



A comparison between two moth surveys on the farm Zandrivier 559, Lephallale, Limpopo, South Africa.

Published online: 16 September 2015

Hermann S. Staude

P. O. Box 398, Magaliesburg, 1791, South Africa. E-mail: hermann@busmark.co.za

Copyright © Lepidopterists' Society of Africa

Abstract: Two moth surveys conducted during March, a year apart, in the same locality, using a standard protocol, allowed for the gathering of comparative data. The number of specimens and the number of species recorded were almost identical from year to year but the actual species count increased from 264 to 401, an increase of 52%. The high increase in species may be simply an indication of the inefficiency of the sampling method to assess the species richness of an area. Other factors such as the possible influence of differential seasonal rainfall on moth numbers, distance between trap sites and the influence of short adult flight periods are discussed. No definitive conclusions could be reached to explain the high increase in species recorded from year to year. The results from this study questions the validity of species richness assessments for highly diverse taxa such as Lepidoptera, based on short term surveys and cautions their unequivocal use as a benchmark in Environmental Impact Assessments.

Key words: Lepidoptera, comparative biodiversity survey, EIA, species richness.

Citation: Staude, H.S. (2015). A comparison between two moth surveys on the farm Zandrivier 559, Lephallale, Limpopo, South Africa. *Metamorphosis* 26: 50–59.

INTRODUCTION

Andre Coetzer invited the author to survey moths for a BioBlitz he organised during March 2014 on the farm. The BioBlitz was repeated during March 2015, providing the opportunity to analyse comparative data. This report provides the results of the 2015 survey compared with the results of the 2014 survey.

The idea of the BioBlitz is to bring together people from various disciplines studying all animals and to see how many species can be recorded during a 40 hour period at a given site. Such events gather a lot of valuable data about biodiversity occurrence at the selected site. The events also allow for valuable and enjoyable interactions between naturalists who do not usually have contact with one another. The results of the BioBlitz are collated afterwards by the organisers and reports are distributed amongst participants, property owners and interested parties. The 2014 Zandrivier report recorded 619 animal species, 264 of which were moths (Coetzer *et al* 2014). The final report for the 2015 BioBlitz was not yet available at the time of writing. A film crew of the TV program 50/50 was present during the 2015 BioBlitz and the media exposure it created contributed to publicise such

events and to make the public aware of the incredible biodiversity South Africa harbours.

This study explores the value of comparative surveys conducted at the same locality, in the same month, using standard methodology.

STUDY SITE

The farm Zandrivier 559, Lephallale, Limpopo, South Africa (23°48'S, 27°46'E, 850 m amsl.) is situated in the savannah biome, comprising two main vegetation types: SVcb 19 Limpopo Sweet Bushveld and Aza 7 Subtropical Alluvial Vegetation (Mucina & Rutherford 2006).

MATERIALS AND METHODS

The 2014 survey was conducted over the evenings 29 & 30 March. The 2015 survey was conducted over the evenings 14 & 15 March. The applied methodology and equipment for both the 2014 and 2015 surveys were identical. Three standard 'tent type' moth traps were used for two nights deployed in both major vegetation types in as many different habitats spread over the farm as conditions allowed. The traps were placed in different locations each night, when possible, comprising a total of twelve 'trap nights', six during 2014 and six during 2015. Figure 1 shows the locations of the actual trap sites for the two surveys. The traps were visited once each night starting 22h00 and again starting 04h30 the next morning.

Nocturnal moths attracted to the tents were photographed and voucher specimens for each

Received: 7 September 2015

Accepted: 16 September 2015

Copyright: This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License. To view a copy of this license, send a letter to Creative Commons, Second Street, Suite 300, San Francisco, California, 94105, USA, or visit: <http://creativecommons.org/licenses/by-nc-nd/3.0/>

‘morpho species’ identified in the field were collected, placed individually in cellophane zip lock bags and stored in a freezer. Additional specimens were collected in cases where it was suspected that more than one species was involved. A few Neuroptera and other insects were also collected.



Figure 1 Trapping sites used during the surveys.

After the survey, collected specimens were labelled and spread on pins in the standard way used for preparing specimens for dry storage. These were deposited as voucher specimens, initially in the author’s collection, but for distribution to various workers specializing in various taxa for future morphological, taxonomic and molecular research.



Figure 2 Moths collected during 2014 survey.



Figure 3 Moths collected during 2015 survey.

The specimens were sorted into ‘morpho species’ to family level (Figs 2 & 3). Specimens were then identified to species level where possible by the author working in the database Lepidops version 4.1ah (Coetzer & Coetzer 2009). The LepiAfrica group for

moths (comprising Stade H. S.; Kroon D. M. & Joannou J. G.) have contributed over 40 000 images of moths to this database providing an ideal resource for moth identifications. Geometridae were identified using the author’s extensive collection as reference. Notodontidae were identified using Schintlmeister & Witt, 2015. In addition images of moths photographed during the survey were also analysed and additional species identifications were made from these images.

RESULTS

Weather and climate

The weather conditions during both surveys were good for moth trapping with no severe winds or low temperatures, which can adversely affect results.

Just prior to the 2014 survey the area experienced unusual amounts of rain resulting in much of the farm being flooded.

A comparison in the monthly rainfall for Lephalale recorded during the 2013/2014 season and the 2014/2015 season was extracted from the website of the South African Weather Service (accessed 04-09-2015), shown in Table 1.

Table 1 Comparative rainfall by month for Lephalale for the 2013/2014 and 2014/2015 seasons, with a long term average for each month.

Month	2013/2014	2014/2015	Average
November	25	30	39
December	150	150	66
January	30	30	93
February	30	25	60
March	250	30	48

Survey results

465 adult moth specimens were sampled, labelled and spread during the 2015 survey, compared to 468 specimens sampled during the 2014 survey.

In addition 346 images of live specimens were taken during the two night survey in 2015, compared to 225 images taken during the two night 2014 survey.

A total of 260 ‘morpho species’ of Lepidoptera (excluding butterflies) were recorded in 2015, compared to 264 ‘morpho species’ recorded in 2014. The total ‘morpho species’ for the farm for both seasons is 401 species.

176 (65%) of these could readily be identified to species level for the 2015 survey, compared to 196 (74%) for the 2014 survey (a complete list of identified and known undescribed species appears in Table 2). The total number of species identified to species level for both surveys is 294. This means that out of the 176 identified species recorded in 2015, 98 species (56%) were not recorded during the 2014 survey.

A list of the higher taxa recorded and number of species for the 2015 survey, with the 2014 survey

results in brackets, is shown below (including unidentified ‘morpho’ species).

Noctuoidea 127 (123)
Erebidae 82 (72)
Aganainae 1 (1)
Thyretinae 0 (2)
Lymantriinae 7 (3)
Hypeninae 3 (3)
Arctiinae 4 (9)
Erebinae 35 (28)
Eublemminae 32 (26)
Noctuidae 15 (34)
Amphipyridae 8 (5)
Plusiinae 0 (2)
Hadeninae 3 (5)
Cuculiinae 0 (1)
Heliiothinae 1 (1)
Noctuinae 1 (11)
Acontiinae 2 (9)
Notodontidae 11 (8)
Nolidae 16 (9)
Hermiidae 2 (2)
Euteliidae 1 (0)
Geometroidea 61 (60)
Geometridae 61 (60)
Ennominae 22 (27)
Geometrinae 17 (10)
Larentiinae 2 (2)
Sterrhinae 20 (21)
Papilionoidea
Thyrididae 0 (1)
Bombycoidea 12 (10)
Eupterotidae 1 (1)
Lasiocampidae 6 (6)
Sphingidae 4 (3)
Saturniidae 1 (0)
Pyraloidea 24 (43)
Pyalidae 16 (20)
Crambidae 8 (23)
Zygaenoidea 3 (2)
Limaecodidae 3 (2)
Gelechioidea 13 (12)
Gelechiidae 13 (10)
Ethmiidae 0 (2)
Pterophoroidea 1 (3)
Pterophoridae 1 (3)
Tortricoidea 4 (4)
Tortricidae 4 (4)
Tineoidea 7 (2)
Tineidae 4 (1)
Psychidae 3 (1)
Cossoidea 1 (1)
Cossidae 1 (1)
Ypomeutoidea
Yponomeutidae 1 (0)

Species not assigned to Superfamily 6 (2)

DISCUSSION

It is important to set up a standardised protocol for comparative Lepidoptera surveys (Terblanche & Edge 2011). A standard protocol for nocturnal moth surveys in South Africa does not exist. The two surveys in this study were conducted by the same surveyor for two nights, using the same methodology and equipment, in the same month, allowing for comparable results. The moth traps were placed in roughly the same areas of the farm (Fig. 1), although not in exactly the same spots.

It is therefore not surprising that the numbers recorded between the two seasons are very similar (2014: 468 specimens, 264 species; 2015: 465 specimens, 260 species).

What is surprising is the high number of additional species recorded during the 2015 survey (137 [52%] of the species found in 2015 were not recorded during the 2014 survey).

This is probably an indication that the actual number of moth species occurring in the area during March is much higher than the total of 401 recorded during the two surveys. These results highlight the importance of repeat surveys, not only at different times of the year, but also for a number of seasons before one can make any confident statements about the moth diversity occurring in a particular area.

Under-sampling, however, is probably not the only factor that would explain the surprising growth in species. There are a number of other factors that may have had an impact:

The 2014 survey was conducted during flooded conditions in contrast to the 2015 survey conducted in much drier conditions. The impact that the differential seasons/conditions may have had on the survey could be worth exploring. It can be argued that species preferring a relatively wet environment, as it may have been in 2014, would have been more numerous during such times and the chances of such species being captured at the light traps would have been higher in 2014. In contrast species preferring a relatively dry environment, as it may have been in 2015, would be expected to be more numerous and more liable to be collected during dry years. A comparison between the monthly rainfall for Lephalale of the two seasons as a whole, however, indicates that the two seasons were actually very similar and that the flooded conditions during March 2014 were a late anomaly (Table 1). These late heavy rains probably did not have a great impact on population numbers. One would have expected a significant drop in collected specimens, if the heavy rain and flooding did have a significant impact on moth adult numbers immediately after the heavy rains, which was not the case.

The two-week differential between the two surveys could possibly have had a larger impact as many

species have a narrow flight period. Species that spend the dry season in the pupal phase need to have enough time to complete the next generation to this stage before the host-plant deteriorates. Larger species such as Saturniidae seldom fly much after February in South African savannah areas probably because they need more time to complete their larval stages. The 2014 survey (29–30 March) recorded no Saturniidae and the 2015 survey (15–16 March) recorded only two worn specimens of a single species *Aurivillius fuscus*. The area should harbour many more species of Saturniidae. Adults of other species emerge later in autumn and perhaps spend the dry season in the egg or larval stage and therefore would appear late in the season. Too little is known about the early stages of the vast majority of the recorded species to come to any conclusions in this regard.

The impact of the differential trap-site choice may also have had an influence in the large increase in the number of additional species recorded in 2015, even though they were placed in similar habitats during the two surveys. In the experience of the author many Geometridae for instance do not fly far from their chosen host-plants and moth traps placed within 300m of each other repeatedly attract different species (Stade 1999, 2008).



Figure 5 *Coenina dentataria* – (Geometridae: Ennominae).

A remarkable result of the 2015 survey was the relatively common occurrence of the ennomine species *Coenina dentataria* (illustrated in Fig 5). It was not recorded during the 2014 survey. This is a widespread species that is very rare in collections. All of the handful of previously known existing specimens in the collections of the Ditsong Museum of Natural History and that of the author were collected as singletons many years apart from different lowland savannah localities. All indications are that this species occurs widely in lowland savannah but in low numbers. During this 2015 survey no less than eight specimens were seen at three different traps, including only the second female ever recorded in southern Africa. Two weeks after the survey the author visited the Umbabat Game Reserve near Hoedspruit and recorded an additional seven specimens of this species. A week later Hanna Roland sent a photograph of another specimen to the author, recorded at the Kololo Game Lodge near Vaalwater during February 2015. This

must have been an exceptionally bumper year for this species.

CONCLUSIONS

It seems clear from the above discussions on the results of these two comparative surveys that no definitive conclusions could be reached as to the species richness of moths at the site, even for the month of March. This should serve as a caution to those who conduct environmental impact studies of short duration where no comparative data is available, not to come to any premature conclusions as to the species richness of a locality.

This study also highlights the importance of ongoing biodiversity surveys conducted by citizen scientists and the importance of organising events such as the Bioblitz's that initiated this study. The availability of such information is of paramount importance when a site needs to be environmentally evaluated before commencement of proposed development. Once the compulsory Environmental Impact Assessment is initiated there is simply not enough time to conduct such biodiversity inventory properly in the case of highly diverse fauna such as Lepidoptera.

ACKNOWLEDGEMENTS

The author wishes to thank Andre Coetzer for inviting him to participate in these BioBlitz events and for organising two events a year apart allowing for the gathering of comparative data. Thanks to all the other participants of the Bioblitz's from whom much was learnt about the surveying of other taxa and for their companionship. Martin Viljoen is thanked for his great assistance when the author's 4x4 got stuck in mud during the 2014 survey. Jan Eckard the owner of the farm is thanked for permission to conduct these surveys on his property. Thanks to Hanna Roland for sharing all the valuable images of moths photographed during her South African safaris. The Editor of Metamorphosis, Dave Edge is thanked for encouraging the writing of this article.

LITERATURE CITED

- COETZER, A., BOYCE, J., PARRY, N., WEBB, P., STAUDE, H., COETZER, B., VAN DER MERWE, A., VILJOEN, M. & WEBB, G. 2014. BioBlitz – March 2014; Survey Location: Farm Vygeboomspoor & Zandrivier, Lephale, Limpopo Province. Unpublished report.
- COETZER, B.H., & COETZER, A.J. 2009. Lepidops Ver. 4.04ah – database software programme, LepiAfrica.
- MUCINA, L. & RUTHERFORD, M. C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute (SANBI), Pretoria, 808 pp.
- SCHINTLMEISTER, A. & WITT, T. 2015. The Notodontidae of South Africa – including Swaziland and Lesotho (Lepidoptera: Notodontidae). *Proceedings of the Museum Witt*

- Munich, Volume 2.* Museum Witt Munich & Nature Research Center Vilnius. 288 pp.
- SOUTH AFRICAN WEATHER SERVICE (Accessed 04-09-2015) <http://www.weathersa.co.za/>.
- STAUDE, H. S., 1999. An illustrated report of 510 geometrid moth taxa (Lepidoptera: Geometridae) recorded from 28 protected areas from the northern and eastern parts of South Africa. *Metamorphosis* **10**: 97–150.
- STAUDE, H.S., 2008. An annotated report on 115 further host-plant associations for African Loopers (Lepidoptera: Geometridae). *Metamorphosis* **19**: 193–209.
- TERBLANCHE, R. F. & EDGE, D. A. 2011. A rapid assessment protocol for surveying and monitoring diurnal Lepidoptera in Africa. *Metamorphosis* **22**: 75–80.

Table 2 – List of taxa recorded during field surveys at Zandrivier farm near Lephalale, Limpopo Province, South Africa on 29–30th March in 2014 and 15th March in 2015. x = recorded

Family	Genus	Species	Subspecies	2014	2015
Cossidae	<i>Azygophleps</i>	<i>atrifasciata</i>			x
Cossidae	<i>Azygophleps</i>	<i>inclusa</i>		x	
Crambidae	<i>Nomophila</i>	<i>noctuella</i>		x	
Crambidae	<i>Parapoynx</i>	<i>diminutalis</i>		x	
Crambidae	<i>Parapoynx</i>	<i>fluctuosalis</i>		x	
Crambidae	<i>Spoladea</i>	<i>fascialis</i>		x	
Crambidae	<i>Euclasta</i>	<i>warreni</i>		x	
Crambidae	<i>Hyalobathra</i>	<i>charopolis</i>		x	
Crambidae	<i>Pyrausta</i>	<i>atricinctais</i>			x
Crambidae	<i>Pyrausta</i>	<i>phoenicealis</i>		x	
Crambidae	<i>Antigastra</i>	<i>catalaunalis</i>		x	
Crambidae	<i>Bocchoris</i>	<i>onychinalis</i>		x	
Crambidae	<i>Cirrhochrista</i>	<i>grabczewskyi</i>		x	
Crambidae	<i>Diaphania</i>	<i>indica</i>		x	
Crambidae	<i>Herpetogramma</i>	<i>phaeopteralis</i>		x	
Crambidae	<i>Hydriris</i>	<i>ornatalis</i>		x	
Crambidae	<i>Pardomima</i>	<i>callixantha</i>		x	
Crambidae	<i>Psara</i>	<i>atritermina</i>		x	
Crambidae	<i>Synclera</i>	<i>traducialis</i>		x	
Erebidae	<i>Digama</i>	<i>meridionalis</i>	<i>meridionalis</i>	x	x
Erebidae	<i>Amerila</i>	<i>bauri</i>		x	x
Erebidae	<i>Estigmene</i>	<i>linea</i>		x	
Erebidae	<i>Galtara</i>	<i>species no. 1</i>		x	
Erebidae	<i>Micralarctia</i>	<i>punctulata</i>	<i>auricincta</i>	x	
Erebidae	<i>Spilosoma</i>	<i>lineatum</i>		x	x
Erebidae	<i>Utetheisa</i>	<i>pulchella</i>		x	
Erebidae	<i>Cropera</i>	<i>sericea</i>			x
Erebidae	<i>Knappetra</i>	<i>fasciata</i>	<i>stellata</i>	x	x
Erebidae	<i>Lacipa</i>	<i>gracilis</i>			x
Erebidae	<i>Morasa</i>	<i>modesta</i>		x	
Erebidae	<i>Palasea</i>	<i>albimacula</i>		x	x
Erebidae	<i>Polymona</i>	<i>rufifemur</i>	<i>rufifemur</i>		x
Erebidae	<i>Amyna</i>	<i>axis</i>		x	x
Erebidae	<i>Amyna</i>	<i>natalica</i>			x
Erebidae	<i>Amyna</i>	<i>punctum</i>			x
Erebidae	<i>Autoba</i>	sp. 1		x	
Erebidae	<i>Cerynea</i>	sp. 1			x
Erebidae	<i>Chrysozonata</i>	<i>latiflavaria</i>		x	x
Erebidae	<i>Eublemma</i>	<i>anachoresis</i>		x	x
Erebidae	<i>Eublemma</i>	<i>apicata</i>		x	x
Erebidae	<i>Eublemma</i>	<i>bolinia</i>		x	x
Erebidae	<i>Eublemma</i>	<i>exigua</i>			x
Erebidae	<i>Eublemma</i>	<i>gayneri</i>			x
Erebidae	<i>Eublemma</i>	<i>nigrivitta</i>			x
Erebidae	<i>Eublemma</i>	<i>plumbosa</i>			x
Erebidae	<i>Eublemma</i>	<i>ragusana</i>			x
Erebidae	<i>Eublemma</i>	<i>seminivea</i>		x	
Erebidae	<i>Eublemma</i>	sp. 16			x
Erebidae	<i>Eustrotia</i>	<i>decissima</i>		x	
Erebidae	<i>Incertae sedis</i>	sp. 11		x	
Erebidae	<i>Incertae sedis</i>	sp. 20			x
Erebidae	<i>Lithacodia</i>	<i>blandula</i>		x	
Erebidae	<i>Lophocytarra</i>	<i>phoenicoxantha</i>		x	
Erebidae	<i>Mimasura</i>	<i>tripunctoides</i>		x	
Erebidae	<i>Oruza</i>	<i>latifera</i>		x	
Erebidae	<i>Ozarba</i>	<i>acclivis</i>		x	
Erebidae	<i>Ozarba</i>	<i>albimarginata</i>		x	
Erebidae	<i>Ozarba</i>	<i>bipartita</i>			x
Erebidae	<i>Ozarba</i>	<i>chionoperas</i>			x
Erebidae	<i>Ozarba</i>	<i>corniculans</i>		x	
Erebidae	<i>Ozarba</i>	<i>heliastis</i>		x	x

Erebidae	<i>Ozarba</i>	<i>hypoxantha</i>			x
Erebidae	<i>Ozarba</i>	<i>nigroviridis</i>		x	
Erebidae	<i>Xanthomera</i>	<i>leucoglène</i>		x	
Erebidae	<i>Hypena</i>	<i>cherylae</i>		x	
Erebidae	<i>Hypena</i>	<i>obacerralis</i>		x	x
Erebidae	<i>Rhynchina</i>	<i>coniodes</i>		x	
Erebidae	<i>Rhynchina</i>	<i>leucodonta</i>		x	
Erebidae	<i>Rhynchina</i>	<i>tinctalis</i>		x	
Erebidae	<i>Acantholipes</i>	<i>circumdata</i>			x
Erebidae	<i>Acantholipes</i>	<i>namacensis</i>			x
Erebidae	<i>Acantholipes</i>	<i>trimeni</i>		x	x
Erebidae	<i>Anoba</i>	<i>unipuncta</i>			x
Erebidae	<i>Anomis</i>	<i>flava</i>		x	
Erebidae	<i>Anomis</i>	<i>leona</i>		x	
Erebidae	<i>Antiophlebia</i>	<i>bracteata</i>		x	
Erebidae	<i>Catephia</i>	sp. 1			x
Erebidae	<i>Chalciope</i>	<i>delta</i>			x
Erebidae	<i>Cortyta</i>	<i>canescens</i>		x	
Erebidae	<i>Cyligramma</i>	<i>latona</i>		x	
Erebidae	<i>Grammodes</i>	<i>bifasciata</i>		x	x
Erebidae	<i>Grammodes</i>	<i>congenita</i>		x	
Erebidae	<i>Grammodes</i>	<i>stolida</i>		x	x
Erebidae	<i>Heteropalpia</i>	<i>cortytoides</i>		x	x
Erebidae	<i>Hypocala</i>	<i>rostrata</i>			x
Erebidae	<i>Pericyma</i>	<i>atrifusa</i>			x
Erebidae	<i>Phytometra</i>	<i>subflavalis</i>		x	x
Erebidae	<i>Plecopterodes</i>	<i>moderata</i>			x
Erebidae	<i>Rhanidophora</i>	<i>ridens</i>		x	x
Erebidae	<i>Rhesala</i>	<i>maestalis</i>		x	
Erebidae	<i>Taviodes</i>	<i>subjecta</i>		x	
Erebidae	<i>Trigonodes</i>	<i>hyppasia</i>		x	x
Erebidae	<i>Acantholipes</i>	sp. 1			x
Erebidae	<i>Anomis</i>	<i>luperca</i>		x	
Erebidae	<i>Audea</i>	<i>albifasciata</i>		x	x
Erebidae	<i>Audea</i>	<i>funata</i>		x	x
Erebidae	<i>Audea</i>	<i>melanoplaga</i>			x
Erebidae	<i>Brevipecten</i>	<i>clearchus</i>			x
Erebidae	<i>Brevipecten</i>	<i>cornutus</i>			x
Erebidae	<i>Catephia</i>	<i>pallididisca</i>		x	
Erebidae	<i>Cuneisigna</i>	<i>rivulata</i>			x
Erebidae	<i>Dysgonia</i>	<i>latifascia</i>			x
Erebidae	<i>Ericcia</i>	<i>sobria</i>		x	
Erebidae	<i>Mocis</i>	<i>frugalis</i>		x	
Erebidae	<i>Pandesma</i>	<i>robusta</i>			x
Erebidae	<i>Phytometra</i>	<i>duplicalis</i>		x	
Erebidae	<i>Phytometra</i>	<i>opsiphora</i>			x
Erebidae	<i>Plecoptera</i>	<i>annexa</i>			x
Erebidae	<i>Plecoptera</i>	<i>misera</i>			x
Erebidae	<i>Plecoptera</i>	<i>poderis</i>		x	
Erebidae	<i>Plecoptera</i>	<i>rufirena</i>			x
Erebidae	<i>Pleuronodes</i>	<i>arida</i>			x
Erebidae	<i>Rhesala</i>	<i>moestalis</i>		x	x
Erebidae	<i>Tathorhynchus</i>	<i>exsiccatas</i>	<i>exsiccatas</i>		x
Erebidae	<i>Ulotrichopus</i>	sp. 1		x	
Ethmiidae	<i>Ethmia</i>	<i>coscineutis</i>		x	
Ethmiidae	<i>Ethmia</i>	<i>sabiella</i>		x	
Eupterotidae	<i>Stenoglène</i>	<i>obtusus</i>		x	
Euteliidae	<i>Colpocheilopteryx</i>	<i>callichroma</i>			x
Geometridae	<i>Acanthovalva</i>	<i>inconspicuaris</i>		x	x
Geometridae	<i>Ascotis</i>	<i>reciprocaria</i>		x	x
Geometridae	<i>Chiasmia</i>	<i>arenosa</i>		x	
Geometridae	<i>Chiasmia</i>	<i>assimilis</i>		x	x
Geometridae	<i>Chiasmia</i>	<i>boarmioides</i>			x
Geometridae	<i>Chiasmia</i>	<i>brongusaria</i>	<i>brongusaria</i>	x	
Geometridae	<i>Chiasmia</i>	<i>confusata</i>		x	
Geometridae	<i>Chiasmia</i>	<i>furcata</i>		x	x
Geometridae	<i>Chiasmia</i>	<i>inconspicua</i>	<i>inconspicua</i>	x	

Geometridae	<i>Chiasmia</i>	<i>kirbyi</i>			x
Geometridae	<i>Chiasmia</i>	<i>multistrigata</i>	<i>lliliput</i>	x	
Geometridae	<i>Chiasmia</i>	<i>multistrigata</i>	<i>multistrigata</i>	x	x
Geometridae	<i>Chiasmia</i>	<i>nubilata</i>			x
Geometridae	<i>Chiasmia</i>	<i>streniata</i>	<i>streniata</i>	x	
Geometridae	<i>Coenina</i>	<i>dentataria</i>			x
Geometridae	<i>Drepanogynis</i>	<i>olivescens</i>	<i>olivescens</i>		x
Geometridae	<i>Erastria</i>	<i>leucicolor</i>	<i>leucicolor</i>	x	x
Geometridae	<i>Heterostegane</i>	<i>auranticollis</i>			x
Geometridae	<i>Isturgia</i>	<i>arizeloides</i>			x
Geometridae	<i>Isturgia</i>	<i>catalaunaria</i>	<i>catalaunaria</i>	x	x
Geometridae	<i>Isturgia</i>	<i>deerraria</i>		x	x
Geometridae	<i>Isturgia</i>	<i>spissata</i>		x	
Geometridae	<i>Isturgia</i>	<i>supergressa</i>		x	x
Geometridae	<i>Lhommeia</i>	<i>subapicata</i>		x	
Geometridae	<i>Lomographa</i>	<i>indularia</i>		x	x
Geometridae	<i>Omphalucha</i>	<i>ditriba</i>	<i>ditriba</i>	x	x
Geometridae	<i>Omphalucha</i>	<i>epixyna</i>		x	
Geometridae	<i>Orbamia</i>	<i>octomaculata</i>		x	x
Geometridae	<i>Plateoplia</i>	<i>acrobelia</i>		x	x
Geometridae	<i>Platyepla</i>	<i>persubtilis</i>		x	
Geometridae	<i>Zamarada</i>	<i>adiposata</i>		x	
Geometridae	<i>Zamarada</i>	<i>consecuta</i>		x	
Geometridae	<i>Zamarada</i>	<i>differens</i>		x	x
Geometridae	<i>Zamarada</i>	<i>ilma</i>		x	x
Geometridae	<i>Zamarada</i>	<i>metallicata</i>		x	
Geometridae	<i>Zamarada</i>	<i>plana</i>	<i>denticincta</i>	x	x
Geometridae	<i>Zeuctoboarmia</i>	sp. 1		x	
Geometridae	<i>Allochrotes</i>	<i>biornata</i>		x	x
Geometridae	<i>Allochrotes</i>	<i>imperfecta</i>		x	x
Geometridae	<i>Allochrotes</i>	<i>impunctata</i>			x
Geometridae	<i>Antharmostes</i>	<i>papilio</i>	<i>papilio</i>		x
Geometridae	<i>Celidomphax</i>	<i>quadrimacula</i>			x
Geometridae	<i>Chlorissa</i>	<i>albistrigulata</i>		x	
Geometridae	<i>Chlorissa</i>	<i>attenuata</i>		x	
Geometridae	<i>Chlorocoma</i>	<i>clopia</i>		x	
Geometridae	<i>Comibaena</i>	<i>coryphata</i>		x	x
Geometridae	<i>Eucrotes</i>	<i>albicornaria</i>			x
Geometridae	<i>Heterorachis</i>	<i>simplicissima</i>			x
Geometridae	<i>Microbaena</i>	<i>pulchra</i>	<i>minor</i>	x	
Geometridae	<i>Microloxia</i>	<i>ruficornis</i>			x
Geometridae	<i>Mictoschema</i>	<i>swierstrai</i>		x	x
Geometridae	<i>Mimandria</i>	<i>cataractae</i>	ssp.1	x	
Geometridae	<i>Mixocera</i>	<i>albistrigata</i>			x
Geometridae	<i>Mixocera</i>	<i>frustatoria</i>			x
Geometridae	<i>Mixocera</i>	sp.1			x
Geometridae	<i>Mixocera</i>	<i>viridans</i>		x	
Geometridae	<i>Neromia</i>	<i>rubripunctilla</i>			x
Geometridae	<i>Neromia</i>	sp.1			x
Geometridae	<i>Neromia</i>	<i>strigulosa</i>			x
Geometridae	<i>Omphacodes</i>	<i>punctilineata</i>		x	
Geometridae	<i>Pingasa</i>	<i>lahayei</i>	undesc. ssp.1		x
Geometridae	<i>Disclisioprocta</i>	<i>natalata</i>		x	
Geometridae	<i>Mesocolpia</i>	<i>lita</i>		x	x
Geometridae	<i>Pseudolarentia</i>	<i>megalaria</i>			x
Geometridae	<i>Chlorerythra</i>	<i>rubriplaga</i>	<i>rubriplaga</i>	x	
Geometridae	<i>Discomiosis</i>	<i>crescentifera</i>		x	x
Geometridae	<i>Idaea</i>	<i>consericeata</i>		x	
Geometridae	<i>Idaea</i>	<i>lilliputaria</i>		x	x
Geometridae	<i>Idaea</i>	<i>ossicolor</i>			x
Geometridae	<i>Idaea</i>	<i>ruffifascia</i>			x
Geometridae	<i>Idaea</i>	<i>squamulata</i>		x	x
Geometridae	<i>Idaea</i>	<i>subterfundata</i>		x	
Geometridae	<i>Idaea</i>	<i>torrida</i>			x
Geometridae	<i>Idaea</i>	<i>umbricosta</i>	<i>umbricosta</i>	x	x
Geometridae	<i>Pseudosterrha</i>	<i>falcata</i>		x	x
Geometridae	<i>Rhodometra</i>	<i>sacrararia</i>		x	x
Geometridae	<i>Traminda</i>	<i>neptunaria</i>		x	x

Geometridae	<i>Traminda</i>	<i>obversata</i>	<i>obversata</i>	x	
Geometridae	<i>Traminda</i>	<i>ocellata</i>			x
Geometridae	<i>Traminda</i>	<i>vividaria</i>		x	x
Geometridae	<i>Scopula</i>	<i>donovani</i>		x	
Geometridae	<i>Scopula</i>	<i>ioscia</i>			x
Geometridae	<i>Scopula</i>	<i>latitans</i>		x	
Geometridae	<i>Scopula</i>	<i>minorata</i>	<i>minorata</i>	x	x
Geometridae	<i>Scopula</i>	<i>minorata</i> cf.1			x
Geometridae	<i>Scopula</i>	<i>nigrinotata</i>		x	
Geometridae	<i>Scopula</i>	<i>nigrinotata</i> cf.14			x
Geometridae	<i>Scopula</i>	<i>pulchellata</i>	<i>rufinubes</i>	x	x
Geometridae	<i>Scopula</i>	<i>rufisalsa</i>	<i>rufisalsa</i>	x	
Geometridae	<i>Scopula</i>	<i>sincera</i>		x	x
Geometridae	<i>Scopula</i>	<i>sublobata</i>		x	
Geometridae	<i>Scopula</i>	undescribed sp.1			x
Geometridae	<i>Scopula</i>	<i>vestalis</i>			x
Hermiidae	<i>Naarda</i>	<i>xanthopis</i>			x
Lasiocampidae	<i>Anadiasa</i>	<i>punctifascia</i>			x
Lasiocampidae	<i>Bombycopsis</i>	<i>pallida</i>		x	x
Lasiocampidae	<i>Dinometa</i>	<i>maputuana</i>		x	x
Lasiocampidae	<i>Henometa</i>	<i>clarki</i>		x	x
Lasiocampidae	<i>Lebeda</i>	<i>mustelina</i>		x	
Lasiocampidae	<i>Odontopacha</i>	<i>kilwana</i>		x	
Lasiocampidae	<i>Sena</i>	<i>donaldsoni</i>	<i>marshalli</i>		x
Lasiocampidae	<i>Sena</i>	<i>prompta</i>		x	x
Limacodidae	<i>Afrobirthama</i>	<i>hobohmi</i>		x	
Limacodidae	<i>Afrobirthama</i>	<i>reducta</i>			x
Limacodidae	<i>Halseyia</i>	<i>intacta</i>			x
Limacodidae	<i>Isozinara</i>	<i>pallidifascia</i>			x
Limacodidae	<i>Parapluda</i>	<i>invitabilis</i>		x	
Noctuidae	<i>Acontia</i>	<i>discoidea</i>		x	
Noctuidae	<i>Acontia</i>	<i>gratiosa</i>		x	
Noctuidae	<i>Acontia</i>	<i>porphyrea</i>		x	
Noctuidae	<i>Acontia</i>	<i>stumpffi</i>		x	
Noctuidae	<i>Acontia</i>	<i>tinctilis</i>		x	x
Noctuidae	<i>Acontia</i>	<i>trimaculata</i>		x	
Noctuidae	<i>Hoplotarache</i>	<i>nubila</i>		x	x
Noctuidae	<i>Callopietria</i>	<i>latreillei</i>	<i>latreillei</i>	x	
Noctuidae	<i>Chasmina</i>	<i>tibialis</i>		x	
Noctuidae	<i>Cirrodes</i>	sp. 1		x	x
Noctuidae	<i>Condica</i>	<i>capensis</i>		x	x
Noctuidae	<i>Hypoplexia</i>	<i>melanica</i>			x
Noctuidae	<i>Lambia</i>	<i>inferalis</i>			x
Noctuidae	<i>Paracrوريا</i>	<i>major</i>			x
Noctuidae	<i>Spodoptera</i>	<i>exempta</i>			x
Noctuidae	<i>Spodoptera</i>	<i>exigua</i>	<i>exigua</i>	x	x
Noctuidae	<i>Chrysodeixis</i>	<i>acuta</i>		x	
Noctuidae	<i>Aletia</i>	<i>umbrigera</i>			x
Noctuidae	<i>Leucania</i>	<i>phaea</i>			x
Noctuidae	<i>Helicoverpa</i>	<i>armigera</i>	<i>armigera</i>	x	x
Noctuidae	<i>Helicoverpa</i>	<i>assulta</i>	<i>assulta</i>	x	
Noctuidae	<i>Agrotis</i>	<i>ipsilon</i>		x	x
Noctuidae	<i>Paranola</i>	<i>nigristriga</i>		x	
Noctuidae	<i>Trichoplusia</i>	<i>orichalcea</i>		x	
Nolidae	<i>Arcyophora</i>	<i>clathrimaculata</i>			x
Nolidae	<i>Arcyophora</i>	<i>endoglauca</i>			x
Nolidae	<i>Arcyophora</i>	<i>longivalvis</i>		x	
Nolidae	<i>Earias</i>	<i>biplaga</i>		x	
Nolidae	<i>Earias</i>	<i>cupreoviridis</i>			x
Nolidae	<i>Earias</i>	<i>insulana</i>		x	x
Nolidae	<i>Maurilia</i>	<i>arcuata</i>		x	x
Nolidae	<i>Neaxestis</i>	<i>irrorata</i>		x	
Nolidae	<i>Neaxestis</i>	<i>rhoda</i>		x	x
Nolidae	<i>Neaxestis</i>	sp. 1			x
Nolidae	<i>Negeta</i>	<i>luminosa</i>			x
Nolidae	<i>Xanthodes</i>	<i>albago</i>			x
Nolidae	<i>Xanthodes</i>	<i>graellsii</i>		x	x
Notodontidae	<i>Archistilbia</i>	<i>atrifrons</i>			x

Notodontidae	<i>Atrasana</i>	<i>excellens</i>		x	x
Notodontidae	<i>Atrasana</i>	<i>grisea</i>			x
Notodontidae	<i>Desmeocraera</i>	<i>basalis</i>			x
Notodontidae	<i>Desmeocraera</i>	<i>canescens</i>		x	
Notodontidae	<i>Janthinisca</i>	<i>joannoui</i>			x
Notodontidae	<i>Leptolepida</i>	<i>varians</i>			x
Notodontidae	<i>Pararethona</i>	<i>hierax</i>		x	
Notodontidae	<i>Polelassothys</i>	<i>plumitarsus</i>			x
Notodontidae	<i>Rhenea</i>	<i>mediata</i>		x	
Notodontidae	<i>Scalimicauda</i>	<i>oneili</i>		x	
Notodontidae	<i>Scrancia</i>	<i>discomma</i>		x	
Notodontidae	<i>Stenostaura</i>	<i>impedita</i>			x
Notodontidae	<i>Stenostaura</i>	<i>varians</i>		x	
Notodontidae	<i>Turnacoides</i>	<i>basipuncta</i>			x
Pyralidae	<i>Galleria</i>	<i>mellonella</i>		x	
Pyralidae	<i>Hypsopygia</i>	<i>sanguinalis</i>		x	
Pyralidae	<i>Pyralis</i>	<i>fumipennis</i>		x	
Pyralidae	<i>Tyndis</i>	<i>dentilinealis</i>		x	
Saturnidae	<i>Aurivillius</i>	<i>fuscus</i>			x
Sphingidae	<i>Acherontia</i>	<i>atropos</i>		x	
Sphingidae	<i>Agrius</i>	<i>convolvuli</i>	<i>convolvuli</i>	x	x
Sphingidae	<i>Batocnema</i>	<i>africana</i>			x
Sphingidae	<i>Nephele</i>	<i>comma</i>			x
Sphingidae	<i>Rufoclanis</i>	<i>numosae</i>	<i>numosae</i>	x	x
Thyretidae	<i>Automolis</i>	<i>confederationis</i>		x	
Thyretidae	<i>Thyretes</i>	<i>caffra</i>		x	
Thyrididae	<i>Hapana</i>	<i>verticalis</i>		x	
Tineidae	<i>Edosa</i>	<i>leucastis</i>		x	