congolian species (**EQU**), which is known from a few specimens collected in Cameroon, and a single male collected in the Nimba Mountains (Western Range) in Liberia. From the few records available, the species probably inhabits wetter types of forest (**WEF**) in good condition and must be very rare. Similarly to other *Gretna*, adults probably fly at dusk and dawn, hiding in the dark forest undergrowth during the day.

Gretna balenge zowa Lindsey & Miller, 1965

PLATE XXI

The subspecies *G. balenge zowa* is endemic to the Upper Guinean forest zone (**UPG**). It inhabits wetter forests (**MEF**), especially where swamps with *Raphia* palms, foodplant of *G. balenge zowa* occur. The species is rare in West Africa but is also difficult to detect, as it is active only in the evening hours or might even be partially nocturnal. Adults usually hide in the dark undergrowth of forest during daytime. There are only a few old (Fox *et al.* 1965) and a few recent records (Putu Range, Lake Piso and the Nimba Mountains) from Liberia. The Nimba specimen was captured at light.

Genus *Pteroteinon* Watson, 1893

Pteroteinon laufella (Hewitson, 1868)

PLATE XXI

Guineo-Congolian forest species (**EQU**), which occurs in all types (**ALF**) of forest, also in secondary growth. It is not common in Liberia, with only a few scattered old and several recent records.

Pteroteinon iricolor (Holland, 1890)

PLATE XXI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, known only from a few old and recent records.

Pteroteinon laterculus (Holland, 1890)

PLATE XXI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, known only from a few recent records (Putu Range, Nimba Mountains, Wologizi Mountains).

Pteroteinon capronnieri (Plötz, 1879)

PLATE XXI

Guineo-Congolian forest species (**EQU**), which is known to occur in dark forest undergrowth of wet forest (**WEF**) in good condition. It is known only from two specimens collected in Liberia, the first one was attracted to artificial light in the Krahn-Bassa Proposed Protected Area, while the second one was captured in the dense undergrowth of an old relict coastal forest near the estuary of the Lofa River.

Pteroteinon caenira (Hewitson, 1867)

PLATE XXI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), also in secondary growth. It is rather widespread and not rare in Liberia, with several old and several recent records. It is possible that some old records actually refer to *P. concaenira*, which was not described by the time of publication of Fox *et al.* (1965).

Pteroteinon ceucaenira (Druce, 1910)

PLATE XXI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, known only from a single recent record (Putu Range).

Pteroteinon concaenira Belcastro & Larsen, 1996

PLATE XXI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only four recent records (Gola National Forest, Lake Piso), but it is possible, that some old records of *P. caenira* actually refer to this species.

Pteroteinon pruna Evans, 1937

PLATE XXII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**), also in secondary growth. In Liberia, it is known only from a single recent record by Jens Lund, collected in Sanniquellie.

Pteroteinon reali Berger, 1962

PLATE XXII

For a long time, this species was misunderstood and was recorded under the name *Leona na* (Lindsey & Miller, 1965) from Liberia (road between Yendamalahoun & Voinjama) by *Fox et al.* (1965), repeated also by Larsen (2005). Collins & Larsen (2008) revised its status and recognised that the western subspecies (ssp. *reali*) of *Pteroteinon pruna* Evans, 1937 is actually this taxon. As the distribution of the two largely overlap, *pruna* and *reali* should be recognised as two distinct species, and *reali* was elevated to species rank. So far, Fox's is still the only record from the Liberia, despite a few recent records from Sierra Leone – Gola Forest (Sáfián 2010, Waka River (Sáfián unpublished), Guinea (Diecké Forest) and western Ghana (Bia National Park) (Collins & Larsen 2008). *P. reali* is a Liberian subregion endemic species (**LIB**) (reaching Ghana in the west). It is very rare all over its range. All specimens were found in good quality wet or hyperwet forest (**WEF**) and secondary growth.

Genus *Leona* Evans, 1937

Leona binoevatus (Mabille, 1891)

PLATE XXII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is extremely rare in Liberia, with a single recent record from the Sapo National Park (Brattström 2010).

Leona maracanda (Hewitson, 1876)

PLATE XXII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is extremely rare in West Africa, including Liberia, where it was found as a new country record from the coastal forest near Wolala village in dark undergrowth in January

2018. A male later came to light in Krahn-Bassa Proposed Protected Area, while a second male was collected by Gábor Simonics, again in the same coastal forest in February 2018.

Leona leonora (Plötz, 1879)

PLATE XXII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is extremely rare in Liberia, with a single old (Harbel) and a couple of recent records (Putu Range, Wologizi Mountains).

Leona meloui (Riley, 1926)

PLATE XXII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is very rare in Liberia, with a single old (near Voinjama) and two recent records from the Putu Range (Sáfián 2011) and Mount Gangra (Nimba West). The latter specimen came to moth light at 6.00 a.m.

Genus *Lissia* Grishin, 2019

Lissia lissa Evans, 1937

PLATE XXII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It was recorded recently as new to West Africa west of the Dahomey Gap from the Gola Rainforest National Park, Sierra Leone (Sáfián 2010). *L. lissa* is extremely rare in Liberia, with a single recent record from the Putu Range (Sáfián 2011).

Note: there is uncertainty concerning the identification of the species. All West African specimens in the Liberian subregion collected appear to be females, which look like females of *L. lissa*, but all males in collections clearly belong to *L. luehderi* and therefore misidentification and the conspecificity of the two in Liberia could not be ruled out. To clarify the situation, further taxonomic work is necessary. *L. lissa* is tentatively listed from Liberia.

Lissia luehderi (Plötz, 1879)

PLATE XXII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is very rare in Liberia, with only five recent records (Putu Range, Sapo National Park, Mount Swa and the Wologizi Mountains)(Brattström 2010, Sáfián 2011, 2012, Sáfián et al. 2020c). The males were recorded hill-topping at dusk after 18.00 in dark forest undergrowth on Mount Swa and in the Wologizi Mountains.

Genus *Caenides* Holland, 1896

Caenides soritia (Hewitson, 1876)

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only two old and two recent records (Putu Range, Nimba Mountains).

Caenides kangvensis Holland, 1896

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only a few recent records (Sapo National Park, Putu Range) (Brattström 2010, Sáfián 2011, 2012).

Caenides xychus (Mabille, 1891)

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only a few recent records (Sapo National Park, Putu Range, Nimba Mountains) (Brattström 2010, Sáfián 2011, 2012, 2014a).

Caenides bengalensis (Holland, 1891)

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, with only a single (Harbel) old and a couple of recent records (Putu Range, Wologizi Mountains).

Caenides otilia Belcastro, 1990

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is extremely rare in Liberia, with only a single recent record by Stephen Georgiadis (Sapo National Park).

Caenides dacenilla Aurivillius, 1925

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is very rare in Liberia, with only four recent records: Putu Range, Sapo National Park, Lake Piso and Mount Gangra (West Nimba). The latter specimen appeared at moth light at 6.00 a.m.

Caenides dacela (Hewitson, 1876)

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) in good condition, occasionally in secondary growth. It is rather widespread and not rare in Liberia, with several old and recent records.

Caenides hidaroides Aurivillius, 1896

PLATE XXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition, occasionally in secondary growth. It is rare in Liberia, with a single old and a few recent records.

Caenides dacena (Hewitson, 1876)

PLATE XXIV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), it has a preference to more open secondary growth. It is rather rare in Liberia, with no old and only a few recent records.

Genus *Monza* Evans, 1937

Monza alberti (Holland, 1896)

PLATE XXIV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), including degraded secondary growth and riverine forest in the savannah zone. It is widespread and common in Liberia, with many old and recent records.

Monza cretacea (Snellen, 1872)

PLATE XXIV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), including degraded secondary growth. It is widespread and not rare in Liberia, with several old and recent records.

Genus *Melphina* Evans, 1937

Melphina malthina (Hewitson, 1876)

PLATE XXIV

Guineo-Congolian forest species (**EQU**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is rare in Liberia, with a few old and a further few recent records.

Melphina statira (Mabille, 1891)

PLATE XXIV

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**), occasionally in secondary growth. It is rare in Liberia, with only a single old and a further few recent records.

Melphina melphis (Holland, 1893)

PLATE XXIV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, with only a few recent records from the Putu Range, the Nimba Mountains, Foya Proposed Protected Area and Lake Piso.

Genus *Melphinyet* Larsen, 2012

Melphinyet unistriga (Holland, 1893)

PLATE XXIV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It is not common in Liberia, with only a few old and a few further recent records.

Melphinyet tarace (Mabille, 1891)

PLATE XXIV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is rare in Liberia, with only a few recent records from the Putu Range, Sapo National Park and the Nimba Mountains.

Melphinyet statirides (Holland, 1896)

PLATE XXV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is very rare in Liberia, known only from a single old record from Harbel.

Melphinyet flavina Lindsey & Miller, 1965

PLATE XXV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is rare in Liberia, with only a few recent records from the Putu Range, Sapo National Park, the Gola National Forest and the Nimba Mountains.

Genus *Noctulana* Larsen, 2012

Noctulana noctula (Druce, 1909)

PLATE XXV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only a few recent records.

Genus *Fresna* Evans, 1937

Fresna netopha (Hewitson, 1878)

PLATE XXV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It is not common in Liberia, with only a single old and several recent records.

Fresna maesseni Miller, 1971

PLATE XXV

It is best treated as a Guineo-Congolian (**EQU**) wet forest species (**WEF**), but as the butterfly is extremely rare and known only from about a dozen records, it is difficult to assess. There are only a few records known from Cameroon and another few from Ghana and Ivory Coast (Larsen 2005). It was not expected to be found in Liberia until the first specimen was captured in April 2011 in the Putu Range (Sáfián 2011). Another two specimens were collected in the Nimba Mountains (Mount Beeton, Western Range)(Sáfián 2014a).

Fresna nyassae (Hewitson, 1878)

PLATE XXV

Guineo-Congolian forest species (**EQU**), which occurs in drier types of forest (**DRF**) and secondary growth. It is very rare in Liberia, known only from two recent records from the Putu Range and the Nimba Mountains.

Fresna cojo (Karsch, 1893)

PLATE XXV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth. It is very rare in Liberia, known only from three recent records from the Gola Forest and Sapo National Parks and the Nimba Mountains.

Fresna carlo Evans, 1937

PLATE XXV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, known only from a single record from the Gola National Forest and two records from the Wologizi Mountains.

Genus *Platylesches* Holland, 1896

Platylesches galesa (Hewitson, 1877)

PLATE XXVI

Guineo-Congolian species (**EQU**), which seems to occur in all types of forest (**ALF**), including riverine gallery forest and occasionally dense wooded savannah. It is widespread and common in Liberia.

Platylesches rossii Belcastro, 1986

PLATE XXVI

West African forest species (**WAF**), which is known only from a handful of records between Ghana's Volta Region and Senegal. Most specimens were collected in forest or in forest-savannah mosaic (**ALF**). In Sierra Leone it was found in mountainous region (Larsen 2005), while in Liberia's Putu Range it was also collected in upland forest. In Liberia it is also known from the Nimba Mountains and the Wologizi Mountains, where it was observed hill-topping, as well, as on the flowers of *Chromolaena odorata*.

Platylesches picanini (Holland, 1894)

PLATE XXVI

Pan-African forest species (**PAN**), which occurs in all types of forest (**ALF**), riverine gallery forests and wooded savannah. It is widespread and common in Liberia, with many old and recent records.

Platylesches lamba Neave, 1910

PLATE XXVI

Guineo-Congolian species (**EQU**), which is known only from a few records in West Africa, all collected in wetter forests (**WEF**) in good condition. It is known only from a single recent record in Liberia, collected in the Putu Range.

Platylesches affinissima Strand, 1921

PLATE XXVI

The status of the species is rather unclear, as some Liberian specimens collected and identified by Sáfíán as *P. affinissima* were included in the material of the newly described *P. morigambia* in the ABRI collection by Larsen, limiting the Liberian material of *P. affinissima* to a single

recent record from the Putu Range. The species is pan-African (**PAN**) and occurs in both savannah and forest areas (**ALF**), wherever *Parinari* trees occur.

Platylesches morigambia Larsen, 2013

PLATE XXVI

This species was previously mentioned as *P. batangae* from West Africa (Larsen 2005), but during his revision of Afrotropical skippers Larsen (2013a) recognized it as distinct from the Eastern-Southern African *batangae*. Although the original paper does not mention it from Liberia, Larsen actually identified all *Platylesches* in the ABRI collection and found specimens of *P. morigambia* from the Putu Range, the Gola National Forest and the Nimba Mountains collected by Sáfián. *P. morigambia* seems to be a West African species (**WAF**), which can occur in a wide range of habitats from wet forest and secondary growth and through savannah to coastal sand-dunes (**UBQ**) (Larsen 2013a).

Platylesches chamaeleon (Mabille, 1891)

PLATE XXVI

Guineo-Congolian forest species (**EQU**), which occurs in drier types of forest (**DRF**), wherever *Parinari* trees occur. It is known from a long series of old records in Liberia (Fox *et al.* 1965) but was found only rarely during the most recent surveys.

Platylesches iva Evans, 1937

PLATE XXVI

West African forest species (**WAF**), which is known only from a few records, all caught in wet forest (**WEF**) in good condition. In Liberia, it was found only in the unique upland forest of the Putu Range.

Genus *Afrogegenes* De Jong & Coutsis, 2017

Afrogegenes hottentota (Latreille, 1824)

PLATE XXVII

Pan-African (**PAN**) savannah (**GUI**) species, which occurs in various types of savannah habitats, also in secondary grasslands, occasionally in degraded open habitats in the forest zone. It is known only from a few recent records in Liberia, all came from degraded habitats in the Nimba County.

Afrogegenes letterstedti (Wallengren, 1857)

PLATE XXVII

Pan-African (**PAN**) savannah (**GUI**) species, which occurs in various types of savannah habitats, also in secondary grasslands, occasionally in degraded open habitats in the forest zone. It is rather rare in Liberia, known only from a few old and recent records.

Genus *Borbo* Evans, 1949

Borbo micans (Holland, 1896)

PLATE XXVII

Pan-African species (**PAN**), which is otherwise localised to grassy wetlands (**SPE**), including bogs, swamps, marshlands and occasionally small ponds or lakes in the savannah zone. It is not a good coloniser of cleared areas in the forest zone and it is probably the main reason, why it was not previously recorded from Liberia. The first Liberian specimen was caught by Jens Lund in December 2013 in a grassy guesthouse garden in Sanniquellie (Nimba County) near a small river and swamp.

Borbo borbonica (Boisduval, 1833)

PLATE XXVII

Pan-African species (**PAN**), which extends its range also to the Mediterranean. In Africa it inhabits arid and semi-arid habitats (**SUD**) in the Sahel and the savannah zone, but the species has the ability to colonise cleared areas in the forest zone through migrations (Larsen 2005). It was recorded only in a few localities in Liberia (Nimba Mountains) but will eventually be found in disturbed areas and secondary grasslands.

Borbo fatuellus (Hopffer, 1855)

PLATE XXVII

Pan-African (**PAN**) ubiquitous (**UBQ**) species, which can occur in most habitat types between wet forest and dry savannah grasslands. It can also occur in degraded habitats and urban parks and gardens. It is widespread and common in Liberia, with many old and recent records.

***Torbenlarsenia* Kemal & Koçak, 2020**

Torbenlarsenia perobscura (Druce, 1912)

PLATE XXVII

Savannah species (**GUI**), which is widely distributed along the edges of the Guineo-Congolian forest zone (**EQS**). It also occurs in drier forest formations, and open areas in forests, especially during dry season. It seems to be seasonally common in the Nimba Mountains but is known only from another recent record from elsewhere in Liberia (Lake Piso).

Torbenlarsenia gemella (Mabille, 1884)

PLATE XXVII

Pan-African (**PAN**) species, which occurs in various types of savannah habitats (**GUI**), semi-arid and arid grasslands, semi-desert. It occasionally penetrates the forest zone proper during the dry season. There are only two confirmed records from Liberia: a specimen was found on the ridge of Mount Bele (Blei Community Forest) in the Nimba Mountains in dry open forest, while the second one was found on the ridge leading to Mount Belegizi in the Wologizi Mountains in burnt, open habitat, both in dry season (Sáfián *et al.* 2020c).

Torbenlarsenia holtzi (Plötz, 1883)

PLATE XXVII

Pan-African (**PAN**) savannah (**GUI**) species, which is known from a single, old record from Harbel (Fox *et al.* 1965).

Genus *Pelopidas* Walker, 1870

Pelopidas mathias (Fabricius, 1798)

PLATE XXVIII

Cosmopolitan (**COS**) ubiquitous (**UBQ**) species, which occurs in various types of savannah habitats, also in secondary grasslands, occasionally in degraded open habitats in the forest zone. It is surprisingly rare in Liberia, known only from a single old and two recent records (Lake Piso, Nimba Mountains).

Pelopidas thrax (Hübner, 1821)

PLATE XXVIII

Cosmopolitan (**COS**) ubiquitous (**UBQ**) species, which occurs in various types of savannah habitats, but only occasionally penetrates the forest zone proper, when it can appear in degraded open habitats. It is known only from two recent records in Liberia (Lake Piso, Nimba Mountains).

FAMILY NYMPHALIDAE Rafinesque, 1815

Genus *Danaus* Kluk, [1780]

Danaus chrysippus (Linnaeus, 1758)

PLATE XXVIII

Cosmopolitan (**COS**) ubiquitous (**UBQ**) species, which occurs in all sorts of open habitats, including savannah, arid and semi-arid grasslands, coastal sand dunes, also clearings and farms in the forest zone, also in parklands and gardens in urban areas. It is known from many old and recent records in Liberia.

Genus *Tirumala* Moore, [1880]

Tirumala petiverana (Doubleday, 1847)

PLATE XXVIII

Pan-African (**PAN**) ubiquitous (**UBQ**) species, which occurs mainly in savannah woodlands and open forest habitats, but it can occur also in degraded forests, farmlands and park and gardens in urban areas. Interestingly, *T. petiverana* was not recorded from Liberia before the most recent surveys, which found the species only in the Nimba Mountains, except a single specimen captured in the Foya Proposed Protected Area.

Genus *Amauris* Hübner, [1816]

Amauris niavius (Linnaeus, 1758)

PLATE XXVIII

Pan-African species (**PAN**), which occurs mostly in wooded savannah (**GUI**) and drier forests (and transition), also in clearings, farmlands and other degraded forest habitats. It is widespread in Liberian with many old and recent records in Liberia.

Amauris tartarea tartarea Mabille, 1876

PLATE XXVIII

The nominate subspecies is Guineo-Congolian (**EQU**) with slightly wider distribution beyond the forest zone. It occurs in drier forests (**DRF**), forest-savannah transition and wooded savannah habitats and can also appear in clearings and degraded forest occasionally, particularly during dry season. It seems to be widely distributed in Liberia, with several old and recent records.

Amauris hecate (Butler, 1866)

PLATE XXVIII

Guineo-Congolian species (**EQU**) with slightly wider distribution beyond the forest zone. It occurs in all types of forest (**ALF**), forest-savannah transition and wooded savannah habitats. It can also appear in clearings and degraded forest occasionally. It seems to be widely distributed in Liberia, with several old and recent records.

Amauris damocles (Fabricius, 1793)

PLATE XXVIII

West African forest species (**WAF**), which occurs in drier forests (**DRF**), forest-savannah transition and wooded savannah habitats. It can also appear in clearings and degraded forest occasionally, particularly during dry season. It seems to be widely distributed in Liberia, with many old and recent records.

Genus *Libythea* Fabricius, 1807

Libythea labdaca Westwood, 1851

PLATE XXIX

Guineo-Congolian species (**EQU**), which occurs in all types of forest (**ALF**) and woodlands. It is also a regular migrant. Surprisingly, *L. labdaca* is known only from a few old and new records in Liberia.

Genus *Elymnias* Hübner, 1818

Elymnias bammakoo bammakoo Westwood, [1851]

PLATE XXIX

The species was moved back to its original genus, *Elymnias* from *Elymniopsis* Fruhstorfer, 1907 by Wei *et al.* (2017) based on molecular data. The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread and could seasonally and locally be common in Liberia.

Genus *Gnophodes* Doubleday, [1849]

Gnophodes parmeno Doubleday, 1849

PLATE XXIX

The taxon was recently elevated to species rank (Pyrzcz *et al.* 2020) It is Guineo-Congolian (**EQU**) with slightly wider distribution beyond the forest zone to the northern savannah belt (Sáfián unpublished). It occurs in all types of forest (**ALF**) and degraded habitats, occasionally also in dense open woodland. It is widespread and common in Liberia with many old and recent records.

Genus *Haydonia* Pyrcz & Collins, 2020

Haydonia pythia (Fabricius, 1793)

PLATE XXIX

The species was formerly recorded from West Africa as *Gnophodes chelys* (Fabricius, 1793), but recent revision reinstated the taxon *pythia*, described from West Africa, the species was also moved into a newly erected genus, *Haydonia* (Pyrzcz *et al.* 2020). *H. pythia* is a Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), occasionally also in degraded habitats. It is widespread and common in Liberia, with several old and recent records.

Haydonia harpa (Karsch, 1893)

PLATE XXIX

In their recent revision, Pyrcz *et al.* (2020) resurrected *Gnophodes harpa* from synonymy, based on genitalia morphology and molecular data. It is a Guinea-Congolian species (**EQU**), which is

much rarer than the very similar *H. pythia* but seems to occur in various types of forest (**MEF**). There are only two recent records from Liberia (Nimba Mountains, Wologizi Mountains).

Genus *Melanitis* Fabricius, 1807

Melanitis leda (Linnaeus, 1758)

PLATE XXIX

Cosmopolitan (**COS**) ubiquitous species (**UBQ**), which is also widely distributed in the Oriental and Australian Regions. In Africa it can occur in all sorts of habitats from wet forest to semi-desert. *M. leda* is widespread and common in Liberia, with many old and recent records.

Melanitis libya Distant, 1882

PLATE XXIX

Pan-African (**PAN**) ubiquitous species (**UBQ**), which occurs in all types of forest and woodlands, occasionally also in grasslands and scrub. It is rather widespread and not rare in Liberia, with several recent records.

Genus *Bicyclus* Kirby, [1871]

Bicyclus xeneas occidentalis Condamin, 1965

PLATE XXIX

The subspecies *B. xeneas occidentalis* is West African (**WAF**) and occurs in wetter types of forest (**WEF**). It is rather widespread but not common in Liberia, with no old and only a few recent records in Liberia.

Bicyclus evadne evadne (Cramer, 1779)

PLATE XXX

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**), where it inhabits wetter types of forest (**WEF**) in good condition. As males often perch in sunny patches in forest glades or in clearings, it could rather easily be detected. In Liberia *B. evadne* is widespread and common with many old and recent records.

Bicyclus ephorus Weymer, 1892

PLATE XXX

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is rather widespread and not rare in Liberia with no old, but several recent records.

Bicyclus zinebi (Butler, 1869)

PLATE XXX

Upper Guinean endemic forest species (**UPG**), which occurs in all types of forest (**ALF**). It is widespread and rather common in Liberia, with several old and recent records.

Bicyclus uniformis (Bethune-Baker, 1908)

PLATE XXX

Guineo-Congolian forest species (**EQU**), which is known only from a male specimen very recently captured in the Wologizi Mountains and a few more specimens collected in fruit-baited traps in the Wonegizi Mountains (Sáfián *et al.* 2020c). It should be very local and rare in Liberia. In West Africa the species occurs only in wet forest (**WEF**) in good condition

Bicyclus procora (Karsch, 1893)

PLATE XXX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with a few old and several recent records.

Bicyclus jacksoni Condamin, 1961

PLATE XXX

The taxon *jacksoni* was elevated to species rank by Aduse-Poku *et al.* (2016). It is West African (**WAF**) and occurs in wetter types of forest (**WEF**) in good condition. *B. jacksoni* is generally rare and obscure, staying mostly in the dark forest interior. It can be trapped only occasionally by using fruit bait and is known only from a few recent records in Liberia.

Bicyclus ignobilis (Butler, 1870)

PLATE XXX

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is generally rare and obscure, staying mostly in the dark forest interior. It can only occasionally be trapped by fruit-baited traps. *B. ignobilis* is known only from a couple of old and a few more recent records in Liberia. The old records should be treated with reservations, as they were collected before the description of the very similar *B. maesseni*, which was recently recorded as new to Liberia.

Bicyclus maesseni Condamin, 1971

PLATE XXX

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is generally rare and obscure, staying mostly in the dark forest interior. It can only occasionally be trapped by fruit-baited traps. *B. maesseni* is known only from a few recent records in Liberia.

Bicyclus larseni vande Weghe, 2009

PLATE XXXI

Listed in Larsen (2005) as *B. nobilis* (Aurivillius, 1893). Upper Guinean forest endemic species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is generally a rare and obscure species, as it stays in the dark forest interior. It could, however, be attracted to fruit bait, and trapped occasionally, as recent records show from various localities in Liberia.

Bicyclus taenias (Hewitson, 1877)

PLATE XXXI

Guineo-Congolian forest species (**EQU**) which occurs in all types of forest (**ALF**). It is rather widespread and common in Liberia with numerous old and recent records.

Bicyclus vulgaris (Butler, 1868)

PLATE XXXI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), it is found also in secondary growth and semi-open farmlands. *B. vulgaris* is widespread and common in Liberia with numerous old and recent records.

Bicyclus dorothea dorothea (Cramer, 1779)

PLATE XXXI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It flies at forest edges, glades and in clearings, and occurs also in secondary growth and semi-open farmlands. *B. dorothea* is among the commonest species in disturbed forests in Liberia with many old and recent records.

Bicyclus sandace (Hewitson, 1877)

PLATE XXXI

Guineo-Congolian forest species (**EQU**), with slightly wider distribution beyond the forest zone. It occurs in all types of forest (**ALF**) and flies at forest edges, glades and in clearings, occurring also in secondary growth and semi-open farmlands. *B. sandace* is among the commoner species in disturbed forest in Liberia with many old and recent records.

Bicyclus sambulos unicolor Condamin, 1971

PLATE XXXI

The subspecies *B. sambulos unicolor* is endemic to the Upper Guinean forest zone (**UPG**). It occurs in wetter types of forest (**WEF**) in good condition. It is generally a rare and obscure species, as it stays in the dark forest interior. It could, however, be attracted to fruit bait, and trapped occasionally, as recent records show from various localities in Liberia.

Bicyclus sangmelinae Condamin, 1963

PLATE XXXI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**), occasionally also in secondary growth. In Liberia It is widespread and not rare with several old and recent records.

Bicyclus mandanes Hewitson, 1873

PLATE XXXI

Guineo-Congolian forest species (**EQU**), which is known to occur in drier types of forest (**DRF**). In Liberia, the species seems to be associated with hilly country, as all records come from the Nimba and Wologizi Mountains.

Bicyclus auricruda auricruda (Butler, 1868)

PLATE XXXII

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**), occurring mainly in wetter types of forest (**WEF**). Surprisingly, in Liberia the situation seems to be different, as the species is not rare in the drier northern regions (Lofa, Nimba), but seems to be absent in wet and hyperwet lowland forests of the south with a single exception collected in the Foya Proposed Protected Area.

Bicyclus angulosa (Butler, 1868)

PLATE XXXII

Pan-African (**PAN**) savannah (**GUI**) butterflies, which has little ability to penetrate degraded forest areas. It was recorded as new to Liberia from fruit-baited traps in the Nimba Mountains (ENNR) in sub-montane forest above 1200 m during the dry season in 2014.

Bicyclus abnormis (Dudgeon, 1909)

PLATE XXXII

Upper Guinean endemic forest species (**UPG**), which occurs mainly in wetter types of forest (**WEF**). It is known only from a few recent records and seems to be widespread but rare in Liberia.

Bicyclus safitza safitza (Westwood, 1850)

PLATE XXXII

The nominate subspecies is a quasi-Pan-African (**PAN**), with ssp. *aethiops* occurring locally in highland forests in Ethiopia. In West Africa occurs mostly in Guinea savannah (**GUI**), but also in disturbed secondary grasslands, degraded open habitats in the forest zone, and occasionally also in forests, usually during the dry season. It is known only from two old and a few recent records in Liberia, all recently collected specimens were found in the Nimba Mountains.

Bicyclus funebris (Guérin-Méneville, 1844)

PLATE XXXII

Guineo-Congolian forest species (**EQU**), which prefers drier types of forest (**DRF**), but it can occur also in wetter forests where it is highly seasonal, flying only during the dry season. *B. funebris* is known only from a single old record, however recently it was found very abundant during the dry season in the Nimba Mountains in Liberia.

Bicyclus dekeyseri (Condamin, 1958)

PLATE XXXII

Upper Guinean endemic forest species (**UPG**), which inhabits wet to hyperwet lowland forests (**WEF**) in good condition. In Liberia it is rather widespread and also penetrates the sub-montane forest zone of the Nimba Mountains.

Bicyclus istaris (Plötz, 1880)

PLATE XXXII

Although generally known as a Guineo-Congolian forest species (Larsen 2005), recent molecular research shown that *B. istaris* is distributed only in the Upper Guinean forest zone and in the outpost forests of the Volta subregion (Oskar Brattström pers. com., Aduse-Poku *et al.* 2017) (**UPG**). It occurs in various types of forest (**MEF**) but is very rare in Liberia with only a single old and four recent records.

Bicyclus madetes (Hewitson, 1874)

PLATE XXXII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), also in secondary growth. It is widespread and common in Liberia, with many old and recent records.

Bicyclus martius (Fabricius, 1793)

PLATE XXXIII

The species is endemic to the Upper Guinean forest zone (**UPG**), as its eastern subspecies *B. martius sanaos* proved to be a valid species as replaces *B. martius* east of the Dahomey Gap (Oskar Brattström pers. com.). *B. martius* occurs in all types of forest (**ALF**), also in secondary growth. *B. martius* is widespread and common in Liberia, with many old and recent records.

Genus *Hallelesis* Condamin, 1961

Hallelesis halyma (Fabricius, 1793)

PLATE XXXIII

Upper Guinean endemic forest species (**UPG**), which occurs mainly in wetter types of lowland forests, especially swamp forest (**WEF**). It is rather widespread and common in Liberia with many old and recent records.

Genus *Brakefieldia* Aduse-Poku, Lee & Wahlberg, 2016

Brakefieldia decira (Plötz, 1880)

PLATE XXXIII

Upper Guinean endemic forest species (**UPG**), which occurs mainly in upland forests (**UPF**) in Ghana, Liberia and probably in Guinea and Ivory Coast. Its distribution is very patchy in Liberia confined to mid-elevation mountain ranges between 550-1370 m (Mount Swa, Nimba Mountains) according to the recent surveys. It was also found in hyperwet lowland forest in Foya Proposed Protected Area.

Genus *Ypthima* Hübner, [1818]

Ypthima doleta Kirby, 1880

PLATE XXXIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), although it is not found in primary closed canopy stands but rather inhabits clearings, forest edges and glades, also regenerating secondary vegetation and fallow. *Y. doleta* is widespread and common in Liberia with many old and recent records.

Ypthima impura Elwes & Edwards, 1893

PLATE XXXIII

Pan-African (**PAN**) savannah species (**GUI**), which occurs in various types of savannah habitats, occasionally including, secondary grasslands. It is known from a few old records in Liberia, which are also confirmed by recent data from the Nimba Mountains by genitalia determination.

Genus *Ypthimomorpha* van Son, 1955

Ypthimomorpha itonia (Hewitson, 1865)

PLATE XXXIII

Pan-African (**PAN**) savannah species, which occurs in various types of savannah habitats, including secondary grasslands, occasionally. Larsen (2005) often found it associated with swamps and other wetlands (**SPE**). *Y. itonia* is not common and probably local in Liberia, known only from a short series of old records (Ganta, Harbel), and two recent records from the coastal savannah of Lake Piso.

Genus *Palla* Hübner, [1819]

Palla violinitens violinitens (Crowley, 1890)

PLATE XXXIII

The nominate subspecies is West African (**WAF**) and occurs in wetter types of forest (**WEF**). It has several recent records from the Putu Range and the Nimba Mountains in Liberia. Although it is probably more widespread in the country. *P. violinitens* does not seem to be common.

Palla decius (Cramer, 1777)

PLATE XXXIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather widespread and common in Liberia with a few old and several recent records.

Palla ussheri ussheri (Butler, 1870)

PLATE XXXIV

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**). It is rather widespread and common in Liberia with a few old and several recent records.

Palla publius publius Staudinger, 1892

PLATE XXXIV

The nominate subspecies is West African (**WAF**) and occurs in wetter types of forest (**WEF**). It is rather widespread and but not common in Liberia with no old but quite a few recent records.

Genus *Charaxes* Ochsenheimer, 1816

Charaxes varanes vologeses (Mabille, 1876)

PLATE XXXIV

The subspecies *C. varanes vologeses* is a quasi-Pan-African (**PAN**), with the nominate subspecies occurring in South Africa. It can occur basically in all sorts of habitats (**UBQ**), from closed-canopy forests to arid savannah, also in urban areas. It is rarely found in the wetter regions such as Liberia, which is well reflected in its rarity in the country, as the butterfly is known only from a single old and three recent records.

Charaxes fulvescens senegala van Someren, 1975

PLATE XXXIV

The subspecies *C. fulvescens senegala* is West African (**WAF**), which occurs in various types of forest (**MEF**). It is widespread and not rare in Liberia, despite the lack of older records.

Charaxes candiope (Godart, 1824)

PLATE XXXIV

Pan-African species (**PAN**), which occurs both in forest and savannah habitats, also in parklands, wherever its foodplants (**UBQ**), *Croton* trees occur. It is known only from a few recent records in Liberia.

Charaxes protoclea protoclea Feisthamel, 1850

PLATE XXXIV

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**) and secondary growth. It is among the commonest *Charaxes* in Liberia with only a single old and many recent records.

Charaxes boueti boueti Feisthamel, 1850

PLATE XXXIV

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**) where natural bamboo species occur. It can also colonise disturbed habitats and farmlands, wherever introduced varieties of bamboo (*Bambusa* spp. and other genera) planted. So far, it is known only from two recent records in Liberia.

Charaxes cynthia cynthia Butler, 1866

PLATE XXXIV

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**) and secondary growth. It is widespread and not rare in Liberia with a few old and several recent records.

Charaxes lucretius lucretius Cramer, [1775]

PLATE XXXV

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**). It is rather widespread and not rare in Liberia with several old and recent records.

Charaxes castor castor (Cramer, 1775)

PLATE XXXV

The nominate subspecies is distributed across the equatorial savannah zone (**EQS**) following the limits of the Guineo-Congolian forest in the wetter wooded savannah (**GUI**), also often penetrating the forest area due to the species' powerful flight and dispersal ability. It has several recent records from Liberia but is common only in the Nimba Mountains.

Charaxes brutus brutus (Cramer, 1779)

PLATE XXXV

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**), also in wooded savannah. It is rather widespread and not rare in Liberia, with a few old and several recent records.

Charaxes pollux pollux (Cramer, 1775)

PLATE XXXV

The nominate subspecies is Guineo-Congolian (**EQU**), where it occurs in various types of forest (**MEF**). Larsen (2005) mentions its association with upland forests in West Africa, which seems improbable from many of its localities in Liberia.

Charaxes eudoxus eudoxus (Drury, 1782)

PLATE XXXV

The nominate subspecies is West African (**WAF**), occurring patchily in wetter types of forest (**WEF**). It is not usually common and was recorded only from upland localities in Liberia.

Charaxes tiridates tiridates (Cramer, 1777)

PLATE XXXV

The nominate subspecies is West African (**WAF**), occurring in all types of forest (**ALF**), including degraded fallow and secondary growth. It can also appear in dense wooded savannah habitats and urban parks and gardens. *C. tiridates* is widespread and common in Liberia.

Charaxes numenes numenes (Hewitson, 1859)

PLATE XXXV

The nominate subspecies is West African (**WAF**), occurring in all types of forest (**ALF**). It is widespread and not rare in Liberia, with several old and recent records.

Charaxes smaragdalis butleri Rothschild, 1900

PLATE XXXV

The subspecies *C. smaragdalis butleri* is endemic to the Upper Guinean forest zone (**UPG**) and occurs only in wetter types of forest (**WEF**) in good condition. It is rather rare in Liberia, known only from a few recent records.

Charaxes imperialis imperialis Butler, 1874

PLATE XXXVI

The nominate subspecies was recorded only from Upper Guinean forest zone and from a few relict dry forest patches in the Dahomey Gap in Benin (Fermon *et al.* 2001, Coache & Rainon 2016) (**UPG**). It is rare and local everywhere and seems to be centred on dry forests (**DRF**) but with records also from hyperwet forests in Liberia (Sáfián 2012b).

Charaxes ameliae doumeti Henning, 1989

PLATE XXXVI

The subspecies *C. ameliae doumeti* is West African (**WAF**), where it occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia with no old, but a number of recent records.

Charaxes hadrianus Ward, 1871

PLATE XXXVI

Guineo-Congolian forest species (**EQU**), which occurs in wet to hyperwet forests (**WEF**) in good condition. In Liberia, it has records from various localities (Sapo National Park, Lake Piso, Putu Range), but is not common.

Charaxes nobilis claudei le Moul, 1933

PLATE XXXVI

The subspecies *C. nobilis claudei* is West African (**WAF**). It is usually very rare west of the Dahomey Gap with scattered records from Ghana, Ivory Coast and Sierra Leone, all from wetter types of forest (**WEF**) in good condition (Larsen 2005). In Liberia, it was found only recently in the Gola National Forest and the Nimba Mountains (West Nimba)(Sáfíán 2014a).

Charaxes zingha (Stoll, 1780)

PLATE XXXVI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and not rare in Liberia with a few old and many recent records.

Charaxes etesipe etesipe (Godart, 1824)

PLATE XXXVI

The nominate subspecies is Guineo-Congolian (**EQU**), occurring in all types of forest (**ALF**). It is widespread and not rare in Liberia with a single old and many recent records.

Charaxes achaemenes atlantica van Someren, 1970

PLATE XXXVI

The subspecies *C. achaemenes atlantica* is West African (**WAS**), which inhabits Guinea savannah (**GUI**) and the forest-savannah transition zone. It rarely appears in the forest zone proper, although it was recorded even from wet forests occasionally (Owen & Chanter 1972, Joly 2003). In Liberia, it is known only from a handful of recent records from the Nimba Mountains. All specimens were attracted to fruit-baited traps set at canopy level in high dry season.

Charaxes eupale eupale (Drury, 1782)

PLATE XXXVI

The nominate subspecies is West African (**WAF**), occurring in all types of forest (**ALF**), including degraded secondary growth and fallow. It appears also in wooded savannah, occasionally in urban parks and gardens. *C. eupale* is widespread and very common with numerous old and recent records.

Charaxes subornatus couilloudi Plantrou, 1976

PLATE XXXVII

The subspecies *C. subornatus couilloudi* is endemic to the Upper Guinean forest zone (**UPG**) (including the forests of the Volta subregion). It occurs in wetter types of forest (**WEF**) in good condition. In Liberia, it is known only from a couple of recent records from the Nimba Mountains, the Foya Proposed Protected Area and the Wologizi Mountains. The latter specimen was captured in UV light trap.

Charaxes anticlea anticlea (Drury, 1782)

PLATE XXXVII

The nominate subspecies is West African (**WAF**), occurring in all types of forest (**ALF**). It is widespread and not rare in Liberia with a number of old and recent records.

Charaxes hildebrandti gillesi Plantrou, 1973

PLATE XXXVII

The subspecies *C. hildebrandti gillesi* is endemic to the Upper Guinean forest zone (**UPG**) with records also from a relict forest in the Dahomey Gap (Coache & Rainon 2017). It has scattered distribution in various types of forest (**MEF**), and is usually rare, wherever its foodplants, various *Dyboscia* species occur (Larsen 2005). In Liberia, it is known only from a single locality at the foothills of the Nimba Mountains, however the species was also recorded near the border in Sierra Leone (Gola Rainforest National Park)(Sáfián 2013).

Charaxes etheocles etheocles (Cramer, 1777)

PLATE XXXVII

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**), including degraded secondary growth and fallow. It appears also in wooded savannah, occasionally in urban parks and gardens. *C. etheocles* is widespread and common in Liberia with several old and recent records.

Charaxes petersi van Someren, 1969

PLATE XXXVII

Upper Guinean endemic forest species (**UPG**), which occurs only in wetter types of forest (**WEF**). It is very rare throughout its range, including Liberia, where the species is known only from a few recent records (Gola National Forest, Nimba Mountains).

Charaxes virilis virilis van Someren & Jackson, 1952

PLATE XXXVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**), including degraded secondary growth and fallow. It appears also in wooded savannah,

occasionally in urban parks and gardens. *C. virilis* has only recent records from Liberia, centred on the Nimba Mountains.

Charaxes cedreatis Hewitson, 1874

PLATE XXXVII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), including degraded secondary growth and fallow. It appears also in wooded savannah, occasionally in urban parks and gardens. *C. cedreatis* is rather widespread and not rare in Liberia with several recent records.

Charaxes viola viola Butler, 1866

PLATE XXXVII

The nominate subspecies is West African (**WAS**) and is widely distributed in the Guinea savannah zone (**GUI**). It occasionally migrates south into the forest zone during the dry season. It was found as new to Liberia in 2013, when a few female specimens were caught in canopy traps in the Nimba Mountains (ENNR). Subsequently, males were also observed hill-topping on sparsely wooded summits in the ENNR around midday in December 2016 and 2017 (900 m asl.). The species was found very common in the upland Guinea savannah in the Guinea Nimba in 2017 (Sáfián unpublished).

Charaxes pleione pleione (Klug, 1829)

PLATE XXXVIII

The nominate subspecies is West African (**WAF**) and occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia with several recent records.

Charaxes paphianus falcata (Butler, 1872)

PLATE XXXVIII

The subspecies *C. paphianus falcata* is West African (**WAF**) and occurs in various types of forest (**MEF**). It is probably widespread and not rare in Liberia with records concentrated on the Putu Range and the Nimba Mountains.

Charaxes nichetes bouchei Plantrou, 1974

PLATE XXXVIII

The subspecies *C. nichetes bouchei* is West African (**WAF**) and occurs in various types of forest in good condition (**MEF**). It is rather rare in Liberia, with recent records concentrated on the Nimba Mountains, and a few records from the Gola National Forest, Foya and the Lake Piso area.

Charaxes porthos gallayi van Someren, 1968

PLATE XXXVIII

The subspecies *C. porthos gallayi* is West African (**WAF**) and occurs in wetter types of forest (**WEF**) in good condition. It seems to be rather widespread but not common in Liberia with no old and only a few recent records.

Charaxes zelica zelica Butler, 1869

PLATE XXXVIII

The nominate subspecies is West African (**WAF**) and occurs in various types of forest (**MEF**). Larsen (2005) also mentions it from savannah habitats, which seems unlikely. It is rather rare west of the Dahomey Gap and is known only from a single record in Liberia, collected at the foothills of the Nimba Mountains.

Charaxes lycurgus (Fabricius, 1793)

PLATE XXXVIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is rather widespread and not rare in Liberia with a number of old and recent records.

Charaxes mycerina mycerina (Godart, 1824)

PLATE XXXVIII

The nominate subspecies is West African (**WAF**) and occurs in wetter types of forest (**WEF**) in good condition. It is rather rare west of the Dahomey Gap and was recorded in Liberia only recently (Gola National Forest, Nimba Mountains).

Charaxes doubledayi (Aurivillius, 1899)

PLATE XXXVIII

Guineo-Congolian forest species (**EQU**), which seems to occur in wetter types of forest (**WEF**) in good condition. The species is very rare in West Africa. It was first recorded from Liberia only in 2019 (Grand Kru-River Gee Proposed Protected Area).

Charaxes eurinome eurinome (Cramer, 1775)

PLATE XXXIX

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**). It is rather widespread and not rare in Liberia with a few old and several recent records.

Genus *Antanartia* Rothschild & Jordan, 1903

Antanartia delius delius (Drury, 1782)

PLATE XXXIX

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is normally found in forest edges, glades and small clearing, where the butterfly sits on sunny patches. *A. delius* is rather widespread and not rare in Liberia with several old and recent records.

Genus *Vanessa* Fabricius, 1807

Vanessa cardui (Linnaeus, 1758)

PLATE XXXIX

Cosmopolitan (**COS**) ubiquitous (**UBQ**) species, which is widely distributed in the Palaearctic, Afrotropical and Indo-Australian Regions. It can occur in all types of open habitats, including secondary grasslands, farmlands, road verges etc., especially during the dry season. It is, so far, known only from a few recent records from the Nimba Mountains in Liberia.

Genus *Catacroptera* Karsch, 1894

Catacroptera cloanthe ligata Rothschild & Jordan, 1903

PLATE XXXIX

Pan-African savannah species, the subspecies *C. cloanthe ligata* is West African (**WAS**). It occurs mostly in the Guinea savannah zone (**GUI**) but has ability to penetrate the forest zone and establish small colonies in open degraded habitats. It is rather widespread and not rare in Liberia, with several old and recent records.

Genus *Junonia* Hübner, [1819]

Junonia orithya madagascariensis Guenée, 1865

PLATE XXXIX

The subspecies *J. orithya madagascariensis* is pan-African (**PAN**), while the nominate one is distributed in the Indo-Australian Region. The butterfly is more of a savannah species (**GUI**), but it occasionally penetrates the forest zone, where it can occur in degraded open habitats and secondary savannah grasslands, especially in the dry season. There are only two single old records without locality and a few recent records from Sapo National Park and the Nimba Mountains in Liberia.

Junonia oenone oenone (Linnaeus, 1758)

PLATE XXXIX

The nominate subspecies is pan-African (**PAN**) and occurs in all types of open habitats (**UBQ**) from savannah and open woodlands through degraded forest areas, clearing to farms, urban habitats and coastal dunes. It has the ability to establish colonies in the smallest open area even in a clearing in the middle of a large forest area. *J. oenone oenone* is among the most widespread and commonest butterflies in Liberia, with many old and recent records.

Junonia hierta cebrene Trimen, 1870

PLATE XXXIX

The subspecies *J. hierta cebrene* is pan-African (**PAN**), while the nominate one is distributed in Asia. It is home in dry habitats, mostly savannah grasslands (**SUD**), but it has the ability to penetrate the forest zone in degraded open habitats, where it can establish colonies in secondary grasslands or even urban parks or gardens. Liberia seems to be too wet for the species, as it is known only from two recent records, both collected in secondary grasslands in the Nimba Mountains in high dry season.

Junonia sophia sophia (Fabricius, 1793)

PLATE XXXIX

The nominate subspecies has equatorial distribution (**EQU**) and is ubiquitous (**UBQ**), occurring in more open habitats, including various types of savannah, also all sorts of degraded habitats. It has good ability to penetrate the forest zone proper, where it can establish permanent colonies in clearings, farmlands also in urban parklands and gardens. *J. sophia sophia* is widespread and common in Liberia, with many old and recent records.

Junonia stygia (Aurivillius, 1894)

PLATE XL

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is more of a forest edge, glade species, rather than inhabiting the forest interior. *J. stygia* is widespread and rather common in Liberia, with several old and recent records.

Junonia chorimene (Guérin-Méneville, 1844)

PLATE XL

The species is widely distributed in the dry zone from West Africa to Yemen and Tanzania in the south (**EQS**). It occurs mainly in various types of savannah habitats (**GUI**) and other open formations. It occasionally penetrates the forest zone and establishes colonies in degraded open areas and secondary savannah. *J. chorimene* is known only from a few recent records in Liberia (Nimba Mountains).

Junonia terea terea (Drury, 1773)

PLATE XL

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**), degraded secondary growth, riverine forests, dense woodlands, parks and gardens. It is among the most widespread and commonest butterflies in Liberia, with many old and recent records.

Genus *Salamis* Boisduval, 1833

Salamis cacta cacta (Fabricius, 1793)

PLATE XL

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread but not common in Liberia, with a handful of old and recent records.

Genus *Protogoniomorpha* Wallengren, 1857

Protogoniomorpha cytora (Doubleday, [1847])

PLATE XL

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**). It seems to be localised in Liberia, with records centred in Nimba County. There are also old records from the Putu Range, where Sáfián (2011, 2012) did not find it.

Protogoniomorpha parhassus (Drury, 1782)

PLATE XL

According to recent studies (Pyrzcz *et al.* in prep.), *P. parhassus* will remain West African (**WAF**) after the separation of its Congolian vicariant, which is distributed from central Cameroon, across the Congo Basin to northern Zambia and even beyond in isolated colonies. *P. parhassus* occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Genus *Precis* Hübner, [1819]

Precis octavia octavia (Cramer, 1777)

PLATE XL

The nominate subspecies is widely distributed in the equatorial forest and savannah zone (**EQU**) and is ubiquitous (**UBQ**). It is, however, not common in Liberia, most recent records have been collected in the Nimba Mountains.

Precis frobeniusi Strand, 1909

NOT ILLUSTRATED

Considering present knowledge, the species is endemic to the drier zone of West Africa (**WAS**), with scattered records from savannah habitats (**GUI**) in Guinea, Sierra Leone, Nigeria. McLeod (1988) mentions a specimen collected “north of Karawau” in Liberia, which re-appears in Larsen (2005), but the locality was not found, and the species does not therefore appear in Appendix II. It could inhabit the dry grasslands on the inselbergs in Lofa County (North-western Liberia)

Precis pelarga (Fabricius, 1775)

PLATE XLI

The species is widely distributed in West, Central and East Africa, (**EQS**) where it mostly occurs in savannah (**GUI**) and other open habitat types. It can, however, penetrate the forest zone proper through gaps and degraded habitats, where it can establish quickly establish colonies. *P. pelarga* is widespread and common in Liberia, with many old and recent records.

Precis sinuata Plötz, 1880

PLATE XLI

Guineo-Congolian species (**EQU**) with slightly broader distribution beyond the forest zone, appearing also in montane forests in Malawi and Mozambique. It inhabits wet forests in good condition (**WEF**). It is not uncommon in Liberia, found usually in singletons.

Precis milonia milonia Felder & Felder, 1867

PLATE XLI

The nominate subspecies is Guineo-Congolian (**EQU**), which, west of the Dahomey Gap inhabits only the unique upland rainforests (**UPF**) of the Atewa Range in Ghana and the Nimba and the Wologizi Mountains in Liberia (possibly also in Guinea and Ivory Coast Nimba). The species could be relatively common in its habitats, especially during the rainy season and the transition seasons.

Genus *Hypolimnas* Hübner, [1819]

Hypolimnas misippus (Linnaeus, 1764)

PLATE XLI

Cosmopolitan (**COS**) ubiquitous (**UBQ**) species, which is also widely distributed in the Indo-Australian Region. It can occur basically in all types of habitat, however it usually avoids closed canopy forest. *H. misippus* is widespread and common in Liberia, with many old and recent records.

Hypolimnna anhedon anhedon (Doubleday, 1845)

PLATE XLI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**) and dense woodlands. It is widespread and very common in Liberia, with many old and recent records.

Hypolimnna dinarcha dinarcha (Hewitson, 1865)

PLATE XLI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in wetter types of forest (**WEF**). It seems to be widespread but rare in Liberia with only a handful of old and recent records.

Hypolimnna aubergeri Hecq, 1987

PLATE XLI

Considering present knowledge, the species is endemic to the Guinea Highlands (**END**) with a few previous records from Ivory Coast and Guinea. It was found along rivers and streams in mid-elevation and lowland (**WEF**), rather than upland forest at the foothill of various mountainous areas and is usually very rare. The species was found as new to Liberia from Mount Tokadeh (Nimba Mountains, Western Range) during a biodiversity survey (Boireau 2009). It was subsequently found in the eastern foothills of Mount Nimba (Blei Community Forest and ENNR) (Sáfián 2014a) and most recently in the Wologizi Mountains. The knowledge on the distribution of *H. aubergeri* was summarized by Sáfián & Takano (2019).

Hypolimnna salmacis salmacis (Drury, 1773)

PLATE XLI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread and very common in Liberia, with many old and recent records.

Genus *Kallimoides* Shirôzu & Nakanishi, 1984

Kallimoides rumia rumia (Doubleday, 1849)

PLATE XLI

The nominate subspecies flies in the Upper Guinean forest zone (**UPG**), including forests of the Volta subregion. It prefers wetter types of forest (**WEF**) but has wide ecological tolerance and can occur in wetter parts in other forest areas from lowland to montane forest. In Liberia, it is known mainly from the northern, north-eastern part of the country, both from old and recent records.

Genus *Vanessula* Dewitz, 1887

Vanessula milca milca (Hewitson, 1873)

PLATE XLII

Guineo-Congolian species, which inhabits wetter types of forest, often near streams and rivers. The nominate subspecies is patchily distributed in the Upper Guinean forest zone (**UPG**), often in upland evergreen forests or in wet forests (**WEF**). Only a single specimen was recorded from Liberia (Yendamalahoun)(Fox *et al.* 1965). It was also found in the Gola Rainforest National Park in eastern Sierra Leone near the Liberian border, its presence in other areas in western Liberia is therefore probable. The subspecies *V. milca angustifascia* occurs in upland and montane forest in the Nimba Mountains (see below).

Vanessula milca angustifascia Joicey & Talbot, 1928

PLATE XLII

Considering present knowledge, *V. milca angustifascia* is narrowly endemic (**END**) to the Nimba Mountains (Liberia, Guinea and Ivory Coast), but is missing from the lower Western Range in Liberia. The butterfly is rarely found below 800 m and is commonest in submontane forests (**UPF**) above 1100 m.

Genus *Cyrestis* Boisduval, 1832

Cyrestis camillus camillus (Fabricius, 1781)

PLATE XLII

Pan-African forest species, the nominate subspecies is widely distributed in the equatorial forest zone (**UPG**) and slightly beyond into East Africa. It can occur in all types of forest (**ALF**), including secondary growth and riverine forest in the savannah zone. *C. camillus* is widespread and not rare in Liberia, with numerous old and recent records.

Genus *Byblia* Hübner, [1819]

Byblia anvatarra crameri Aurivillius, 1894

PLATE XLII

B. anvatarra is a pan-African savannah species, the subspecies *B. anvatarra crameri* is widely distributed from West Africa to Tanzania in the east and Angola in the south (**EQS**). Although its main habitats are Guinea savannah (**GUI**) and other dry grasslands, it has the ability to penetrate the forest zone proper, where it occurs in secondary grassland, grassy road verges, farmlands and other open habitats. In Liberia it also breeds in the coastal savannah. *B. anvatarra crameri* is widespread in Liberia, often common in the dry season. It has many old and recent records.

Genus *Mesoxantha* Aurivillius, [1899]

Mesoxantha ethosea ethosea (Drury, 1782)

PLATE XLII

Considering present knowledge, the nominate subspecies Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is widespread and not rare in Liberia, with several old and recent records.

Mesoxantha liberiana sp.n. (manuscript name)

PLATE XLII

The species is new to science, females differ from strongly both the Central African *M. ethosea ethosoides* and the East African *M. ethosea reducta* in the wing morphology and slightly also in male genitalia. It is probably endemic to the Liberian subregion (**LIB**), recorded on Mount Swa and in the Zor Community Forest at the eastern foothills of the Nimba Mountains and seems to be local in good quality wet forest (**WEF**), also in south-western Ghana as disjunct occurrences. A few specimens were also collected in the Gola Rainforest National Park, Sierra Leone and the corridor area between the national park and the Liberian border and in the Guinean Nimba Mountains (Sáfián *et al.* in prep).

Genus *Ariadne* Horsfield, [1829]

Ariadne enotrea enotrea (Cramer, 1779)

PLATE XLII

The nominate subspecies is West African (**WAF**) and occurs in clearings, forest edges and glades, also in degraded open areas in all types of forest (**ALF**). It is widespread and very common in Liberia, with numerous old and recent records.

Ariadne albifascia (Joicey & Talbot, 1921)

PLATE XLII

Guineo-Congolian forest species (**EQU**), which occurs in clearings, forest edges and glades, also in degraded open areas in all types of forest (**ALF**). It is rarer than the previous species in Liberia, with only a few recent records from Sapo National Park, the Putu Range and the Nimba Mountains.

Genus *Neptidopsis* Aurivillius, [1899]

Neptidopsis ophione ophione (Cramer, 1777)

PLATE XLIII

The nominate subspecies is Guineo-Congolian (**EQU**). It occurs in clearings, forest edges and glades, also in degraded open areas in all types of forest (**ALF**). *N. ophione* is widespread and very common in Liberia, with numerous old and recent records.

Genus *Eurytela* Boisduval, 1833

Eurytela dryope dryope (Cramer, [1775])

PLATE XLIII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in clearings, forest edges and glades, also in degraded open areas in all types of forest (**ALF**), also in wooded savannah. *E. dryope* is widespread and not rare in Liberia, with several old and recent records.

Eurytela hiarbas (Drury, 1782)

PLATE XLIII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in clearings, forest edges and glades, also in degraded open areas in all types of forest (**ALF**), also in wooded savannah. *E. hiarbas* is widespread and not rare in Liberia, with several old and recent records.

Genus *Sevenia* Koçak, 1996

Sevenia occidentarium (Mabille, 1876)

PLATE XLIII

The nominate subspecies is Guineo-Congolian (**EQU**) with migratory tendencies and occasional gradations. It can occur in all types of forest habitats (**ALF**) and degraded forests. *S. occidentarium* is very rare in Liberia, with only a few recent records.

Sevenia boisduvali omissa (Rothschild, 1918)

PLATE XLIII

Pan-African forest species, the subspecies *S. boisduvali omissa* is Guineo-Congolian (**EQU**), which can occur in all types of forest (**ALF**), also in wooded savannah, urban parks and gardens. It has migratory tendencies and occasional gradations. *S. boisduvali omissa* is very rare in Liberia, known only from a few recent records from the Gola National Forest and the Nimba Mountains.

Genus *Apaturopsis* Aurivillius, [1899]

Apaturopsis cleocharis cleocharis (Hewitson, 1873)

PLATE XLIII

The nominate subspecies is Guineo-Congolian (**EQU**) and is known to occur in wetter types of forest (**WEF**) in good condition. It is rare in West Africa and the adults spend most of their life at canopy level (Larsen 2005). A single female specimen was captured in fruit-baited canopy trap in the Wonegizi Mountains during a rapid survey in April 2019.

Genus *Acraea* Fabricius, 1807

Acraea camaena (Drury, 1773)

PLATE XLIII

Guineo-Congolian forest species (**EQU**), which is centred on drier types of forest (**DRF**). It is rather widespread and not rare in Liberia, with several old and recent records.

Acraea endoscota Le Doux, 1928

PLATE XLIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It seems to be widespread but not common in Liberia, with several old and recent records.

Acraea leucographa jolyi Pierre, 2009

PLATE XLIV

The subspecies *A. leucographa jolyi* is West African (**WAF**) and occurs locally in wetter types of forest (**WEF**). It is very rare in Liberia, known only from a single recent record from the Putu Range.

Acraea neobule neobule Doubleday, 1847

PLATE XLIV

The nominate subspecies is Pan-African (**PAN**) and ubiquitous (**UBQ**), which can occur in basically all sorts of habitats, including savannah, degraded forests and agricultural land, also in urban habitat, such as parks and gardens. It is not common, known only from a few scattered old and recent records in Liberia.

Acraea quirina (Fabricius, 1781)

PLATE XLIV

Guineo-Congolian (**EQU**) species, which occurs in all types of forest (**ALF**) and secondary growth. It is widespread and common in Liberia, with many old and recent records.

Acraea zetes (Linnaeus, 1758)

PLATE XLIV

The species is widespread from West Africa to Kenya and Tanzania in the east and Zambia in the south (**EQS**). It usually occurs in savannah country (**GUI**), but it successfully colonises degraded areas in the forest zone, also urban habitats, such as parks and gardens. It seems to be widespread but not common in Liberia with only a few old and several recent records.

Subgenus *Rubraea* Henning, 1992

Acraea abdera eginopsis Aurivillius, 1899

PLATE XLIV

The subspecies *A. abdera eginopsis* is West African (**WAF**), where it occurs in various types of forest (**MEF**). It is rather rare in Liberia, with only a few scattered old and recent records.

Acraea egina egina (Cramer, [1775])

PLATE XLIV

The nominate subspecies is Guineo-Congolian (**EQU**) and ubiquitous (**UBQ**), which can occur in basically all types of habitat, including degraded forests and agricultural land, also in urban parks and gardens. It is widespread and very common in Liberia, with many old and recent records.

Subgenus *Stephenia* Henning, 1992

Acraea caecilia caecilia (Fabricius, 1781)

PLATE XLIV

The nominate subspecies is widespread north of the forest belt in West Africa to Sudan and Ethiopia in the east and Western Tanzania in the south (**EQS**). It usually occurs in savannah country (**GUI**), but it can occasionally colonise secondary savannah, degraded areas in the forest zone and urban habitats, such as parks and gardens. It was found only locally in Liberia in grassland, with a few old and recent records (Nimba Mountains, Lake Piso).

Acraea pseudegina Westwood, [1852]

PLATE XLIV

The species is widespread north of the forest belt in West Africa to Ethiopia in the east and Angola in the south (**EQS**). It usually occurs in savannah country (**GUI**), but it successfully colonises degraded areas in the forest zone, also urban habitats, such as parks and gardens. It is widespread and common in Liberia with many old and recent records.

Acraea kraka (Aurivillius, 1893)

PLATE XLV

Guineo-Congolian (**EQU**) species, which in West Africa is restricted to upland rainforests (usually above 700 m) (**UPF**). In the region it is known from Ghana (Atewa Range, Tano Ofin) and from a single locality in eastern Liberia (Putu Range).

Acraea rogersi Druce, 1878

PLATE XLV

Guineo-Congolian (**EQU**) species, which occurs in various types of forest (**MEF**) and secondary growth. It is widespread and not rare in Liberia, with only a few old, but many recent records.

Subgenus *Bematistes* Hemming, 1935

Acraea alcinoe alcinoe Felder & Felder, 1865

PLATE XLV

The nominate subspecies is West African (**WAF**), which occurs in various types of forest (**MEF**) and secondary growth. It is widespread and common in Liberia, with numerous old and recent records.

Acraea consanguinea sartina (Jordan, 1910)

PLATE XLV

The subspecies *A. consanguinea sartina* is endemic to the Upper Guinean forest zone (**UPG**). It occurs in wetter types of forest (**WEF**) in good condition. *A. consanguinea sartina* is very rare in Liberia, known only from eight old specimens, all collected at Harbel (Fox *et al.* 1965).

Acraea epaea epaea (Cramer, [1779])

PLATE XLV

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread and very common in Liberia, with many old and recent records.

Acraea macaria (Fabricius, 1793)

PLATE XLV

Upper Guinean endemic forest species (**UPG**), which occurs in various types of forest (**MEF**). It seems to be widespread but not common in Liberia, with only a few old and a further few recent records.

Acraea umbra umbra (Drury, 1782)

PLATE XLV

The nominate subspecies is West African (**WAF**) and occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with several old and recent records.

Acraea vestalis vestalis Felder & Felder, [1865]

PLATE XLV

The nominate subspecies is West African (**WAF**), which occurs in various types of forest (**MEF**) and secondary growth. It is widespread and common in Liberia, with several old and recent records.

Genus *Telchinia* Hübner, [1819]

Subgenus *Telchinia* Hübner, [1819]

Telchinia acerata (Hewitson, 1874)

PLATE XLVI

The species is widely distributed from West Africa to Kenya in the east, mostly following the forest zone (**EQU**), and beyond to Zambia, Malawi and Botswana in the south. It mostly occurs in degraded areas in the forest zone (**UBQ**) and can be found also in the forest-savannah transition and locally in thickets and shrub. It is very rare in Liberia, with only a single old record from Harbel and a few recent records from Yekepa residential area in the Nimba Mountains.

Telchinia alciope (Hewitson, [1852])

PLATE XLVI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), also in degraded secondary growth, wooded farmlands. It is widespread and common in Liberia, with many old and recent records. Some of them could actually refer to the very similar *A. aurivillii aurivillii*, as dissection of the genitalia would have been necessary for exact identification (Larsen 2005). The records not confirmed via genitalia dissection are illustrated with those of *T. aurivillii aurivillii*.

Telchinia aurivillii aurivillii (Staudinger, 1896)

PLATE XLVI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is mentioned from Liberia by Larsen (2005) without locality, and the species is known also from a recent record by Georgiades (gen. det.: Larsen) from Sapo National Park. Some records of *A. alciope* certainly refer to this species, but they could not be separated without dissecting male genitalia. The records not confirmed via genitalia dissection are illustrated with those of *T. alciope*.

Telchinia bonasia (Fabricius, 1775)

PLATE XLVI

Guineo-Congolian (**EQU**) species, which occurs in wetter types of forest (**WEF**) and secondary growth. It is widespread and among the commonest butterflies in Liberia, with many old and recent records.

Telchinia circeis (Drury, 1782)

PLATE XLVI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), also in degraded secondary growth. It is widespread and common in Liberia, with many old and recent records.

Telchinia encedana (Pierre, 1976)

PLATE XLVI

The species is widely distributed from West Africa to Ethiopia in the east and Mozambique in the south (**EQU**). It occurs in various types of wetlands, including bogs, swamps, regularly inundated coastal areas (**SPE**), but also in rice paddies and even around artificial ponds. It is not common in Liberia, with only a few scattered recent records (Putu Range, Nimba Mountains, Sapo National Park).

Telchinia encedon encedon (Linnaeus, 1758)

PLATE XLVI

The nominate subspecies is Pan-African (**PAN**) and ubiquitous (**UBQ**), which has considerable tolerance for habitat degradation. It can occur in all types of open habitats, including savannah, degraded forests, farmlands, urban parks and gardens. It is not common in Liberia, with scattered old and recent records.

Telchinia jodutta jodutta (Fabricius, 1793)

PLATE XLVI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with several old and recent records.

Telchinia lycoa (Godart, [1819])

PLATE XLVII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), also in degraded secondary growth, open woodland and wooded (shaded) farmland. It is widespread and very common in Liberia, with many old and recent records.

Telchinia orestia (Hewitson, 1874)

PLATE XLVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**), secondary growth and even in disturbed habitats around forest area (Larsen 2005). It is very rare in West Africa west of the Dahomey Gap with a single recent record from Liberia (Nimba Mountains) (Sáfián 2014a).

Telchinia peneleos peneleos (Ward, 1871)

PLATE XLVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is rather rare, known, only from a few recent scattered records in Liberia (Putu Range, Nimba Mountains).

Telchinia pharsalus (Ward, 1871)

PLATE XLVII

Guineo-Congolian (**EQU**) species, which occurs in various types of forest (**MEF**). It is rather widespread, but not common in Liberia, with only a few old and recent records.

Telchinia polis (Pierre, 1999)

PLATE XLVII

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with only a few old, but several recent records.

Telchinia pseudepaea ziama Belcastro, Boireau & Sáfián, 2020

PLATE XLVII

T. pseudepaea Dudgeon, 1909 is a West African forest species, the subspecies *T. pseudepaea ziama* is endemic to the Liberian subregion (**LIB**). It occurs in wetter types of forest (**WEF**) in good condition and is usually very rare and probably local in Liberia, with only a few records mentioned from Haut Cavally in Larsen (2005) and another couple of recent records from the Nimba Mountains (Sáfián *et al.* 2020d).

Telchinia serena (Fabricius, 1775)

PLATE XLVII

Pan-African (**PAN**) ubiquitous (**UBQ**) species, which occurs in all sorts of open habitats, including savannah, clearings in forests, secondary grasslands and farmlands, also in urban areas, such as parks and gardens. It is widespread and very common in Liberia, with many old and recent records.

Telchinia vesperalis (Grose-Smith, 1890)

PLATE XLVII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is very rare in West Africa, including Liberia, with only a single recent record from the Putu Range.

Subgenus *Alacria* Henning, 1992

Telchinia orina (Hewitson, 1874)

PLATE XLVIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is known only from a single recent record in Liberia (Nimba Mountains) (Boireau 2009).

Telchinia parrhasia parrhasia (Fabricius, 1793)

PLATE XLVIII

The nominate subspecies is West African (**WAF**) and occurs in various types of forest (**MEF**). It is rather rare in Liberia, known only from a couple of old and a few recent records.

Telchinia perenna perenna (Doubleday, [1847])

PLATE XLVIII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**) and forest-savannah transition. *T. perenna* is not common in Liberia, with only a single old and a few further recent records from the Nimba Mountains and Sapo National Park.

Genus *Lachnoptera* Doubleday, [1847]

Lachnoptera anticlia (Hübner, [1819])

PLATE XLVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread and common in Liberia, with many old and recent records.

Genus *Phalanta* Horsfield, [1829]

Phalanta phalanta aethiopica (Rothschild & Jordan, 1903)

PLATE XLVIII

The subspecies *P. phalanta aethiopica* is quasi-Pan-African (**PAN**), which occurs in various types of savannah habitats (**GUI**), occasionally also in secondary grasslands, but it only occasionally colonises disturbed areas in the forest zone during migrations during dry season. It is rare in Liberia, known only from a single old record from Harper (Fox *et al.* 1965) and a few recent ones, all from the Nimba Mountains (Boireau 2009, Sáfián 2014a).

Phalanta eurytis eurytis (Doubleday, [1847])

PLATE XLVIII

The nominate subspecies is quasi-Pan-African (**PAN**) and occurs in all types of forest (**ALF**), dense woodlands and thickets, also in wooded parkland and gardens. It can also survive severe habitat degradation and could be found in plantations and agricultural land. It is widespread and very common in Liberia, with many old and recent records.

Genus *Cymothoe* Hübner, [1819]

Cymothoe fumana fumana (Westwood, 1850)

PLATE XLVIII

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**). It occurs in various types of forest (**MEF**) and secondary growth. It is widespread and common in Liberia, with numerous old and recent records.

Cymothoe egesta (Cramer, [1775])

PLATE XLVIII

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**), occasionally in secondary growth. It is widespread and common in Liberia with numerous old and recent records.

Cymothoe herminia gongoa Fox, 1965

PLATE XLIX

The subspecies *C. herminia gongoa* is endemic to the Upper Guinean forest zone (**UPG**), where it occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia with only a few old and recent records.

Cymothoe weymeri mulatta Belcastro, 1990

PLATE XLIX

The subspecies *C. weymeri mulatta* is endemic to the Upper Guinean forest zone (**UPG**), where it occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia with only a single old and a few recent records.

Cymothoe druryi van Velzen & Larsen, 2009

PLATE XLIX

Recently separated from *C. caenis* and described on the basis of DNA and genitalic differences (van Velzen & Larsen 2009). It is distributed between Sierra Leone and the River Niger in Nigeria (**WAF**), occurring in all types of forest (**ALF**), also in degraded secondary growth, but as a migrant, it can occasionally appear in other habitat types as well. *C. druryi* is widespread and common in Liberia, with many old (all former records of *C. caenis* actually refer to this species) and recent records.

Cymothoe althea althea (Cramer, 1776)

PLATE XLIX

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**), where it inhabits various types of forest (**MEF**) in good condition. It is widespread and common in Liberia, with many old and recent records.

Cymothoe jodutta jodutta (Westwood, 1850)

PLATE XLIX

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**), where it inhabits wetter types of forest (**WEF**) in good condition. It is widespread and very common in Liberia, with many old and recent records.

Cymothoe hartigi Belcastro, 1990

PLATE XLIX

Liberian subregion endemic species (**LIB**), which inhabits wet and hyperwet forests (**WEF**) in good condition. In Liberia, it is rather rare and possibly local, as it was found only in a few localities (Nimba Mountains, Gola National Forest) during the recent surveys.

Cymothoe mabillei Overlaet, 1944

PLATE XLIX

Upper Guinean endemic forest species (**UPG**), which occurs in various types of forest (**MEF**), also in secondary growth. It is widespread and common in Liberia, with many old and recent records.

Cymothoe sangaris sangaris (Godart, [1824])

PLATE XLIX

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is widespread and rather common in Liberia, with several old and recent records. The taxonomy of the species is still unclear, Genetic evidence proves that more than a single species would occur in West Africa (Robin van Velzen pers. com.), which are not possible to separate on the basis of wing morphology.

Genus *Harma* Doubleday, [1848]

Harma theobene theobene Doubleday, 1848

PLATE L

The nominate subspecies is West African (**WAF**) and occurs in various types of forest (**MEF**). It is widespread and common in Liberia, with numerous old and recent records.

Genus *Neptis* Fabricius, 1807

An ongoing revision of this very complex genus will most likely recognize new species from Liberia. Also, in the first part of the revision various (Richardson 2019) taxonomic changes were applied, which are noted below. It is important to mention that the determination of *Neptis* species listed below are based solely on wing characters and therefore the identification of species listed in the *N. nysiades*-group should be treated as tentative, except those dissected and/or barcoded by Richardson (2019).

Neptis nemetes nemetes Hewitson, [1868]

PLATE L

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**) and secondary growth. It is widespread and very common in Liberia, with many old and recent records.

Neptis metella (Doubleday, 1848)

PLATE L

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**) and secondary growth. It is widespread and common in Liberia, with many old and recent records.

Neptis serena Overlaet, 1955

PLATE L

Most often referred to as a Pan-African savannah species (**GUI**), which can also colonise degraded open areas, and urban habitats in the forest zone. However, the West African populations (**WAS**) of *N. serena* differ in the COI barcode by about 2% with very little intra-population variation from the ‘real’ *N. serena* that is East and Southern African and could be treated as a separate species (Ian Richardson pers. com.). *N. serena* and the following species *N. morosa* were treated collectively under the name *N. agatha* in Fox *et al.* (1965), old records were, therefore, excluded from the occurrence maps. According to recent records, *N. serena* is not rare in the Nimba Mountains, but the species was not found elsewhere.

Neptis morosa Overlaet, 1955

PLATE L

This is a savannah species (**EQS**), which follows and occasionally enters the Guineo-Congolian forest zone from Senegal to Kenya in the east and Angola in the south. In West African it is found mostly in Guinea savannah (**GUI**) but can occur also in secondary savannah and degraded open habitats in the forest zone. It seems to be rare in Liberia, known only from a few recent records from the Nimba Mountains and Sanniquellie. As the following, very similar species was described only very recently, it is probable that some or all records of *N. morosa* from the Nimba Mountains actually refer to *N. morosopsis* Richardson, 2020 and the distribution records of the two are therefore illustrated together.

Neptis morosopsis Richardson, 2020

PLATE L

A newly described species very similar to *N. morosa*, but the males have different genitalia, and the two species are actually rather distant with their COI barcodes differing by 7.2%. From the limited knowledge available, the species seems to be distributed in the northern savannah belt (**EQS**) and occurs in Guinea savannah (**GUI**) in West Africa. Richardson (2020) listed five specimens as paratypes from Liberia, collected by Steve Collins in the Nimba Mountains without more accurate locality data in January 2014.

Neptis constantiae Carcasson, 1961

PLATE L

In the first part of his revision of *Neptis*, Richardson (2019) synonymized *N. loma* Condamin, 1971 and *N. angusta* Condamin, 1966 with *N. constatae*, based on molecular data. This Guineo-Congolian species (**EQU**) is widely distributed in Liberia but is rarely observed, as specimens spend most of the time in the canopy of wetter types of forest (**WEF**). There are recent records from the Gola Forest National Park, the Putu Range and the Nimba Mountains. The records of original identification remain in the database as a note until further evidence of conspecificity of the three taxa.

Neptis alta Overlaet, 1955

PLATE L

Guineo-Congolian species (**EQU**), which inhabits all types of forest (**ALF**) throughout its wide range. Although not normally rare, it is rarely seen, as both sexes stay high in the upper canopy of high forest, descending only rarely, when (mostly) males visit muddy patches or foul substances.

Neptis puella Aurivillius, 1894

PLATE L

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather rare in Liberia, with only a few scattered records from Sapo National Park, Putu Range and the Nimba Mountains.

Neptis cf. *conspicua* Neave, 1904

PLATE LI

A species very similar to *N. conspicua* was collected in Liberia, but neither Larsen (2005), nor Richardson (2019) actually confirms the presence of *N. conspicua* in West Africa. Until a taxonomic decision, it is listed here as *N. cf. conspicua*. It was found in wetter types of lowland forest with only a single recent record from the Nimba Mountains (Western Range) (**INS**).

Neptis najo Karsch, 1893

PLATE LI

Upper Guinean endemic forest species (**UPG**), which occurs in various types of forest (**MEF**). It is rare in Liberia, with only two recent records from Sapo National Park and Sanniquellie.

Neptis nysiades-group

The name *N. nysiades* used to cover a wide range of very similar looking species, between which no consistent differences could be drawn for over a century. However, Pierre-Baltus & Pierre (2007) made an attempt to solve this taxonomic issue, with describing ten species in the so-called “*N. nysiades*-group” based on pre-imaginal stages. This solved the problem only partially, as they established constant identification key for each species, examining series of specimens, although further “*nysiades* forms”, probably undescribed species still appear in Africa. Moreover, Richardson (2019) found the group extremely complex using DNA COI barcodes to clarify the status of many *Neptis* taxa, finding 45 barcodes could not be associated with currently described species. For this reason, identification of almost all taxa in the group will remain tentative. The presence of *N. nysiades* Hewitson, 1868 from West Africa was not confirmed by Richardson (2019) therefore former Liberian records and those identified as *N. nysiades* during the present study, are listed here under the very similar *N. lamtoensis* Pierre-Baltus, 2007, which was described from Ivory Coast.

Neptis nigra Pierre-Baltus, 2007

PLATE LI

N. nigra was recently separated from *N. nysiades* based on pre-imaginal stages (Pierre-Baltus & Pierre 2007). It is known from Gabon and Liberia (**EQU**). From the few recent records (Putu Range, Gola National Forest, Nimba Mountains), *N. nigra* is known to occur in wetter types of forest (**WEF**) in good condition. Richardson (2019) does not list the species from Liberia.

Neptis cf. *stellata* Pierre-Baltus, 2007

PLATE LI

N. stellata was recently separated from *N. nysiades* based on pre-imaginal stages (Pierre-Baltus & Pierre 2007). It is known from Gabon and Liberia (**EQU**), but the single specimen collected in Liberia does not exactly match the holotype. It was recorded only from the upland zone of the Putu Range (**INS**). Richardson (2019) does not list the species from Liberia.

Neptis metanira Holland, 1892/*Neptis continuata* Holland, 1892

PLATE LI

Seven specimens originally identified either as *N. metanira* or *N. continuata* were recorded recently from Liberia. Neither species were mentioned from West Africa west of the Dahomey Gap by Richardson (2019) but he mentions two further barcodes without locality data, not assigned to any described species in the group. Due to these taxonomic uncertainties the identifications remain tentative and the records are illustrated together on the locality map (**INS**).

Neptis rosa Pierre-Baltus, 2007

PLATE LI

N. rosa was recently separated from *N. nysiades* based on pre-imaginal stages (Pierre-Baltus & Pierre 2007). It is known from Gabon and Liberia (**EQU**). From the few recent records (Putu Range, Gola National Forest), *N. rosa* is known to occur in wetter types of forest (**WEF**) in good condition. As Richardson (2019) does not list *N. rosa* from West Africa west of the Dahomey Gap, this identification remains tentative.

Neptis viridis Pierre-Baltus, 2007

PLATE LI

N. viridis was recently separated from *N. nysiades* based on pre-imaginal stages (Pierre-Baltus & Pierre 2007). It is known from Ivory Coast and Liberia (**UPG**). From the few recent records (Putu Range, Nimba Mountains), *N. viridis* is known to occur in wetter types of forest (**WEF**) in good condition. Richardson (2019) confirms its presence in Liberia.

Neptis lamtoensis Pierre-Baltus, 2007

PLATE LI

N. lamtoensis was recently separated from *N. nysiades* based on pre-imaginal stages (Pierre-Baltus & Pierre 2007). It is known from Ivory Coast and Liberia (**UPG**). From the recent records (Gola National Forest, Nimba Mountains), *N. lamtoensis* is known to occur in wetter types of forest (**MEF**) in good condition. All previously records previously assigned to *N. nysiades* are listed and illustrated under *N. lamtoensis* on the locality map following Richardson's (2019) exclusion of *N. nysiades* from the Upper Guinean fauna.

Neptis cf. amieti Pierre-Baltus, 2007

PLATE LII

A species similar in facies to the newly described *N. amieti* (Pierre-Baltus & Pierre 2007) was collected Liberia. There are a few records from the Gola National Forest and the Nimba Mountains. Richardson (2019) does not list *N. amieti* from West Africa, and therefore this identification remains tentative (**INS**).

Neptis camarensis Schultze, 1920

PLATE LII

Richardson (2019) has identified the species from Liberia based on molecular data. The specimen was collected in the Nimba Mountains. It is a Guineo-Congolian species (**EQU**) which occurs in wetter types of forest (**WEF**).

Neptis quintilla Mabille, 1890

PLATE LII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It seems to be widespread and not rare in Liberia, with several recent records.

Neptis paula Staudinger, 1896

PLATE LII

Guineo-Congolian species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. The species is usually rare, or at least rarely descends to ground level, but it could be observed on forested hilltops, where it still stays up in the canopy. It was recorded from a number of localities in Liberia.

Neptis strigata Aurivillius, 1894

PLATE LII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rather rare in Liberia, with only a few records from the Putu Range and the Nimba Mountains.

Neptis nicoteles Hewitson, 1874

PLATE LII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It is widespread and not rare in Liberia, with several old and recent records.

Neptis nicobule Holland, 1892

PLATE LII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is rare in Liberia, with only a couple of old and a few scattered recent records.

Neptis mixophyes Holland, 1892

PLATE LII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only a few recent records.

Neptis nebrodes Hewitson, 1874

PLATE LIII

Guineo-Congolian forest species (**EQU**), which occur in various types of forest (**MEF**), occasionally in secondary growth. It is rather rare in Liberia with only a single recent and a few of old records.

Neptis trigonophora melicertula Strand, 1912

PLATE LIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), including degraded secondary growth and fallow farm-bush. It is rather widespread and common in Liberia with several recent records. Surprisingly it was not found in Liberia by Fox *et al.* (1965), although some of their old records of *N. melicerta* could easily be misidentified *N. trigonophora melicertula* specimens.

Neptis agouale Pierre-Baltus, 1978

PLATE LIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), including degraded secondary growth and fallow farm-bush. It is rather widespread and common in Liberia with several recent records. Some of the old records of *N. melicerta* (Fox *et al.* 1965) might refer to this species, but the specimens could not be checked.

Neptis melicerta (Drury, 1773)

PLATE LIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), including degraded secondary growth and fallow farm-bush. It is rather widespread and common in Liberia with several recent records. The old record of Fox *et al.* (1965) should be treated with reservations, as they most probably include misidentified records of *N. agouale* and *N. troundi*, which were not described by the time, they may also include misidentified specimens of *N. trigonophora melicertula*, which was found commonly in Liberia recently. However, these old records are illustrated on the occurrence map.

Neptis troundi Pierre-Baltus, 1978

PLATE LIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**), including degraded secondary growth and fallow farm-bush. It seems to be less common than the previous three species in Liberia with only a few recent records. Some of the old records of *N. melicerta* (Fox *et al.* 1965) might refer to this species, but the specimens could not be checked.

Genus *Evena* Westwood, [1850]

Evena crithea (Drury, 1773)

PLATE LIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and very common in Liberia, with many old and recent records.

Evena niji (Fox, 1965)

PLATE LIII

Guineo-Congolian forest species (**EQU**), which is found only in wetter types of forest (**WEF**) in good condition. It is widespread and rather common in Liberia, with a few old and several recent records.

Evena oberthueri (Karsch, 1894)

PLATE LIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Evena angustatum (Felder & Felder, 1867)

PLATE LIV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Genus *Aterica* Boisduval, 1833

Aterica galene galene (Brown, 1776)

PLATE LIV

The nominate subspecies is West African (**WAF**), which occurs in all types of forest (**ALF**), including degraded young secondary. It is widespread and very common in Liberia, with many old and recent records.

Genus *Cynandra* Schatz, [1887]

Cynandra opis opis (Drury, 1773)

PLATE LIV

The nominate subspecies is West African (**WAF**), occurring in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Genus *Euryphura* Staudinger, 1891

Euryphura togoensis Suffert, 1904

PLATE LIV

West African forest species (**WAF**), which inhabits wetter types of forest (**WEF**) in good condition. It is rather rare in Liberia with only a handful of recent records, mostly from upland forest.

Euryphura chalcis chalcis (Felder & Felder, 1860)

PLATE LIV

Considering present knowledge, the nominate subspecies is Guineo-Congolian (**EQU**), however, recent molecular studies shown that there are at least three different species under the name *E. chalcis* in West Africa (Torben Larsen pers. com.) and the clear distribution of each taxon is yet unknown. Specimens were found in all forest types (**ALF**) from various localities in Liberia.

Genus *Euryphurana* Hecq, 1992

Euryphurana nobilis nobilis (Staudinger, 1891)

PLATE LIV

The nominate subspecies is Guineo-Congolian (**EQU**), the few West African records came from wet and hyperwet forests (**WEF**) of the Liberian subregion. Apart from a single specimen found in the NHM without accurate locality label, it is only known from a recent record, a female seen in the Central Valley in the Wologizi Mountains in November 2018 (Sáfián *et al.* 2020c). The specimen was investigating sun-lit leaves of a bush in the dense forest undergrowth at 14.30.

Genus *Euphaedra* Hübner, [1819]

Euphaedra aubergeri Hecq, 1977

PLATE LIV

The species was, for a long time believed to be narrowly endemic to the Nimba area in West Africa, and until recently it was known only from a small series, collected near Danané (Ivory Coast) (Larsen 2005). The first Liberian specimen was caught hill-topping in the Nimba Mountains (Western Range) and most surprisingly it was also found in the Wologizi Mountains in upland forest (**UPF**). Males were observed hill-topping between 14.00 and 15.30. They keep territories in the darker undergrowth, where they usually settle on sun-lit lower leaves of bushes or on leaf-litter on the ground and are often involved in intra-specific fights. The new records indicate that the species could occur patchily also in other upland areas in the Guinea Highlands (e.g. Ziama Forest, Simandou Mountains in Guinea, or the Tingi and Loma Mountains in Sierra Leone) (**END**).

Euphaedra medon medon (Linnaeus, 1763)

PLATE LIV

A widely distributed Guineo-Congolian forest species with multiple subspecies across its range. In West Africa, two subspecies are recognized, the nominate one occurs in Liberia and is distributed from eastern Sierra Leone to western Cameroon (**WAF**). It inhabits all forest types (**ALF**), including riverine forests in the Guinea savannah zone, occasionally found also in dense Guinea savannah woodlands. In Liberia the species is widespread and common, with many old and recent records.

Euphaedra gausape (Butler, 1866)

PLATE LV

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is widespread and common in Liberia, with many old and recent records.

Euphaedra judith Weymer, 1892

PLATE LV

Liberian subregion endemic species (**LIB**), which occurs in wet and hyperwet forests (**WEF**) in good condition. It is very rare in Liberia, with only a few recent records from the Gola National Forest, the Wologizi Mountains and the Sapo National Park. Old records by Condamin (1951), listed under *E. gausape* by Fox *et al.* (1965) from eastern Liberia are probably valid records of *E. judith*.

Euphaedra melpomene Hecq, 1981

PLATE LV

Liberian subregion endemic species (**LIB**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare with only a few recent records from Sapo National Park, Mount Swa and the Nimba Mountains (Western Range). The status of ssp. *aubergeriana* Hecq, 1981, described from Tai National Park and the Nimba Mountains in Ivory Coast is unclear and is not discussed here.

Euphaedra xypete xypete (Hewitson, 1865)

PLATE LV

The Lower Guinean and Central African populations were recently separated from those distributed in the Upper Guinean forest zone and were described as a subspecies *E. xypete maritima* Oremans, 2014 (Oremans 2014). The nominate *E. xypete xypete* is endemic to the Upper Guinean forests (**UPG**) and occurs in various types of forest (**MEF**) in good condition. It is widespread and common in Liberia, with many old and recent records.

Euphaedra hebes Hecq, 1980

PLATE LV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It seems to be widespread, but not common in Liberia, with no old, but quite a few recent records.

Euphaedra diffusa albocoerulea Hecq, 1976

PLATE LV

The subspecies *E. diffusa albocoerulea* is West African (**WAF**) and occurs in various types of forest with preference to drier forests (**DRF**). It is rare in Liberia, with only a few recent records from the Putu Range and the Nimba Mountains.

Euphaedra crockeri (Butler, 1869)

PLATE LV

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is widespread and not rare in Liberia, with several old and recent records.

Euphaedra eusemoides (Grose-Smith & Kirby, 1889)

PLATE LV

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**). It is very rare throughout its range and was never found outside of forest in good condition. Apart from two old records from Touzon and Wanau Forest (Fox *et al.* 1965), *E. eusemoides* is known from the Putu Range (Mount Ghi Ridge) and the Nimba Mountains (East Nimba Nature Reserve, Mount Bele).

Euphaedra cyparissa cyparissa (Cramer, 1775)

PLATE LVI

Guineo-Congolian forest species with multiple subspecies across the forest zone. The nominate subspecies is distributed in the Liberian subregion (**LIB**) and occurs in various types of forest (**MEF**). It is very rare in Liberia, with only a couple of old records from Monrovia and Diyala. It was recently found also on Mount Swa and the Foya Proposed Protected Area.

Euphaedra cyparissa nimbina Pycrz & Warren-Gash, 2013

PLATE LVI

The recently described subspecies *E. cyparissa nimbina* (Pycrz *et al.* 2013) is endemic to the Guinea Highlands (Guinea, Ivory Coast and Liberia) (**END**). It has only a single Liberian record from the upland forest zone (**UPF**) of Mount Beeton (Nimba Mountains, Western Range).

Euphaedra sarcoptera sarcoptera (Butler, 1871)

PLATE LVI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is exceedingly rare in Liberia, with only a few records, collected recently on Mount Swa.

Euphaedra sarcoptera ferrea Pycrz & Warren-Gash, 2013

PLATE LVI

The recently described subspecies *E. sarcoptera ferrea* (Pycrz *et al.* 2013) is endemic to the Nimba Mountains (Ivory Coast and Liberia) (**END**). It has only a single Liberian record from the upland forest zone (**UPF**) of Mounts Gangra-Yuelliton (Nimba Mountains, Western Range).

Euphaedra themis (Hübner, 1807)

PLATE LVI

West African forest species (**WAF**) with unclear eastern distribution (Larsen 2005), which seems to be centred on drier types of forest (**DRF**). It occurs also in open woodlands, occasionally in urban parks and gardens. *E. themis* is widespread but not common in Liberia, with several recent records. Some of the numerous old records certainly refer to *E. laboureana eburnensis* Hecq, 1979, which was not recognised by the time of the publication of Fox *et al.* (1965) and the taxon was overlooked by the authors with reference to the range of “extraordinary range of variation in colouring and in details of the pattern” of *E. themis*.

Euphaedra laboureana eburnensis Hecq, 1979

PLATE LVI

Upper Guinean endemic forest species (**UPG**), the subspecies *E. laboureana eburnensis* occurs from Ghana to eastern Sierra Leone. It inhabits various types of forest (**MEF**), and is widespread and rather common in Liberia, with several recent records. Some old records of *E. themis*, certainly refer to this species.

Euphaedra minuta Hecq, 1982

PLATE LVI

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only a few scattered recent records (Gola National Forest, Putu Range, Nimba Mountains).

Euphaedra modesta Hecq, 1982

PLATE LVI

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is known only from the Putu Range in Liberia, with a few recent records.

Euphaedra janetta janetta (Butler, 1871)

PLATE LVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**) and secondary growth. It is widespread and common in Liberia, with numerous old and recent records.

Euphaedra splendens ghanaensis Hecq & Joly, 2004

PLATE LVII

The subspecies *E. splendens ghanaensis* was previously recorded only from Ghana. Surprisingly, a single specimen was captured in the Foya Proposed Protected Area in 2017, a significant range expansion. This Upper Guinean endemic (**UPG**) taxon inhabits only wetter types of forest (**WEF**) in good condition.

Euphaedra vetusta (Butler, 1871)

PLATE LVII

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, with only a few recent records from the Putu Range and the Nimba Mountains.

Euphaedra aberrans Staudinger, 1891

PLATE LVII

Upper Guinean endemic forest species (**UPG**), which is usually very rare throughout its distribution and is known from wetter type of forest (**WEF**), mostly in the coastal zone. In Liberia it was found only in coastal forest near Lake Piso.

Euphaedra ceres ceres (Fabricius, 1775)

PLATE LVII

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**) with significant habitat tolerance. It can occur virtually in all types of forest (**ALF**) and degraded secondary growth, dense savannah, coastal palm thickets and shrub, also in urban parks and gardens. *E. ceres* is among the most commonly recorded butterflies in Liberia. Some old records probably refer to the very similar *E. phaethusa*, as both species were found commonly in Liberia during recent surveys, but *E. phaethusa* was not mentioned in Fox *et al.* (1965).

Euphaedra phaethusa (Butler, 1866)

PLATE LVII

West African species (**WAF**), the western *E. phaethusa aurea* is listed from Liberia (Larsen 2005), but neither the taxonomic, nor the biogeographic boundaries between this and the nominate subspecies are clear, and therefore the Liberian populations are discussed here only at species level. It occurs in various types of forest (**MEF**) and secondary growth. *E. phaethusa* is widespread and common in Liberia, with numerous recent records. It is highly probable that some of the old records of *E. ceres* refer to this species.

Euphaedra inanum (Butler, 1873)

PLATE LVII

Upper Guinean endemic forest species (**UPG**), which occurs in various types of forest (**MEF**) in good condition. It is known only from a few records in Liberia, all collected recently in the Putu Range.

Euphaedra tenebrosa Hecq, 1983

PLATE LVII

Liberian subregion endemic (**LIB**), which is restricted to wet forests (**WEF**) in good condition. It was found as new to Liberia during the recent surveys and is known from the Putu Range and the Nimba Mountains (Mount Bele).

Euphaedra francina francina (Godart, 1824)

PLATE LVIII

The species *E. francina* is restricted to the Upper Guinean forest zone, with the nominate subspecies endemic to the Liberian subregion (**LIB**). It occurs only in wetter types of forest (**WEF**) in good condition. Although widespread, it does not seem to be common in Liberia, with only a few old and a few more recent records.

Euphaedra eleus eleus (Drury, 1782)

PLATE LVIII

The nominate subspecies is Guineo-Congolian forest species (**EQU**) and occurs in various types of forest (**MEF**), occasionally also in secondary growth. It seems to be widespread and not rare in Liberia with numerous old and recent records.

Euphaedra zampa (Westwood, 1850)

PLATE LVIII

Upper Guinean endemic species (**UPG**), which inhabits wet forests (**WEF**) in good condition. It was found infrequently during the present surveys, but is probably widespread in lowland forests in Liberia.

Euphaedra edwardsii edwardsii (van der Hoeven, 1845)

PLATE LVIII

The nominate subspecies is Guineo-Congolian (**EQU**), which has preference to drier forests (**DRF**). Although many old records are known, they mostly come from a single locality (Ganta) and the species is rare in Liberia, found only as singletons during the more recent surveys.

Euphaedra perseis (Drury, 1773)

PLATE LVIII

Upper Guinean endemic species (**UPG**), which inhabits wet forests (**WEF**) in good condition. It is usually uncommon and was found only in singletons during the recent surveys in various places in Liberia.

Euphaedra harpalyce harpalyce (Cramer, 1777)

PLATE LVIII

The nominate subspecies is West African (**WAF**), which occurs in all forest types (**ALF**), including denser riverine forests in the Guinea savannah zone and degraded secondary growth. It is widespread and very common in Liberia, with many old and recent records.

Euphaedra eupalus (Fabricius, 1781)

PLATE LVIII

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is widespread and common in Liberia, with numerous old and recent records.

Genus *Euriphene* Boisduval, 1847

Euriphene incerta incerta (Aurivillius, 1912)

PLATE LVIII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in wetter types of forest (**WEF**). It occurs sporadically in Liberia and is rare with only a few recent and no old records.

Euriphene veronica (Stoll, 1780)

PLATE LIX

Liberian subregion endemic species (**LIB**), which just penetrates into Ghana's south-western rainforests (Ankasa, Cape Three Points)(Larsen 2005). It inhabits all types of forest within its range (**ALF**) also secondary growth. From the limited amount of information Larsen (2006) listed in under WEF, but this decision was taken probably on its Ghanaian distribution, where *E. veronica* is restricted to the wettest evergreen forests. Widespread and very common in Liberia.

Euriphene grosesmithi muehlenbergi Hecq, 1995

PLATE LIX

The subspecies *E. grosesmithi muehlenbergi* is endemic to the Upper Guinean forests (**UPG**). It inhabits wetter types of forest (**WEF**) in good condition, but it is difficult to assess, as the species is very rare west of the Dahomey Gap. It is known only from a few recent records in Liberia (Sapo National Park, Putu Range, Mount Swa).

Euriphene simplex (Staudinger, 1891)

PLATE LIX

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**). It is widespread and not rare in Liberia with many recent records.

Euriphene amicia gola Fox, 1965

PLATE LIX

The subspecies *E. amicia gola* is endemic to the Liberian subregion (type locality: Bomi Hills, Liberia)(Fox *et al.* 1965) (**LIB**), replaced by the nominate one in Ghana. It is widespread but rather rare in Liberia's wetter lowland forests (**WEF**) with only a handful of records.

Euriphene aridatha feronia (Staudinger, 1891)

PLATE LIX

The subspecies *E. aridatha feronia* is endemic to the Liberian subregion (**LIB**). It occurs in various types of forest (**MEF**) and is rather widespread but not common in Liberia.

Euriphene taigola Sáfián & Warren-Gash, 2009

PLATE LIX

Liberian subregion endemic species (**LIB**), which inhabits hyperwet and wet lowland forests (**WEF**) in good condition. It is rather widespread in Liberia and was occasionally found common in the Putu Range and the Gola National Forest.

Euriphene coerulea Boisduval, 1847

PLATE LIX

Upper Guinean endemic species (**UPG**) (records from Western Nigeria (Larsen 2005) turned out to belong a recently described species, *E. epe* Pyrcz & Larsen, 2009), which inhabits wetter types of forest (**WEF**) in good condition. It is often found near swamps and also occurs in coastal swamp forest. *E. coerulea* is widespread and not rare in lowland forests in Liberia.

Euriphene lomaensis Belcastro, 1986

PLATE LIX

Liberian subregion endemic species (**LIB**), which inhabits hyperwet lowland and wet upland forests (**WEF**) in good condition. It was recently found as new to Liberia from Sapo National Park but was also recorded in the Nimba Mountains (East Nimba Nature Reserve, Western Range). The female was first described in Sáfián *et al.* (2019b).

Euriphene gambiae vera Hecq, 2002

PLATE LX

The subspecies *vera* is endemic to the Upper Guinean forest zone (**UPG**) and occurs in all types of forest (**ALF**). It is widespread and rather common in Liberia, with many old and recent records.

Euriphene ampedusa (Hewitson, 1866)

PLATE LX

West African forest species (**WAF**), which occurs in all types of forest (**ALF**). It is widespread and rather common in Liberia.

Euriphene leonis (Aurivillius, 1899)

PLATE LX

Liberian subregion endemic species (**LIB**), which inhabits hyperwet and wet lowland forests (**WEF**) in good condition. It seems to be rare in Liberia and was found recently only in the Putu Range and the Nimba Mountains (Western Range). A few old records are known from other lowland localities: Monrovia, Harbel, Bomi Hills.

Euriphene atossa atossa (Hewitson, 1865)

PLATE LX

The nominate subspecies is Guineo-Congolian (**EQU**) and which occurs in wetter types of forest (**WEF**) in good condition. It seems to be widespread but not common in Liberia with scattered recent and old records.

Euriphene doriclea doriclea (Drury, 1782)

PLATE LX

The nominate subspecies is West African (**WAF**) and occurs in wetter types of forest (**WEF**) in good condition. It seems to be widespread but not common in Liberia with scattered recent and old records.

Genus *Bebearia* Hemming, 1960

Bebearia lucayensis Hecq, 1996

PLATE LX

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is rare in Liberia, with only a few recent records from the Putu Range and the Nimba Mountains.

Bebearia tentyris tentyris (Hewitson, 1866)

PLATE LX

The nominate subspecies is Upper and Lower Guinean (**WAF**), inhabiting all types of forest (**ALF**). It is usually very common in Ghana, taken over by *B. osyris* further west. Originally, Sáfián omitted the record of the species based on a specimen of faintly marked *B. osyris* collected in Sapo National Park (Brattström 2010) but a single male specimen captured in the Krahn-Bassa Proposed Protected Area carries all typical features of *B. tentyris* confirmed its presence in Liberia.

Bebearia osyris (Schultze, 1920)

PLATE LX

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**). It is rather widespread and common in Liberia, with several old and recent records.

Bebearia carshena (Hewitson, 1871)

PLATE LXI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is often found near swamps and water courses. *B. carshena* is widespread but rather rare in Liberia, with only a few old and quite a few recent records.

Bebearia absolom absolom (Fabricius, 1793)

PLATE LXI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread but not common in Liberia, with several old and recent records.

Bebearia zonara (Butler, 1871)

PLATE LXI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread but not common in Liberia, with several old and a few recent records.

Bebearia mandinga mandinga (Felder & Felder, 1860)

PLATE LXI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is widespread and not rare in Liberia, with several old and recent records.

Bebearia oxione oxione (Hewitson, 1866)

PLATE LXI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**) in good condition. It is widespread and not rare in Liberia, with numerous old and recent records.

Bebearia abesa abesa (Hewitson, 1869)

PLATE LXI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is rather rare in Liberia, with only a few old records from two localities and a single new record from the Nimba Mountains.

Bebearia barce barce (Doubleday, 1847)

PLATE LXI

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**) and occurs in wetter types of forest (**WEF**) in good condition. It is widespread and not rare with numerous old and recent records.

Bebearia mardania (Fabricius, 1793)

PLATE LXI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**), mainly palm-rich swamp forests. It is widespread and common in Liberia, with many old and recent records.

Bebearia cocalia cocalia (Fabricius, 1793)

PLATE LXII

The nominate subspecies is restricted to the Upper Guinean forest zone (**UPG**), replaced by *B. cocalia continentalis* Hecq, 1988 already in the Volta Region (Larsen 2005) *B. cocalia cocalia* occurs in wetter types of forest (**WEF**), mainly palm-rich swamp forests. It is widespread and common in Liberia, with many old and recent records.

Bebearia paludicola blandi Holmes, 2001

PLATE LXII

The subspecies *B. paludicola blandi* is endemic to the Upper Guinean forest zone (**UPG**), which occurs in wetter types of forest (**WEF**), mainly palm-rich swamp forests. It is probably local and rare in Liberia, with only a few recent records.

Bebearia sophus sophus (Fabricius, 1793)

PLATE LXII

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in all types of forest (**ALF**), including degraded secondary growth, riverine forest and occasionally even dense savannah. It is widespread and very common in Liberia with many old and recent records.

Bebearia arcadius (Fabricius, 1793)

PLATE LXII

Upper Guinean endemic forest species (**UPG**), which inhabits wetter forests (**WEF**) in good conditions. In Liberia it is widespread and not rare with a number of recent and old records.

Bebearia laetitia (Plötz, 1880)

PLATE LXII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is rather widespread and not rare in Liberia, with many old and recent records.

Bebearia phantasina phantasina (Staudinger, 1891)

PLATE LXII

The nominate subspecies is distributed between Guinea (Forest Region) to western Nigeria (**WAF**). It is a forest butterfly, which occurs in various types of forest (**MEF**), also in secondary growth. It is widespread and common in Liberia, with many old and recent records.

Bebearia demetra demetra (Godart, 1824)

PLATE LXII

The nominate subspecies is endemic to the Upper Guinean forest zone (**UPG**), where it occurs in wetter types of forest (**WEF**) in good condition. It is rather widespread and not rare in Liberia, with several old and recent records.

Bebearia warrengashi Hecq, 2000

PLATE LXII

Liberian subregion endemic species (**LIB**), which inhabits hyperwet forests (**WEF**) in good condition. So far, it is known from a single recent record from the Sapo National Park in Liberia (Brattström 2010) but was found also near the Liberian border in the Gola Rainforest National Park in eastern Sierra Leone (Sáfián 2010).

Bebearia inepta Hecq, 2001

PLATE LXIII

Liberian subregion endemic species (**LIB**), which is patchily distributed and rare in wet lowland forests (**WEF**) from western Ivory Coast to eastern Sierra Leone. It is known only from a few recent records from Mount Swa and the Nimba Mountains.

Bebearia maledicta (Strand, 1912)

PLATE LXIII

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**) in good condition. It is known only from a few recent records from Sapo National Park, Putu Range, Mount Swa and the Nimba Mountains (Western Range) in Liberia.

Bebearia ashantina (Dudgeon, 1913)

PLATE LXIII

Upper Guinean endemic species (**UPG**), which is distributed very patchily between Ghana and Liberia and inhabits wet forests (**WEF**) in good condition. It seems to be very rare and local

throughout its distribution and was only recently discovered in Liberia. Only a few records are known from the Putu Range, Mount Swa and the Wologizi Mountains where males were observed hill-topping in the late afternoon hours between 14.30 and 16.00.

Bebearia cutteri harleyi (Fox, 1968)

PLATE LXIII

The subspecies *harleyi* is endemic to the Liberian subregion (**LIB**), where it occurs in wetter types of forest (**WEF**) in good condition. It seems to be rather widespread, but rare in Liberia with only a few old and recent records.

Genus *Euptera* Staudinger, 1891

Euptera crowleyi crowleyi (Kirby, 1889)

PLATE LXIII

The nominate subspecies is West African (**WAF**) and occurs in wetter types of forest (**WEF**), in many cases it was recorded from riverine or swamp forests (Larsen 2005). It was first captured in a fruit-baited trap by Jens Lund in a coastal forest at Lake Piso, while a pair was caught under similar circumstances by Sáfián's team in January 2018.

Euptera elabontas elabontas (Hewitson, 1871)

PLATE LXIII

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs locally in wetter types of forest (**WEF**). So far, it is known only from a few records, collected recently in a unique coastal forest near Lake Piso, where virtually all other West African (west of the Dahomey Gap) *Euptera* are present.

Euptera dorothea warrengashi Libert, 2002

PLATE LXIII

The subspecies *E. dorothea warrengashi* is endemic to the Liberian subregion (**LIB**), occurring also in Ankasa Forest in south-western Ghana in wet evergreen forest (**WEF**). The nominate subspecies occurs mainly in riverine forest in hilly country (e.g. Fouta Djallon) west of the Liberian subregion. In Liberia, the species was recorded only near Lake Piso from swamp forest, where it could be moderately common.

Euptera zowa Fox, 1965

PLATE LXIII

West African forest species (**WAF**), which prefers drier types of forest (**DRF**) in good condition (Larsen 2005). It was described from Liberia, from where it is known only from the types, and a small series of both sexes collected near Lake Piso in January 2018.

Euptera pluto occidentalis Chovet, 1998

PLATE LXIV

Considering present knowledge, the subspecies *E. pluto occidentalis* is endemic to the Upper Guinean forest zone (**UPG**), where its habitat preference is unknown (**INS**). In Liberia, it was collected only recently in coastal forests near Lake Piso.

Euptera plantroui Chovet & Collins, 1998

PLATE LXIV

Guineo-Congolian species (**EQU**), which possibly inhabits coastal forest habitats (**INS**). Only a single record of a female specimen was known from Monrovia (Libert *et al.* 2002), until another female was caught by Jens Lund on fruit bait in the coastal area near Lake Piso in February 2013. The Liberian localities and further two specimens from Kribi (Cameroon) indicate that the butterfly might be associated with coastal swamp forest.

Genus *Pseudathyma* Staudinger, 1891

Pseudathyma falcata Jackson, 1969

PLATE LXIV

West African forest species (**WAF**), which occurs in various types of forest (**MEF**) in good condition. It is usually rare throughout its range, including Liberia, where it is known only from two recent records (Sapo National Park, Mount Swa).

Pseudathyma sibyllina (Staudinger, 1890)

PLATE LXIV

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**) in good condition. It is rare in Liberia, with only a single old and a few scattered recent records.

Genus *Hamanumida* Hübner, [1819]

Hamanumida daedalus (Fabricius, 1775)

PLATE LXIV

Pan-African species (**PAN**), which originally inhabited the savannah zone (**GUI**), but it has an ability to colonise recently cleared areas in the forest zone, and now it is also well distributed in agricultural land and urban areas. Widespread and common in degraded habitats in Liberia, especially in the dry season. It also occurs in the coastal savannah near Lake Piso.

Genus *Pseudoneptis* Snellen, 1882

Pseudoneptis bugandensis ianthe Hemming, 1964

PLATE LXIV

The subspecies *P. bugandensis ianthe* is widely distributed in the Guineo-Congolian forest zone (**EQU**), where it occurs in various types of forest (**MEF**) and secondary growth. It is widespread and very common in Liberia, with many old and recent records.

Genus *Pseudacraea* Westwood, [1850]

Pseudacraea eurytus eurytus (Linnaeus, 1758)

PLATE LXIV

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**), occasionally also in secondary growth. It is widespread and very common in Liberia, with many old and recent records.

Pseudacraea boisduvalii boisduvalii (Doubleday, 1845)

PLATE LXIV

The nominate subspecies is Guineo-Congolian (**EQU**) and which occurs in various types of forest (**MEF**), occasionally also in secondary growth. It is widespread and not rare in Liberia, with several old and recent records.

Pseudacraea lucretia lucretia (Cramer, [1775])

PLATE LXV

The nominate subspecies is Guineo-Congolian (**EQU**), which occurs in various types of forest (**MEF**), occasionally also in secondary growth. It is widespread and very common in Liberia, with many old and recent records.

Pseudacraea warburgi Aurivillius, 1892

PLATE LXV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is widespread and not rare in Liberia, with several old and recent records.

Pseudacraea hostilia (Drury, 1782)

PLATE LXV

The species is best considered a Liberian subregion endemic (**LIB**), but it occurs also in the Atewa Range, Ghana. It is rather rare in Liberia, found in hyperwet and we lowland forest (**WEF**) with only a single old and a few recent records.

Pseudacraea semire (Cramer, [1779])

PLATE LXV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), occasionally also in secondary growth. It is widespread and common in Liberia, with many old and recent records.

FAMILY PIERIDAE Swainson, 1820

Genus *Pseudopontia* Plötz, 1870

Pseudopontia gola Sáfián & Mitter 2011

PLATE LXV

Liberian subregion endemic forest species (**LIB**), which occurs in wet to hyperwet lowland and upland forests (**WEF**). It is widespread and usually common during the wet season and the beginning of the dry season in Liberia. However, it is missing from the Nimba Mountains and possibly also from other drier mountains in the north-west. Based on DNA and biogeographic analysis, the species was recently separated from *P. paradoxa*, which was, for a long time, believed to be monotypic within the Pseudopontiinae subfamily (Mitter *et al.* 2011). Its life-cycle and the pre-imaginal stages were described by Sáfián (2015d).

Genus *Eurema* Hübner, [1819]

Eurema senegalensis (Boisduval, 1836)

PLATE LXV

Guineo-Congolian species (**EQU**), which extends slightly further away from the main forest zone. It occurs mostly in open areas in forests (**ALF**), forest edges and dense wooded savannah land. *E. senegalensis* is rather widespread and common in Liberia with many old and recent records.

Eurema hecabe solifera (Butler, 1875)

PLATE LXV

The nominate subspecies is widespread in Asia. The African subspecies *E. hecabe solifera* occurs all over the continent's tropical and subtropical areas (**PAN**). As a ubiquitous species (**UBQ**), it could be found in all habitat types, but prefers forests and densely wooded land. It is widespread and common in Liberia.

Eurema floricola leonis (Butler, 1886)

PLATE LXV

The subspecies *E. floricola leonis* is Guineo-Congolian (**EQU**) and inhabits various forest types (**MEF**), found mostly in clearings, forest glades and edges, rather than the forest interior proper. It is widespread and usually common in Liberia.

Eurema desjardinsii regularis (Butler, 1876)

PLATE LXVI

The subspecies *E. desjardinsii regularis* is Pan-African (**PAN**) and occurs mostly in savannah habitats (**GUI**), locally in drier forests, forest edges and clearings, occasionally in degraded forest habitats. It is very rare in Liberia, with only three old records from Harper and the Putu Range.

Eurema brigitta brigitta (Stoll, [1780])

PLATE LXVI

The nominate subspecies is Pan-African (**PAN**) and inhabits savannah habitats (**GUI**) but is able to colonise open habitats in the forest zone, especially in the dry season, when during occasional migrations, it could establish colonies in farmlands, parks, forest clearings. It is known from a few old and several recent records in Liberia.

Genus *Catopsilia* Hübner, [1819]

Catopsilia florella (Fabricius, 1775)

PLATE LXVI

Pan-African (**PAN**) ubiquitous (**UBQ**) species, which could occur basically in all sorts of habitats, excluding only the interior of primary forest and thick secondary growth. The species is strong flier, with occasional migrations observed (citation). It is most commonly seen in disturbed open habitats such as coastal grasslands, secondary savannah and farmbrush.

Genus *Leptosia* Hübner, [1818]

Leptosia alcesta alcesta (Stoll, [1782])

PLATE LXVI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Leptosia hybrida hybrida Bernardi, 1952

PLATE LXVI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is widespread but not common in Liberia, with only a few recent records. Due to confusion in identification, records prior to Bernardi (1966) records could refer also to *L. medusa*.

Leptosia medusa (Cramer, 1777)

PLATE LXVI

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is widespread and common in Liberia, with many recent records. Due to confusion in identification, records prior to Bernardi (1966) records could refer also to *L. hybrida*.

Genus *Nepheronia* Butler, 1870

Nepheronia argia argia (Fabricius, 1775)

PLATE LXVI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**), dense savannah, other woodlands and even in wooded urban areas. It is widespread and very common in Liberia, with many old and recent records.

Nepheronia thalassina thalassina (Boisduval, 1836)

PLATE LXVI

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**), dense savannah, other woodlands and even in urban areas. It is widespread and very common in Liberia, with many old and recent records.

Nepheronia pharis phatis (Boisduval, 1836)

PLATE LXVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is rather rare in Liberia, with scattered old and new records.

Genus *Colotis* Hübner, [1819]

Colotis euipe euipe (Linnaeus, 1758)

PLATE LXVII

The nominate subspecies is Guineo-Congolian (**EQU**). As a ubiquitous (**UBQ**) butterfly, it is common in Liberia and is most frequently seen in urban areas, secondary grasslands along roads, secondary savannah areas and other degraded open habitats throughout the country.

Genus *Appias* Hübner, [1819]

Appias sylvia sylvia (Fabricius, 1775)

PLATE LXVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Appias phaola phaola (Doubleday, 1847)

PLATE LXVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in wetter types of forest (**WEF**) in good condition. It seems to be widespread but rare in Liberia, with only a single old and a few recent records.

Appias sabina sabina (Felder & Felder, [1865])

PLATE LXVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Appias epaphia epaphia (Cramer, [1779])

PLATE LXVII

The nominate subspecies is equatorial (**EQS**), where it was originally distributed in the savannah zone (**GUI**), however the butterfly has good ability to penetrate the forest zone and establish colonies in degraded habitats (Larsen 2005). It is widespread and not rare in Liberia, with several old and recent records.

Genus *Belenois* Hübner, [1819]

Belenois aurota (Fabricius, 1793)

PLATE LXVII

Pan-African (**PAN**) savannah (**SUD**) species, which has the ability to colonise disturbed areas in the forest zone temporarily. It has also migratory tendencies. No old records of the species were found, while it was recently recorded from Sapo National Park (Brattström 2010) and the Nimba Mountains.

Belenois calypso calypso (Drury, 1773)

PLATE LXVII

The nominate subspecies is West African (**WAF**) and occurs in all types of forest (**ALF**) and has the ability to survive severe habitat degradation. Both old records and recent observations suggest that the species is widely distributed and common in Liberia.

Belenois theora theora (Doubleday, 1846)

PLATE LXVIII

The nominate subspecies is Guineo-Congolian (**EQU**) and inhabits various types of forest (**MEF**). It is rather widespread but not common in Liberia, with several old and recent records.

Genus *Mylothris* Hübner, [1819]

Mylothris chloris chloris (Fabricius, 1775)

PLATE LXVIII

The nominate subspecies has equatorial distributions and was originally distributed in wooded savannah habitats (**EQS**) but due to its tolerance for climatic and habitat conditions it became ubiquitous (**UBQ**) and could occur in all sorts of habitat, including forest, riverine vegetation, open woodland, also in parks and gardens or agro-forestry plantations wherever mistletoe (Loranthaceae) infested trees occur. Old and recent records suggest that the species is widespread and common throughout Liberia.

Mylothris dimidiata Aurivillius, 1898

PLATE LXVIII

Upper Guinean forest zone endemic (**UPG**) species, which inhabits wet lowland forest (**WEF**). Occasionally it occurs also in wetter upland forests. Recent records suggest that the species is widespread and not rare throughout Liberia but occurs only in good quality forest and older secondary growth.

Mylothris poppea (Cramer, [1777])

PLATE LXVIII

Upper Guinean forest species (**UPG**), which occurs in all types of forest (**ALF**), also in degraded secondary growth. It is widespread and common in Liberia, with many old and recent records.

Mylothris boireau Warren-Gash 2020

PLATE LXVIII

The species was previously recognised as *M. hilara* (Larsen 2005) but Warren-Gash has found the populations occurring on Mount Tonkoui (Ivory Coast), in the Nimba Mountains (Guinea, Ivory Coast) and in Fouta Djallon (Guinea) specifically distinct (Warren-Gash 2020). It is being described in the revision of the genus. The species was confirmed from the Liberian side of Nimba during a research trip in December 2017, when a few specimens were collected in the East Nimba Nature Reserve above 1100 m asl. It was subsequently observed in other sub-montane forests in the Liberian Nimba. The species is restricted to and patchily distributed in sub-montane forests (**UPF**) of the Guinea Highlands (**END**).

Mylothris spica (Möschler, 1884)

PLATE LXVIII

For a long time, the species was known to occur only in Ghana (Larsen 2005). Recent surveys recorded the species from the Liberian Nimba Mountains, where it was found only in the upland zone (Sáfián 2014a). A single female was also caught on the summit of Mount Belegizi, Wologizi Mountains at 1086 m asl. According to Larsen, ssp. *gabela* Berger, 1979 from Angola

should be treated as a distinct species, *M. spica* is therefore endemic to the Upper Guinean forest zone (**UPG**), where it occurs in various types of forest in good condition (**MEF**).

Mylothris rhodope (Fabricius, 1775)

PLATE LXVIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**AFL**), secondary growth and even degraded woodlands. It is widespread and common in Liberia, with many old and recent records.

Mylothris jaopura Karsch, 1893

PLATE LXVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest and secondary growth (**MEF**). Larsen (2005) mentions an old female from the Peters Collection (NHM, London) from Liberia, without further locality given, but it was recently collected in the Nimba Mountains and in the Wologizi Mountains.

Mylothris schumanni Suffert, 1904

PLATE LXIX

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest and secondary growth (**ALF**). It is rather rare in Liberia with only a few recent records from the Gola National Forest, the Putu Range and the Wologizi Mountains.

Mylothris melita Belcastro & Warren-Gash, 2020

PLATE LXIX

The species is being described in the revision of the genus (Warren-Gash 2020). It was originally collected by Claudio Belcastro on Mount Kakoulima near Conakry, Guinea and was subsequently recorded also from the Fouta Djallon area further north (Warren-Gash 2020). It was surprising to find the species in the Wologizi Mountains, Liberia in December 2018 by Sáfián and Simonics. A small series of females and a couple of males were identified in the ANHRT collection by Warren-Gash, all came from Wologizi. From the known localities, *M. melitta* appears to be an upland or sub-montane species (**UPF**), rather than a species of high-altitude forest, distributed patchily in the Guinea Highlands (**END**). Although the higher plateaus of Fouta Djallon reach well over 1300 m, Mount Kakoulima does not exceed 1000 m asl. and some specimens were caught as low as 650 m in the Wologizi Mountains with the majority of them collected on lower ridges between 850 and 1100 m. The species must be very local and also seasonal as it was absent during a previous expedition in the Wologizi Mountains and Sáfián and colleagues could not find it on Mount Kakoulima in September 2019.

FAMILY RIODINIDAE Grote, 1895

Genus *Afriodinia* d'Abbrera, 2009

Afriodinia tantalus tantalus (Hewitson, 1861)

PLATE LXIX

The nominate subspecies is restricted to the Upper Guinean forest zone (**UPG**) It occurs in wet to hyperwet lowland forests (**WEF**) in good condition. The species is rare and supposedly local, but there are too few records available for accurate assessment. It is known only from a few specimens collected at a single locality (Ganta) by Fox (Fox *et al.* 1965). All records came from the wet season, indicating seasonality.

Afriodinia gerontes gerontes (Fabricius, 1781)

PLATE LXIX

The nominate subspecies is West African (**WAF**), which occurs in wet to hyperwet lowland forests (**WEF**) in good condition. The species is rare and supposedly local, but there are too few records available for accurate assessment. It is known only from a few old and a single recent record (Sapo National Park) in Liberia.

FAMILY LYCAENIDAE Leach, 1815

Genus *Ptelina* Clench, 1965

Ptelina carnuta (Hewitson, 1873)

PLATE LXIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread and common in Liberia, with many old and recent records.

Genus *Pentila* Westwood, [1851]

Pentila pauli pauli Staudinger, 1888

PLATE LXIX

The nominate subspecies is distributed in the drier zone of West Africa (**WAS**). It occurs in several types of wooded savannah (**GUI**), also in secondary grasslands, woodlands and dry forests. It has only a few old records from Liberia, recently *P. pauli* was found in the Nimba Mountains.

Pentila petreoides Bethune-Baker, 1915

PLATE LXIX

Upper Guinean forest species (**UPG**), which is very rare between Ghana and Liberia, slightly commoner in Guinea and Sierra Leone. From the few records it inhabits wetter types of forest (**WEF**) in hilly country (Larsen 2005). It is known only from a couple of old records from Zorzor, and two recent records from the upland forests of the Nimba Mountains in Liberia.

Pentila petreia Hewitson, 1874

PLATE LXIX

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is widespread and common in Liberia, with many old and recent records.

Pentila condamini Stempffer, 1963

PLATE LXX

Liberian subregion endemic species (**LIB**), with a single record from western Ghana (Bia National Park). It occurs in wetter types of forest (**WEF**). It is rare in Liberia, with a single old and a few recent records.

Pentila cf. picena Hewitson, 1874

PLATE LXX

P. picena is distributed from central Ivory Coast to western Nigeria, in western Ivory Coast. The typical creamy coloured *P. picena* is replaced by an ochreous form, which was already mentioned in Larsen (2005). Further identical specimens were recently collected in eastern Liberia (Putu Range, Sapo National Park). The typical form of *P. picena* was not found in Liberia. Based on their morphological stability, it is probable that these specimens represent an undescribed taxon, which is endemic to the Liberian subregion (**LIB**), but clarification of its status needs further evidence. In Liberia, it was found only in wet forest (**WEF**) in good condition.

Pentila abraxas (Westwood, 1851)

PLATE LXX

Liberian subregion endemic species (**LIB**), which is widespread and not rare in lowland forests (**WEF**) in good condition throughout the country. It is observed mostly as singletons, flying slowly in the forest interior.

Pentila hewitsoni hewitsoni (Grose-Smith & Kirby, 1887)

PLATE LXX

The nominate subspecies is West African (**WAF**), which inhabits wetter types of forest (**WEF**) in good condition. It is very rare in Liberia with a single old and a couple of recent records (Putu Range).

Genus *Telipna* Aurivillius, 1895

Telipna acraea acraea (Westwood, [1851])

PLATE LXX

The nominate subspecies is West African (**WAF**) and occurs in various types of forest (**MEF**) in good condition. It is widespread and not rare in Liberia, with several old and recent records.

Telipna semirufa (Grose-Smith & Kirby, 1889)

PLATE LXX

Upper Guinean forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is widespread but not common in Liberian with a few old and another few recent records.

Genus *Ornipholidotos* Bethune-Baker, 1914

Ornipholidotos sylviae Libert, 2005

PLATE LXX

Upper Guinean endemic forest species (**UPG**), which seems to occur in wetter types of forest (**WEF**) in good condition. It is known only from a few specimens collected recently in the Putu Range in Liberia.

Ornipholidotos tiassale Stempffer, 1969

PLATE LXX

Upper Guinean endemic forest species (**UPG**), which occurs in various types of forest (**MEF**) in good condition. It is among the commonest *Ornipholidotos* in West Africa west of the Dahomey Gap, also in Liberia with a couple of old and quite a few recent records.

Ornipholidotos issia Stempffer, 1969

PLATE LXXI

Upper Guinean endemic forest species (**UPG**), which seems to occur in wetter types of forest (**WEF**) in good condition. It is known only from a few specimens collected recently in the Putu Range and the Nimba Mountains in Liberia.

Ornipholidotos cf. *irwini* Collins & Larsen, 1998

PLATE LXXI

O. irwini is a Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is known only from a few specimens from west of the Dahomey Gap (Ghana)(Larsen 2005). Two specimens collected in the Putu Range almost certainly belong to this species, based on their habitus and biogeographic position, although their genitalia were not examined. The lack

of large comparative material West African specimens of *O. irwini* in collections also prevented certain identification.

Ornipholidotos ivoiriensis Libert, 2005

PLATE LXXI

Considering present knowledge, the species is restricted to the Liberian subregion (**LIB**), with only two known records from Ivory Coast and a recent record from Liberia (Putu Range) (**INS**).

Ornipholidotos nympa Libert, 2005

PLATE LXXI

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**) in good condition. It is local and rare in Liberia with only a few recent records from the Putu Range and the Nimba Mountains.

Genus *Torbenia* Libert, 2001

Torbenia wojtusiaki Libert, 2000

PLATE LXXI

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**). It has patchy distribution in West Africa. So far, *T. wojtusiaki* was recorded only from a few specimens in the Putu Range in Liberia.

Genus *Liptena* Westwood, [1851]

Liptena submacula liberiana Stempffer, Bennett & May, 1974

PLATE LXXI

The subspecies *liberiana* is endemic to the Liberian subregion (**LIB**) and occurs in various types of forest (**MEF**). It seems to be rather widespread but not common in Liberia.

Liptena griveaudi Stempffer, 1969

PLATE LXXI

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**) and has little tolerance for habitat degradation. The butterfly is very rare and is known only from a few localities in Ghana (Larsen 2005), while it seems to be more widespread and common in Liberia inhabiting both lowland and upland forests.

Liptena simplicia Möschler, 1887

PLATE LXXI

West African forest species (**WAF**), which occurs in various types of forest in good condition (**MEF**). It is rather widespread and no rare in Liberia, with several old and recent records.

Liptena neiltennanti Sáfián, 2021

PLATE LXXII

A single female of this unique new species was collected in the upland forest of the Putu Range in Liberia (**LIB**) and might prove endemic to this habitat type (**UPF**).

Liptena albicans Cator, 1904

PLATE LXXII

Most probably an Upper Guinean endemic forest species (**UPG**), although Larsen (2005) mentions records from Nigeria with doubts. It occurs in wetter types of forest (**WEF**) in good condition. *L. albicans* is rare in Liberia, with only a few old and recent records.

Liptena alluaudi Mabille, 1890

PLATE LXXII

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is rather widespread, but not common in Liberia with several old and recent records.

Liptena ferrymani bigoti Stempffer, 1964

PLATE LXXII

A recent record is found in Boireau's report (2009) as *Liptena* cf. *ferrymani* collected on Mount Tokadeh in the Nimba Mountains (Western Range). A local colony was subsequently found in the East Nimba Nature Reserve in semi-open canopy upland forest, along the Cellcom road (1100 m asl.). The species usually occurs in the forest-savannah transition zone (**WAS**), the southern boundary of which is found just north of the Liberia-Guinea-Ivory Coast border near the Nimba Mountains. It inhabits wooded savannah habitats (**GUI**) and dry forest. In the Liberian Nimba Mountains it was found in only above 1100 m asl. in upland/submontane forest and passing specimens were also observed in submontane secondary grassland over 1300 m. The species was previously recorded from the Nimba Mountains in Guinea and Ivory Coast (Larsen 2005).

Liptena septistrigata (Bethune-Baker, 1903)

PLATE LXXII

Guineo-Congolian forest species (**EQU**), which seems to be centred on drier types of forest (**DRF**). It can also occasionally occur in the savannah-forest transition zone. It seems to be very rare in Liberia, with a single record from the Putu Range (Sáfián 2011) and a few specimens observed in the Wologizi Mountains (Sáfián *et al.* 2020c).

Liptena evanescens (Kirby, 1887)

PLATE LXXII

Guineo-Congolian forest species (**EQU**), which was not previously recorded in Liberia. Recently, a small series of the species was caught in the Gola National Forest (Camp Alpha) in hyperwet lowland forest (**WEF**).

Liptena xanthostola coomassiensis Hawker-Smith, 1933

PLATE LXXII

Guineo-Congolian forest species, the western subspecies ssp. *coomassiensis* is restricted to the Upper Guinean forest zone (**UPG**) and is quite rare in good quality wet lowland forest (**WEF**) and secondary growth, including those in Liberia.

Liptena bia Larsen & Warren-Gash, 2008

PLATE LXXII

Upper Guinean forest species (**UPG**), which inhabits various types of forest (**MEF**). It is associated with *Crematogaster* ants and is rarely found away from ant-trees or hilltops, where males usually display. The butterfly was found sporadically in Liberia, including the Putu Range, Nimba Mountains and the Gola National Forest.

Liptena flavicans (Grose-Smith & Kirby, 1891)

PLATE LXXIII

The subspecies *oniens* Talbot, 1935, listed in Larsen (2005) from West Africa was recently synonymized with the nominate subspecies (Libert & Collins 2018). The species has Guineo-Congolian distribution (**EQU**) and occurs in wetter types of forest (**WEF**) but its small colonies are usually restricted to individual *Crematogaster*-infested ant-trees, where males usually display between tree trunks in the early afternoon hours rather high, usually above 6 metres. *L. flavicans* is known from a few localities in Liberia, including Putu Range, the Gola National Forest and the Wonegizi Mountains.

Liptena seyboui Larsen & Warren-Gash, 2004

PLATE LXXIII

Upper Guinean forest species (**UPG**), which, until the first Liberian record, was known only from six specimens collected in two localities in Eastern Ivory Coast and Ghana, both known to be wetter forest (**WEF**). The only Liberian specimen was caught by Gábor Simonics on a hilltop in upland forest in the Wologizi Mountain (880 m asl), where other Lipteninae were also present, including the Liberian subregion endemic *Parasiomera alfa* (Sáfián *et al.* 2020c).

Liptena similis (Kirby, 1890)

PLATE LXXIII

Guineo-Congolian forest species (**EQU**), which occurs mainly in wetter types of forest (**WEF**). *L. similis* must be very rare in Liberia, known from a couple of old records from Kpain.

Genus *Helenia* Libert, 2021

Helenia helena (Druce, 1888)

PLATE LXXIII

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**). It is widespread but not common in Liberian with a single old and a few recent records (Gola National Forest, Sapu National Park, Nimba Mountains). The species was recently moved to the newly established genus *Helenia* by Libert (2021).

Helenia modesta (Kirby, 1890)

PLATE LXXIII

The species was omitted from the Liberian checklist by Larsen 2005, believing, that the records actually referring to specimens of *H. helena* with reduced red spots on the hindwing. Since long series were caught of both species in sympatry in the Putu Range, it seems proved, that *H. modesta* actually re-occurs in the Liberian subregion in West Africa completely disjunct from its main distribution area in Central Africa (**EQU**). *H. modesta* could be locally commoner in the Putu Range than *H. helena* in wet lowland forests (**WEF**). Both like to rest on dry twigs in the dark forest interior, occurring also in older secondary growth. The species was recently moved to the newly established genus *Helenia* by Libert (2021).

Genus *Obania* Collins & Larsen, 1998

Obania catalina (Grose-Smith & Kirby, 1887)

PLATE LXXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is difficult to find, as specimens usually sit solitarily on dry twigs in the dark forest interior. Several old and recent records indicate that *O. catalina* is rather widespread in Liberia. The species was recently moved to the genus *Obania* by Libert (2021).

Genus *Kakumia* Collins & Larsen, 1998

Kakumia otlauga (Grose-Smith & Kirby, 1890)

PLATE LXXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest in good condition (**WEF**). It is usually rare and found only in singletons in gaps in the forest interior. *K. otlauga* is rather widespread in Liberia, with only a few old and recent records.

Genus *Tetrarhanis* Karsch, 1893

Tetrarhanis symplocus Clench, 1965

PLATE LXXIII

West African species (**WAS**), which inhabits all types of forest (**ALF**). It is widespread and is among the commonest forest butterflies in Liberia, with many old and recent records. It is possible that some of the old data refer to the recently described *T. baralingam*, although the latter is very rare and is found only in wet forests in good condition.

Tetrarhanis baralingam (Larsen, 1998)

PLATE LXXIV

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**) in good condition. It was recorded only on a few occasions in Liberia's lowland forests.

Tetrarhanis diversa (Bethune-Baker, 1904)

PLATE LXXIV

The species seems to be genuinely endemic to the Liberian subregion (**LIB**). Its few Liberian records come from somewhat drier forests (**DRF**) and degraded secondary growth (Yekepa, Lake Piso).

Tetrarhanis stempfferi (Berger, 1954)

PLATE LXXIV

Guineo-Congolian forest species (**EQU**), which occurs only in wetter types of forest (**WEF**) in good condition. It is very rare in Liberia, recorded only recently from a few localities.

Genus *Falcuna* Stempffer & Bennett, 1963

Falcuna leonensis Stempffer & Bennett, 1963

PLATE LXXIV

Upper Guinean endemic species (**UPG**), which occurs in various types of forest. It is widespread and usually common in various types of lowland forest (**MEF**) and secondary growth throughout its range, including Liberia.

Falcuna campimus (Holland, 1890)

PLATE LXXIV

The nominal subspecies of the species is West African (**WAF**), which inhabits wetter types of forest (**WEF**). It is known only from a few lowland forest localities in Liberia, with a single old and four recent records.

Genus *Larinopoda* Butler, 1871

Larinopoda eurema (Plötz, 1880)

PLATE LXXIV

Upper Guinean endemic species (**UPG**), which inhabits all types of forest (**ALF**). It is widespread and common in Liberia, with many old and recent records.

Genus *Micropentila* Aurivillius, 1895

Micropentila adelgitha (Hewitson, 1874)

PLATE LXXIV

Guineo-Congolian forest species (**EQU**), which is the least rare among *Micropentila* and seems to be less tied to individual “ant-trees” in wetter types of forest (**WEF**). Still, it is known only from a couple of specimens, recorded in the Putu Range and the Nimba Mountains (ENNR).

Micropentila dorothea Bethune-Baker, 1903

PLATE LXXIV

Guineo-Congolian forest species (**EQU**), which is rare throughout its range, and could only be found around individual “ant-trees” in wetter types of forest (**WEF**). Usually a few specimens could be seen at a given time. Small series of both sexes were collected near individual “ant-trees” in the Putu Range in 2011-12. The butterflies were usually resting in the undergrowth on dry twigs and tendrils among other *Micropentila* species (*M. brunnea*, *M. cf. brunnea*).

Micropentila brunnea (Kirby, 1887)

PLATE LXXV

Guineo-Congolian forest species (**EQU**), which is rare throughout its range, and could only be found around individual “ant-trees” in wetter types of forest (**WEF**). Usually a few specimens could be seen at a given time. Small series of both sexes were caught near individual “ant-trees” in the Putu Range in 2011-12. The butterflies were usually resting on dry twigs and tendrils among other *Micropentila* species (*M. dorothea*, *M. cf. brunnea*). A single specimen was caught also in the Nimba Mountains (Mount Bele).

Micropentila cf. brunnea (Kirby, 1887)

PLATE LXXV

It is a Liberian endemic species (**LIB**), with its outpost in Ghana. The species inhabits wetter types of forest in good condition (**WEF**) and is usually local and very rare. Until recently, the butterfly was known only from a few localities in Ghana (Atewa Range, Cape Three Point Forest Reserve)(Sáfián *et al.* 2012), its colonies are restricted to individual “ant-trees”, where only single specimens were found. It is known from the Putu Range in Liberia, where small series of both sexes were collected near individual “ant-trees” in 2011-12, two males were also collected in the bufferzone of Sapo National Park in December 2020. The butterflies were usually resting on dry twigs and tendrils among other *Micropentila* species (*M. dorothea*, *M. brunnea*).

Micropentila mabangi Bethune-Baker, 1904

PLATE LXXV

Liberian subregion endemic species (**LIB**), which was found locally in hyperwet and wet primary lowland and upland forests (**WEF**) in Sierra Leone and recently Liberia. The species is very rare and local, with small colonies breeding on individual “ant-trees”. Small series of both sexes were caught near a single “ant-tree” in the Putu Range and near another one in the Gola National Forest in 2010-11 as the first Liberian records. The butterflies were usually resting on dry twigs and tendrils among other *Micropentila* species (e.g. *M. dorothea*, *M. brunnea*).

Genus *Pseuderesia* Butler, 1874

Pseuderesia eleaza (Hewitson, 1873)

PLATE LXXV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and has tolerance for habitat type and degradation, as far as *Crematogaster* infested “ant-trees” are present. A single specimen was recorded from the Putu Range in November 2012.

Genus *Eresina* Aurivillius, [1899]

Eresina maesseni Stempffer, 1956

PLATE LXXV

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is usually local around ant-trees but is probably widespread in Liberia.

Eresina fusca (Cator, 1904)

PLATE LXXV

Liberian subregion endemic species (**LIB**), of which there is very little information available. Only a few specimens are known from Sierra Leone and Ivory Coast. Like other *Eresina*, it probably lives in small and isolated colonies on individual “ant-trees” and the specimens stay in the canopy of the trees in wetter types of forest (**WEF**). Known only from a few specimens from Liberia collected in both lowland and upland localities.

Eresina pseudofusca Stempffer, 1961

PLATE LXXV

Guineo-Congolian forest species (**EQU**), which is known from many localities in Ghana, but only from a single specimen collected in Ivory Coast (Larsen 2005). The species is usually found around individual “ant-trees” in various types of forest (**MEF**). One male and two female specimens were collected in 2012-2013, as first records to Liberia in the Putu Range and in the Nimba mountains.

Eresina saundersi Stempffer, 1956

PLATE LXXV

Upper Guinean endemic forest species (**UPG**), which is rare all over its range, and is probably restricted to individual ant-trees. From the few records available it is difficult to assess the habitats of the species, but the recent records from Sierra Leone (Sula Mountains) (Sáfián unpublished) and first Liberian records from Lake Piso indicate that the species might be centred on drier forests and forest-savannah transition (**DRF**), rather than wet rainforest. In Liberia, the butterfly was found only in coastal savannah near Lake Piso, where most individuals of the dominant *Neocarya macrophylla* (Sabine) Prance trees hosted *Crematogaster* ants. The observed specimens stayed close to the ant-trees, sitting on dry twigs or flying slowly around the tree-trunks.

Genus *Eresiomera* Clench, 1965

Eresiomera bicolor (Grose-Smith & Kirby, 1890)

PLATE LXXVI

West African species (**WAF**), which inhabits all types of forest (**ALF**). It is widespread but rather rare in Liberia with no old records.

Eresiomera isca occidentalis Collins & Larsen, 1998

PLATE LXXVI

The subspecies *occidentalis* is West African (**WAF**), which inhabits wetter types of forest (**WEF**). It is known from several old and recent records from Liberia but is usually rare.

Eresiomera petersi (Stempffer & Bennett, 1956)

PLATE LXXVI

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**). It is rather rare with only a few sporadic recent records in Liberia.

Eresiomera cf. *jacksoni* (Stempffer, 1969)

PLATE LXXVI

A small series of male specimens of an unidentified *Eresiomera* species was captured by Sáfián in November 2017 in upland forest in the Wologizi Mountains. They are large and bright orange and could belong to to almost unknown species *E. jacksoni*, but comparative material was not available for identification. The specimens could also represent an undescribed taxon (**INS**).

Genus *Parasiomera* Sáfián & Collins, 2015

Parasiomera alfa Sáfián, 2015

PLATE LXXVI

Considering present knowledge, the species is endemic to the Liberian subregion (**LIB**), where it was first found in the Gola National Forest (Camp Alpha) on a hilltop, near an “ant-tree” in hyperwet lowland forest (**WEF**). The second specimen, a male, was collected in the Wologizi Mountains, flying among other Liptenini on a hilltop in upland forest (880 m asl)(Sáfián *et al.* 2020c). The species is probably more widely distributed in Liberia, as unconfirmed sightings were reported from Mount Swa and the Putu Range, but the specimens remained in the canopy level and were not caught, and therefore their identity could not be confirmed.

Genus *Citrinophila* Kirby, 1887

Citrinophila marginalis Kirby, 1887

PLATE LXXVI

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is probably rather widespread and not rare in Liberia, but is difficult to identify, as separating males from the following species is possible only with examination of male genitalia. Most Liberian records are females, found singly in clearing and forest edges.

Citrinophila similis (Kirby, 1887)

PLATE LXXVI

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is probably rather widespread and not rare in Liberia, but is difficult to identify, as separating males from the previous species is possible only with examination of male genitalia. Most Liberian records are females, found singly in clearing and forest edges.

Citrinophila erastus erastus (Hewitson, 1866)

PLATE LXXVI

The nominate subspecies has Guineo-Congolian distribution (**EQU**). It is widespread in Liberia. It occurs both in lowland and upland rainforest with considerable tolerance for habitat (**MEF**). Small colonies are found mostly around *Crematogaster* infested ant-trees. Males also hill-top in the afternoon.

Genus *Argyrocheila* Staudinger, 1892

Argyrocheila undifera undifera Staudinger, 1892

PLATE LXXVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in wetter types of forest (**WEF**) It has little tolerance for habitat degradation and is very rare in West Africa, occurring

only near individual “ant-trees”, staying mostly in the canopy. *A. undifera undifera* is known only from two specimens in Liberia, collected in the Putu Range in January 2011.

Genus *Mimacraea* Butler, 1872

Mimacraea neurata Holland, 1895

PLATE LXXVII

West African forest species (**WAF**), which occurs in various types of forest (**ALF**). It is rather widespread but rare in Liberia, with a few old and several recent records. Most specimens recorded were males, observed as circling around “ant-trees”.

Mimacraea darwinia Butler, 1872

PLATE LXXVII

Upper Guinean forest species (**UPG**), which inhabits wetter types of forest (**WEF**). It is widespread but rather rare in Liberia, with a few old, and several recent records. Most specimens recorded were males, observed as circling around “ant-trees”.

Genus *Mimeresia* Stempffer, 1961

Mimeresia libentina libentina (Hewitson, 1866)

PLATE LXXVII

The nominate subspecies is West African (**WAF**), which occurs in most forest types (**ALF**), including coastal forests and dry forest patches in the forest-savannah transition zone. It can also survive severe habitat degradation. It is somewhat less common in Liberia than the drier forests of Ghana but is still known from a number of old and recent records.

Mimeresia moyambina (Bethune-Baker, 1904)

PLATE LXXVII

Upper Guinean endemic species (**UPG**), which inhabits wetter types of forest (**WEF**). It was believed to be extremely rare throughout its range, known only from a few localities in Sierra Leone and Ivory Coast, also in Ghana’s upland forests (Atewa Range, Tano Ofin) (Larsen 2005). Its distribution is probably centred in Liberia, where it is local but small colonies occur near *Crematogaster* infested “ant-trees”, where males display higher up (6-15 m) along the tree trunks. Females can also be found only near ant-trees.

Mimeresia debora catori (Bethune-Baker, 1904)

PLATE LXXVII

The western subspecies *M. debora catori* is restricted to the Upper Guinean forest zone (**UPG**) and is very rare and local throughout its range, being restricted to individual “ant-trees”, where it could be permanently present in low numbers. In Liberia, it was found in the Putu Range and in

the Nimba Mountains (Western Range) and probably occurs only in wetter types of forest (**WEF**).

Mimeresia semirufa (Grose-Smith, 1902)

PLATE LXXVII

Upper Guinean endemic species (**UPG**), which inhabits wet lowland forests (**WEF**) in good condition. Small colonies are usually found around individual “ant-trees”. It is known only from a couple of recent records from the Putu Range and Sapo National Park in Liberia.

Mimeresia issia Stempffer, 1969

PLATE LXXVII

Upper Guinean endemic species (**UPG**), which was found in low numbers only in wet and hyperwet forests (**WEF**) in good condition. Small colonies are usually found around individual “ant-trees” It is known only from a few recent specimens (Putu Range, Sapo National Park, Gola National Forest) in Liberia.

Genus *Iridana* Aurivillius, [1920]

Iridana incredibilis (Staudinger, 1891)

PLATE LXXVIII

Guineo-Congolian forest species (**EQU**), which has tolerance for habitat degradation. It could be found in various types of primary and secondary forest (**MEF**) and could survive also in parklands or traditional cocoa farms, where old forest trees were left to provide shade to the cocoa trees. All *Iridana* develop in association with *Crematogaster* ants and could most easily be found around individual “ant-trees” A single pupa of this species was found on the bark of an “ant-tree” in the Putu Range, while a caterpillar was recorded from the coastal savannah of the Lake Piso area.

Iridana kollariki Sáfián, 2014

PLATE LXXVIII

Upper Guinean forest species (**UPG**), which, so far is known only from three localities in Ghana (Bunso Arboretum) and western Liberia (Sáfián & Collins 2014), all wetter types of forest (**WEF**). The species was first bred from larvae, collected in Bunso, but males were subsequently caught during display on a hilltop in the Gola National Forest and in the Foya Proposed Protected Area, where many other Liptenini were also present.

Iridana agneshorvathae Collins, Larsen & Sáfián, 2008

PLATE LXXVIII

West African forest species (**WAF**), which was, for a long time, known only from the holotype captured at light in Bia National Park in western Ghana. More recently, a second specimen was found in the Volta Region (ABRI collection), and another specimen was collected at moth light

on the canopy walkway in Kakum National Park by Michael Ochse (pers. com.). In 2018 a male was captured on the Belegizi Ridge in the Wologizi Mountains, as the first record to Liberia. It was also found in Benin in the Dahomey Gap (Sáfián *et al.* 2020b). The Liberian male specimen was displaying at 8.30 on a hilltop with regenerating shrubs and small trees after a big wildfire in 2015. The specimen was flying surprisingly slowly compared to other *Iridana*, maybe the specimen was disturbed in the first morning sun rather than flying during its usual display time, but it is difficult to assume. From the known localities, the species should inhabit various forest types in lowland and upland localities (**MEF**) but is certainly very rare and is probably a canopy-dwelling species.

Iridana hypocala Eltringham, 1929

PLATE LXXVIII

Guineo-Congolian forest species (**EQU**), which was not previously known from the Upper Guinean forest zone before its first records from Liberia. The previous westernmost occurrence was near Ho in the Volta Region, Eastern Ghana (Larsen 2005), further specimens were caught recently in the Likpe Mountains, Volta Region (both localities are in the Togo Mountains subregion)(ABRI collection unpublished). The first Liberian records are from the Nimba Mountains (Western Range), where a few male specimens were caught hill-topping in February 2012. They started their display flight at the first sunshine in the morning hours (9.00-9.30) on the hilltop, flying at an enormous speed, often involved in intraspecific fights, occasionally settling with wings half open on the top of the small trees and bushes. Exactly the same behaviour was observed in Mabira Forest, Uganda by Ward and Sáfián, where the butterflies started their display flight at about 8.30 in the morning. In West Africa, the species were found only in upland forest habitats (**UPF**).

Genus *Epitola* Westwood, [1851]

Epitola posthumus (Fabricius, 1793)

PLATE LXXVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is not rare, but adults usually stay at the lower canopy level. *E. posthumus* is known from several recent records in Liberia, indicating a wide distribution.

Epitola occidentalis Libert, 1999

PLATE LXXVIII

E. occidentalis was raised to species rank in Libert (2020). The species is endemic to the Upper Guinean forest zone (**UPG**), where it occurs in various types of forest (**MEF**). In Liberia it was found recently in the Nimba Mountains, the Wologizi Mountains and in the Foya Proposed Protected Area.

Epitola larseni Libert, 2020

PLATE LXXVIII

The species was listed from West Africa as *E. urania* Kirby, 1887 by Libert (1999) also by Larsen (2005), however Libert (2020) has separated it from the Congolian populations. It is rare but widely distributed in the Upper Guinean forest zone (**UPG**) and is more confined to wetter types of forest (**WEF**). *E. larseni* is known in Liberia only from an old record with no locality data and two specimens collected recently in the Putu Range and near Lake Piso.

Genus *Cerautola* Libert, 1999

Cerautola crowleyi crowleyi (Sharpe, 1890)

PLATE LXXVIII

The nominate subspecies is West African (**WAF**), which is widespread and sometimes common in various types of high forests (**MEF**), also in secondary growth throughout its range. The species develops in association with arboreal *Crematogaster* ants (Sáfián & Larsen 2009). It is not rare in Liberia, being found most often near individual ant-trees or on hilltops, where males usually display above the lower canopy.

Cerautola cf. *ceraunia* (Hewitson, 1873)

PLATE LXXIX

Based on molecular data Libert (2020) recognized that two species appear to exist under the name *C. ceraunia*. This is confirmed by morphological differences in the larval stages (Sáfián unpublished). However, the biogeographical division between the two is not yet clear and Libert abstained from the description. According to his recognition, the populations in West Africa belong to the undescribed taxon *C. cf. ceraunia* (**WAF**). It is widespread and sometimes common in various types of high forest (**ALF**), also in secondary growth throughout its range. The species develops in association with arboreal *Crematogaster* ants, the larvae are gregarious (Sáfián & Larsen 2009). It is locally common in Liberia, found most often near “ant-trees”, where males usually display in or just below the canopy level. The species is often recorded as wings found on the forests floor, as a proof that the shiny blue colour also attracts its predators, probably swifts and bee-eaters, which hunt above the canopy. A male was caught at light in the Putu Range in 2012.

Cerautola subargentea continua Libert, 1999

PLATE LXXIX

Guineo-Congolian forest zone species; its western subspecies *C. subargentea continua* is West African (**WAF**) with only from a few specimens known west of the Dahomey Gap. The first West African specimen was collected at light by Ugo Dall’Asta in eastern Ivory Coast (Larsen 2005), otherwise it was recorded only on hilltops in good quality forests, including upland forests (**WEF**) of the Putu Range and the Nimba Mountains (East Nimba Nature Reserve, Western Range) as the first Liberian records (Boireau 2009, Sáfián 2014a). It was subsequently found also in the Wologizi Mountains (Sáfián *et al.* 2020c).

Cerautola miranda miranda (Staudinger, 1889)

PLATE LXXIX

According to the recent revision of *Epitola* s.l. by Libert (2020) the nominate subspecies is restricted to the Liberian subregion (**LIB**). It is widespread and sometimes common in various types of forest (**MEF**), also in secondary growth throughout its range. The species develops in association with arboreal *Crematogaster* ants (Sáfián & Larsen 2009). It is not rare in Liberia, being found most often near individual “ant-trees”. Males often displays on hilltops, while females are most often observed investigating the tree-bark of ant-trees for egg laying. It was recorded from various forest localities, also from coastal savannah at Lake Piso, the most unusual habitat for any *Epitola*.

Genus *Geritola* Libert, 1999

Geritola gerina (Hewitson, 1878)

PLATE LXXIX

Guineo-Congolian forest species (**EQU**), which is widespread but usually local. It is found in various types of forest (**MEF**), developing in association with arboreal *Crematogaster* ants and small colonies are often found around individual ant-trees. Currently the butterfly is known from a single female record from the East Nimba Nature Reserve, Nimba Mountains in Liberia, but would eventually be found in suitable habitats.

Geritola goodii (Holland, 1890)

PLATE LXXIX

Guineo-Congolian forest species (**EQU**), which had no previous records from the Upper Guinean forest zone. Its first and only West African (west of the River Cross) record is from a hilltop at Camp Alpha, Gola National Forest, where a single male specimen was caught in February 2011 in hyperwet lowland forest (**WEF**).

Geritola albomaculata (Bethune-Baker, 1903)

PLATE LXXIX

West African forest species (**WAF**), which is known only from a few old references from east of the Dahomey Gap and a single recent one (Omo Forest, Nigeria)(Sáfián unpublished). It is also known from the wet forests (**WEF**) in Ghana (Atewa Range, Ankasa National Park)(Sáfián *et al.* 2012), but the majority of the records are from Sierra Leone and Ivory Coast, and it was also found recently in a few localities in Liberia (Putu Range, Nimba Mountains). Like other *Geritola*, it develops in association with arboreal *Crematogaster* ants. Male individuals patrol high at canopy level around “ant-trees” between 11.00 and 12.00, sometimes swooping down at a very powerful flight, when they appear as a sudden light flash.

Geritola frankdaveyi Libert, 1999

PLATE LXXIX

This extremely rare species was believed to be endemic to the Niger Delta area in Nigeria (Larsen 2005), until a few specimens bred from larva from eastern Nigeria, Sierra Leone and Liberia were identified as *G. frankdaveyi* (Sáfián 2015). Considering present knowledge, it is a West African species (**WAF**), which inhabits various types of forest (**MEF**). One of the Liberian specimens was collected as a caterpillar in coastal savannah, where *Crematogaster* ant nest on *N. macrophylla* trees (Sáfián 2015).

Geritola virginea (Bethune-Baker, 1904)

PLATE LXXIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) but has certain level of toleration for habitat degradation. It is always very local west of the Dahomey Gap, small colonies are usually found around individual “ant-trees”, where males display below the canopy, flying up and down along the tree trunks. The first Liberian specimens, a male and a female, were recorded from an “ant-tree” in dense coastal savannah near Lake Piso (Jens Lund pers. com.). It was far the commonest Liptenini in the same area in November 2013. It was previously recorded from dense savannah habitat also in the Likpe Mountains, Volta Region, Ghana, but this is obviously not its primary habitat, as the species is not found in the real Guinea savannah zone of West Africa (Larsen 2005, Sáfián *et al.* 2012).

Geritola pacifica Sáfián & Libert, 2015

PLATE LXXX

Considering present knowledge, *G. pacifica* is a Liberian subregion endemic species (**LIB**), which inhabits wet forest in good condition (**WEF**). Only two male specimens are known; the holotype was found on a hilltop at Camp Alpha, Gola National Forest in February 2011, where many other rare *Epitola* s.l. and other Liptenini were recorded (Sáfián 2012b). The second (male) specimen was found in the buffer-zone to Sapo National Park in November 2012 (both lowland forest localities).

Genus *Stempfferia* Jackson, 1962

Stempfferia cercene (Hewitson, 1873)

PLATE LXXX

Identification of a single male from Mount Beeton, Nimba Mountains was confirmed via genitalia determination. However, Libert expressed doubts that *S. cercene* actually occurs in West Africa, and all previous records might belong to *S. baoule* Libert, 1999 (Michel Libert pers. com.). Until further evidence, the species is listed as *S. cercene* (**INS**).

Stempfferia moyambina (Bethune-Baker, 1903)

PLATE LXXX

Upper Guinean forest species (**UPG**), which inhabits wet forests (**WEF**) in good condition. Larsen (2005) lists the species from Southern Nigeria but those specimens probably pertain to *S. subtumescens* Libert, 1999. It is usually local, as the species is associated with *Crematogaster* ants and is mostly found near ant-trees. *S. moyambina* is rare in Liberia, with no old and only a few recent records.

Stempfferia dorothea (Bethune-Baker, 1904)

PLATE LXXX

Upper Guinean endemic forest species (**UPG**), which inhabit wetter types of forest (**WEF**) in good condition. It is usually local, as the species is associated with *Crematogaster* ants and is mostly found near ant-trees. *S. dorothea* is rather rare in Liberian, with only a couple of old and a few recent records.

Stempfferia katikae Sáfián, 2015

PLATE LXXX

A small series of males of a *Stempfferia* species closely related to the East-Central African *S. insulana* was collected in the Nimba Mountains (Mount Beeton, Western Range) in 2013. The two, however, slightly differed in ground colour and in male genitalia. It was originally found in the Nimba Mountains (Sáfián 2015a) but was more recently recorded also in upland forest in the Wologizi Mountains (Sáfián *et al.* 2020c). Considering present knowledge *S. katikae* is endemic to the Guinea Highlands area (**END**) with upland affinities (**UPF**).

Stempfferia leonina (Staudinger, 1888)

PLATE LXXX

Upper Guinean endemic forest species (**UPG**), which occurs in various types of forest (**MEF**). Although it is among the commonest *Epitola* s.l. in Ghana (Larsen 2005, Sáfián *et al.* 2012), *S. leonina* is rather rare in Liberia with no old and only a few scattered recent records.

Stempfferia ciconia (Grose-Smith & Kirby, 1892)

PLATE LXXX

Guineo-Congolian forest species (**EQU**), which inhabits wetter forests (**WEF**) in good condition. It is also associated with *Crematogaster* ants. *S. ciconia* is among the commonest and most widespread *Epitola* s.l. in Liberia with quite a few recent records. Interestingly, no records of the species are listed in Fox *et al.* (1965).

Stempfferia michelliberti Sáfián, Warren-Gash & Belcastro, 2021

PLATE LXXX

This new species in the “*S. zelza*-group” is known only from Liberia from a single female specimen captured near a *Crematogaster* infested “ant-tree” in lowland forest at the foothills of

the Nimba Mountains. Further specimens were collected in Sierra Leone and in the Forest Region of Guinea, also a series from Alépé, Ivory Coast (Sáfián *et al.* 2021). This new taxon probably represents the Liberian subregion vicariant (**LIB**) of the Guineo-Congolian *S. zelza*. It inhabits wetter lowland forest (**WEF**) and is restricted to individual ant-trees.

Stempfferia michelae michelae Libert, 1999

PLATE LXXXI

Guineo-Congolian forest species, which is represented by two subspecies (ssp. *centralis* is Central African, while the nominate subspecies is distributed from Nigeria to Sierra Leone) (**WAF**), occurring in all types of forest (**ALF**). It is known only from a few records in Liberia, including the Nimba Mountains (Grassfield, Mount Beeton) and Lake Piso. The species was also bred from larva in the Gola Forest National Park.

Stempfferia kholifa (Bethune-Baker, 1904)

PLATE LXXXI

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**). It is usually found near individual ant-trees, where the males display in semi-open gaps or clearings. *S. kholifa* is known only from a few recent records from Liberia but is probably widespread.

Stempfferia staudingeri (Kirby, 1890)

PLATE LXXXI

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**). It was recorded only recently in Liberia, from lowland forest localities in the Putu Range, Sapo National Park, Mount Swa and Foya Proposed Protected Area, also from coastal forests near Lake Piso, mainly near individual ant-trees.

Genus *Cephetola* Libert, 1999

Cephetola doleta (Kirby, 1890)

PLATE LXXXI

Using COI barcodes Libert (2020) has identified that the West African populations differ from real *C. cephena* (Hewitson, 1873). In West Africa, he described *C. daveyi* Libert, 2020 from Nigeria with a distinct subspecies occurring in Ghana, while for the populations occurring in the Liberian subregion, he resurrected *C. doleta* (Kirby, 1890) (**LIB**). It occurs in various types of forest (**MEF**). Adults are usually found near *Crematogaster* infested ant-trees, where they display in open areas in the morning hours. The species is known only from a few recent records in Liberia, most of them are males caught during their display flight in the Nimba Mountains. One male specimen was collected at moth light in the Putu Range, while another one in coastal forest near Lake Piso (Bomi).

Cephetola subcoerulea (Roche, 1954)

PLATE LXXXI

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**). Adults are usually found only around *Crematogaster* infested ant-trees, where males display more open areas in the morning hours. The species is known from a single male in Liberia, recorded recently in the Putu Range.

Cephetola pinodes pinodes (Druce, 1890)

PLATE LXXXI

The nominate subspecies is West African (**WAF**) and is usually found in wet forest (**WEF**) in good condition. The first Liberian specimen, a female was collected in the Putu Range, followed by a couple of males, found on a hilltop in the Wologizi Mountains and another one found in the Nimba Mountains. The species was expected to occur in Liberia, since it was recorded from the Gola Forests near the Liberian border in Sierra Leone (Sáfián 2012b).

Cephetola mercedes ivoriensis (Jackson, 1967)

PLATE LXXXI

The subspecies *C. mercedes ivoriensis* is endemic to the Upper Guinean forest zone (**UPG**). It occurs mostly in wetter types of forest (**WEF**), where it is rare and local, tied to individual *Crematogaster* infested ant-trees. In Liberia, it is known only from a single male collected at light in the Putu Range (Sáfián 2012a).

Cephetola obscura (Hawker-Smith, 1933)

PLATE LXXXI

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). Adults are usually found only around *Crematogaster* infested ant-trees, where males display more open areas in the morning hours. It is known only from a couple of old and a few recent records in Liberia.

Cephetola praecox Sáfián, 2021

PLATE LXXXII

Only the unique male holotype known. It was caught displaying early in the morning (7.30), circling up and down at high speed along the trunk of an ant-tree on the ridgeline of Mount Jideh in the Putu Range (**END**). The species might be associated with the unique upland forest habitats (**UPF**) of the Putu Range (Sáfián *et al.* 2021).

Cephetola sublustris (Bethune-Baker, 1904)

PLATE LXXXII

A rather widely distributed Guineo-Congolian forest species (**EQU**), which occurs in various forest types (**MEF**) also in secondary growth. So far, it is known only from a single specimen in

Liberia, captured by Gábor Simonics on a hilltop in the Wologizi Mountains in upland forest, degraded by wildfire. The male specimen was disturbed to fly in the afternoon from an ant-tree.

Cephetola wingae Sáfián, 2015

PLATE LXXXII

This unique *Cephetola* is close to the East-Central African *C. izidori* and is restricted to the Liberian subregion and maybe to the upland zone of the Guinea Highlands (**END**). It was recorded only from upland forests (**UPF**) on the summits of Mount Beeton and Mount Bele in the Nimba Mountains and more recently in the Wologizi Mountains (Sáfián *et al.* 2020).

Cephetola wologizi Sáfián, 2021

PLATE LXXXII

This is another newly described *Cephetola*, which could prove endemic to the Guinea Highlands (**END**). It is known only from two males, hill-topping between 9.30-10.00 in the morning on a hilltop (ca 1050-1100 m asl.) in the Wologizi Mountains in upland forest (**UPF**), degraded by wildfire (Sáfián *et al.* 2021).

Genus *Neaveia* Druce, 1910

Neaveia lamborni lamborni Druce, 1910

PLATE LXXXII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**) and it could also establish colonies in parklands and urban gardens if *Crematogaster* infested “ant-trees” are available. In Liberia it was found only on a few occasions in the Putu Range and Sapo National Park, also in the coastal savannah-forest complex of the Lake Piso area.

Genus *Epitolina* Aurivillius, 1895

Epitolina dispar (Kirby, 1887)

PLATE LXXXII

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**). It is widespread and common throughout Liberia, with many old and recent records.

Epitolina melissa (Druce, 1888)

PLATE LXXXII

Guineo-Congolian forest species (**EQU**), which occurs mainly in wetter types of forest (**WEF**). It is widespread and rather common in Liberia.

Genus *Hypophytala* Clench, 1965

Hypophytala leonetta Libert, 2020

PLATE LXXXII

The species was originally identified as *H. hyettina* (Aurivillius, 1897), but Libert's (2020) description of *H. leonetta* corresponds with the male specimens recently collected in the Nimba Mountains. Stempffer & Bennett (1956) mentions a female of *Hypophytala* sp. from Kpain, which was designated as neallotype of *H. hyettina* by Libert (1999) is actually the female of *H. leonetta*. This butterfly is known only from a few wet forest localities (**WEF**) in Liberia and Sierra Leone and would likely to be endemic to the Liberian subregion (**LIB**).

Hypophytala henleyi depuncta Libert, 2020

PLATE LXXXIII

The recently described subspecies is endemic to the Upper Guinean forest zone (**UPG**). It is found in various types of forest (**MEF**). The species lives in myrmecophilous association with arboreal *Crematogaster* ants and is usually found around ant-trees. So far, it is known only from a single old record in Liberia (Kpain) (Stempffer & Bennett 1956, Libert 2020).

Hypophytala benitensis contrasta Libert, 2020

PLATE LXXXIII

The recently described western subspecies ssp. *contrasta* endemic to the Upper Guinean forest zone (**UPF**) (Libert 2020). It usually occurs in wetter types of forest (**WEF**). The species lives in myrmecophilous association with arboreal *Crematogaster* ants and is usually found around ant-trees. So far, it is known only from a single recent record in Liberia (Putu Range).

Genus *Phytala* Westwood, [1851]

Phytala elais catori Bethune-Baker, 1903

PLATE LXXXIII

The western subspecies ssp. *catori* is a Liberian subregion endemic taxon (**LIB**), which possibly is specifically distinct from the nominal *P. elais* (Larsen 2005). It inhabits wet forest (**WEF**), and like other *Epitola* s.l. it probably develops in association with *Crematogaster* ants but its strict habitat requirements are unknown due to its genuine rarity throughout its distribution. There are two old records known from Liberia (Harbel), the species was recently collected in the Nimba Mountains (ENNR) (Leg.: Andre Coetzer) (Sáfián 2014a) and a hindwing was found in the Wologizi Mountains by Marios Aristophanous.

Genus *Aethiopana* Bethune-Baker, 1915

Aethiopana honorius divisa (Butler, 1901)

PLATE LXXXIII

The western subspecies flies from the River Niger to Sierra Leone (**WAF**). It inhabits various types of forest (**MEF**), although it can survive severe habitat degradation, provided that *Crematogaster* ants are present, with which the species is associated. It certainly is the commonest and most widespread *Epitola* s.l. in Liberia with many old and recent records.

Genus *Hewitsonia* Kirby, [1871]

Hewitsonia boisduvalii (Hewitson, 1869)

PLATE LXXXIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is widespread but usually local, found near ant-trees in both lowland and upland forests in Liberia, with a few scattered records.

Hewitsonia occidentalis Bouyer, 1997

PLATE LXXXIII

West African forest species (**WAF**), which occurs in various types of forest (**MEF**). It is probably restricted to individual ant-trees and rare in Liberia with only a single recent record from the Gola National Forest.

Hewitsonia inexpectata Bouyer, 1997

PLATE LXXXIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), also in secondary growth and occasionally in parks and gardens. So far the species is known only from two recent records, from the Putu Range and the ENNR in Liberia.

Genus *Euliphyra* Holland, 1890

Euliphyra mirifica Holland, 1890

PLATE LXXXIII

The species is distributed from Senegal to Cameroon (**WAF**). It occurs in forest edges (**MEF**) and secondary growth of various age, wherever *Oecophylla* ants are present, as the larvae develop in association with the ants. It is known only from a single old, and a few recent records in Liberia.

Euliphyra leucyana leucyana Holland, 1890

PLATE LXXXIV

The nominate subspecies is restricted to the Upper Guinean forest zone (**UPG**) and occurs in various types of forest (**MEF**). It is known only from a few old (Harbel, Harper)(Fox *et al.* 1965) and new records from the Nimba Mountains.

Genus *Aslauga* Kirby, 1890

Aslauga larseni Sáfián, 2015

PLATE LXXXIV

Considering present knowledge, *A. larseni* is a narrowly endemic species (**END**), known only from a few males, which were caught hill-topping on the Mount Nimba ridge (**UPF**), and two females, one from the same locality (Sáfián 2015), while the other one was collected on Mount Gangra in March 2017. All other closely related *Aslauga* species have very limited range (Libert 1994, Larsen 2005), and mostly males were found displaying on hilltops, where the slopes or the lower slopes and the river valleys were forested but the summit area is covered by grassland or more open woodland. It could occur in other mountainous areas in the Liberian subregion (e.g. Wologizi Mountains).

Aslauga marginata marginalis Kirby, 1890

PLATE LXXXIV

The subspecies *marginalis* is West African (**WAF**), which occurs in all types of forest (**ALF**). It is widespread and rather common in Liberia with a number of old and recent records.

Aslauga lamborni Bethune-Baker, 1914

PLATE LXXXIV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). Only three female specimens are known from Liberia, which were caught on the Ghi Ridge in the Putu Range in December 2012. They were flying around a *Crematogaster* infested “ant-tree”.

Aslauga guineensis Collins & Libert, 1997

PLATE LXXXIV

The species was believed to be endemic to Guinea’s Fouta Djallon Mountains (known only from a few female specimens), until one female was recorded in the East Nimba Nature Reserve. It is probably a rare Guinea Highlands endemic species (**END**), which might be associated with upland or submontane forests (**UPF**).

Genus *Lachnocnema* Trimen, 1887

Lachnocnema vuattouxi Libert, 1996

PLATE LXXXIV

The species is widely distributed in the drier zone from Senegal to Kenya in the east (**EQS**). It primarily inhabits Guinea savannah (**GUI**) but can occur in secondary savannah and disturbed forest as well. *L. vuattouxi* is known only from three recent records in Liberia.

Lachnocnema emperamus (Snellen, 1872)

PLATE LXXXIV

The species is widely distributed in the drier zone from Senegal to Ethiopia the east and Angola in the south (**EQS**). It primarily inhabits Guinea savannah (**GUI**) but can occur in secondary savannah and disturbed forest as well. *L. emperamus* is known mainly from coastal savannah in Liberia as a few old and recent records.

Lachnocnema luna Druce, 1910

PLATE LXXXIV

Guineo-Congolian forest species (**EQU**), which inhabits the wetter lowland forest habitats (**WEF**). It is rare throughout its range, with only a few specimens known from West Africa (Larsen 2005). In Liberia only three females were caught, two at moth light in December 2010 and January 2011 in the Putu Range, while the thirds one was collected in Pellokon Community Forest, near the Krahn-Bassa Proposed Protected Area in 2018.

Genus *Spalgis* Moore, 1879

Spalgis lemolea pilos Druce, 1890

PLATE LXXXV

Spalgis lemolea is a pan-African forest species, while the subspecies *S. lemolea pilos* is widely distributed in the Guineo-Congolian forest zone (**EQU**). It is centred on drier forests (**DRF**) and inhabits forest glades, degraded forests, open woodlands, also parklands and gardens in urban areas, as well as various savannah formations. It is rather widespread but not common in Liberia, with a couple of old and a few recent records.

Genus *Megalopalpus* Röber, 1886

Megalopalpus zymna (Westwood, 1851)

PLATE LXXXV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread but not common in Liberia, with only a few old and recent records.

Megalopalpus metaleucus Karsch, 1893

PLATE LXXXV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread and not rare in Liberia, with several old and recent records.

Genus *Aphnaeus* Hübner, [1819]

Aphnaeus orcas (Drury, 1782)

PLATE LXXXV

Guineo-Congolian forest species (**EQU**), which inhabits all types of forest (**ALF**). It is also found in dense Guinea savannah. The species is the commonest *Aphnaeus* and is usually found perching on bushes or intaking dissolved minerals from muddy soil. Female also come down occasionally to rest on low bushed in clearings of wood edge. It is widespread and rather common in Liberia.

Aphnaeus argyrocyclus Holland, 1890

PLATE LXXXV

Guineo-Congolian forest species (**EQU**), which is very rare in wetter forests (**WEF**) in good condition. It is known only from a few recent records in Liberia. All were found mud-puddling during the extreme dry season in February 2012 in the Nimba Mountains (Western Range).

Aphnaeus mirabilis Sáfián & Collins, 2013

PLATE LXXXV

Considering present knowledge, the species is narrowly endemic to the Nimba Mountains (**END**) and is known only from the unique holotype caught mud-puddling in the Western Range during the extreme dry season in 2012 (Sáfián *et al.* 2013). Its type locality is a swamp surrounded by lowland wet forest (**WEF**). Recently Thierry Bouyer (pers. com.) obtained DNA COI barcodes of a specimen collected in the Kivu area of the Democratic Republic of Congo, identical to that of *A. mirabilis*. The facies of the specimen is intermediate between *A. flavescens* Stempffer, 1954 and *A. mirabilis* and it could prove conspecific with *A. mirabilis*. Further taxonomic investigation is needed to clarify its status.

Aphnaeus nimbaensis Sáfián & Libert, 2013

PLATE LXXXV

Considering present knowledge, the species is narrowly endemic to the Liberian subregion and is known only from three male specimens (**END**), collected both in the East Nimba Nature Reserve and the Western Range (Mount Gangra, Mount Beeton). Wings of male specimens were found on a hilltop in Wologizi and in the Krahn-Bassa Proposed Protected Area, the latter is lowland wet evergreen forest (**WEF**). The males usually appear on hill-tops between 14.00 and 15.00 and they perch usually on the highest shoots of tall bushes or trees, making extremely fast display circles in their territory, often involved in intra-specific fights. The known localities lie between

870 m and 1120 m above sea level, and it is possible that *A. nimbaensis* is an essentially upland forest species.

Genus *Axiocerses* Hübner, [1819]

Axiocerses harpax (Fabricius, 1775)

PLATE LXXXV

The species is widely distributed in the savannah zone from West Africa to Kenya (**EQS**) and was originally confined to savannah habitats (**GUI**), but has tolerance for habitat degradation and can also occur anywhere in the forest zone, wherever open areas are found, especially in the dry season. It seems to be widespread and common in Liberia, with many old and recent records.

Genus *Cigaritis* Donzel, 1848

Cigaritis iza (Hewitson, [1865])

PLATE LXXXVI

Upper Guinean forest species (**UPG**), of which there is little information available. It probably inhabits wetter forests (**WEF**) in good condition and adults tend to stay in the canopy. Males sometimes visit flowering bushes and mud-puddles during the dry season. It was not rare in the Nimba Mountains in the dry season of 2012 and 2013 and is known only from a single old and a few more recent records in Liberia.

Cigaritis menelas (Druce, 1907)

PLATE LXXXVI

West African species (**WAF**), which is extremely rare throughout its range. All known records are from forest (Larsen 2005), and they indicate preference for wetter types (**WEF**). A single female specimen was caught at 08.00 a.m. on the ridge of Mount Jideh in the Putu Range in April 2011 as a new record to Liberia.

Genus *Lipaphnaeus* Aurivillius, [1916]

Lipaphnaeus leonina leonina (Sharpe, 1890)

PLATE LXXXVI

The nominate subspecies is endemic to the Liberian subregion (**LIB**), which inhabits wetter types of forest (**WEF**) in good condition. Ssp. *ivoiriensis* (Stempffer, 1966) was also mentioned from eastern Liberia, but no records confirming its presence in Liberia could be traced. It seems quite improbable as eastern Liberia still lies in the Liberian subregion with no real boundary between the ranges of the two subspecies. *L. leonina* is widespread but not common in Liberia with only a couple of old and a few recent records.

Genus *Pseudaletis* Druce, 1888

Pseudaletis agrippina warrengashi Libert, 2007

PLATE LXXXVI

The subspecies *warrengashi* is known from a few specimens from Ivory Coast between Banco Forest in Abidjan and Yéalé at the foothills of the Nimba Mountains (Libert 2007). However, Sáfián *et al.* (2012) identified two specimens collected in Aburi Botanical Garden as ssp. *warrengashi* giving a broader distribution. The first Liberian specimen was found in Sapo National Park in December 2020. It should be a butterfly of wetter types of forest (**WEF**), confined to the Upper Guinean forest zone (**UPG**).

Pseudaletis subangulata Talbot, 1935

PLATE LXXXVI

The species is endemic to the Upper Guinean forest zone (**UPG**). It probably inhabits wetter types of forest (**WEF**) in good condition, but from the few records available, it is difficult to assess. The only old Liberian specimen in the Carnegie Museum does not carry a more accurate locality label, the three recently collected specimens were found hill-topping between 13.40-14.30 in upland forest in the East Nimba Nature Reserve.

Pseudaletis jolyana Libert, 2007

PLATE LXXXVI

Upper Guinean endemic species (**UPG**), which is known only from the type series, caught in upland rainforest in the Atewa Range in Ghana, one male specimen from the nearby Bunso Arboretum and a single male specimen from the Nimba Mountains in Liberia (**WEF**). Virtually all specimens were caught at moth light, which indicates crepuscular or nocturnal activity of the species. The habitat of the Liberian species was lowland secondary forest at the foothills of Mount Bele.

Pseudaletis leonis (Staudinger, 1888)

PLATE LXXXVI

West African forest species (**WAF**), which inhabits all types of forest (**ALF**). It is less rare than other species in the genus, however, adults usually stay in the canopy and they are therefore rarely observed. Males do hill-top at mid-day. *P. leonis* was recorded as new to Liberia from the Putu Range. It was subsequently found also in the Nimba Mountains (Western Range).

Genus *Anthene* Doubleday, 1847

Anthene larydas (Cramer, [1780])

PLATE LXXXVI

Pan-African forest species (**PAN**), which occurs in virtually all types of forest, dense woodland and thickets (**ALF**). It is widespread and very common in Liberia with many old and recent records.

Anthene crawshayi vuattouxi Libert, 2010

PLATE LXXXVII

The subspecies *A. crawshayi vuattouxi* is widely distributed in the savannah zone (**GUI**) between Mauritania and northern Cameroon (**WAS**). It occasionally occurs also in the forest zone, especially in secondary grasslands and degraded open habitats. *A. crawshayi vuattouxi* is rare in Liberia, with only a few scattered recent records.

Anthene agumatsa agumatsa Libert, 2010

PLATE LXXXVII

This recently described species was collected mostly in Ghana, under the name *A. ligures* (Hewitson, 1874) (Larsen 2005). A further specimen is known from the Ziama Forest, Guinea (Libert 2010). Several males were found at water in the Nimba Mountains in December 2016 and 2017 and a single male was also captured in Krahn-Bassa Forest. The species could be distributed throughout but not beyond the Upper Guinean forest zone (**UPG**) and could indicate wet forest (**WEF**).

Anthene sylvanus (Drury), [1773]

PLATE LXXXVII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and not rare in Liberia with many old and recent records.

Anthene rubricinctus derubescens Libert, 2010

PLATE LXXXVII

The subspecies *A. rubricinctus derubescens* is West African (**WAF**), which occurs in all types of forest (**ALF**) and secondary growth. It is widespread and common in Liberia, with many old and new records.

Anthene princeps (Butler, 1876)

PLATE LXXXVII

Pan-African savannah species (**PAN**), which occurs in various types of savannah habitats (**GUI**). Four Liberian specimens of this species were available for Libert's revision of the genus. It was found locally common in the Nimba Mountains during the surveys in 2012-2014.

Anthene lunulata grosei (Aurivillius, 1898)

PLATE LXXXVII

The subspecies *A. lunulata grosei* is widely distributed in the savannah zone (**GUI**), between Mauritania and the western Kenya and Ethiopia (**EQS**). It tolerates habitat degradation and has good dispersal abilities, and therefore it can occur also in secondary grasslands and other

degraded areas in the forest zone. *A. lunulata grosei* is rare in Liberia, found mostly during dry season, known only from ten old and two recent records.

Anthene liodes monteironis (Kirby, 1878)

PLATE LXXXVII

Pan-African forest species, the subspecies *A. liodes monteironis* is West African (**WAF**). It is centred on drier forests (**DRF**), but occurs also in the forest-savannah transition, wooded savannah and degraded habitats in the forest zone, but not usually in arid grasslands. *A. liodes monteironis* is rather rare in Liberia, with a few old and several recent records. Most recent observations are from the dry season (e.g. Nimba Mountains), where mostly males were seen on muddy spots.

Anthene amarah amarah (Guérin-Méneville, 1849)

PLATE LXXXVII

The nominate subspecies is Pan-African (**PAN**), which occurs in all types of savannah land (**GUI**), but occasionally also in degraded open habitats in the forest zone, especially during dry season. It is known from several old and a few recent records in Liberia.

Anthene irumu (Stempffer, 1948)

PLATE LXXXVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) and secondary growth. It is rather rare in Liberia, with no old and only a few recent records.

Genus *Cupidesthes* Aurivillius, 1895

Cupidesthes cf. *robusta* Aurivillius, 1895

PLATE LXXXVIII

C. robusta Aurivillius, 1895 is a Guineo-Congolian forest species (**EQU**), which is known to occur in wetter types of forest (**WEF**). The only Liberian specimen, a male, was captured on the edge of coastal swamp forest, unique to the coastal zone in Liberia (Leg.: Josiane Goossens & Steve Collins). There is another specimen found west of the River Cross in West Africa, which was collected also in a coastal swamp forest, in the Lekki Conservation Area, Lagos in Nigeria (Leg.: Robert Warren). These two specimens differ in the tone of blue from the Central African population of *C. robusta*, and they might represent an undescribed taxon. At present, no sufficient information is available to decide on its taxonomic status.

Cupidesthes lithas (Druce, 1890)

PLATE LXXXVIII

West African forest species (**WAF**), which occurs in various types of forest (**MEF**) and secondary growth. It is not rare in Liberia, known from several old and recent records.

Cupidesthes henrii Libert, 2010

PLATE LXXXVIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is rather rare and local in Liberia, with only a few recent records from the Putu Range and Mount Swa.

Cupidesthes jacksoni Stempffer, 1969

PLATE LXXXVIII

Upper Guinean endemic forest species (**UPG**), which occurs in wetter types of forest (**WEF**) in good condition. It is widespread but rather rare in Liberia, with scattered recent records.

Genus *Neurellipes* Bethune-Baker, 1910

Neurellipes lusones (Hewitson, 1874)

PLATE LXXXVIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is widespread and rather common in Liberia, with numerous old and recent records.

Neurellipes fulvimacula (Mabille, 1890)

PLATE LXXXVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread but not common in Liberia, with only a couple of old and a few recent records.

Neurellipes kampala incerta Libert, 2010

PLATE LXXXVIII

Recently described taxon, which is widely distributed in the Guineo-Congolian forest zone (**EQU**). It occurs mostly in wetter types of forest (**WEF**). *N. kampala incerta* is widespread but not common in Liberia, with only a few old and several recent records.

Neurellipes radiata (Bethune-Baker, 1910)

PLATE LXXXIX

Upper Guinean forest zone endemic species (**UPG**), which was recorded mainly in wet to hyperwet forests (**WEF**) in good condition with a single record from coastal forest. It is known only from a single old and a few recent records in Liberia (Putu Range, Sapo National Park, Lake Piso).

Neurellipes scintillula aurea (Bethune-Baker, 1910)

PLATE LXXXIX

The subspecies *N. scintillula aurea* is endemic to the Upper Guinean forest zone (**UPG**). It seems to inhabit wet to hyperwet lowland forests (**WEF**) (e.g. Sapo National Park), although a single specimen was also recorded from upland forest in the Nimba Mountains (Western Range). *N. scintillula aurea* is probably local and rare in Liberia with no old and only a few recent records.

Neurellipes gola Libert, 2010

PLATE LXXXIX

Recently described species, which is endemic to the Liberian subregion of West Africa (**LIB**). It is known to occur in hyperwet lowland forests (**WEF**) in Liberia (Sapo National Park, Gola National Forest). It could locally be common in its type locality (Gola Rainforest National Park) in Sierra Leone, close to the Liberian border.

Neurellipes georgiadisi (Larsen, 2009)

PLATE LXXXIX

Considering present knowledge, the species is endemic to Liberia (**LIB**) (Larsen 2009). It is known only from the holotype and a few further males collected in the Sapo National Park and in Krahn-Bassa Proposed Protected Area in hyperwet lowland forest (**WEF**).

Neurellipes juba (Fabricius, 1787)

PLATE LXXXIX

West African forest species (**WAF**), which occurs in wetter types of forest (**WEF**). It is widespread but not common in Liberia, with only a couple of old and a few recent records.

Neurellipes lachares lachares (Hewitson, 1878)

PLATE LXXXIX

The nominate subspecies has Guineo-Congolian distribution (**EQU**) and occurs in various types of forest (**MEF**) and secondary growth. It is widespread and not rare in Liberia, with several old and recent records.

Neurellipes lysicles lysicles (Hewitson, 1874)

PLATE LXXXIX

The nominate subspecies is Guineo-Congolian (**EQU**) and inhabits wetter types of forest (**WEF**). It is widespread and not rare in Liberia, with several old and recent records.

Neurellipes lyzanius (Hewitson, 1874)

PLATE LXXXIX

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**). It is widespread and common in Liberia, with several old and recent records.

Genus *Triclema* Karsch, 1893

Triclema lucretilis (Hewitson, 1874)

PLATE XC

Guineo-Congolian species (**EQU**), which occurs in various types of forest (**MEF**). Although no Liberian specimens were available for the revision (Libert 2010), the species is actually known from Liberia from a few specimens found recently in the Putu Range and the Nimba Mountains (West Nimba). The males are active hill-toppers. They are among the first butterflies to appear soon after sunrise (sometimes as early as 7.30-8.00 depending on weather conditions) and usually disappear after an hour of displaying.

Triclema staudingeri (Grose-Smith & Kirby, [1894])

PLATE XC

Guineo-Congolian species (**EQU**), which occurs mainly in wet forest (**WEF**). It is usually very rare in West Africa with no previous records from Liberia (Larsen 2005, Libert 2010). Two specimens were found recently in the Wologizi Mountains in lowland forest (Sáfián *et al.* 2020c).

Triclema phoenicis Karsch, 1893

PLATE XC

The species for a long time was referred to as *T. hades* (Bethune-Baker, 1910), but was recently synonymized by Libert (2010). It is widely distributed in the Guineo-Congolian forest zone (**EQU**), where it inhabits various types of forest (**MEF**). *T. phoenicis* is widespread and not rare in Liberia with several old and recent records.

Triclema nigeriae (Aurivillius, 1905)

PLATE XC

The species is widely distributed in the savannah zone from Senegal to Kenya (**EQS**) in the west and Zimbabwe in the south. It occurs in various savannah formations (**GUI**) and the forest-savannah transition, occasionally also in degraded open habitats in the forest zone. *T. nigeriae* is very rare in Liberia, known only from two recent records, found in the Nimba Mountains in the extreme dry season in February 2012.

Triclema rufoplagata rufoplagata Bethune-Baker, 1910

PLATE XC

The nominate subspecies is restricted to the Upper Guinean forest zone (**UPG**) and occurs in various types of forest (**MEF**). It seems to be rather widespread in Liberia with a few old and several recent records.

Triclema fasciatus subnitens (Bethune-Baker, 1903)

PLATE XC

The subspecies *T. fasciatus subnitens* is Guineo-Congolian (**EQU**) with uncertainties of its taxonomy and distribution (Libert 2010). It occurs in various types of forest (**MEF**). *T. fasciatus subnitens* is rather rare in Liberia, with a few old and recent records.

Triclema lamias lamias (Hewitson, [1878])

PLATE XC

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in all types of forest (**ALF**) and secondary growth, occasionally also in wooded savannah. It is widespread and not rare in Liberia, with several old and recent records.

Triclema melambrotus liberiana ssp. n.

PLATE XC

Triclema melambrotus is a Central African forest species, which occurs in wet forests. The Liberian population (**END**) belongs to an undescribed taxon ssp. *liberiana* (manuscript name), which was found only in the unique upland forests of the Putu Range (**UPF**).

Genus *Monile* Ungemach, 1932

Monile gemmifera maculata Libert, 2010

PLATE XCI

The subspecies *M. gemmifera maculata* is endemic to the Upper Guinean forest zone (**UPG**), ranging from Togo to Guinea. In Liberia, it is known only from a few male specimens collected in the Nimba Mountains. It might have sub-montane affinities (**UPF**), as most records in West Africa were found in hilly areas (Libert 2010).

Genus *Cupidopsis* Karsch, 1895

Cupidopsis cissus (Godart, [1824])

PLATE XCI

Pan-African species (**PAN**), which occurs mainly in various types of wooded savannah (**GUI**), also in secondary grasslands. It is known mainly from the coastal savannah land at Lake Piso, it was also recorded from Harbel by Fox *et al.* (1965) and most recently from the foothills of the Nimba Mountains.

Genus *Pseudonacaduba* Stempffer, 1943

Pseudonacaduba sichela (Wallengren, 1857)

PLATE XCI

Pan-African (**PAN**) ubiquitous (**UBQ**) species, which can occur in all types of habitats. It is widespread and not rare in Liberia, with several old and recent records.

Genus *Lampides* Hübner, [1819]

Lampides boeticus (Linnaeus, 1767)

PLATE XCI

Cosmopolitan (**COS**) and ubiquitous (**UBQ**) species, which in preferable season, could occur everywhere in Liberia. Hill-topping males were recorded in the Nimba Mountains, it is also known from the coastal area (e.g. Harbel, Lake Piso) with scattered old and recent records.

Genus *Uranothauma* Butler, 1895

Uranothauma falkensteini (Dewitz, 1879)

PLATE XCI

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and rather common in Liberia with many old and recent records.

Uranothauma belcastroi Larsen, 1997

PLATE XCI

The species is restricted to upland and submontane habitats (**UPF**) in the Loma Mountains, Fouta Djallon and the Nimba Mountains (**END**). It was recently recorded as new to Liberia in the East Nimba Nature Reserve, where it is not rare. Both males and females were actively flying in submontane forest and grassland mosaic in the Nimba Mountains above 1250 m, males were also observed intaking minerals from bird-drops and at water as low as 650-850 m.

Uranothauma cyara stactalla Karsch, 1895

PLATE XCI

The subspecies *U. cyara stactalla* is West African (**WAF**) and occurs in all types of forest (**ALF**). It is rather widespread and not rare in Liberia, with several old and recent records.

Genus *Cacyreus* Butler, 1898

Cacyreus lingeus (Stoll, 1782)

PLATE XCI

Pan-African forest species (**PAN**), which occurs in all types of forest (**ALF**). It is widespread and common in Liberia with a number of old and recent records.

Cacyreus audeoudi Stempffer, 1936

PLATE XCII

Guineo-Congolian forest species (**EQU**), which occurs in various forest types (**MEF**). It is usually rare and was known only from two old records in Liberia, until a small series of both sexes was collected in the Nimba Mountains in December 2017.

Genus *Leptotes* Scudder, 1876

Leptotes pirithous pirithous (Linnaeus, 1767)

PLATE XCII

The nominate subspecies is Pan-African (**PAN**), ubiquitous (**UBQ**), which can occur in all sorts of open habitats, also in forest glades or in clearings. It is known from a number of old and new records in Liberia. As other, almost identical species also occur in West Africa, multiple specimens have been sampled and identified from genitalia and/or COI gene barcodes with the help of Zdeňek Faltýnek Fric (pers. com.). All proved *L. pirithous*, which is not surprising, as all other species genuinely inhabit savannah habitats, at least in West Africa (Larsen 2005).

Genus *Tuxentius* Larsen, 1982

Tuxentius carana kontu (Karsch, 1893)

PLATE XCII

The subspecies *T. carana kontu* is West African (**WAF**) and occurs in all types of forest (**ALF**). It is widespread and rather common in Liberia with a number of old and recent records.

Genus *Zizeeria* Chapman, 1910

Zizeeria knysna (Trimen, 1862)

PLATE XCII

Cosmopolitan species (**COS**), which, outside of Africa is widely distributed in tropical areas of the Indo-Australian Region. It is found in all sorts of open habitats (**UBQ**), including savannah, arid and semi-arid grasslands, coastal sand dunes, clearings and farms in the forest zone, but also in parks and gardens in urban settlements. It avoids closed canopy forests. It is widespread and not rare in Liberia, with several old and recent records.

Genus *Zizina* Chapman, 1910

Zizina otis antanossa (Mabille, 1877)

PLATE XCII

The subspecies *Z. otis antanossa* is Pan-African (**PAN**), which inhabits savannah habitats (**GUI**), semi-arid and arid grasslands, occasionally secondary savannah. It has four records from Liberia, only two of these are recent.

Genus *Zizula* Chapman, 1910

Zizula hylax (Fabricius, 1775)

PLATE XCI

Pan-African species (**PAN**), which inhabits savannah habitats (**GUI**), semi-arid and arid grasslands, occasionally secondary savannah. It has only a few old and recent records from Liberia.

Genus *Azanus* Moore, [1881]

Azanus moriqua (Wallengren, 1857)

PLATE XCII

Pan-African savannah species (**PAN**), which inhabits savannah and other arid habitats (**SUD**), penetrating also the southern part of the Arabian Peninsula (Larsen 2005). The first specimens in Liberia were collected in a small secondary savannah patch in Yekepa town at the foothills of Nimba Mountains in May 2020.

Azanus mirza (Plötz, 1880)

PLATE XCII

Pan-African species (**PAN**), which is usually associated with forests and denser woodlands, including riverine gallery forests and could appear in other kinds of wooded habitat (**UBQ**). It is widespread and usually very common in Liberia, with many old and recent records.

Azanus isis (Drury, 1773)

PLATE XCIII

Guineo-Congolian forest species (**EQU**), which occurs in all types of forest (**ALF**). It is widespread and rather common in Liberia, with many old and recent records.

Genus *Eicochrysops* Bethune-Baker, 1924

Eicochrysops hippocrates (Fabricius, 1793)

PLATE XCIII

Pan-African forest species (**PAN**), which can occur in all sorts of forested and semi-open habitats, excluding extremely arid areas. It is also home in disturbed land and urban parklands

and gardens (**UBQ**). *E. hippocrates* is widespread and common in Liberia with many old and recent records.

Eicochrysops dudgeoni Riley, 1929

PLATE XCIII

The species inhabits savannah areas (**GUI**) in West Africa (**WAS**) and is usually very rare. The specimen caught by Jens Lund (pers. com.) was of surprise, but the coastal savannah habitats near the Lake Piso area seem suitable.

Genus *Euchrysops* Butler, 1900

Euchrysops albistriata greenwoodi d'Abrera, 1980

PLATE XCIII

The subspecies *E. albistriata greenwoodi* is West African (**WAS**), which is distributed in the savannah zone between Guinea and northern Nigeria (**GUI**). It only occasionally occurs in the forest zone. *E. albistriata greenwoodi* is known only from a few old records in Liberia (Fox *et al.* 1965), collected probably on drier grassy hills in the Lofa County.

Euchrysops malathana (Boisduval, 1833)

PLATE XCIII

Pan-African (**PAN**), ubiquitous (**UBQ**) species, which occurs in all sorts of open habitats, including savannah, arid and semi-arid grasslands, coastal sand dunes, also in clearings, road verges, farmland and even parklands in urban areas. It is widespread and very common in Liberia, with many old and several recent records.

Euchrysops osiris (Hopffer, 1855)

PLATE XCIII

Pan-African (**PAN**) savannah (**GUI**) species, which occurs both in wooded savannah and grasslands. It can appear also in secondary savannah grasslands in the forest zone, especially during dry season, when it tends to migrate. *E. osiris* is known from Liberia from a single old record without locality and a couple of specimens collected most recently in the Nimba Mountains (ENNR).

Genus *Lepidochrysops* Hedicke, 1923

Lepidochrysops parsimon (Fabricius, 1775)

PLATE XCIII

Western-Central African (**EQS**), savannah (**GUI**) species which occasionally occurs also in open habitats in the forest zone. It is known only from a few specimens in Liberia, captured in the residential area of Yekepa in the high dry season of 2012 and a single specimen found in farmland in the Wonegizi Mountains in 2019 (Sáfián *et al.* 2020c).

Lepidochrysops sychrematiza (Bethune-Baker, [1923])

PLATE XCIII

West African species (**WAS**), occurring between the Dahomey Gap and the western coast. It mostly inhabits Guinea savannah habitats (**GUI**) with rather good ecological tolerance. *L. sychrematiza* is a good coloniser and could therefore occur occasionally also in secondary savannah grasslands, clearings and along road verges in the forest zone. It is known from a few old Liberian records as well as recent ones from the Nimba area (Yekepa).

Genus *Thermoniphas* Karsch, 1895

Thermoniphas micylus (Cramer, 1780)

PLATE XCIV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread and rather common in Liberia, with many old and recent records.

Genus *Oboronia* Karsch, 1893

Oboronia punctatus (Dewitz, 1879)

PLATE XCIV

Guineo-Congolian species (**EQU**), which inhabits various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with several old and recent records.

Oboronia liberiana Stempffer, 1950

PLATE XCIV

Liberian subregion endemic species (**LIB**), which just penetrates Ghana in the south-west (Ankasa National Park). It inhabits wet to hyperwet lowland forests (**WEF**) (e.g. Sapo National Park) in Liberia but is usually local near its foodplants (*Costus* spp.) stands.

Oboronia guessfeldti (Dewitz, 1879)

NOT ILLUSTRATED

Guineo-Congolian forest species (**EQU**), which is centred on drier types of forest (**DRF**). It occasionally occurs also in riverine forest in the Guinea savannah zone. It is known only from a single old record (Fox *et al.* 1965), without locality. It is therefore excluded from the occurrence maps.

Oboronia ornata (Mabille, 1890)

PLATE XCIV

Guineo-Congolian species (**EQU**), which occurs in various types of forest (**MEF**). It is widespread and not rare in Liberia, with many old and recent records.

Genus *Myrina* Fabricius, 1807

Myrina silenus silenus (Fabricius, 1775)

PLATE XCIV

The nominate subspecies follows the equatorial savannah zone (**EQU**) and occurs in wooded savannah habitats (**GUI**), but could also appear in disturbed forest areas, wherever fig trees or shrubs (*Ficus* spp.) are present. From Liberia it is known only from a handful old and three recent records.

Myrina dermaptera subornata Lathy, 1903

PLATE XCIV

The subspecies *M. dermaptera subornata* occurs mostly in savannah country (**GUI**) in the northern savannah belt (**EQS**), occasionally penetrating into disturbed forest areas (Larsen 2005, Sáfián *et al.* 2009). It was also found in good quality lowland forest in Sierra Leone (Gola Forest) (Sáfián 2010), while a single female was collected in secondary forest in the Nimba Mountains (West Nimba) as new to Liberia.

Genus *Iolaus* Hübner, [1819]

Iolaus eurisus eurisus (Cramer, 1779)

PLATE XCIV

The nominate subspecies has Guineo-Congolian distribution (**EQU**), which occurs in all types of forest (**ALF**) and seems to be associated more open woodlands and younger secondary growth rather than closed canopy primary forest. It is widespread and common in Liberia and is known from many old and quite a few recent records.

Iolaus menas Druce, 1890

PLATE XCIV

Widely distributed (**EQS**) Guinea savannah species (**GUI**), which occurs also in the transition zone. It seems to penetrate the more open upland forests of the Nimba Mountains, where males were collected hill-topping in the ENNR (c. 1100 m asl.), a female was also caught there during dry season.

Iolaus iulus Hewitson, 1869

PLATE XCV

Guineo-Congolian forest species (**EQU**), which inhabits all types of forest (**ALF**). It occurs also in secondary growth and open woodlands in the forest zone, wherever mistletoe (Loranthaceae) infested trees appear. It is known from only a few localities in Liberia, but this is due to its usual *Iolaus* habits, as most species tend to stay in the canopy.

Iolaus alcibiades Kirby, 1871

PLATE XCV

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**) in good condition. It is probably not uncommon in Liberia, but is difficult to detect, as the adults usually stay in the canopy. The scattered Liberian records are mostly females, which were caught at ground level after eclosion, which indicates that the larva leave the host-tree of the mistletoe before pupation.

Iolaus liberiana Sáfián, 2017

PLATE XCV

Three males and a female, resembling *I. parasilanus* were captured in the Nimba Mountains (**LIB**) in the dry season in 2012 at mud in wet lowland forest (**WEF**). Strangely, in appearance, the female is more similar to the Central African subspecies spp. *mabillei* than the West African ssp. *maesseni* and was described as a new taxon by Sáfián (2017). Since its description doubts were raised that the species might be conspecific with *I. alexanderi* Warren-Gash, 2003 but a taxonomic revision is needed to clarify its status.

Iolaus paneperata Druce, 1890

PLATE XCV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**) in good condition. It is known only from two recent records in Liberia, both from the Nimba Mountains.

Iolaus lukabas Druce, 1890

PLATE XCV

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. It is very rare throughout its range, but is also very difficult to detect, as the adults usually stay in the canopy. *I. lukabas* is known only from four recent records in Liberia (Nimba Mountains, Lake Piso, Sapo National Park).

Iolaus mane Collins & Larsen, 2004

PLATE XCV

Upper Guinean endemic forest species (**UPG**), which is known only from a few localities in Ghana and Guinea. Although Larsen indicates wider distribution in West Africa between, all specimens were found in upland or submontane forest localities, including the one in the Nimba Mountains, Liberia (**UPF**).

Iolaus jadwigae Sáfián, 2017

PLATE XCV

A large male *Iolaus* (*Philiolaus*) was collected in the upland forest (**UPF**) of the Putu Range in December 2010 (Leg.: Erika Zakar), which could not be identified, and not even a closely

resembling species was found during the examination of the relevant literature and the extensive collection of the African Butterfly Research Institute in Nairobi. The species could prove endemic to the Putu Range (**END**) or to upland areas in the Liberian subregion.

Iolaus calisto (Westwood, 1851)

PLATE XCV

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), also in secondary growth. It is not rare, but difficult to detect, as the adults usually stay in the canopy. *I. calisto* is known only from a few recent records in Liberia (Nimba Mountains, Putu Range, Sapo National Park).

Iolaus laonides Aurivillius, 1898

PLATE XCVI

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. The species is very rare, but is also very difficult to detect, as the adults usually stay in the canopy. It is known only from two hilltops (Mount Jideh, Mount Beeton) in Liberia, where males were found displaying in the afternoon hours at about 15.00.

Iolaus timon timon (Fabricius, 1787)

PLATE XCVI

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It seems to be rare, but is also difficult to detect, as the adults usually stay in the canopy. *I. timon timon* is known only from a few recent records in Liberia (Putu Range, Nimba Mountains).

Iolaus scintillans Aurivillius, 1905

PLATE XCVI

The species is distributed across the northern Guinea savannah (**GUI**) belt from Senegal to Sudan (**EQS**) (Larsen 2005). Its occurrence in the Liberian Nimba Mountains is very surprising but other Guinea savannah species were also recently found there during the dry season as a potential influx (*Belenois aurota*, *Charaxes achaemenes atlantica*, *C. viola*, *Iolaus menas* with which *I. scintillans* co-occurs in the majority of its distribution. The single male specimen was collected during hill-topping at about 1100 m asl.

Iolaus moyambina (Stempffer & Bennett, 1959)

PLATE XCVI

Liberian subregion forest species (**LIB**), which occurs in wetter types of forest (**WEF**). It seems to be rare in Liberia, with only a couple of old and another two recent records.

Iolaus banco Stempffer, 1966

PLATE XCVI

Upper Guinean endemic forest species (**UPG**), which inhabits wetter types of forest (**WEF**) in good condition. Its presence in Liberia was confirmed by a female specimen recorded recently by Jens Lund from Robertsport, Lake Piso. Another specimen most probably belongs to this species – identified as *I. laon* by Stempffer & Bennett (1959) before the description of *I. banco* (Stempffer, 1966), repeated also in Fox *et al.* (1965) – was found near Monrovia.

Iolaus leonis (Staudinger, 1888)

PLATE XCVI

Liberian subregion endemic forest species (**LIB**), which is very rare throughout its range. It is known only from a single old record (near Monrovia) (**WEF**) in Liberia.

Iolaus pollux oberthueri (Riley, 1929)

PLATE XCVI

The subspecies *I. pollux oberthueri* is endemic to the Liberian subregion (**LIB**), where it occurs in wetter types of forest (**WEF**) in good condition. It is known only from a few recent records in Liberia, collected in Sapo National Park, the Nimba Mountains and near Lake Piso.

Iolaus longicauda haydoni Collins & Larsen, 2000

PLATE XCVI

The subspecies *I. longicauda haydoni* is endemic to the Liberian subregion (**LIB**), where it occurs in wetter types of forest (**WEF**) in good condition. So far, it is known only from a couple of recent records collected in lowland forest in the Nimba Mountains (Western Range) and near Lake Piso in Liberia.

Iolaus sappirus (Druce, 1902)

PLATE XCVII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It seems to be rather rare in Liberia, with only a single old and a few recent records.

Iolaus bellina bellina (Plötz, 1880)

PLATE XCVII

The nominate subspecies is West African (**WAF**), which occurs in various types of forest (**MEF**). It seems to be quite rare in Liberia, with only a couple of old and another two recent records.

Iolaus fontainei (Stempffer, 1956)

PLATE XCVII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is very rare in West Africa with only a few records from Ghana's Volta Region, and eastern Nigeria. Larsen (2005) doubted an old record from Sierra Leone, however the female collected in 2013 in the Nimba Mountains, seems to belong to this species. Further specimens were collected also in the Guinean Nimba, their taxonomic status needs further investigation.

Iolaus aethria Karsch, 1893

PLATE XCVII

West African forest species (**WAF**), which occurs in various types of forest (**MEF**), also in secondary growth. It is widespread but not common in Liberia, with only a few old and recent records.

Iolaus farquharsoni (Bethune-Baker, 1922)

PLATE XCVII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), including more open secondary growth. It is very rare in West Africa and was not previously known from the Liberian subregion, until the first male specimen was recorded from the Nimba Mountains (ENNR) in Liberia in September 2013.

Iolaus iasis iasis Hewitson, 1865

PLATE XCVII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia, with several old recent records.

Iolaus maesa (Hewitson, 1862)

PLATE XCVII

Guineo-Congolian forest species (**EQU**), which is found in various types of forest (**MEF**). It is difficult to detect, as both sexes tend to stay in the canopy of high forest. The species is known from two male specimens in Liberia, one was collected in degraded coastal forest near Lake Piso (Bomi), while the second one was found in the Western Nimba (Vanyanpah Camp, Gba Community Forest).

Genus *Etesiolaus* Stempffer & Bennett, 1959

Etesiolaus catori catori Bethune-Baker, 1904

PLATE XCVII

The nominate subspecies is Guineo-Congolian (**EQU**) and seems to be centred on drier types of forest (**DRF**), occurring also in forest-savannah transition. It was, for a long time, known only from two old records (Harbel) in Liberia. Recently, a series of males was collected near Lake

Piso (Bomi). They were displaying in the lower canopy layer along a forest track between 14.00 and 16.00 in degraded coastal forest.

Genus *Hypolycaena* Felder, 1862

Hypolycaena philippus philippus (Fabricius, 1793)

PLATE XCVIII

The nominate subspecies is Pan-African (**PAN**), which occurs mostly in drier habitats (**GUI**), such as savannah, shrubland, dry forests and occasionally open areas or even urban habitats in the forest zone. Most Liberian records are old, but it was found also recently in the Putu Range and in the coastal savannah near Lake Piso.

Hypolycaena liara liara Druce, 1890

PLATE XCVIII

The nominate subspecies is Guineo-Congolian (**EQU**) and inhabits wetter types of forest (**WEF**). It is quite widespread in Liberia, with several old and recent records.

Hypolycaena lebona lebona (Hewitson, 1865)

PLATE XCVIII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). Although there are many old records from Liberia, they cannot be trusted, as many of them would probably refer to two other species, which have not been described at the time of publication of Fox *et al.* (1965). The few recent records correspond with Larsen's (2005) observations, as the species is found only in forest in good condition and is not common.

Hypolycaena clenchi Larsen, 1997

PLATE XCVIII

Considering present knowledge, the species is restricted to the Upper Guinean forest zone (**UPG**), which can occur in wetter types of forest (**WEF**). It is a rather recently described species and probably some old records of *H. lebona* could refer to *H. clenchi*, but the material could not be checked. Based on the few recent records, the butterfly is widespread and probably not rare in Liberia.

Hypolycaena scintillans Stempffer, 1957

PLATE XCVIII

West African forest species (**WAF**), which can occur in all types of forest (**ALF**), also in secondary growth. Fox *et al.* (1965) did not seem to be aware of the description of another *Hypolycaena* during the preparation of their work, and no therefore old records of *H. scintillans* available from Liberia, although some of them might hide in old collection specimens, as from the recent records, *H. scintillans* seems to be the most widespread and commonest *Hypolycaena* in the country.

Hypolycaena dubia Aurivillius, 1895

PLATE XCVIII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**), also in secondary growth. The old Liberian records of the species cannot be trusted, as some definitely refer to the very similar *H. clenchi* was not described by the time of publication of Fox *et al.* (1965). There are also recent records, according to which, *H. dubia* is rather widespread and not rare in Liberia.

Hypolycaena kakumi Larsen, 1997

PLATE XCVIII

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**) in good condition. So far, it is known only from two recent records collected in the Gola National Forest and the Nimba Mountains in Liberia, but the species is probably more widespread.

Hypolycaena antifaunus antifaunus (Westwood, [1851])

PLATE XCVIII

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is rather widespread and not rare in Liberia with many old and recent records.

Hypolycaena hatita hatita Hewitson, 1865

PLATE XCIX

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is widespread and common in Liberia with many old and recent records.

Hypolycaena nigra Bethune-Baker, 1914

PLATE XCIX

Guineo-Congolian forest species (**EQU**), which occurs in wetter types of forest (**WEF**). It is widespread and not rare in Liberia with a few old and several recent records.

Genus *Dapidodigma* Karsch, 1895

Dapidodigma hymen (Fabricius, 1775)

PLATE XCIX

Guineo-Congolian forest species (**EQU**), which is found in all types of forest (**ALF**), including regenerating secondary growth. It is widespread in Liberia but is usually difficult to detect, as only females come down to near ground level and males stay up in the canopy. Quite a few males were actually recorded displaying on sunny spots in the canopy of individual trees in the buffer zone of Sapo National Park (Jawodee) late in the afternoon, after 17.00.

Dapidodigma demeter Clench, 1961

PLATE XCIX

West African forest species (**WAF**), which inhabits all types of forest (**ALF**), but is generally rare throughout its range. A single male specimen was caught as new to Liberia in the Nimba Mountains (ENNR) in September 2013, while another male was captured at light in the Wologizi Mountains in November 2017.

Genus *Oxylides* Hübner, [1819]

Oxylides faunus faunus (Drury, 1773)

PLATE XCIX

The nominal subspecies is West African (**WAF**), which inhabits all types of forest (**ALF**). It is widespread and common in forest and secondary growth throughout Liberia.

Genus *Deudorix* Doherty, 1886

Deudorix antalus (Hopffer, 1855)

PLATE XCIX

Pan-African (**PAN**) ubiquitous (**UBQ**) species, which is home in all types of dry habitats, including both wooded and grassy savannah, even semi-desert, but also in drier forest. The species can also occur in the forest zone, especially during the dry season. It is known from a number of old records, collected mostly near Harbel (Fox *et al.* 1965), and a few recent ones from the Putu Range and the Nimba Mountains in Liberia.

Deudorix lorisona lorisona (Hewitson, 1862)

PLATE XCIX

The nominate subspecies is widely distributed in the Guineo-Congolian forest zone (**EQU**) (apart from the extreme west), while other subspecies extend well into Eastern and Southern Africa. It occurs in all types of forest (**ALF**) and is widely distributed and not rare in Liberia.

Deudorix kayonza Stempffer, 1956

PLATE XCIX

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is rather rare in West Africa and the Upper Guinean populations might belong to a distinct, undescribed taxon (Larsen 2005, Libert 2005). It was found only in the Putu Range and the Nimba Mountains (ENNR) during the recent surveys.

Deudorix dinochares Grose-Smith, 1887

PLATE C

Pan-African (**PAN**) savannah (**GUI**) species, which was found hill-topping on a single occasion among other savannah-dwelling species in the Nimba Mountains during dry season in January 2017.

Deudorix odana odana Druce, 1887

PLATE C

The nominate subspecies is Guineo-Congolian (**EQU**) and occurs in various types of forest (**MEF**). It is probably rare, but also difficult to detect, as the adults usually stay in the canopy. *D. odana* is known only from a couple of recent records in Liberia (Sapo National Park, Nimba Mountains).

Deudorix galathea (Swainson, 1821)

PLATE C

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It is known from a good number of old records, collected probably at a single locality near Harbel, but the butterfly was found also during the recent surveys in both lowland and upland forest localities (e.g. Sapo National Park, Putu Range, Nimba Mountains).

Deudorix caliginosa Lathy, 1903

PLATE C

Guineo-Congolian forest species (**EQU**), which extends even further from the forest zone in the south-east to Malawi and Mozambique, Zimbabwe and Zambia. It is very rare in West Africa west of the Dahomey Gap, found in various types of forest (**MEF**) in Ghana and Ivory Coast in low numbers. It was found as new to Liberia from the Nimba Mountains, a few specimens were collected on the flowers of *Chromolaena odorata* at Coldwater in the East Nimba Nature Reserve in December 2013 and January 2014.

Genus *Hypomyrina* Druce, 1891

Hypomyrina mimetica Libert, 2004

PLATE C

Guineo-Congolian forest species (**EQU**), which inhabits various types of forest (**MEF**). It is widespread but not common in Liberia, with only a few recent records.

Hypomyrina nomion (Staudinger, 1891)

PLATE C

Guineo-Congolian forest species (**EQU**), which occurs mostly in drier types of forest (**DRF**) but can occur also in forest-savannah transition and wooded savannah habitats. In Liberia, the species is rare with two old records and single recently captured specimen.

Genus *Paradeudorix* Libert, 2004

Paradeudorix eleala viridis (Stempffer, 1964)

PLATE C

The subspecies *P. eleala viridis* is West African (**WAF**), which occurs in all types of forest (**ALF**). It is rather widespread and not rare with a couple of old and several recent records.

Paradeudorix petersi (Stempffer & Bennett, 1956)

PLATE C

The species was described from Liberia (Stempffer & Bennett 1956) and is known only from a handful of further specimens caught in wetter types of forest (**WEF**) in Ghana, Ivory Coast and Guinea (Larsen 2005), so it is probably endemic to the Upper Guinean forest zone (**UPG**). A copula was recently captured (including the first female) in Liberia by Harald Selb in the Nimba Mountains (Mount Bele, Blei Community Forest).

Genus *Pilodeudorix* Druce, 1891

Pilodeudorix camerona camerona (Plötz, 1880)

PLATE CI

The nominate subspecies is Guineo-Congolian (**EQU**) and inhabits various types of forest (**MEF**), including secondary growth and occasionally also riverine forests in savannah land. It is widespread and common in Liberia.

Pilodeudorix diyllus diyllus (Hewitson, [1878])

PLATE CI

The nominate subspecies is West African (**WAF**) and seems to be centred on drier types of forest (**DRF**). It is rather widespread but rare in Liberia with a single old and only a few recent records.

Pilodeudorix caerulea (Druce, 1890)

PLATE CI

Equatorial savannah species (**EQS**), which occurs mainly in wooded savannah habitats (**GUI**), also in drier forests and forest-savannah transition. It is known only from a few old records and two recent ones from the Nimba Mountains in Liberia.

Pilodeudorix zela (Hewitson, 1869)

PLATE CI

Guineo-Congolian forest species (**EQU**), with slightly broader distribution. It occurs in various types of forest (**MEF**). It is known from quite a few old records, centred on Harbel, but was also recently recorded from other localities (Lake Piso, Gola National Forest, Nimba Mountains).

Pilodeudorix catori (Bethune-Baker, 1903)

PLATE CI

West African forest species (**WAF**), which seems to be centred on drier types of forest (**DRF**). It was found only on a single occasion in the Nimba Mountains (Western Range) during an extreme dry season, when males came to drink from muddy soil among many other Theclinae.

Pilodeudorix mera mera (Hewitson, 1873)

PLATE CI

The nominate subspecies is Guineo-Congolian (**ECU**) and is widely distributed in Central Africa from eastern Nigeria to north-western Zambia but is very rare in West Africa, west of the Dahomey Gap with only a single record known from Mount Péko, Ivory Coast (Larsen 2005). Surprisingly, two male specimens were caught in upland forest (**UPF**) on the Elephant Ridge (880 m) in the Wologizi Mountains as the first records to Liberia by Gábor Simonics in November 2018 (Sáfián *et al.* 2020c). The males perched on a sun-lit leaf rather high on a hilltop in the afternoon between 14.00-15.00 (Simonics pers. com). The West African specimens might represent an undescribed taxon.

Pilodeudorix otraeda otraeda (Hewitson, 1863)

PLATE CI

The nominate subspecies is restricted to the Upper Guinean forest zone (**UPG**). It occurs in various types of forest (**MEF**) and is known only from a single record from the Putu Range in Liberia.

Pilodeudorix leonina (Bethune-Baker, 1904)

PLATE CI

The species is endemic to the Upper Guinean forest zone (**UPG**), including forests of the Volta Region in the Dahomey Gap. It occurs in wetter types of forest (**WEF**). *P. leonina* is rather widespread and not rare in Liberia, with no old, but several recent records.

Pilodeudorix mano Sáfián, 2015

PLATE CII

For the description only the unique holotype was known, which was captured in the afternoon hours in the upland forest zone in the Nimba Mountains (ENNR). Later, a series of specimens was collected in the same locality in December 2017, including the first female. The species was subsequently found also in the Wologizi Mountains in upland forest (**UPF**), also in Guinea (Nimba Mountains, Ziama Forest) in similar conditions and thus the species is probably endemic to the Guinea Highlands (**END**) (Sáfián 2020a, Sáfián *et al.* 2020c).

Pilodeudorix virgata (Druce, 1891)

PLATE CII

Upper Guinean forest species (**UPG**), which occurs in wetter types of forest (**WEF**). The recently described *P. virgatoides* Libert, Collins Sáfián, 2015 replaces *P. virgata* in Lower

Guinea and the Congolian forest zone. *P. virgata* is rather widespread but not common in Liberia with only a couple of old and a few recent records.

Pilodeudorix aucta (Karsch, 1895)

PLATE CII

West African forest species (**WAF**), which inhabits various types of forest (**MEF**). It was not known from Liberia previously, and only a single female specimen was recorded during the recent surveys from the Nimba Mountains (Gbarpa, West Nimba).

Pilodeudorix aurivilliusi (Stempffer, 1954)

PLATE CII

Upper Guinean endemic species (**UPG**), which also occurs in the forested areas of the Volta subregion. It inhabits various types of forest (**MEF**). In Liberia it is the commonest species in the *P. deritas*-group, with many old and new records.

Pilodeudorix intermedia Sáfián, 2015

PLATE CII

Considering present knowledge, the species is restricted to the mountainous areas in the Liberian subregion (**END**). It was recorded only from the upland rainforest zone of the Nimba Mountains (Mount Gangra) and the Putu Range (**UPF**). Male specimens hill-top before midday with *P. aurivilliusi*.

Pilodeudorix putu Sáfián, 2015

PLATE CII

Considering present knowledge, the species is restricted to the mountainous areas in the Liberian subregion (**END**), where it was recorded only from the upland rainforest zone of the Nimba Mountains (Mount Bele) and the Putu Range (**UPF**). Male specimens hill-top before midday with *P. aurivilliusi*.

Pilodeudorix kiellandi Congdon & Collins, 1998

PLATE CII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). The female specimen recently found in Eastern Sierra Leone (Gola Forest) (Sáfián 2012b) was captured on the edge of hyperwet secondary forest, while the few Liberian males were caught on the flowers of *Chromolaena odorata* growing along a track also in secondary forest. It is so far known from the Nimba Mountains (Coldwater) and from a single male specimen captured in the Wonegizi Mountains in Liberia (Sáfián *et al.* 2020c).

Pilodeudorix violetta (Aurivillius, 1897)

PLATE CII

Guineo-Congolian forest species (**EQU**), which occurs in various types of forest (**MEF**). It was known only from an old record from Kpain (Fox *et al.* 1956) but recent surveys found it more widespread in Liberia (Brattström 2010, Sáfián 2014a). *P. violetta* was recorded mainly in open secondary forest and forest edges.

4.2.4. Omissions from the checklist

The following species appeared in various publications as recorded from Liberia. Various evidence prove that they do not however occur in the country, in other cases taxonomic changes led to the omission of the species.

Pseudopontia paradoxa (Felder & Felder, 1869)

Mitter *et al.* (2011) established that the species *P. paradoxa* actually covered five genetically recognizable species and is replaced by *P. gola* in the Liberian subregion.

Mylothris sulphurea primulina Butler, 1897

Old records of *M. sulphurea primulina* certainly refer to males of *M. dimidiata*, which were misidentified by Fox *et al.* (1965).

Mimeresia cellularis (Kirby, 1890)

The species appears on the checklist of Sapo National Park (Brattström 2010). The specimen was a male *M. issia*, which strongly resembling *M. cellularis* (det.: Sáfián). The latter should be omitted from the checklist.

Liptena opaca (Kirby, 1890)

As Larsen (2005) points out, the specimen, identified as *L. opaca* is the holotype of the later described *L. submacula liberiana*. *L. opaca* is strictly Central-East African, distributed from eastern Nigeria to Uganda.

Liptena rochei Larsen & Warren-Gash, 2008

The western populations of *L. rochei* were recognised as distinct and were described as *L. bia* by Larsen & Warren-Gash (2008), which occurs west of the Dahomey Gap. *L. rochei* flies from the Volta Region eastwards and should not, therefore occur in Liberia.

Hypophytala hyetta (Hewitson, 1873)

The species was mentioned in Fox *et al.* (1965) as *H.* near *hyetta*. As *H. hyetta* is a Central African species, it should be omitted from the checklist. The female specimen probably belongs to the similar *H. hyettina* but without further proof, the latter species was not included in the checklist.

Stempfferia uniformis (Kirby, 1887)

The species was included in Fox *et al.* (1965) on the basis of two females (*Epitola uniformis*), collected by Naysmith (without locality) and Fox (Harbel). These records were not reported again in the *Epitola* s.l. revision (Libert 1999), Larsen (2005) also omitted these records. As the females of *S. uniformis* are very distinctive, it is rather improbable that the specimens were misidentified, but the name *S. uniformis* was also previously used for *S. leonina*, which was not recorded by Fox *et al.*, and the two records of *S. uniformis* could refer to the latter species. This could be found out only through the examination of Fox's specimen in the Carnegie Museum, but without confirmation *S. uniformis* is best omitted from the Liberia fauna.

Anthene mahota (Grose-Smith, 1887)

The species was recorded from Liberia by Fox *et al.* (1965), repeated by Larsen (2005). In the recent revision of African *Anthene* s.l. (Libert 2010), the species was moved to the genus *Neurellipes* and the Liberian-Sierra Leonean populations were separated from the Central African *N. mahota* under the name *Neurellipes gola* Libert, 2010.

Triclema hades (Bethune-Baker, 1910)

The species was recently synonymised with *T. phoenicis* by Libert (2010), *T. hades* is therefore removed from the checklist.

Oboronia pseudopunctatus (Strand, 1912)

The species occurs only east of the Ghana subregion and could not therefore be present in Liberia (Larsen 2005). Some females of *O. liberiana* could have been subject to misidentification.

Cymothoe caenis (Drury, 1773)

C. druryi was recently described as a West African vicariant of *C. caenis* (van Velzen & Larsen 2009), and the latter does not occur in Liberia.

Neptis biafra Ward, 1871

Although Fox *et al.* (1965) claim, their specimen collected in Wanau belongs to *N. biafra*, it is difficult to accept, as the species is known only from Cameroon with certainty. The specimen could easily have been a form of *N. paula*, which is not rare in Liberia, or a specimen of *N.*

camarensis, which was only found recently in Liberia (Richardson 2019). Until further material is collected, it is best treated as absent in Liberia.

Euphaedra mariachristinae Hecq & Joly, 2003

The species appears on the checklist of Sapo National Park (Brattström 2010). The specimen was checked by Sáfíán in the ABRI collection and it appeared to be a male *B. gausape*, a species generally similar to *E. mariachristinae*.

Borbo detecta (Trimen, 1893)

As Larsen (2005) points out, *B. detecta* is Eastern-Southern African and does not occur anywhere in West Africa. Specimens identified by Fox *et al.* (1965) most probably belong to *Torbenlarsenia perobscura*.

4.3. Ecology

4.3.1. Ecological composition of the butterflies of Liberia

The fact that Liberia lies entirely in the Upper Guinean forest zone, covering almost entirely the Liberian subregion is also well reflected in the butterfly fauna. About 86% of all species occurring in Liberia are associated with forest habitats (705 species) and only 8% are savannah dwellers (68 species). 4% of the species are ubiquitous (35 species) and could occur in all types of habitat, and 1% of the species (10 species) are insufficiently known to be safely associated with any specific habitat type (Figure 21). The proportion of forest species in Liberia is significantly higher than in Ghana (81%), despite the higher recorded richness of forest species (756 species), in the latter country, where savannah covers almost 60% of the land. The general butterfly diversity is also significantly lower in savannah habitats, containing only 14% (130 species) of all butterfly species in Ghana (Larsen 2006). Interestingly, the hyperwet lowland forests of the Gola Rainforest National Park, Sierra Leone have even higher proportion of forest species, containing 91% of all butterfly species. In the Gola Forest landscape, only 4% of all butterflies were found associated with savannah habitats reflecting the good condition and intactness of forests (Sáfián 2012b). The high proportion of butterflies associated with wet forests (WEF) in Liberia was predicted by the checklist of Fox *et al.* (1956), but the fact that WEF actually represent over one-third (36%) of all Liberian butterfly species is outstandingly high (Figure 22). This high proportion should be viewed in comparison with that in the Gola Rainforest National Park, which is situated entirely in the hyperwet-wet evergreen forest zone in the Liberian subregion. In Gola 20% of all species fall into WEF, while in the Wologizi Mountains in north-western Liberia and in the Ziama Forest in the neighbouring Guinea Forest Region 23% and 19% of all recorded butterflies were found associated with wet forest, respectively (Sáfián *et al.* 2020c). In Ghana, 26% of the butterfly fauna is centred on wetter forests, and this is already enriched by the few Liberian subregion elements, which occur only in the wettest south-western, western part of the country or in the upland forest of the Atewa Range (e.g. *Ceratrachia crowleyi*, *Euriphene veronica*, *Euptera dorothea warrengashi*). It is generally known that species associated with wet forests have a narrow ecological tolerance and their high proportion in the Liberian fauna could reflect either or both the intactness of the forest habitats and climatic conditions in the Liberian subregion, which is generally wetter compared to the neighbouring biogeographical subregions.

Various genera of skippers which are known to occur in the undisturbed interior of forest habitats fall almost entirely in WEF. They are usually also good indicators of habitat quality (e.g. genera *Ortholexis*, *Leona*, *Caenides*) (Larsen 2005). Sáfián *et al.* (2010) shown that the proportion of WEF elements in fruit-feeding butterflies is significantly higher in intact forest than in secondary growth or other degraded forest habitats, whereas higher proportion of ALF could indicate degraded forest habitats.

Actually, the low proportion of Sudan savannah species (SUD) also supports the generally wetter climate, as these species are usually not good colonisers, and those recorded in Liberia are

amongst the few known to have good dispersal abilities and migratory tendencies (e.g. *Belenois aurota*, *Anthene amarah*, *Junonia orithya madagascarensis*).

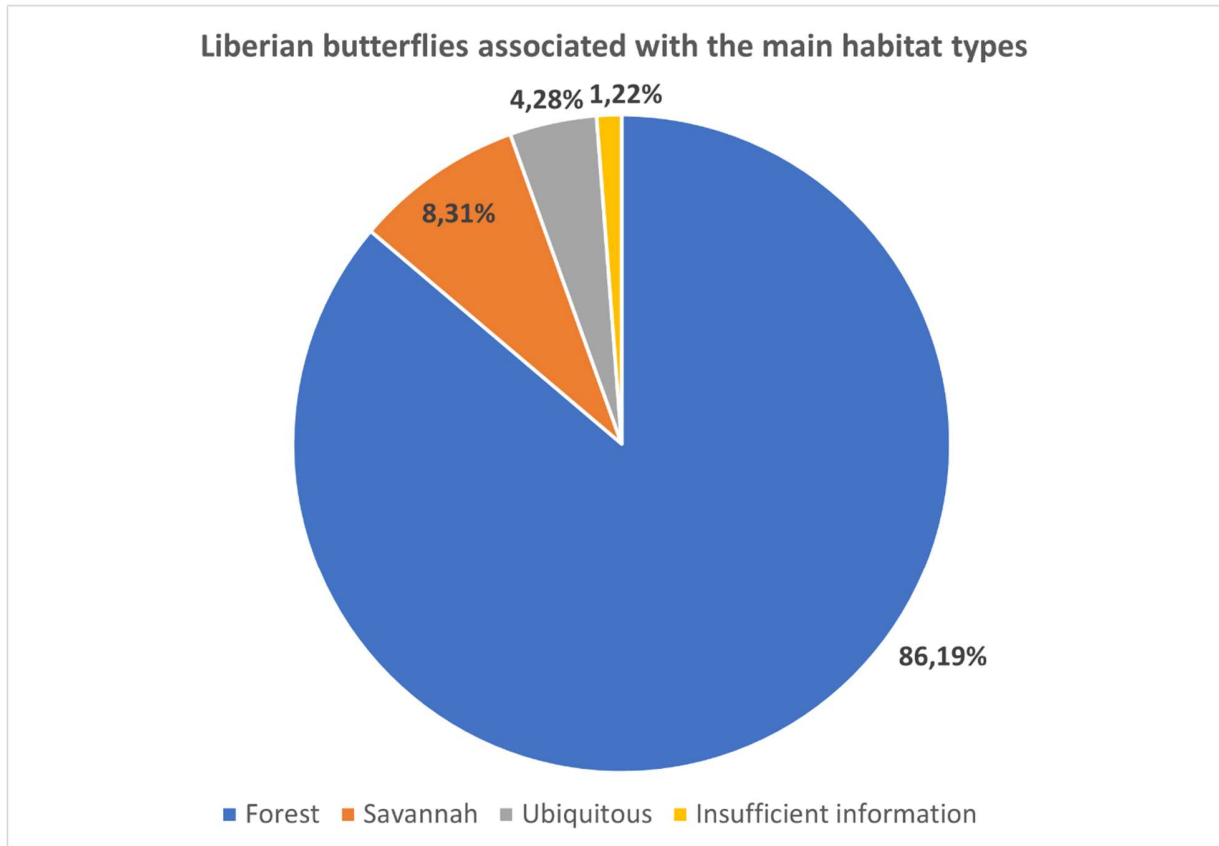


Figure 21. Liberian butterflies associated with the main habitat types.

MEF represent one-quarter of all Liberian taxa, while the proportion forest species with wider ecological tolerance (ALF) is 5% lower (155 species). The low proportion of dry forest species (DRF) further emphasizes the significance of WEF, reaching just over 3% (28 species) of all Liberian butterfly taxa. Even Guinea savannah butterflies (GUI) contains more taxa (61 species, 7%), but DRF are usually of narrow tolerance occurring only in the northern forest zone and in the forest-savannah transition, which just approaches Liberia in the north and northwest (Nimba and Lofa Counties). Actually, many DRF were only recently recorded from the Nimba Mountains (*Aslauga guineensis*, *Pilodeudorix diyllus*, *Liptena ferrymani bigoti*, *Telchinia acerata*, *Abantis elegantula*, where some of them shown extreme abundance during the dry season (e.g. *Bicyclus mandanes*, *B. funebris*). Dry forest elements also occur along the coastline, where coastal forests, swamp forests and coastal savannah once formed a mosaic-type landscape of which now only small remnants exist in natural condition. Still, quite a few butterflies were recorded only from the coast (e.g. *Eresina saundersi*, *Euptera zowa*, *Pyrrhiades lucagus*) (Figure 22).

In Ghana, the upland elements found only in the Atewa Range and/or Tano Ofin Forest Reserve were all included in WEF in the analysis (*Mylothris atewa*, *Acraea kraka*, *Abantis ja usheri*) by

Larsen (2006). For more accurate specification, these – usually restricted range species – associated with upland evergreen forest and other altitude forest habitats, a new group, upland forest species (UPF) was erected, first published in Sáfián *et al.* (2020c) to better emphasize their ecological significance. They form a small, but ecologically very interesting group in Liberia, especially as the various mountain ranges within the Guinean Highlands harbour the highest number of endemic taxa, and virtually all narrowly endemic butterflies are restricted to these mountains (see chapter 4.4.1 for details). The group contains 29 taxa, and many of these were found only very recently (e.g. *Liptena neiltennanti*, *Cephetola praecox*, *C. wologizi*, *Stempfferia katikae*, *Pilodudorix mano*), showing both the peculiarity of these upland and submontane forest habitats, but also how under-recorded the mountains of Liberia and in a broader context the Guinea Highlands are (Figure 22).

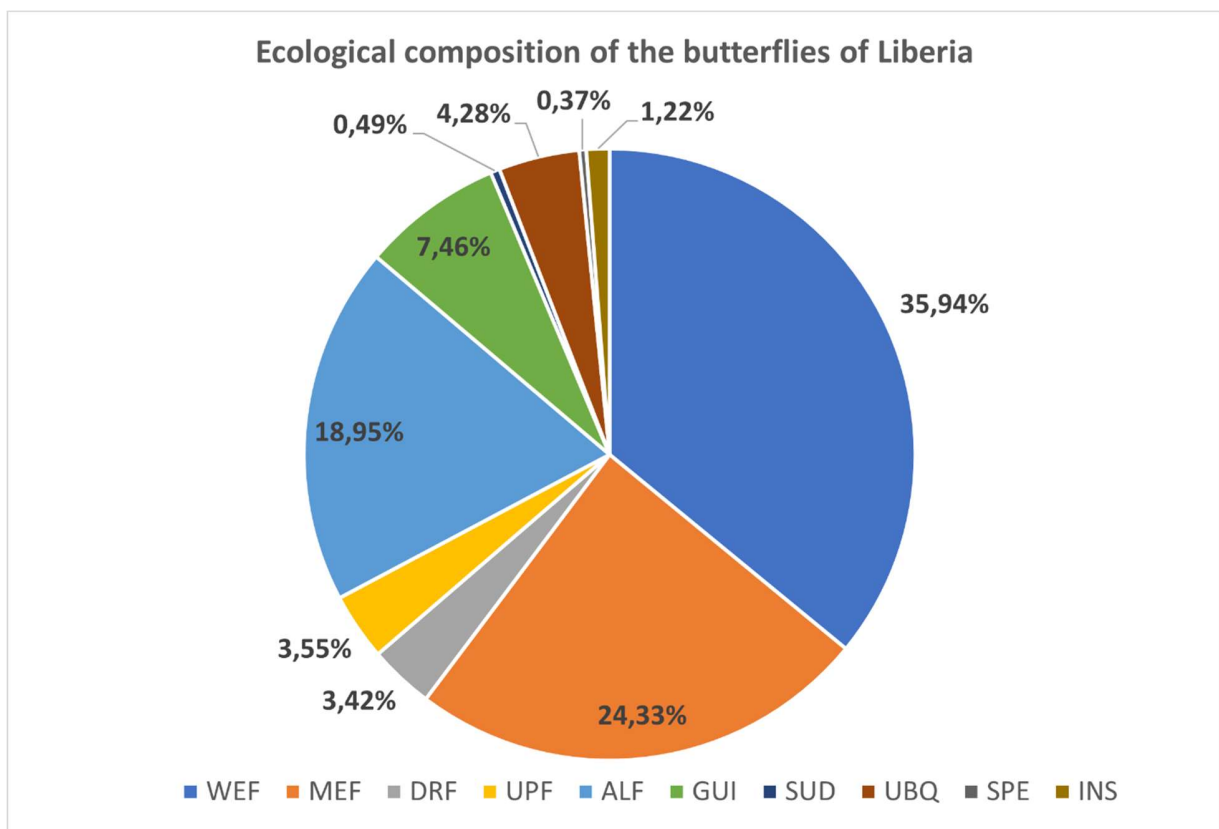


Figure 22. Ecological composition of the butterflies of Liberia, based on Larsen (2006).

Although almost 100 butterfly species are known to be associated with Guinea savannah (GUI) in West Africa (Larsen 2005), only slightly more than half of them (61 species) were recorded from Liberia, accounting for 7% of all butterfly species (Figure 22). Even the majority of these are of wide ecological tolerance with good dispersal abilities, and they regularly occur in degraded, open habitats in the forest zone (*Graphium angolanus baronis*, *Axiocerses harpax*, *Cupidopsis cissus*, *Amauris niavius*, *Charaxes varanes vologeses*, *Precis octavia*, *Telchinia serena*, *Hamanumida daedalus*, *Pardaleodes incerta*). Other savannah species were found only in the extreme northern part of Nimba County, where savannah-dwelling species can disperse

southwards into Liberia during high dry season (*Junonia chorimene*, *Triclema nigeriae*, *Azanus moriqua*), or through influxes supported by northerly wind during Harmattan season (*Larsenia gemella*, *Charaxes achaemenes atlantica*, *Charaxes viola*, *Belenois aurota*). Other savannah species probably have permanent populations in the coastal savannah occurring in localized colonises (*Lachnocnema emperamus*, *L. vuattouxi*, *Eicochrysops dudgeoni*). *Ypthima impura* seems to be genuinely established in the secondary savannah grasslands in the submontane zone of the Nimba Mountains.

The proportion of ubiquitous (UBQ) species is generally low, counting 35 species in Liberia (Figure 22), but this number elsewhere in Africa is relatively constant, as Larsen (2005) lists the same number of ubiquitous species from entire West Africa, all of them were also recorded from Liberia (e.g. *Papilio demodocus*, *P. nireus*, *Colotis euipe*, *Appias epaphia*, *Euchrysops malathana*, *Azanus mirza*, *Danaus chrysippus*, *Melanitis leda*, *Ypthima doleta*, *Vanessa cardui*, *Junonia oenone*, *Hypolimnas misippus*, *Telchinia serena*, *Coeliades forestan*, *Pelopidas mathias*).

4.4. Endemism and Biogeography

4.4.1. Endemism

Upper Guinean endemics

The Upper Guinean forest zone stretches from the isolated outlier forest areas of Basse Casamance in southern Senegal and Guinea Bissau across Guinea, Sierra Leone, Liberia, Ivory Coast, to eastern Ghana. Despite obvious affinities with the Upper Guinean forests and overlap with the Upper Guinean forest butterfly fauna, the disjunct forests in the Volta subregion (already inside the Dahomey Gap) should already be excluded, using River (Lake) Volta as the eastern boundary of the Upper Guinean forests. This large forest block once covered approximately 60 million hectares with rainforest, and along with the Lower Guinean forest zone it is treated as one of the World's 25 biodiversity hotspots (Myers *et al.* 2000).

According to Larsen (2005, 2006), updated by Sáfián (present work), 128 forest butterfly taxa (including subspecies) are distributed in West Africa, west of the Dahomey Gap, thus endemic to the Upper Guinean forest zone with a few extending also into the forests in the Volta subregion (also referred to as Togo Mountains) (e.g. *Euphaedra eupalus*), excluding all savannah-dwelling species, as well as those limited more narrowly to the Liberian subregion. These taxa are often distributed throughout the Upper Guinean forests and are, in many cases, common (e.g. *Cymothoe mabillei*, *Larinopoda eurema*, *Falcuna leonensis*), as their distribution within the forest zone is not limited by micro-ecological factors but rather by major geological features, such as the River Volta, the Togo Mountains, or the climatic zonation on their northern or eastern limits. Others are more restricted to their preferred habitat types due to special ecological requirements and/or occurrences of larval foodplants: most Upper Guinean taxa of *Mimeresia* are rather rare and local, occurring mainly around *Crematogaster*-infested "ant-trees". The widespread *Bebearia arcadius* is usually very rare in Ghana and could be found more commonly in wetter types of evergreen rainforests, whereas it becomes one of the commoner species in the generally wetter Liberian subregion. This also applies to various other Adoliadini, such as *B. osyris*, *Euphaedra gausape* or *E. minuta*. Only a few species among those limited to the Upper Guinean forest zone are generally very rare and their distribution is patchy throughout their range. The large and colourful, and therefore unmistakable *Bebearia ashantina* and *Euphaedra eusemoides* are very rarely recorded everywhere in West Africa, and their records do not depend only on personal observations, since they appear very rarely also in fruit-baited traps. Other species are probably only rarely recorded due to their obscure behaviour. Although seem to be widely distributed in the Upper Guinean forests, only a few records of *Pseudaletis richardi* and *P. jolyana* are known, mainly for their habits to stay in the canopy level. Almost all records of *P. jolyana* actually come from light traps, when one or more specimens (including the only record from Liberia) were attracted to artificial light sources. The Upper Guinean forest zone endemic butterfly taxa are listed in Appendix 1.

Liberian subregion endemics

The Liberian subregion also referred to as the Liberian forest region is a poorly defined biogeographical subunit, which deserves better recognition for its outstanding biological diversity and also for the high rate of endemism. One of the best-known Liberian subregion endemics is Pygmy Hippopotamus – *Choeropsis liberiensis*, which is distributed in the Forest Region of Guinea, eastern Sierra Leone, Liberia and western Ivory Coast. The distribution of Jentink's duiker – *Cephalophus jentinki* is also centred on Liberia's wet and hyperwet lowland forests (www.iucnredlist.org). The distribution of these species actually rather accurately delineates the boundaries of the Liberian subregion, coinciding roughly with the boundary-zone of the isohyetal boundary line of the wet rainforest area. However, the exact historic boundary of the region cannot be drawn, as the natural habitats in central and eastern Ivory Coast and in central Sierra Leone have mostly been destroyed before the emergence of classical natural history research. It is generally agreed that the region covers the land between the Sassandra River in the east, the existing lowland forests of eastern Sierra Leone, including also the Tingi and Loma Mountains and the lowland forests in eastern Guinea and north-western Ivory Coast, including the entire Nimba Mountains. It is argued whether a disjunct, narrow coastal area in eastern Ivory Coast and southwestern Ghana could belong also to the Liberian subregion (see chapter 4.4.3). The ness of Cape Three Points here reaches further south into the Atlantic Ocean and for this reason the area receives much higher annual precipitation than the land further inland. Quite a few butterfly taxa, recognized as Liberian subregion endemics (e.g. *Euriphene veronica*, *Euptera dorothea warrengashi*, *Ceratruchia crowleyi*) have their eastern boundary of distribution in this area, occurring in the remaining wet evergreen forests of Ankasa National Park or the Cape Three Points Forest Reserve in south-western Ghana. Recently, disjunct occurrences of Liberian subregion butterflies were discovered in the unique upland forests of Atewa (e.g. *Andronymus fenestra*). Atewa hosts far the highest butterfly diversity in the entire Ghana subregion and could be considered as a microrefugium for its endemic species and potentially for surviving of the Liberian subregion faunal elements.

So far, 58 butterfly taxa are considered to be endemic to the Liberian subregion. These exclude those narrowly endemic upland and sub-montane specialists, which might not occur outside of the higher mountainous areas of the Guinea Highlands e.g. the Nimba Mountains and the surrounding country (Nimba endemics) or the upland forest zone of the Putu Range and other mountain ranges. The Liberian subregion endemics usually inhabit wet to hyperwet lowland evergreen rainforest habitats, as they are either ecologically connected to wet conditions (e.g. moisture is essential for survival in the pupal stage) or their larval foodplant occurs exclusively in these rainforests (e.g. *Pseudopontia gola*). Many species could be considered widespread and locally or seasonally common in Liberia, at least in the centre area of their distribution. They could become much rarer towards the edge of their ecological niche even within the Liberian subregion, while some could even be missing from potential habitats. A good example is

Pseudopontia gola, which is widely distributed in the hyperwet lowland forests of the Liberian subregion but it does not occur further north in the forests of the Nimba Mountains, not even in the lowland forests at the foothills of Nimba, as its larval foodplant, *Urobotrya congolana afzelii* is absent in the area (Jongkind pers. com.). Both *Euriphene veronica* and *Ceratrachia crowleyi* are common and widespread in the Liberian subregion, reoccurring also in the wet evergreen forests of western Ghana (Larsen 2005). They are obviously limited by the boundaries of the vegetation (precipitation) zones, being ecologically more tolerant or more mobile than *P. gola*, as the latter is replaced by the genetically rather distant *P. paradoxa* in Ghana's western wet forests (Mitter *et al.* 2011), utilizing the same larval foodplant. Other Liberian subregion endemics are rare, or just obscure, as they inhabit the dark undergrowth of rainforests, which they seldom leave. However, some of these species have been discovered as regular hill-toppers, and were subsequently recorded from hilltops during their display (e.g. *Euriphene lomaensis*). A few species are definitely very local, especially Lycaenids, which are associated with ants. Two species in the subfamily Poritiinae of Lycaenidae have recently been discovered and described: *Parasiomera alfa*, *Geritola pacifica*, and both of them belong to groups, which develop in association with arboreal *Crematogaster* ants. These usually form local colonies on and around sized ant-infested trees, where the larvae feed among the ants, and the adults rarely fly away from their ant-tree. Males usually display in a favourable nearby locality, while females are very sedentary, sitting on dry twigs around the tree for most of the day, and could only be seen flying when they investigate the tree-trunks, or branches to lay eggs among the ant workers. Both *P. alfa* and *G. pacifica* have so-called sister species, probably of common origin in Central Africa, (*P. paradoxa* and *G. nitidica*). They are found in real biogeographical allopatry, as neither of them occur in the intervening area. Other Liberian subregion endemics also have close relatives in central Africa, forming allopatric species pairs between West and Central Africa: *Gorgyra ziama* (west) – *G. kalinzu* (central-eastern), *Neurellipes gola* (west) – *N. mahota* (western-central), *N. georgiadisi* (west) – *N. rhoko* (western-central), *Andronymus fenestra* (west) – *A. fenestrella* (central-eastern). Others were recognised as a distant geographic form of a Central African species and were described a subspecies limited to the Liberian subregion: *Iolaus pollux oberthueri*, *I. longicauda haydoni*. However, their taxonomic status might need revision, as due to long isolation they might prove genetically more distinct, than their actual morphological appearance. The Liberian subregion endemic butterfly taxa are listed in Appendix 1.

Narrowly endemic species

Presently, three areas are identified to host narrowly endemic species in Liberia, due to their unique ecological conditions. The consistency of these conditions allowed survival of various species, which were probably more widely distributed, but their range has shrunk due to macroclimatic changes and habitat shifts. This isolation could have led also to the speciation of ecologically specialised, distinct taxa during the glacial periods.

The upland zone of the Putu Range is unique, as the mountain range faces the wet air masses, which frequently arrive from southwest, forming the north-western boundary line of the wet-evergreen forests in Liberia. Sapo National Park at the southern piedmonts of Putu receive significantly higher rainfall than other parts of the region, and regular rainfall even during the dry season is a well-known phenomenon among local inhabitants. The upland forests of Putu receive similarly high precipitation, and the main ridge of Mount Jideh usually stays in clouds for several hours throughout the year above 650 m probably except during the strongest waves of Harmattan wind. These permanently moist conditions probably persisted during the various dry (glacial) periods, and forest species could migrate also along the elevational gradient during the climatic changes between those periods. The Putu Range is best considered as a microrefugia as described by Rull (2010) or Dobrowski (2011) for butterflies, defined by the outstanding local diversity, the presence of strongly isolated populations of West African upland forest specialists, and three possibly narrowly endemic taxa.

Liptena neiltennanti: its closest relative, *L. batesana* is widely distributed in the Congolian forest zone, occurring in wet lowland forests. Surprisingly, it is replaced in the Kivu area of the DRC and in Uganda, east of the Albertine Rift by a species, which is very similar in appearance, but with completely different male genitalia (Sáfián in prep.). Both the Kivu and the Ugandan populations occur in mid-elevation to sub-montane forests, differing ecologically from the lowland *L. batesana*. As known only from a single female specimen, it is not yet known, if *L. cf. batesana* will fall nearer to *L. batesana* than its eastern African relatives, but it seems highly probable that it will prove endemic to the upland forests of Putu, being in complete isolation with no closely related species occurring in West Africa.

Pilodeudorix putu is clearly very closely related to the Upper Guinean forest zone endemic *P. aurivilliusi*, although its specific status is in no question (Sáfián *et al.* 2015). It was recorded only from the upland zone of the Putu Range, and in a single specimen, on the ridgeline of Mount Bele (Blei), the southernmost peak of the Nimba Mountains, which is also covered with upland forest. The known occurrences of *P. putu* indicate upland affinities, and it is therefore possible that the species is restricted to upland forests in the Liberian subregion, which are basically limited to a few localities.

Iolaus jadvigae, known only from the unique holotype collected on the highest ridge of the Putu Range appears to have no close relatives in West Africa or anywhere else (Sáfián 2017).

Two further taxa recorded in the Putu Range are obviously confined to upland forests. Although they are not restricted to Putu, occurring also in Ghana's upland forests (Atewa Range, Tano Ofin Forest Reserve); they are narrowly endemic to their ecological niche, even across biogeographic boundaries (they could also be considered as Upper Guinean endemics with narrow ecological tolerance depending on approach). *Abantis ja usheri* is currently recognized as restricted-range subspecies of species with wider Central African distribution, re-appearing only in the isolated patches of upland forests west of the Dahomey Gap (Larsen 2005).

The other mountain refugium recognized in the Liberia subregion is the Nimba Mountains, which is well known for its endemic fauna, such as Liberian Nimba Toad (*Nimbaphrynoides liberiensis*), Nimba Otter Shrew (*Micropotamogale lamottei*) (Coe & Curry-Lindahl 1965, Colston & Curry-Lindahl 1986, Sandberger *et al.* 2010, Granier & Martinez 2011), also an endemic insectivorous bat (*Hipposideros lamottei*) (Monadjem *et al.* 2016) and catfish species (*Chiloglanis tweddlei* and *Ch. lamottei*) (Schmidt *et al.* 2017). The high number of endemic butterflies in the Nimba area (including the higher mountains in Guinea and Ivory Coast) is outstanding compared to all other areas in West Africa with 14 taxa (including both species and subspecies) (Larsen 2005, Sáfián 2015a, 2015b, 2018, Sáfián & Takano 2019, Sáfián *et al.* 2015, 2020a). Interestingly, not all species are restricted to the upland and/or submontane zone of the Nimba Mountains. Some are more widely distributed in the lowland forests at the foothills and the surrounding hilly country. These species are probably more mobile and could move along the elevation gradient with the natural disappearance of forests in the lowlands during drier periods. Still, these species did not disperse widely into the extensive lowland areas within the Liberian subregion after the expansion of forest, when ecological conditions became favourable: *Hypolimnas aubergeri*, *Euphaedra aubergeri*. However, other species are very local and are probably genuinely limited to their respective elevational zone. The upland forest species are probably restricted to a narrow zone between 650 m and 1100 m, especially on the lower isolated mountains of the Western Range, each of which peaks at about 1000 m asl. (e.g. Mount Gangra, Mount Bele). The summit and/or the ridge of these mountains are covered with upland forest, which harbours a considerable number of narrowly endemic species. They are associated with this unique habitat type, and in some cases no closely related species occur in West Africa, and they have relatives only in Central or Central-East Africa: e.g. *Cephetola wingae*, *C. wologizi*, *Stempfferia katikae*, *Pilodeudorix mano*.

Some of these sub-montane endemics do not even occur in the relatively low Western Nimba Range.

Vanessula milca angustifascia, a very distinctive local subspecies of a widely distributed Guineo-Congolian forest species appears as low as 600 m east of the main Nimba mountain range and could be locally abundant during rainy season above 900 m to the treeline at about 1300 m asl. It disappears from or becomes very rare at lower elevations, appearing locally near streams only above 1200 m during peak of the dry season. Interestingly, *V. milca angustifascia* has never been recorded in the mountains of the Western Nimba Range (West Nimba), which are found only about 10 km west of the main Nimba mountain range. More interestingly, already the nominate subspecies is found approximately 100 km east of the Nimba Mountains on Mount Tonkoui (1000-1100 m) in Ivory Coast (Patrick Boireau pers. com.) and also in the Zياما Massif (850 m), approximately 120 km west of the Nimba Mountains in Guinea (Sáfián 2019) Note: Moretto *et al.* (2021) list *V. milca angustifascia* from Mount Tonkoui, illustrating a specimen, which morphologically looks like a transition between the nominate subspecies and ssp. *angustifascia*.

Uranothauma belcastroi, another endemic species to the submontane zone of the Guinea Highlands including the Loma Mountains (Sierra Leone), the Nimba Mountains (Guinea, Ivory Coast, Liberia) and Mount Tonkoui (Ivory Coast) shows similar distribution pattern in the Nimba Mountains. Male specimens could be seen as low as 650 m during the dry season at water, but they are more common in the submontane zone above 1200 m and the species was never found in the Western Range, despite extensive research (Boireau 2009, Sáfián & Larsen 2012, Sáfián 2014a). Similarly to *V. milca*, two *Euphaedra* species are also represented in the Nimba Mountains by an endemic subspecies: *E. cyparissa nimba* and *E. sarcoptera ferrea* (Pyrzcz *et al.* 2013). Both species are widely distributed in the Guineo-Congolian forest zone and they are also represented in Liberia's lowland forests by their nominate subspecies.

The status of *Bettonula bettoni nimba* is still unclear, as it is known only from a few specimens, collected on the Ivorian side of the Nimba Mountains, also in the Ziama Forest in Guinea and most recently in the upland zone of the Wologizi Mountains. The nominate subspecies occurs in the submontane zone in the Gulf of Guinea Highlands (as the nearest occurrence), usually not below 1500 m, but it changes habitat preference further east, becoming more widely distributed in the Congo Basin (Larsen 2005).

Similar ecological conditions exist locally in other mountainous areas in Liberia, such as the Wologizi Mountains, which seem to share character with the upland forest zone of the Nimba Mountains. A number of species previously recorded only from the Nimba Mountains and the wider Nimba area were also found more recently in Wologizi, including *Bettonula bettoni nimba*, *Hypolimnias aubergeri*, *Euphaedra aubergeri*, *Cephatola wingae*, *Aphnaeus nimbaensis*, *Pilodeudorix mano*. Two further restricted-range species were also recorded, the newly described *Cephatola wologizi* Sáfián, 2020 and *Mylothris melita* Belcastro & Warren-Gash, 2020. The Wologizi Mountains with the Wonegizi Mountains further north and the adjacent Ziama Massif (where further upland/submontane species, such as *Uranothauma belcastroi* and *Mylothris boireau* were recorded) in Guinea's Forest Region certainly constitute another centre of endemism for upland butterflies within the Liberian subregion (Sáfián *et al.* 2020c). The narrowly endemic butterfly taxa are listed in Appendix 1.

4.4.2. Biogeography

The biogeographical pattern of butterflies in Liberia was formed by various factors, mainly by the history of climate in correspondence with the available habitat types, but also on the dispersal and colonisation ability of species and their susceptibility to speciation due to changing environment. The climate changes in the most recent time during and between the glacial periods (approximately between 35 000 and 7 000 years before present) was probably the main moving force of speciation as there are evidences that rainforests almost completely disappeared from West Africa during the last glacial maximum, restricted only to a couple of macro- (Liberian, Gold Coast) and several micro-refugia (e.g. Nimba Mountains). Forest could later re-occupy vast areas reaching present day's forest maximum (see above and Chapman 1983, Larsen 2005). The

biogeographical pattern supports the theory that many formerly widespread forest species with distribution all over the Guineo-Congolian (equatorial) forests went extinct in Upper Guinea or their long term isolation led to the evolution of distinct subspecies or species, which are now treated as Upper Guinean endemics, but many of them have more restricted distribution, depending the level of their speciation.

Biogeographical pattern and classification

Cosmopolitan species (COS). The African continent hosts relatively few truly cosmopolitan species (8 species, 1%), although none of them were actually resident in the Neotropical Region before the accidental introduction of *Hypolimnas misippus* to the New World. Originally, *H. misippus* is widely distributed in the Afrotropical and the Indo-Australian Regions, largely missing from the temperate zone of the Palaeartic, while *Vanessa cardui* is also present in Europe and the temperate Asia due to its migratory tendencies. Both of them are present also in Liberia, but only *H. misippus* is actually constantly common and widespread in the country as *V. cardui* was recorded only from the Nimba Mountains, where it might occur as a regular coloniser during the dry season.

Pan-African species (PAN). The relatively low proportion of Pan-African species (61 species, 7.5%) in Liberia could be explained by climatic factors, as the majority of the widely distributed African species favour drier and more open types of habitats, whereas entire Liberia lies entirely in the forest zone, with extensive and relatively intact forest areas, high annual precipitation and fairly short dry season (which prevents influxes of species from the drier zones). Even if recorded, pan-African species are rather rare or local in Liberia and could establish colonies only for shorter periods of time, when an ecological niche or a human-created secondary habitat becomes temporarily available. The few records of *Pelopidas mathias* and *P. thrax* clearly show this pattern, both species are usually very common in open habitats all over Africa (including the forest zone), but they probably avoid the wettest parts of the equatorial forest zone, including Liberia. *Graphium angolanus baronis* is usually found everywhere in West Africa (Larsen 2005) but was not found during the extensive research by Fox *et al.* (1965) and the first specimen was recorded from the country only in 2010. The species is probably not present in the country permanently but has the ability to disperse into the forest zone during dry season, following probably the man-created open corridors along roads and railways. In Fox's time these corridors were still non-existent or much narrower, as neither deforestation nor the establishment of large agricultural areas around town and settlements happened by their time. Many other pan-African species could become widespread on the continent due to their ability to breed in a wide range of habitats, or adaptation to various ecological conditions. They could be found also in various degraded habitat types, still, some of them could not cope climatic extremes, such as the high precipitation in Liberia, and they remain relatively rare even if they continuously breed. *Leptotes pirithous*, *Zizeeria knysna* are among the rarer species, while *Azanius mirza* could be commoner

even in forest areas. Forest-dwelling species pan-African species are generally widely distributed and often common in Liberia. *Graphium policeses* occurs basically all over the country and breeds throughout the year, being among the commonest species in Liberia.

Guineo-Congolian or Equatorial forest species (EQU). Not surprisingly, widely distributed forest species take up more than 45% (372 taxa) of all butterfly taxa in Liberia (Figure 23). They are usually distributed from Basse Casamance in southern Senegal through the Guinean forests across the Congo basin with no, or little geographical variation. Rather a few of them are represented in the eastern part of the Congo basin by a different subspecies. Some also occur in the outlier forests of the Horn of Africa or the mid-elevation and montane forests of East Africa. Guineo-Congolian species could occur across various types of forest, but they could also be specialised on selected micro-habitats or foodplants. Many strong-flying and less habitat-restricted butterflies fall in this group, including many *Papilio*, *Graphium*, *Iolaus*, *Hypolycaena*, *Pilodeudorix*, *Bicyclus*, *Charaxes*, *Cymothoe*, *Neptis*, *Bebearia*, *Acraea* and various groups of Hesperidae, as they were more easily capable to re-colonise suitable forest habitats during the historical climate changes, when forest became widespread.

Equatorial savannah species (EQS). Savannah-dwelling species cover only a small proportion of the Liberian fauna (8%) (Figure 23). Approximately one-third of these (3.6%, 26 species) have wide distribution, following largely the Equatorial forest zone in the north, but in many cases they are distributed beyond the northern savannah zone, occurring also in East Africa or following the forest zone also in the south in Zambia and Angola. Many of them are common and occur also in the forest-savannah transition zone and disturbed open areas in the forest zone due to their wide ecological tolerance. Categorisation of a few pre-forest species such as *Junonia sophia* or *Precis pelarga* proved difficult, as they occur in both savannah and disturbed forest. However, *J. sophia* is more tied to forests, whereas *P. pelarga* is regularly found outside of forest habitats and was considered savannah species. The majority of species in this category do not form local geographic forms or subspecies due to their good dispersal ability and wide tolerance for habitats (e.g. *Lachnocnema vuattouxi*, *Axiocerses harpax*, *Junonia chorimene* and *Neptis morosa*), however, a few of them are divided into two or more subspecies within their range, often separating the eastern and western population. *Pardaleodes incerta incerta* occurring between eastern Congo and Kenya-Tanzania, replaced by *P. incerta murcia* in northern Cameroon, which is distributed in the savannah and forest-savannah transition zone to Senegal. *Pentila pauli*, a weak-flying savannah and transition zone butterfly, forms several subspecies throughout its range.

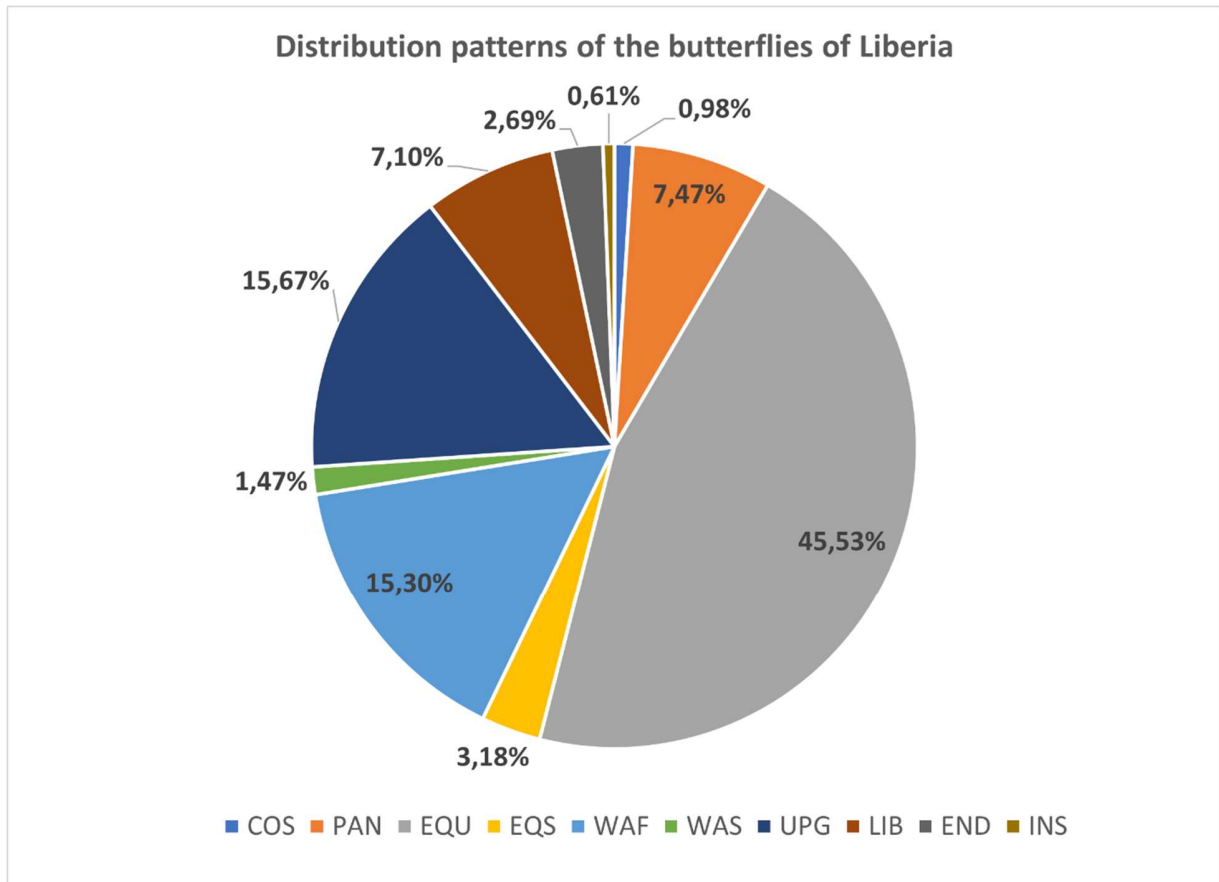


Figure 23. Biogeographic (distribution) patterns of butterflies of Liberia.

West African forest species (WAF). Relatively fewer forest species show West African distribution pattern (125 taxa, 15%) (Figure 23). Obviously, the only difference between them and Equatorial species is that the West African subspecies have narrower distribution between Senegal and Nigeria or western Cameroon, changing to a Central African species. Only a few are truly West African, they are usually rare and highly specialised, many of them belong to the ant-associated Liptenini of Lycaenidae, which are known to form small and isolated colonies near *Crematogaster* ant infested trees (*Ornipholidotos nympha*, *Torbenia wojtusiaki*, *Stempfferia moyambina*, *Geritola frankdaveyi* (see also in the species account). Many West African forest species are widespread in the Guineo-Congolian forest zone, although they are represented in West Africa by a distinct subspecies (*Anthene rubricinctus derubescens*, *Oxylides faunus*, *Uranotauma cyara stactalla*, *Charaxes fulvescens*, *C. protoclea*).

West African savannah species (WAS). The savannah zone in West Africa is significantly poorer concerning butterfly richness, compared to the savannah habitats in East and Southern Africa. Also, the majority of species in this zone are of wide distribution and only a small proportion of restricted range species exist in West African savannah. This is also well reflected in the proportion of West African savannah butterflies in Liberia, they represent slightly more

than 1% of the total fauna (Figure 23). Even the majority of these are restricted to West Africa in subspecific level, which are usually common savannah species: *Euchrysops albistriata greenwoodi*, *Charaxes achaemenes atlantica*, *C. viola*, and only two *Lepidochrysops* (a genus of which has over 100 members in Eastern and Southern Africa)(Larsen 1991, Pringle *et al.* 1994), *Lepidochrysops synchrematiza* and *L. parsimon* and the very rare *Eicochrysops dudgeoni* and *Precis frobeniusi* are real West African savannah elements in the Liberian fauna. These species might not even be permanently present in Liberia, as the strong flying *C. achaemenes atlantica* and *C. viola* were found only in the northernmost corner of the country, where an influx of other savannah species was recorded during permanent northerly wind in the dry season of 2013. *L. parsimon* is known only from a few specimens collected on the Guinean border and in the Wonegizi Mountains. *E. albistriata greenwoodi* and *P. frobeniusi* are known only from old records. Interestingly, *E. dudgeoni* was found in the savannah area of Lake Piso, which indicates a permanent population and presence of other ‘real’ savannah species in the area.

Upper Guinean endemics or Upper Guinean forest endemics (UPG). The forest species, occurring only west of the Dahomey Gap were extensively discussed in Belcastro & Larsen (2006), where the authors listed 67 species, excluding endemic subspecies. After the revision of the checklist of all West African butterflies (including also those recorded after the publication of Larsen (2005)), 128 taxa (15.6%), including also endemic subspecies considered endemic to the Upper Guinean forest zone were found to occur in Liberia. The Upper Guinean endemic taxa are discussed in detail in chapter 4.4.1.

Liberian subregion endemics (LIB). The 58 forest taxa, which are restricted to the Liberian subregion represent 7% of Liberia’s butterfly fauna (Figure 23). This is an unusually high proportion for a relatively small area, as the Ghana subregion has only about 25, while the smaller Volta subregion has only 7 endemic taxa, representing altogether 3% of all butterfly species occurring in Ghana (Larsen 2006). This is a further indication that the area of Liberia served as a forest refugium (as discussed in chapter 4.4.3) during the drier (glacial) periods, which is also supported by presence of various endemic species in other animal groups (further details in chapter 3.1.3), also plants (Van Rompaey 1996) and deep-sea pollen records (Jahns *et al.* 1998). The presence of forests in isolation from other forest regions in present day Liberia during the glacial maximum helped speciation of several butterfly taxa resulted in higher endemism. The Liberian subregion endemic taxa are discussed in detail in chapter 4.4.1.

Narrowly endemic species (END). All 22 narrowly endemic taxa (2.5%) are premontane, upland and submontane forest specialists, restricted either to the Nimba Mountains and/or the broader Nimba area, the Guinea Highlands or to the small area of upland forests of the Putu Range in eastern Liberia. Many of them are unique and some are without any closely related species occurring in West Africa. The narrowly endemic taxa are discussed in detail in chapter 4.4.1.

4.4.3. Re-definition of the Liberian subregion

In Larsen's (2005) work the Liberian biogeographic subregion or Liberia subregion is only very vaguely defined as the forest area between the Sassandra River in western Ivory Coast and Sierra Leone. To assess the potential boundaries of the Liberian subregion, the distribution patterns of several butterfly species that are centred on the forests of Liberia need to be carefully examined. It is questioned whether or not the scattered forest areas in Guinea and the highlands of north-western Ivory Coast, northern, north-western Liberia, Guinea (Forest Region) and northern Sierra Leone (Tingi Mountains, Loma Mountains) (collectively Guinea Highlands) are part of the subregion. Multiple forest butterflies of restricted range with no pronounced upland affinities actually extend to Central Sierra Leone to the Loma Mountains and the Tonkolili Range (e.g. *Gorgyra zياما*, *Hypolimnas aubergeri*, *Euriphene lomaensis*) indicate that the Guinea Highlands should be included in the subregion. The butterfly diversities of mountainous forest areas in Zياما Forest and in the Loma Mountains are most probably comparable with those nearer to the hypothetical centre of the Liberian subregion (Sáfián *et al.* 2020c, unpublished, Larsen 2005, Belcastro pers. com). This would justify the inclusion of these isolated mountains in the Liberian subregion. Unfortunately, no historic records of the extent of lowland forest in north-eastern Sierra Leone are available but these mountains have been most likely connected even in recent times.

Although, the distribution of several Upper Guinean endemic butterflies reaches the eastern lower mountains of the of Fouta Djallon, providing evidence that the forest was once continuous with those in the Liberian subregion, the general butterfly diversity is actually lower than in other mountains in the Guinea Highlands. This massive and rather heterogeneous highland is now completely isolated from the main forest block of Liberia by a quite broad Guinea savannah belt in the Upper Niger Valley and in northern, north-western Sierra Leone. Also, the species composition shows quite a mixture of Guineo-Congolian forest and Guinea savannah butterflies with the presence of narrowly endemic species (e.g. *Pseudaletis malangi* Collins & Larsen, 1995, *Iolais djallonensis* Collins & Larsen, 1998)(Larsen 2005).

However, butterfly species endemic to the forests further west in Guinea-Bissau and lower Senegal (Basse Casamance) (e.g. *Euphaedra hastiri*, *E. dubreka*, *E. villiersi*) are also present. This latter area is of completely different character as it forms a transition from the Upper Guinean forest to the drier Guinea savannah zone, which has been isolated from the main forest area for a long period of time. Its species composition shows a largely impoverished forest butterfly fauna. This forest-savannah mosaic is not currently recognized and defined as a separate biogeographic subregion, but the uniqueness and presence of endemism in the area might justify the definition of a "Western transitional subregion". Fouta Djallon might rather belong to this subregion, with a transitional fauna and also presence of endemics and upland species due to its mountainous properties.

Generally, the majority of the Liberian subregion endemics halt at the Sassandra River in the east, occurring only in Taï National Park in western Ivory Coast (possibly also in the Cavally

River Forest Reserve and other smaller forest remnants), as virtually no other larger forest areas left in western Ivory Coast and across a wide landscape east of the Sassandra River. As natural forest has been cleared before any Lepidoptera records collected in central Ivory Coast, no proper assessment of original eastern boundary of distribution is possible for the majority of butterflies centred on the Liberian forests and the vast majority of them have no records from the remaining forests of eastern Ivory Coast (Banco, Bossematié or Yapo) and the eastern boundary of their distribution could have lied somewhere between Taï National Park and central Ivory Coast (Larsen 2005). Quite a few species endemic to the Liberian subregion would fall into this category, including *Geritola pacifica*, *Iolaus alexanderi*, *Neurellipes georgiadisi*, *Euriphene taigola*, *E. lomaensis*, *Bebearia inepta*, *Gorgyra ziama*.

A further group of species have a large, continuous distribution in the forests of Liberia, with disjunct distribution area around the cape between Abidjan and southwestern Ghana (Cape Three Points, Ankasa National Park, possibly even up to Bia National Park) (e.g. *Pteroteinon reali*, *Euriphene veronica*, *E. leonis*, *Euptera dorothea warrengashi*, *Ceratruchia crowleyi*). This area receives significantly higher precipitation than the surrounding land and is covered by wet evergreen forest, the only area representing this forest type in Ghana. Its character is similar to the lowland wet and hyper-wet forests in Liberia and is considered to be one of the areas of high endemism and a postulated glacial forest refuge for plant species by various authors (e.g. Maley 1996, Robbrecht 1996, van Rompaey 1996).

The third group encompasses only a few species and their distribution patterns could best be explained through the example of *Pseudacraea hostilia* or *Andronymus fenestra*. *P. hostilia* was described from Sierra Leone where it is known only from a few localities including the Loma Mountains. The species has not been recorded from the Forest Region in Guinea, but has scattered old records from Liberia, where it was also collected recently in the Nimba Mountains, the Putu Range and in the Sapo National Park. In Ivory Coast, Larsen (2005) reported it only from forests around Abidjan. It also occurs in Ankasa National Park (southwest Ghana) and there are two records from the Atewa Range. *A. fenestra* was described from a short series collected in the Gola Forests in eastern Sierra Leone, north-western Ivory Coast (Bloléquin, Yéalé) and at the foothills of the Nimba Mountains in Liberia (Sáfián *et al.* 2019a). Surprisingly, two further specimens identified in the ABRI collection were collected in the Atewa Range very recently. Despite this odd distribution pattern, both species are considered as their distribution centred on the Liberian subregion.

Atewa was never previously recognized as a forest refuge area, although Hillers *et al.* (2008) highlight it as a Pleistocene microrefugium for leaf-litter frogs as part of larger macrorefugia. The Atewa Range is one of the only two isolated upland evergreen forest localities in Ghana, which receives higher precipitation compared to the surrounding lowland areas (Hall and Swaine 1981). It was also identified by Larsen (2005, 2006) as the area of the highest butterfly diversity in Ghana with approximately 700 species occurring in the forest of the Atewa Range. Although

Atewa is situated in the centre of the Ghana subregion, the highly disjunct occurrence of two butterfly species with their distribution centred on Liberia certainly indicates affinities with the Liberian subregion.

Considering the above-described distribution patterns, the limit of the Liberian biogeographical subregion is best delineated in a rather conservative way, where the subregion encompasses the two main lowland forest blocks of Liberia to the coast and extends to the Sassandra River in the east, including Taï National Park and the Haut Cavally Forest Reserve in Ivory Coast. The subregion should encompass also the eastern mountainous areas of the Guinea Highlands in north-western Ivory Coast up to Mount Sangbé in the north, the Nimba Mountains, the Wologizi and Wonegizi Mountains in north-western Liberia, the Ziama Massif and the Simandou Mountains or Chaîne de Fon, and the much smaller forested mountains of Mont Béro and Mont Tetini further north in the Forest Region of Guinea including the lowland forest areas between them, where the northern boundary is drawn between the towns of Kerouane and Kissidougou. The boundary continues slightly north from the northern limit of the Loma Mountains in Sierra Leone. West of the Loma Mountains the proposed boundary line turns southward, encompassing the Tonkolili Forest Reserve and the Bumbuna area, the Kangari Forest Reserve and the Western Peninsular Mountains near Freetown.

The current knowledge of the butterfly fauna does not allow full assessment of the area between Abidjan and Cape Three Points in Ghana and therefore its inclusion in the Liberian subregion could not be concluded. Although several Liberian subregion centred butterfly species are present in the wet evergreen forests in this area, other species considered associated with upland, pre-montane and submontane habitats are almost certainly absent. The area will still serve as a secondary centre of distribution for Liberian lowland forest species.

The Atewa Range and the Fouta Djallon area, and a few isolated mountains in south-eastern Guinea (e.g. Mount Kakoulima) are unique outposts of Liberian subregion endemics, where the geomorphological setting allowed survival of isolated populations of a few restricted-range species (Figure 24). Both Atewa and the Fouta Djallon are actually highlighted by Hillers *et al.* (2008) as microrefugia for leaf-litter frogs and the high number of endemic species in Fouta Djallon and the outstanding butterfly diversity of Atewa and presence of endemism support this approach. The potentially higher mobility of butterflies possibly enabled gene-flow for a longer period of time, preventing or mitigating speciation of the isolated populations on Atewa, however, evidence of such speciation already exists in the cases of *Telchinia pseudepaea* – *T. pseudepaea ziama* and *Neurellipes helpsi* – *N. helpsi* ssp. n. where the populations occurring in the Liberian subregion are already proven distinct from their isolated relative found on Atewa (Sáfián *et al.* 2020c, 2020d).

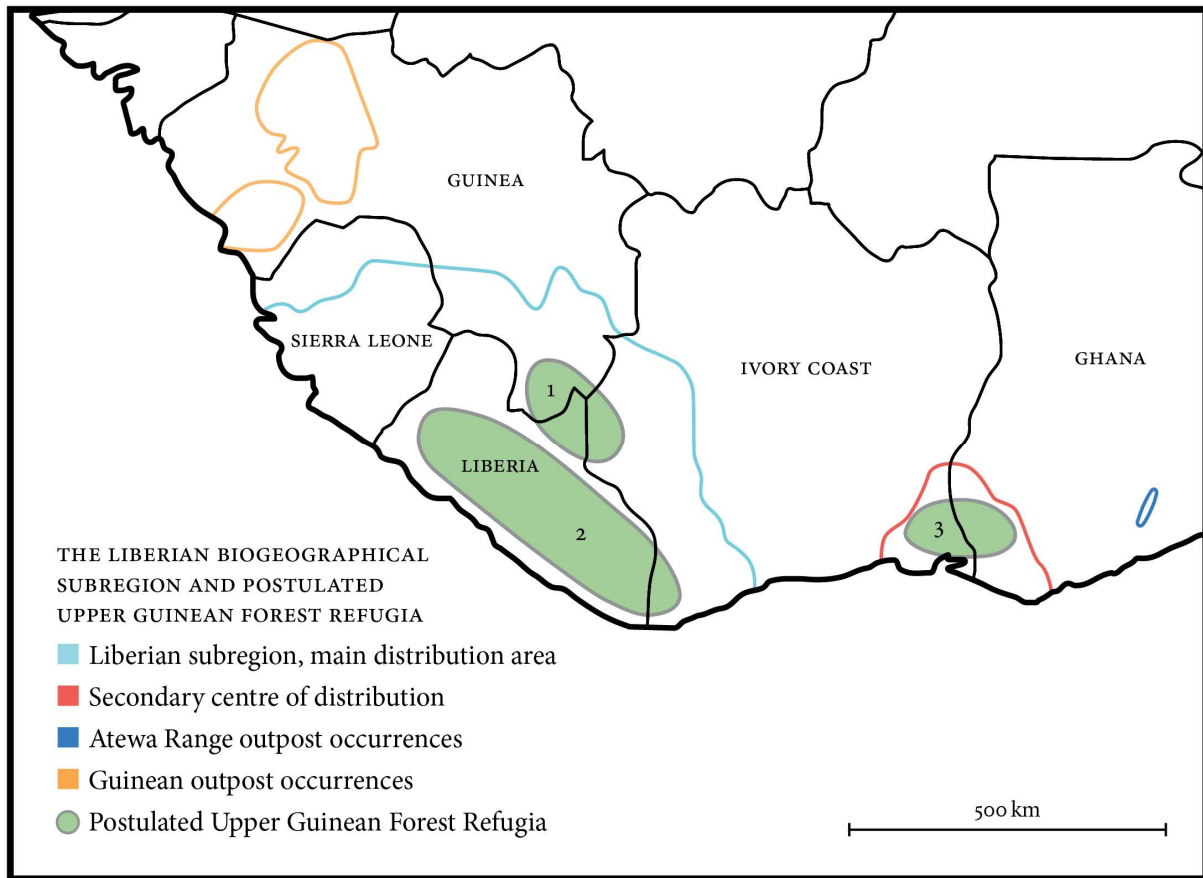


Figure 24. The Liberian biogeographical subregion and postulated Upper Guinean Forest Refugia. Blue outlined area: Liberian subregion, main distribution area. Red outlined area: Secondary centre of distribution. Darker blue outlined area: Atewa Range outpost occurrences, Ochre outlined area: Guinean outpost occurrences. Forest refugia: 1. Liberian refugium, 2. Cape Palmas refugium, 3. Cape Three Point refugium (reproduced using Maley 1996, Robbrecht 1996, Van Rompaey 1996).

The above-described delineation of the Liberian subregion, the area of the secondary centre of endemism and the other outpost occurrences of Liberian subregion endemics correspond with the postulated Upper Guinean forest refugia and the identified microrefugia with high fidelity. The Liberian subregion virtually covers the so-called Liberian refuge area, which is centred on the Nimba Mountains and the Cape Palmas refuge area, while the secondary centre of distribution fully overlaps with the Cape Three Points refuge area for various plant groups as defined in the works of Maley (1996), Robbrecht (1996) and also Van Rompaey (1996) (Figure 24).

5. Summary of scientific results, theses

1. Review of literature data and extensive field surveys resulted in 818 butterfly species positively recorded and identified from Liberia, an increment of 72% since the publication of the latest comprehensive fauna work. Both the Michelis-Menten model and the known butterfly records near the borders of Liberia (eastern Sierra Leone and the Forest Region of Guinea) indicate even higher butterfly diversity in the country. Although Ghana has significantly higher richness of butterflies (estimated to exceed 950 species), approximately 150 are associated exclusively with Guinea and Sudan savannah habitats, the majority of them are not expected to occur in Liberia. It is also important to emphasize that Ghana stretches across three biogeographical subregions; the Volta subregion or Togo Mountains, the Dahomey Gap and the Ghana subregion and in the extreme southwest and in two small upland rainforest areas disjunct populations of a few Liberian subregion endemic species are also found. According to extensive faunistic studies a single intact forest area in Ghana would harbour approximately 500-650 species. It should be similar to the diversity in the poorly documented eastern Ivory Coast, derived from data originate from forests on the Ghana-Ivory Coast border. The recent field studies in Liberia and in the Liberian subregion, just beyond the Liberian border revealed higher butterfly diversity in single forest areas, reaching approximately 700 species. Further west in Guinea, Guinea-Bissau and southern Senegal the diversity of forest butterflies drops drastically. These fragmented outlier forests of the yet undefined Western subregion are strongly impoverished in butterflies, leaving Liberia the ultimate hotspot of diversity of forest butterflies in the Upper Guinean forest zone.

2. The unrevealed diversity of butterflies in Liberia and in the broader context of Liberian subregion proved significantly higher than hypothesized. Altogether, twenty-three undescribed taxa – almost 3% of the Liberian fauna – were new discoveries, including twenty species and three subspecies.

2a. The majority of new taxa found during the study remained unrevealed until now for the lack of field research in Liberia, as they are generally easily recognizable species and none of them were collected previously and were found in museum collections. The several of these species appear to have no close relatives in West Africa and they probably evolved in genuine allopatry, often with a distance over a couple of thousand kilometres between the Liberian species and its supposedly closest relative. These taxa include: *Geritola pacifica*, *Cephetola wologizi*, *Aphnaeus nimbaensis*, *A. mirabilis*, *Pilodeudorix mano*,

2b. A significant proportion of new taxa could be considered as cryptic diversity, as several of them are almost identical or generally very similar to their respective closest relatives and recognition of their uniqueness required examination of longer series of comparative material across their distribution, also dissection and examination of genitalia. Quite a few of these taxa

belong to species-groups that consist of several similar species or a single species with multiple subspecies, and beyond the morpho-taxonomic comparison, understanding of their biogeographic pattern also played an important role in clarification of their taxonomic status. These taxa include *Parasiomera alfa*, *Liptena neiltennanti*, *Mesoxantha liberiana* and *Eagris tetrastigma lomana*. In one case a single, Upper Guinean endemic species, *Pilodeudorix aurivilliusi* seems to have evolved further, resulting in two additional species in the Liberian subregion, *P. putu* and *P. intermedia*. They both are known only from a few upland localities where all three are genuinely sympatric, ruling out subspecific relationship.

2c. Further undescribed taxa are still expected to occur in the region as undescribed species and subspecies were also found in the Forest Region of Guinea (Guinée Forestière) near the Liberian border: *Apallaga klaudiae* Sáfián, Boireau & Belcastro, 2020, *Junonia agnesberenyiae* Sáfián, 2019 and *Neurellipes helpsi* ssp.n.

3. According to the information available, all newly described taxa are considered to be of restricted range to variable extent and thus endemic to a well-defined area in West Africa. Alongside groups of previously recognized taxa, they could be categorized in three groups of endemics according to their distribution range.

Upper Guinean endemics: 128 taxa were recognized as being restricted to the forest zone between south-western Senegal to Ghana or the Volta subregion in eastern Ghana and western Togo. A considerable proportion of these taxa are rather widespread and common within the Upper Guinean forest zone, and some have wide ecological tolerance in habitat occupancy, also for disturbance. For this reason, it is not surprising that among the newly discovered taxa only one is considered as an Upper Guinean forest zone endemic: *Iridana kollariki* Sáfián, 2014, which was first found in Ghana and was only later discovered in Liberia. The Ghanaian locality does not fit in the unique upland localities, where disjunct, probably relict populations of a few species, considered endemic to the Liberian subregion exist.

Liberian subregion endemics: 58 taxa are restricted to a rather small, but well-defined forest area between eastern/central Sierra Leone and western Ivory Coast, they could also occur sporadically in the Forest Region of Guinea. This area receives the highest annual precipitation in West Africa, influenced by the extensive mountainous areas of the Guinea Highlands, and is also recognised as a hotspot for endemism for various plant and animal groups. Many of the Liberian subregion endemic butterflies are found in wet to hyperwet lowland forests and they are widely distributed within their range but they usually have limited ability to adapt to changes of ecological factors or habitat disturbance, or they might utilize plant species also restricted to this subregion. Only a few have slightly broader distribution, occurring also in limited areas of south-western, western Ghana, a postulated forest refuge area, and two species were found in one of the two unique upland localities in Ghana (Atewa Range) in correspondence to locally higher

precipitation. A significant proportion of the newly discovered taxa could be considered as endemic to the Liberian subregion, distributed rather widely in lowland and occasionally also in upland forests within the subregion. *Parasiomera alfa*, *Geritola pacifica* were, so far found exclusively in Liberia, whereas beyond their Liberian subregion records *Mesoxantha liberiana* and *Andronymus fenestra* were found also in Ghana; the former one in the southwestern wet forest area, while the latter in the upland forests of Atewa Range.

Narrowly endemic taxa: Narrowly endemic taxa were identified from three mountainous areas in Liberia: the Nimba Mountains (also referred to as Nimba mountain refugium), which was for a long time recognised for its high rate of endemism and the postulated Liberian forest refugia is also centred on the Nimba Mountains. Several butterfly taxa are known to occur only in the Nimba Mountains, including *Vanessula milca angustifascia*, *Euphaedra sarcoptera ferrea*, *Aslauga larseni*. However, recent field-studies revealed that some taxa previously believed to be Nimba endemics also occur in the upland forest zone of the other Liberian higher mountain range, the Wologizi Mountains, and these taxa should occur also in mountainous areas of the Guinea Highlands. These are still considered as narrowly endemic as their distribution within the highlands are probably strictly limited by various ecological factors (e.g. altitude, habitat, food plant). Among others, *Bettonula bettoni nimba*, *Euphaedra aubergeri*, *Cephetola wingae* and *Aphnaeus nimbaensis* were recorded from both the Nimba and Wologizi Mountains, while *Cephetola wologizi* was found exclusively in the upland forests of Wologizi.

The other, quite different mountainous area is the Putu Range, which is a lower mountain range situated in eastern Liberia in complete isolation from all other mountains in the region. It faces the south-westerly moist air of maritime origin, causing rather evenly distributed higher precipitation in the vicinity of the mountain range. These local ecological conditions could have allowed the Putu Range to serve as a microrefugia during the recent drier (glacial) periods, which is well supported by the endemic taxa and local higher butterfly diversity present. *Liptena neiltennanti*, *Cephetola praecox* and *Iolaus jadwigae* were found exclusively in Putu and they could prove narrowly endemic to this small mountainous area inside the hyperwet forest zone. Other species with upland affinities also occur in the lower section of the Nimba mountain range and on the isolated lower mountains of West Nimba. Both *Pilodeudorix putu* and *Pilodeudorix intermedia* first recorded from the Putu Range were also found in upland forests in the Nimba.

4. During the analysis of the ecological composition of the butterfly fauna 86% of all butterfly species were found associated with forest habitats, only 8% are savannah-dwelling species and 4% are ubiquitous. The proportion of species associated with wetter types of forest is very high (over 35%), which is a good indication of intact forest areas in Liberia, but it also indicates that Liberian subregion is generally wetter than the rest of West Africa west of the Dahomey Gap. It is also supported by the low proportion of dry forest elements (3%). Although many of the Guinea savannah species are good colonisers, their proportion still remain relatively low (7%), and only the commoner species of good dispersal abilities and higher tolerance for habitat

degradation are present in Liberia. The Sudan savannah elements are almost completely missing from Liberia, their proportion is only 0.5%, and only strong-flying species with migratory tendencies were recorded. Ubiquitous species represent only 4% of the butterfly fauna, however the same widely distributed species usually colonise forests all over West Africa making the number of ubiquitous species recorded from a single area rather constant.

The intactness of the butterfly fauna is also reflected in the distribution patterns of the species. Over 45% of all taxa inhabit the forest zone from south-western Senegal across the Congo Basin to the Albertine Rift or even beyond (Guineo-Congolian or Equatorial forest species). In addition to the Guineo-Congolian forest taxa, 15% of the fauna is distributed in West Africa's forests east of the Sanaga River in Cameroon. Over 25% of forest dwellers are of restricted range: 15% of them are distributed in the Upper Guinean forest zone, while 6% is found only in the Liberian subregion. More than 2% is narrowly endemic to the upland forest of the mountainous areas of the Nimba and Wologizi Mountains and the Putu Range. Only a very small proportion of the fauna is distributed also beyond Africa (cosmopolitan species) (<1%), and only 7.5% is distributed across the continent (pan-African taxa), inhabiting both open and forest habitats. Taxa distributed in savannah regions are generally underrepresented in the butterfly fauna. Only 3% are widely distributed in a relatively narrow savannah belt that follows the Guineo-Congolian forest zone, while only 1% is distributed in the savannah areas across West Africa.

5. The Liberian subregion appears to be a discrete biogeographical subunit within the Upper Guinean forest zone as indicated by both the diversity patterns and the outstandingly high number of endemic/restricted-range species.

5a. The distribution patterns of the Liberian subregion centred species identify a main centre of distribution, which encompasses the forests of Liberia, also those in western Ivory Coast to the Sassandra River in the east, a large proportion of southern Sierra Leone in the west, also major isolated mountainous areas in north-central Sierra Leone, northern Liberia, in the Forest Region of Guinea and also in north-western Ivory Coast.

5b. A large coastal forest area originally covered by wet evergreen forest on the Ivory Coast-Ghana border shows strong affinities to the Liberian subregion in precipitation, vegetation and in the presence of several Liberian subregion centred butterfly species. From the current knowledge of the butterfly fauna, it is not possible to assess whether or not this area should be considered as an integral part of the Liberian subregion, but the upland endemic elements of the subregion are almost certainly missing from this disjunct, essentially lowland area. The above defined Liberian subregion and this disjunct area effectively cover the three postulated Upper Guinea Forest Refugia (1. Liberian refuge area, 2. Cape Palmas refuge area, 3. Cape Three Points refuge area) as was identified for various plant groups.

5c. The Atewa Range, a small isolated mountainous area in the Eastern Region of Ghana has strongly disjunct records of a few Liberian subregion centred butterfly. Atewa is one of the two unique upland forest localities in Ghana, it shows exceptional butterfly diversity in with a few endemic butterflies present. Although Atewa was not recognized as part of forest refugia, it was recently identified as a microrefugium for leaf-litter frogs, which corresponds well with butterfly data. Despite the affinities, the Atewa Range could not be recognized as part of the Liberian subregion but is an isolated outpost of Liberian endemic fauna due to its unique ecological conditions.

5d. Although they geographically form part of the Guinea Highlands, the massive Fouta Djallon highlands area and other isolated mountainous area in southern Guinea could not be considered as integral part of the Liberian subregion; they rather serve as minor outposts of a few Liberian subregion centred butterfly species due to their mountainous properties similar to those in their main distribution area, but these mountainous areas show already a transition towards the yet undefined 'Western transition subregion' with their own endemics and significantly lower diversity of forest butterflies compared to the above defined Liberian subregion.

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Appendix I. Endemism in Liberia's butterfly fauna.

The list of endemic taxa is based on Larsen's (2006) original compilation. Updated using numerous publications cited previously throughout this work.

Taxon	Endemism/Range	Ecological class
<i>Graphium latreillianus</i>		
<i>latreillianus</i>	UPG	WEF
<i>Graphium rileyi</i>	UPG	WEF
<i>Graphium illyris illyris</i>	UPG	WEF
<i>Papilio horribilis</i>	UPG	WEF
<i>Eagris tetrastigma lomana</i>	LIB	WEF
<i>Pyrrhiades lucagus</i>	UPG	DRF
<i>Abantis tanobia</i>	UPG	WEF
<i>Abantis ja usheri</i>	UPG	UPF
<i>Scopulifera sagamase tropeki</i>	LIB	WEF
<i>Bettonula bettoni nimba</i>	END	UPF
<i>Apallaga leona</i>	UPG	WEF
<i>Apallaga belcastroi</i>	LIB	WEF
<i>Apallaga galkasa</i>	UPG	WEF
<i>Apallaga ankasa ankasa</i>	UPG	WEF
<i>Apallaga confusa occidentalis</i>	LIB	WEF
<i>Apallaga perconfusa</i>	LIB	WEF
<i>Apallaga vicariana</i>	LIB	WEF
<i>Apallaga safiani</i>	LIB	WEF
<i>Astictopterus anomoeus</i>	UPG	WEF
<i>Gorgyra ziama</i>	LIB	WEF
<i>Ceratruchia crowleyi</i>	LIB	WEF
<i>Argemma maesseni</i>	UPG	WEF
<i>Osmodes lindseyi occidentalis</i>	UPG	MEF
<i>Paracleros placidus</i>	UPG	MEF
<i>Hypoleucis tripunctata</i>		
<i>tripunctata</i>	UPG	MEF
<i>Andronymus fenestra</i>	LIB	WEF
<i>Gretna balenge zowa</i>	UPG	WEF
<i>Pteroteinon reali</i>	LIB	WEF
<i>Bicyclus evadne evadne</i>	UPG	WEF
<i>Bicyclus zinebi</i>	UPG	ALF
<i>Bicyclus larseni</i>	UPG	WEF
<i>Bicyclus sambulos unicolor</i>	UPG	WEF
<i>Bicyclus auricruda auricruda</i>	UPG	WEF
<i>Bicyclus abnormis</i>	UPG	WEF

<i>Bicyclus dekeyseri</i>	UPG	WEF
<i>Bicyclus istaris</i>	UPG	MEF
<i>Bicyclus martius martius</i>	UPG	ALF
<i>Hallelesis halyma</i>	UPG	WEF
<i>Brakefieldia decira</i>	UPG	UPF
<i>Charaxes smaragdalis butleri</i>	UPG	WEF
* <i>Charaxes imperialis imperialis</i>	UPG	DRF
<i>Charaxes subornatus couilloudi</i>	UPG	WEF
<i>Charaxes hildebrandti gillesi</i>	UPG	MEF
<i>Charaxes petersi</i>	UPG	WEF
<i>Protogoniomorpha cytora</i>	UPG	WEF
<i>Hypolimnas aubergeri</i>	END	WEF
<i>Kallimoides rumia</i>	UPG	WEF
<i>Vanessula milca milca</i>	UPG	WEF
<i>Vanessula milca angustifascia</i>	END	UPF
<i>Mesoxantha liberiana</i>	LIB	WEF
<i>Acraea consanguinea sartina</i>	UPG	WEF
<i>Acraea macaria</i>	UPG	MEF
<i>Telchinia pseudepaea ziama</i>	LIB	WES
<i>Cymothoe fumana fumana</i>	UPG	MEF
<i>Cymothoe herminia gongoa</i>	UPG	WEF
<i>Cymothoe weymeri mulatta</i>	UPG	WEF
<i>Cymothoe althea althea</i>	UPG	MEF
<i>Cymothoe jodutta jodutta</i>	UPG	WEF
<i>Cymothoe hartigi</i>	LIB	WEF
<i>Cymothoe mabillei</i>	UPG	MEF
<i>Neptis najo</i>	UPG	MEF
<i>Neptis viridis</i>	UPG	WEF
<i>Neptis lamtoensis</i>	UPG	MEF
<i>Euphaedra aubergeri</i>	END	UPF
<i>Euphaedra gausape</i>	UPG	WEF
<i>Euphaedra judith</i>	LIB	WEF
<i>Euphaedra melpomene</i>	LIB	WEF
<i>Euphaedra xypete xypete</i>	UPG	MEF
<i>Euphaedra crockeri</i>	UPG	WEF
<i>Euphaedra eusemoides</i>	UPG	WEF
<i>Euphaedra cyparissa cyparissa</i>	LIB	MEF
<i>Euphaedra cyparissa nimbina</i>	END	UPF
<i>Euphaedra sarcoptera ferrea</i>	END	UPF
<i>Euphaedra laboureaana</i>		
<i>eburnensis</i>	UPG	MEF
<i>Euphaedra minuta</i>	UPG	WEF
<i>Euphaedra modesta</i>	UPG	WEF

<i>Euphaedra splendens</i>		
<i>ghanaensis</i>	UPG	WEF
<i>Euphaedra vetusta</i>	UPG	WEF
<i>Euphaedra aberrans</i>	UPG	WEF
<i>Euphaedra ceres ceres</i>	UPG	ALF
<i>Euphaedra inanim</i>	UPG	MEF
<i>Euphaedra tenebrosa</i>	LIB	WEF
<i>Euphaedra francina francina</i>	LIB	WEF
<i>Euphaedra zampa</i>	UPG	WEF
<i>Euphaedra perseis</i>	UPG	WEF
<i>Euphaedra eupalus</i>	UPG	WEF
<i>Euriphene veronica</i>	LIB	ALF
<i>Euriphene grosesmithi</i>		
<i>muehlenbergi</i>	UPG	WEF
<i>Euriphene simplex</i>	UPG	WEF
<i>Euriphene amicia gola</i>	LIB	WEF
<i>Euriphene aridatha feronia</i>	LIB	MEF
<i>Euriphene taigola</i>	LIB	WEF
<i>Euriphene coerulea</i>	UPG	WEF
<i>Euriphene lomaensis</i>	LIB	WEF
<i>Euriphene gambiae vera</i>	UPG	ALF
<i>Euriphene leonis</i>	LIB	WEF
<i>Bebearia osyris</i>	UPG	WEF
<i>Bebearia barce barce</i>	UPG	WEF
<i>Bebearia cocalia cocalia</i>	UPG	WEF
<i>Bebearia paludicola blandi</i>	UPG	WEF
<i>Bebearia arcadius</i>	UPG	WEF
<i>Bebearia ashantina</i>	UPG	WEF
<i>Bebearia demetra demetra</i>	UPG	WEF
<i>Bebearia warrengashi</i>	LIB	WEF
<i>Bebearia inepta</i>	LIB	WEF
<i>Bebearia maledicta</i>	UPG	WEF
<i>Bebearia ashantina</i>	UPG	WEF
<i>Bebearia cutteri harleyi</i>	LIB	WEF
<i>Euptera dorothea warrengashi</i>	LIB	WEF
<i>Euptera pluto occidentalis</i>	UPG	INS
<i>Pseudacraea hostilia</i>	LIB	WEF
<i>Pseudopontia gola</i>	LIB	WEF
<i>Mylothris dimidiata</i>	UPG	WEF
<i>Mylothris poppea</i>	UPG	MEF
<i>Mylothris boireaui</i>	END	UPF
<i>Mylothris spica</i>	UPG	MEF
<i>Mylothris melita</i>	END	UPF
<i>Afriodinia tantalus tantalus</i>	UPG	WEF

<i>Pentila petreoides</i>	UPG	WEF
<i>Pentila condamini</i>	LIB	WEF
<i>Pentila cf. picena</i>	LIB	WEF
<i>Pentila abraxas</i>	LIB	WEF
<i>Telipna semirufa</i>	UPG	WEF
<i>Ornipholidotos sylviae</i>	UPG	WEF
<i>Ornipholidotos tiassale</i>	UPG	WEF
<i>Ornipholidotos issia</i>	UPG	WEF
<i>Ornipholidotos ivoiriensis</i>	LIB	WEF
<i>Liptena submacula liberiana</i>	LIB	MEF
<i>Liptena griveaudi</i>	UPG	WEF
<i>Liptena neiltennanti</i>	END	UPF
<i>Liptena albicans</i>	UPG	WEF
<i>Liptena xanthostola</i>		
<i>coomassiensis</i>	UPG	MEF
<i>Liptena bia</i>	UPG	MEF
<i>Liptena seybouii</i>	UPG	WEF
<i>Helenia helena</i>	UPG	WEF
<i>Falcuna leonensis</i>	UPG	MEF
<i>Tetrarhanis baralingam</i>	UPG	WEF
<i>Tetrarhanis diversa</i>	LIB	DRF
<i>Larinopoda eurema</i>	UPG	MEF
<i>Micropentila cf. brunnea</i>	LIB	WEF
<i>Micropentila mabangi</i>	LIB	WEF
<i>Eresina fusca</i>	LIB	WEF
<i>Eresina saundersi</i>	UPG	DRF
<i>Eresiomera petersi</i>	UPG	WEF
<i>Eresiomera cf. jacksoni</i>	INS	INS
<i>Parasiomera alfa</i>	LIB	WEF
<i>Mimacraea darwinia</i>	UPG	WEF
<i>Mimeresia moyambina</i>	UPG	WEF
<i>Mimeresia debora catori</i>	UPG	WEF
<i>Mimeresia semirufa</i>	UPG	WEF
<i>Mimeresia issia</i>	UPG	WEF
<i>Iridana kollariki</i>	UPG	WEF
<i>Epitola occidentalis</i>	UPG	MEF
<i>Epitola larseni</i>	UPG	WEF
<i>Geritola pacifica</i>	LIB	WEF
<i>Stempfferia moyambina</i>	UPG	WEF
<i>Stempfferia dorothea</i>	UPG	WEF
<i>Stempfferia katikae</i>	END	UPF
<i>Stempfferia leonina</i>	UPG	MEF
<i>Stempfferia michelliberti</i>	LIB	WEF
<i>Stempfferia staudingeri</i>	UPG	WEF

<i>Cephetola doleta</i>	LIB	MEF
<i>Cephetola mercedes ivoriensis</i>	UPG	WEF
<i>Cephetola praecox</i>	END	UPF
<i>Cephetola wingae</i>	END	UPF
<i>Cephetola wologizi</i>	END	UPF
<i>Hypophytala leonetta</i>	LIB	WEF
<i>Hypophytala henleyi depuncta</i>	UPG	MEF
<i>Hypophytala benitensis contrasta</i>	UPG	WEF
<i>Phytala elais catori</i>	LIB	WEF
<i>Euliphyra leucyana leucyana</i>	UPG	MEF
<i>Aslauga larseni</i>	END	UPF
<i>Aslauga guineensis</i>	END	UPF
<i>Aphnaeus mirabilis</i>	END	WEF
<i>Aphnaeus nimbaensis</i>	LIB	WEF
<i>Cigaritis iza</i>	UPG	WEF
<i>Lipaphnaeus leonina leonina</i>	LIB	WEF
<i>Pseudaletis subangulata</i>	UPG	WEF
<i>Pseudaletis jolyana</i>	UPG	WEF
<i>Anthene agumatsa</i>	UPG	WEF
<i>Cupidesthes jacksoni</i>	UPG	WEF
<i>Neurellipes radiata</i>	UPG	WEF
<i>Neurellipes scintillula aurea</i>	UPG	WEF
<i>Neurellipes gola</i>	LIB	WEF
<i>Neurellipes georgiadisi</i>	LIB	WEF
<i>Triclema rufoplagata rufoplagata</i>	UPG	MEF
<i>Triclema melambrotus liberiana</i>	END	INS
<i>Monile gemmifera maculata</i>	UPG	UPF
<i>Uranothauma belcastroi</i>	END	UPF
<i>Oboronia liberiana</i>	LIB	WEF
<i>Iolaus liberiana</i>	LIB	WEF
<i>Iolaus mane</i>	UPG	UPF
<i>Iolaus jadwigae</i>	END	UPF
<i>Iolaus moyambina</i>	LIB	WEF
<i>Iolaus banco</i>	UPG	WEF
<i>Iolaus leonis</i>	LIB	WEF
<i>Iolaus pollux oberthueri</i>	LIB	WEF
<i>Iolaus longicauda haydoni</i>	LIB	WEF
<i>Hypolycaena clenchi</i>	UPG	WEF
<i>Paradeudorix petersi</i>	UPG	WEF
<i>Pilodeudorix leonina</i>	UPG	WEF
<i>Pilodeudorix otraeda otraeda</i>	UPG	MEF
<i>Pilodeudorix mano</i>	END	UPF

<i>Pilodeudorix virgata</i>	UPG	WEF
<i>Pilodeudorix aurivilliusi</i>	UPG	MEF
<i>Pilodeudorix intermedia</i>	END	UPF
<i>Pilodeudorix putu</i>	END	UPF

TOTAL	207 taxa
	145 species
	62 subspecies
Upper Guinean endemics	128 taxa
Liberian subregion endemics	58 taxa
Narrowly endemic taxa	22 taxa
Insufficiently known	1 taxon

***with records also from relict forests in the Dahomey Gap**

Appendix II. Locality maps of the butterfly fauna of Liberia.