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Basic pattern of Lepidoptera diversity in southwestern Africa

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Foreword

In 2006, the author joined the last 3 year phase of the German BIOTA South Africa Project. The name is an abbreviation for Biological Transect Analysis. The aim of the project was the investigation of the relationship between different land use systems and biodiversity. More than 40 Biodiversity observatories were established along a north-south transect from the Okavango Region in north Namibia to the Cape Peninsula at the southern tip of Africa, and along a shorter west-east transect in central Namibia. Research was carried out on these observatories at irregular intervals. The project, a trilateral venture of cooperating institutions from Germany, Namibia and South Africa, was formally finished in 2010 with the publication of a three-volume monograph "Biodiversity in southern Africa" (Jürgens et al. 2010, Schmiedel & Jürgens 2010, Hoffmann et al. 2010). Data on Lepidoptera are presented in volumes 1 and 2. Because of space limitations only a part of the available information was given. Taxonomic results were not included. The data, however, provided the basis for a general assessment of the Lepidoptera fauna in Namibia. One of the tasks of the project was performing inventory work on the Observatories with the aim of producing some sort of identification book, preferably a field guide. Since such a book should reasonably cover a larger area than just the fauna of the Observatories, collecting efforts were extended to the whole of Namibia and to the western and southern parts of South Africa. The taxonomic study of the collected material soon revealed that the fauna of this part of the Africa is poorly known and little documented. A growing number of species turned out to be unnamed, or could not be placed in any of the known genera or families. Nearly all efforts to correctly identify species or genera ended up in time-consuming taxonomic research or revisionary studies. It became evident that neither the taxonomic nor the faunistic knowledge is at a level which would allow work on an identification book. Even considering a popular approach like producing an introduction to the Lepidoptera fauna must capitulate on the fact that also common and widespread species, which cannot simply be omitted from such a book, are without names. The present task is therefore to broaden the taxonomic basis, describing several aspects of Lepidoptera diversity and providing names for the occurring species. The elaboration of a field guide has to be postponed to a later date, once the hitherto collected material has been worked up and the majority of common or ecologically important species are described.

The purpose of this volume is a first step to carry out this task. The book presents results of taxonomic studies, which have been done parallel to intensive field work in Namibia and South Africa during the last years. It paves the way for further studies and for the eventual publication of an identification book.

Wolfram Mey, Berlin & Potsdam, 25.9.2011

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1. Introduction

Entomological research in Africa has a long tradition in the Museum für Naturkunde Berlin. It started with the foundation of the museum as an integral part of the Friedrich-Wilhelms-University in 1810, and widely predates the formation of the German Colonial system in Africa in 1884. The first African Lepidoptera came into the museum via the collection of J. C. Graf von Hoffmansegg; one of the founders of the museum. The material of the few species he described is partly still in existence, partly cast away or does not exist anymore. The director of the museum from 1815 to 1857 was M.H.C. Lichtenstein. In 1803-1806 he worked as a medical doctor and teacher in Cape Town and was in accompany with the Dutch govenor of the Cape Colony. In 1811 he and published his book "Reisen im südlichen Afrika" [Travels in southern Africa]. He collected butterflies and moths only incidentally, and donated the material to the museum where it is still present. A contemporary of Hoffmansegg and Lichtenstein was Alexander von Humboldt.

Fig. 1: Johann Christoph Friedrich Klug (MfN: B IX/1178)

The Friedrich-Wilhelm-University changed its name after World War II and is now known as Humboldt-University. One might assume that Humboldt deposited material from his famous travels in South America and Russia in the museum, but this is not correct. The museum does not possess any Lepidoptera collected by Humboldt. However, Humboldt was an avid promoter of natural-history research in Berlin. He encouraged and helped the then students C.G. Ehrenberg and W.F. Hemprich to realise their plans for an expedition to Arabia and North-East Africa. The Lepidoptera material from this expedition carried out in 1820-1825 was worked up by J.C.F. Klug, the second director of the museum (Fig. 1). He described and named 31 butterfly species, which are common and widespread in Africa and well-known to lepidopterists, e.g. *Colotis eris, Yphthima asterope*. The types of his species were revised by Olivier & Nekrutenko (2000) and belong to the oldest stock of Lepidoptera in the museum.

Further expeditions to Africa always brought some Lepidoptera collections to the museum. Material from the expedition of W.K.H. Peters to Mozambique was studied by H.C. Hopffer. He named a large number of butterflies, which are valid names today, e.g. *Acraea oncaea, Tarucus sybaris*. After Hopffer`s death in 1876 the next Lepidoptera curator was H. Dewitz (Fig. 2). He continued the work on African butterflies and moths, and described species from all over the continent. He died in 1890, and responsibility for the Lepidoptera collection was taken over by Karl Grünberg (1878-1931). He published the first checklist of Lepidoptera of South-West Africa (Grünberg 1910) and named new species in several families.

Fig. 2: Hermann Dewitz (MfN: B I/31)

Fig. 3: Embrik Strand (MfN: B I/171)

In those years Embrik Strand (Fig. 3) was a research associate, who described numerous species from the growing collection. He published the first and only summary of African Microlepidoptera (Strand 1913).

The next curator was F.A.F. Karsch (Fig. 4). He was an able entomologist, who did research and curatorial work in many invertebrate groups. Apart from describing butterflies he also named moths. He was especially interested in the families Limacodidae and Metarbelidae. This interest was passed on to his successor M.E. Hering (Fig.5), who worked in the museum from 1921 to 1957. Hering was a contributing author to the famous Seitz Series, "Die Gross-Schmetterlinge der Erde". He worked on the families Sphingidae, Limacodidae, and Lymantriidae for the African Region and discovered and named hundreds of new species. He was also the first Lepidoptera curator who visited Africa. Unfortunately, material from his voyage to Ethiopia in October to December 1959 (after his retirement) mostly remained unstudied (Spencer 1968: p. 96). During the times of Hering`s curatorship, several well known lepidopterists were permanent visitors in the collection or research associates working and publishing on African groups. Among the most productive was Max Gaede (Fig. 6), who contributed to the Seitz Series by writing several family chapters including the speciose Noctuidae, the Arctiidae, Saturniidae, Cossidae, Metarbelidae etc. Although he was

Fig. 4: Ferdinand Anton Franz Karsch (MfN: B I/531)

Fig. 5: Martin Erich Hering (MfN: B I/470)

Fig. 6: Max Gaede (MfN: BI/2305)

Fig. 7: Arnold Schultze (MfN: B I/2127)

not a staff member his type material is preserved and included in the collection. A contemporary of Hering was Arnold Schultze (Fig. 7). He served some years as lieutenant and topographer in the German colonies of Africa and was a passionate butterfly collector and researcher. He and other specialists described several new species from his collection. He bequeathed his butterfly collection to the museum. Many interesting details of the interesting life of A. Schultze after World War I can be found in Zeckau & Zischler (2010).

The successor of Hering was H.J. Hannemann (1925 – 2010). He was the first and only one in the sequence of curators, who did not work on African Lepidoptera. However, he was the director of the Zoological Museum for many years and enabled me to join the museum as his designated successor in 1986. After the reunification of Germany travels to Africa and other parts of the world became eventually possible for most of the museum`s scientists. In 1992, I took part in the first expedition to Africa, organised by entomologists of the museums in Berlin and Windhoek, which lead us to Namibia. Since that time, the author has been a regular visitor to southern Africa and also to other African countries, sometimes together with entomologists from the museum who shared the interest

Fig. 8: The African group of entomologists of the museum in Namibia 1993 (from left to right: W. Mey, K. Ebert, F. Koch, M. Uhlig, J. Deckert)

in the African entomofauna (Figs 8-9).

Today, the collection-based research in the museum has an emphasis on the study of African Lepidoptera. In contrast to the studies of most preceding curators, butterflies play only a minor role. The focus is on the Microlepidoptera, a group which belongs to the least collected and least known insects in Africa.

The present volume summarises the taxonomic and faunistic research on Microlepidoptera that was done by the author during recent years in the framework of the BIOTA project and other DFG-financed projects.
The taxonomic part covers only a small proportion of the accumulated material present now in the museum`s collection. The treatment concentrates on descriptions and re-descriptions of species from which sufficient material or long series are available.

A large part of the remaining material of supposedly unnamed species consists mostly of singletons and doubletons. The taxonomic study of these species is underway and will remain a task of years to come.

Period	Name	Birth/death	Major publications
1818 - 1856	Johann C.F. Klug	1775 - 1856	Klug (1829-45)
1839 - 1876	Heinrich C. Hopffer	1839 - 1876	Hopffer (1862)
1876 - 1890	Hermann Dewitz	1848 - 1890	Dewitz (1879)
1878 - 1921	Ferdinand A.F. Karsch	1853 - 1936	Karsch (1896)
?1891 - 1915	Karl Grünberg	1878 - 1931	Grünberg (1910)
1921 - 1957	Martin E. Hering	1893 - 1967	Hering (1926, 1955)
1950 - 1990	Hans-Joachim Hannemann	1925 -2010	-
1986 -	Wolfram Mey	1953 -	Mey (2004, 2007)

Table A: Chronological list of curators of the Lepidoptera collection of the Museum für Naturkunde Berlin since its foundation.

Fig. 9: Time for a sundowner, Gobabeb, Namibia, 2007 (from left to right: J. Deckert, F. Koch, W. Mey, K. Ebert)

2. Material and methods

Collecting

All collecting methods can be used if an inventory of the local fauna is the aim of a project. The application of a variety of methods should ensure that the entire fauna is covered and as many species as possible are collected. It was the goal of all collecting campaigns to get the complete spectrum of adult Lepidoptera species from each sample site during a visit.
In general, day flying moth and butterflies were collected by using a conventional hand net. Night active moths were collected by operating different light sources. Incidentally found caterpillars and larvae (e.g. miners) were tried to breed.

If it comes to comparisons of different localities it is necessary to apply a quantitative collecting technique and a standardised sampling protocol.

Quantitative samples were obtained by using battery operated automatic light traps (Fig. 10-11). The trap was equipped with one 15 W superactinic light-tube (Philips TLD) and a photoelectric switch. Chloroform was used as killing agent. The traps were in operation over a 4 hours period after sunset. One, two or three traps per night were operated simultaneously. They were deployed at different sites of a locality or on a BIOTA Observatory. The disadvantage of this trap type is the short distance within which Lepidoptera are effectively attracted and the often poor quality of the sampled specimens. Therefore additional material was gathered by systematic collecting of an illuminated (160 Watt bulb) white sheet (Fig. 12-14). The lamp was powered by a Honda Ex 7 generator. A third method of light trapping was the use of a so called light-tower with 2 x 15 Watt super-actinic light-tubes (company F. Weber, Stuttgart). The tower was battery powered (Panasonic, 12 V, 10 Ah) and was in operation simultaneously with the light traps. The tower is a very mobile device (Fig. 15), and thus, was very useful for collecting in remote or special habitats. Especially Microlepidoptera can be effectively collected with the light tower.

Sampling protocol

Butterflies

Butterflies were not in the focus of the collecting activities. They were not collected systematically because most of the time allocated for single locality was spent in processing and setting moths, and only little time left for hunting and searching butterflies. Nevertheless, at least some butterflies were caught on most localities during inspection walks or while searching for day flying moths.

Fig. 10--11: Automatic light trap: 10 - version with standing on the ground (Pronamib south of Sesriem after good rain in 2008)
11 – version with hanging trap on a tree at 1.5-2.00 m height

Material from Malaise-traps was provided by my colleague Dr. Frank Koch. On some BIOTA Observatories quantitative sampling of butterflies was carried out using the line transect method (Pollard & Yates 1993, Settele et al. 1999). Four transects measuring 250 m each were cut through the observatory. They formed a continuous line leading through different habitat types within the observatory. Trails passing through or along the edge of the observatory were used. While walking along the transects all flying or resting individuals of butterflies were recorded and counted in a corridor of 5 m width. Individuals that could not be identified in the field were captured using a sweep net.

Butterfly activity is highest in sunshine between 9.00 a.m. and 15.00 p.m. and counting was performed during this time. Specimens were identified using Pringle et al. (1994) and Woodhall (2005). The results were published in Mey (2010b).

There is usually a strong seasonality in butterflies. Emergence takes place after the first rains that start in Namibia in December-January. Many species fly only during this time. Later, the abundance of butterflies is declining and counting becomes irrelevant. The onset of the rainy period is uncertain and can vary within 2-3 months.

Moths

All individuals obtained from light traps and the light tower were counted and identified to family, and if possible to genus and species. The result of each trap, number of specimens (N) and number of species (s), was eventually summarised in a single sample. All samples which are used for comparing the observatories are based on these 2-3 sub-samples (2-3 light traps or 2 light traps + light tower). The diversity of the samples was calculated using the diversity index Fisher`s alpha. Calculations were done with the computer program EstimateS (Colwell 2006). The Jaccard index was chosen to asses the faunal similarity between observatories and other sampling sites. Rank/abundance plots were derived from the light trap samples and the Berger-Parker index ($d = N_{max} / N$) was used for indicating proportional abundance of species.

The analysis of the complete spectrum of Lepidoptera made use of four categories into which Lepidoptera are tradtionally separated: Microlepidoptera, Pyraloidea, Macrolepidoptera (Heterocera) and butterflies. In addition, the Noctuidae (Macrolepidoptera) as the species-richest family was kept and documented separately.

Fig. 12: A. Kirk-Spriggs, collecting Diptera from the illuminated sheet (Mile 46, March 2003)

Fig. 13: Light tower in action at night

Fig. 14: K. Ebert (left) and L. Kühne (right) collecting on vertical and horizontal sheets (near Bitterfontein, November 2008)

Fig. 15: Improvised collecting with HWL, 160 W bulb on windy Karios Observatory (April 2008)

Table B List of the localities visited since 1997

1. Namibia

No.	locality	district	province	Elevation	coordinates	Date	collector
01	Epupa Falls	Opuwo	Kunene	630m	S 17°00.127' E 13°14.742'	21.-23.2.2008	W. Mey
02	Swartbooisdrif, Kunene River Lodge	Opuwo	Kunene	1127m	S 16°39' E 15°13'	26.-27.11.2000	W. Mey
03	Baynes Mts., Otjikotona	Opuwo	Kunene	1252m	S 17°20.071' E 13°07.276'	23.-25.2.2008	W. Mey
04	Joubert Pass	Opuwo	Kunene	1360m	S 18°53.975' E 13°46.090'	1.2.2009	W. Mey
05	Ruacana Falls	Opuwo	Kunene	1178m	S 17°24' E 14°13'	22.2.2008	J. Deckert
06	Ongongo Falls Sesfontein	Opuwo	Kunene	ca. 900m	S 19°08' E 13°49'	28.11.2000	W. Mey
07	Hobatere Campsite	Opuwo	Kunene	1256m	S 19°19.016' E 14°28.153'	19.-21.2.2008	W. Mey
08	Khowareb, River Camp	Khorixas	Kunene	688m	S 19°15.541' E 13°52.658'	2.2.2009	W. Mey
09	Palmwag Lodge, campsite	Khorixas	Kunene	995m	S 19°45.21' E 15°10.12'	12.3.2005	W. Mey
						26.2.2008	W. Mey
10	Etendeka Plateau	Khorixas	Kunene	1133m	S 19°38.328' E 13°52.142'	27.-29.2.2008	W. Mey
11	Koigab, 5 km E Springbokwasser	Khorixas	Kunene	580m	S 20°15.371' E 13°44.187'	31.1.2009	W. Mey
12	Grootberg Pass	Khorixas	Kunene	1546m	S 19°50.601' E 14°07.703'	3.2.2009	W. Mey
13	Buschfeld Park Resort	Outjo	Kunene	1288m	S 20°05.649' E 16°07.662'	4.-5.2.2009	W. Mey
14	Holstein Farm, Otjikondo	Outjo	Kunene	1200m	S 19°45' E 15°30'	13.3.2005	W. Mey
15	Xaragu Camp	Khorixas	Kunene	561 m	S 20°24.221' E 14°20.042'	7.8.2007	C. Wieser

16	Etosha National Park, Namutoni	Tsumeb	Oshikoto	1200m	S 18°48' E 16°56'	7.11.1999	W. Mey
						23-25.11.2000	W. Mey
17	Varianto Farm	Tsumeb	Oshikoto	1550m	S 19°23.01' E 17°43.57'	29.3.- 1.4.2003	W. Mey
						22.2.2007	J. Deckert
18	Etosha National Park, Halali	Tsumeb	Oshikoto	1270m	S 18°48' E 16°56'	6.11.1999	W. Mey
19	Mile 46 BIOTA observatory	Rundu	Kavango	1180m	S 18°18.06' E 19°15.29'	24.-29.3.2002	V. Richter
						24.-26.3.2003	W. Mey
						16.2.2007	J. Deckert
20	Kaudom Game Park	Rundu	Kavango	1200m	S 18°31' E 20°43'	25.2.2009	F. Koch
21	Rundu, River Lodge	Rundu	Kavango	1086m	S 17°54.43' E 19°45.34'	27.- 29.3.2003	W. Mey
22	Popa Falls	Rundu	Kavango	1005m	S 18°07' E 21°35'	8.11.1999	W. Mey
23	Nakatwa, Mudumu National Park	Katima Mulilo	Caprivi		S 18°10' E 23°26'	4-6.11.2007	F.Koch, V. Richter
24	Katima Mulilo, Zambezi River Lodge	Katima Mulilo	Caprivi		S 17°27' E 24°14'	9.-10.11.1999	W. Mey
25	Bushbaby Camp, 10 km N Grootfontein	Grootfontein	Otjozondjuba		S 19°32' E 18°01'	8.2.2010	J. Deckert
26	Roys`s Restcamp, Grootfontein 56 km NE	Grootfontein	Otjozondjuba		S 19°14 E 18°30	5.2.2007	J. Deckert
27	Mt. Etjo	Otjiwarongo	Otjozondjuba	1700m	S 21°15' E 16°50'	14.3.2005	W. Mey
28	Okatjikona, Waterberg	Otjiwarongo	Otjozondjupa	1439m	S 20°23.765' E 17°23.909'	30.10.-1.11.2007	F. Koch
						14.-18.2.2008	W. Mey
29	Aha Hills	Tsumkwe	Otjozondjuba		S 19°51' E 20°54'	17.-21.11.2008	F. Koch
30	Tsumkwe, 34 km NNE	Tsumkwe	Otjozondjuba		S 19°18.49' E 20°37.47'	4.2.2007	J. Deckert
31	Waterberg, Tourist camp	Otjiwarongo	Otjozondjupa	1535m	S 20°25.37' E 17°15.01'	21-22.11.2000	W.Mey
32	Omatako Ranch BIOTA observatory	Okahandja	Otjozondjupa	1519m	S 21°30.429' E 16°43.566'	22.-23.3.2002	K. Ebert
						22.-23.3.2003	W. Mey
						12.1.2007	W. Mey, K. Ebert
						9.4.2008	J. Deckert
33	Erichsfelde BIOTA observatory	Okahandja	Otjozondjupa	1349m	S 21°35.447' E 16°56.174'	15.4.-19.4.2002	V. Richter
						19.-21.3.2003	W. Mey
						10.-11.1.2007	W. Mey, K. Ebert
						12.2.2007	J. Deckert
						29.10.2007	W. Mey
						13.-14.2.2008	W. Mey
						8.4.2008	W. Mey
34	Farm Tiefenbach	Okahandja	Otjozondjupa	1340m	S 21°32.34' E 16°58.10'	15.- 19.4.2002	V. Richter
35	Kaiser Wilhelm Berg	Okahandja	Otjozondjuba	1400 m	S 21°58' E 16°56'	30.10.2007	W. Mey
						6.3.2010	J. Deckert
36	Sandveld BIOTA observatory	Gobabis	Omaheke	1523m	S 22°04.33' E 19°13.39'	22.-26.1.2007	W. Mey, K. Ebert
37	Ondekaremba Farm	Windhoek	Khomas	1600m	S 22°31' E 17°30'	18.2.2008	W. Mey
38	Windhoek Mountain Lodge	Windhoek	Khomas	1917m	S 22°41.345' E 17°06.948'	20.4.2008	W. Mey
						4.12.2008	W. Mey, K. Ebert
						25.1.2009	W. Mey

39	Daan Viljoen Game Park	Windhoek	Khomas	1600m	S 22°26' E 16°53'	17.3.2005	W. Mey
	Brakwater	Windhoek	Khomas	1600 m	E 22°20' E 17°05'	3.-4.10.2001	W. Mey
40	Krumhuk Farm	Windhoek	Khomas	1850m	S 22°43.065' E 17°06.070'	24.1.2009	W. Mey
41	Claratal Farm BIOTA observatory	Windhoek	Khomas	1865m	S 22°46.758' E 16°46.488'	21.1.2005	W. Mey, K. Ebert
						22.4.2008	J. Deckert
42	Vaalgras Farm	Windhoek	Khomas	1843m	S 22°78.23' E 16°77.12'	22.1/1.2.2005	W. Mey, K. Ebert
43	Gamsberg, Weener Farm	Windhoek	Khomas	1900-2050m	S 23°50' E 16°23'	26.-29.1.2007	W. Mey, K. Ebert
44	Rooisand, BIOTA observatory	Windhoek	Khomas	1156m	S 23°17.755' E 16°06.693'	20.-21.1.2007	W. Mey, K. Ebert
						12.4.2008	W. Mey
45	Nanais, Omaruru Flußtal	Omaruru	Erongo	ca 900 m	S 21°27.790' E 15°03.894'	23.3.2001	W. Mey
46	Brandberg, White Lady Lodge	Omaruru	Erongo	380 m	E 14°40.28' E 21°01.33'	6.8.2007	C. Wieser
47	Eileen Farm Erongo Mt.	Omaruru	Erongo	1310m	S 21°30.52' E 15°55.03'	15.- 16.3.2005	W. Mey
48	Kuduberg Farm, Erongo Mt.	Omaruru	Erongo	1500m	S 21°31' E 15°55'	12.-15.1.2007	W. Mey
						27.2.-2.3.2008	F. Koch
49	Wlotzkasbaken, BIOTA observatory	Swakopmund	Erongo	34m	S 22°22.556' E 14°29.119'	9.4.2008	W. Mey
						29.1.2009	W. Mey
50	Ombujomenge Farm	Karibib	Erongo	1316m	S 22°01.961' E 16°06.850'	3.-12.1.2003	P. Schmitz
						26.12.-10.1.2005	P. Schmitz
51	Great Spitzkoppe	Karibib	Erongo	1102m	S 21°48.715' E 15°10.404'	1.-3.3.2008	W. Mey
52	Wüstenquell Farm, 90 km E Swakopmund	Swakopmund	Erongo		S 22°37.35' E 15°22.34'	21.3.2010	J. Deckert
53	Swakopmund, Sophia Dale Resort	Swakopmund	Erongo	36m	S 22°42' E 14°31'	15.1.2007	W. Mey, K. Ebert
54	Ganab, BIOTA observatory	Karibib	Erongo	995m	S 23°07.204' E 15°32.498'	18-20.1.2001	W. Mey, K. Ebert
						10.4.2008	W. Mey
55	Gobabeb, BIOTA observatory	Swakopmund	Erongo	419m	S 23°53.24' E 15°04.58'	16.-20.1.2007	W. Mey, K. Ebert
						11.4.2008	W. Mey
56	Gobabeb, Kuiseb Rivier	Swakopmund	Erongo	373m	S 23°52.58' E 15°04.28'	16.1.2007	W. Mey, K. Ebert
57	Mirabib	Swakopmund	Erongo	752m	S 23°27.264' E 15°21.223'	27.1.2009	W. Mey
58	Vogelfederberg	Swakopmund	Erongo	493m	S 23°03.334' E 14°59.376'	28.1.2009	W. Mey
59	Messum Revier	Swakopmund	Erongo	133m	S 21°23.294' E 13°56.312'	30.1.2009	W. Mey
60	Sesriem	Maltahöhe	Hardap	983m	S 24°55.618' E 15°57.499'	13.4.2008	W. Mey
						15.3.2003	W. Mey
61	Sossusvley, Namib Desert Lodge	Maltahöhe	Hardap	900m	E 24°07.10' E 15°54.18'	8.12.2009	C. Wieser
62	Naukluft Mts. Tsams Ost	Maltahöhe	Hardap	1370m	S 24°14.053' E 16°06.127'	2.-3.12.2008	W. Mey, L. Kühne, K. Ebert
63	Naukluft Mts., Blässkranz Farm	Maltahöhe	Hardap	1380m	S 24°81' E 16°14'	7.3.2003	W. Mey
						3.3.2002	J. Deckert
64	Naukluft Mts. , Koedoesrus campsite	Maltahöhe	Hardap	1460 m	S 24°16' E 16°14'	8.3.2005	W. Mey

						29.-31.1.2007	W. Mey, K. Ebert
						27.2.2008	J. Deckert
65	Oerwald, Tsauchab	Maltahöhe	Hardap	1080m	S 24°30' E 16°07'	15.12.2007	J. Deckert
66	Anib campsite 27 km N Mariental	Mariental	Hardap	1205 m	S 24°25' E 18°06'	10.2.2009	J. Deckert
67	Koiimasis Farm, Tiras Berge	Lüderitz	Karas	1280 m	S 26°01.25' E 16°24.01'	6.3.2005	W. Mey
						11.12.2009	C. Wieser
68	Namtip Farm, Tiras Berge	Lüderitz,	Karas	1420m	E 26°02' E 16°16'	13.12.2007	J. Deckert
69	Aus, Klein-Aus Vista	Lüderitz	Karas	1406m	S 26°39.572' E 16°14.103'	14.4.2008	W. Mey
						11.12.2009	C. Wieser
						5.3.2005	W. Mey
70	Kolke, Nasepberg	Lüderitz	Karas	1186m	S 27°41.713' E 17°01.715'	15.4.2008	W. Mey
71	Sturtzbach Farm	Karasburg	Karas	1299m	S 27°07.477' E 18°43.839'	18.-19.4.2008	W. Mey
72	Brukkaros, campsite	Keetmanshoop	Karas	1100m	S 25°55.57' E 17°48.22'	18.3.2005	W. Mey
73	Gellap Ost BIOTA observatory	Keetmanshoop	Karas	1099m	S 26°24.42' E 18°00.44'	3.- 7.4.2002	V. Richter
						6.– 7.3.2003	W. Mey
74	Karios, BIOTA observatory	Karasburg	Karas	897m	S 27°40.412' E 17°49.199'	28.3- 2.4.2001	W. Mey, K. Ebert
						9.- 11.3.2003	W. Mey
						13.10.2007	W. Mey,
						28.10.2007	W. Mey,
						16.-17.4.2008	W. Mey,
						1.12.2008	W. Mey
75	Canyon Village, Gondwana Canyon Lodge	Karasburg	Karas	757m	S 27°39.185' E 17°46.476'	1.12.2008	W. Mey, L. Kühne, K. Ebert
76	Swartkoppies Gondwana Canyon Lodge	Karasburg	Karas	850m	S 27°41.01' E 17°48.21'	8./ 12.3.2003	W. Mey
						13.-15.12.2007	F. Koch
						21.-25.2.2008	F. Koch
77	Ai-Ais, Fish River Canyon	Karasburg	Karas	140m	S 27°55' E 17°29'	5.-6.10.1997	W. Mey
						19.3.2005	W. Mey
						14.10.2007	W. Mey
78	Orange River, Felix Unite, Noordoewer	Karasburg	Karas	125m	S 28°25.251' E 17°41.314'	13.- 14.3.2003	W. Mey
79	Orange River, Abiqua River Camp, Noordoewer	Karasburg	Karas	120m	S 28°25.051' E 17°41.301'	4.3.2005	W. Mey
80	Gamkap, Orange River, Aussenkehr	Karasburg	Karas	105m	S 28°15.051' E 17°21.269'	30.11.2008	W. Mey, L. Kühne, K. Ebert

2. South Africa (RSA)

No.	locality	district	province	elevation	coordinates	time
81	Brandkaros, Orange River	Namakwa	Northern Cape	36	S 28°29' E 16°41'	10.10.2001
82	Numees, BIOTA observatory	Namakwa	Northern Cape	626m	S 28°17.58' E 16°57.228'	9.-12.10.2001
83	Yellow Dunes, BIOTA observatory	Namakwa	Northern Cape	193m	S 28°22.038' E 16°23.85'	13.10.2001

84	Koeroegapvlakte, BIOTA observatory	Namakwa	Northern Cape	664m	S 28°14.116' E 17°01.509'	14.- 16.10.2001
						6.-11.10.2002
85	Kamieskroon, Hotel	Namakwa	Northern Cape	830m	S 30°09.35' E 17°57.02'	20.3.2005
86	Windhoek Farm	Namakwa	Northern Cape	930m	S 30°11.103' E 17°56.308'	15-18.10.2007
						26.11.2008
87	Eselkop Mt.,	Namakwa	Northern Cape	1233m	S 30°22.402' E 18°04.224'	27.11.2008
88	Sneeukop Mt., Modderfontein	Namakwa	Northern Cape	1147m	S 30°09.334' E 17°58.734'	28.11.2008
89	Spoekrevier, Bethelklip	Namakwa	Northern Cape	393m	S 30°22.194' E 17°50.135'	29.11.2008
						6.- 11.10.2002
90	Soebatsfontein, BIOTA observatory	Namakwa	Northern Cape	392m	S 30°11.14' E 17°32.58'	29.9.- 5.10.2002
91	Draihoek	Namakwa	Northern Cape	436m	S 30°42.765 E 18°25.644	25.11.2008
92	Molopo Lodge	Siyanda	Northern Cape	800m	S 26°28' E 20°37'	7.10.1997
93	Twee Rivieren	Siyanda	Northern Cape	800m	S 25°04.970' E 22°09.294'	8.-10.10.1997
						16.12.2009
94	Karoo National Park	Karoo	Western Cape		S 32°19' E 22°30'	12.-13.10.1997
95	Swellendam	Overberg	Western Cape		S 34°02' E 20°26'	17.10.1997
96	Groot Graafwater, Kners-vlakte	West Coast	Western Cape	208m	S 31°18.103' E 18°29.398'	27.10.2007
97	Roscherpan Nature Reserve, BIOTA obsery.	West Coast	Western Cape	2-35m	S 32°36.725' E 18°17.821'	20. - 21.11.2008
98	Cederberg Wilderness Area, Algeria	West Coast	Western Cape	500m	S 32°23.08' E 19°04.02'	2.10.1997
99	Uitkykpass, Cederberg Wilderness Area	West Coast	Western Cape	800m	S 32°24.99' E 19°05.02'	21.10.2001
						3./23.3.2005
						23.11.2008
100	Jamaka Farm	West Coast	Western Cape	510m	S 32°20.242' E 19°01.473'	18. –21.10.2001
						1.- 3.3.2005
						21.3.2005
						18-22.10.2007
						8.-12.12.2007
						7.-18.9.2008
						22-24.11.2008
101	Constantia	Cape Town	Western Cape	195m	S 34°01.480' E 18°24.934'	13.- 17.10.2009
102	Hout Bay, Orange Kloof	Cape Town	Western Cape	70m	S 34°00.622' E 18°23.278'	
103	Table Mtn. National Park, Headquarter	Cape Town	Western Cape	48m	S 34°14.254' E 18°25.056'	22-26.10.2007
						4.12.2007
						2.-6.12.2007
104	Table Mtn. National Park, Olifantsbos	Cape Town	Western Cape	10m	S 34°15.842' E 18°23.904'	22-26.10.2007
						17- 19.11.2008
105	Cape Peninsula, BIOTA observatory	Cape Town	Western Cape	83m	S 34°26.020' E 18°39.2285	18.11.2008
106	Jonkershoek, Glenn-conner	Winelands	Western Cape	185m	S 33°57.364' E 18°54.562'	28.9.- 5.10.2008
						23.3.2009

107	Jonkershoek Nature Reserve	Winelands	Western Cape	560m	S 33°59.620' E 18°56.930'	30.9. and 4.10.2008
						25.3.2009
108	Assegaibosch Nature Reserve	Winelands	Western Cape	248m	S 33°58.200' E 18°55.441'	4.10.2008
						25.3.2009
109	Theewaters Nature Reserve	Winelands	Western Cape	450m	S 33°56.315' E 19°09.661'	26.3.2009
						16.10.2009

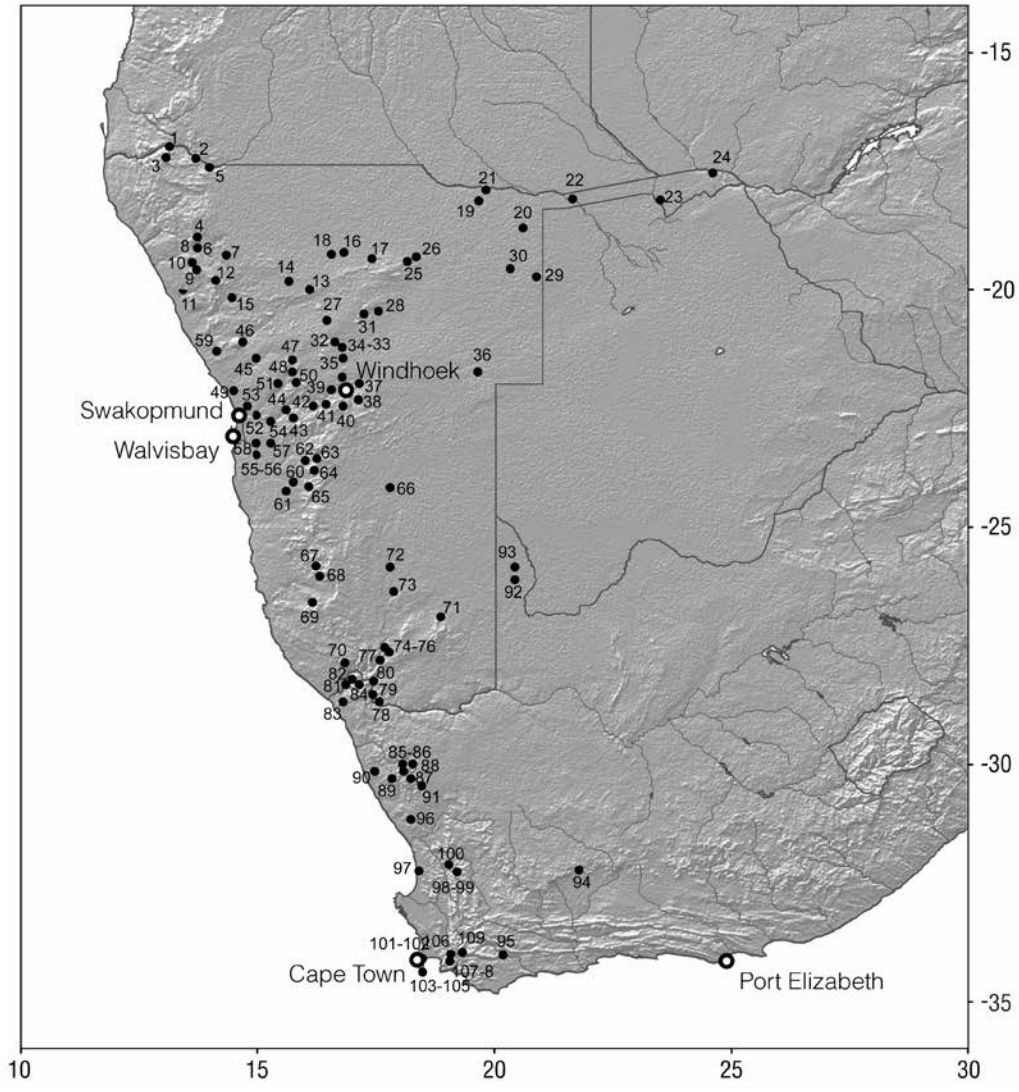

Fig. 16: Map of southwestern Africa showing sample sites. The numbers correspond with the numbers in table B.

3. Study Area

Delimitation

South West Africa was the name of the German colony situated south of Portuguese Angola and north & east of British South Africa and founded in 1884. After World War I the country became a protectorate of South Africa. In 1990 it gained independence and was founded as the Republic of Namibia. South West Africa is a historical and political term that was used to denote the land which is today Namibia. From a geographical perspective, southwestern Africa can be understood as a much larger area including Angola, Namibia and parts of South Africa. The characteristic feature of this area is an arid and semiarid climatic zone which extends as a narrow coastal strip from south-western Angola to the south becoming a broader corridor through Namibia towards South Africa, and encompassing deserts, semi-deserts, steppes and macchia. Biogeographically the area is clearly separated from the rest of Africa. The term southwestern Africa is used here to denote this region. Concerning administrative units the area encompasses the provinces Namibe and Cunene in Angola, the western and southern provinces of Namibia and the Northern and Western Cape of South Africa (RSA). For practical reasons the whole of Namibia is included in the study area.

Topography and geology

According to altitude, four major physical features characterise the study area and govern the distribution of the biota. These are the narrow coastal strip along the west coast, the mountainous Escarpment, the high central plateau including the vast Kalahari Basin and the coastal mountains of the Cape. A profile/cross-section of the continent from the Atlantic Ocean to the interior of Central Namibia (Fig. 17, cf. p. 22) clearly shows these different landscape structures. The coastland of Namibia is covered by large sand dunes or rocky plains of the Namib Desert and extends from southern Angola to the lower valley of the Orange River. The mountainous Escarpment is the elevated edge of the central plateau which runs inland parallel to the coastline. In Namibia it slopes towards the west and in South Africa towards the south. It is strongly dissected and divided into a series of subsequent mountain ranges and inselbergs. The Richtersveld and the Kamieskroon Mountains are included in the Escarpment. In central Namibia the Escarpment is interrupted by a large plain, but in this interval the ancient volcanoes Brandberg and Erongo tower over the plains as spectacular inselbergs. In South Africa the Escarpment turns from a north-south orientation to an eastward direction beginning with the Roggeveld and Langeberg. The plains south of the Escarpment and stretching to the Cape Fold Mountains belong to the Karoo. The Cape Fold Mountains are a system of longer and shorter mountain ranges running west-east parallel to the south coast of the continent. In the west, the ranges have a north-south directed extension (Cederberg) or form isolated mountain blocks rising abruptly from the lowland plains (e.g. Cape Peninsula, Piketberg).

The geology of the western Cape Mountains is dominated by quarzitic sandstones of Jurassic age. The resulting soils on these rocks are nutrient poor. The geology of the Escarpment is diverse and complicated. In Namaqualand metamorphic rocks dominate the landscape. In northern Namibia the sandstones and layers of the Karoo sequence are topped by basalt layers (= Etendeka Plateau). Inselbergs consist mostly of granites. The coastal plains are sandy areas with dune fields behind the shoreline and with isolated rocky outcrops further inland. The central plains and the Kalahari Basin are also covered by sandy soils.

Detailed information on the geology and geography of the study area can be found in Birkenhauer (1991), Mendelson et al. (2002), Miller (2000), Moore et al. (2009), Mthoko et al. (1990), Van Zinderen Bakker (1975).

Vegetation and ecological conditions

The overwhelming majority of the Lepidoptera species have phytophageous larvae (= caterpillars) feeding on green plant material or algae. Species are either polyphageous with a larger or smaller number of host plants, or oligophageous to monophageous using only a single species or genus as food-plant. Vegetation and its composition is therefore of prime significance for the occurrence and distribution of Lepidoptera. The dependency on plants, or material of plant origin, suggests an evolution which is closely associated with the evolution and distribution of the flora.

In terms of plant distribution, Africa south of the Sahara is a rather homogenous continent. Savanna, thornbush and forest are the dominate ecosystems which cover three quarters of the continent (Kingdon 1989). The remaining quarter is allocated to the Afromontane Biome and the southern part of Africa. The vast savanna type ecosystem of the Sudano-Zambezian Biome is replaced in southern Africa by several, much smaller biomes with a remarkable endemism and a history of their own. In southwestern Africa the vegetation exhibits

some peculiarities which are unique for the entire African continent. It is a vegetation of an arid and sub-arid land stretching from southern Angola in the North to the Karoo and the Western Cape in the South. Physiognomically it can be described as encompassing four vegetation types: desert, semi-desert, sclerophyllous shrubland (macchie or maquis) and dry savanna. The development and extent of these biomes is determined by climatic conditions. The principal abiotic factors which largely determine the diversity and composition of vegetation are temperature and rainfall.

In the winter months frost is a regular phenomenon at higher elevations at night and the mountains are often capped with snow for a short time. In summer temperatures may exceed 40°C. The pattern of temperature and rain regime is provided in figs 18-20 .These factors are not stable but fluctuate seasonally and sometimes drastically across subsequent years. In the north and north-east of Namibia and in the Karoo rainfall mainly occurs in summer (November – April), while the west-coast and the Cape receive rain during the winter months (May – October). The northern and eastern Karoo sometimes also receive summer and autumn rain (Fig. 18). In Fig 21 the typical annual rainfall pattern of three BIOTA Observatories is depicted demonstrating the seasonality and the long dry spell in the summer or winter months. A major effect on the climate of southwestern Africa has the Benguela current. Up-welling of deep, cold water occurs along the western coast with the result that rain from the sea cannot reach the coast. The development of the Namib Desert is closely connected with the existence of the Bengula sea current, which dates back to the Oligocene (Van Zinteren Bakker 1975).

On the basis of climatic diagrams Walter & Breckle (1984) have summarised vegetational units into larger Zonobiomes. For southern Africa they delimited a Zonobiome III (subtropical deserts) with transitional zones (zono-ecotones) to more humid savannas in the East and to the Mediterranean climate of the Cape in the South (Fig. 22). The Cape Floristic Region with a winter rain regime is termed Zonobiome IV. The climatic and ecological zonation of Walter & Breckle (1984) correlates more or less with the biome system developed and applied to southern Africa (Rutherford & Westfall 1986).

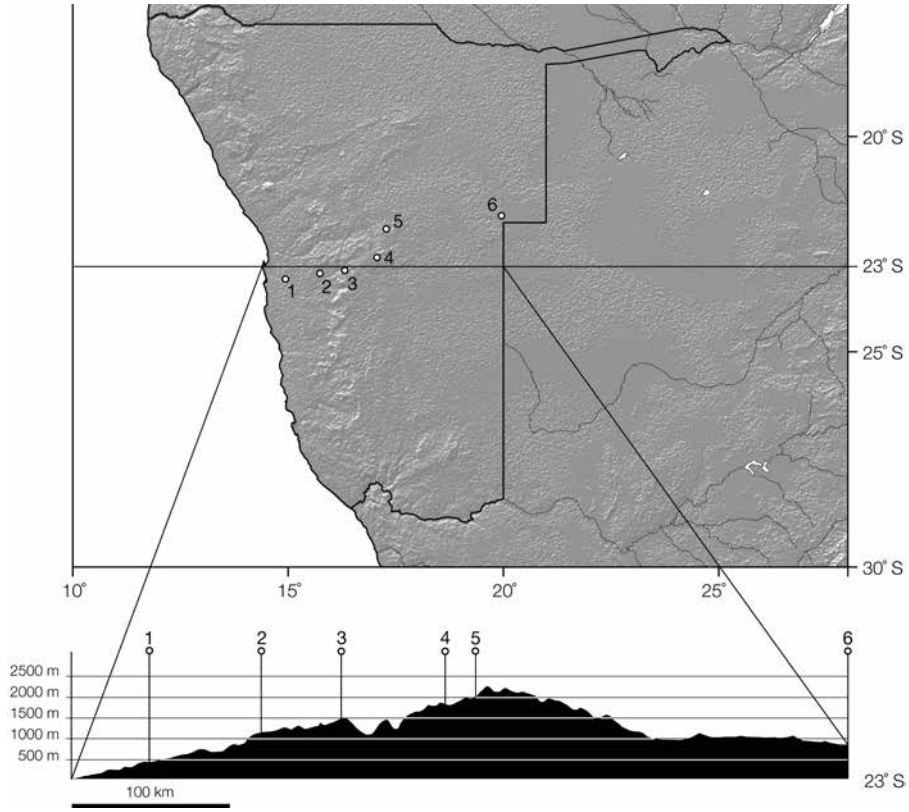

Fig. 17: Profil of the continent along transect in central Namibia on 23° S latitude line. The numbers denote the locations of BIOTA Observatories (1 – Gobabeb, 2 – Ganab, 3 – Rooisand, 4 – Claratal, 5 – Erichsfeld, 6 – Sandveld)

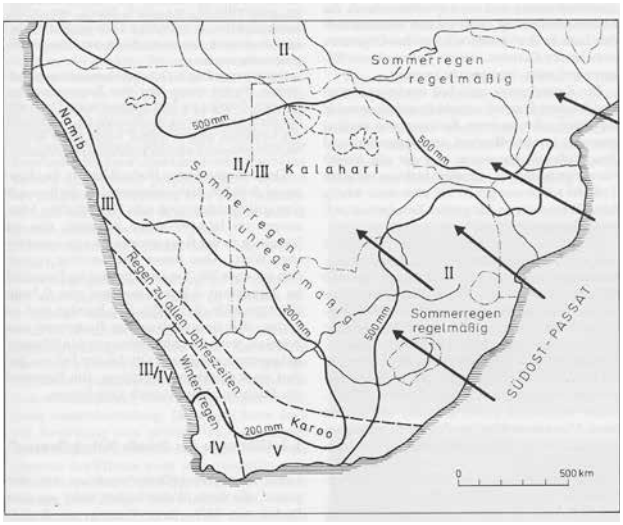

Fig. 18: Rainfall regime in southern Africa (from Walter & Breckle 1984)

Per definitionem a biome is a geographical area with a uniform appearance of vegetation based on a dominant growth form of the occurring plants. The biomes in south-western Africa are termed the Namib-Desert, Nama-Karoo, Succulent-Karoo and Fynbos (Fig. 23). In the east and north-east the Nama-Karoo intergrades into the dry Savanna Biome. In Mendelsohn et al. (2001) the Etosha Pan in Namibia is considered a biome on its own. This biome system is a finer scaled classfication in comparison to that of Walter & Breckle (1984). They both provide an overview of and guidance towards the gross ecological conditions relevant to Lepidoptera. The biome system is obviously also relevant for other groups. It is often used in Fieldguides, identification books or other summary papers on various animal groups others than terrestrial insects, e.g. scorpions (Leeming 2003), birds (Sinclair et al. 2002), mammals (Haltenorth & Diller 1980).

There are further zonation systems which were developed by considering special taxonomic groups (e.g. succulents - Van Jaarsveld et al. (2000), trees – Curtis & Mannheimer (2005)) or ecological aspects. Burgess et al. (2004) proposed a concept of Ecoregions which was established to promote conservation activities. It largely follows the division into biomes, but since the defined ecoregions are smaller, the biomes extend over several ecoregions (Fig. 24). The Namib Desert for example is split into a northern (= Kaokoveld Desert ecoregion) and a southern part (= Namib Desert ecoregion). Also the Nama-Karoo was like-wise separated into a northern (= Namib Escapment Woodlands ecoregion) and a southern part (= Nama Karoo ecoregion). If the geographical ranges of plant taxa and floristic composition are considered the large vegetation units can be differentiated further into smaller, more homogenous units. They are called vegetation types and are based on Giess (1971) for Namibia.

For South Africa a detailed system of vegetation types was established by Munica & Rutherford (2006) These units can be divided further leading to a complex hierarchy of nested phytochoria with smaller distribution areas.

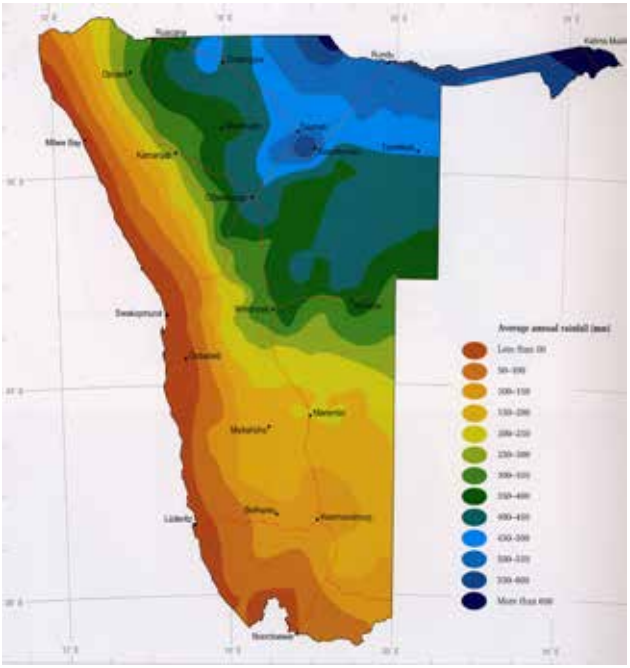

Fig. 19: Distribution of mean annual rainfall (mm) in Namibia, showing the arid coast (Namib Desert) and the semi-arid southern part (Nama-Karoo), which continues into South Africa (from Mendelsohn et al. 2002)

They are defined by their floristic composition. Are these smaller or larger distribution units of the flora or the mentioned ecoregions relevant for Lepidoptera? Does the distribution of Lepidoptera follow the vegetation pattern and ecological gradients? The best researched group in Lepidoptera are butterflies (Rhopalocera). Sufficient distributional records were available to provide sketches of the ranges of all species in South Africa (Woodhall 2005) and adjacent countries (Henning et al. 1997).

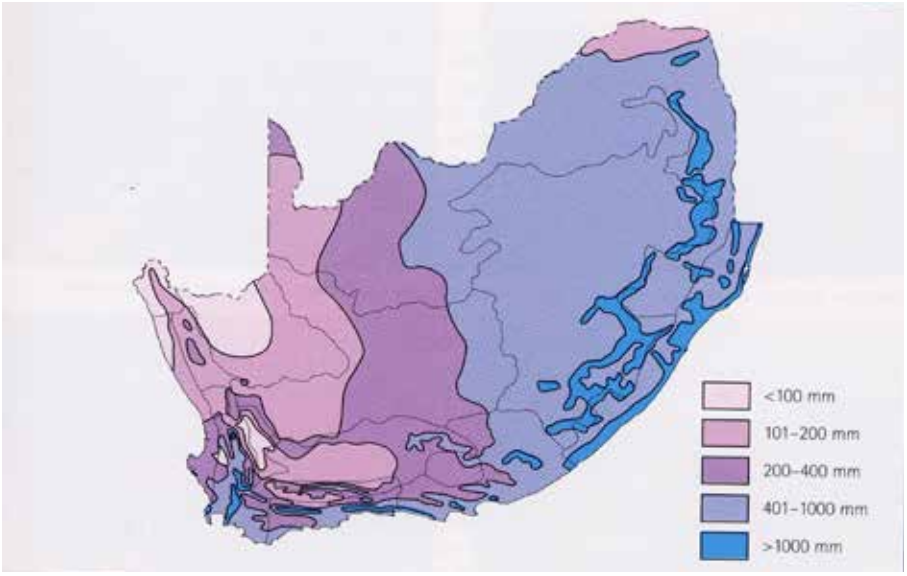

Fig. 20: Distribution of mean annual rainfall (mm) in South Africa, showing the increasing aridity towards the west (from Van Jaarsveld et al. 2000)

According to the published maps, the ranges are frequently not a reflection of the biome areas. Either these ranges are much smaller, restricted to a small area within the biome, or they are larger, encompassing parts of two or more biomes (e. g. *Tarsocera spp., Acraea trimeni*). Only species of the Fynbos biome have ranges that coincide approximately with the geographical area of this biome (e.g. *Tharucus thespis*). It can be expected that this situation also applies to many Microlepidoptera and Heterocera families (moths). However, butterflies are a homogenous group representing a single ecological guild. Besides of some special adaptations (e.g. myrmecophily) most species have caterpillars feeding externally on the host plants. In moth families a variety of further guilds occur: leaf miners, stem and twig borers, detritus feeders, leaf rollers, fruit and seed miners, root feeders etc. The many feeding strategies provide the basis for many ecological adaptations and different life-histories to exist, which must have a bearing on the distribution of these groups, resulting in additional range types. Butterflies for example are represented in arid environments by very few species only, whereas micro-moths are usually species-rich and very abundant there. The smaller body size of microlepidopteran species allows the sympatric occurrence of many species in a single locality, often in huge numbers. Therefore and in contrast to butterflies, Microlepidoptera together with the family Noctuidae, provide a much larger diversity in ecological adaptations, range sizes and range pattern which results in the development and presence of rich taxocenoses. The high diversity renders these assemblages promising candidates for corroborating vegetation units or defining them from a lepidopterological perspective. It is a task of future studies to find out whether phytochoria have their own, adequately adapted and unique Lepidoptera taxocenosis, or not.

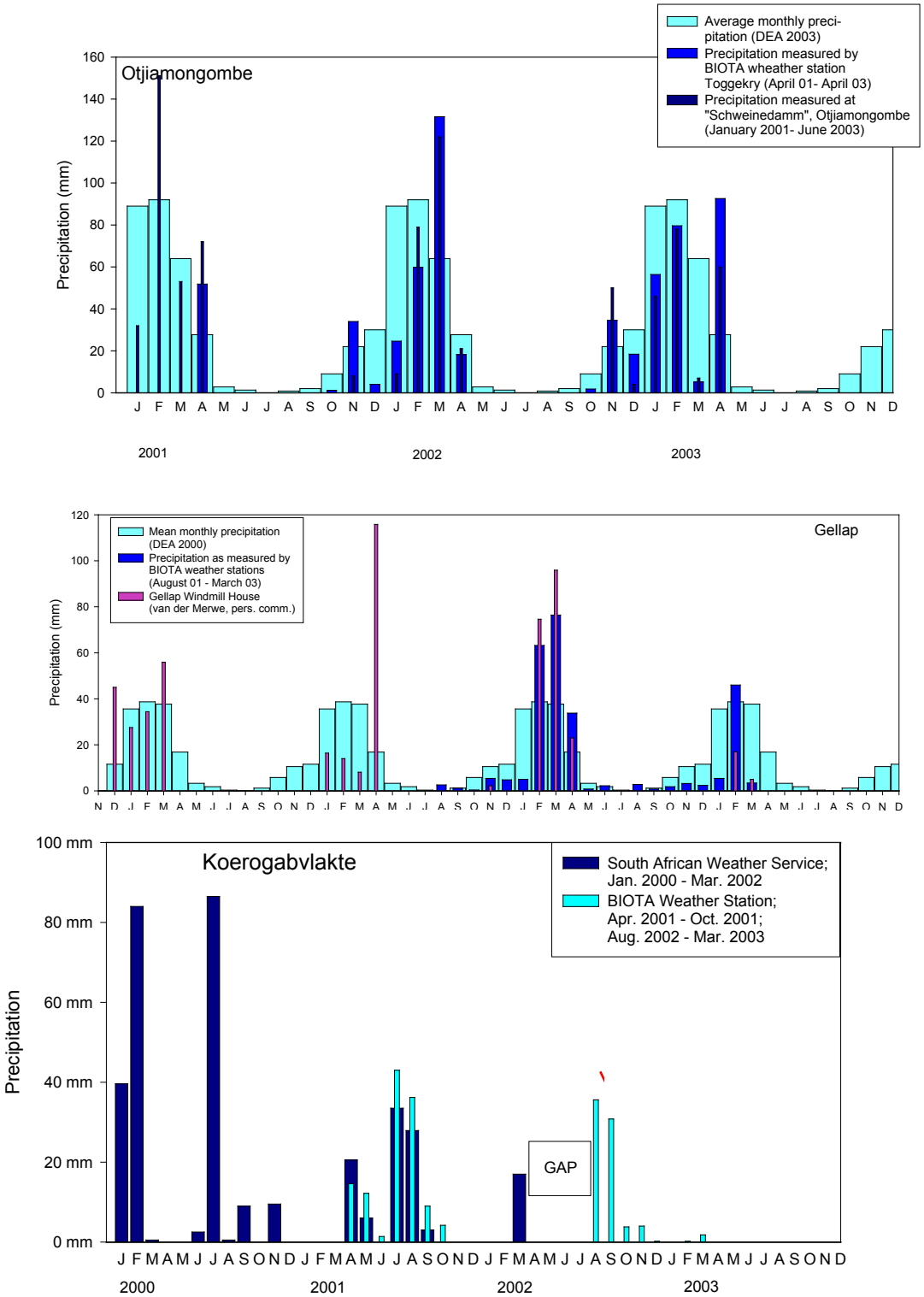

Fig. 21: Annual rainfall pattern on three BIOTA Observatories (Erichsfelde, Gellap, Koeroegapvlakte) (from: South African Weather Service)

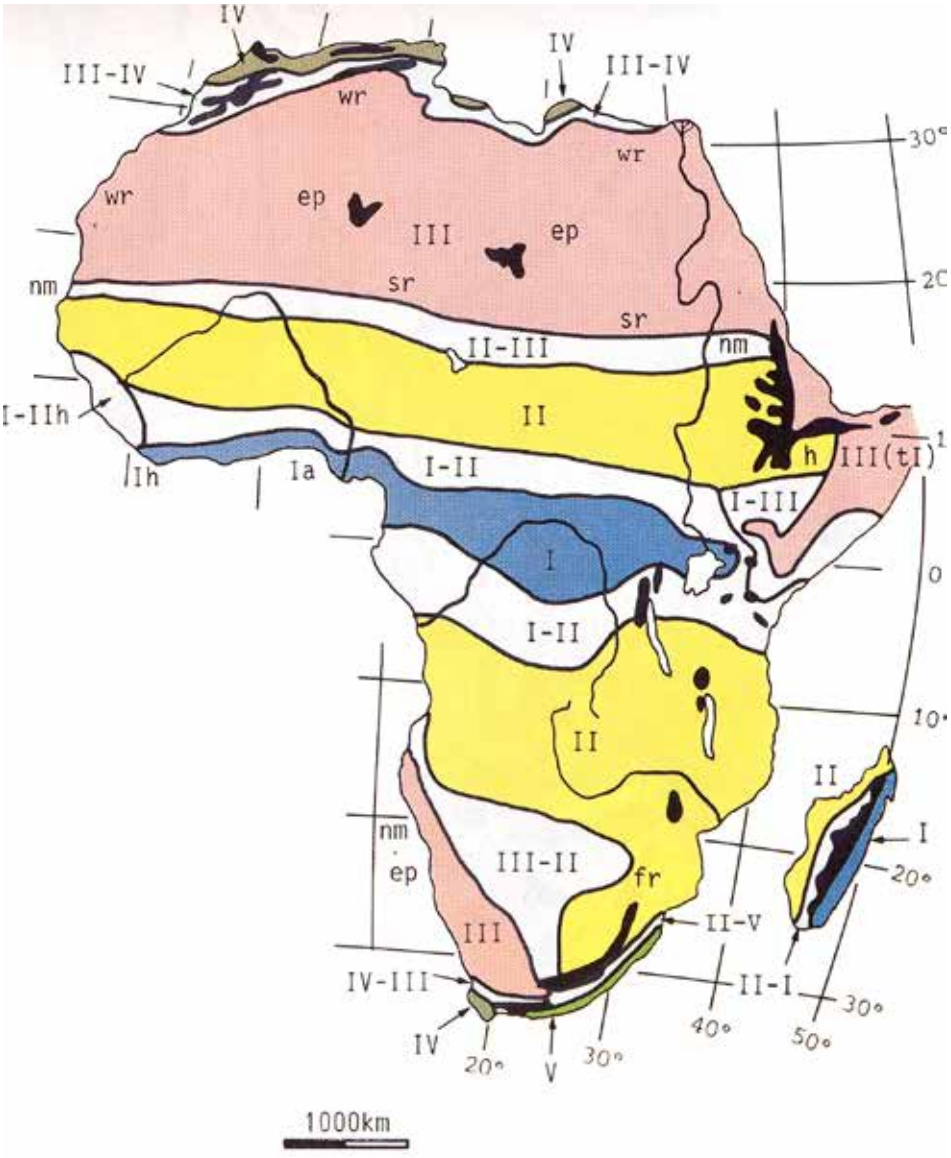

Fig. 22: Ecological zonation of Africa by Zonobiomes. In southwestern Africa the Zonobiomes III (subtropical-arid), IV (mediterranean, arido-humid) and V (humid) are separated by Zono-ecotones (transional areas) (from WALTER & BRECKLE 1984)

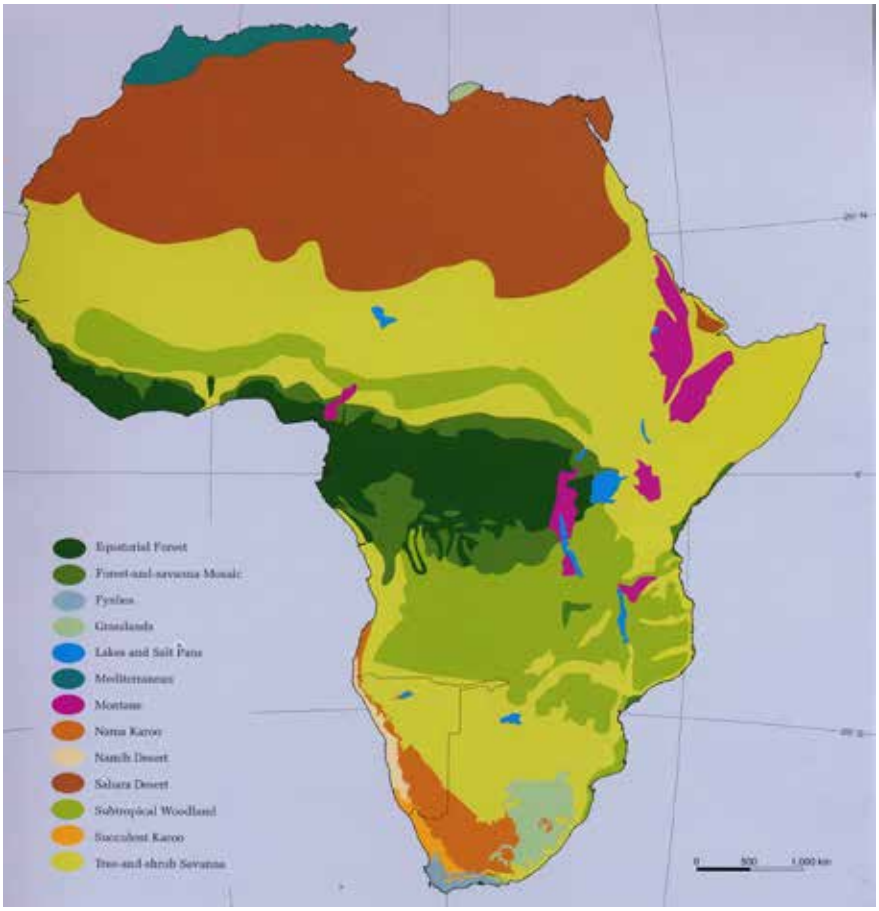

Fig. 23: The distribution of Biomes in Africa. The area of Southwestern Africa encompasses five biomes (from Mendelsohn et al. 2002)

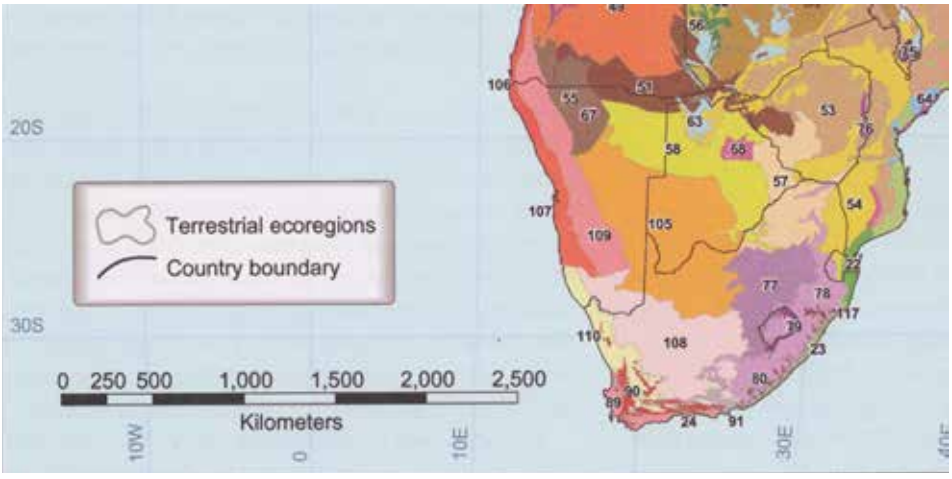

Fig. 24: Terrestrial ecoregions in southern Africa (24 - Knysna-Amatole Montane Forest, 106 - Kaokoveld Desert, 107 - Namib Desert, 108 - Nama Karoo, 109 - Namib Escarpment Woodlands, 110 - Succulent Karoo, 89 - Lowland Fynbos and Renosterveld, 90 - Montane Fynbos and Renosterveld, 91 - Albany Thickets) (from Burgess et al. 2004)

4. Lepidoptera diversity of light trap samples

Collecting Lepidoptera with artificial light sources at night remains the most efficient way of obtaining a large number of the species present in a given area. Moths collected in light traps can yield large sample sizes and many species can be easily identified by wing pattern. These advantages make the use of light traps particularly appropriate for biodiversity surveys of Lepidoptera. This method has been applied in numerous ecological studies and biodiversity projects (e.g. Axmacher & Fiedler 2004, Brehm & Axmacher 2006, Hammond & Miller 1998, Landau et al. 1999, Lödl 1987, Pogue 1999, Robinson & Tuck 1993).

In the tables the abundance classes or categories are on a log2 scale and are identified by their lower bound.

The tables already contain the names of the new species, which are described in the taxonomic chapter of the book. The attribute “spec. nov.” and the authors names were omitted because of space limitations. It was often not possible to find the correct genus of a given species. In this and similar cases the relevant taxonomic basis was found to be weak or absent at all. These species in question could only be identified to family, and thus, the family name with question marks for genus and species names were used in the tables as a surrogate.

All sample sites were photographically documented. At least one or two photos of local habitats or landscape structures were included in each chapter. The photos are self-explaining and go without legends.

Light trapping is highly dependent on weather conditions. Temperature, wind, humidity and moonlight are the main drivers of moth activity at night. When temperature drops below 10°C flight activity ceases and finally stops. At temperatures above 20°C the full spectrum of night active Lepidoptera is on the wing. Strong wind prevents especially the flight of the smaller moths whereas slight wind interrupted by calm periods has little negative effect. After rainfall, when the vegetation is wet, the smaller moths remain in their shelters and do not risk adhesion to wet surfaces. Larger moths are less affected. Even light rain can be tolerated. Full to half-moon interferes or competes with the lamp lights with the result that fewer moths are attracted. This moon-effect is less pronounced or neutralised if it is cloudy or the light trapping is done in a forest. These conditions act together to determine the eventual quality and quantity of a sample. Conversely, the nature of a sample allows the reconstruction of the weather conditions during trap operation. Samples with few Microlepidoptera are usually the result of low temperatures, whereas plenty of micromoths and the presence of scarcely attracted groups are indicatiors of optimal conditions. These observations are generally valid in southwestern Africa for the summertime or rainy season. Late autumn to early spring are seasons with rapidly falling temperatures at sunset, rendering light-trapping barley successful. Only in the evenings, when temperatures remain moderately high, are moths active and can be collected at lights. However, during winter times such days are unpredictable and exceptional for collecting. Nonetheless, there are species still flying in the cold season and some of them have been collected only in winter up to now. They are better searched for using other methods.

In summary, light traps provide highly stochastic samples, and the traps cannot be operated all year-round with the same efficiency. A single sample is always a fragment of the total species number present in a given locality. With several light traps in action at the same time, or running a single trap over consecutive nights, a much larger part of the fauna can be sampled. A single sample may give a first insight into a taxocenosis and its dominant species but it is not sufficient for other purposes. The application of the method and analysis of the samples depends on the aims of the investigations. If the aim is qualitative, i.e. the registration of species of a certain group, the target specimens are picked out from the samples and the rest can be disregarded. If quantitative data have to be collected for comparative purposes the obtained samples have to be sorted out and the specimens per species must be counted. During the BIOTA-Project qualitative data were collected with light traps on the BIOTA Observatories and were used to study seasonality, taxonomic composition or β-diversity (Mey 2010b). Moreover, the quantitative data provided baseline information for future monitoring purposes and are superior to simple qualitative presence/absence data. Unfortunately, the collected data from all Observatories are incomplete and have not reached the level of inventories. The same applies to the light trap samples that are presented in this chapter. They have been collected irregularly when available time allowed the operation of one or two traps. The main collecting methods of the faunistic survey were a light tower and the generator operated HWL lamps (see method chapter). They provided maximal numbers of species which usually included the species caught with the traps. The traps should give information on species abundances. When fully counted out, both results offer a snapshot of the fauna and conditions at the period of collecting. The results are summarised in tables, which are statistical descriptions of the encountered assemblages. They give only a restricted picture of the faunistics of the sampled habitats, but retain the complete context in which all species were standing. In combination with data on vegetation, the results

can be used for linking plants and Lepidoptera ensembles. The following 36 analyses of Lepidoptera or moth spectra from light trap samples collected in recent years should be regarded as an approximate reflection of the diversity, geographical variety and peculiarities of the fauna in southwestern Africa.

Abbreviations:

A – altitude, in meters (m)
T – temperature, in °C
H – relative humidity, in %
S – number of species
N – number of specimens
HWL – generator powered mixed light bulbs

The names of the vegetation types are adapted from Mendelsohn et al. (2002) for Namibia, and for South Africa from Munica & Rutherford (2006).

The Lepidoptera families are arranged in systematic order. The sequence is sometimes different, but the major groups Microlepidoptera, Pyraloidea and Macrolepidoptera including Noctuidae are always kept separate. Systematic progress in recent years has changed the concept of some families leading to splits (e.g. Noctuidae) or fusions with other families (e.g. Ethmiidae). These changes are not adapted here. The family names are, however, well known terms and still represent valid entities which should not confuse the trained lepidopterist.

The absolute numbers of specimens are calculated as dominance values (d) per species using the Berger-Parker index (d = number of individuals of a species / number of all specimens of a major group) and are listed separately for each of the major taxonomic groups.

4. 1. Savanna Biome

03. Baynes Mountains

Namibia, Kunene Kaoko-veld, Otjikotona	S 17°29.071 E 13°07276 A: 1252m	23.2.2008	19.00 – 24.00 cloudy, light rain	T: 21°C H: 88%

Vegetation: Mopane Woodland

Dominant trees and shrubs and landscape features: Eastern part of the Baynes Mts close to the road to Epupa Falls, open Mopane woodland in valleys and plains, broad-leaved woodland on slopes and hills with Colophospermum mopane, Boscia albitrunca, Combretum apiculatum, Ziziphus mucronata, Commiphora glandulosa, Catophractes alexandri, Grewia flavescens, and Acacia spp.

Table 3.1: Family spectrum and number of species and specimens

Family	Light trap	
	s	N
Tineidae	3	6
Psychidae	1	2
Eriocottidae	2	10
Bucculatricidae	1	1
Gracillariidae	1	1
Yponomeutidae	1	1
Plutellidae	1	5
Scythrididae	4	4
Chrysopeleidae	2	10
Gelechiidae	18	56
Tortricidae	3	24
Thyrididae	1	54
Pyralidae: Pyralinae	3	5
Pyralidae: Epipaschiinae	1	3
Pyralidae: Phycitinae	3	7
Crambidae	16	87
Limacodidae	3	14
Saturniidae	2	11
Geometridae	10	45
Arctiidae	2	9
Sphingidae	2	4
Notodontidae	2	3
Lymantriidae	2	2
Noctuidae s.l.	94	1862
total	**178**	**2226**

Table 3. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total
1	20	6	10	39	75
2	5	7	2	17	31
4	5	5	4	13	27
8	3	2	4	3	12

16	3	0	2	7	12
32	1	3	1	10	15
64	1			0	1
128				1	1
>128				4	4
total	38	23	23	94	178
%	21%	13%	13%	53%	100%

Table 3.3: List of the most common species with dominance values

Microlepidoptera	**N = 173**	**Pyraloidea**	**N = 102**
Rhodoneura abacha	0.31	*Achyra coelatalis*	0.20
Hypatima austera	0.1	*Tegostoma comparalis*	0.18
Dichomeris dysnotata	0.08	*Flotschapa rhynchopalpata*	0.17
Metendotheina balanacma	0.07	*Hyperlais transversalis*	0.05
Cydia haematopa	0.05	*Tegostoma* spec.	0.05
Compsoctena spec.	0.04	*Spoladea recurvalis*	0.04
Ascalenia spec.	0.04	*Herpetogramma mutualis*	0.04
Plutella xylostella	0.03	*Synclera traducalis*	0.03
Anarsia spec.	0.03	*Haimbachia* spec.	0.03
		Otjipagapaga prima	0.03
Macrolepidoptera	**N = 89**	**Noctuidae**	**N = 1862**
Hypolephrina spec.	0.19	*Amyna punctum*	0.3
Imbrasia belina	0.11	*Anomis sabulifera*	0.18
Chiasmia punctilinea	0.1	*Rhesala moestalis*	0.16
Afrobirthama hohbomi	0.08	*Asplenia melanodonta erffai*	0.11
Irostola dentilinea	0.07	*Characoma nilotica*	0.05
Chiasmia extrusilinea	0.07	*Chrysodeixis acuta*	0.02
Phryganopsis spec.	0.06	*Cryphia* spec.	0.01
Epilacydes unistriga	0.05	*Spodoptera exempta*	0.01

04. Joubert Pass

Namibia, Kunene Kaokoveld	S 18°53.975 E 13°46.090 A: 1360m	1.2.2009	22.00 – 2.00 cloudy, dry, windy to calm	T: 24 – 15.8°C H:36 – 63%

Vegetation: see next page

Table 4. 1: Family spectrum and number of species and specimens

Family	trap 1		trap 2		HWL		total	
	s	N	s	N	s	N	s	N
Adelidae					1	1	1	1
Nepticulidae	3	3	4	55			5	
Tischeriidae			1	1	1	1	1	2
Tineidae	5	7	2	14	1	4	7	
Eriocottidae					1	14	1	
Psychidae	2	14	2	8			3	
Bucculatricidae	1	28	2	53			2	
Gracillariidae			1	8			1	8
Yponomeutidae	1	3	1	7			1	
Elachistidae	3	12	5	47			5	
Coleophoridae			3	3			3	3
Ethmiidae	3	14			1	2	3	
Scythrididae	4	6	3	4			4	
Oecophoridae	3	6	2	2	3	1	3	9
Chrysopeleidae	1	1	3	7			3	8
Cosmopterigidae	2	3	3	16			3	
Gelechiidae	19	29	20	41	7	14	27	
Tortricidae			1	1	1	1	1	2
Thyrididae			1	3	1	9	1	
Pterophoridae			1	1			1	1
Alucitidae	1	1					1	1
Pyralidae: Phycitinae	19	47	11	36	10	20	19	
Pyralidae: Epipaschiinae	1	2	1	1	1	1	3	4
Pyralidae: Pyralinae	6	12	2	2	5	18	10	
Crambidae	16	29	11	51	17	43	31	
Metarbelidae	1	8	1	3	1	2	2	
Cossidae			1	2			1	2
Limacodidae	3	7	6	8	4	6	6	
Saturniidae	2	11			1	2	2	
Lasiocampidae	2	7	2	3	1	6	3	
Sphingidae	4	10	4	8	5	6	6	
Geometridae	15	32	27	62	21	27	42	
Arctiidae	2	10	3	13	2	3	3	
Notodontidae	4	7	2	4	1	1	4	
Lymantriidae	4	12	5	15	3	23	5	

Noctuidae	52	73	82	329	48	107	113
Nolidae	5	13	5	10	3	3	11
total	**184**	**407**	**218**	**818**	**140**	**315**	**338**

Vegetation: dense Mopane Woodland

Dominant trees and shrubs: Colophospermum mopane, Terminalia prunioides, Cadaba schroeppelii, Sterculia africana, Commiphora multijuga, C. anacardifolia, Moringa ovalifolia, Maerua schinzii, Combretum imberbe, Sesamothamnus guerichii, Kessenia capensis, Catophractes alexandri, Grewia flavescens.

Table 4. 2: Distribution of species over abundance classes from sample trap 2

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	to-tal
1	26	12	30	43	
2	9	4	11	12	36
4	4	4	5	11	24
8	10	2	3	8	23
16	4	2	2	8	16
32	2	1		3	6
64				2	2
total	55	25	51	87	
%	25%	11%	24%	40%	

Table 4. 3: List of the most common species of the combined samples of trap 1 and 2 with dominance values

Microlepidoptera	**N = 398**	**Pyraloidea**	**N = 180**
Bucculatrix wittnebeni	0.15	*Statina cf. albivenella*	0.13
Phthinostoma spec.	0.06	*Synclera traducalis*	0.12
Stigmella cf. irrorata	0.04	*Hypotia pronamibiella*	0.08
Compsoctena spec.nov.	0.04	*Zitha* spec.	0.04
Placodoma brandbergensis	0.03	*Acrobasis* spec.	0.04
Ethmia coscinocera	0.03	*Chilo* spec.	0.04
Limnaecia spec.	0.03	*Haimbachia* spec.	0.03
Perrisomastix spec.	0.02	*Tegostoma* spec.	0.02
Stigmella spec.	0.02	*Ancylolomia* spec.1	0.02
Zelleria spec.nov.	0.02	*Ancylolomia* spec.2	0.02
Macrolepidoptera	**N = 140**	**Noctuidae**	**N = 480**
Metarbela naumanni	0.08	*Eulocastra aethiops*	0.12
Chiasmia spec.	0.08	*Characoma nilotica*	0.1
Amsacta unistriga	0.06	*Cyligramma latona*	0.09
Trimetopia aetheraria	0.06	*Phytometra* spec.	0.04
Porthesaroa spec.	0.06	*Ozarba corniculans*	0.03
Micralarctia australis	0.06	*Arcyophora piperitella*	0.03
Laelia spec.	0.06	*Maurilia arcuata*	0.03
Chiasmia spec.*2*	0.06	*Ozarba sancta*	0.03

Usta wallengreni	0.05	*Amyna punctum*	0.02
Rufoglanis numosae	0.05	*Eublemma* spec.	0.02

07. Hobatere

Namibia, Kunene Hobatere Lodge campsite	S 19°19.016 E 14°28.153 A: 1256m	20.2.2008	20.00 – 0.30 cloudy, rain from 21-22.00	T: 25.6°C H: 54 – 82%

Vegetation: open Mopane Woodland

Dominant trees and shrubs: Colophospermum mopane, Terminalia prunioides, Catophractes alexandri, Grewia flavescens.

Table 7.1: Family spectrum and number of species and specimens

Family	light traps	
	s	N
Tineidae	1	1
Eriocottidae	1	6
Psychidae	2	7
Plutellidae	1	23
Oecophoridae	1	1
Ethmiidae	2	2
Scythrididae	5	7
Chrysopeleidae	2	2
Cosmopterigidae	1	1
Gelechiidae	6	40
Alucitidae	1	1
Tortricidae	2	41
Thyrididae	2	4
Pyralidae: Galleriinae	1	1
Pyralidae: Phycitinae	1	1
Pyralidae: Pyralinae	1	1
Crambidae	11	45
Metarbelidae	1	2
Limacodidae	1	1
Saturniidae	2	11
Geometridae	7	12
Arctiidae	3	3
Notodontidae	1	1
Lymantriidae	1	1
Noctuidae	36	160
indet.		63
total	**93**	**438**

Table 7. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total
1	18	7	7	11	43
2	3	2	6	7	18
4	3	1	1	7	12

8	3	0	1	7	11
16	1	1		2	4
32	1	1		2	4
64	1				1
total	30	12	15	36	93
%	32%	13%	16%	39%	100%

Table 7.3: List of the most common species with dominance values

Mikrolepidoptera	**N = 136**	**Pyraloidea**	**N = 48**
Cydia haematopa	0.29	*Haimbachia spec.*	0.44
Plutella xylostella	0.17	*Achyra coelatalis*	0.27
Hypatima austera	0.08	*Tegostoma bipartalis*	0.06
Ephysteris spec.	0.05	*Euchromius discopis*	0.04
Compsoctena spec.	0.04	gen. nov., spec. nov.	0.04
Placodoma brandbergensis	0.04	*Nomophila noctuella*	0.01
Deltophora typica	0.03	*Anania* spec.	
Anarsia spec.	0.03	*Synclera traducalis*	
Rhodoneura abacha	0.02	*Calamoschoena nigripunctalis*	
Macrolepidoptera	**N = 31**	**Noctuidae**	**N = 160**
Imbrasia spec.	0.23	*Asplenia melanodonta effrai*	0.18
Imbrasia belina	0.13	*Cryphia* spec.	0.12
Metarbela weinmanni	0.06	*Arcyophora piperitella*	0.08
		Pseudozarba schencki	0.06
		Eublemma anachoresis	0.06
		Zekelita canestriata	0.04
		Ozarba spec.	0.04

13 Buschfeld Park Resort, Outjo

Namibia, Kunene Outjo	S 20°05.649' E 16°07.662' A: 1288m	4.2.2009	21.30 – 01.30 rain in the evening	T: 18°→ 16°C H: 85 %

Vegetation: Karstveld

Dominant trees and shrubs: Kirkia acuminata, Sterculia quinqueloba, Berchemia discolor, Terminalia prunioides, Pachypodium lealii, Acacia erubescens, Combretum apiculataum, C. collinum, Commiphora glaucescens, C. glandulosa, Boscia albitruncata, Grewia flava, Croton gratissimus

Table 13. 1: Family spectrum and number of species and specimens

Family	trap 1		HWL		total	
	s	N	s	N	s	N
Hepialidae			1	2	1	2
Tineidae	3	3	2	2	5	5
Eriocottidae	1	1	1	1	2	2
Psychidae	1	3			1	3
Bucculatricidae	1	2			1	2
Blastobasidae			1	1	1	1
Scythrididae	1	1			1	1
Lecithoceridae			1	1	1	1
Gelechiidae	4	5	6	6	10	11
Tortricidae	1	2	1	2	1	4
Pterophoridae			1	1	1	1
Pyralidae: Phycitinae	2	6	4	11	4	17

Pyralidae: Pyralinae	5	10	4	12	5	22
Crambidae	8	11	17	35	22	46
Thyrididae	1	2	2	3	2	5
Limacodidae	1	1	4	18	4	19
Saturniidae			1	1	1	1
Lasiocampidae			6	12	6	12
Sphingidae	1	1	2	4	2	5
Geometridae	6	7	13	18	15	25
Thyatiridae	1	2	1	2	1	4
Arctiidae	2	6	5	6	6	12
Notodontidae			4	7	4	7
Lymantriidae	1	1	1	7	2	8
Noctuidae s.l.	32	182	48	69	57	251
Nolidae	2	14	2	2	2	16
total	**74**	**260**	**128**	**223**	**158**	**483**

Table 13. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	8	9	9	17	43
2	3	3	2	4	12
4	1	1	0	2	4
8		2	3	3	8
16				5	5
32				1	1
64				1	1
total	12	15	14	33	74
%	16	20	19	45	100

Table 13.3: List of the most common species with dominance values

Microlepidoptera	**N = 17**	**Pyraloidea**	**N = 27**
Placodoma brandbergensis	0.18	*Acrobasis* spec.	0.19
Bucculatrix wittnebeni	0.12	*Pseudozitha alticolalis*	0.19
Cydia spec.	0.12	*Tyndis cf. namibiensis*	0.11
Macrolepidoptera	**N = 34**	**Noctuidae**	**N = 182**
Characoma nilotica	0.21	*Eulocastra aethiops*	0.32
Characoma spec.	0.21	*Arcyophora piperitella*	0.11
Alpenus investigatorum	0.15	*Eustrotia luteocapitata*	0.06
Hapana verticalis	0.06	*Risoba sticticraspis*	0.06
		Ozarba corniculans	0.06
		Ozarba fuscata	0.06
		Acontia antica	0.06
		Ozarba spec.	0.05
		Ozarba cinerea	0.04

19 Mile 46

Namibia, Kavango 60 km SW Rundu BIOTA Observatory	S 18°18'39" E 19°15'29" A: 1180m	24. - 26.3.2003	19.40 – 0.30 dry, calm	T: 21 → 10°C H: not registered

Vegetation: North-Eastern Kalahari Woodland

Dominant trees and landscape feature: Sandy plain covered by open, broad-leaved woodland with Terminalia sericea, Burkea africana, Aristida stipitata, Guibourtia coleosperma, Pterocarpus angolensis and Baikiaea plurijuga.

Table 19.1: Family spectrum and number of species and specimens in 2003, based on 3 trap samples

Family	Trap 1	
	s	N
Nepticulidae	1	1
Tineidae	5	8
Bucculatricidae	2	4
Gracillariidae	4	65
Plutellidae	1	1
Coleophoridae	3	17
Elachistidae	1	55
Ethmiidae	2	8
Scythrididae	3	24
Lecithoceridae	1	3
Oecophoridae	1	1
Cosmopterigidae	6	14
Gelechiidae	17	124
Tortricidae	5	19
Thyrididae	1	2
Pyralidae	30	126
Crambidae	26	116
Cossidae	1	1
Limacodidae	1	1
Lasiocampidae	2	20
Lymantriidae	2	65
Sphingidae	1	1
Notodontidae	1	1
Geometridae	35	91
Noctuidae	72	531
total	**224**	**1299**

Table 19. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1				25	20
2				10	3

4		data		18	2
8	data missing	missing	data missing	9	5
16				6	6
32				2	3
64					1
128				2	1
total	53	56	43	72	224
%	24	25	19	32	100

Table 19. 3: List of the most common species with dominance values

Microlepidoptera	**N = 346**	**Pyraloidea**	**N = 242**
Epicephala pyrrhogastra	0.18	*Staudingeria* spec.	0.18
Deltophora typica	0.17	*Achyra coelatalis*	0.15
Phthinostoma spec.	0.14	*Emmalocera unitella*	0.11
Stegasta sattleri	0.08	*Epilepia melanobasalis*	0.07
Cydia spec.	0.08	*Epacternis* spec.	0.06
Ephisteris promptella	0.04	*Nomophila noctuella*	0.05
Scythris spec.	0.03	*Sindris albimacula*	0.04
Coleophora spec.	0.03	*Synclera traducalis*	0.04
Aspades hutchinsonella	0.02	*Oncocera africanella*	0.03
Microcolona pantomima	0.02	*Achyra impunctata*	0.03
Macrolepidoptera	**N = 180**	**Noctuidae s.l.**	**N = 531**
Palasea albimacula	0.31	*Amyna punctum*	0.21
Acanthovalva inconspicuaria	0.13	*Spodoptera exigua*	0.18
Holoterpna errata	0.08	*Eublemma* spec.	0.05
Craspia igneotincta	0.07	*Eublemma anachoresis*	0.05
Pseudothosea albisignata	0.05	*Grammodes exclusiva*	0.04
Antharmostes papilio	0.05	*Earias insulana*	0.03
Hemerophanes flammeola	0.05	*Rhesala moestalis*	0.02
		Eublemma cf.chiophlebia	0.02
		Zekelita coniodes	0.02

28 Okatjikona, Waterberg

Namibia, Otjiwarongo, Okatjikona, NW of Okakarara	S 20°23.765' E 17°23.909' A: 1439m	16.2.2008	20.00 – 0.30 calm, half-moon	T: 25.0 → 20.1°C H: 65 → 81%

Vegetation: Northern Kalahari

Dominant trees and landscape features: Undulating plateau and base of cliffs with broadleaved woodlands of Combretum molle, C. hereroensis, C. apiculatum, C. imberbe, Ficus sycomorus, Ziziphus mucronatus, Terminalia sericea, Croton gratissimus, Acacia ataxacantha and Grewia flavescens

Table 28.1: Family spectrum and number of species and specimens of two trap samples

Family	trap 1 (plateau)		trap 2 (foothills)		shared species	total s
	s	N	s	N		
Adelidae	1	13	1	8	1	1
Nepticulidae	1	3	1	2	1	1
Tineidae	8	29	8	21	3	13
Psychidae	3	18	3	16	2	4
Eriocottidae	1	1	3	4		4
Pseudurgis group			1	1		1
Bucculatricidae	2	4	2	7	2	2
Gracillariidae	9	24	6	7	3	12
Yponomeutidae	1	2	1	2	1	1
Plutellidae	1	7	1	5	1	1

Ethmiidae	1	1	1	8		2
Oecophoridae	4	13	4	12	3	5
Coleophoridae	1	1	1	1	1	1
Batrachedridae	1	2	1	1	1	1
Elachistidae	2	5	2	25	1	3
Scythrididae	6	21	8	46	3	11
Chrysopeleidae	3	47	4	38	3	4
Cosmopterigidae	4	4	4	4	1	7
Lecithoceridae			1	3		1
Gelechiidae	25	598	23	622	9	39
Tortricidae	7	92	8	13	5	10
Alucitidae	1	2				1
Thyrididae			1	1		1
Pyralidae: Pyralinae	4	13	3	7	2	5
Pyralidae: Galleriinae	1	7	2	8	1	2
Pyralidae: Phycitinae	8	15	11	20	2	17
Crambidae	8	37	15	55	5	18
Lasiocampidae	1	2	2	6	1	2
Geometridae	9	63	10	59	4	15
Arctiidae	3	4	1	1		4
Sphingidae	1	1				1
Notodontidae	1	1				1
Lymantriidae	1	1	1	1		2
Noctuidae s.l.	47	127	48	170	24	71
total	**166**	**1158**	**178**	**1174**	**80**	**264**

Table 28. 2: Distribution of species over abundance classes

Plateau Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	27	8	9	28	72
2	14	6	3	5	28
4	19	1	0	7	27
8	9	4	3	3	19
16	8	2	1	2	13
32	2		0	1	3
64	1		1		2
128	1				1
>128	1				1
total	82	21	17	46	166
%	49%	13%	10%	28%	100%
Foothills Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	43	16	10	25	94

2	17	5	1	12	35
4	11	5	0	5	21
8	8	3	1	3	15
16	3	1	1	1	6
32	2	1	0	1	4
64	0		1	1	2
128	0				0
>128	1				1
total	85	31	14	48	178
%	48%	17%	8%	27%	100%

Table 28. 3: List of the most common species with dominance values of the plateau sample

Microlepidoptera	**N = 887**	**Pyraloidea**	**N = 73**
Anarsia agricola	0.48	*Haimbachia* spec.	0.16
Dichomeris spec.	0.09	*Glaucocharis maculata*	0.14
Cydia spec. 1	0.06	*Deltophora basalis*	0.11
Gisilia meyi	0.04	*Achyra coelatalis*	0.11
Cydia spec. 2	0.02	*Paroxyptera hererofiliella*	0.1
Dichomeris basistriata	0.02	Phycitinae ?gen. ?spec.	0.07
Dichomeris marmorata	0.02		
Ascalenia spec.	0.01		
Ceromitia okatjikona	0.01		
Propachyarthra spec.	0.01		
Macrolepidoptera	**N = 76**	**Noctuidae**	**N = 126**
Idaea liliputana	0.43	*Rhesala moestalis*	0.21
Lomographa aridata	0.17	*Amyna punctum*	0.1
Geometridae ?gen. ? spec.	0.07	*Eublemma* spec.	0.09
Senna prompta	0.07	*Earias insulana*	0.04
Isturgia deerraria	0.07	*Anomis flava*	0.04
		Ozarba spec.	0.04

Table 28. 4: List of the most common species with dominance values of the foothills sample

Microlepidoptera	**N = 887**	**Pyraloidea**	**N = 90**
Anarsia agricola	0.68587	*Glaucocharis maculata*	0.23
Ascalenia spec.	0.04	*Achyra coelatalis*	0.13
Phthinostoma maculata	0.03	*Paroxyptera hererofiliella*	0.07
Scythris camelella	0.02	*Haimbachia* spec.	0.06
Struthisca spec.	0.01	*Saluria* spec.	0.06
Scythris spec.	0.01	*Euchromius discopis*	0.03
Ceromitia okatjikona	<0.01	*Deltophora basalis*	0.03
Ethmia oculigera	<0.01		

Macrolepidoptera	**N = 76**	**Noctuidae**	**N = 171**
Idaea liliputana	0.53	*Rhesala moestalis*	0.28
Chiasmia spec.	0.13	*Gryphia* spec.	0.18
Sena prompta	0.07	*Ozarba* spec.	0.05
		Arcyophora spec.	0.04
		Eublemma spec.	0.03
		Characoma nilotica	0.02
		Thiacides duplicata	0.02

32 Omatako

Namibia, 60 km NW of Okahandja, Omatako Ranch	S 21°30'46" E 16°44'01" A: 1519m	22. – 23.3.2003	20.00 → 0.30 windy, half-moon up from 23.00	T: 23°C H: not registered

Vegetation: Thornbush Shrubland

Dominant trees and landscape features: Flat, open Thornbush Savanna on sandy soils, with Acacia tortilis, A. hebeclada, A. erioloba, A. reficiens, Dichrostachys cinera and Boscia albitrunca; in between grassland patches dominated by Stipagrostis uniplumis.

Table 32.1: Family spectrum and number of species and specimens in 2003, based on two trap samples and HWL (160 W).
The comparison of light trap samples and manually collected material clearly shows the general superiority of the latter method in terms of species numbers. Its disadvantage is the number of specimens which is biased to rare species.

Family	trap 22.3.		trap 23.3.		total		HWL
	s	N	s	N	s	N	s
Nepticulidae							2
Tineidae	1	2	3	3	4	5	7
Bucculatricidae							2
Gracillariidae							1
Lyonetiidae							1
Yponomeutidae	1	1			1	1	1

Coleophoridae			1	1	1	1	2
Elachistidae							1
Ethmiidae	1	4			1	4	2
Oecophoridae							2
Scythrididae	2	4	2	2	4	6	7
Cosmopterigidae							3
Chrysopeleidae							1
Gelechiidae	15	50	11	17	20	67	32
Tortricidae							2
Pyralidae	15	18	4	7	16	25	25
Crambidae	4	10	2	6	4	16	6
Cossidae							1
Limacodidae			1	1	1	1	1
Lasiocampidae	2	6	1	2	2	8	2
Notodontidae							1
Lymantriidae	1	2	1	2	1	4	1
Geometridae	11	40	7	22	13	62	15
Arctiidae	1	1			1	1	1
Noctuidae	26	60	12	23	30	83	33
total	**80**	**198**	**45**	**86**	**99**	**284**	**152**

Table 32. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	17	15	7	16	55
2	2	2	5	9	18
4	6	1	2		9
8	3	1	1	4	9
16	2	1	3	1	7
32			1		1
total	30	20	19	30	99
%	30%	20%	20%	30%	100%

Table 32. 3: List of the most common species with dominance values in 2003

Microlepidoptera	**N = 84**	**Pyraloidea**	**N = 41**
Athrips spec. 1	0.13	*Achyra nudalis*	0.22
Athrips spec. 2	0.11	*Ancylosis ocellella*	0.15
Polyhymno chionarcha	0.08	*Tegostoma comparalis*	0.1
Macrolepidoptera	**N = 76**	**Noctuidae**	**N = 83**
Allocrostes spec.	0.24	*Centrarthra* spec	0.19
Isturgia deerraria	0.21	*Ozarba* spec.	0.1
Holoterpna errata	0.12	*Eublemma* spec.	0.08
Crorema setinoides	0.12	*Acantholipes trimeni*	0.07
Sena meyi	0.07		

33 Erichsfelde

Namibia, Farm 50 km N of Okahandja BIOTA Observatory	S 21°35'46'' E 16°56'16'' A: 1495m	19. – 21.3.2003	20.00 – 0.30 windy	T: 23°C
		10.1.2007	21.00 – 1.30 dry, calm	T: 24°C H: 44%
		12.2.2007 leg.J.Deckert	20.00 – 24.30 dry, calm	T: 25°C
		7.4.2008	19.30 – 24.00 dry, cloudy	T: 22°C

Vegetation: Thornbush Shrubland

Dominant trees and shrubs: Acacia mellifera, A. hebeclada, A. tortilis, A. reficiens, Boscia albitrunca, Catophractes alexandri, Ziziphus mucronatus, Grewia flava.
Grasses dominated by Stipagrostis uniplumis and herbs by Monechma genistifolium…

Table 33.1: Family spectrum of three combined trap samples in 2003. The trap samples provided less than a half of the manually collected species from the HWL bulb.

Family	trap 1-3		HWL
	s	N	s
Nepticulidae			4
Tineidae	2	2	11
Bucculatricidae			2
Gracillariidae			3
Yponomeutidae			1
Lyonetidae			1
Coleophoridae	2	2	3
Elachistidae			1
Ethmiidae	2	2	2
Oecophoridae			2
Scythrididae	4	7	14
Chrysopeleidae	1	1	6
Gelechiidae	10	14	35
Pterophoridae			1
Tortricidae			4
Thyrididae			1
Pyralidae	9	37	31
Crambidae	7	12	20
Metarbelidae	1	1	1
Sphingidae	1	2	1
Limacodidae			1
Lasiocampidae	1	1	4
Geometridae	7	27	16
Arctiidae	2	10	3
Noctuidae	37	256	60
total	**86**	**374**	**228**

Table 33.2: Family spectrum and number of species and specimens in 2007

Family	10.1.2007		12.2.2007		shared species	total s
	s	N	s	N		
Nepticulidae	6	57	2	3	2	6
Tischeriidae	1	2				1
Tineidae	12	60	7	22	4	15
Eriocottidae	5	81	1	5	1	5
Psychidae	3	43	3	7	1	5
Bucculatricidae	5	22				5
Gracillariidae	2	8	2	2	2	2
Galacticidae	1	1				1
Yponomeutidae	2	3				2
Lyonetiidae	2	17				2
Coleophoridae	4	42	5	20	2	7
Xyloryctidae			1	1		1
Ethmiidae	5	33	5	19	4	6
Scythrididae	21	288	10	36	8	23
Oecophoridae	2	6	1	1		3
Lecithoceridae	2	11				2
Autostichidae	1	1	1	1	1	1
Chrysopeleidae	9	139	3	5	2	10
Cosmopterigidae	3	352	2	27	2	3
Gelechiidae	51	536	17	69	14	54
Gelechiidae, indet.		82				
Tortricidae	4	5	2	5	2	4
Pterophoridae	2	2				2
Alucitidae	1	3	1	1	1	1
Pyralidae: Phycitinae	44	947	24	124	18	50
Pyralidae: Endotrichinae	1	4	1	5	1	1
Pyralidae: Galleriinae	2	2				2
Pyralidae: Pyralinae	9	31	6	33	5	10
Crambidae	31	444	25	144	18	48
Thyrididae			1	3		1
Limacodidae	2	9				2
Lasiocampidae	4	17	2	3	1	5
Saturniidae	1	1	1	1		2
Sphingidae	1	3	2	2		3
Geometridae	28	740	19	108	12	35
Arctiidae	3	5	2	4	2	3
Notodontidae	1	4				1
Lymantriidae	2	8	1	1	1	2
Noctuidae	109	1292	64	344	47	127
Noctuidae, indet.		22				
total	**382**	**5323**	**211**	**996**	**151**	**453**

Table 33. 3: Distribution of species over abundance classes in January 2007

10.01.2007 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	43	28	17	32	120
2	18	15	4	22	59
4	15	16	5	13	49
8	26	9	6	12	53
16	18	5	6	14	43
32	14	5	1	6	26
64	7	3	1	8	19
128+	2	6	2	3	13
total	143	87	42	110	382
%	37	23	11	29	100

Table 33. 4: Distribution of species over abundance classes in February 2007

11.02.2007 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	31	20	14	21	86
2	7	6	4	17	34
4	12	9	4	8	33
8	7	7	2	8	24
16	5	8	2	6	21
32	3	2	0	2	7
64	0	2	1	2	5
total	65	54	27	64	210
%	31	26	13	30	100

Table 33. 5: List of the most common species with dominance values in January 2007

Microlepidoptera	**N = 1794**	**Pyraloidea**	**N = 1428**
Chalcocolona cyananthes	0.18	*Laodamia cf. nonplagella*	0.3
Athrips spec.	0.06	*Homoeosoma stenotea*	0.11
Parapsectris spec.	0.05	*Achyra coelatalis*	0.09
Gisilia stagnans	0.04	*Antigastra catalaunalis*	0.08
Scythris spec. 14	0.02	Phycitinae ?gen. ?spec.	0.08
Scythris spec.	0.02	*Epicrosis* spec.1	0.04
Pyncostola iospila	0.02	*Coniestra* spec.	0.04
Psychidae ?gen. ?spec.	0.02	*Ancylosis ocellella*	0.03
Stigmella protosema	0.01	*Haimbachia* spec. 1	0.02
Compsoctena spec.	0.01	Anerastiini ?gen. ?spec.	0.01
Coleophora spec.	0.01		
Macrolepidoptera	**N = 787**	**Noctuidae**	**N = 1314**
Scopula sincera	0.44	*Athetis* spec.	0.19
Idaea lilliputaria	0.34	*Ozarba cinerea*	0.11
Chiasmia grimmia	0.07	*Iambiodes incerta*	0.10

Isturgia deerraria	0.04	*Agrotis cf. legraini*	0.05
Scopula lactaria	0.02	*Acantholipes trimeni*	0.05
Conchylia lapsicolumna	0.01	*Pseudozarba cf.schencki*	0.05
		Eublemma seminivea	0.04
		Ozarba spec.	0.04
		Acontia simo	0.03
		Acontia conifrons	0.03
		Leucania tacuna	0.02
		Tathorhynchus plumbea	0.02

Table 33. 6: List of the most common species with dominance values in February 2007

Microlepidoptera	**N = 224**	**Pyraloidea**	**N = 306**
Chalcocolona cyananthes	0.1	*Coniestra cf. williami*	0.13
Scythris spec.	0.1	*Laodamia cf. nonplagella*	0.1
Scythris spec. 14	0.09	Anerastiini ?gen. ?spec.1	0.06
Athrips spec.	0.05	*Hypotia deckerti*	0.06
Pyncostola spec.	0.05	*Tegostoma subterminalis*	0.06
Ethmia coscineutis	0.04	*Homoeosoma stenotea*	0.05
Coleophora spec.	0.04	*Antigastra catalaunalis*	0.04
Scrobipalpa vicaria	0.04	*Tegostoma subterminalis*	0.04
Parapsectris spec.	0.03	Anerastiini ?gen. ?spec.2	0.03
Onebala obsoleta	0.03	*Haimbachia* spec.	0.03
Ethmia rhomboidella	0.02	*Tyndis namibiensis*	0.03
		Euchromius discopis	0.03
		Achyra coelatalis	0.03
Macrolepidoptera	**N = 122**	**Noctuidae**	**N = 344**
Idaea lilliputaria	0.38	*Acantholipes trimeni*	0.16
Chiasmia grimmia	0.1	*Eublemma seminivea*	0.14
Conchylia lapsicolumna	0.1	*Ozarba* spec.	0.07
Isturgia deerraria	0.07	*Rhesala moestalis*	0.06
Sena parva	0.03	*Acontia conifrons*	0.05
		Pseudozarba cf.schencki	0.04
		Hypotacha isthmigera	0.04
		Acantholipes spec.	0.03
		Ozarba cinerea	0.03
		Iambiodes incerta	0.03

Table 33.7: Family spectrum and number of species and specimens in 2008

Family	trap 1		trap 2			
	s	N	s	N	total s	total N
Tineidae	1	1	2	2	2	3
Eriocottidae			1	2	1	2
Bucculatricidae			1	2	1	2
Plutellidae	1	1	1	9	1	10
Oecophoridae	1	1			1	1
Coleophoridae	1	1	2	3	3	4
Ethmiidae	3	4	1	1	3	5

Scythrididae	4	20	8	45	10	65
Lecithoceridae	1	2	1	1	1	3
Chrysopeleidae	1	1	2	5	2	6
Cosmopterigidae			1	2	1	1
Gelechiidae	10	121	14	209	19	330
Brachodidae	1	1			1	1
Tortricidae	3	7	3	20	5	27
Pyralidae: Pyralinae	3	9	1	7	3	16
Pyralidae: Phycitinae	10	26	4	9	12	35
Pyralidae: Galleriinae	1	2			1	2
Crambidae	20	437	13	270	23	707
Metarbelidae	1	2			2	2
Lasiocampidae	2	3	1	1	2	4
Geometridae	21	62	12	50	27	142
Arctiidae	3	11	2	5	3	16
Lymantriidae	2	5	1	1	2	6
Notodontidae	2	3			2	3
Noctuidae	57	276	54	503	79	779
total	**149**	**996**	**125**	**1147**	**207**	**2172**

Table 33. 8: Distribution of species over abundance classes in April 2008

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	26	14	19	26	85
2	7	8	7	17	39
4	7	4	5	10	26
8	4	4	5	12	25
16	3	4	1	8	16
32	2	2	1	2	7
64	0	0		1	1
128	1	2		2	5
>128	1	1		1	3
total	51	39	38	79	207
%	25	19	18	38	100

Table 33. 9: List of the most common species with dominance values in April 2008

Microlepidoptera	**N = 460**	**Pyraloidea**	**N = 760**
Pyncostola spec.	0.43	*Spoladea recurvalis*	0.37
Anarsia cf.agricola	0.18	*Euchromius ocelleus*	0.18
Cryptophlebia spec.	0.06	*Nomophila noctuella*	0.17
Scythris spec.1	0.04	*Antigastra catalaunalis*	0.03
Scythris cf.kebirella	0.03	*Achyra nudalis*	0.02
Scythris spec. 2	0.02	*Synclera traducalis*	0.02
Plutella xylostella	0.02	*Homoeosoma stenotea*	0.02

Deltophora typica	0.02	*Prionapteryx albimaculata*	0.01
Euryctista hobohmi	0.01	*Tyndis namibiensis*	0.01
Hedma spec.	0.01	*Loxostege frustalis*	0.01
		Staudingeria magnifica	<0.01
Macrolepidoptera	**N = 173**	**Noctuidae**	**N = 779**
Chiasmia deerraria	0.21	*Eublemma anachoresis*	0.31
Zamarada spec.1	0.17	*Rhesala moestalis*	0.09
Chiasmia grimmia	0.11	*Ozarba corniculans*	0.08
Diacrisia sublutea	0.06	*Agrotis cf. legraini*	0.05
Porthesaroa spec.	0.04	*Antarchaea subflavalis*	0.03
Zamarada spec. 2	0.04	*Tathorynchus plumbea*	0.03
Utetheisa pulchella	0.04	*Ozarba* spec.	0.02
Zamarada spec. 3	0.03	*Tarache gratiosa*	0.02
		Ilatia octo	0.02
		Perigea capensis	0.02

36 Sandveld

Namibia, Gobabis N of Drimiopsis BIOTA Observatory	S 22°02.598' E 19°08.034' A: 1523m	23.1.2007	20.00 – 0.30 wet, calm	T: 19°C H: 79%

Vegetation: Central Kalahari

Plants and landscape feature: The observatory is on a sandy plain covered by a more or less moderately closed bush. Optical orientation is difficult because of lacking landmarks (no hills). Dominant trees are Terminalia sericea, Acacia mellifera, A. erioloba, and A. hebeclada. Common shrubs are Grewia flava, Dichrostachys cinerea and Tarchonanthus camphoratus.

Table 36. 1: Family spectrum and number of species and specimens

Family	trap 1	
	s	N
Adelidae	1	2
Nepticulidae	2	5
Tischeriidae	1	1
Tineidae	8	84
Eriocottidae	2	26
Psychidae	1	25
Bucculatricidae	3	5
Gracillariidae	1	1
Lyonetiidae	1	1
Bedelliidae	1	2
Lacturidae	1	2
Coleophoridae	1	2
Batrachedridae	1	2
Xyloryctidae	1	7
Ethmiidae	4	17
Scythrididae	7	103
Elachistidae	1	10
Oecophoridae	1	1
Lecithoceridae	2	3
Chrysopeleidae	5	29
Cosmopterigidae	1	19
Gelechiidae	27	134
Gelechiidae, indet.		40
Tortricidae	4	12
Pterophoridae	3	4
Alucitidae	1	1
Pyralidae: Phycitinae	34	343
Pyralidae: Pyralinae	10	39
Pyralidae, indet.		57
Crambidae	19	84
Thyrididae	1	3
Cossidae	2	16

Limacodidae	3	6
Lasiocampidae	2	2
Saturniidae	1	1
Eupterotidae	1	6
Sphingidae	2	2
Geometridae	14	68
Arctiidae	4	18
Notodontidae	1	4
Lymantriidae	2	4
Noctuidae	67	350
total	**244**	**1541**

Table 36. 2: Distribution of species over abundance classes from sample of trap 1

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	27	17	17	27	88
2	18	13	2	9	42
4	13	9	6	13	41
8	10	13	4	7	34
16	5	6	3	6	20
32	5	3	1	3	12
64	2	1		1	4
128	1	1		1	3
total	81	63	33	67	244
%	33%	26%	14%	27%	100

Table 36. 3: List of the most common species with dominance values

Microlepidoptera	**N = 538**	**Pyraloidea**	**N = 523**
Scythris spec.	0.14	*Sclerobia triangulella*	0.17
Neoepiscardia spec.	0.09	*Haimbachia* spec.	0.12
Pyncostola iospila	0.05	*Rhamphimetopus ablutellus*	0.06
Lytrophila spec.	0.05	*Laodamia* spec.	0.05
Compsoctena spec.	0.05	*Euchromius discopis*	0.04
Chalcocolona cyananthes	0.04	*Laodamia nonplagella*	0.03
Scythris spec	0.03	*Ukulunkula kalahariensis*	0.03
Scalmatica cf.*phaulocentra*	0.03	*Aglossa* spec.	0.03
Schizovalva exoenota	0.03	*Tyndis namibiensis*	0.02
Leuronoma spec.	0.02	*Pleuroptya balteata*	0.02
Neotelphusa bimaculata	0.02	*Heliothela ophideresana*	0.01
Macrolepidoptera	**N = 130**	**Noctuidae**	**N = 350**
Isturgia spec.	0.14	*Eublemma* spec.	0.23
Thyretis caffra	0.13	*Ozarba* spec.	0.16
Azygophleps spec.	0.12	*Acantholipes* spec.	0.11
Isturgia spec.	0.11	*Felinopsis africana*	0.09
Craspia igneotincta	0.07	*Amyna punctum*	0.05
Chiasmia spec.	0.06	*Acontia conifrons*	0.05
Microloxia ruficornis	0.05	*Acantholipes trimeni*	0.03
Phiala costipuncta	0.05	*Rhesala moestalis*	0.03
		Honeya clearchus	0.03

38 Mountain Lodge

Namibia, Khomas Windhoek	S 22°41.345' E 17°06.948' A: 1938 m	26.04.2008 leg.J.Deckert	20.00 – 23.00	T: 21°C → 16°C
		25.1.2009	20.15 – 0.30 light wind, few rain-drops, later calm	T: 21.5° → 18.8°C H: 59 → 70%

Vegetation type: Highland Shrubland

Dominant trees and shrubs: Tarchonanthus camphoratus, Acacia mellifera, A. karoo

Table 38. 1: Family spectrum and number of species and specimens

Family	26.04.2008 trap 1		25.01.2009 trap 1	
	s	N	s	N
Adelidae	1	1		
Nepticulidae	1	1		
Tischeriidae			1	1
Tineidae	2	2	4	5
Eriocottidae			1	2
Psychidae	1	1	2	2
Bucculatricidae			1	1
Gracillariidae			2	4

Batrachedridae			1	1
Yponomeutidae			1	1
Plutellidae	1	1	1	1
Lacturidae			1	1
Elachistidae	1	2		
Stathmopodidae	1	1		
Ethmiidae	1	1		
Oecophoridae	1	1		
Coleophoridae			1	1
Scythrididae	3	4	8	22
Chrysopeleidae			5	31
Cosmopterigidae	1	1	1	1
Gelechiidae	7	27	25	43
Epermeniidae			1	1
Pterophoridae	1	1	1	1
Tortricidae	1	1	1	1
Pyralidae: Phycitinae	11	14	18	38
Pyralidae: Pyralinae	1	1	6	7
Crambidae	11	40	8	9
Limacodidae			2	7
Saturniidae			2	2
Sphingidae			1	1
Geometridae	11	36	14	17
Arctiidae	1	4	3	4
Notodontidae			1	1
Lymantriidae			2	2
Noctuidae	46	172	52	141
Nolidae			2	42
total	**104**	**312**	**169**	**391**

Table 38. 2: List of the most common species with dominance values of the April sample 2008

Microlepidoptera	N = 45	**Pyraloidea**	N = 55
Parapsectris albicostella	0.24	*Nomophila noctuella*	0.22
Anarsia spec.	0.24	*Uresiphita polygonalis*	0.15
		Spoladea recurvalis	0.09
		Pagyda pulvereiumbralis	0.09
Macrolepidoptera	**N = 40**	**Noctuidae**	**N = 172**
Isturgia deerraria	0.23	*Eublemma* cf. *anachoresis*	0.20
Chiasmia procidata	0.18	*Perigea capensis*	0.12
Rhodometra sacraria	0.15	*Adisura aerugo*	0.1
Utetheisa pulchella	0.1	*Hypotacha isthmigera*	0.08
		Tathorhynchus plumbea	0.06
		?genus ?spec.	0.06
		?genus ?spec.	0.06
		Amyna punctum	0.05
		Spodoptera exigua	0.04

41 Claratal

Namibia, Khomas Windhoek BIOTA Observatory	S 22°46.758' E 16°46.704' 1865m	21.1.2007	20.30 – 1.00 wet, slight wind	T: 20°C H: 67%
		22.4.2008 leg.J.Deckert	19.00 – 23.00	T: not registered H: not registered

Vegetation type: Highland Shrubland

Plants and landscape features: The dissected, hilly landscape exhibits a mix of grassland and woody vegetation dominated by Acacia hereroensis, A. karoo, A. mellifera, A. reficiens, Lantana dinteri, Rhus marlothii, and Combretum apiculatum.

Table 41.1: Family spectrum and number of species and specimens

Family	21.01.2007 trap 1		22.04.2008 trap 1	
	s	N	s	N
Adelidae	1	1		
Opostegidae	1	1		
Nepticulidae	1	2	1	1
Tischeriidae	2	10	1	1
Tineidae	11	120	2	5
Eriocottidae	3	13		
Psychidae	2	6		
Pseudurgis group	1	1		
Bucculatricidae	3	16	1	1
Gracillariidae	2	2		
Yponomeutidae	1	1		
Scythrididae	11	28	4	4
Elachistidae	1	2	1	1
Oecophoridae	1	35		
Chrysopeleidae	6	40	3	5
Cosmopterigidae	1	2		

Gelechiidae	29	133	9	54
Tortricidae	1	1		
Pterophoridae	1	1		
Alucitidae	1	15		
Pyralidae: Phycitinae	29	95	7	22
Pyralidae: Epipaschiinae	1	2		
Pyralidae: Galleriinae	1	6		
Pyralidae: Pyralinae	2	18	1	1
Crambidae	11	60	5	25
Cossidae	1	2		
Limacodidae	3	12		
Lasiocampidae	2	19		
Sphingidae	1	2		
Geometridae	16	49	14	47
Arctiidae	3	3	1	2
Notodontidae	1	6		
Lymantriidae	3	3	1	1
Noctuidae	63	627	35	250
total	**217**	**1332**	**86**	**420**

Table 41. 2: Distribution of species over abundance classes in 2007

21.01.2007 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	s
1	34	19	13	27	93
2	12	6	9	12	39
4	9	9	3	11	32
8	12	3	3	4	22
16	9	4	1	3	17
32	3	3	1	1	8
64	1	0	0	4	5
128		0	0	1	1
total	80	44	30	63	217
%	37	20	14	29	100

Table 41. 3: Distribution of species over abundance classes in 2008

22.04.2008 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	s
1	16	5	10	12	43
2	2	4	3	8	17
4	2	1	1	4	8
8	0	0	0	3	3
16	0	3	1	4	8
32	2		1	1	4
64				3	3
total	22	13	16	35	86
%	26	15	19	40	100

Table 41. 4: List of the most common species in 2007 with dominance values

Microlepidoptera	**N = 430**	**Pyraloidea**	**N = 181**
Perissomastix mucrapex	0.13	*Laodamia cf. nonplagella*	0.22
Plesiosticha galactaea	0.08	*Euchromius discopis*	0.14
Ascalenia spec.	0.05	*Canthelea* spec.	0.16
Deltophora typica	0.04	*Heliothela ophideresana*	0.09
Athrips spec.	0.03	*Ematheudes hispidus*	0.07
Athrips latipalpella	0.03	*Aglossa* spec.	0.07
Scythris spec. 14	0.03	*Candiope* spec.	0.05
Alucita spec.	0.03	*Tegostoma comparalis*	0.05
Tinea spec.	0.02	*Lamoria* spec.	0.05
Bucculatrix wittnebeni	0.02	*Canthelea nigrinella*	0.03
Macrolepidoptera	**N = 96**	**Noctuidae**	**N = 627**
Microloxia ruficornis	0.19	*Pseudozarba cf. schencki*	0.26
Sena parva	0.17	*Eublemma delicata*	0.08
Coenobasis argentilinea	0.06	*Ozarba* spec. *1*	0.08
Stenostaura spec.	0.06	*Eublemma* spec.*2*	0.06
Taeda aetitis	0.05	*Hypotacha pulla*	0.06
Hoplistopus penricei	0.05	*Ozarba fuscata*	0.04
		Ozarba spec. *2*	0.03
		Acantholipes spec.	0.02
		Tathorhynchus exsiccata	0.01

Table 41. 4: List of the most common species in 2008 with dominance values

Microlepidoptera	**N = 72**	**Pyraloidea**	**N = 48**
Athrips spec.	0.36	*Homoeosoma stenotea*	0.27
Anarsia agricola	0.26	*Spoladea recurvalis*	0.19
Phaeoses spec.	0.06	*Nomophila noctuella*	0.19
Deltophora typica	0.05	*Pagyda pulvereiumbralis*	0.08
		Pyrausta diatoma	0.04
Macrolepidoptera	**N = 50**	**Noctuidae**	**N = 250**
Zamarada spec.	0.4	*Adisura aerugo*	0.18
Chiasmia spec.	0.22	*Eublemma anachoresis*	0.18
Chiasmia procidata	0.06	*Spodoptera exigua*	0.14
Rhodometra sacraria	0.05	*Ozarba* spec.1	0.07
		Neaxestis rhoda	0.05
		Cardepia definiens	0.04
		Tathorhynchus exsiccata	0.04
		Ozarba spec .2	0.03
		Hypotacha isthmigera	0.03
		Trichoplusia vittata	0.02

44 Rooisand

Namibia, Khomas Windhoek BIOTA Observatory	S 23°17.755' E 16°06.693' A: 1156m	20.1.2007	21.30 – 2.00 dry, calm	T: 20°C H: 56%
		12.4.2008	18.10 → 22.35 dry, calm	T: 23.3 → 15.3°C H: 39 → 70%

Vegetation type: Western Central Escarpment and Inselbergs

Plants and landscape features: The observatory is situated in the foothills of the escarpment with the Gamsberg in close vicinity. The woody vegetation is dominated by Acacia reficiens, A. erubescens, Catophractis alexandri, Boscia foetida, Commiphora glandulosa, and C. glaucescens.

Table 44. 1: Family spectrum and number of species and specimens

Family	20.01.2007		12.04.2008	
	s	N	s	N
Opostegidae	1	1		
Nepticulidae	2	60	1	1
Tineidae	3	4	2	4
Psychidae	1	1	4	15
Pseudurgis group	1	1		
Bucculatricidae	2	4	1	43
Gracillariidae			1	2
Lyonetiidae			2	2
Coleophoridae	1	13	1	2
Ethmiidae			1	1
Scythrididae	4	32	4	7
Elachistidae	1	2	1	1
Oecophoridae	1	2	1	2
Stathmopodidae	1	2		
Chrysopeleidae	6	78	1	1
Cosmopterigidae	2	155	3	75
Gelechiidae	26	185	17	49
Gelechiidae, indet.				6
Tortricidae	1	1	1	1
Epermeniidae			1	1
Pyralidae: Phycitinae	21	179	9	41
Pyralidae: Galleriinae	1	1		
Pyralidae: Pyralinae	1	2		
Crambidae	12	61	14	35
Lasiocampidae	1	1	2	4
Sphingidae			1	2
Geometridae	5	8	11	48
Lymantriidae	1	1	1	1
Noctuidae	30	1079	47	908
total	**125**	**1878**	**127**	**1252**

Table 44. 2: Distribution of species over abundance classes from trap 1 in 2007 and 2008

20.01.2007 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noc-tuidae	Total s
1	19	16	5	12	52
2	10	7	1	6	23
4	5	4	1	4	14
8	6	3		3	11
16	3	2		2	7
32	2	1			3
64	2	1		2	5
128	6	1			5
>128				1	1
total	53	35	7	30	125
%	42	28	6	24	100

12.04.2008 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noc-tuidae	Total s
1	19	12	6	12	49
2	10	5	3	6	24
4	6	4	4	5	19
8	4	0	1	12	17
16	1	1	0	4	6
32	0	1	1	0	2
64	1			5	6
128	1			0	1
>128				3	3
total	42	23	15	47	127
%	33	18	12	37	100

Table 44. 3: List of the most common species of the sample in 2007 with dominance values

Microlepidoptera	**N = 546**	**Pyraloidea**	**N = 243**
Parapsectris punctosa	0.18	*Epicrosis nigrinella .*	0.43
Eteobalea spec.	0.15	*Cadra figulilella*	0.14
Stagmatophora trimitra	0.13	*Noorda blitealis*	0.07
Ectoedemia vannifera	0.1	*Ancylolomia* spec.	0.06
Ascalenia spec.	0.07	*Ceutolopha isidis*	0.05
Scythris spec.	0.05	*Prionapteryx luteola*	0.03
Ochrodia subdiminutella	0.05	*Leonardo davinci*	0.03
Coleophora spec.	0.02	*Crambicybalomia ariditalis*	0.03
Gisilia meyi	0.02	*Etiella zinckenella*	0.03
Streyella pallidigrisea	0.01		
Stathmopoda spec.	0.01		
Polyhymno intortoides	0.01		

Macrolepidoptera	**N = 10**	***Noctuidae***	**N = 1079**
Isturgia deerraria	0.1	*Pseudozarba cf. schencki*	0.85
		Athetis spec.	0.04
		Ozarba spec. 1	0.03
		Stenosticta virgata	0.01
		Eublemma spec.1	0.01
		Eublemma spec.2	0.01
		Hypotacha parva	0.01
		Eublemma spec.3	0.01

Table 44. 4: List of the most common species of the sample in 2008 with dominance values

Microlepidoptera	**N = 197**	**Pyraloidea**	**N = 76**
Stagmatophora trimitra	0.35	*Canthelea nigrinella*	0.33
Bucculatrix wittnebeni	0.22	*Synclera traducalis*	0.21
Polyhymno spec.	0.05	*Rhamphimetopus ablutella*	0.05
Placodoma spec.	0.04	*Crambicybalomia ariditalis*	0.04
Picronarycia spec.	0.04	*Achyra coelatalis*	0.04
Metzneria spec.	0.03	*Nomophila noctuella*	0.04
Ochrodia diminutella	0.03		
Macrolepidoptera	**N = 47**	**Noctuidae**	**N = 908**
Zamarada spec.	0.36	*Spodoptera exigua*	0.25
Geometridae ?gen. ?spec.	0.13	*Ozarba cf. sancta*	0.17
Chiasmia spec.	0.06	*Eublemma* spec. 1	0.16
Sena parva	0.06	*Ozarba anachoresis*	0.05
		Ozarba spec. 1	0.05
		Ozarba topnaari	0.05
		Eublemma spec. 2	0.05
		Ozarba spec. 2	0.04
		Acontia okra	0.02
		Adisura aerugo	0.02

4.2. Nama Karoo Biome

10 Etendeka Plateau

Namibia, Kunene Etendeka, 40km N Palmwag	S 19°38.328 E 13°52.142 A: 1133m	27.2.2008	20.00 – 24.00 cloudy, wet	T: 19°C H: 91%

Vegetation: transition of Mopane Woodland and Nama Karoo shrubland

Dominant trees and shrubs: Colophospermum mopane, Terminalia prunioides, Euphorbia damarana, Euphorbia virosa, Cyphostemma uter, Acacia robysniana, Pachypodium lealii, Sesamothamnus guerichii, Commiphora virgata.

Table 10.1: Family spectrum and number of species and specimens

Family	trap 1	
	s	N
Tineidae	1	3
Psychidae	1	1
Gracillariidae	1	2
Plutellidae	1	4
Ethmiidae	3	10
Coleophoridae	1	1
Scythrididae	2	6
Chrysopeleidae	1	1
Gelechiidae	8	76
Tortricidae	1	13
Pterophoridae	1	1

Pyralidae: Phycitinae	3	19
Crambidae	10	95
Limacodidae	1	1
Saturniidae	1	3
Geometridae	3	3
Arctiidae	1	1
Sphingidae	2	2
Lymantriidae	1	6
Noctuidae	36	583
indet.		11
total	**79**	**842**

Table 10. 2: Distribution of species over abundance classes

abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total
1	8	5	7	12	32
2	3	1	0	5	9
4	4	1	1	3	9
8	2	2	1	7	12
16	2	3		2	7
32	2	0		2	4
64		1		3	4
128				1	1
>128				1	1
total	21	13	9	36	79
%	26%	18%	11%	45%	100%

Table 10.3: List of the most common species with dominance values

Microlepidoptera	**N = 118**	**Pyraloidea**	**N = 114**
Metzneria brandbergi	0.27	*Achyra coelatalis*	0.51
Ochrodia subdiminutella	0.18	*Synclera traducalis*	0.11
Cydia haematopa	0.11	*Spoladea recurvalis*	0.11
Lacistodes fuscomaculata	0.11	*Epicrocis nigrinella*	0.1
Ethmia pericentrota	0.07	*Tegostoma* spec.	0.04
Anarsia spec.	0.05	*Cadra figulilella*	0.04
Plutella xylostella	0.03	*Ancylosis* spec.	0.03
Scythris spec.1	0.03	*Loxostege frustalis*	0.03
Macrolepidoptera	**N = 16**	**Noctuidae**	**N = 583**
Laelioproctis leucosphena	0.38	*Grammodes stolida*	0.37
Imbrasia belina	0.19	*Spodoptera exigua*	0.11
Hippotion rosae	0.06	*Pseudozarba cf. schencki*	0.11
Hoplistopus penricei	0.06	*Spodoptera exempta*	0.08
Epilacydes unistriga	0.06	*Asplenia melanodonta erffai*	0.08
		Chrysodeixis acuta	0.05
		Maurilia arcuata	0.04
		Cyligramma latona	0.02
		Anomis sabulifera	0.02
		Characoma nilotica	0.01

11 Koigab

Namibia, Kunene Khorixas	S 20°15.371' E 13°44.187' 580m	31.1.2009	20.40 → 0.20 calm	T: 19.5 → 16.3°C H: 60 → 78%

Vegetation: North-western Escarpment and Inselbergs

Dominant plants and landscape features:Broad valley of the Koigab Rivier with scattered small Euclea pseudebenus, Salvatorea persica, Prosopis spec. and Tamarix usneoides on the banks, Cyperus marginatus and Welwitschia mirabilis in the revier, plains with Calicorema capitata, Euphorbia damarana, Boscia foetida, Citrullus ecirrhosus

Table 11.1: Family spectrum and number of species and specimens

Family	trap 1		trap 2		light tower		all sites	
	s	N	s	N	s	N	s	N
Tineidae	1	1	5	18	8	10	8	29
Eriocottidae			1	1			1	1
Scythrididae					1	1	1	1
Coleophoridae			1	1			1	1
Gelechiidae			5	17	6	49	7	66
Tortricidae	1	1					1	1
Pyralidae: Galleriinae					1	3	1	3
Pyralidae: Epipaschiinae					1	1	1	1
Pyralidae: Phycitinae	3	6	4	25	7	47	7	78
Pyralidae: Pyralinae	2	2	2	3	3	16	4	21
Crambidae	2	3	2	2	4	19	6	24
Geometridae			3	3	2	3	5	6
Hyblaeidae	1	1					1	1
Lymantriidae					1	2	1	2
Noctuidae	5	31	10	164	15	60	18	255
total	**15**	**45**	**33**	**234**	**49**	**211**	**63**	**490**

Table 11. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	11	9	6	9	35
2	1	2	1	2	6
4	2	2		2	6
8	3	1		2	6
16	1	2		1	4
32		3		1	4
64	1				1
128					
>128				1	1
total	19	19	7	18	63
%	30%	30%	11%	29%	100%

Table 11.3: List of the most common species with dominance values

Microlepidoptera	**N = 99**	**Pyraloidea**	**N = 127**
Ochrodia subdiminutella	0.47	*Hypsotropa* spec.	0.21
Scalmatica gnathosella	0.10	*Cadra figulilella*	0.18
Edosa spec.	0.8	*Epicrosis nigrilinella*	0.17
Ornativalva kalahariensis	0.7	*Hypotia namibiensis*	0.11
Neotelphusa spec.	0.5	*Euchromius discopis*	0.11
Rhodobates mirabib	0.4	*Hypotia* spec.	0.05
Macrolepidoptera	**N = 8**	**Noctuidae**	**N = 255**
Lymantriidae ?gen. ?spec.	0.25	*Pseudozarba cf. schencki*	0.67
		Eublemma spec.	0.11
		Athetis spec.	0.05

12. Grootberg Pass

Namibia, Kunene Khorixas	S 19°50.601' E 14°07.703' A: 1546m	3.2.2009	20.40 - 01.00 calm, slight wind, cloudy	T: 18° → 16° C

Vegetation: North-western Escarpment and inselbergs,

Dominant trees and shrubs:Colophospermum mopane (mostly shrubs), Acacia reficiens, Terminalia prunioides, Boscia foetida, Petalidium setosum, Phaeoptilum spinosum

Table 12.1: Family spectrum and number of species and specimens

Family	Light tower		trap 1		total s
	s	N	s	N	
Nepticulidae			2	2	2
Tineidae	3	10	2	7	4
Psychidae			1	2	1
Bucculatricidae	1	1	1	2	2
Gracillariidae	1	1			1
Yponomeutidae	1	1			1
Coleophoridae	1	1	1	1	1
Scythrididae	1	1	1	1	1
Elachistidae			1	4	1
Oecophoridae	1	3			1
Batrachedridae			1	2	1
Agonoxenidae			1	2	1
Chrysopeleidae			1	1	1
Gelechiidae	4	9	3	3	6
Gelechiidae, indet.				5	
Tortricidae	1	3	1	2	1
Pterophoridae	1	2			1
Pyralidae: Phycitinae	6	61	6	50	9
Pyralidae: Pyralinae	3	9	3	5	5
Crambidae	4	70	5	27	5
Thyrididae	2	3			2
Metarbelidae	2	3	1	3	2
Limacodidae	1	1			1
Lasiocampidae	1	1			1
Sphingidae	1	1	1	1	2
Geometridae	11	24	7	14	14
Arctiidae	1	1			1
Lymantriidae	2	2	1	1	3
Noctuidae	35	89	17	61	43
total	**84**	**297**	**57**	**196**	**114**

Table 12. 2. Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total s
1	12	8	17	28	65
2	10	4	3	5	22
4	3	2	1	5	11
8	3	2	2	2	9
16		1	1	2	4
32				1	1
64		2			2
total	28	19	24	43	114
%	25 %	16 %	21%	38%	100%

Table 12.3. List of the most common species with dominance values

Microlepidoptera	**N = 59**	**Pyraloidea**	**N = 222**
Ochrodia subdiminutella	0.1	*Metasia grootbergensis*	0.25
Cydia spec.	0.08	*Cadra figulilella*	0.23
Perissomastix spec.	0.08	*Haimbachia* spec.	0.05
Anarsia agricola	0.07	*Tyndis namibiensis*	0.03
		Calamoschoena nigripunctalis	0.02
		Ceutolopha isidis	0.02
Macrolepidoptera	**N = 55**	**Noctuidae**	**N = 150**
Idaea spec.	0.24	*Zekelita canestriata*	0.15
Geometridae ?gen. ?spec.	0.13	*Ozarba persinua*	0.15
Metarbela weinmanni	0.09	*Characoma nilotica*	0.11
Geometridae ?gen. ?spec.	0.07	*Pseudozarba cf. schencki*	0.11
Geometridae ?gen. ?spec.	0.04	*Ozarba hemisarca*	0.08
		Earias insulana	0.03
		Ozarba cf. sancta	0.03

65 Oerwald

Namibia, Hardap Maltahöhe, Tsauchab	S 24°30' E 16°07' A: 1080m	15.12.2007 leg. J. Deckert	20.00 – 24.00	T: 25° C

Vegetation type: Desert Dwarf Shrub Transition

Dominant plants and landcape features: The sampling locality was situated in the narrow valley of the Tsauchab River bordered by steep slopes. In December large pools were present in the river bed and the dense vegetation on the banks consisted of Acacia karoo, Euclea pseudebenus, Ficus sycomorus, Tamarix usneoides, Lagerra decurrens, Pechuel-Loeschea leubnitziae, Juncus spec.und Scrirpus spec.

Table 65. 1: Family spectrum of a single trap sample in the Tsauchab Valley in 2007

Family	Trap 1	
	s	N
Nepticulidae	2	10
Tineidae	3	4
Bucculatricidae	1	1
Scythrididae	7	13
Ethmiidae	1	1
Coleophoridae	1	1
Cosmopterigidae	1	1
Chrysopeleidae	3	10
Oecophoridae	1	1
Gelechiidae	10	25
Tortricidae	1	3
Pyralinae	1	1
Phycitinae	8	27
Crambidae	4	21
Metarbelidae	1	1
Lasiocampidae	2	27
Geometridae	7	10
Noctuidae	20	467
total	**74**	**624**

Table 65. 2: Dominant species of with numbers of specimens

Microlepidoptera	**N = 70**	**Pyraloidea**	**N = 49**
Ectoedemia vannifera	9	*Noorda blitealis*	18
Ascalenia spec.	7	*Ceutolopha isidiella*	13
Scythris spec.	7	*Epicrocis nigrinella*	6
Ochrodia subdiminutella	6	*Pogononeura hirticostella*	3
Hedma spec.	6	*Ptychopseustis lucipara*	2
Macrolepidoptera	**N = 38**	**Noctuidae**	**N = 467**
Sena parva	27	*Pseudozarba cf.schencki*	291
Streblote spec.	1	*Pandemis robusta*	149
		Antiophlebia bracteata	3
		Eublemma spec.1	2

Eublemma spec.2	2
Ozarba hemisarca	2
Trichanua spec.	2
Perigea capensis	2

68 Namtib Farm

Namibia, Tiras Berge Karas, Lüderitz,	E 26°02' E 16°16' A: 1420m	13.12.2007 leg.J.Deckert	20.00 – 24.00	T and H: not registered

Vegetation type: Desert Dwarf Shrub Transition

Dominant plants: Acacia erioloba, Ozoroa spec., Euphorbia mauritanica, Boscia foetida, Stipagrostis spec., Maerua schinzii.

Table 68. 1: Family spectrum of a single trap sample in 2007. The high abundance of *Pseudozarba cf. schencki* is often registered in southern Namibia, but not as auch a massive occurrence as reported here.

Family	Trap 1	
	s	N
Nepticulidae	1	1
Psychidae	1	1
Tineidae	2	3
Scythrididae	5	15
Ethmiidae	3	5
Coleophoridae	2	16
Oecophoridae	1	1
Agonoxenidae	1	1
Gelechiidae	9	29
Tortricidae	2	2
Copromorphidae	1	5
Pyralinae	4	8
Phycitinae	13	59
Crambidae	5	10
Metarbelidae	1	4
Lasiocampidae	1	1
Geometridae	12	28
Noctuidae	23	4896
total	**87**	**5085**

Table 69. 2: List of the most common species with dominance values

Microlepidoptera	**N = 79**	**Pyraloidea**	**N = 77**
Coleophora spec.	0.19	*Epicrocis nigrinella*	0.44
Ochrodia subdiminutella	0.13	*Pyralosis polycyclophora*	0.06
Scythris spec.1	0.08	*Ptychopseustis lucipara*	0.05
Rhynchoferella syncentra	0.06	*Cadra figulilella*	0.05
Hedma spec.	0.06	*Ancylosis* spec.	0.05
Macrolepidoptera	**N = 33**	**Noctuidae**	**N = 4896**
Proutiana spec.	0.27	*Ozarba cf.schencki*	0.96
Isturgia deerraria	0.18	*Pandemis robusta*	0.02
Salagena albovenosa	0.12	*Spodoptera exigua*	<0.01
Acanthovalva focularia	0.09	*Eublemma* spec.	<0.01

	Iambiodes incerta	<0.01
	Pseudomicrodes spec.	<0.01

71 Sturtzbach

Namibia, Karasberge Farm Sturtzbach	S 27°07.477' E 18°43.839' A: 1299m	18.4.2008	18.05 → 22.15 calm to windy, full moon, cloudy	T: 24.1 → 16.3°C H: 25 → 44%

Vegetation type: Karas Dwarf Shrubland

Plants and landscape features: The sample site was close to the dry Sturtzbach cataract on steep porphyrous walls; small pool on cataract base; slopes with Boscia foetida, Phaeoptilum spinosum and Acacia mellifera, grassland with Aristidia meridionalis, Enneapogon cenchroides, Hyparrhenia hirta and Stipagrostis ciliata.

Table 71.1: Family spectrum and number of species and specimens

Family	Falle 1		Falle 2		Turm		Total s	
	s	N	s	N	s	N	s	N
Psychidae	1	1	2	3			2	4
Tineidae	4	5	1	1	3	5	5	11
Bucculatricidae	3	36	1	8			3	44
Gracillariidae	1	1					1	1
Lyonetiidae	1	1					1	1
Scythrididae	4	8	1	1	2	2	4	11
Oecophoridae	1	1					1	1
Ethmiidae	1	5	1	2	3	7	3	14
Elachistidae	1	1					1	1
Cosmopterigidae	2	11	1	1	1	1	3	13
Gelechiidae	7	36	3	3	1	2	11	41
Pterophoridae	1	1	1	2	3	3	4	6
?family	1	1					1	1
Tortricidae	1	12	1	1	2	3	2	16
Pyralidae: Phycitinae	11	85	9	13	9	9	16	107
Pyralidae: Pyralinae	1	3	2	2	1	1	2	6
Crambidae	3	10	7	11	2	4	11	25
Lasiocampidae					2	3	2	3
Geometridae	13	31	9	35	2	2	16	68
Arctiidae			1	3			1	3
Noctuidae s.l.	33	89	30	183	8	11	47	283
total	**90**	**338**	**70**	**269**	**39**	**53**	**137**	**660**

Table 71. 2: Distribution of species over abundance classes of all samples

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	21	13	8	21	63
2	8	5	3	8	24
4	5	5	5	4	19
8	4	4	2	5	15
16	3	2	0	5	10

32	1		1	1	3
64				3	3
total	42	29	19	47	137
%	31	21	14	34	100

Table 71. 3: List of the most common species with numbers of individuals (only females of *Bucculatrix* spec. were present in the sample)

Microlepidoptera	**N = 165**	**Pyraloidea**	**N = 138**
Bucculatrix spec.	38	*Epicrocis nigrinella*	22
Cydia spec.	15	*Ancylosis* spec.	11
Ethmia vulcanica	12	*Rhamphimetopus ablutellus*	10
Deltophora typica	10	*Antigastra catalaunalis*	6
Ochrodia subdiminutella	8	*Nomophila noctuella*	5
Syncopacma oxyspila	7	*Etiella zinckenella*	5
Pyncostola spec.	7	*Hypotia* spec.	5
Ascalenia spec.	7	*Daulia* spec.	4
Ceratophaga spec.1	4	*Tegostoma comparalis*	4
Ceratophaga spec.2	4	*Ancylosis* spec.	4
Macrolepidoptera	**N = 74**	**Noctuidae**	**N = 263**
Rhodometra sacraria	32	*Spodoptera exigua*	48
Idaea spec.	6	*Ozarba hemisarca*	43
Geometridae ?gen. ?spec.	5	*Eublemma* spec.	33
Geometridae ?gen. ?spec.	5	*Cerocala vermiculosa*	22
Geometridae ?gen. ?spec.	3	*Ozarba* spec.	14
Utheteisa pulchella	3	*Cardepia definiens*	10
		Pseudomicrodes spec.	13
		Erias insulana	9
		Masalia galathea	9
		Spodoptera spec.	7
		Acantholipes circumdata	6

73 Gellap

Namibia, Karas, NW Keetmanshoop, Gellap Ost BIOTA observatory	S 26°24.42' E 18°00.44' A: 1099m	5. - 7.3.2003	19.00 – 20.00, 5.00 – 6.30, windy, breaking off after 1 hour	T: 24°C

Vegetation type: Karas Dwarf Shrubland

Dominant plants: Acacia erioloba, Acacia mellifera, Acacia nebrownii, Callicorema capitata, Maerua schinzii, Catophractis alexandri, Rhigozum trichotonum, Salsola spec., Stipagrostis namaquensis, S. obtusa

Table 73. 1: Family spectrum of three combined trap samples

Family	trap 1	
	s	N
Nepticulidae	1	12
Tineidae	3	10
Yponomeutidae	1	1
Ethmiidae	1	1
Oecophoridae	1	1
Scythrididae	5	6
Cosmopterigidae	5	15
Pterophoridae	1	1
Gelechiidae	18	74
Tortricidae	4	21
Pyralidae	22	69
Crambidae	10	27
Metarbelidae	1	1
Cossidae	1	3
Limacodidae	1	5
Lasiocampidae	2	8
Geometridae	19	32
Arctiidae	1	2
Noctuidae	48	146
total	**145**	**435**

Table 73. 2: List of the most common species with dominance values

Microlepidoptera	**N =143**	**Pyraloidea**	**N = 96**
Ochrodia subdiminutella	0.27	*Epicrocis nigrinella*	0.6
Ectoedemia vannifera	0.08	*Nomophila noctuella*	0.11
Cydia spec.	0.08	*Tegostoma comparalis*	0.09
Ephysteris spec.	0.07	*Cadra figulilella*	0.09
Macrolepidoptera	**N = 51**	**Noctuidae**	**N = 146**
Proutiana spec.	0.2	*Pseudozarba cf. schencki*	0.68
Palaeaspalatus carnea	0.16	*Eublemma cf. delicata*	0.07
Coenobasis argentilinea	0.1	*Ozarba hemiochra*	0.05
Rethona strigosa	0.09	*Proxenus* spec.	0.04
		Centrarthra spec	0.04

74 Karios

Namibia, Karas, Karasburg BIOTA Observatory	S 27°40.412' E 17°49.199' A: 897m	9. - 12.3.2003	19.00 – 24.00 no wind, clear sky	T: 31°C → 20°C H: not registered
		13.10.2007	20.00 - 1.00 weak wind	T: 21°C → 17°C H: 32%
		16.4.2008	18.05 – 23.00 windy, moonlight	T: 25.1 → 22.1°C H: 25 → 28%
		1.-2.12.2008	21.20 – 0.30 no wind,clear	T: 30°C → 26°C H: 20 – 23%

Vegetation type: Dwarf Shrub Savanna

Dominant plants and landscape feauture: The Observatory was situated on a wide plain, slightly inclined towards Fish River Canyon, and dissected by erosion channels. Some koppies and rocky outcrops are in the vicinity. Vegetation is dominated by Aloe dichotoma trees and dense population of Euphorbia gregaria, with Rhizogum trichotomum, Galenia africana, Sisyndite spartea, Stipagrostis ciliata, S. uniplumis, S. obtusa in between.

Tabel 74. 1: Family spectrum of four combined trap samples (9.-12.3.2003) and manually collected material (HWL, 160 W)

Family	trap 1 s	N	HWL s
Tineidae	3	9	11
Pseudurgis group	3	5	3
Plutellidae			1
Coleophoridae			2
Ethmiidae			2
Oecophoridae			1
Scythrididae	2	3	3
Cosmopterigidae	3	4	7
Gelechiidae	8	56	13
Tortricidae	1	1	2
Pyralidae	18	112	22
Crambidae	4	7	6
Cossidae	1	1	1
Metarbelidae			1
Lasiocampidae			1
Sphingidae	1	3	1
Geometridae	3	3	5
Arctiidae	1	1	1
Noctuidae	26	2643	29
total	**74**	**2848**	**112**

Table 74. 2: Distribution of species over abundance classes of the trap sample of 2003

Abundance class	Noctuidae	all species
1	8	37
2	2	10
4	7	11

8	4	7
16	3	4
32		2
>32	2	3
total	26	74
%	35%	100%

Table 74. 3: List of the most common species (combined sample 2003) with dominance values

Microlepidoptera	N = 82	**Pyraloidea**	**N = 119**
Ochrodia subdiminutella	0.48	*Epicrocis nigrinella*	0.75
Pseudotelphusa spec.	0.11	*Tegostoma comparalis*	0.1
Paraptica concinnerata	0.09	*Namibicola karios*	0.06
Ephysteris spec.	0.08	*Cadra figulilella*	0.05
Macrolepidoptera	**N = 7**	**Noctuidae**	**N = 2643**
Hyles malagassica	0.42	*Pseudozarba cf. schencki*	0.97
Arctiocossus strigulata	0.14	*Eublemma cf.delicata*	0.01
Palaeaspalatus carnea	0.14	*Ozarba hemiochra*	>0.01
		Proxenus spec.	>0.01
		Centrarthra spec.	>0.01

Tabel 74. 4: Family spectrum of trap on Observatory and nearby Swartkoppies (manually collected material, HWL, 160 W) in 2007

Karios 13.10.2007					
Family	trap 1		Swartkoppies		total
	s	N	s	N	s
Nepticulidae	1	3			1
Psychidae	2	3			2
Tineidae	3	22	3	13	4
Scythrididae	4	8			4
Coleophoridae	3	3			3
Stathmopodidae	1	1	1	1	1
Chrysopeleidae	1	1	1	2	2
Gelechiidae	11	22	5	6	12
Tortricidae	1	9	3	9	3
Pyralidae: Galleriinae	2	2	1	9	2
Pyralidae: Phycitinae	7	35	9	25	12
Pyralidae: Pyralinae	2	16	5	11	6
Crambidae	1	1	1	3	2
Geometridae	3	6	3	3	5
Noctuidae	15	24	7	19	21
total	**57**	**156**	**39**	**101**	**80**

Table 74. 5: Distribution of species over abundance classes of the trap sample of 2007

Karios 13.10.2007 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	15	8	1	9	33
2	2	1	1	4	8
4	6		1	2	9
8	2	1			3
16	2	1			3
32		1			1
total	27	12	3	15	57
%	48%	21%	5%	26%	100%

Table 74. 6: List of the most common species with dominance values

Microlepidoptera	**N = 72**	**Pyraloidea**	**N = 54**
Paraptica concinnerata	0.17	*Namibicola karios*	0.44
Cydia spec.	0.13	*Hypotia brandbergensis*	0.26
Picronarycia karioscola	0.086	*Phycita* spec. *2*	0.11
Hedma spec.	0.08	*Aglossa* spec.	0.04
Neoepiscardia namibiae	0.06		
Macrolepidoptera	**N = 6**	**Noctuidae**	**N = 24**
Rhodometra sacraria	0.5	*Cardepia definiens*	0.17
Idaea spec.	0.3	*Eublemma* spec.1	0.13
		Grammodes stolida	0.08
		Pseudozarba cf.schencki	0.08

Tabel 74. 7: Family spectrum of trap on Karios Observatory and nearby Swartkoppies (manually collected material, HWL, 160 W) in 2008

Karios 16.4.2008 Family	trap 1		HWL		Swartkoppies		total	
	s	N	s	N	s	N	s	N
Adelidae			1	2			1	2
Psychidae	1	1					1	1
Tineidae	1	6	1	4	5	25	5	35
Bucculatricidae			1	1			1	1
Plutellidae	1	2			2	2	2	4
Scythrididae	6	14	1	1			6	15
Coleophoridae			1	1	1	1	1	2
Oecophoridae					1	1	1	1
Ethmiidae	1	4			3	15	3	19
Holcopogonidae					2	2	2	2
Batrachedridae					1	1	1	1
Cosmopterigidae	3	5					3	5
Gelechiidae	8	68	4	12	2	15	10	96
Pterophoridae					1	1	1	1

Pseudurgis group	1	14	1	23	2	2	3	39
Tortricidae			1	1	3	6	4	7
Pyralidae: Phycitinae	9	100			20	35	24	135
Pyralidae: Pyralinae	2	4			7	22	9	26
Crambidae	1	4			8	14	9	18
Metarbelidae	1	1			1	2	1	3
Lasiocampidae					2	7	2	7
Geometridae	6	21	1	1	11	27	14	49
Noctuidae	28	276			33	83	54	359
total	**69**	**520**	**12**	**46**	**105**	**261**	**158**	**828**

Table 74. 8: List of the most common species of the trap with dominance values

Microlepidoptera	**N = 87**	**Pyraloidea**	**N = 108**
Acutitornus cf. munda	0.24	*Namibicola karios*	0.43
Pseudurgis karoo	0.16	*Epicroscis nigrinella*	0.28
Ochrodia subdiminutella	0.1	*Staudingeria mimeugraphella*	0.11
Paraptica concinnerata	0.07	*Nomophila noctuella*	0.04
Aproeremia spec.	0.07	*Candiopa cf. joannisella*	0.03
Scythris spec.	0.06	*Hypotia* spec.	0.03
Ethmia spec	0.05		
Macrolepidoptera	**N = 22**	**Noctuidae**	**N = 276**
Proutiana spec.	0.64	*Spodoptera exigua*	0.28
Palaeaspalates carnea	0.18	*Pseudomicrodes spec.*	0.21
		Eublemma anachoresis	0.15
		Ozarba spec. 1	0.05
		Ozarba spec. 2	0.04

Tabel 74. 8: Family spectrum of two trap samples on Karios Observatory, 1.12.2008

Familie	trap 1, hanging		trap 2, standing		total
	s	N	S	N	s
Nepticulidae	1	12	1	7	1
Psychidae	2	5	1	11	2
Tineidae	4	86	4	29	5
Pseudurgis group	1	2			1
Bucculatricidae	1	1			1
Gracillariidae	1	21	1	10	1
Oecophoridae	3	4	1	1	4
Xyloryctidae			1	1	1
Coleophoridae	2	16	3	4	3
Agonoxenidae			1	1	1
Scythrididae	5	29	5	17	5
Chrysopeleidae	3	15	2	4	3

Gelechiidae	13	74	7	32	13
Gelechiidae indet.		5		7	
Tortricidae	1	50	1	35	1
Galleriinae			1	1	1
Pyralinae	6	29	7	31	9
Phycitinae	14	103	12	109	14
Crambidae	7	240	6	221	7
Geometridae	1	1	1	3	2
Noctuidae s.l.	20	96	15	135	28
total	**84**	**789**	**70**	**659**	**101**

Table 74. 9: Distribution of species in abundance classes of the combined trap samples, 1.12.2008

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	22	9		15	46
2	5	4	1	4	14
4	2	3	1	4	10
8	2	5		2	9
16	5	2		2	9
32	3	2			5
64	1	3			4
128	2				2
>128		1		1	2
total	42	29	2	28	101
%	42%	29%	2%	28%	

Table 74. 10: List of the most common species with dominance values, 1.12.2008

Microlepidoptera	**N = 479**	**Pyraloidea**	**N = 733**
Cydia spec.	0.18	*Ptychopseustis lucipara*	0.54
Paraptica concinnerata	0.17	*Namibicola karios*	0.06
Ochrodia subdiminutella	0.1	*Hypotia brandbergensis*	0.05
Neoepiscardia namibiae	0.04	*Epicrocis nigrinella*	0.05
Ectoedemia vannifera	0.04	*Hyperlais transversella*	0.04
Picronarycia karioscola	0.03	*Cadra figulilella*	0.04
Hedma spec.	0.03	*Actenia fuscoserrata*	0.03
Ascalenia spec.	0.02	*Parancylolomia relicta*	0.02
Macrolepidoptera	**N = 4**	**Noctuidae**	**N = 231**
Rhodoneura sacraria	0.75	*Pseudozarba cf.schencki*	0.7
		Pseudomicrodes spec.	0.06
		Eublemma spec.1	0.04
		Heliothis armigera	0.03
		Ozarba hemisarca	0.02

4.3 Namib Desert Biome

49 Wlotzkasbaken

Namibia, Erongo Swakopmund BIOTA Observatory	S 22°22.603' E 14°29.077' 48m	9.4.2008	22.15 → 1.00 windy, with calm intervalls.	T: 16.2 → 14.4°C H: 75 → 93%
		29.1.2009	20.30 → 0.30 no wind after 21.30	T: 15.4 → 17.0°C H: 84 → 86%

Vegetation type: Central Desert

Plants: Zygophyllum stapffi, Z. simplex, Arthraerua leubnitziae, Tetragonia reduplicata, Barleria lancifolia, Brownanthus kuntzei, Euphorbia phylloclada, Schmidtia pappophoroides

Table 49.1: Family spectrum and number of species and specimens in 2008

Family	Light towers	
	s	N
Tineidae	1	1
Plutellidae	1	2
Holcopogonidae	2	2
Gelechiidae	1	11
Pyralidae: Pyralinae	1	75
Pyralidae: Phycitinae	1	1
Crambidae	7	29
Cossidae	1	1
Sphingidae	2	12
Geometridae	1	1
Arctiidae	2	4
Noctuidae	21	168
total	**41**	**307**

Table 49. 2: Distribution of species over abundance classes in 2008

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	2	4	4	10	20
2	2	1			3
4			1	1	2
8		2		3	5
16	1	1	1	3	6
32				3	3
64				1	1
128		1			1
total	5	9	6	21	41
%					

Table 49. 3: List of the most common species with dominance values in 2008

Microlepidoptera	**N = 17**	**Pyraloidea**	**N = 105**
Ochrodia subdiminutella	0.65	*Hypotia bolinalis*	0,71

Plutella maculipennis	0.12	*Diaphana indica*	0,11
Hesperestes rhyodes	0.12	*Tegostoma aridalis*	0,07
Holcopogonidae ?gen.?spec.	0.06	*Spoladea recurvalis*	0,05
Trichophaga cuspidata	0.06	*Synclera traducalis*	0,02
		Herpetogramma licarsisalis	0,01
		Hellula undalis	0,01
		Ancylosis luederitzella	0,01
		Tegostoma albinalis	0,01
Macrolepidoptera	**N = 18**	**Noctuidae**	**N = 168**
Hyles malagassica	0,6	*Amyna octo*	0,23
Utetheisa pulchella	0,17	*Agrotis longidentifera*	0,15
Pectiocossus spec.	0,06	*Spodoptera exempta*	0,14
Rhodometra sacraria	0,06	*Cardepia definiens*	0,1
Hyles lineata	0,06	*Spodoptera exigua*	0,07
Hippotion celerio	0,06	*Hypena strigata*	0,07
		Ectochela nigrilineata	0,06
		Anomis sabulifera	0,05
		Sphingomorpha chlorea	0,04

Table 49. 4: Family spectrum and number of species and specimens in 2009

Family	Light tower		Trap 1		Trap 2		Total s	N
	s	N	s	N	s	N		
Tineidae					1	3	1	3
Coleophoridae					1	1	1	1
Scythrididae			1	1	1	1	2	2
Holcopogonidae			1	1	1	1	1	2
Gelechiidae	1		3	3	3	4	5	7
Pyralidae: Phycitinae	1	1			1	1	2	2
Pyralidae: Pyralinae	1	17	1	12	1	5	1	34
Crambidae	1	1			2	2	2	3
Cossidae	3	16			1	1	3	17
Geometridae	1	11	1	10	2	10	2	32
Arctiidae	2	3	1	2	1	2	2	7
Lymantriidae	1	5	2	4	1	1	2	10
Noctuidae	5	34	4	10	3	11	5	55
total	**16**	**88**	**14**	**43**	**19**	**43**	**29**	**175**

Table 49. 5: Distribution of species over abundance classes in 2009

52 Wüstenquell

Namibia, Erongo Swakopmund	S 22°37.35' E 15°22.34' A: 70m	21.3.2010 leg. J. Deckert	20.00 → 0.30 windy, with calm intervalls.	T and H not registered,

Vegetation type: Central Desert

Plants and landscape features: Dry river-bed in an undulating gravel and sandy plain, with some trees on the banks; Euclea pseudebenus, Euphorbia damarana, Euphorbia mauretanica, Zygophyllum simplex, Brownanthus kuntzei

Table 52.1: Family spectrum and number of species and specimens

Family	trap 1	
	s	N
Tineidae	1	1
Scythrididae	1	1
Coleophoridae	1	1
Gelechiidae	1	5
Pterophoridae	1	1
Pyralidae: Phycitinae	3	3
Crambidae	2	2
Geometridae	2	2
Arctiidae	1	1
Noctuidae	6	40
total	**19**	**57**

Table 52. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	4	5	3	5	17
2					
4	1				1
8					
> 32				1	1
total	5	5	3	6	19
%	26%	26%	16%	32%	100%

Table 52.3: List of all collected species with absolute numbers

Microlepidoptera	**N = 7**	**Pyraloidea**	**N = 4**
Ochrodia subdiminutella	5	*Dyssalacta negatalis*	1
Agdistis spec.	1	*Antigastra catlaunalis*	1
Coleophora spec.	1	*Ceutolopha isidis*	1
Scythris spec.	1	*Pempelia* spec.	1
Tineidae ?gen. ?spec.	1	*Veldticola striatella*	1
Macrolepidoptera	**N = 3**	**Noctuidae**	**N = 40**
Utetheisa pulchella	1	*Pseudozarba cf. schencki*	35
Eupithecia spec.	1	*Eublemma odontophora*	1
Geometridae ?gen. ?spec.	1	*Characoma nilotica*	1
		Pandesma robusta	1
		Acontia spec.	1
		Ozarba spec.	1

54 Ganab

Namibia, Erongo Swakopmund BIOTA Observatory	S 23°07.204' E 15°32.498' A: 995m	18.1.2007	20.30 – 23.30 dry, calm	T: 23,2°C H: 37%
		10.4.2008	18.00 – 21.00	T: 19.8 → 16.7°C H: 72 → 67%

Vegetation type: Central Desert

Plants and landscape features: The plain is cut by some drainage channels were single shrubs of Commiphora glaucescens, C. pyracanthoides, C. saxicola, Ziziphus mucronata, Boscia foetida are growing together with Cleome suffruticosa, Crotolaria damarensis, Indigofera auricoma, and Tribulus terrestris. On the plains are found Zygophyllum cylindrifolium, Calicorema capitata and Salsola tuberculata. Grasses are dominated by Stipagrostis ciliata, S. hirtigluma and Eragrostis nindensis.

Table 54.1: Family spectrum and number of species and specimens in 2007 and 2008

Family	18.01.2007 trap+tower		10.04.2008 trap 1		light tower		total	
	s	N	s	N	s	N	total s	N
Nepticulidae	3	32						
Tischeriidae	1	1						
Tineidae	4	6			1	2	1	2
Psychidae					1	1	1	1
Bucculatricidae	3	5						
Yponomeutidae	2	2			1	1	1	1
Plutellidae	1	1	1	19	1	2	1	21
Lyonetiidae	1	1						
Coleophoridae	3	11						
Scythrididae	7	9			2	2	2	2
Oecophoridae	1	1						
Autostichidae	1	4						
Chrysopeleidae	2	8						
Cosmopterigidae	2	2						
Gelechiidae	11	142	2	272	4	16	5	288
Tortricidae	3	4			4	4	4	4
Pyralidae: Phycitinae	5	8	2	11	5	17	6	28
Pyralidae: Pyralinae	3	9			4	7	4	7
Crambidae	4	15	3	18	10	12	12	30
Metarbelidae	1	8						
Cossidae	1	3			1	1	1	1
Lasiocampidae	1	1						
Sphingidae			2	10			2	10
Geometridae	3	3	10	25	3	3	11	28
Arctiidae			1	1	1	1	1	2
Noctuidae s.l.	8	36	32	173	18	24	43	197
total	**71**	**312**	**53**	**529**	**56**	**93**	**95**	**622**

Table 54. 2: Distribution of species over abundance classes in 2007

18.01.2007 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total s
1	30	4	4	4	42

2	6	5	1	2	14
4	4	1	1	0	6
8	2	1		1	4
16	1	1		0	2
32	1	0		1	2
64	0	0			0
128	1	0			1
total	45	12	6	8	71
%	63	17	9	11	100

Table 54. 3: Distribution of species over abundance classes in 2008

10.04.2008 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total s
1	10	13	8	25	56
2	1	3	4	3	11
4	2	4	0	4	10
8	0	0	3	3	6
16	0	1		5	6
32	1	1		2	4
64	0			1	1
>128	1				1
total	15	22	15	43	95
%	16	23	16	45	100

Table 54. 4: List of the most common species with dominance values in 2007

Microlepidoptera	**N = 230**	**Pyraloidea**	**N = 32**
Ochrodia subdiminutella	0.54	*Hyperlais xanthomista*	0.28
Ectoedemia vannifera	0.13	*Namibiodes brandbergensis*	0.19
Coleophora spec.	0.04	*Ancylosis* spec.	0.09
Ephysteris eremaula	0.04	*Ancylolomia* spec.	0.06
Ascalenia spec.	0.03	*Surattha luteola*	0.06
Hesperestes rhyaula	0.02	*Crambicybalomia ariditalis*	0.06
		Etiella zinckenella	0.06
Macrolepidoptera	**N = 15**	**Noctuidae**	**N = 36**
Salagena albovenosa	0.13	*Pseudozarba cf. schencki*	0.55
Xyleutes dictyotephra	0.13	*Acontia okra*	0.2
		Stenosticta virgata	0.06
		Athetis capicola	0.06

Table 54. 5: List of the most common species with dominance values in 2008

Microlepidoptera	**N = 319**	**Pyraloidea**	**N = 65**
Ochrodia subdiminutella	0.85	*Epicrocis nigrinella*	0.31
Plutella xylostella	0.07	*Achyra coelatalis*	0.18
Syncopacma spec.	0.02	*Antigastra catalaunalis*	0.06
		Euchromius ocelleus	0.05
Macrolepidoptera	**N = 41**	**Noctuidae**	**N = 197**
Rhodometra sacraria	0.22	*Spodoptera exigua*	0.18
Hyles malagassica	0.22	*Eublemma delicata*	0.15
Uthetheisa pulchella	0.15	*Acontia okra*	0.09
Zamarada spec.	0.15	*Ozarba* spec 1	0.08
		Ozarba spec. 2	0.06
		Ozarba spec. 3	0.05
		Cerocala vermiculosa	0.05
		Sphingomorpha chlorea	0.03

55 Gobabeb

Namibia, Erongo Swakopmund BIOTA Observatory	S 23°31'94" E 15°02'08" A: 419m	19.1.2007	20.00 – 2.00 windy with intervalls	T: 23°C H: 31%
		11.4.2008	23.00 – 3.30 windy with intervalls	T: 18.5°C H: 62%

Vegetation type: Central Desert

Plants and landscape features: The observatory is situated on a vast, undulating plain covered by quartz gravel, sand and granite boulders where Calicorema capitata, Heliotropium tubulosum, Blepharis obmistrata, Zypophyllum spongiosum and Salsola tuberculata occur.

Table 55.1: Family spectrum and number of species and specimens in 2007 and 2008

Family	19.01.2007 trap 1		11.04.2008 trap 1	
	s	N	s	N
Tineidae	1	1		
Coleophoridae	1	1		
Ethmiidae			1	7
Scythrididae			2	3
Gelechiidae	5	25	4	180
Pyralidae: Phycitinae	1	2	4	13
Pyralidae: Pyralinae	2	2	1	15
Crambidae			8	14
Sphingidae			1	4
Geometridae			2	2
Arctiidae			1	6
Noctuidae	3	14	10	26
total	**13**	**45**	**34**	**270**

Table 55. 2: Distribution of species over abundance classes in 2007

18.01.2007 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total s
1	3	2		2	7
2	2	1			3
4					0
8					0
16	2			1	3
total	7	3	0	3	13
%	54	23	0	23	100

Table 55. 3: Distribution of species over abundance classes in 2008

11.04.2008 Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total s
1	2	5	2	7	16
2	1	4	0	1	6

4	2	2	1	1	6
8	1	1	1	0	3
16	0	1		1	2
>128	1				1
total	7	13	4	10	34
%	20	38	12	30	100

Table 55.4: List of collected species in 2007 with number of individuals

Microlepidoptera	**N = 27**	**Pyraloidea**	**N = 4**
Ephysteris gobabensis	10	*Rhamphimetopus ablutellus*	2
Ochrodia subdiminutella	10	*Hypotia dinteri*	1
Ornativalva kalahariensis	2	*Hypotia* spec.	1
Ephysteris eremaula	2		
Coleophora spec.	1		
Tineidae ?gen. ?spec.	1		
Dichomeris spec.	1		
Macrolepidoptera	**N = 0**	**Noctuidae**	**N = 14**
		Pandesma robusta	12
		Agrotis segetum	1
		Acanthonyx marginalis	1

Table 55.5: List of collected species in 2008 with dominance values (except for Macrolepidoptera)

Microlepidoptera	**N = 190**	**Pyraloidea**	**N = 42**
Ochrodia subdiminutella	0.97	*Epicrocis nigrinella*	0.52
Ethmia cf. epiloxa	0.04	*Staudingeria mimeugraphella*	0.14
Phthorimaea operculella	0.02	*Ancylosis subpyrethrella*	0.14
Ephisteris eremaula	0.02	*Synclera traducalis*	0.07
Macrolepidoptera	**N = 12**	**Noctuidae**	**N = 26**
Uthetheisa pulchella	6	*Spodoptera exigua*	0.53
Hyles malagassica	4	*Eublemma delicata*	0.12
Rhodometra sacraria	1	*Sphingomorpha chlorea*	0.11

57 Mirabib

Namibia, Erongo Swakopmund	S 23°27.264' E 15°21.223' A: 752m	27.1.2009	20.30 – 1.00, slight wind, later calm	T: 20.4 → 16.9°C H: 60 → 74%

Vegetation type: Central Desert

Plants: Commiphora saxicola, Monechma cleomoides, Blepharis grossa, Tribulus terrestris, Ruellia diversifolia, Sutera naxii, Stipagrostis ciliata, Mesembryanthemum spec.,

Table 57.1: Family spectrum and number of species and specimens

Family	trap 1		trap 2		light tower		Total s
	s	N	s	N	s	N	s
Psychidae	1	9	1	4	1	16	1
Tineidae	1	16	3	7	5	21	6
Scythrididae	2	2			1	1	3
Coleophoridae	1	27	1	1	1	11	1
Oecophoridae	1	1			1	1	2
Chrysopeleidae					1	1	1
Gelechiidae	4	40	6	15	9	96	9
Tortricidae					1	1	1
Pyralidae: Phycitinae	3	3	3	3	6	18	8
Pyralidae: Pyralinae					2	3	2
Crambidae			1	1	1	1	2
Geometridae	3	3	1	5	3	18	5
Lymantriidae					1	1	1
Noctuidae	5	10	6	12	9	46	15
total	**21**	**111**	**22**	**48**	**42**	**235**	**57**

Table 57. 2: Distribution of species over abundance classes

Adundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	11	7	5	10	33
2	2	2		2	6
4	2	1		1	4
8	2	2			4
16	2				2
32	2		1	2	5
64	2				2
128	1				1
total	24	12	6	15	57
%	42%	21%	11%	26%	100%

Table 57.3: List of most dominant species with dominance values

Microlepidoptera	**N = 270**	**Pyraloidea**	**N = 29**
Argophara epaxia	0.27	*Cadra figulilella*	0.28
Ochrodia subdiminutella	0.19	*Ancylosis* spec.	0.28
Coleophora mirabibella	0.14	*Ceutolopha isidis*	0.1
Picronarycia deserta	0.11	*Epicrosis nigrinella*	0.07
Rhodobates mirabib	0.06	*Ancylosis ocellella*	0.03
Scalmatica gnathosella	0.05	*Tegostoma arida*	0.03
Perissomastix peltiger	0.03	*Synaphe fuscochralis*	0.03
Gelechiidae ?gen. ?spec.	0.03	*Noorda blitealis*	0.03
Macrolepidoptera	**N = 32**	**Noctuidae**	**N = 68**
Proutiana perconspersa	0.84	*Ozarba topnari*	0.46
Rhodometra sacraria	0.03	*Acontia okra*	0.29
Isturgia deerraria	0.03	*Ectochela nigrilineata*	0.04
Palaeaspilates carnea	0.03	*Oedicodia* spec.	0.03

58. Vogelfederberg

Namibia, Erongo Swakopmund	S 23°03.334' E 14°59.376' A: 493m	28.1.2009	21.00 → 1.00 slight wind	T: 17.4 → 14.4°C H: 71 → 84%

Vegetation type: Central Desert

Plants: Zygophyllum stapffi, Arthraerua leubnitziae, Ipomoea adenioides, Salsola spec., Orthanthera albida, Dyerophytum africanum, Monechma cleomoides, Kleinia longiflora

Table 58.1: Family spectrum and number of species and specimens

Family	all traps	
	s	N
Tineidae	1	1
Oecophoridae	1	2
Scythrididae	1	18
Coleophoridae	1	2
Gelechiidae	4	19
Pterophoridae	1	4
Pyralidae: Phycitinae	4	5
Crambidae	1	1
Cossidae	2	2
Noctuidae	8	15
total	24	69

Table 58. 2: Distribution of species over abundance classes

Abun-dance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	3	4	2	6	15
2	3	1		1	5
4	1				1
8				1	1
16	1				1
32	1				1
total	9	5	2	8	24
%	32%	28%	8%	32%	100%

Table 58.3: List of all collected species with absolute numbers

Microlepidoptera	**N = 46**	**Pyraloidea**	**N = 6**
Scythis vogelfederbergensis	18	*Ancylosis luederitzella*	2
Ochrodia subdiminutella	15	*Tegostoma aridalis*	1
Agdistis spec.	4	*Anerastia* spec.1	1
Coleophora spec.	2	*Anerastia* spec.2	1
Paraspectris spec.	2	*Pempelia* spec.	1
Paratemelia spec.	2		
Gelechiidae ?gen. ?spec.	1		
Ceratophaga spec.	1		

Gelechiidae ? gen. ? pec.	1		
Macrolepidoptera	**N = 2**	**Noctuidae**	**N = 15**
Pectiocossus spec.	1	*Characoma nilotica*	7
Cossidae ? gen. ? spec.	1	*Eublemma* spec.	2
		Amyna punctum	1
		Ectochela nigrilineata	1
		Helicoverpa spec.	1
		Pseudomicrodes spec.	1
		Eublemma spec. 2	1
		Noctuidae ? gen. ? spec.	1

4.4 Succulent Karoo Biome

69 Aus

Namibia, Lüderitz, Klein-Aus Vista campsite	S 26°39.572' E 16°14.103' A: 1406m	14.4.2008	18.25 – 3.00 windy with calm intervalls, half-moon	T: 21.8 → 18.2°C H: 32 → 37%

Vegetation type: Succulent Steppe

Plants and landscape features: North-faced valley of the Aus Mountains, up of campsite, dry river with moderately steep slopes, covered by succulents shrubs like Tetragonia arbuscula, Brownanthus spec., Euphorbia spec. and Eriocephalus spec. On the river banks are a few old trees of Acacia karoo and A. erioloba.

Table 69.1: Family spectrum and number of species and specimens

Family	Light tower		Trap 1		total	comon species	N
	s	N	s	N	s		
Hepialidae	1	1	1	1	1	1	2
Psychidae	1	1	2	7	2	1	8
Tineidae	1	1	1	3	1	1	4
Pseudurgis-group			1	2	1		2
Plutellidae	1	5	1	6	1	1	11
Batrachedridae			1	1	1		1
Scythrididae			2	2	2		2
Oecophoridae			1	1	1		1
Ethmiidae			1	1	1		1
Elachistidae			1	1	1		1
Gelechiidae	2	2	8	15	9	1	17
Tortricidae			1	2	1		2
Pyralidae: Phycitinae	7	13	12	21	13	7	34
Pyralidae: Pyralinae	2	10	5	16	5	2	26
Crambidae	4	6	2	2	5	1	8
Lasiocampidae	2	2	1	3	2	1	5
Sphingidae			1	5	1		5
Geometridae	13	33	19	67	22	9	100
Arctiidae			1	1	1		1
Lymantriidae	2	2			2		2
Noctuidae	22	80	40	309	46	17	389
total	**58**	**156**	**102**	**466**	**119**	**42**	**622**

Table 69. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	11	8	15	12	46
2	5	7	2	11	25
4	3	3	4	12	22
8	2	4	3	5	14
16	1	1	4	1	7

32				2	2
64				2	2
128				0	0
>128				1	1
total	22	23	28	46	119
%	18	19	24	39	100

Table 69. 3: List of the most common species with dominance values

Microlepidoptera	**N = 52**	**Pyraloidea**	**N = 60**
Plutella xylostella	0.21	*Pseudozitha alticolalis*	0.25
Lytrophila gracilis	0.1	*Gaana nigronervosa*	0.1
Ochrodia subdiminutella	0.1	*Pseudogetulia luminosa*	0.08
Tineidae ?genus ? spec.	0.06	*Uresiphita polygonalis*	0.08
Cathalistis bispinosa	0.06	*Hypotia namaensis*	0.08
Pyncostola spec.	0.06	*Epicrosis* spec.	0.07
Macrolepidoptera	**N = 113**	**Noctuidae**	**N = 389**
Biclavigera cf. fontis	0.27	*Hadula cimbebasia*	0.38
Rhodometra spec.	0.22	*Centarthria ossicolor*	0.15
Geometridae ?gen. ?spec.	0.15	*Perigea capensis*	0.09
Isturgia focularia	0.09	*Tatorhynchus plumbea*	0.06
Conchylia cf. decorata	0.08	*Centarthria vansoni*	0.05
Pachycnemoides pseudognophoides	0.04	*Cerocala vermiculosa*	0.03
		Ozarba hemisacra	0.02
		Agrotis spec.	0.02
		Agrotis segetum	0.02

70 Kolke

Namibia, Lüderitz, Nasepberg, Kolke	S 27°41.713' E 17°01.715' A: 1186m	15.4.2008	18.25 – 1.00 calm, moonlight	T: 25.3 → 17.7°C H: 28 → 34%

Vegetation: Succulent Steppe

Plants and landscape features: Tafelbergs and plains, dissected by larger and smaller river valleys, on the plains species of Zygophyllum spec. dominate the vegetation, on the river banks are Acacia erioloba, A. karoo, Euclea pseudebenus and Zizyphus mucronatus.

Table 70.1: Family spectrum and number of species and specimens

Family	trap 1		HWL		total	
	s	N	s	N	s	N
Hepialidae	1	2	1	1	1	3
Adelidae	1	2	3	9	3	10
Bucculatricidae			1	1	1	1
Gracillariidae	1	1	1	1	1	2
Plutellidae	1	4	1	1	1	5
Scythrididae	3	3	1	1	4	4
Coleophoridae	1	1			1	1
Ethmiidae			1	2	1	2
Cosmopterigidae	1	1			1	1
Gelechiidae	6	13	6	13	8	22
Pterophoridae			1	1	1	1
Tortricidae	1	1			1	1
Pyralidae: Galleriinae			1	3	1	3
Pyralidae: Phycitinae	9	18	13	27	17	45
Pyralidae: Pyralinae	3	6	2	9	4	15
Crambidae	7	13	4	4	9	16
Lasiocampidae	1	1	1	1	1	2
Geometridae	14	36	16	28	24	64
Arctiidae	1	1			1	1
Noctuidae	25	93	16	23	38	116
total	**74**	**195**	**69**	**125**	**119**	**315**

Table 70. 2: Distribution of species over abundance classes of the trap sample

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	total
1	12	12	8	13	45
2	2	3	5	4	14
4	1	2		4	7
8	1	2		1	4
16				1	1
32			1	2	3
total	16	19	14	25	74
%					

Table 70. 3: List of the most common species with dominance values

Microlepidoptera	**N = 28**	**Pyraloidea**	**N = 37**
Plutella xylostella	0.21	*Nomophila noctuella*	0.19
Dactylethrella leuconota	0.13	*Epicrosis nigrinella*	0.16
Acutitornus spec.	0.08	*Staudingeria mimeugraphella*	0.08
Ceromitia spec. 1	0.08	*Cadra figulilella*	0.08
Macrolepidoptera	**N = 38**	**Noctuidae s.l.**	**N = 93**
Rhodometra sacraria	0.55	*Ozarba* spec.	0.31
Conchylia decorata	0.06	*Spodoptera exigua*	0.10
		Eublemma anachoresis	0.1
		Pseudomicrodes spec.	0.05
		Ozarba sancta	0.04
		Cardepia definiens	0-04

82 Numees

RSA, Northern Cape, Richtersveld BIOTA Observatory	S 28°17.581' E 16°57.228' A: 362m	9.- 12.10.2001	19.30 – 22.30 slight wind	T: 28°C H: not registered

Vegetation: Dn 5 Western Gariep Hills Desert

Plants and landscape features: Transition from a valley bottom to dissected slopes of the Numees Mts., soils with bolders, gravel, stones and sand covered by desert shrubland with Brownanthus pubescens, Zygophyllum spp., Mesembryanthemum spp., Othonna opima and few specimens of Aloe pillansii and Pachypodium namaquanum on the upper parts of the hills.

Table 82. 1: Family spectrum and number of species and specimens of three combined trap samples

Family	**trap 1**	
	s	**N**
Nepticulidae	1	2
Tineidae	6	50
Psychidae	2	13
Gracillariidae	1	1
Coleophoridae	3	9
Elachistidae	1	3
Ethmiidae	1	1
Scythrididae	9	141
Oecophoridae	1	1
Gelechiidae	19	1305
Pterophoridae	2	17
Tortricidae	4	34
Pyralidae	25	292
Crambidae	9	128
Lasiocampidae	1	20
Lymantriidae	1	1
Sphingidae	1	2
Geometridae	10	45
Arctiidae	1	3
Noctuidae	37	957
total	**135**	**3025**

Table 82. 2: Proportions of the major groups

	s	**%**	**N**	**%**
Microlepidoptera	50	38%	1577	52%
Pyraloidea	34	25%	420	14%
Macrolepidoptera	14	10%	71	2%
Noctuidae	37	27%	957	27%

Remarks: The moth fauna was essentially the same as observed at the BIOTA Observatory Koeroegapvlakte with all common species being common also here. In Microlepidoptera *Austroplacodema bicolorata* (Psychidae) was an interesting record. The species is an endemic of the Succulent Karoo, where it is widespread throughout Namaqualand and Knersvlakte. However, the species was described only recently from an isolated population

on the Brandberg in Namibia. The new genus *Austroplacodema* had to be established to accommodate the new species (Sobczyk & Mey 2007). Another common but hitherto undetected micromoth was *Agdistis meyi* (Pterophoridae) named recently by Arenberger (2008). *Achyra nudalis* (Hübner, 1818) and *Uresiphita polygonalis* (Denis & Schiffermüller, 1775) of the Pyraloidea group appeared with many specimens at the lights.

83 Yellow Dunes

RSA, Norther Cape, Namakwa, BIOTA observatory	S 28°22.038' E 16°23.85' A: 193m	13.10.2001	22.00-23.00 dry, clear, windy with calm inter- vall	T: 23.5°C H: not observed

Vegetation: SKs3, Southern Richtersveld Yellow Duneveld

Plants and landscape: The collecting site was at an undulating, sandy plain with some dunes and isolated patches of succulent, small shrubs of Brownanthus spec., Zygophyllum morgsana, Othonna cylindrica, Aridaria serotina, Salsola spec. and Euphrobia mauritanica.

Table 83. 1: Family spectrum with numbers of species and specimens

Family	trap + tower	
	s	N
Scythrididae	2	2
Gelechiidae	5	179
Pterophoridae	2	10
Pyralidae	7	14
Crambidae	2	4
Cossidae	1	4
Lymantriidae	1	2
Noctuidae	15	18
total	**35**	**233**

Table 83. 2: Proportion of major Lepidoptera groups

	s	**%**	**N**	**%**
Microlepidoptera	9	26%	191	82%
Pyraloidea	9	26%	18	8%
Macrolepidoptera	2	6%	6	3%
Noctuidae	15	43%	18	8%

Remarks: Collecting nocturnal species in the desert or desert environments close to the coast is difficult. It largely depends on the prevailing wind regime. Usually, strong winds are blowing from the sea. Sometime at night the wind ceases and stops blowing. Later, the wind resumes blowing again, but now from the opposite direction. Light trap samples can be taken only during this short time window the hour of which is unpredictable however. Only one sample was obtained and examined. The moth fauna was dominated by two microlepidopterans from the family Gelechiidae which appeared in large numbers in the light traps and at the light tower: *Ochrodia pentamacula* (Janse, 1958) and *Hedma* spec. The noctuids were represented by 15 species, mainly singletons, but with several individuals of *Agrotis ipsilon* (Hufnagel, 1767). The caterpillars of this species are subterranean cutworms which are preadapted to live in both Succulent and Nama Karoo Biomes. In the Pyraloidea the most abundant species was *Ceutolopha isidis* (Zeller, 1867), an ubiquitous resident in the region.

84 Koeroegapvlakte

RSA, Northern Cape, Richtersveld BIOTA Observatory	S 28°14.116' E 17°01.509' A: 664m	16.- 17.10.2001	19.45 – 23.45 slight wind	T: 17 - 14°C H: not registered

Vegetation: SKr 1 Central Richtersveld Mountain Shrubland

Plants and landscape features: plain area between mountain ranges, dissected by dry river beds and erosion channels. The flat areas are covered by succulent dwarf shrubs of Aizoacaeae (Brownanthus spp.) and Asteraceae.

Table 84. 1: Family spectrum with numbers of species and specimens

Family	trap 1-2	
	s	N
Tineidae	7	31
Plutellidae	1	2
Lyonetiidae	1	1
Coleophoridae	6	19
Scythrididae	6	49
Batrachedridae	1	14
Oecophoridae	1	15
Cosmopterigidae	2	2
Gelechiidae	16	1282
Pterophoridae	3	69
Tortricidae	1	2
Pyralidae	22	108
Crambidae	3	8
Geometridae	8	16
Noctuidae	25	299
total	**103**	**1917**

Table 84. 2: Proportion of major Lepidoptera groups

	s	%	N	%
Microlepidoptera	45	44%	1486	78%
Pyraloidea	25	24%	116	6%
Macrolepidoptera	8	8%	16	0.8%
Noctuidae	25	24%	299	15%

Table 84. 3: Dominant species of Noctuidae and Microlepidoptera with numbers of individuals

Noctuidae	**s**
Cardepia definiens (Walker, 1857)	58
Ozarba cf. hemisarca Hampson, 1916	57
Eublemma spec. B	55
Zekelita canestriata Hacker, 2004	26
Pseudozarba cf. schencki Strand, 1901	25
Ozarba hypoxantha Wallengren, 1860	18
Spodoptera exigua (Hübner, 1808)	15

?gen. ?spec.	9
Eublemma spec. A	5
Eublemma olivacea Walker, 1857	4
Microlepidoptera	
Ochrodia cf. subdiminutella Stainton, 1867	1210
Ochrodia pentamacula (Janse, 1958)	81
Agdistis eberti Arenberger, 2009	62

Remarks: The October sample contained a surprisingly large number of species. Microlepidopterans of the family Gelechiidae, *Ochrodia subdiminutella* and *O. pentamacula*, were the most frequent taxa. The Succulent Karoo is known to be home of many plume-moths (Pterophoridae). The most abundant species of this family turned out to be an unknown species which was recently described as *Agdistis eberti* by Arenberger (2009). In Pyraloidea eight species of *Hypotia* sp. (Pyralidae) were registered to occur syntopically. The most common species were *Staudingeria mimeugraphella* Balinsky, 1989 and an undescribed *Gaana* spec. (both Phycitinae). Dominant species of the numerous Noctuidae were *Cardephia definiens* and *Ozarba cf. hemisarca,* which are common all over southern Africa. The co-occurrence of 11 small *Eublemma* species (Noctuidae) was a characteristic feature of the fauna. Unfortunately, the species cannot be identified as long as the genus remains unrevised.

86 Windhoek Farm

RSA, Northern Cape Kamiesberge, 4 km N of Kamieskroon	S 30°11.103' E 17°56.308' A: 930m	16.10.2007	20.40 – 1.00	T: 24.8 → 19°C H: 25%

Vegetation: SKn 6, Kamiesberg Mountains Shrubland

Dominant plants and landscape features: Campsite east of the farmhouse on a long, rocky hillside, bordered by overgrazed shrubland with Lebeckia sericea, Rhus undulata, R. incisa, Antizona miersiana, Didelta spinosa, Euphorbia dregeana, Hermannia disermifolia, Eriocephalus microphyllus, a few, small Ozoroa dispar trees on the slopes

Table 86.1: Family spectrum and number of species and specimens

Family	trap 1	
	s	N
Plutellidae	1	1
Coleophoridae	5	11
Scythrididae	4	4
Oecophoridae	3	53
Gelechiidae	21	68
Tortricidae	2	5
Epermeniidae	1	2
Pterophoridae	1	1
Pyralidae: Phycitinae	11	15
Pyralidae: Pyralinae	1	2
Crambidae	1	3
Lasiocampidae	1	12
Geometridae	13	28
Arctiidae	1	3
Noctuidae	16	28
total	**82**	**236**

Table 86. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	24	7	7	11	49
2	6	5	3	3	17
4	2	1	3	1	7
8	3		1	1	5
16	1		1		2
32	1				1
64	1				1
total	38	13	15	16	82
%	46%	16%	18%	20%	100%

Table 86. 3: List of the most common species with numbers of individuals

Microlepidoptera	**N = 145**	**Pyraloidea**	**N = 20**
Pelochares palpata	0.35	*Autocharis arida*	0.15

Schizovalva adelosema	0.12	*Aglossa* spec.	0.1
Schizovalva brunneotincta	0.1	*Etiella zinckenella*	0.1
Schizovalva nigrifasciata	0.06		
Ephysteris spec.	0.05		
Macrolepidoptera	**N = 43**	**Noctuidae**	**N = 28**
Mesocelis cf. monticola	0.28	*Condica capensis*	0.29
Geometridae ?gen. ?spec.	0.19	*Leiorhynx argentifascia*	0.11
Chiasmia spec.	0.09		
Sozusa montana	0.07		

4.5 Fynbos Biome

97 Rocherpan Nature Reserve

RSA, Western Cape, West Coast, BIOTA Observatory	S 32°36725' E 18°17.821' A: 2 - 8 m	20. – 21.11.2008	20.00 – 24.00 fog rolling in from the sea	T: 15.6 → 13.9°C H: 77 → 92%

Vegetation: FS 5 Langebaan Dune Strandveld

Plants and landscape features: Coastal dunes with evergreen, dense shrubland followed inland by a flooded lagoon with numerous flocks of waterbirds. Dominant shrubs were Chrysanthemoides monilifera, Metalasia muricata, Zygophyllum morgsana, Aridoria noctiflora, Stoeberia frutescens, S. utilis, Euphorbia mauretanica, and Rhus glauca; large supply of flowering Senecio halimifolius close to the lagoon.

Table 97. 1: Family spectrum of four trap samples at Rocherpan in 2008

Family	trap 1		trap 2		trap 3		trap 4		total
	s	N	s	N	s	N	s	N	s
Tineidae	1	2	1	1			2	3	3
Psychidae	1	1							1
Gracillariidae					1	1	1	1	2
Plutellidae					1	1	1	1	1
Oecophoridae			1	1	1	1	2	17	2
Batrachedridae							1	1	1
Agonoxenidae							1	1	1
Blastobasidae							1	9	1
Gelechiidae	1	1	1	1	3	5	6	32	7
Pterophoridae			1	1	1	1	1	8	1
Tortricidae	2	2	1	1	1	1	5	40	7
Pyralidae: Galleriinae							1	1	1
Pyralidae: Pyralinae	2	2	1	2			2	4	4
Pyralidae: Phycitinae	3	63	2	6	1	1	8	123	9
Crambidae	2	4	1	2	4	20	5	21	7
Cossidae					1	1			1
Sphingidae	1	1			1	1	1	4	1
Lasiocampidae	1	1							1
Geometridae	15	24	4	8	8	8	18	106	22
Arctiidae	1	14	1	7	1	1	1	147	1
Lymantriidae	1	1	1	1					2
Thyatiridae							1	2	1
Noctuidae	18	152	7	43	18	66	19	269	33
Nolidae	2	2					2	3	3
total	**51**	**270**	**22**	**74**	**42**	**108**	**79**	**793**	**113**

Table 97. 2: Distribution of species over abundance classes of trap 4

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	11	5	8	5	29
2	1	3	4	2	10
4	3	3	4	3	13
8	3	3	2	4	12
16	2	2	3	2	9
32	1	0	1	1	3
64		2		1	3
128			1	1	2
total	21	16	23	19	79
%	27%	20%	29%	24%	100%

Table 97. 3: List of the most common species of the trap 4 sample with dominance values

Microlepidoptera	**N = 107**	**Pyraloidea**	**N = 149**
Neaspasia orthacta	0.3	*Gaana basiferella*	0.38
Epiphractis aulica	0.15	*Cadra figulilella*	0.26
Gelechia nigra	0.12	*Nomophila noctuella*	0.08
Agdistis spec.	0.07	*Gaana asperella*	0.07
Blastobasis spec.	0.07	*Apomyelosis bicolorata*	0.05
Gelechia tripunctata	0.07	*Hypsotropha cf. roseotincta*	0.03
Gelechia palpata	0.04	*Metasia profanalis*	0.03
Dichomeris longisignata	0.04	*Hypotia achatina*	0.03
Macrolepidoptera	**N = 262**	**Noctuidae**	**N = 269**
Phryganopsis continentalis	0.56	*Araea indecora*	0.51
Isturgia deerraria	0.1	*Helicoverpa armigera*	0.2
Eupithecia inconclusaria	0.06	*Namagapa atripars*	0.07
Parectopis atelomeres	0.06	*Centrarthra dicksoni*	0.06
Obolcola petronaria	0.05	*Athetis* spec.	0.06
Parectopis spec.	0.04	*Heliothis scutuligera*	0.02

100 Jamaka Farm

RSA, Western Cape Cederberg, north of Algeria	S 32°20.111' E 19°01.702' A: 529m	19-21.10.2007	21.40 – 2.30 calm, later cloudy	T: 19 → 17°C H: 62%

Vegetation: FFs 3, Olifants Sandstone Fynbos

Dominant plants and landscape features: Collecting sites were at the west-facing slope of the Rondegat River Valley close to Geelhoutskloof, unspoiled fynbos with Protea nitida, Metrosideros angustifolia, Heeria argentea, Podocarpus elongatus, Rhus rimosa, R. undulata, Euryops speciosissimus, Leucadendron pubescens, Rafnia amplexicaulis, Crassula spec., Struthiola ciliata, Pelargonium alternans, Agathosma marifolia, Cannamois congesta, Willdenowia incurvata. The nearby vegetation on the Jamaka farm was degraded by overgrazing.

Tabel 100. 1: Family spectrum of three trap samples in October 2007.
(The Jaccard Index of faunal similarity between trap 1 and 2 is J = 0.33, which points to a considerable habitat heterogeneity. The low species and individual numbers of trap 1 is probably due to the degraded fynbos vegetation at this site caused by goats and donkeys.)

Family	trap 1		trap 2		trap 3		co-	Total s
	s	N	s	N	s	N		
Acanthopteroctetidae					1	1		1
Adelidae	1	1	1	16	1	24	1	2
Nepticulidae			2	2	2	2		4
Tischeriidae					1	1		1
Tineidae	2	8	7	41	9	41	5	11
Bucculatricidae			1	2	2	4		3
Gracillariidae	1	1	3	18	6	13	3	6
Yponomeutidae			1	1				1
Plutellidae					1	1		1
Oecophoridae	1	3	3	5	7	13		10
Pterolonchidae			1	1				1
Xyloryctidae	1	3	1	13	3	3	2	4
Coleophoridae			4	11	2	8	2	4
Scythrididae					2	57		3
Elachistidae			1	2	3	3	1	3
Batrachedridae			4	18	2	7	2	4
Agonoxenidae			1	2	2	2		3
Blastobasidae			1	1				1
Cosmopterigidae			2	3	1	1		3
Gelechiidae	4	5	22	155	32	122	16	38
Pterophoridae			2	2	2	2		4
Tortricidae			5	6	4	14	2	7
Pyralidae: Pyralinae			3	5	4	10	1	6
Pyralidae: Phycitinae	4	4	9	26	15	60	6	18
Crambidae			6	40	8	41	5	9
Limacodidae			1	1	1	1		2
Sphingidae	1	1	2	2				3
Lasiocampidae	1	1	1	2	2	2	1	3

Geometridae	7	8	34	111	42	146	22	64
Arctiidae			1	9	3	27	1	3
Lymantriidae			1	1	4	7	1	4
Thyatiridae			1	5	1	4	1	1
Noctuidae	6	9	19	67	23	41	7	35
Nolidae			3	19	4	40	3	4
total	**29**	**44**	**143**	**587**	**189**	**697**	**82**	**266**

Table 100. 2: Distribution of species over abundance classes of trap 2

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae s.l.	s
1	32	8	20	14	74
2	12	5	10	4	31
4	4	2	3		9
8	5		4	2	11
16	4	1	3	1	9
32	5	1	1		7
64		1		1	2
total	62	18	41	22	143
%	43%	13%	29%	15%	

Table 100. 3: Distribution of species over abundance classes of all traps

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae s.l.	s
1	55	12	35	27	129
2	24	5	14	4	47
4	12	8	12	5	37
8	5	4	6	1	16
16	8	1	8	1	18
32	8	2	4		14
64	3	1		1	5
total	115	33	79	39	266
%	43%	12%	30%	15%	

Table 100. 4: List of the most common species (combined sample of all traps) with dominance values

Microlepidoptera	**N = 576**	**Pyraloidea**	**N = 202**
Syngelechia psimythota	0.11	*Crinophthora arida*	0.31v
Scythris spec.	0.09	*Faveria* spec.	0.12
Khoisa panaula	0.08	*Palpita trisabiensis*	0.07
Ceromitia jamaka	0.07	*Cadra figulilella*	0.1
Schizovalva spec. 2	0.07	*Pogonotropha dicksoni*	0.03
Schizovalva trisignis	0.05	*Triphassa conspicualis*	0.03
Picrospora oreotrephes	0.05	*Epicrosis* spec.	0.02
Picrospora isometra	0.05	*Metasia profanalis*	0.02
Stomphastis spec.	0.04		
Schizovalva spec.3	0.04		

Macrolepidoptera	**N = 373**	**Noctuidae**	**N = 176**
Mauna filia	0.08	*Ozarba schmidelae*	0.28
Idaea basicostalis	0.07	*Nola iridescens*	0.23
Phryganopsis spec.	0.064	*Acantholipes circumdata*	0.07
Epirrhooe edelsteni	0.061	*Nola* spec. 1	0.05
Isturgia deerraria	0.051	*Nola* spec. 2	0.04
Cabera pseudognophos	0.04	*Spodoptera* spec.	0.03
Rhadinomphax trimeni	0.03		
Eilema trichopteroides	0.03		
Marplera spec.	0.024		
Adicoarta koranata	0.018		
Drepanogynis ennomaria	0.016		

105 Cape Peninsula

RSA, Cape Peninsula Table Mountain NP Headquarter, and Olifantsbos	S 34°14.254' E 18°25.056' 40m	22.-26.10.2007	20.00 – 0.30 windy, half-moon	T: 18.6 → 18.0°C H: 71 → 81%
		17. – 19.11.2008	20.00 → 0.30 strong wind with calm intervalls	T: 16.6 → 13.9°C H: 57%

Vegetation: FFs 9 Peninsula Sandstone Fynbos

Dominant plants and landscape features: Collecting site at headquarter was at an inclined plain with a meandering stream (Klaasjagers River) trough dense proteoid shrubland, with Struthiola ciliata, Psoralea pinnata, Leucospermum concarpodendron, Aspalatus linearis, Metalasia densa, Berzelia lanuginosa, Erica tristis, E. setosa; Eucalyptus trees around the National Park Headquarter.
The collecting sites at Olifantsbos were on the bases of the steep, north-facing cliffs, somewhat protected from the stormy winds.

Table 105. 1: Family spectrum of two trap samples at Park Headquarter in 2007

Family	**22.10.2007**		**26.10.2007**			
	s	**N**	**s**	**N**	**common**	**total**
Tineidae	1	1	1	1		2
Lyonetiidae	1	1				1
Plutellidae	1	5	1	2	1	1
Scythrididae	1	2				1
Oecophoridae	3	3				3
Batrachedridae	1	1				1
Agonoxenidae	1	1	1	1	1	1
Cosmopterigidae			1	1		1
Gelechiidae	3	3	2	2	1	4
Tortricidae			3	3		3
Pyralidae: Phycitinae			2	2		2
Pyralidae: Pyralinae			1	1		1
Crambidae	4	6	1	1	1	4
Limacodidae	1	1				1
Notodontidae	1	4	1	1	1	1
Geometridae	12	27	13	21	7	18
Arctiidae	4	11	2	3	1	5
Lymantriidae	1	1	1	1		2
Noctuidae	11	18	7	10	1	17
Nolidae	1	4	2	2	1	2
total	**47**	**89**	**39**	**52**	**15**	**71**

Table 105. 2: Distribution of species over abundance classes of the trap samples (Headquarter) in 2007 (The high number of singletons is an effect of unfavourable weather conditions)

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	14	5	19	12	50
2	3	1	1	2	7

4	0	1	3	2	6
8	1		4	1	6
16			2		2
total	18	7	29	17	71
%	25%	10%	41%	24%	100%

Table 105. 3: Family spectrum of two trap samples at Olifantsbos in 2007

Family	trap 1		trap 2			
	s	N	s	N	common	Total s
Adelidae	1	3				1
Tineidae	2	2				2
Gracillariidae	2	2				2
Plutellidae	1	1	1	2	1	1
Gelechiidae	4	4	1	1		5
Thyritidae	1	2				1
Tortricidae	6	18	7	11	4	9
Pyralidae: Phycitinae	3	3	2	3	1	4
Pyralidae: Epipaschiinae			1	1		1
Crambidae	1	1	5	5		6
Cossidae	2	2	1	9	1	2
Sphingidae	1	1				1
Notodontidae	1	2	1	2	1	1
Geometridae	16	32	7	12	3	20
Arctiidae	2	4				2
Lymantriidae	2	2	1	1	1	2
Noctuidae	6	8	13	16	2	17
total	**51**	**87**	**40**	**63**	**14**	**77**

Table 105. 4: Distribution of species over abundance classes of the trap samples (Olifantsbos) in 2007 (The high number of singletons is an effect of unfavourable weather conditions)

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	13	9	15	10	47
2	2	2	4	7	15
4	3		6		9
8	2		1		3
16	1		2		3
total	21	11	28	17	77
%	27%	14%	37%	22%	100%

Table 105. 5: Dominant species of Macrolepidoptera (without Noctuidae s.l.) with numbers of specimens in the combined samples in 2007

Headquarter		Olifantsbos	
Macrolepidoptera	**N = 76**	**Macrolepidoptera**	**N = 70**
Argyrophora trofonia	15	*Drepanogynis dochmoleuca*	10

Phryganopsis spec.	9	*Brachylia terebroides*	10
Drepanogynis dochmoleuca	6	*Drepanogynis sinuata*	8
Dichroma equestralis	5	*Sarimarais peringueyi*	4
Nola iridescens	5	*Thyretes hippotes*	3
Sarimarais peringueyi	5	*Pseudomaenas alcidata*	3
Aerasia crinita	3		
Pseudomaenas alcidata	3		

Table 105. 6: Family spectrum of two trap samples at Olifantsbos in 2008

Family	17.11.2008		18.11.2008			
	s	N	s	N	common	Total s
Tineidae	2	4	1	2	1	2
Psychidae	1	1	1	1		2
Yponomeutidae	2	2				2
Oecophoridae	6	7	5	9	2	9
Xyloryctidae	1	2				1
Gelechiidae	7	18	3	4	1	9
Tortricidae	3	4	2	2	1	4
Pyralidae: Phycitinae	4	5	1	1		5
Pyralidae: Epipaschiinae	1	1				1
Crambidae	2	2	2	3	1	3
Cossidae	2	8	2	6	1	3
Notodontidae			1	1		1
Sphingidae	2	2	1	2		3
Lasiocampidae	1	2				1
Geometridae	13	41	6	16	3	16
Arctiidae	2	5	4	5	2	4
Lymantriidae	3	10	2	6	1	4
Noctuidae	15	22	4	8	3	16
Nolidae	2	2				2
total	**69**	**138**	**35**	**66**	**16**	**88**

Table 105. 7: Distribution of species over abundance classes of the trap samples (Olifantsbos) in 2008 (The high number of singletons is an effect of unfavourable weather conditions)

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	20	7	21	11	59
2	2	1	6	2	11
4	5	1	1	1	8
8	1		3		4
16	1		4	1	6
total	29	9	35	15	88
%	35%	10%	40%	17%	100%

Table 105. 8: Dominant species with numbers of specimens in the combined samples at Olifantsbos in

Macrolepidoptera	**N = 105**	**Noctuidae**	**N = 31**
Drepanogynis dochmoleuca	16	*Namagana atripars*	12
Brachylia terebroides	12	?gen. ?spec.	4
Dasychira spec.	12		
Idaea spec.	12		
Dichroma equestralis	8		
Phryganopsis spec.	5		
Rhadinompha divincta	5		
Microlepidoptera	**N = 45**	**Pyraloidea**	**N = 12**
Hedma microcasis	10	*Palpita unionalis*	3
Hieroxestis omoscopa	4	*Apomyelosis bicolorata*	2
Schizovalva trisignis	4		
Oecophoridae ?gen.?spec.	4		
Cnephasia spec.	3		

106 Jonkershoek

RSA, Western Cape Stellenbosch, Glennconner	S 33°57.364' E 18°54.562' A: 185m	28.9. – 4.10.2008	19.30 – 24.00 rainy,	T: 16,2 → 12.1°C H: not registered

Vegetation: FFh 5 Cape Wineland Shale Fynbos

Pants and landscape features: East side of Eerste River Valley, at the base of moderately steep, east-facing slope with degraded fynbos vegetation 3 years after fire. Common shrubs are Aspalathus uniflora, Rhus angustifolia, Protea coronata, Maytenus acuminata and Myrsine africana.

Table 106.1: Family spectrum and number of species and specimens of a light trap operated in six successive days

Family	28.9.		29.9.		30.9.		1.10.		2.10.		3.10.		total s	
	s	N	s	N	s	N	s	N	s	N	s	N		
Adelidae					1	1	1	4					2	5
Tineidae	1	1			5	5	3	3	1	1			8	10
Plutellidae	1	2	1	3	1	2	1	1	1	5			1	13
Yponomeutidae							1	1					1	1
Xyloryctidae			1	1									1	1
Oecophoridae	2	2	1	1	1	1	2	3					4	7
Cosmopterigidae							1	1					1	1
Gelechiidae	1	1	1	2	4	7	3	3	3	4			6	17
Tortricidae	2	2	1	1	1	1	2	2	1	1			6	7
Carposinidae									1	2			1	2
Epermeniidae	1	1	1	2									2	3
Alucitidae							1	1					1	1
Pyralidae: Phycitinae	2	2	1	1	3	3	4	6	1	1				13
Pyralidae: Pyralinae			2	3										3
Crambidae	2	2	2	2	1	2	4	4	4	7				17
Geometridae	20	37	10	18	20	39	12	18	14	18	3	3	38	
Thyatiridae	1	5			1	1	1	3	1	2	1	2	1	13
Arctiidae	4	7	2	8	2	17	2	2	2	8			4	42
Lymantriidae	1	1											1	1
Nolidae	1	1	1	1	1	4	1	1	1	1			1	8
Noctuidae	15	31	8	15	17	32	10	17	14	19	4	6	31	
total	**54**	**95**	**32**	**58**	**58**	**115**	**49**	**70**	**44**	**69**	**8**	**11**		

Table 106. 2: Distribution of species over abundance classes

Abundance class	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae	Total s
1	21	7	17	13	58
2	7	3	10	6	26
4	2	3	5	4	14
8	3	1	8	3	15
16	1		4	4	9
32			2	1	3

total	34	14	46	31	125
%	27%	11%	37%	25%	100%

Table 106.3: List of all collected species with numbers of specimens

Microlepidoptera	**N = 71**	**Pyraloidea**	**N = 32**
Plutella maculipennis	0.18	*Udea ferrugalis*	0.22
Neotelphusa spec.	0.1	*Panotima angularis*	0.13
Ceromitia praetexta	0.07	*Apomyelois bicolorata*	0.13
Mesophleps palpigera	0.07	*Cadra* spec.	0.13
Oecophoridae ?gen.?spec.	0.07		
Macrolepidoptera	**N = 197**	**Noctuidae**	**N = 120**
Sozusa spec.	0.11	*Viettearia intestata*	0.16
Eilema spec. 1	0.09	*Ochropleura perirrorata*	0.12
Pseudomaeras alcidata	0.08	*Athetis pigra*	0.09
Marplena designina	0.07	*Conservula cinisigna*	0.08
Drepanogynis pallidimargo	0.05	*Leucania* spec.3	0.07
Prosomptax callistra	0.05	*Agrotis segetum*	0.07
Celama cf. tineoides	0.04	*Tycomarples inferior*	0.05
Drepanogynis dochmoleuca	0.04	*Chusaris* spec.	0.05
Scopula inscriptata	0.04		
Mimoclystia aphanata	0.04		

Remarks: The collecting period was during unfavourable weather conditions in early spring. Nevertheless, a considerable number of species, especially macromoths, were found in consecutive six days, often in few individuals or on a single day. The Microlepidoptera are largely underrepresented in the samples due to the cold and wet conditions after sunset. The combined sample is by no means representative for the fauna of this locality at early spring.

5. Butterflies

Although butterflies were not among the target groups in the faunistic explorations during the last years, some material was however collected more or less incidentally. The material collected from 1992 until 1998 was studied by Kühne (2000). Records from Zimbabwe, Malawi and South Africa were included in his account. During the BIOTA project, some of the Observatories were visited several times. Unfortunately, the time span between subsequent visits was too long for recording phenology and population dynamics of local butterfly assemblages. The collected species were listed in the Observatory reports in Jürgens et al. (2010) and Mey (2010a). The BIOTA Observatory with the highest number of observed species was Erichsfelde (= Otjiamongombe). A total of 39 butterfly species were recorded from this Thornbush Savanna site (locality No. 33). In table 4 the species are listed with their sampling dates. The figures do not show the gradual shift in the appearance of species and their abundances, but the total numbers between dates allows the general pattern of butterfly phenology to be recognised: The first rainfall in December-January (summer rain) triggers the emergence/eclosion of most species. Species richness and abundances reach a peak shortly after the onset of the rainy season, and decrease gradually towards April-May. In winter and autumn butterflies are rarely encountered in the now completely dried-up habitats. This pattern applies to dry or Thornbush Savanna localities. Principally, in Nama- and Succulent Karoo habitats, butterflies are less frequent, but are often enriched by migrating species from savanna areas. Even in the more humid Fynbos localities butterflies are not a common sight, and are encountered mostly as singletons.

In comparison with other major Lepidoptera groups (e.g. Microlepidoptera, Pyraloidea) the butterflies of southwestern Africa are well known. The density of butterfly records may be less than in other parts of South Africa, but there is a comprehensive knowledge about the species occurring in the study area. A large community of butterfly collectors has amassed an extensive body of data over the years, which resulted in an equally good knowledge about the distribution of species. The modern basis for the identification of species in southern Africa was lead by the brilliant determination manuals of Van Son (1949, 1955, 1963, 1979), Pringle et al. (1994) and Woodhall (2005). Records from Namibia were included in these books. In 2007 the South African Butterfly Conservation Assessment (SABCA) was founded. It is a joint project between the Lepidoptera Society of Africa, the University of Cape Town and the South African National Biodiversity Institute (SANBI). The main aim of this project is to establish a current atlas of South African butterflies and to determine the conservation status of each species in line with SANBI's overall goal of achieving this for all animals and plants in South Africa. Namibia was beyond the scope of this project. Regrettably, the country has only a few lepidopterists, and a similar task of producing an atlas or an identification book, is a long lasting venture. Many more records have to be collected and concentrated in a database before at least a catalogue of the butterflies occurring in Namibia can be written.

The following list provides faunistic data for about 100 species. They were irregularly collected from various localities spanning the entire length of southwestern Africa from the Cape Peninsula in the south to the Kaokoveld and Okavango River in the north. The already published records from BIOTA Observatories are not repeated here, with the exception of species that are of special interest. Records of common and ubiquitous species, e.g. *Danaus chrysippus aegyptius* (von Schreber, 1759) are only included if locality or date are unusual. The number of localities corresponds with the number of localities in table B on p. 15 ff. Some collecting sites are not listed in table B. Their geographical coordinates are inserted after the name of the respective locality.

species	date					
	21.03.2003	11.01.2007	12.02.2007	30.11.2007	14.02.2008	08.04.2008
Danaus chrysippus aegyptius	13	2	2		4	
Acraea stenobea	1					2
Acraea neobule	1		1		1	
Junonia hierta cebrene	2		3		6	7
Junonia oenone oenone						
Hypolimnas misippus					5	2
Vanessa cardui					1	15
Lepidochrysops plebeia		1			1	
Lepidochrysops michellae			1			
Leptotes babaulti					2	
Cigaritis phanes		2			1	2
Tarucus sybaris linearis					1	
Tuxentius melaena melaena					1	
Leptotes pirithous pirithous			1		3	
Azanus jesous jesous		2	2		2	2
Azanus ubaldus						
Chilades trochylus	1		1			10
Eurema brigitta brigitta	4					1
Pinacopteryx eriphia eriphia	8			1	8	3
Colotis agoye bowkeri	5				2	
Colotis celimene				1		
Colotis eris eris					1	1
Colotis evagore antigone		1			1	
Colotis evenina evenina	11	1	4		2	4
Colotis lais					1	
Colotis pallene					1	
Colotis regina					10	3
Colotis subfasciatus	1	1				7
Colotis ione	4					
Colotis antevippe gavisa		2			1	
Colotis evippe omphale					2	
Catopsilia florella					12	
Belenois aurota	127	13	21		19	12
Coeliades pisistratus					1	
Spialia colotes transvaaliae		1				
specimens	178	26	36	2	89	71
species	12	10	9	2	25	14

Table 1: Butterflies collected along a transect line of 1000 m on BIOTA Observatory Erichsfelde at different dates. Further four species were found elsewhere on the Observatory. In Mey (2010a) a wrong table was inserted in the chapter on this Observatory. The correct numbers are given here in column 2. The low number of species in January 2007 is due to a late start of the rain, which came after the collecting date.

Faunistic data on butterflies from southwestern Africa

The data are arranged according to the following sequence:
Country, number of locality (as in table B), short name of locality, collecting date, number of collected specimens (without separating sexes), name of the collector.

Nymphalidae

Danainae

Danaus chrysippus aegyptius (von Schreber, 1759)

Namibia	29	Aha Hills	17.11.2008	1	F. Koch	

Satyrinae

Aeropetes tulbaghia (Linnaeus, 1764)

RSA	104	Cape of Good Hope	13.02.2009	1	F. Koch	

Cassionympha detecta (Trimen, 1914)

RSA	107	Jonkershoek	04.10.2008	1	W. Mey	

Coenyropsis natalii natalii (Boisduval, 1847)

Namibia	36	Sandveld	23.01.2007	1	W. Mey	
Namibia	13	Outjo	04.02.2009	1	W. Mey	

Melampias huebneri huebneri Van Son, 1955

RSA	100	Jamaka Farm	07.09.2008	4	F. Koch	
RSA		Karukareb	20.09.2008	1	F. Koch	S 32°14 E 19°00

Melanitis leda helena (Westwood, 1851)

Namibia	28	Okatjikona	16.10.2008	1	F. Koch	

Stygionympha geraldi Pennington, 1970

RSA		Port Nolloth	20.09.2008	4	F. Koch	

Stygionympha vigilans Trimen, 1887

RSA	104	Cape of Good Hope	22.10.2007	2	W. Mey	

Tarsocera cassus cassus (Linnaeus, 1764)

RSA	90	Quaggafontein	02.10.2002	1	K. Ebert	

Tarsocera dicksoni (Van Son, 1962)

RSA		Pakhuis Pass	12.11.2008	1	F. Koch	S 32°08 E 18°59

Tarsocera imitator imitator Vári, 1971

RSA	84	Koeroegapvlakte	16.10.2001	2	W. Mey	

Ypthima asterope asterope (Klug, 1832)

Namibia	28	Okatjikona	15.02.2008	1	W. Mey	
Namibia	29	Aha Hills	17.11.2008	1	F. Koch	

Heliconiinae

Acraea horta (Linnaeus, 1764)

RSA	108	Assegaibosch	09.11.2008	2	F. Koch	

Acraea lygus Druce, 1875

Namibia	28	Okatjikona	15.02.2008	1	W. Mey	

Acraea neobule neobule Doubleday, 1847

Namibia	10	Etendeka Plateau	29.02.2008	3	W. Mey	
Namibia	28	Okatjikona	15.02.2008	1	W. Mey	
Namibia	51	Spitzkoppe	02.03.2008	1	W. Mey	
Namibia	3	Baynes Mts.	24.02.2008	2	W. Mey	
Namibia	76	Road House	23.02.2008	2	F. Koch	

Acraea stenobea (Wallengren, 1860)

Namibia	33	Erichsfelde	19.03.2003	1	W. Mey
Namibia	19	Mile 46	26.03.2003	1	W. Mey
Namibia	33	Erichsfelde	10.01.2007	1	W. Mey
Namibia	64	Naukluft	08.03.2005	1	W. Mey

Hyalites encedon encedon (Linnaeus, 1758)

Namibia	23	Nakatwa	04.11.2007	2	F. Koch

Biblidinae

Byblia anvatara acheloia (Wallengren, 1857)

Namibia	29	Aha Hills	17.11.2008	1	F. Koch
Namibia	20	Kaudom	25.02.2009	1	F. Koch
Namibia	29	Aha Hills	22.02.2009	2	F. Koch

Byblia ilithya (Drury, 1773)

Namibia	10	Etendeka Plateau	29.02.2008	1	W. Mey
Namibia	28	Okatjikona	15.02.2008	1	W. Mey
Namibia	29	Aha Hills	17.11.2008	1	F. Koch
Namibia	20	Kaudom	25.02.2009	2	F. Koch

Charaxinae

Charaxes achemenes achemenes Felder & Rogenhofer, 1867)

Namibia	19	Mile 46	16.02.2007	1	J.Deckert
Namibia	19	Mile 46	26.03.2003	1	W. Mey

Charaxes jasius saturnus Butler, 1866

Namibia	19	Mile 46	16.02.2007	1	J.Deckert
Namibia	20	Kaudom	25.02.2009	2	F. Koch

Charaxes pelias (Cramer, 1775)

RSA	100	Jamaka	01.03.2005	1	W. Mey

Limenitinae

Hamanumida daedalus (Fabricius, 1775)

Namibia	20	Kaudom	25.02.2009	1	F. Koch

Nymphalinae

Hypolimnas misippus (Linnaeus, 1764)

Namibia	29	Aha Hills	17.11.2008	1	F. Koch

Junonia antilope (Feisthamel, 1850)

Namibia	17	Varianto Farm	30.03.2003	1	W. Mey
Namibia	29	Aha Hills	22.02.2009	1	F. Koch

Junonia hierta cebrene Trimen, 1870

Namibia	10	Etendeka Plateau	29.02.2008	1	W. Mey
Namibia	51	Spitzkoppe	02.03.2008	1	W. Mey
Namibia	76	Road House	23.02.2008	1	F. Koch
Namibia	27	Mt. Etjo	14..3.2005	1	W. Mey
Namibia	29	Aha Hills	22.02.2009	2	F. Koch

Junonia oenone oenone (Linnaeus, 1758)

Namibia	28	Okatjikona	15.02.2008	1	W. Mey
Namibia	29	Aha Hills	22.02.2009	1	F. Koch

Vanessa cardui (Linnaeus, 1758)

Namibia	49	Wlotzkasbaken	09.04.2008	2	W. Mey

Lycaenidae

Alaena brainei Vári, 1976

Namibia	17	Varianto Farm	29.03.2003	5	W. Mey

Aloeides apicalis Tite & Dickson, 1968

RSA		Cederberg	04.11.2008	1	F. Koch S32°26 E19°11

Aloeides arida Tite & Dickson, 1968

RSA	100	Jamaka Farm	01.03.2005	1	W. Mey

Aloeides damarensis damarensis (Trimen, 1891)

Namibia	29	Aha Hills	17.11.2008	5	F. Koch
Namibia	20	Kaudom	25.02.2009	2	F. Koch
RSA	90	Quaggafontein	02.10.2002	5	K. Ebert
RSA	82	Numees	11.10.2001	2	W. Mey
RSA		N.Cape, Garies	19.09.2008	1	F. Koch
RSA		40 km W Steinkopf	20.09.2008	4	F. Koch

Argyraspodes argyraspis (Trimen, 1873)

Namibia	70	Kolke	15.04.2008	1	W. Mey

Axiocerses tjoane (Wallengren, 1857)

Namibia	19	Mile 46	26.03.2003	1	W. Mey
Namibia	20	Kaudom	17.11.2008	1	F. Koch

Axiocerses amanga amanga (Westwood, 1881)

Namibia	19	Mile 46	26.03.2003	2	W. Mey

Azanus jesous jesous (Guérin-Meneville, 1849)

Namibia	71	Sturzbach Farm	19.04.2008	2	W. Mey
Namibia	76	Road House	23.02.2008	1	F. Koch

Azanus ubaldus ubaldus (Stoll, 1782)

Namibia	76	Road House	23.02.2008	5	F. Koch

Azanus moriqua (Wallengren, 1857)

Namibia	28	Okatjikona	15.02.2008	4	W. Mey
Namibia	29	Aha Hills	17.11.2008	1	F. Koch

Brephidium metophis (Wallengren, 1860)

RSA	84	Koeroegapvlakte	16.10.2001	2	W. Mey

Cacyreus lingeus (Stoll, 1782)

RSA	90	Quaggafontein	02.10.2002	1	K. Ebert

Cacyreus marshalli Butler, 1898

RSA	90	Quaggafontein	02.10.2002	1	K. Ebert
RSA	104	Cape of Good Hope	22.10.2007	3	W. Mey

Cacyreus virilis Stempffer, 1936

RSA	82	Numees	11.10.2001	1	W. Mey

Chilades trochylus (Freyer, 1843)

Namibia	71	Sturzbach Farm	19.04.2008	2	W. Mey
Namibia	57	Mirabib	27.01.2009	5	W. Mey
Namibia	29	Aha Hills	17.11.2008	1	F. Koch

Chrysoritis chrysaor (Trimen, 1864)

RSA	107	Jonkershoek	04.10.2008	2	W. Mey

Chrysoritis pan (Pennington, 1862)

RSA	90	Quaggafontein	02.10.2002	4	K. Ebert

Chrysoritis thysbe thysbe (Linnaeus, 1764)

RSA	104	Cape of Good Hope	22.10.2007	2	W. Mey

Cigaritis namaqua (Trimen, 1874)

RSA	84	Koeroegapvlakte	16.10.2001	2	W. Mey

Cigaritis phanes (Trimen, 1873)

Namibia	76	Road House	23.02.2008	1	F. Koch
Namibia	64	Naukluft	08.03.2005	1	W. Mey

Crudaria leroma (Wallengren, 1857)

Namibia	48	Erongo	24.11.2008	1	F. Koch

Cupidopsis jobates jobates (Hopffer, 1855)

Namibia	29	Aha Hills	17.11.2008	1	F. Koch
Namibia	20	Kaudom	17.11.2008	1	F. Koch

Deudorix antalus (Hopffer, 1855)

Namibia	32	Omatako	22.03.2003	2	W. Mey

Durbaniopsis saga (Trimen, 1883)

RSA	100	Jamaka Farm	04.11.2008	3	F. Koch

Hypolycaena cf. caeculus (Hopffer, 1855)

Namibia	65	Tsauchab	15.12.2007	1	J. Deckert

Hypolycaena philippus philippus (Fabricius, 1793)

Namibia	17	Varianto Farm	29.03.2003	2	W. Mey

Iolaus mimosae mimosae (Trimen, 1874)

Namibia	44	Rooisand	20.01.2007	1	F. Koch

Iolaus subinfuscata subinfuscata (Grünberg, 1910)

Namibia	54	Ganab	20.01.2007	1	W. Mey
Namibia	3	Baynes Mts.	24.02.2008	1	W. Mey

Lepidochrysops glauca glauca (Trimen, 1887)

Namibia	32	Omatako	11.01.2007	1	W. Mey

Lepidochrysops michellae Henning & Henning, 1983

Namibia	29	Aha Hills	17.11.2008	1	F. Koch

Leptomyria lara (Linnaeus, 1764)

RSA	84	Koeroegapvlakte	16.10.2001	2	W. Mey
RSA	104	Cape of Good Hope	22.10.2007	1	W. Mey

Leptotes pirithous pirithous (Linnaeus, 1767)

Namibia	28	Okatjikona	15.02.2008	1	W. Mey
Namibia	17	Varianto Farm	29.03.2003	2	W. Mey
Namibia	20	Kaudom	17.11.2008	2	F. Koch

Leptotes brevidentatus (Tite, 1958)

RSA		40 km W Steinkopf	20.09.2008	4	F. Koch

Oraidium barberae (Trimen, 1868)

RSA	90	Quaggafontein	02.10.2002	2	K. Ebert
RSA	82	Numees	11.10.2001	3	W. Mey

Phasis clavum clavum Swanepoel, 1953

RSA	90	Quaggafontein	02.10.2002	4	K. Ebert

Pseudonacaduba sichela sichela (Wallengren, 1857)

Namibia	28	Okatjikona	15.02.2008	2	W. Mey

Tarucus sybaris linearis (Aurivillius, 1924)

Namibia	74	Karios	21.02.2008	1	F. Koch
Namibia	28	Okatjikona	15.02.2008	2	W. Mey
Namibia	76	Road House	23.02.2008	3	F. Koch
Namibia	20	Kaudom	17.11.2008	1	F. Koch

Tarucus thespis (Linnaeus, 1764)

RSA	104	Cape of Good Hope	22.10.2007	5	W. Mey
RSA	107	Jonkershoek	04.10.2008	1	W. Mey

Tuxentius melaena melaena (Trimen, 1887)

Namibia	33	Erichsfelde	19.03.2003	2	W. Mey

Zintha hintza krooni (Dickson, 1973)

Namibia	17	Varianto Farm	30.03.2003	1	W. Mey

Zizula hylax (Fabricius, 1775)

Namibia	60	Sesriem	13.04.2008	1	W. Mey
Namibia	44	Rooisand	20.01.2007	1	F. Koch

Pieridae

Catopsilia florella (Fabricius, 1775)

Namibia	10	Etendeka Plateau	29.02.2008	1	W. Mey
Namibia	17	Varianto Farm	30.03.2003	1	W. Mey
Namibia	76	Road House	23.02.2008	2	F. Koch

Colotis evagore antigone (Boisduval, 1839)

Namibia	20	Kaudom	17.11.2008	2	F. Koch

Colotis lais (Butler, 1876)

Namibia	17	Varianto Farm	30.03.2003	1	W. Mey
Namibia	29	Aha Hills	17.11.2008	1	F. Koch

Colotis pallene (Hopffer, 1855)

Namibia	28	Okatjikona	15.02.2008	1	W. Mey
Namibia	20	Kaudom	17.11.2008	1	F. Koch
Namibia	48	Erongo	24.11.2008	1	F. Koch

Colotis celimene pholoe (Wallengren, 1860)

Namibia	28	Okatjikona	01.11.2007	2	F. Koch
Namibia	48	Erongo	24.11.2008	1	F. Koch
Namibia	62	Naukluft	02.12.2008	1	W. Mey

Colotis evenina evenina (Wallengren, 1857)

Namibia	29	Aha Hills	22.02.2009	1	F. Koch
Namibia		Hobas, Fishriver	02.11.2008	1	F. Koch
Namibia	20	Kaudom	17.11.2008	2	F. Koch

Colotis evippe omphale (Godart, 1819)

Namibia	76	Road House	23.02.2008	4	F. Koch

Colotis vesta mutans (Butler, 1877)

Namibia	32	Omatako	22.03.2003	1	W. Mey
Namibia	28	Okatjikona	15.02.2008	1	W. Mey
Namibia	3	Baynes Mts.	24.02.2008	1	W. Mey

Colotis doubledayi flavulus Henning et al. 1997

Namibia	73	Gellap Ost	06.03.2003	6	W. Mey
Namibia		Hobas, Fishriver	02.11.2008	3	F. Koch
Namibia		Ai-Ais	09.02.2009	1	F. Koch

Mylothris agathina agathina (Cramer, 1779)

Namibia	19	Mile 46	26.03.2003	2	W. Mey

Namibia	20	Kaudom	25.02.2009	1	F. Koch

Pieris brassicae (Linnaeus, 1758)

RSA	108	Assegaibosch	09.11.2008	1	F. Koch

Pontia helice helice (Linnaeus, 1764)

RSA	84	Koeroegapvlakte	16.10.2001	2	W. Mey
RSA	90	Quaggafontein	02.10.2002	5	K. Ebert
RSA	82	Numees	11.10.2001	2	W. Mey
Namibia	41	Claratal	23.04.2008	1	J. Deckert
Namibia	76	Road House	23.02.2008	1	F. Koch
RSA		Port Nolloth	20.09.2008	4	F. Koch
RSA		40 km W Steinkopf	20.09.2008	4	F. Koch

Hesperiidae

Alenia namaqua Väri, 1974

RSA	84	Koeroegapvlakte	16.10.2001	2	W. Mey

Coeliades pisistratus (Fabricius, 1793)

Namibia	29	Aha Hills	22.02.2009	1	F. Koch
Namibia	33	Erichsfelde	10.01.2007	1	W. Mey

Leucochitonea levubu Wallengren, 1857

Namibia	28	Okatjikona	15.02.2008	1	W. Mey
Namibia	36	Sandveld	24.01.2007	1	W. Mey

Pelopidas thrax inconspicua (Bertoloni, 1858)

Namibia	17	Varianto Farm	29.03.2003	1	W. Mey
Namibia	29	Aha Hills	22.02.2009	1	F. Koch

Sarangesa phidyle (Walker, 1870)

Namibia	19	Mile 46	26.03.2003	2	W. Mey

Caprona pillaana Wallengren, 1857

Namibia	48	Kuduberg Fam	08.01.2007	1	W. Mey

Kedestes barberae bonsa Evans, 1950

Namibia		Windhoek,Kupferbg.	22.09.2008	1	F. Koch

Kedestes callicles (Hewitson, 1867)

Namibia	28	Okatjikona	18.02.2008	1	W. Mey

Metisella malgacha malgacha (Boisduval, 1833)

RSA	104	Cape of Good Hope	22.10.2007	2	W. Mey

Metisella metis metis (Linnaeus, 1764)

RSA	108	Assegaibosch	09.11.2008	3	F. Koch

Sarangesa seineri seineri Strand, 1909

Namibia	20	Kaudom	17.11.2008	1	F. Koch

5. Basic pattern of Lepidoptera diversity in southwestern Africa[1]

5. 1. Introduction

The Lepidoptera fauna southwestern Africa including Namibia is insufficiently known (Barnard 1998, Mendelsohn et al. 2002). Despite some progress in recent years (e.g. Bidzilia 2010, Braine 2002, Händel 1998, Hacker et al. 2008, Hacker & Fibiger (2007), Hacker & Zilli 2010, Krüger 2002, 2007, Kühne 2000, 2005, 2010, Mey 2004, 2007, 2010, Swart 2004) and intensive collecting in several places, vast areas of the region including a number of special habitats (e.g. salt-pans, wetlands, coastal dunes) have remained unexplored. Also, inventories for the BIOTA Observatories (Fig. 25) have not yet been compiled due to unresolved taxonomic problems in nearly all groups. Registration of the complete spectrum of autochthonous communities would necessitate year-round sampling and ongoing faunistic observations with an intensity that could not be performed within the frame of the BIOTA project. So far, we have sampled only parts of the fauna, which were, however, partly obtained by systematic sampling with a standardised method. These data, obtained by completely analysed light trap samples, are presented and summarised in the preceding chapter. These parts or fragments were used for some comparisons among different observatories or with other localities and provided insights into some general features of the Lepidoptera fauna in this part of Africa.

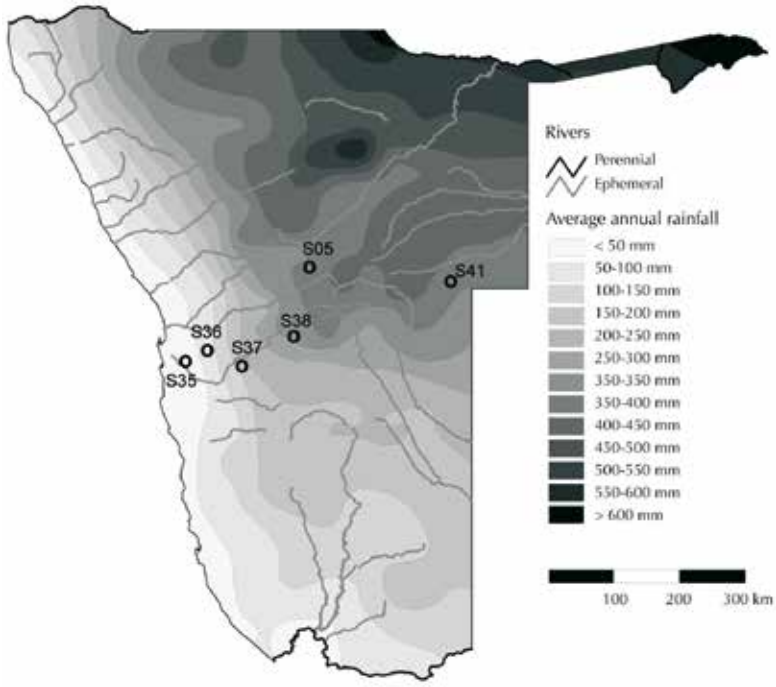

Fig. 25: Location of Observatories of the east-west transect along the rainfall gradient in Central Namibia: Gobabeb (S35), Ganab (S36), Rooisand (S37), Claratal (S38), Erichsfelde (S05) and Sandveld (S41) (map derived from Suhling et al. 2009)

5. 2. Features of the fauna

5. 2. 1. Distribution

The Lepidoptera fauna of southwestern Africa is richest and most diverse in terms of species numbers and abundance in the north and north-eastern regions. Towards the arid and semiarid regions in the south and along the Atlantic coast the fauna becomes less species-rich and diverse although abundance can still be very high. This pattern corresponds with the mean annual precipitation and the diversity patterns of vascular plants.

The chapter is an expanded version of Mey (2010b)

The Lepidoptera as a phytophageous insect group simply follow this rainfall gradient (Figs 26). This decline towards the Atlantic coast, however, is not only a gradual impoverishment of a rich fauna that becomes more and more fragmented. At the same time it is characterised by a gradual change in species, species groups and genera. Some groups disappear or become rare elements whilst new species appear and alter the faunal composition. The changes in the Lepidoptera fauna follow more or less the distribution of the biomes, which are based on the vegetation (life form dominance) and abiotic factors.

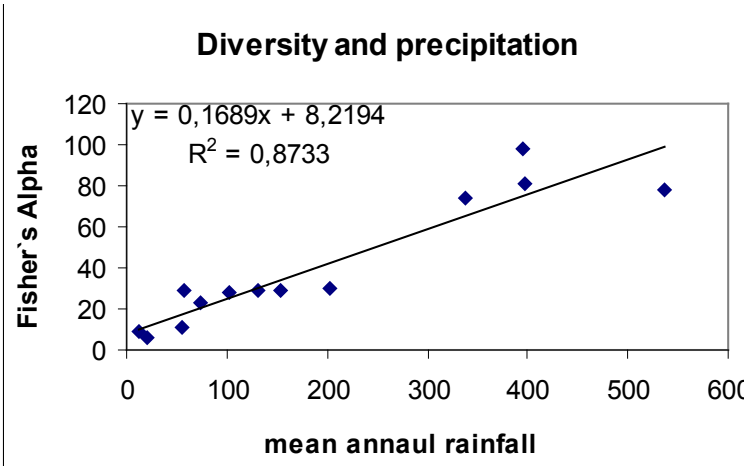

Fig. 26: Relationship of diversity of Lepidoptera (excl. Rhopalocera) and annual precipitation (in mm) at BIOTA Observatories in Namibia and South Africa

Namib Desert

The Namib, as a geographic entity, is not a compact, homogenous and isolated desert. It is largely influenced by the neighbouring areas. There are many river beds, almost dry for most of the year, which cut through the Namib and reach the Atlantic coast, especially in the northern and central parts. They are lined with remnants of river bank vegetation that is well developed in the interior of Namibia. Together with the host plants many Lepidoptera species follow the river banks, and thus occur in the middle of the Namib without being true desert species. An example is *Ornativalva kalahariensis* (Janse, 1960)(Gelechiidae), a common species which together with its host plant *Tamarix usneoides* reaches even the coastal dunes. This distribution pattern is no restricted to Lepidoptera but occurs in many insects groups, including aquatic orders, e.g. Odonata (Suhling et al. 2009).

Another landscape structure that contributes to more faunal heterogeneity are large outcrops and inselbergs. They receive more precipitation via coastal fog than the surrounding plains and thus possess a richer flora and fauna. According to the Lepidoptera species occurring there such localities can be considered as enclaves of the adjacent Nama-Karoo Biome.

Lichen fields are another special biotope (habitat) in the Namib Desert. Within the Lepidoptera, species of the subfamily Lithosiinae (Arctiidae) are known to be specialised lichen feeders (Pinhey 1975). Several species of this group occur in the Namib Desert and even on the offshore Guano islands, e.g. *Phryganopsis continentalis* Kühne, 2010.

Nama Karoo

The Lepidoptera of the Nama-Karoo form very interesting assemblages. This biome is in general a transition between the Desert and the Savanna Biomes and species of both biomes are present. Species numbers are usually lower, and widespread species dominate the communities. Very often, certain species of Noctuidae, Microlepidoptera or Pyraloidea make up more than 90% of the total catch. The biome, however, is home of a large number of endemic species recognised only from Namibia or South Africa so far. This is due mainly to the mountainous nature of the escarpment that borders or lies within the biome, and provides a wide array of differing habitats. But the wide and undulating plains in the south of Namibia and in the Karoo also possess a heterogeneous Lepidoptera fauna including endemic species.

Succulent Karoo

In contrast to other biomes the Lepidoptera fauna of the Succulent Karoo is very peculiar. The large number of endemic, mostly succulent plants is mirrored by a high number of endemic species and genera of moths. The survival of these groups is favoured by a concealed feeding behaviour. Subterranean ground dwellers feeding on roots are abundant. (e.g. Noctuidae). Leaf-miners are scarce but species with larvae, which bore into stems and twigs or case-bearers are well represented. Detritophageous species are also common. This species composition closely resembles those of desert communities, but with much higher species numbers. The common southern African butterflies, abundant in the neighbouring Nama-Karoo are rarely seen whilst the abundance of the few endemic butterfly species is always low.

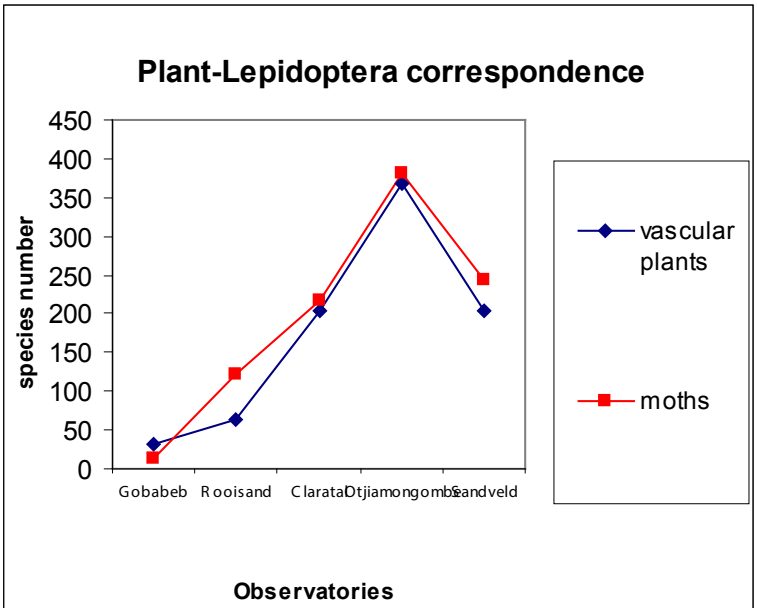

Fig. 27: Correspondence in distribution of species numbers between Lepidoptera (excl. Rhopalocera) and vascular plants

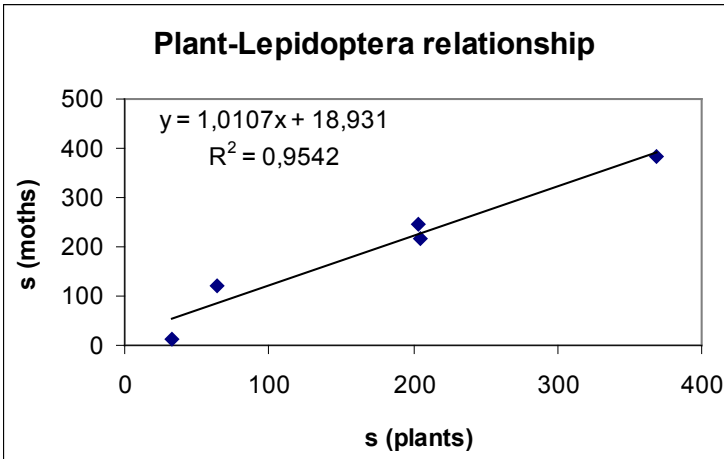

Fig. 28: Relationship between number of vascular plants and number of Lepidoptera species at Observatories of the East-West Transect in January 200

Fynbos

The species of the Fynbos Biome are either endemics restricted to this region or they have ranges which extend into neighbouring biomes. The fauna has similarities with that of the Succulent Karoo. A basis of this concordance is the frequent occurrence of succulents in both biomes, often belonging to widely distributed species and genera. (e.g. Euphorbia). The fynbos fauna, however, is richer than Nama-Karoo and Succulent Karoo. The species richness follows the precipitation gradient in the same way as observed along the east-west transsect in Central Namibia (Fig. 26). With increasing humid conditions more species are present. In Macrolepidoptera for example the family Geometridae forms a speciose and large part of the fauna, which is in sharp contrast to habitats in adjacent biomes. In Microlepidoptera the family Oecophoridae, poorly represented in semiarid areas, occurs with a variety of genera and species. A biogeographic analysis of this family would certainly unravel important hypothesis on the faunal history of the Fynbos Lepidoptera. As in many other families of Microlepidoptera the taxonomy of the group is in a desolate stage.

A mystery of the Fynbos fauna, however, is the relatively low species diversity in contrast to the rich plant diversity. As a phytophageous group one might expect that a similarly high species number of Lepidoptera or at least an increased α – diversity could be registered here. So far as I am aware, there are no indications or evidence of an unusually elevated Lepidoptera diversity of the Fynbos Biome.

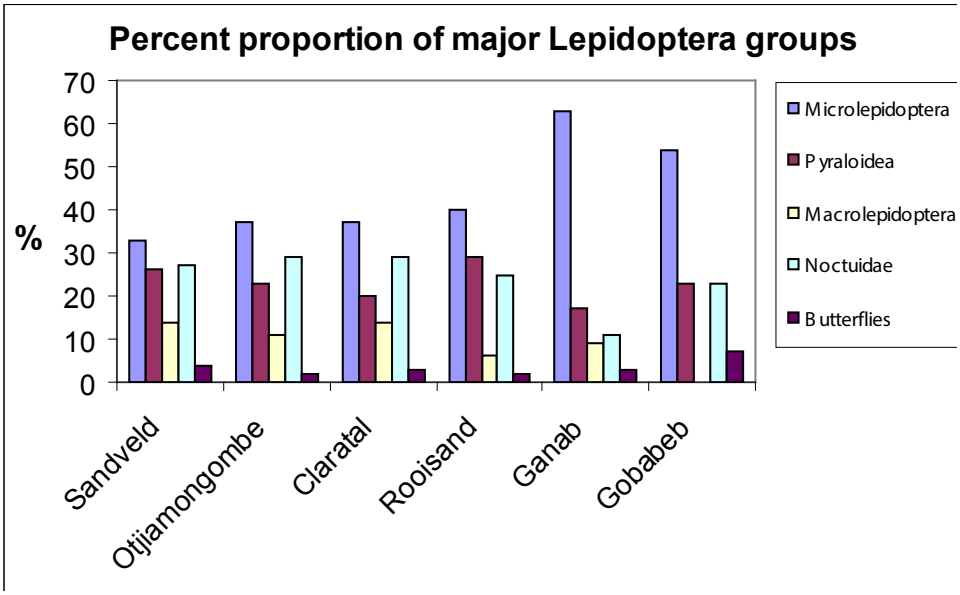

Fig. 29: Composition of Lepidoptera at the Observatories of the east-west transect in Namibia in January 2007

Savanna or Thornbush Savanna

In terms of species numbers the “Savanna” represents the richest biome in southwestern Africa. Within this region it is confined to north and north-east Namibia. Light trap samples usually yield about 170 species with maximum numbers approaching 400 species per night, whereas outside of that Biome light trap catches rarely exceed 150 species (Table 2). Noctuidae are the dominant family with many species occurring only in this part of Namibia but having a much wider distribution in Africa. The large and conspicuous Macrolepidoptera families Sphingidae, Saturniidae, Arctiidae etc. occur with many species, which is in sharp contrast to the arid biomes in southern Namibia and western South Africa, where these groups are poorly represented. Pyraloidea and Microlepidoptera are also well represented, with numerous species confined to the Savanna Biome and not found elsewhere in southwestern Africa. As a rule, the Lepidoptera assemblages of the various vegetation units within this biome are not dominated by a small number of abundant species as is the case in the dryer biomes. The abundance is more evenly distributed and the number of species represented by single individuals (= singletons) is usually high.

5. 2. 2. Diversity and faunal composition

The variation of faunal composition and species diversity among Lepidoptera was examined along the east-west transect in Central Namibia (Fig. 17, 25). A detailed account on the Observatories of this transect is provided by JÜRGENS et al. (2010).The transect corresponds with the precipitation gradient and cuts through the Desert-, Nama-Karoo- and Savanna Biomes. It covered six BIOTA observatories: Gobabeb, Ganab, Rooisand, Claratal, Erichsfelde (Otjiamongombe) and Sandveld. The observatories are situated roughly along the 23° S line of latitude (Tropic of Capricorn) at different altitudes and represent typical habitats and vegetation types in the three occurring biomes. Field work was carried out in January and February 2007, and again in April 2008. Moths were sampled with automatic light traps and butterflies by using hand-nets. The material was analysed at the species level. Relative proportions were calculated from species and specimen numbers. The basic data are documented in the preceding chapter on light trap samples.

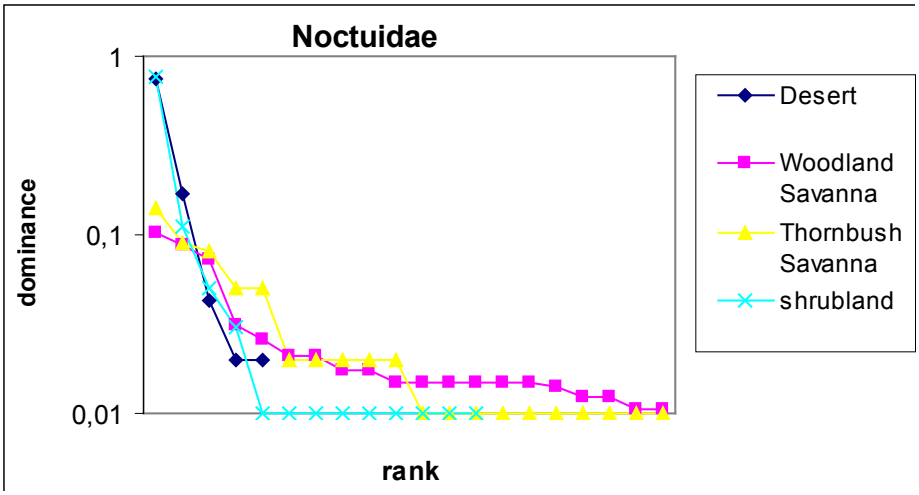

Fig. 30: Dominance structure (Berger-Parker Index) of Noctuidae in different vegetation types

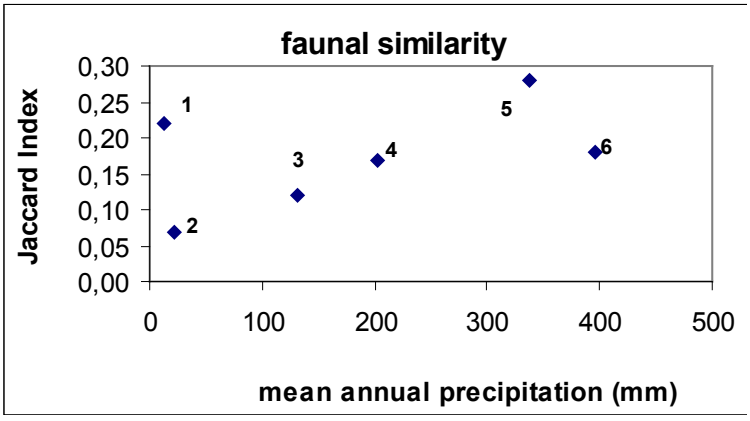

Fig. 31: Faunal similarity of Lepidoptera (excl. Rhopalocera) between January and April samples at six Observatories (1 - Wlotzkasbaken, 2 - Gobabeb, 3 - Ganab, 4 - Rooisand, 5 - Claratal, 6 - Erichsfelde)

Proportions of the Lepidoptera groups changed distinctly along the transect (Fig. 29). Though Microlepidoptera was the dominant group in all samples, the micromoths contributed more strongly to ensembles in arid and semiarid areas with Gelechiidae as the most speciose family. Pyraloidea showed a similar pattern, with the Pyralidae as the dominant family. Macrolepidoptera (excl. Noctuidae) and butterflies are species-poor groups whose numbers decreased dramatically from East to West. They contributed little to the Lepidoptera diversity. Noctuidae was the family with the highest species number. It is the most species-rich family in southern Africa (Krüger 2007). Its species diversity ranked first in all observatories and other sampling sites independent of biome type (Table 3).

Local species diversity was highest in the Observatories of the Savanna Biome and decreased gradually with increasing aridity. The diversity pattern of Lepidoptera corresponded with the precipitation- and vegetation gradient (Fig. 26-28). Changes in diversity corresponded to changes in the dominance structure of the local ensembles. High dominance values were observed in the arid and semiarid observatories Ganab, Rooisand, Gellap Ost and Karios whereas low values were typical for the observatories in the Savanna Biome (Fig. 30), where ensembles were not dominated by one or two species.

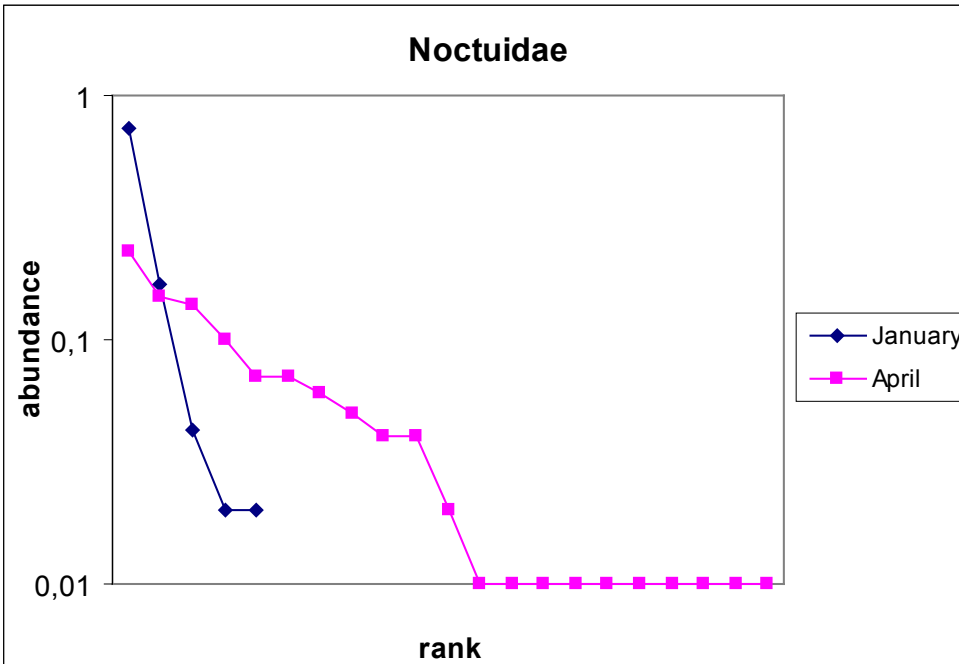

Fig. 32: Rank/abundance plot of Noctuidae on Wlotzkasbaken in 2007. The graphs are significantly different (Kolmogorov-Smirnov test)

5. 2. 3. Seasonality

During most of the year Namibia and the Northern and Western Cape are dry countries. Summer rainfall occurs from December to April, and from May to October in the winter rainfall area that extends from south-west Namibia to the southern tip of Africa. This pronounced change between dry and wet seasons determines the development and phenology of the vegetation and consequently governs the dynamics of the Lepidoptera fauna. In general, the beginning of the rainy season triggers the emergence of the majority of butterflies and moths. From this peak emergence, abundances decline towards the end of the rainy season. During dry months Lepidoptera are on the wing in low numbers. The flight periods of species are adjusted to this annual change in different ways. Although most species of moths come out with the rain, there are groups which appear either before the rain, after the rain or at the end of the rainy season or in the dry season only. Therefore, the taxonomic composition of the Lepidoptera ensembles at the study sites changes during the course of the year. The observed succession of species is not only a matter of dry versus wet season, but it represents an intra-seasonal change too. The faunal differences can be surprisingly wide at all Observatories. As an example, the faunal similarity of moths was calculated between samples from the beginning and samples

Table 2: Average species numbers of Lepidoptera of light trap samples obtained at various localities in southwestern Africa (n = number of localities). Poor samples due to bad weather conditions or drawn from degraded sites were omitted.

Biome	n	min.	max.	average
Savanna	24	45	382	**150,5**
Nama Karoo	12	15	90	**65,4**
Namib Desert	10	13	53	**23,5**
Succulent Karoo	6	35	135	**88,5**
Fynbos	14	22	189	**72.9**

Table 3: Percentage (with variances) of major Lepidoptera groups registered from light trap samples in southwestern Africa (n = number of samples)

Biome	n	Microlepidoptera	Pyraloidea	Macrolepidoptera	Noctuidae
Savanna	15	**30.1** ± 8.6	**19.3** ± 5.4	**16.6** ± 4.4	**35.9** ± 8.1
Nama Karoo	8	**34.5** ± 8.4	**22.3** ± 5.2	**11.8** ± 6.0	**31.6** ± 6.8
Namib Desert	7	**32.0** ± 13.1	**25.1** ± 6.6	**13.4** ± 9.5	**29.2** ± 8.8
Succulent Karoo	6	**32.3** ± 11.8	**22.6** ± 4.2	**14.2** ± 6.4	**31.2** ± 8.9
Fynbos	6	**30.7** ± 6.9	**12.8** ± 3.8	**35.6** ± 5.0	**20.8** ± 4.6

from the end of the rainy season from six Observatories in Namibia (Fig. 31). The similarity expressed by the JACCARD Index was variable and ranged from 0 to 0.34, meaning a rather low level of shared species in all groups. In other words, both samples had a high complementarity. This result clearly shows that seasonality is an important feature of the fauna and contributes towards increasing diversity. As a consequence, many consecutive samples had to be drawn within a single season in order to record species richness comprehensively. All published values on α-diversity are based on samples from a single season, and are therefore incomplete (cf. MEY 2004)

In arid and semiarid biomes rainfall does not have a strong influence in terms of driving Lepidoptera dynamics. In the Namib Desert, seasonal climate differences are small and aseasonality of the fauna is expected. Interestingly, this holds true only for species with detritophageous and coprophageous larvae, e.g. *Hypotia* species (Pyralidae), *Trichophaga cuspidata* GOZMÁNY, 1967 (Tineidae), which can be encountered year-round. Surprisingly, species feeding on desert plants have a restricted flight period and are on the wing during a short time of the year only, e.g. *Scythris vogelfederbergensis* nov. spec. (Scythrididae). At the end of the rainy season ubiquitous species are frequently observed in the desert. They are immigrants from the Nama Karoo and Savanna Biomes and appear together with different species in different localities, contributing to the often surprising dissimilarity and seasonality of local assemblages in the Namib Desert (Fig. 32).

5. 2. 4. Endemism

The arid and semiarid parts of southwestern Africa are rich in endemic species and genera. In Namibia, they are connected in various ways with the Western Escarpment Mountains. Their ranges are situated completely within or close to the escarpment, sometimes with more or less large extensions into neighbouring biomes (Figs 33-34). In South Africa the topography of the escarpment continues as a series of mountain ranges (Great Escarpment) and comes close the Cape Fold Mountain system. Both mountain systems are hot spots in Lepidoptera endemism. Simmons et al. (1998), Picker & Samways (1996) and Vernon (1999) have demonstrated a high endemism rate in vertebrates and arthropods. Notwithstanding some butterfly data, they largely disregarded Lepidoptera in their assessments, simply because specific data on the majority of Lepidoptera, especially moths, were then not available. In fact, all major Lepidoptera groups (Microlepidoptera, Pyraloidea, Macrolepidoptera with Noctuidae and Geometridae) have endemic species in southwestern Africa and are therefore very promising candidates to study endemism patterns in detail. Also butterflies have some endemic species and subspecies, often occupying very small areas (cf. Pringle et a. 1994, Woodhall 2005). Today, the distribution of all assumed endemic species is barely known. In the north, some of them might have ranges that include southern Angola, and in the south, ranges can go beyond the limits of southwestern Africa and disappear somewhere in the Fynbos biome, or in the eastern Karoo, or in Botswana.

Most of the species and genera described in the taxonomic chapter of this book can be regarded as potentially endemic to southwestern Africa and/or to the Cape Floristic Region. It depends on the intensity and speed of ongoing faunistic research to map their ranges and clarify their status.

There are only a small number of true desert species. They either have larvae, which feed on detritus (detritophages) or that feed monophageously on endemic desert plants, mainly of the families Zygophyllaceae and Mesembryanthemaceae. An example of the latter group is *Pecticossus gaerdesi* Daniel, 1956 (Cossidae) whose larvae bore into stems and roots of *Zygophyllum stapffi* in the central Namib. Until now no Lepidoptera species appears to be known to feed on the famous *Welwitschia mirabilis*.

The Western Escarpment Mountain chain from the Kaokoveld in the north to the Cape Fold Mountains in the south, encompasses numerous localities with a permanent water supply that usually supports richer vegetation. Some of these localities can be regarded as refugial areas. In addition, numerous inselbergs contribute to habitat heterogeneity and offer environmental conditions for species to survive periods of climate and vegetation change. Such isolated places provided the geographic location for evolutionary processes that eventually resulted in the development of endemic species. Their ranges can be either very small or extend more widely (Fig. 33). For example, most of the 124 species described as new from the Brandberg in Namibia (Mey 2004, 2007) have subsequently proved not to be endemics of that single mountain massif but to be more widely distributed along the escarpment with its various mountain ranges (pers. observations, unpublished).

The Succulent Karoo Biome contributes with a unique set of species to the overall diversity and endemism of southwestern Africa. However, the species are biome-specific, in some cases not confined to Namibia but also occurring in South Africa. A typical element of this biome is the genus *Centrarthra* of the family Noctuidae with more than 20 described species, 8-10 of which can be found at a single locality. The biology of the species is unknown (Janse 1937).

Concerning Namibia, an often asked question is: “How many endemics occur in the country?” The question cannot be answered for Lepidoptera at the moment because a catalogue or a check-list of all recorded species does not exist for Namibia. As a substitute, we can use the species numbers of the Brandberg, the best explored local fauna in Namibia. Of a total of 611 species, 124 species were described as new (approximately 20 %). A relatively high number of species could not yet be identified, and will probably increase the proportion of new taxa. All of them can be considered as candidates to be Namibian endemics (Mey 2007). Judging from this count about 25 - 30 % of the Brandberg fauna should belong to this group. By applying the numbers to the whole of Namibia, a rough estimate comes to 25- 30 % endemicity in Lepidoptera. This level of endemicity seems to be very high, and confers a large responsibility on the country of Namibia for conserving this wealth.

At present it is not possible to provide a meaningful list of endemic genera and species. The poor faunistic basis for all species would result in too many incorrect statements and errors.

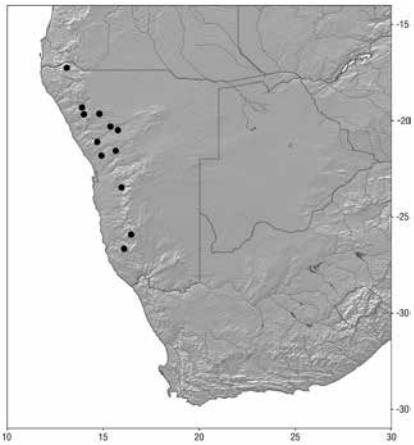

Fig. 33: Presently known localities of *Escarpamenta damarana* spec. nov. (Noctuidae) in the Namibian Escarpment

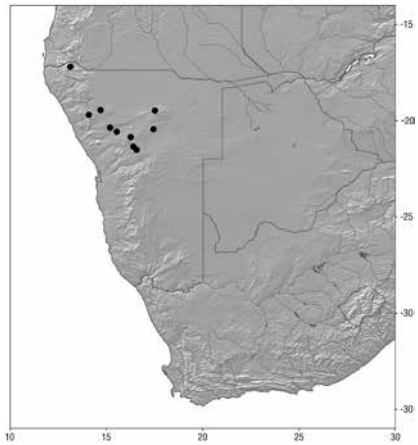

Fig. 34: Localities of *Ozarba fuscata* spec. nov. (Noctuidae)

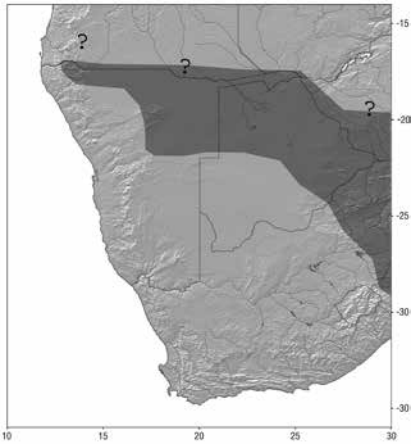

Fig. 35: Presently known range of *Umkulunkula kalahariensis* Mey, 2010 (Pyralinae)

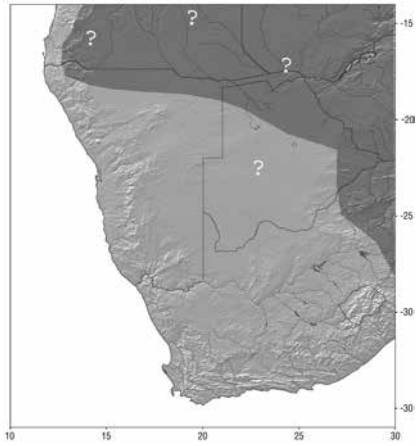

Fig. 36: Presently known range of *Surattha africalis* Hampson, 1919 (Crambinae)

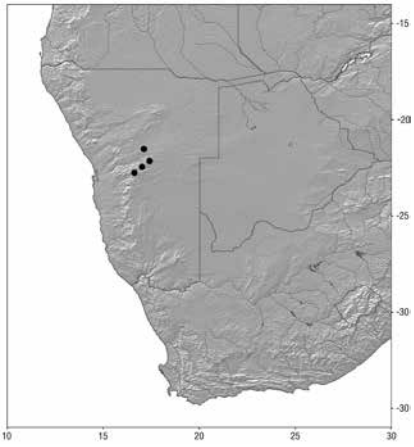

Fig. 37: Known records of *Thiacides khomasana* spec. nov. (Noctuidae) in central Namibia

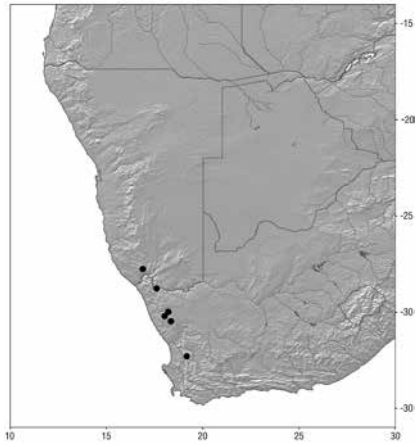

Fig. 38: Localities of *Autocharis arida* spec. nov. (Odontiinae)

5. 3. Biogeography

5. 3. 1. Chorological types

Monophageous species are dependent on their host-plants, follow their distribution and do not occur beyond their ranges. The congruence of Lepidoptera and plant ranges is either complete or incomplete. An example of the first case might be *Ornativalva kalahariensis* Janse, 1960 (Gelechiidae) a species that has always been collected together with Tamarix usneoides up to now. Incomplete congruence with moth species occupying a smaller, or much smaller, territory than that of the host-plant is a frequent situation. The incongruence is a result of the life histories of Lepidoptera species, which have a larval or sedentary stage and an adult or mobile stage, both of which are influenced by different environmental variables. In polyphageous species the distribution is governed to a lesser extent by the range of a single host-plant. The species has the choice where to breed and what host-plant to select. Environmental variables and habitat structures play a more significant role in the selection of oviposition sites than host-plant choices. As a result, polyphageous species are less restricted to host-plant ranges. They usually have wider distributional areas beyond the limits of biomes and ecoregions, either as continuous or disjunct ranges.

The study of the distribution of moths in southwestern Africa is still in an initial phase. The density of faunistic records is insufficient for constructing distribution maps of species. Moreover, records are biased around larger towns and to places with good tourist infrastructure. The currently known distribution of moths is thus an artifact of collecting. Actually, we know so little about the moth fauna of southwestern Africa that reported ranges can give only a suggestion of what the real situation is. This should be kept in mind when looking at the following distribution maps. The maps are first sketches only, which serve to demonstrate the existence of some distributional types occurring in southwestern Africa.

In general, the Lepidoptera fauna of southwestern Africa differs greatly among their northern, central and southern parts, which is more or less governed by the areas of dry (thornbush) and moist (broadleaved) savannas, Karoo type vegetation and fynbos.

The northern half of Namibia (except the coastal areas) is dominated by the occurrence of species of the Savanna Biome. Most of these species remain within the limits of moist or dry savanna habitats. They have small ranges (Fig. 34) or have a wide distribution in southern Africa, sometimes with ranges extending to East Africa. The pyralids *Umkulunkula kalahariensis* Mey, 2010 and *Surattha africalis* Hampson, 1919 are examples of this chorological type (Figs. 35-36). They tend to be sub-continental endemics or are split into vicariing species pairs or species swarms. The noctuid moth *Thiacides khomasana* spec. nov., seemingly endemic to Central Namibia, may serve as example for this type of disjunct distribution (Fig. 37). The sister species, *T. hampsoni* Hacker, 2004, was described from Kenya. Similar continental disjunctions are known to occur in afromontane groups (Mey 2004). They live at high elevations in the escarpment and have obviously small ranges. Larger ranges restricted to the escarpment are typical for endemic species which are not necessarily afromontane elements (Fig. 33).

Southern Namibia, Namaqualand and Knersvlakte have a fauna, which is coined by many regional and local endemics. Larger ranges of resident species may extend from the west coast to the interior of southern Africa (Upper and Great Karoo) and sometimes also into southern Namibia and into the Western Cape (Fig. 38). Species with apparently smaller ranges occur predominately in the mountains of the Richtersveld and the Namaqualand Hills. There are also genera with a preponderance in the Karoo, but with additional species occurring in the adjacent biomes, including fynbos. This chorological type is examplified by the genus *Centrarthra* Hampson, 1909 (Fig. 39), which contains more than 20 species. Species with such a distribution, in some cases from the west to the east coast, cannot be assigned to any of the defined biomes. Notwithstanding large ranges, they are by no means ubiquitous species. If they do not occur north of Namibia or north of southern Zimbabwe they can be regarded as regional endemics. *Drepanogynis dochmoleuca* (Prout, 1917) and *D. bifasciata* (Dewitz, 1891) are further examples of this distribution type (Fig. 40).

The Western Cape is mainly the domain of Fynbos vegetation. The Lepidoptera fauna of this biome is peculiar and restricted to the southern tip of Africa (Fig. 41). The fauna differs from adjacent biomes in the same way as the flora does. Regrettably, the distribution of species is largely unknown, and we cannot discriminate between local endemics and species endemic for the entire Fynbos biome. *Triphassa* Hübner, 1818, with about five species is an example of a widespread fynbos group. In addition to the regular Fynbos residents, a large number of species from the Savanna Biome occur here too. Their ranges extend from the north, sometimes from Kenya and Tanzania through Mpumalanga and Kwazulu-Natal along the east coast or along the escarpment to reach the Western Cape (Fig. 43).

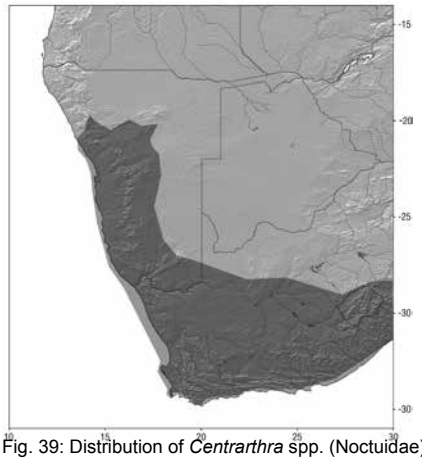

Fig. 39: Distribution of *Centrarthra* spp. (Noctuidae) in southern Africa (based on Janse 1937 and personal observations)

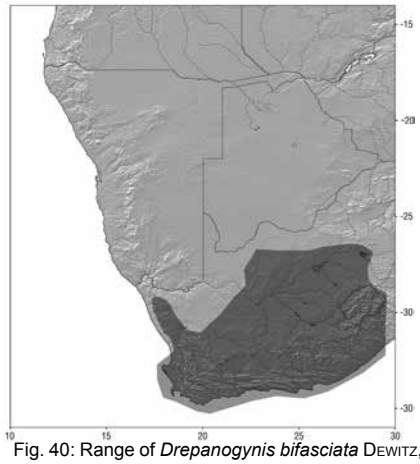

Fig. 40: Range of *Drepanogynis bifasciata* Dewitz, 1881 (Geometridae) (derived from Krüger 2002)

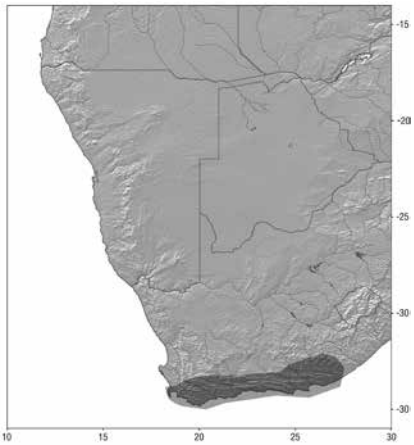

Fig. 41: Range of *Crambus proteus* spec. nov. (Crambinae) encompassing the Fynbos Biome

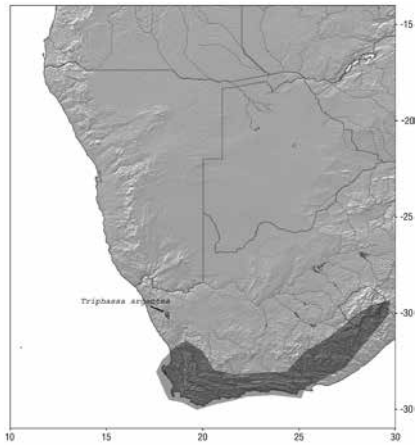

Fig. 42: Range of *Triphassa* Hübner, 1818 (Pyralinae), with isolated occurrence of *T. argentea* spec. nov. in Namaqualand

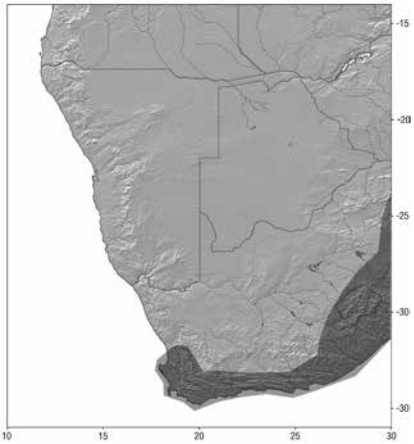

Fig. 43: Range of *Dysphylia viridella* Ragonot, 1888 (Phycitinae) in southern Africa

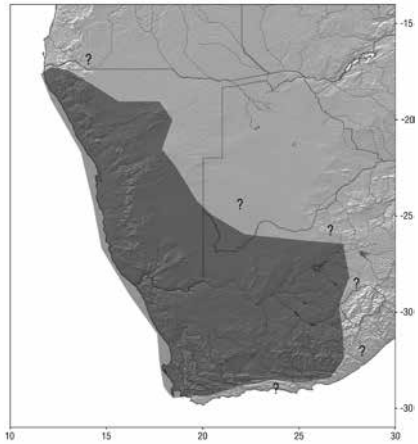

Fig. 44a: Currently known distribution of *Hypotia* Zeller, 1847 in southwestern Africa

The last region which should be mentioned as having a fauna of its own is the Namib Desert. It is an old desert (Van Zinderen Bakker 1975), and has a number of endemic plants, which are host-plants of several endemic moth species like the wood boring *Pectiocossus gaerdesi* (Daniel, 1952). Inselbergs and dry riverbeds (called "Reviere") provide semi-arid conditions and are colonized by species from the Nama-Karoo. They are outposts in the desert or have been established as separate species. Common sights in the Desert are individuals of the many ubiquitous species, which occur everywhere or in most parts of southwestern Africa. Grünberg (1910: p. 98) in his account on the fauna of southwestern Africa presented a list of 54 species. Today, many more species can be added. They often occur in large numbers and can even dominate local communities. Good flyers like noctuids or sphingids are regularly encountered in light trap samples in the Namib, hundreds of kilometers away from suitable breeding sites. Also for migrating butterflies the desert is not a severe obstacle.

This coarse, biome-focussed description of biogeographical patterns is obscured by the presence of large transitional areas between the biomes and by the mosaic character in the dispersion of habitats. Moreover, all biomes have outposts or exclaves in neighboring biomes, often equipped with endemic species. These isolated patches are tightly connected with the presence of the Western Escarpment Mountains. This system of more or less separated mountain ranges provides suitable habitats for many groups. It currently is, and has served in the past, as a system of refuges for species of distant biomes or of vanished ecosystems. Changing climate in combination with shifting vegetation zones has brought species arriving from elsewhere to the escarpment. Stranded and genetically isolated they could have evolved into new species, or they went extinct. The current distribution of such surviving species follows the geographical position of the escarpment, or the ranges are confined to larger or smaller parts of the mountain chain. For example, the distantly situated enclave of fynbos vegetation surrounded by Succulent or Nama Karoo vegetation at higher altitudes of the Kamieskroon Mountains (van Wyk & Smith 2001) possess typical fynbos genera with endemic species. *Triphassa argentea* spec. nov. and *Isolopha magna* spec. nov. are probably narrow endemics of these enclaves and striking examples for such a disjunction (Fig. 42). As it appears today, the escarpment is the main source of endemism in Lepidoptera in the Northern Cape and in Namibia.

The research on the distribution of species, endemic or non-endemic, might enable a better recognition of existing range patterns including the detection of new ones. It is still a long way to go until the data file of records is broad or long enough to embark in a study of distinguishing discrete distribution types. The establishment of a system of distribution types was a valuable tool to analyse the biogeographical information of local faunas and to provide additional arguments useful for conservation purposes.

5. 3. 2. Radiations

Radiations or species swarms clearly belong to the noticeable features of the southwestern Lepidoptera fauna. In general, a radiation is a concentration of several species of a monophyletic group (species-groups, genera) occurring together in a limited area, e.g. mountain ranges, islands. They are always diversity centers of the taxonomic group they belong to. The study of species from all families occurring in the study area has revealed the presence of some species swarms. Eight of them are listed in Table 4. According to available material in collections there are probably some more candidates, which still remain to be studied, e.g. *Ceromitia* spp. (Adelidae). Their known ranges are not concentrated in a given area but are dispersed variously in different regions in southwestern Africa. They each are located in the Cape Fold Mountain System, in the Namibian and South African escarpment or occupy larger areas including savanna and desert biomes, e.g. *Hypotia* spp. (Pyralinae). Even the entire length of the escarpment can be occupied by a radiation (Fig. 44). There is obviously no discernible concordance in distribution, which points to the presence of different ecological backgrounds on which each radiation is based. A closer examination of radiations is a very interesting and rewarding task. It may provide a key for unraveling the faunal history of the entire region by considering the phylogenetic relationship of the species swarms in conjunction with what we know about the ups and downs of the climatic change in the past.

Table 4: Examples of taxonomic radiations of Lepidoptera groups in southwestern Africa

Taxon	Family	Species by 2007	spec. nov.	Region
Picronarycia gen.nov.	Psychidae	2	4	Western Escarpment Mountains
Encepastra Meyrick, 1920	Batrachedridae	2	5	Cape Fold Mountains
Pseudurgis Meyrick, 1908	*Pseudurgis* group	3	7	southwestern Africa
Athrips Billberg, 1820	Gelechiidae	6	11	southwestern Africa
Parapsectris Meyrick, 1911	Gelechiidae	10	12	southwestern Africa
Hypotia Zeller, 1847	Pyralidae	7	7	Western Escarpment Mountains
Hyperlais Marion, 1959	Crambidae	1	4	Western Escarpment Mountains
Ozarba Walker, 1865	Noctuidae	52	4	southwestern Africa

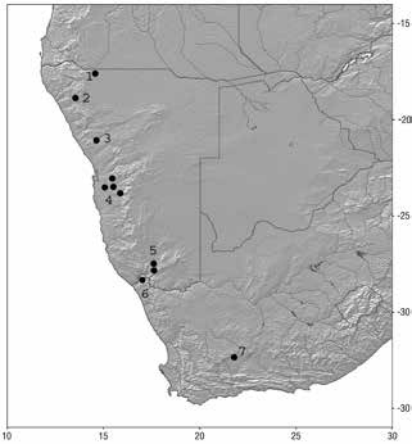

Fig. 44b: Distribution of the know species of *Picronarycia* gen. nov. (Psychidae) along the Escarpment of southwestern Africa (1 – *P. antibatis,* 2 – *P. transversa* spec. nov., 3 – *P. maculasquamosa*, 4 - *P. deserta* spec. nov., 5 - *P. karioscola* spec. nov., 6 - *P. richtersveldicola* spec. nov., 7 – unnamed species)

7. New and little known species of Lepidoptera of southwestern Africa

Introduction

According to the catalog of the Lepidoptera of southern Africa (Vári et al. 2002) a total of 7615 species are recorded from this region. Since 2002 a permanent flow of new species descriptions has raised this number to over 8000. The numbers increased in all major groups. This general shift probably did not alter their percent porportion within Lepidoptera significantly, which allows us to still use the percent figures of the catalogue today.

The best researched and documented group are the butterflies (Papilionoidea + Hesperoidea). They are, however, only a small part and make up 11.6 % of the fauna. The largest group are the Microlepidoptera (including the Pyraloidea) encompassing 45.8 %, i.e. nearly half of the Lepidoptera fauna. The Microlepidoptera are a group of over 50 families in South Africa and Namibia. Nearly all of them are poorly studied and knowledge on biology, life-history and distribution is fragmented. The Microlepidoptera belong to the least-researched insects in Africa and beyond. It does not come as a surprise, therefore, that the majority of new species described in this chapter are Microlepidoptera. Notwithstanding the considerable number of already described taxa the species diversity in southern Africa is much larger and will probably encompass the largest group within Lepidoptera with an estimated porportion of 55-60 %. Many undescribed taxa were found during recent studies on the Brandberg Massif in Namibia (Mey 2004, 2007a). Many further unknown species were found in material collected from several places in the arid western regions of Namibia and RSA. Some of these species were encountered locally in large numbers, thus dominating the Microlepidoptera taxocenoses in desert, semi-desert and Karoo-type habitats. Most of these species have the potential to be bioindicators for certain vegetation types and arid landscape structures. Because of their prevalence in local Lepidoptera assemblages the species are of ecological significance and must be described and named. Only named species can be studied further in an ecological and biogeographical context. The problem with new species descriptions in Africa is the weak taxonomic basis in all families. The number of revised genera is small, but it is very unlikely that in the absence of any microlepidopteran specialists new revisions of South African Microlepidoptera groups can be published in the near future. In almost all cases the newly detected species do not belong to revised genera. When describing new taxa in unrevised and unresolved groups/genera the risk of producing synonyms is high. I am aware of this risk. But as long as we need names to work with, we are forced to accept this risk. However, in the present case the risk can be minimized. The majority of the South African species were described by C. Zeller (1808-1883), Edward Meyrick (1854-1938), Lord Walsingham (1843-1919) and A.J.T. Janse (1879-1975). Today, the collections of these entomologists still exist and are housed in the Natural History Museum, London (Zeller, Meyrick, Walsingham), South African Museum, Cape Town (Meyrick) and in the Transvaal Museum Pretoria (Janse). The historical material including the type specimens are thus concentrated in three museums only. Regular visits to these museums and the study of type material allowed the recognition, re-description and delimitation of the “old” species, which were often inadequately described (no illustrations, no genitalia examined).

A second advantage making the descriptions of new taxa less risky is the geographical origin of the relevant material. I am mainly working on the fauna of the arid countries in southwestern Africa. It is a specific fauna with a high level of endemism. The area was rarely visited by early collectors and has remained under-collected to date. Very few samples were taken from this part of Africa and the unique character of the fauna escaped the attention of former collectors and specialists. Most of the endemic species are descendants of species from other parts of Africa. They can be separated clearly from already described species both by external and genital characters.

On the following pages the descriptions of new species and genera, mostly Microlepidoptera, are presented. Nearly all of these species are abundant insects, at least in some habitats. Some are known from single places only, others were found to be widely distributed in southwestern Africa. Only in cases of biogeographically interesting species are the descriptions based on singletons or a few individuals. It is the aim of this chapter to provide names for these common and/or important species and to place them correctly in the current system.

The species descriptions are arranged in systematical order according to the classification of Vári et al. (2002).

The **Holotypes** of the new species are deposited in the Natural History Museums of Windhoek, Pretoria and Berlin. **Paratypes** of all species are kept in the MFN Berlin. The type material which is to be deposited in

the museum in Windhoek is preliminarily retained in the MFN Berlin. Ten years ago, during the Brandberg Project, the curator of the insect collection E. Marais together with A. Kirk-Spriggs made strides to improve and expand the collection. Today, both posts are abandoned and the proper curation of the collection ceased some years ago. I have deposited type material of the Brandberg species in this collection in the past, but now it seems to be irresponsible from a scientific point of view to deposit there types anymore. As long as the curator position is not taken over by an entomologist, the material for the Museum in Windhoek remains provisionally in the MFN.

Abbreviations of depositories:

BMNH – Natural History Museum, London (the former British Museum of Natural History)
KLK – Kärntener Landesmuseum, Klagenfurt
MFN – Museum für Naturkunde, Berlin
MHNG - Muséum d`Histoire Naturelle, Genève
NMNW – National Museum of Namibia, Windhoek
RMS – Natural History Museum [Naturhistoriska Riksmuseet], Stockholm
SAM – South Africa Museum, Cape Town
TMSA – Transvaal Museum of South Africa, Pretoria
ZML – Zoological Museum, University of Lund
ZMK - Zoological Museum, National Taras Shevchenko University, Kiev

Synopsis of the species and genera described or commented in this chapter

Hepialidae

Gorgopis angustiptera (Janse, 1948),
Gorgopis limbopunctata(Gaede, 1930)

Acanthopteroctetidae

Acanthopteroctetes nepticuloides spec. nov.

Cecidosidae

Scyrotis natalensis spec. nov.

Adelidae

Adela siccana spec. nov.
Adela culminicola spec. nov.
Ceromitia okatjikona spec. nov.
Ceromitia jamaka spec. nov.

Heliozelidae

Antispilina varii spec. nov.

Eriocottidae

Compsoctena kaokoveldi spec. nov.

Cathalistis secularis (Meyrick, 1918), comb. nov.
Cathalistis bispinosa spec. nov.
Picrospora oreotrephes spec. nov.

Psychidae

Picronarycia gen. nov.
Picronarycia transversa spec. nov.
Picronarycia richtersveldicola spec. nov.
Picronarycia deserta spec. nov.
Picronarycia karioscola spec. nov.
Picronarycia maculasquamosa (Sobczyk & Mey,2007), comb. nov.
Picronarycia antibatis (Meyrick, 1926), comb. nov.
Placodoma vista spec. nov.
Lytrophila gracilis spec. nov.

Lasioctena bonaprospecti spec. nov.

Tineidae

Glaucostolella oxyteles (Meyrick, 1926)
Rhodobates mirabib spec. nov.
Nyctocyrmata numeesia spec. nov.
Scalmatica gnathosella spec. nov.
Scalmatica saccusella spec. nov.
Perissomastix peltiger spec. nov.
Edosa namakwana spec. nov.

Pseudurgis group

Kariosa gen. nov.
Kariosa autumnaria spec. nov.
Kariosa albulata spec. nov.
Pseudurgis karoo spec. nov.
Pseudurgis mollis spec. nov.
Pseudurgis minorata spec. nov.
Pseudurgis vernalis spec. nov.
Pseudurgis acosmetos spec. nov.
Pseudurgis tineiformis spec. nov.

Bucculatricidae

Bucculatrix khomasi spec. nov.
Bucculatrix wittnebeni Mey,2004
Bucculatrix inchoata Meyrick, 1913

Yponomeutidae

Zelleria namibiensis spec. nov.

Plutellidae

Baerenschenkia gen. nov.
Baerenschenkia umtrunkula spec. nov.
Paraxenistis macrostoma Meyrick, 1919
Deryaxenistis gen. nov.

Lyonetidae

Phyllobrostis peninsulae spec. nov.

Galacticidae

Homadaula wieseri spec. nov.

Oecophoridae

Pelochares palpata spec. nov.

Elachistidae

Perittia eselkopensis spec. nov.

Coleophoridae

Coleophora mirabibella spec. nov.

Scythrididae

Scythris vogelfederbergensis spec. nov.

Ethmiidae

Ethmia namella spec. nov.
Ethmia austronamibiensis spec. nov.

Xyloryctidae

Eporycta lurida spec. nov.

Pterolonchidae

Plexippica verberata Meyrick, 1912
Plexippica fuscinervosa sp. nov.

Autostichidae

Morotripta fatigata Meyrick, 1917
Morotripta argillacea spec. nov.

Batrachedridae

Enscepastra curvipalpata spec. nov.
Enscepastra recurvata spec. nov.
Enscepastra acutissima sp. nov.
Enscepastra cygnica sp. nov.
Enscepastra scolopaxica sp. nov.

Gelechiidae

Namatetris gen. nov.
Namatetris rhinoceros spec. nov.
Pyncostola grandicornuta spec. nov.
Polyhymno paraintortoides spec. nov.
Stegasta sattleri spec. nov.
Khoisa gen. nov.
Khoisa panuala (Meyrick, 1909)
Khoisa epicentra (Meyrick, 1909)
Istrianis fynbosella spec. nov.
Afrotelphusa gen. nov.
Afrotelphusa accensa (Meyrick, 1921) comb. nov.
Benguelasa gen. nov.
Benguelasa major spec. nov.
Benguelasa minor spec. nov.
Ephysteris gondwana spec. nov.
Ephysteris gobabebensis spec. nov.
Scrobipalpa meridioafricana spec. nov.
Scrobipalpa brandbergensis spec. nov.
Scrobipalpa swakopi spec. nov.
Sitotroga exquisita spec. nov.
Lacistodes fuscomaculata spec. nov.
Aspades luteomaculata spec. nov.
Dactylethrella leuconota spec. nov.

Brachodidae

Nigilgia eucallynta (Meyrick, 1937*)*

Pyralidae
Galleriinae

Paroxyptera hererofiliella spec. nov.

Pyralinae

Hypotia brandbergensis Leraut, 2004
Hypotia bolinalis (Walker, 1859)
Hypotia namaensis spec. nov.
Hypotia pronamibiella spec. nov.
Hypotia juergensi spec. nov.
Hypotia namaquensis spec. nov.
Hypotia quagga spec. nov.
Hypotia deckerti spec. nov.
Hypotia faucis spec. nov.
Triphassa argentea spec. nov.
Actenia fuscoserrata spec. nov.
Actenia dirempta spec. nov.

Epipaschiinae

Isolopha magna spec. nov.

Otjipagapaga gen. nov.
Otjipagapaga prima spec. nov.
Otjipagapaga secundaria spec nov.
Otjipagapaga dentilinealis (Hampson, 1906), comb. nov.
Salma gamsbergpastalis spec. nov.
Salma mombopastalis spec. nov.
Flohtschapa gen. nov.
Flotschapa rhynchopalpata sp. nov.

Phycitinae

Merulempista colorata spec. nov.
Sclerobia triangulata spec. nov.
Gaana nigronervosa spec. nov.
Elegia inconspicuella (Ragonot, 1888)
Namibicola karios sp. nov.
Namibicola palmwagos sp. nov.
Pogononeura hirticostella Ragonot, 1888
Pogonotropha dicksoni spec. nov.

Crambidae
Crambinae

Surattha luteola spec. nov.
Surratha africalis Hampson, 1919
Prionapteryx splendida spec. nov.
Prionapteryx amathusia spec. nov.
Parancylolomia gen. nov.
Parancylolomia relicta spec. nov.
Glaucocharis maculosa spec. nov.
Crambus proteus spec. nov.
Coniesta williami (de Joannis, 1926) [*Diatraea*], comb. nov.

Acentropinae

Eoophyla assegaia spec. nov.
Eoophyla munroei spec. nov.

Cybalomiinae

Hyperlais xanthomista spec. nov.
Hyperlais conspersalis spec. nov.
Hyperlais transversalis spec. nov.
Crambicybalomia gen. nov.
Crambicybalomia ariditatis spec. nov.
Ptychopseustis lucipara spec. nov.
Ptychopseustis Schmitzi spec. nov.
Odontiinae
Autocharis arida spec. nov.

Emprepes etjomontis spec. nov.
Tegostoma aridalis spec. nov.

Pyraustinae

Metasia grootbergensis sp. nov.

Metarbelidae

Teragra macroptera spec. nov.
Teragra punctana spec. nov.
Arbelodes shimonii Lehmann, 2010
Arbelodes franziskae Lehmann, 2010
Salagena albovenosa spec nov.

Limacodidae

Unithosea gainsfordi spec. nov.
Astatophlebia austera spec. nov.

Noctuidae

Acontia okra spec. nov.
Thiacides khomasana spec. nov.
Escarpamenta gen. nov.
Escarpamenta damarana spec. nov.
Eustrotia luteocapitata spec. nov.
Ozarba himbana spec. nov.
Ozarba fuscata spec. nov.
Ozarba schmiedelae spec. nov.
Ozarba topnaari spec. nov.

Species review

Hepialidae

Gorgopis angustiptera (Janse, 1948), [*Metahepialis*], **comb. nov**.

Remarks: The species was originally described in *Metahepialus* Janse, 1942. The study of freshly collected material revealed a moderately long pectination of the antennae and presence of a triangular hair tuft across the eyes, which are diagnostic characters of *Gorgopis* Hübner, 1822. Concerning wing pattern and antennal structures the species is very similar to *G. olivaceonotata* Warren, 1914, which Janse (1942) did not include in *Metahepialus*. Because the genus is based on *H. plurimaculata* (Warren, 1914), a rather aberrant species with additional apomorphic characters that *M. angustiptera* does not exhibit, the latter species is transferred here to *Gorgopsis*.

Gorgopis limbopunctata (Gaede, 1930), [*Dalaca*], **comb. nov**.
Pl. , fig.

Remarks: The examination of the **Holotype** (MFN) has clearly shown, that the species is a close relative of *G. olivaceonotata* and *G. angustiptera*. The species is here transferred to *Gorgopis*.

Acanthopteroctetidae

***Acanthopteroctetes nepticuloides* spec. nov.**
Pl. , fig.

Holotype ♂, **RSA**, Western Cape, Cederberg Mts, 20 km S of Clanwilliam, Jamaka Farm, 1.-3.-3.2005, LF, leg. W. Mey, genitalia slide Mey 67/09, (TMSA)

Paratype ♀, same data as **Holotype** (MFN).

Derivatio nominis: The name refers to the minute size of the moth, which is a well known feature of Nepticulidae.

Length of forewing 2 mm, wingspan 5 mm. Head with erect piliform scales on frons (yellow tufted) and vertex, brown between antennal sockets and with mixed yellow scales behind; ocelli and chaetosema absent; antenna 0.7 of forewing length, 24 grey-brown flagellomeres present, each with one complete ring of narrow scales, scape yellow, not enlarged, without pecten; maxillary palps 5-segmented, yellow, longer and more prominent than labial palps, proboscis small, coiled; eyes large. Thorax brown, metathorax unscaled, foretibia without epiphysis, spur formula: 0.1.4., hind tibia with hair brush on ventral side between subterminal spurs and apically on dorsal side; forewings somewhat shining, covered with coarse, grey-white scales tipped brown apically, hindwings pale grey, two frenular bristles and a row of 5-6 upright standing, thin spines present; pleural region between abdominal segments VII and VIII with 2-3 short, bulbous appendages (= ? lateral glands).

Male genitalia (Figs): Uncus broadly rounded, with two setose lobes beneath; tegumen and vinculum fused, forming a ring-like genital capsule, caudal margin slightly excavated; gnathos absent; horizontal process of transtilla each with three ventral serrations before the fused and up-curved apex; juxta elongate, membranous, no arrow-shaped sclerite visible; valva elongate, with a slightly excavated ventral margin and a rounded apex; phallic apparatus with more then 10 stout cornuti, arranged in bundles of 2-3, and two longer apical spines, dorso-lateral base of phallic apparatus with a pair of short triangular processes.

Female genitalia (Figs): Apex of ovipositor very flat in lateral view and with 4 minute serrations along lateral