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Source: Journal of Orthoptera Research, 18(2) : 183-214

Published By: Orthopterists' Society

URL: <https://doi.org/10.1665/034.018.0207>

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Annotated list of Caelifera (Orthoptera) of Mt. Kilimanjaro, Tanzania

Submitted October 5, accepted October 26, 2009

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Abstract

A list of the Caelifera (Tetragoidea, Eumastacoidea, and Acridoidea) of Mt Kilimanjaro is presented. A total number of 139 Caelifera was recorded for this mountain, of which 8 species belonged to Tetrigidae, 5 to Eumastacoidea and 126 to Acridoidea. Of the 126 Acridoidea, 2 species belonged to the family Pamphagidae, 14 to the family Pyrgomorphidae, and 3 to the family Lentulidae. The family Acrididae is comprised of 107 species; only one species was recorded for the subfamilies Spathosterninae, Oxyinae, and Euryphyminae, two species within Tropidopolinae, 4 species within Coptacridinae, 5 species each within Hemiacridinae and Calliptaminae, and 7 species each in Eyprepocnemidinae and Cyrtacanthacridinae. The majority of species were found within the four subfamilies Gomphocerinae and Catantopinae (each 14 species), Acridinae (21 species), and Oedipodinae (25 species). Mt Kilimanjaro harbors about 25% of the Acridomorpha species recorded for Tanzania. Together with Mt Meru, with which Kilimanjaro is connected by a ridge at submontane level, 9.4% of the Caelifera are endemics.

Key words

species list, diversity, altitudinal range, endemism, East Africa, Saltatoria

Introduction

The first intensive collections giving an overview in the group Saltatoria on Mt Kilimanjaro and adjacent areas were made by a Swedish expedition at the beginning of the last century (Sjöstedt 1909), recording 34 Tettigonioida and 71 Caelifera species for the whole mountain massif, including Mt Meru and parts of the Usambara and Pare Mountains. Of the tettigonioid fauna, 20, and of the acridoids, 17, species and subspecies, were newly described by Sjöstedt, many of which were synonymized later.

In subsequent years, some more, partly endemic, species were described for Mt Kilimanjaro, namely by Sjöstedt (1923, 1931, 1932) and Ramme (1929). From 1996 onward the Saltatoria fauna was studied again intensively with new species described (Hemp 2001a, b; Hemp *et al.* 2009).

A manuscript of George B. Popov submitted in 1995 to the Natural History Museum, London, was accepted after revision on 8 March 1997, but never published. In this, Popov revised five tribes of east African Acridinae, and described new taxa. Especially important for the present paper, the group *Gymnobothrini* was revised in Popov's unpublished work, clarifying some of the taxonomic problems of this group. I have followed his suggestions in classifying the recorded *Gymnobothrus* species of Kilimanjaro. Popov labelled specimens of all his intended new genera and species in the collection of the NHML.

Ecological data for East African Saltatoria are rare: usually only the species description is available, especially for the Saltatoria fauna restricted to the Mt Kilimanjaro area. Information about the biology and ecology of East African Saltatoria is given generally, *e.g.*, by Vesey-FitzGerald (1964), Phipps (1959, 1966, 1968), and Okelo (1987), by Robertson & Chapman (1962), Robertson (1967) for SW Tanzania, Jago & Masinde (1968), Hochkirch (1996) for the Usambara Mountains, and Hemp & Hemp 2003 and Hemp 2005a for montane grasslands and the Chagga home gardens on Mt Kilimanjaro.

This paper gives a compilation of Caelifera found on Mt Kilimanjaro, together with data on habitat, altitudinal zonation and, for some species, biology & ecology, compiled from literature and, personal observations in the period 1996-2009.

Study area

Kilimanjaro, a large stratovolcano located 300 km south of the equator in Tanzania on the border with Kenya, rises from the savanna plains at 700 m elevation, to a snow-clad summit at 5895 m a.s.l. Its climate is characterized by a bimodal rainfall pattern with the "long rains" from March to May forming the main rainy season, and the "short rains" occurring around December (Coutts 1969). The foothills of the southern slopes receive an annual rainfall of 800-900 mm; the forest belt between 2000 and 2300 m may receive more than 3000 mm (Hemp 2001, 2006a), more than on other high mountains of East Africa. In the alpine zone, the precipitation decreases to 200 mm.

Covering about 5000 km², Kilimanjaro is not only Africa's highest mountain, it is also the highest solitary mountain in the world, with several very different bioclimatic zones: a dry and hot colline savanna zone surrounds the mountain base between 700 and 1100 m a.s.l. at the southern and eastern slopes. Most of this area is used for crop production (maize, beans and sunflower fields) or as pasture land. Remnants of the former savanna vegetation are encountered mainly around Lake Chala on the eastern foothills and on the northwestern side of the mountain.

The submontane forest belt of the southern and eastern slopes, between 1100 and 1800 m, has been converted to coffee-banana fields, the "Chagga home gardens", a special type of agroforestry. Here the human population reaches a maximum density of more than 500 persons per km². Remnants of the former forests of this zone are scarcely found outside of deep valleys and gorges.

Montane tropical rain and cloud forests cover an area of about 1000 km² on Mt Kilimanjaro. The lower parts of the forests on the wetter southern slope are characterized by the dominance of

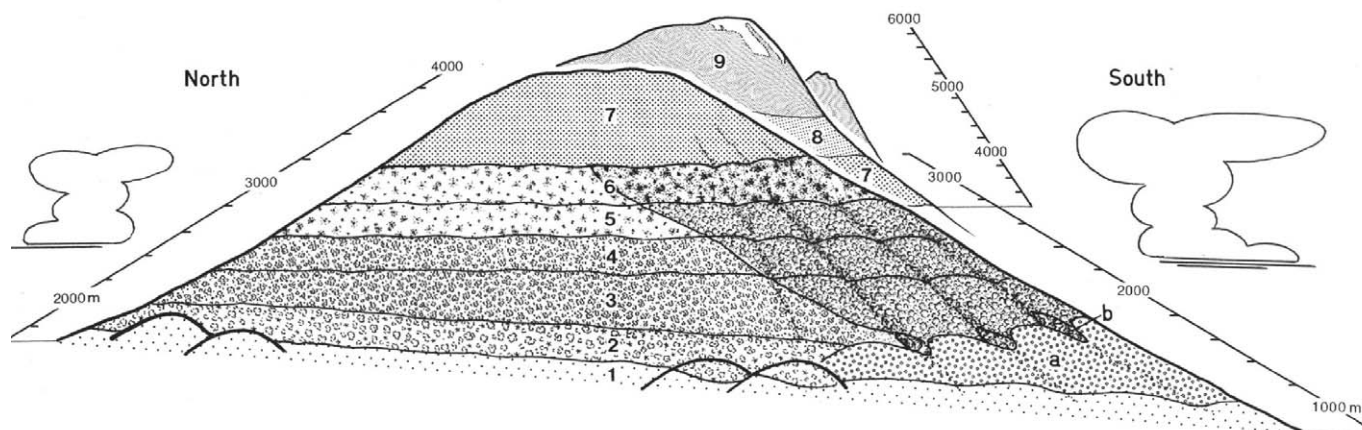


Fig. 1. Schematic north-south profile showing the western slope of Mt Kilimanjaro (foreground to background: Shira, Kibo, Mawenzi) with main altitudinal zones and vegetation types. 1: colline (savanna) zone; 2: submontane zone with *Croton-Calodendrum* forest; a: coffee-banana plantations in the submontane and lower montane zone on the southern slope; b: lower montane gorge forests on the southern slope; 3: lower montane zone with *Cassipourea* forests on the northern slope and *Agarista-Syzygium-Ocotea* forests on the southern slope; 4: middle montane zone with *Cassipourea* forests on the northern slope and *Ocotea* forests on the southern slope; 5: upper montane (cloud forest) zone with *Juniperus* forests on the northern slope and *Podocarpus-Ocotea* forests on the southern slope; 6: upper montane (cloud forest) zone with *Juniperus* forests on the northern slope and *Podocarpus* forests on the southern slope; 7: subalpine heathlands (*Erica* bush); 8: lower alpine zone with *Helichrysum* cushion vegetation; 9: upper alpine and nival zone, mainly bare of vegetation (adapted from Hemp 2005).

the camphor tree (*Ocotea usambarensis*). However, wide areas of these forests have been logged. Above the camphor belt the forest is dominated by *Podocarpus latifolius*, *Hagenia abyssinica* and *Erica excelsa*.

On the drier northern slope, forests are comprised of *Croton-Calodendrum* forests at lower elevations, followed by *Cassipourea* forest at midaltitudes and *Juniperus* forest at higher altitudes. Above ca 3100 m a.s.l., the cloud forests are replaced by *Erica* heathlands. At an altitude of about 3900 m a.s.l., the *Erica* heathlands change into *Helichrysum* dwarf-cushion vegetation that extends up to 4500 m. a.s.l. The highest altitudinal region is very poor in vegetation and the top of Kibo, the main summit, is covered with glaciers. For a more detailed description of these vegetation types see Hemp (2001, 2006a, b, 2008).

Methods

Caelifera were collected using either 1) a transect method (Saltatoria noted in steps of 100 m, along ascending roads and paths) from the savanna to (mostly) the lower border of the montane forest (at some locations also through the montane forest to the afro-alpine zone) or 2) evaluating species lists of permanent plots on which the Saltatoria composition was recorded using a modified method of Braun-Blanquet (1964); this method is usually used in plant sociology (for further information see e.g., Hemp & Hemp 2003 or Hemp 2005a). About 500 permanent plots established between 1996 and 2009 were evaluated for this study.

The Saltatoria specimens were identified with available literature and with the help of the OSF (Eades & Otte 2009). The material was checked again against the collections of the National Museums of Kenya, Nairobi, the Natural History Museum, London, UK (NHML), the Naturkunde Museum Berlin, Germany and the Orthoptera collection of the Africamuseum, Tervuren.

For estimation of the Caelifera fauna of Tanzania I used the checklist of Johnsen & Forchhammer (1975), the OSF (Eades & Otte 2009) and various literature that notes the occurrence of species on

Mt Kilimanjaro (given under the respective species in the list).

The species accumulation curve was created by evaluation of the permanent plots and records noted in the field books. Sampling effort was approximately the same from 1996-2005 (8-month stays in Tanzania), less for the period 2006-2009 (about 3 to 4 month stays in Tanzania). Till 2005 all major habitats were covered by permanent plots. After 2005 surveys in regions of Kilimanjaro were made accessing places where the density of permanent plots was lower. Furthermore more focus was laid on the tree canopy and three tettigoniid species (all new to science) were found on the southern slopes of Mt Kilimanjaro (Hemp, in prep.).

In the species list altitudes of main occurrence of the respective species are underlined when most of the records were found to be at this elevation. No such indication is given, either when the species was evenly distributed over the whole altitudinal span, or if a scarce dataset (mostly below 10 records) did not allow indication of elevation preferences.

The classification of ecological zones on the mountain follows Hemp (2005). Table 1 gives an overview of the zones relevant for

Table 1. Ecological zones of Mt. Kilimanjaro (after Hemp A. 2005).

Altitudinal zone	Altitude (m a.s.l.)
Southern slopes	
Subalpine	3700-4000
Upper montane	2500-2800
Middle montane	2200-2500
Lower montane	1500-2200
Submontane	1100-1500
Colline	700-1100
Northern slopes	
Upper montane	2500-3100
Lower and middle montane	2000-2500
Submontane	1600-2000
Colline	1400-1600

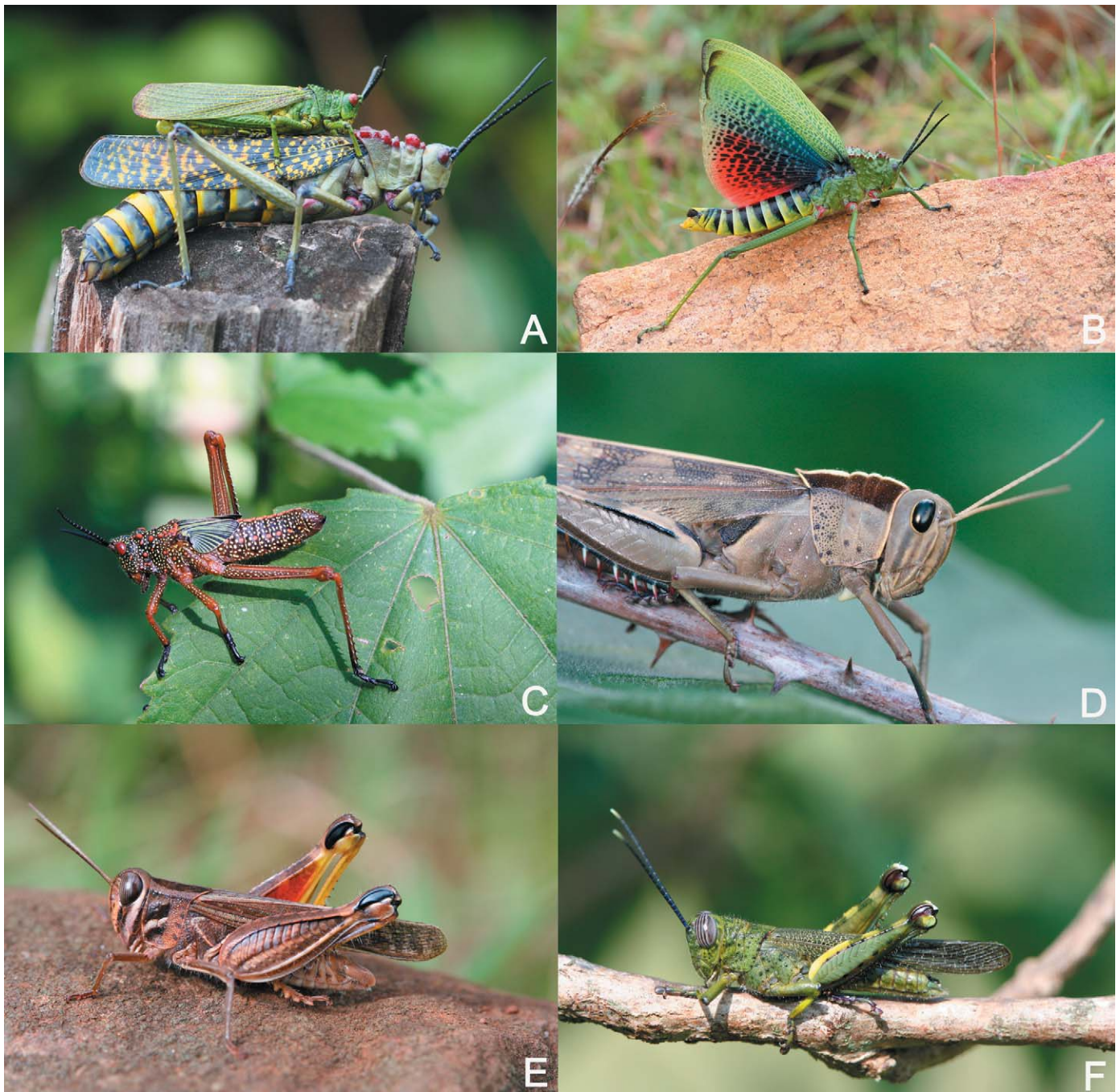


Fig. 2. A. *Phyteumas purpurascens* male atop female *Phymateus aegrotus*; lower border of montane forest, southern slopes of Mt Kilimanjaro, above Kidia, 1800 m. B. *Phymateus viridipes* female showing colored hind wings for defense, North Pare mountains, 1300 m. C. Last instar nymph of *Phyteumas purpurascens*, Lerongo, West Kilimanjaro, forest clearing, 1500 m. D. Female *Acanthacris ruficornis*, a species typical of montane forest edge; Karen, lower slopes of Ngong Hills, Kenya. E. Male *Acorypha nigrovariegata tibialis*, savanna grassland at East Kilimanjaro, 1170 m. F. Male *Abisares depressus*, tree savanna, East Kilimanjaro, Lake Chala area, 1020 m. See Plates.

Saltatoria species. Figure 1 shows the altitudinal zones and main vegetation types viewed from the western side of the mountain, demonstrating the contrast between the dry northern and wet southern slopes. Based on an analysis of 600 vegetation plots, using the method of Braun-Blanquet (1964), the composition of the whole vascular forest-plant flora of about 1220 species was studied in the forests of Mt Kilimanjaro. The altitudinal distribution of all strata (trees, shrubs, epiphytes, lianas and herbs) along a transect of 2400

m was taken into account with respect to altitudinal zonation and ecological factors. This observed zonation was significantly correlated with altitude, temperature, soil acidity (pH) and rainfall. Other key factors were humidity (influenced by stable cloud condensation belts) and minimum temperature (in particular the occurrence of frost at 2700 m altitude upslope). For more details see Hemp (2005).

Table 2. Caelifera species recorded in literature and in entomological collections for Mt Kilimanjaro.

Species	Literature source
<i>Abisares viridipennis viridipennis</i> (Burmeister, 1838)	Sjöstedt (1909); Kevan (1955)
<i>Acanthacris ruficornis ruficornis</i> (Fabricius, 1787)	Sjöstedt (1909)
<i>Acorypha glaucopsis</i> (Walker, 1870)	Sjöstedt (1909)
<i>Acorypha laticosta</i> (Karsch, 1896)	Sjöstedt (1909)
<i>Acorypha nigrovariegata tibialis</i> (Kirby, 1902)	Sjöstedt (1909)
<i>Acrida bicolor</i> (Thunberg, 1815)	Kevan (1955)
<i>Acrida sulphuripennis</i> (Gerstaecker, 1869)	Sjöstedt (1909)
<i>Acrotylus meruensis</i> Sjöstedt, 1932	Sjöstedt (1909, 1932)
<i>Acrotylus patruelis</i> (Herrich-Schaeffer, 1838)	Sjöstedt (1909)
<i>Aiolopus longicornis</i> Sjöstedt, 1909	Sjöstedt (1909); Kevan (1955)
<i>Altiusambilla modicicrus</i> (Karsch, 1896)	Karsch (1896); Sjöstedt (1909); Ramme (1929)
<i>Brachycrotaphus tryxalicerus</i> (Fischer de Waldheim, 1853)	Sjöstedt (1909); Kevan (1955)
<i>Cannula gracilis</i> (Burmeister, 1838)	Sjöstedt (1909)
<i>Catantops melanostictus</i> Schaum, 1853	Sjöstedt (1909); Kevan (1955)
<i>Coryphosima stenoptera stenoptera</i> (Schaum, 1853)	Sjöstedt (1909, 1931); Kevan (1955)
<i>Cyrtacanthacris tatarica tatarica</i> (Linné, 1758)	Sjöstedt (1909); Ritchie (1936); Kevan (1955)
<i>Chromothericles kanga</i> (Sjöstedt, 1923)	Sjöstedt (1923); Descamps 1977
<i>Dictyophorus (Tapesiella) griseus griseus</i> (Reiche & Fairemaire, 1847)	I. Bolivar (1904); Sjöstedt (1909, 1923)
<i>Duronia chloronota</i> (Stål, 1876)	Sjöstedt (1909); Kevan (1955)
<i>Epacrocantops curvicercus</i> (Miller, 1929)	Sjöstedt (1931)
<i>Eucoptacra exigua</i> I. Bolivar, 1912	Krauss, 1877; Sjöstedt (1909); Kevan (1955)
<i>Eupropacris vana</i> (Karsch, 1896)	Karny (1907); Sjöstedt (1909)
<i>Eyprepocnemis plorans ibandana</i> (Giglio-Tos, 1907)	Sjöstedt (1909)
<i>Gastrimargus africanus africanus</i> (Saussure, 1888)	Sjöstedt (1909, 1928)
<i>Gastrimargus determinatus vitripennis</i> (Saussure, 1888)	Sjöstedt (1909)
<i>Gastrimargus verticalis verticalis</i> (Saussure, 1884)	Sjöstedt (1909, 1928); Ritchie (1982)
<i>Gymnbothrus cruciatus</i> I. Bolivar, 1889	Sjöstedt (1909)
<i>Gymnbothroides levipes</i> (Karsch, 1896)	Karsch (1896); Sjöstedt (1909)
<i>Gymnbothrus temporalis temporalis</i> (Stål, 1876)	Sjöstedt (1909)
<i>Hadroleocatantops kilimandjaricus</i> (Ramme, 1929)	Sjöstedt (1909); Ramme (1929)
<i>Heteropternis coulöniana</i> (Saussure, 1884)	Sjöstedt (1909, 1912, 1933)
<i>Heteropternis thoracica</i> (Walker, 1870)	Sjöstedt (1909)
<i>Humbe tenuicornis</i> Schaum, 1853	Brunner v. Wattenwyl (1894)
<i>Ixalidium sjostedti</i> Kevan, 1950	Brunner v. Wattenwyl (1894); Sjöstedt (1909); Kevan (1950)
<i>Jasomenia sansibara</i> (Karsch, 1896)	Kevan (1955)
<i>Kraussaria deckeni</i> (Gerstäcker, 1869)	Kevan (1955)
<i>Lophothericles carinifrons</i> (Karsch, 1889)	Sjöstedt (1909)
<i>Lophothericles kongoni</i> (Sjöstedt, 1909)	Sjöstedt (1909)
<i>Maura lurida</i> (Fabricius, 1781)	I. Bolivar (1904)
<i>Mesopsis laticornis</i> (Krauss, 1877)	Sjöstedt (1909)
<i>Metaxymecus gracilipes</i> (Brancsik, 1895)	Sjöstedt (1909)
<i>Morphacris fasciata</i> (Thunberg, 1815)	Brunner v. Wattenwyl (1894); Kirby (1902); Sjöstedt (1909, 1912); Kevan (1955)
<i>Oedaleus senegalensis</i> (Krauss, 1877)	Sjöstedt (1909)
<i>Ornithacris cyanea</i> (Stoll, 1813)	Sjöstedt (1909)
<i>Orthochtha dasyncnemis dasyncnemis</i> (Gerstaecker, 1869)	Sjöstedt (1909); Popov & Fishpool (1992)
<i>Oxya hyla hyla</i> Serville, 1831	Sjöstedt (1909, 1918)
<i>Paracinema tricolor tricolor</i> (Thunberg)	Sjöstedt (1909); Kevan (1955)
<i>Parasphena meruensis meruensis</i> Sjöstedt, 1909	Sjöstedt (1909)
<i>Parasphena pulchripes</i> (Gerstaecker, 1869)	Gerstäcker (1869); I. Bolivar (1884), Karsch (1888), Sjöstedt (1909)
<i>Paratettix histricus</i> (Stål, 1861)	Sjöstedt, (1909); Kevan (1955)
<i>Parepistaurus lindneri</i> Kevan, 1955	Kevan (1955)
<i>Phaeocatantops concolor</i> (Karny, 1915)	Karny (1915)
<i>Phaeocatantops decoratus decoratus</i> (Gerstaecker, 1869)	Karny (1915); Sjöstedt (1909)

Table 2. Continued.

Species	Literature source
<i>Phymateus (Phymateus) aegrotus</i> (Gerstaecker, 1869)	Gerstaecker (1869), Sjöstedt (1909)
<i>Phymateus karschi</i> I. Bolivar, 1905	specimens in NHML
<i>Phyteumas purpurascens purpurascens</i> (Karsch, 1896)	Karsch (1896), Kevan (1955), Johnston (1956)
<i>Plagiotriptus hippiscus</i> (Gerstaecker, 1869)	Burr (1899)
<i>Pnorisa squalus squalus</i> (Stål, 1860)	Sjöstedt (1909)
<i>Rhaphotittha levis</i> Karsch, 1896	Sjöstedt (1909)
<i>Ruspolia differens</i> (Serville, 1839)	Sjöstedt (1909)
<i>Schistocerca gregaria</i> (Forskål, 1775)	Sander (1902); Sjöstedt (1909)
<i>Spathosternum nigrotaeniatum</i> (Stål, 1876)	Sjöstedt (1909)
<i>Taphronota (Taphronota) calliparea immaculata</i> Sjöstedt, 1929	Sjöstedt (1909); Kevan (1955)
<i>Taramassus cunctator sjöstedti</i> (Ramme, 1929)	Ramme (1929)
<i>Taramassus cunctator flabellatus</i> (Ramme, 1931)	
<i>Trilophidia conturbata</i> (Walker, 1870)	Sjöstedt (1909, 1933)
<i>Truxalis burtti</i> Dirsh, 1951	Sjöstedt (1909); Kevan (1955)
<i>Uganda kilimandjarica</i> (Sjöstedt, 1909)	Sjöstedt (1909)
<i>Xiphoceriana atrox</i> (Gerstaecker, 1869)	Sjöstedt (1909)
<i>Zonocerus elegans elegans</i> (Thunberg, 1815)	Brunner v. Wattenwyl (1894); Kirby (1902), Bolivar (1904)

Results

Sixty-nine species of Caelifera were recorded in literature for Mt Kilimanjaro (Table 2). During this study (between 1996 and 2009) 139 species of Caelifera were found, from the savanna foothills at about 900 m to an altitude of 4400 m in the afro-alpine zone of the mountain (Table 3). Four species recorded in the literature were not found again during this study between 1996 and 2009. These were *Maura lurida* (Fabricius), *Schistocerca gregaria* (Forskål), *Spathosternum nigrotaeniatum* (Stål), and *Acanthacris deckeni* (Gerstaecker). Sixteen species are new records for Tanzania. These are *Hedotettix angustivertex*, *Paratettix villiersi*, *Phymateus karschi*, *Pyrgomorphella albini*, *Sphodromerus reductus*, *Heteracris juliea*, *Abisares depressus*, *Brachycatantops emalicus*, *Acridoderes laevigatus*, *Parga cyanoptera*, *Rhabdoplea munda*, *Acrotylus ndoloi*, *Sphingonotus turkanae*, *Stenohippus maculifemur*, *S. trochilus* and *S. xanthus*. Four species and one subspecies are probably new to science. These are from the genera *Tettiella* (Devriese, pers. comm.), *Euschmidtia*, *Cryptocatantops* and *Stenohippus* and a subspecies of *Brachycatantops emalicus*.

The Caelifera species were grouped into five categories: very rare, rare, uncommon, common, and very common. Approximately the same number of species was found in the categories very rare, rare, uncommon, and common, while only 8 species were very common on the mountain (Table 4). The study area is comparatively well explored for its Caelifera species, as seen in the species accumulation curve (Fig. 3).

In Table 3 Caelifera of Mt Kilimanjaro were sorted for their elevational occurrence. Rare species, where data to determine the main range of their occurrence were too scarce, are listed first, followed by species with more data available to determine elevational preferences. On the southern slopes of Mt Kilimanjaro the savanna zone is well defined, ranging between 700 to 1100 m a.s.l, while it reaches up to 1600 m on the northern slopes, due to a drier climate (see Table 1). Twenty-four species were exclusively found in savanna habitats, while the majority of species (76) had their main occurrence in the colline zone around the mountain, but were also found in the lower submontane zone and occasionally even reached montane habitats.

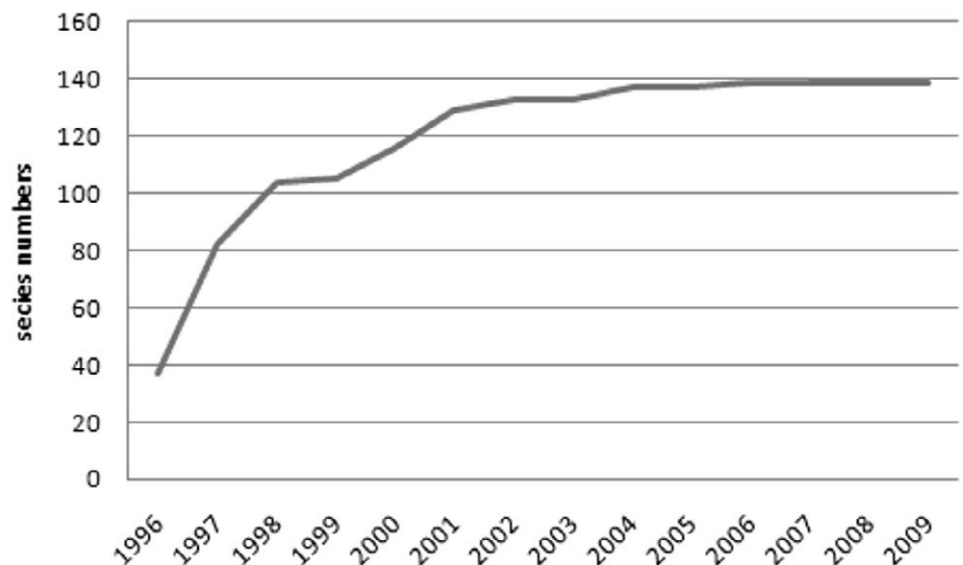


Fig. 3. Accumulation curve of Caelifera species collected on Mt Kilimanjaro in the period 1996-2009.

Table 3. Altitudinal distribution of Caelifera species on Mt Kilimanjaro. **Rec:** number of records between 1996 and 2009. Column headed 9 incorporates altitude span 900-999, 10 the span 1000-1099 *etc.* Where species occur higher (>30) this number is indicated in the table. **Light grey:** species occurs occasionally in this altitude range; **dark grey:** most records of this species in this altitude range.

Species	Rec	Hundreds meters elevation a.s.l.																										
		9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	>30				
<i>Maura lurida</i> (Fabricius, 1781)	0																											
<i>Schistocerca gregaria</i> (Forskål, 1775)	0																											
<i>Spathosternum nigrotaeniatum</i> (Stål, 1876)	0																											
<i>Sudanacris schoutedeni</i> Dirsh, 1954	1	█																										
<i>Xiphoceriana atrox</i> (Gerstäcker, 1869)	2	█	█																									
<i>Gymnobothrus longicornis</i> (Ramme, 1931)	1			█																								
<i>Minihippus reductus</i> (Uvarov, 1941)	1	█																										
<i>Paratettix africanus</i> Bolivar, 1908	3	█	█																									
<i>Pyrgomorpha conica</i> (Olivier, 1791)	3	█	█																									
<i>Cryptocatantops</i> sp.	4	█	█																									
<i>Acrotylus ndoloi</i> Kevan, 1956	6	█	█																									
<i>Usambilla turgidicrus</i> (Karsch, 1896)	2			█																								
<i>Abisares depressus</i> Uvarov, 1938	3	█	█																									
<i>Jasomenia sansibara</i> (Karsch, 1896)	5	█	█																									
<i>Acridoderes laevigatus</i> I. Bolivar, 1911	5	█	█																									
<i>Anacridium wernerellum</i> (Karny, 1907)	7	█	█																									
<i>Truxalis conspurcata somalia</i> Burr, 1902	4	█	█																									
<i>Diabolocatantops axillaris</i> (Burmeister, 1838)	7	█	█																									
<i>Phymateus (Phymateus) aegrotus</i> (Gerstaecker, 1869)	4	█	█																									
<i>Oxyaidea poultoni</i> Ramme, 1929	2	█	█																									
<i>Stenohippus trochilus</i> Jago, 1996	2	█	█																									
<i>Pyrgomorphella albini</i> (Chopard, 1921)	14	█	█																									
<i>Acorypha ornatipes</i> Uvarov, 1950	1	█	█																									
<i>Sphingonotus turkanae</i> Uvarov, 1938	4	█	█																									
<i>Heteropternis pudica</i> (Serville, 1838)	2	█	█																									
<i>Heteracris juliea</i> Grunshaw, 1991	2	█	█																									
<i>Lophothericles carinifrons</i> (Karsch, 1889)	2	█	█																									
<i>Sphodromerus reductus</i> Kevan, 1967	8	█	█																									
<i>Stenohippus xanthus</i> (Karny, 1907)	2	█	█																									
<i>Ochrilidia gracilis nyuki</i> (Sjöstedt, 1909)	3	█	█																									
<i>Gymnobothrus cruciatus</i> I. Bolivar, 1889	3	█	█																									
<i>Hemiacris fervens</i> Walker, 1870	3	█	█																									
<i>Eucrotoptra exigua</i> I. Bolivar, 1912	4	█	█																									
<i>Afroxyrrhypes brevifurca</i> Uvarov, 1943	4	█	█																									
<i>Parga cyanoptera</i> Uvarov, 1926	6	█	█																									
<i>Lobosceliana femoralis</i> (Walker, 1870)	8	█	█																									
<i>Euschmidtia</i> sp.	4	█	█																									
<i>Trichocatantops villosus</i> (Karsch, 1893)	6	█	█																									
<i>Allotriusia luteipennis</i> Ramme, 1929	1	█	█																									
<i>Stenohippus</i> sp.	1	█	█																									
<i>Oedaleus nigeriensis</i> Uvarov, 1926	3	█	█																									
<i>Hedotettix angustivertex</i> (Bolivar, 1908)	4	█	█																									
<i>Heteropternis pugnax</i> I. Bolivar, 1912	6	█	█																									
<i>Ornithacris cyanea</i> (Stoll, 1813)	5	█	█																									
<i>Dasyleurotettix infaustus</i> (Walker, 1871)	9	█	█																									
<i>Oedaleus instillatus</i> Burr, 1900	1	█	█																									
<i>Dnopherula obliquifrons</i> (I. Bolivar, 1912)	3	█	█																									
<i>Acanthacris deckeni</i> (Gerstäcker, 1869)	0																											
<i>Rhabdoplea munda</i> Karsch, 1893	1	█	█																									
<i>Coptotettix rufipes</i> Bolivar, 1887	3	█	█																									
<i>Phymeurus granulatus</i> (Uvarov, 1922)	4	█	█																									
<i>Locusta migratoria</i> (Linné)	13	█	█																									
<i>Chrotogonus (Chrotogonus) hemipterus</i> Schaum, 1853	19	█	█																									
<i>Oraistes luridus</i> Karsch, 1896	7	█	█																									
<i>Acrotylus trifasciatus trifasciatus</i> Kevan, 1961	12	█	█																									
<i>Aiolopus meruensis</i> Sjöstedt, 1909	16	█	█																									
<i>Eyrepocnemis plorans ibandana</i> (Giglio-Tos, 1907)	20	█	█																									
<i>Acorypha glaucopsis</i> (Walker, 1870)	24	█	█																									
<i>Acrida sulphuripennis</i> (Gerstaecker, 1869)	43	█	█																									
<i>Atractomorpha acutipennis gerstaeckeri</i> (Walker, 1870)	15	█	█																									

Table 3. Continued.

Species	Rec	Hundreds meters elevation a.s.l.																												
		9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	>30						
<i>Gastrimargus verticalis verticalis</i> (Saussure, 1884)	77																													
<i>Parepistaurus deses deses</i> Karsch, 1896	83																													
<i>Acanthacris ruficornis ruficornis</i> (Fabricius, 1787)	39																													
<i>Altiusambilla modicicrus</i> (Karsch, 1896)	75																													
<i>Phaeocatantops concolor</i> (Karny, 1915)	20																													
<i>Eucoptacra gowdeyi</i> Uvarov	17																													
<i>Heteropternis couloniana</i> (Saussure, 1884)	63																													
<i>Euparatettix histricus</i> (Stål, 1861)	15																													
<i>Paratettix villiersi</i> Günther, 1979	13																													
<i>Gymnobothroides levipes</i> (Karsch, 1896)	63																													
<i>Leptacrydium gratiosum</i> (Karsch, 1893)	45																													
<i>Parasphena meruensis meruensis</i> Sjöstedt, 1909	52																													
<i>Hadrolecocatantops kilimandjaricus</i> (Ramme, 1929)	45																													
<i>Phyteumas purpurascens purpurascens</i> (Karsch, 1896)	19																													
<i>Chromothericles kanga</i> (Sjöstedt, 1923)	50																													
<i>Parasphena pulchripes</i> (Gerstaecker, 1869)	25																													
<i>Uganda kilimandjarica</i> (Sjöstedt, 1909)	15																													

Only 7 species were found restricted to submontane elevations between 1200 and 1500 m. These were *Dnopherula obliquifrons*, *Gymnobothrus anchietae*, *Eupropacris vana*, *Taphronota calliparea*, *Oedaleus instillatus* and the two species *Phymateus viridipes* and *P. karschi*, which were not separately screened in this study. Only 3 species (*Paracinema tricolor*, *Morphacris fasciata* and *Zonocerus elegans*) occurred from colline to montane habitats; for another two species the data is suggestive that they may also occur from colline to montane elevations (*Oxya eida poultoni*, and *Pyrgomorphella albini*). Of species adapted to mountainous habitats, inhabiting submontane and lower montane zones on Mt Kilimanjaro, there were 23. Eight of these 23 species showed a clear preference for montane habitats. The two endemic species *Parasphena pulchripes* and *Uganda kilimandjarica* only occurred in the upper montane zone, inhabiting the so-called moorland zone of the mountain. Both species were even found in subalpine and alpine habitats among *Helichrysum* cushion vegetation. Two other acridids were occasionally also found in the upper montane zone—*Coryphosima stenoptera* and *Heteropternis couloniana*—both species with the largest

Table 4. Number of records of Caelifera species in this study on Mt Kilimanjaro.

Category	Records	Species
Not recorded again	0	4
Very rare	1-5	37
Rare	6-15	30
Uncommon	16-30	27
Common	31-100	33
Very common	> 100	8

altitudinal range on the mountain (Table 3).

Some of the species listed are probably under-represented and more frequent on the mountain than indicated here, since they occur in habitats which were not studied intensively, such as rice fields and adjacent waste lands in the savanna (habitat of *e.g.*, *Oxya hyla* and *Atractomorpha acutipennis*) or because they are well camouflaged canopy inhabitants (*e.g.*, *Hemiacris fervens*). More information on such species is indicated under the heading "remarks" in the annotated species list that follows.

Table 5. Habitat and elevational preferences of Caelifera species restricted to Mt Kilimanjaro, Mt Meru or the Mts Kilimanjaro/Meru area. Habitat preferences: **f**: forest, **cl**: clearing, **gr**: grassland, **co**: colline, **sbm**: submontane, **mon**: montane, **af**: afromontane, **fl**: flightlessness. **Meru**: Mt Meru, **Kili**: Mt Kilimanjaro.

Species	f	cl	gr	co	sbm	mon	af	fl	Meru	Kili
<i>Euschmidtia</i> sp.	x			x				x		x
<i>Lophothericles kongoni</i> (Sjöstedt, 1909)	x			x				x		x
<i>Lophothericles wardi</i> Descamps, 1977	x			x				x	x	
<i>Parepistaurus lindneri</i> Kevan, 1995	x			x				x	x	x
<i>Ixalidium sjöstedti</i> Kevan, 1950	x				x			x	x	x
<i>Parepistaurus deses deses</i> Karsch, 1896	x				x			x	x	x
<i>Altiusambilla modicicrus</i> (Karsch, 1896)	x					x		x	x	x
<i>Chromothericles twigga</i> (Sjöstedt, 1909)	x					x		x	x	
<i>Chromothericles kanga</i> (Sjöstedt, 1923)	x					x		x		x
<i>Brachycatantops emalicus</i> (Kevan, 1950) ssp.		x		x				x		x
<i>Odontomelus brachypterus</i> (Gerstaecker, 1869)		x			x			x	x	x
<i>Tettiella</i> sp.			x	x				x	x	
<i>Gymnobothroides levipes</i> (Karsch, 1896)			x		x			x	x	x
<i>Parasphena meruensis meruensis</i> Sjöstedt, 1909			x		x			x	x	x
<i>Parasphena pulchripes</i> (Gerstaecker, 1869)			x				x	x		x
<i>Uganda kilimandjarica</i> (Sjöstedt, 1909)			x				x	x		x

Annotated list of Caelifera of Mt Kilimanjaro

Superfamily Tetrigoidea

Family Tetrigidae

Subfamily Tetriginae

Coptotettix rufipes Bolivar, 1887

Distribution.—Sudan, Congo, Nigeria, Senegal, Zambia, Mozambique, Tanzania, Somalia, Chad, Ivory Coast, Guinea, Tanzania (Günther 1979).

Habitat.—Lakeshore; widespread but not common in savanna regions (pers. comm. Devriese). Very rare on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1600-1700 m.

Euparatettix histricus (Stål, 1861)

Distribution.—Whole Africa south of the Sahara except for South Africa; Orientalis (Günther 1979); widespread in Africa and Asia (pers. comm. Devriese).

Recorded for Kilimanjaro by Sjöstedt (1909) and Kevan (1955).

Habitat.—At 0 m a.s.l., periodical wet grassland, coconut plantation on ground between sparse vegetation near Msala, Rufiji Delta, Tanzania (Kevan & Knipper 1961).

On Mt Kilimanjaro from the savanna to the montane forest (Sjöstedt 1909); rare to uncommon species found in swamps, river and lakeshores from the savanna to the border of montane rainforest.

Altitudinal range, Mt Kilimanjaro.—900-1600-1800 m.

Hedetettix angustivertex (Bolivar, 1908)

Distribution.—Ivory Coast (Günther 1979); Tanzania.

Habitat.—Rare species on Mt Kilimanjaro, found in humid meadows and swamps. Common lowland species (pers. comm. Devriese)

Altitudinal range at Mt Kilimanjaro.—1100-1300 m.

Leptacrydium gratiosum (Karsch, 1893)

Distribution.—Senegal, Guinea, Ivory Coast, Ghana, Nigeria, Chad, Gabon, Ethiopia, Rwanda, Angola, Botswana, Togo, Uganda, S Africa, Zimbabwe, Zambia, Congo, Cameroon, Kenya; common species south of the Sahara (Günther 1979); widespread and common species (pers. comm. Devriese).

Habitat.—Common species of humid and dry grasslands of the montane zone, in swamps at altitudes of 1600-1800 m, and on pathways in the montane forest on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1200-1600-1800-1900 m.

Paratettix africanus Bolivar, 1908

Distribution.—Congo, Guinea, Cameroon, Chad, Angola, Senegal, Ivory Coast, Nigeria, Zaire, common species south of the Sahara (Günther 1979).

Habitat.—On Mt Kilimanjaro only in the foothills, at lakeshores of the Rau-forest.

Altitudinal range, Mt Kilimanjaro.—900-1000 m.

Remarks.—Common species, with uncertain nomenclature (pers. comm. Devriese). A species which probably is more common than its records would suggest on Mt Kilimanjaro in its respective habitats, such as rice fields and humid waste lands e.g., near sugar plantations of the colline zone.

Paratettix villiersi Günther, 1979

Distribution.—West and Central Africa, Guinea, Ivory Coast, Nigeria, Congo (Günther 1979); Tanzania.

Habitat.—In Guinea, found in secondary and indigenous forest (Günther 1979). On Mt Kilimanjaro, a rare species in humid grasslands, on lakeshores and swamps of the submontane and montane zones.

Altitudinal range, Mt Kilimanjaro.—1400-1600-1700-1800m.

Remarks.—Species status not clear (pers. comm. Devriese).

Tettiella sp.

Distribution.—Tanzania; Mt Kilimanjaro.

Habitat.—Rare species of *Hyparrhenia* grasslands of the submontane zone on the central southern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1100-1300 m.

Remarks.—The genus *Tettiella* is restricted to South Africa. Several species occur in the Karoo desert; the western border runs through the Herero land; eastward, species are known to Transvaal and Natal. Two isolated species occur in SE Katanga (Günther 1979). *Dasyleurotettix* has its nearest relatives in the genus *Tettiella*.

Subfamily Cladonotinae

Dasyleurotettix infaustus (Walker, 1871)

Distribution.—South Africa, Transvaal, Natal, Rwanda, Congo, Cameroon, Ghana, Togo, Sierra Leone, Botswana, Malawi, Eritrea, Liberia, Ivory Coast, Kenya, Mozambique, Tanzania, Uganda, Guinea, Zambia, Angola, Zimbabwe (Günther 1979); widespread species, known from all savanna regions (pers. comm. Devriese).

Habitat.—Hemp 2005a; found in forest as well as in savanna grassland (Günther 1979); savanna species (pers. comm. Devriese) at 0 m a.s.l. in lush vegetation under coconuts and in periodical wet grassland near Msala, Rufiji Delta, Tanzania (Kevan & Knipper 1961); Recorded in *Hyparrhenia*-meadows and banana-coffee plantations in the cultivation zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1100-1500 m.

Remarks.—Probably under-represented in this study as occurring more often *e.g.*, in submontane habitats (ruderal vegetation, wastelands, fallow fields).

Superfamily Eumastacoidea

Family Euschmidtidae

Subfamily Euschmidtinae

Euschmidtia sp.

Distribution.—Tanzania, Mt Kilimanjaro.

Habitat.—Hemp 2005a; riverine forest and banana-coffee plantations on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1400 m.

Remarks.—A very rare species on Mt Kilimanjaro, endangered by the destruction of lowland forest. From its morphology, near to *E. tangana* Descamps, 1964.

Family Thericleidae

Subfamily Plagiotriptinae

Plagiotriptus hippiscus (Gerstäcker, 1869)

Distribution.—Kenya, Tanzania (Rehn & Rehn 1945; Lee 1972); Uganda (Descamps 1977).

Recorded from Mt Kilimanjaro by Burr (1899).

Diet.—Found clustered on *Indigofera volkensis*, *Rhynchosia* sp., *Crotalaria* sp.

Habitat.—See Hemp 2005a; common species in savanna and *Hyparrhenia* grasslands and the cultivation belt especially on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1300-1600 m.

Subfamily Chromothericleinae

Chromothericles kanga (Sjöstedt, 1923)

Distribution.—Tanzania, Mt Kilimanjaro (Sjöstedt 1923; Descamps 1977). Endemic to the mountain.

Described from Mt Kilimanjaro by Sjöstedt (1923).

Ecology and biology.—See Hemp 2009; species only present in habitats with dense shrub vegetation and a sufficiently high air humidity; males mount females and remain in copula for several hours.

Diet.—See Hemp 2009; found mostly on *Rubus steudneri*, also on *Jaundea pinnata* and *Agauria salicifolia*; seen feeding on *Asplenium* sp.

Habitat.—Hemp 2005a, Hemp 2009; common species along forest

edges and in clearings; clustered on *Rubus steudneri*, but also on *Crassocephalum mannii*, *Agauria salicifolia* and other shrubs and trees.

Altitudinal range, Mt Kilimanjaro.—1540-1560 m (Sjöstedt 1923), 1540-1560 (Descamps 1977); 1400-1700-2200-2700 m.

Subfamily Thericleinae

Lophothericles carinifrons (Karsch, 1889)

Distribution.—Kenya, Tanzania (Descamps 1977). Recorded from Mt Kilimanjaro by Sjöstedt (1909).

Habitat.—"On shrub waste land" and "in dead grass stems in open grassland" at Tanzanian localities (Descamps 1977); very rare species in grassland with isolated bushes on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1100 m.

Lophothericles kongoni (Sjöstedt, 1909)

Distribution.—Mt Kilimanjaro (Sjöstedt 1909, Descamps 1977). Endemic to Mt Kilimanjaro.

Described by Sjöstedt (1909) as *Thericles kongoni* from Mt Kilimanjaro.

Ecology and biology.—Adults and nymphs September to November (Sjöstedt 1909). Adults and nymphs clustering on certain small trees, bushes and herbs within grasslands; frequently found on *Maytenus senegalensis*.

Habitat.—See Hemp 2005a; cultivation belt and savanna SW-Kilimanjaro (Sjöstedt 1909); savanna and *Hyparrhenia* grasslands, also ruderal vegetation, mainly on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m, 1300-1900 m (Descamps 1977); 900-1000-1400-1600 m.

Remarks.—Probably a more common species on Mt Kilimanjaro in savanna habitats on bushes and on trees than indicated in this study.

Superfamily Acridoidea

Family Pamphagidae

Subfamily Porthetinae

Lobosceliana femoralis (Walker, 1870)

Distribution.—Tanzania, Zaire (Dirsh 1965); Zambia (Johnsen 1982a); Zaire (Dirsh 1970 in Johnsen 1982a).

Habitat.—Rare species of savanna grasslands sparse in vegetation, *Hyparrhenia* grasslands on volcanic side vents and wastelands on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1300 m.

Xiphoceriana atrox (Gerstäcker, 1869)

Distribution.—Tanzania, Zanzibar (Johnston 1956); Somalia, Kenya (Dirsh 1965); Ethiopia (Baccetti 1997).

Recorded from Mt Kilimanjaro by Sjöstedt (1909).

Habitat.—Savanna SW Kilimanjaro (Sjöstedt 1909); very rare species in savanna grasslands sparse in vegetation and ruderal vegetation at the southern slopes of Mt Kilimanjaro.

Altitudinal range at Mt Kilimanjaro.—900-1000 m.

Family Pyrgomorphidae

Atractomorpha acutipennis gerstaeckeri (Bolivar, 1884)

Distribution.—Africa south of the Sahara (Baccetti 1997).

Habitat.—See Hemp 2005a; common species in open riverine vegetation, rice fields in the savanna zone and irrigation canals in the cultivation belt on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1100-1400 m.

Remarks.—Under-represented species in this study. Common species in humid savanna habitats such as rice paddies and sugar cane plantations.

Chrotogonus hemipterus Schaum, 1853

Distribution.—Zaire, Rwanda, Burundi, Kenya, Tanzania, Zanzibar, Malawi, Zambia, Zimbabwe, Mozambique, Swaziland, South Africa, Namibia, Angola (Dirsh 1965); Uganda, Botswana (Johnsen 1990).

Ecology and biology.—Imagines in I-VII and IX-XII, nymphs in X and XII (Botswana, Johnsen 1990).

Diet.—Forb feeder, pest on crops *e.g.*, on coffee, sunflower, young leaves of pulse crops, *Sorghum*, tomato, cotton and *Crotalaria* (Johnsen 1990).

Habitat.—Sandy riverside near Mbagala, Tanzania, in undergrowth and bare ground of coconut plantation near Msala, Rufiji Delta, (0 m a.s.l.) Tanzania (Kevan & Knipper 1961); on bare patches on the ground, in *Brachystegia-Isobertlinia* woodland, on crops on castor and *Calotropis*, shrub savanna, lake shore, riverbank, open mopane woodland, delta grassland, *Acacia nigrescens/Combretum apiculatum* tree savanna (Johnsen 1990); uncommon species of savanna, *Hypparrhenia* and rarely *Bulbostylis* grasslands as well as ruderal vegetation, roadsides and waste lands on Mt Kilimanjaro. Within these vegetation types, on places sparse or bare of vegetation.

Altitudinal range, Mt Kilimanjaro.—900-1700 m.

Dictyophorus (Tapesiella) griseus griseus
(Reiche & Fairmaire, 1850)

Distribution.—Guinea, Eritrea, Ethiopia, Somalia, Sudan, Uganda, Kenya, Zanzibar, Tanzania, Malawi, Zaire, Zambia, Zimbabwe, Togo, Cameroon, Gabon, Congo, Angola, Sierra Leone, Ivory

Coast, Nigeria (Dirsh 1965); Mozambique (Dirsh 1966); Ghana (Jago 1967); Rwanda, Burundi (Dirsh 1970).

Recorded as *Tapesia producta* by Bolivar (1904) and as *Tapesia anchietae* by Sjöstedt (1909, 1923) from Mt Kilimanjaro.

Ecology and biology.—Every second year high abundancies in the cultivation belt on the southern slopes of Mt Kilimanjaro.

Habitat.—See Hemp 2005a; uncommon species in *Hypparrhenia* grasslands and cultivated open areas in the cultivation belt.

Altitudinal range, Mt Kilimanjaro.—1000-1400-1600-1700 m.

Occurring at an altitude of 2100 m on Mt Elgon (Uvarov 1938).

Maura lurida (Fabricius, 1781)

Distribution.—Eritrea, Kenya, Belgian Congo, Ghana, Togo, Dahomey, Nigeria, Cameroon, Tanzania, Zanzibar (Dirsh 1965).

Recorded from Mt Kilimanjaro by Bolivar (1904) as *M. venusta*.

Habitat.—On bushes in forest and in gardens at Fourah Bay College, Sierra Leone; one generation per year in Sierra Leone (Phipps 1970).

Remarks.—Not recovered on Mt Kilimanjaro during 1996-2009. Probably a species of lowland forest. This type of forest is almost completely converted to plantations (Chagga home gardens) on Mt Kilimanjaro.

Parasphena meruensis meruensis Sjöstedt, 1909

Distribution.—Tanzania (Johnston 1956, Dirsh 1965).

Described from Mt Meru and Mt Kilimanjaro by Sjöstedt (1909).

Ecology and biology.—High abundancies from November to March, then only single adults may be found from April to August; usually many nymphs hatch from August onwards.

Habitat.—Cultivation belt on Mt Kilimanjaro, cultivation belt and montane forest (3000-4000 m) on Mt Meru (Sjöstedt 1909); see Hemp & Hemp 2003 and Hemp *et al.* 2009; rare in *Hypparrhenia* grasslands, common in montane *Bulbostylis* grasslands on the southern slopes fringing the lower border of the montane forest belt on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1500-1600-1800-2000 m.

Remarks.—Subspecies of *P. meruensis* occur in the Ngorongoro conservation area, on Mt Kitumbeine and in the Monduli Range.

Parasphena pulchripes (Gerstäcker, 1869)

Distribution.—Tanzania; Mt Kilimanjaro. Endemic to Mt Kilimanjaro.

Described as *Sphenarium pulchripes* by Gerstäcker (1869) from Kilimanjaro. Recorded again from the mountain by Bolivar (1884), Karsch (1888) and Sjöstedt (1909).

Ecology and biology.—Adults usually present from November to March.

Habitat.—See Hemp *et al.* 2009; heathland (Sjöstedt 1909); uncommon to common species of tussock grasslands of the moorland zone, *Erica trimeria* bushland and *Helichrysum newii* heathland.

Altitudinal range, Mt Kilimanjaro.—3000-4000 m (Sjöstedt 1909); 3500-4500 m (Kevan 1955); 2400-2600-2700-4400 m.

Remarks.—Endemic to Mt Kilimanjaro, other records due to misidentifications (Kevan 1955) because *Parasphenella* species are morphologically very similar.

Phymateus (Phymateus) aegrotus (Gerstäcker, 1869)

Distribution.—Cape Verde, Ghana, Uganda, Tanganyika, Somalia, Sudan, Ethiopia, Eritrea, Kenya, Zanzibar, Angola, Zambia, Transvaal, South Africa, S.W. Africa (Johnston 1956, Dirsh 1965).

Recorded by Sjöstedt (1909) as *P. hildebrandti* from Mt Kilimanjaro.

Ecology and biology.—Gregarious in the nymphal stages (Roffey 1964); number of generations per year dependent on rainy season (Roffey 1964). On Mt Kilimanjaro adults from October to November, hoppers in March and April (Sjöstedt 1909).

Habitat.—Cultivation belt SW Kilimanjaro (Sjöstedt 1909); very rare species on savanna grasslands, within the cultivation belt to the lower border of the montane rainforest on Mt Kilimanjaro. In the North Pares, found at an elevation of 1750 m on fallow land at the lower border of the montane forest on Mt Kindoroko.

Altitudinal range, Mt Kilimanjaro.—900-1700 m.

Phymateus (Phymateus) viridipes viridipes Stål, 1873
and *Phymateus karschi* Bolivar, 1905

Phymateus (Phymateus) viridipes viridipes Stål, 1873

Distribution.—Namibia, Congo, Zaire, Somalia, Zimbabwe, Malawi, Uganda, Kenya, Ethiopia, Mozambique, South Africa (Kevan 1977 in Johnsen 1982a), Botswana, Tanzania (Johnsen 1982a).

Phymateus karschi Bolivar, 1905

Distribution.—Cameroon (Bolivar 1904); Nigeria, Mozambique (Dirsh 1965); Tanzania, Kenya, Malawi, Zaire, Eritrea.

Habitat.—Hemp 2005a; uncommon species on bushes and trees within *Hyparrhenia* grasslands, in plantations and forest remnants of the submontane zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1200-1400-1800 m.

Remarks.—Both *Phymateus* species vary only in the color of the vannal area of the hind wings. *P. viridipes* has a crimson vannal area while in *P. karschi* it is scarlet. These species were not differentiated in this study. Further research on the distribution, ecology and genetics are necessary to decide whether species status can be confirmed. In NHML

specimens of *P. karschi* were collected in Kenya (Makuyu), Eritrea (Teramni), Zaire (Katanga), Malawi (Mulange Mt, Zomba plateau), and Tanzania (Mt Meru, Mt Kilimanjaro, E Usambara Mts).

Phyteumas purpurascens purpurascens (Karsch, 1896)

Distribution.—Ethiopia, Tanzania, Kenya, Congo (Johnston 1956); Uganda (Dirsh 1965).

Described from Mt Kilimanjaro by Karsch (1896), recorded from the area by Bolivar (1884), Kevan (1955) and Johnston (1956).

Ecology and biology.—Preference for *Lantana camara* in Uganda (Rowell 1967); 1st instar 8 d, 2nd instar 10-11 d, 3rd instar 10-11 days, 4th instar 12 d, 5th instar 14 d males, 20 d females, 6th instar 15-18 d males, 20-30 d females, adults: at least 90 d, first copulation after 14 d, first eggs after 40 d following moult (Rowell 1967); development takes longer in the wild; hatching of the 1st instar in January to March in Uganda, eggs being laid in May and June; per egg pod 90-120 eggs. Food often poisonous plants like Asclepiadaceae or Euphorbiaceae; the defensive secretion contains a variety of cardenolides which also occur in the food plants (Rowell 1967).

Habitat.—Occurs in all habitats from semidesert to rainforest in Uganda (Rowell 1967); near streams and in shady spots in the Uluguru Mts. (Miller 1929); occurring at an altitude of 2000 m at Mt Elgon (Uvarov 1938); at 400 m in the transition zone of rain forest to pastures on herbs in the Iringa District, Tanzania (Kevan & Knipper 1961); Hemp 2005a; uncommon species in moist riverine forest in the savanna zone, on bushes and small trees in the cultivation belt and along forest edges of the montane forest of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1700-1800-2000 m.

Pyrgomorpha conica (Olivier, 1791)

Distribution.—Whole of Africa, S Europe, SW Asia (Dirsh 1965).

Habitat.—Very rare species on Kilimanjaro inhabiting open wasteland bare of vegetation and found on open patches within savanna grasslands.

Altitudinal range, Mt Kilimanjaro.—900-1000 m.

Pyrgomorphella albini (Chopard, 1921)

Distribution.—S Kenya (Chopard 1921) and N Tanzania.

Habitat.—Rare species in savanna grasslands and ruderal vegetation, very rarely on *Hyparrhenia* grasslands and ruderal vegetation of the montane zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1800 m.

Remarks.—Sjöstedt (1909) listed *Parasphenella dubia* (Bolivar, 1904) from the northern side of Mt Meru and Ngare na Nyuki (eastern side). Kevan (1962) remarks that the specimens listed by Sjöstedt actually belong to *Pyrgomorphella albini*. Kevan (1962) records the species from the Masai Reserve, Narok in Kenya and between Mt Suswa and Lake Magadi.

Taphronota (Taphronota) calliparea immaculata Sjöstedt, 1929

Distribution.—Northern Tanzania and southern Kenya (Mt Kilimanjaro, W Usambara, Mt Hanang, Chyulu Hills).

Recorded as *T. calliparea* by Sjöstedt (1909). Subspecies *immaculata* described by Sjöstedt (1929) from Mt Kilimanjaro. Recorded again by Kevan (1955).

Ecology and biology.—Adults in February to April (Sjöstedt 1909); feeds on poisonous plants *e.g.*, *Rauwolfia*. Forms cluster of nymphs on food plants.

Habitat.—See Hemp 2005a; cultivation belt SW Kilimanjaro (Sjöstedt 1909); uncommon in the submontane cultivation belt of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1400 m (Kevan 1955); 1100-1500 m.

Remarks.—Under-represented in this study since its main habitat — hedges and lush road sides of the cultivation belt — was not very intensively studied.

Zonocerus elegans elegans (Thunberg, 1815)

Distribution.—Tropical eastern Africa and southern Africa. Uganda, Tanzania, southeast Zaire, Angola, Malawi, Zambia, Zimbabwe, Mozambique, Transvaal, Botswana, Namibia, Cape Province, Swaziland, Lesotho (Dirsh 1965); Orange Free State, Natal (Dirsh 1966); Rwanda (Dirsh 1970); Zanzibar (Johnston 1956 in Johnsen 1990); Kenya (Kevan 1950 in Johnsen 1990).

Recorded from Kilimanjaro by Brunner v. Wattenwyl (1894), Kirby (1902), Bolivar (1904) and Sjöstedt (1909).

Habitat.—Common in all kinds of grass- and bushlands from the colline to the montane zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1800 m.

Family Lentulidae

Altiusambilla modicrus (Karsch, 1896)

Distribution.—Tanzania (Dirsh 1965); endemic to Mts Kilimanjaro, Meru and the Monduli Range.

Described from Mt Kilimanjaro by Karsch (1896) as *Lentula modicrus* and recorded again by Sjöstedt (1909) and as *Usambilla modicrus* by Ramme (1929).

Ecology and biology.—Present in the montane zone throughout the year.

Molecular analyses.—Schultz *et al.* 2007.

Habitat.—See Hemp 2005a and Hemp *et al.* 2007; savanna to upper cultivation belt, montane forests on Mt Meru (Sjöstedt 1909); in riverine forests of the lower submontane zone, common in the cultivation belt, on montane grasslands, forest edges and clearings.

Altitudinal range, Mt Kilimanjaro.—1900 m (Sjöstedt 1909); 1100-1400-2200-2800 m.

Usambilla olivacea Sjöstedt, 1909

Distribution.—Northern Tanzania (Jago 1981, Hemp & Hemp 2008a); southern slopes of Mt Kilimanjaro; southern slopes of the North Pare and West Usambara mountains.

Described by Sjöstedt (1909) from Mombo, West Usambara.

Molecular analyses.—Schultz *et al.* 2007.

Habitat.—See Hemp & Hemp 2008a; rare species in riverine forests in the colline zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1100 m.

On the southern slopes of the North Pare mountains found between 1100 and 1400 m in riverine and submontane forest.

Usambilla turgidicrus (Karsch, 1896)

Distribution.—Southern Kenya and northern Tanzania (Jago 1981, Hemp & Hemp 2008a).

Ecology and biology.—See Hemp & Hemp 2008a.

Molecular analyses.—See Schultz *et al.* 2007.

Habitat.—See Hemp & Hemp 2008a; very rare species of riverine forests in the colline zone on the eastern slopes of Mt Kilimanjaro. Also found in riverine forests in the Taita Hills at an elevation of 1030 m.

Altitudinal range, Mt Kilimanjaro.—1000-1100 m.

Family Acrididae

Subfamily Hemiacidinae

Hemicris fervens Walker, 1870

Distribution.—Tanzania, Zimbabwe, Transvaal, Natal (Dirsh 1965); Zimbabwe (Ferreira 1964); Zambia, Botswana (Dirsh 1966); Mozambique, Namibia (Dirsh 1956 in Johnsen 1990).

Ecology and biology.—See Johnsen 1990; mating pair beneath a small *Maytenus senegalensis* tree on eastern Kilimanjaro.

Habitat.—See Johnsen 1990; trees and bushes in the savanna of eastern Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m.

Remarks.—Probably uncommon to common in tree and bush savanna habitats on the foothills of Mt Kilimanjaro but easily overlooked.

Leptacris monteiroi monteiroi Bolivar, 1890

Distribution.—Africa south of the Sahara (Grunshaw 1996).

Ecology and biology.—See Fishpool & Popov (1984).

Habitat.—Rare species in savanna and *Hyparrhenia* grasslands, mainly

on the eastern slope of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1100-1200-1400 m.

Meruana usambarica Karsch, 1896

Distribution.—Somalia, Kenya, E Tanzania (Grunshaw 1996); Ethiopia (Baccetti 1997).

Described by Sjöstedt (1909) as *Meruana nyuki* from Mt Meru.

Habitat.—Uncommon in savanna bush and grasslands, very rarely in *Hypparrhenia* grasslands and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200-1500 m.

Oraistes luridus Karsch, 1896

Distribution.—Zanzibar, Tanzania, Kenya, Zimbabwe (Johnston 1956); Mozambique, Zambia (Dirsh 1965); Malawi, Angola, Zaire, Natal, Cape Province (Dirsh 1966); Zimbabwe (Johnston 1968 in Johnsen 1982b).

Ecology and biology.—Rare species found in August at 900 m in Tukuyu District of Tanzania (Miller 1925).

Habitat.—At 0 m a.s.l. in long grass on small clearing near Msala, Rufiji Delta, Tanzania (Kevan & Knipper 1961); see Hemp 2005a; rare in wet forests and in plantations of the colline zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1200 m.

Remarks.—Rare species due to loss of adequate habitat – forests of the colline zone, which are largely destroyed nowadays on Mt Kilimanjaro. A typical species of lowland forest, e.g., along the coast of Tanzania (see Hemp 2005 b).

Sudanacris schoutedeni Dirsh, 1954

Distribution.—Kenya, Tanzania (Grunshaw 1996).

Habitat.—Very rare species on Mt Kilimanjaro, found only once and in a savanna grassland.

Altitudinal range, Mt Kilimanjaro.—900 m.

Subfamily Spathosterninae

Spathosternum nigrotaeniatum (Stål, 1876)

Distribution.—Senegal, Mali, Guinea, Nigeria, Cameroon, Sudan, Tanzania, Zaire, Zambia, Congo, Namibia, Zimbabwe (Johnston 1956, Dirsh 1965); Ghana (Jago 1967); Mali (Descamps 1965 in Johnsen 1990); Chad (Descamps 1968 in Johnsen 1990); Somalia (Johnsen & Schmidt 1982 in Johnsen 1990); Togo (Fishpool & Popov 1984 in Johnsen 1990); Niger (Mestre 1988 in Johnsen 1990); Burkina Faso (Lecoq 1978 in Johnsen 1982b).

Recorded by Sjöstedt (1909) from Mt Kilimanjaro.

Habitat.—Savanna to cultivation zone at SW Kilimanjaro (Sjöstedt 1909).

Remarks.—Sjöstedt (1909) noted that *S. nigrotaeniatum* is a common species in the cultivation belt and forest and the lower slopes. However, this species was not found again in this area or elsewhere on Mt Kilimanjaro.

Subfamily Tropidopolinae

Afroxyrrhepes brevifurca Uvarov, 1943

Distribution.—Tanzania (Uvarov 1943); Kenya (Kevan 1950).

Ecology and biology.—Adults mainly from May to September on the eastern slopes of Mt Kilimanjaro.

Habitat.—Very rare species in savanna grasslands of the colline zone of East Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m.

Tristia pallida Karny, 1907

Distribution.—Sierra Leone, Ghana, Togo, Nigeria, Sudan, Uganda, Rwanda, Congo, Tanzania, Zambia, Angola (Hollis 1970).

Habitat.—Rare in savanna grassland, bushland savanna and *Hypparrhenia* grasslands on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200-1300 m.

Subfamily Oxyinae

Oxya hyla hyla Serville, 1831

Distribution.—Recorded from most African countries south of the Sahara and parts of Asia (Hollis 1971). (Senegal, South Africa, Madagascar, Sao Tome, Tanzania, Mali, Gambia, Guinea, Sierra Leone, Ivory Coast, Ghana, Dahomey, Niger, Nigeria, Chad, Cameroon, Fernando Po, Principe, Sao Tome, Central African Republic, Congo, Sudan, Ethiopia, Kenya, Uganda, Malawi, Zambia, Angola, Mozambique, Zimbabwe, Persia, Afghanistan, Pakistan, Nepal, India, Ceylon, Maldives).

Recorded from Mt Kilimanjaro by Sjöstedt (1909, 1918); upland form described as *Oxya serrulata minor* 1909, synonymized with *O. hyla hyla* by Hollis (1971).

Ecology and biology.—Uvarov (1928); Johnston (1956, 1968); Butani (1961); Bullen & MacQuaig (1969); Hollis (1971).

Habitat.—See Kevan & Knipper 1961; common on rice fields and swamps in the savanna, along irrigation canals and riverine vegetation in the cultivation belt on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1400-1600 m.

Remarks.—Under-represented in this study since its main habitat — wet locations in the savanna such as rice fields, irrigation canals or lush vegetation of small rivers — were not intensively studied.

Subfamily Coptacridinae

Eucoptacra exigua Bolivar, 1912

Distribution.—Zaire, Ethiopia, Tanzania, Malawi (Dirsh 1970); Congo (Descamps & Donskoff 1968 in Johnsen 1990); Botswana (Houston 1978 in Johnsen 1990); Zambia (Johnsen 1982b).

Recorded as *Epistaurus succineus* (Krauss, 1877) by Sjöstedt (1909) and as *Eucoptacris exigua* from Kilimanjaro (Kware near Moshi) by Kevan (1955).

Habitat.—Savanna to cultivation belt (Sjöstedt 1909); very rare in savanna grasslands and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m.

Remarks.—Uvarov (1953) noted that *Epistaurus succineus* was originally described as *Coptacra succineus* by Krauss (1877); Uvarov (1953) transferred this species to *Epistaurus*; two female types were investigated by Uvarov and these two types were not conspecific. Therefore one type was selected by Uvarov (1953) from Sierra Leone and put as *E. succineus*. Uvarov stated that the other type is an *Eucoptacra* (from Port Natal), very close to *E. paupercula* and perhaps identical with it. Since the only *Eucoptacra* species in colline and lower submontane habitats on Mt Kilimanjaro recorded in this study is *E. exigua*, it is presumed here that the records of Krauss (1877) and Sjöstedt (1909) are conspecific with *E. exigua* (the other species of this genus on Kilimanjaro, *E. gowdeyi*, is confined to the upper submontane and the montane zones). Also the ecological information given by Sjöstedt (1909) fits *E. exigua*. However, material of *E. succineus* collected by Krauss and Sjöstedt was not studied.

Eucoptacra gowdeyi Uvarov, 1923

Distribution.—Uganda, Kenya, Tanzania (Dirsh 1965); Zaire, Rwanda (Dirsh 1970); Zambia (Robertson 1967 in Johnsen 1982b); Ethiopia (Baccetti 1997).

Ecology and biology.—Common species in January and February in upland (at about 1500 m) of Tukuyu District of Tanzania (Miller 1925).

Habitat.—Rarely in *Hyparrhenia* and uncommon in *Bulbostylis* grasslands in the montane zone of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1400-1500-1800-1900 m.

Parepistaurus deses deses Karsch, 1896

Distribution.—Tanzania; Mt Kilimanjaro, Mt Meru (Green 1998); endemic to the Mts. Meru and Kilimanjaro region.

Described by Karsch (1896) from Mt Kilimanjaro and recorded from the region by Sjöstedt (1909) and Uvarov (1953).

Ecology and biology.—On Mt Meru associated with *Vernonia* sp. (Green 1998). Feeds on herbs.

Habitat.—Cultivation belt (Sjöstedt 1909); Hemp 2005a; cultivation belt of Mt Kilimanjaro and rainforest of Mt Meru (Green 1998); common species on Mt Kilimanjaro; rare in riverine wet forests of the colline zone, common to very common in shady plantations

and forest remnants of the submontane zone to the lower border of the montane forest, as well as on clearings and paths within the montane forest belt.

Altitudinal range at Mt Kilimanjaro.—1250 m (Kevan 1955); 1000-1400-1800-2200 m.

Parepistaurus lindneri Kevan, 1955

Distribution.—Tanzania; Mt Kilimanjaro, Mt Meru (Green 1998). Monduli Range.

Described from West Kilimanjaro by Kevan (1955).

Habitat.—Hemp 2005a; rare in riverine and dry colline to submontane forest on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1400 m (Kevan 1955); 1000-1100-1400 m.

On the Monduli range found between 1600 and 2100 m in *Croton-Calodendrum* forest.

Remarks.—*P. lindneri* substitutes *P. deses* in lower and dryer forest communities. Seems to be highly endangered on Mt Kilimanjaro due to loss of indigenous colline and submontane forests. In contrast to *P. deses* which has adapted to banana-coffee plantations, *P. lindneri* has found no adequate habitat in the dryer and lower parts of Mt Kilimanjaro, where nowadays maize and sunflowers are cultivated. However, *P. lindneri* is an uncommon to common species in the forests of Mt Meru and the Monduli range.

Subfamily Calliptaminae

Acorypha glaucopsis (Walker, 1870)

Distribution.—India, Pakistan, Iran, Saudi Arabia, Muscat & Oman, Trucial Oman, Bahrain, Socotra, Somalia, Tanzania, Yemen, Aden Prot., Somalia, Somali Rep., Ethiopia, Burkina Faso, Niger, Sudan, Mali, Senegal, Nigeria (Jago 1966); Tanzania (Sjöstedt 1909); Kenya (Sjöstedt 1933, Kevan 1967); Saudi Arabia (Ingrisch 1999).

Described synonymously by Sjöstedt (1909) as *Calliptamus meruensis* from Mt Meru.

Habitat.—See Kevan & Knipper 1961; uncommon on Mt Kilimanjaro in colline savanna grasslands, especially on the eastern side of the mountain.

Altitudinal range, Mt Kilimanjaro.—900-1000-1300 m.

Acorypha laticosta (Karsch, 1896)

Distribution.—Zimbabwe, Malawi, Tanzania (Jago 1966).

Recorded as *Caloptenopsis laticosta* by Sjöstedt (1909) from Mt Kilimanjaro.

Ecology and biology.—Adults in April, June, August to October, nymphs in March (Sjöstedt 1909).

Habitat.—Savanna to cultivation belt at SW and N Kilimanjaro (Sjöstedt 1909); collected around Ngare Nairobi [W Kilimanjaro] (Jago 1966); uncommon in *Hyparrhenia* and *Bulbostylis* grasslands on the southern slopes of Mt Kilimanjaro.

Altitudinal range at Mt Kilimanjaro.— -1800 m (Sjöstedt 1909); 1200-1500 m (Jago 1966); 1200-1400-1700-1800 m.

Acorypha nigrovariegata tibialis (Kirby, 1902)

Distribution.—Kenya (Sjöstedt 1933); Tanzania (Sjöstedt 1909); Pemba Is., Transvaal, Namibia, Mozambique, Malawi, Zambia, Zimbabwe (Dirsh 1965); Swaziland, South Africa (Jago 1966).

Described synonymously by Sjöstedt (1909) as *Caloptenopsis speciosa* from Mt Meru and Mt Kilimanjaro.

Habitat.—Savanna SW Kilimanjaro (Sjöstedt 1909); rare to uncommon in savanna grasslands on the eastern slopes of Mt Kilimanjaro. In the North Pare mountains in grasslands between 1300-1500 m.

Altitudinal range, Mt Kilimanjaro.— 1100-1200-1500 m.

Acorypha ornatipes Uvarov, 1950

Distribution.—Tanzania (Dirsh 1965); Kenya, Ethiopia, Somali Republic (Jago 1966).

Habitat.—Semidesert East Usambara Mts (holotype data, Jago 1966); desert grass and thorn bush Damassa district, Kenya (Jago 1966); savanna grasslands at foothills of Mt Longido, Tanzania and northern slopes of Mt Meru; on waste land in the foothills of the North Pare Mts; only found once in savanna grassland, a very sparse population in sparse vegetation around Lake Chala, East Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.— 1000-1100 m.

Sphodromerus reductus Kevan, 1967

Distribution.—Kenya (Kevan 1967); Tanzania.

Habitat.—Rare in savanna grassland, sparse in vegetation on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.— 1000-1100 m.

Remarks.—Taxonomical status unclear. Kevan (1967) noted, that Jago remarked this species could be conspecific with *Acorypha nodula* (Giglio-Tos, 1907).

Subfamily Euryphyminae

Phymeurus granulatus (Uvarov, 1922)

Distribution.—Kenya, Uganda (Dirsh 1965); Sudan (Mason 1966 in Johnsen 1982c); Zambia (Johnsen 1990).

Habitat.— Swampy grassland (Johnsen 1982c); very rare in *Cymbopogon* grasslands on the northern side of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.— 1700-1800 m.

Subfamily Eyprepocnemidinae

Cataloipus oberthuri oberthuri (Bolivar, 1890)

Distribution.—Uganda, Kenya (Sjöstedt 1933); Tanzania, Pemba

Is., Zaire, Zimbabwe (Dirsh 1965); Rwanda, Angola (Dirsh 1970); Zambia (Vesey-Fitzgerald 1964 in Johnsen 1982c).

Habitat.—Kevan & Knipper 1961; common in savanna and *Hyparrhenia* grasslands and ruderal vegetation on Mt Kilimanjaro, dispersion into higher altitudes (*Bulbostylis* grasslands) after adult emerges.

Altitudinal range, Mt Kilimanjaro.— 900-1300-1800 m.

Eyprepocnemis plorans ibandana (Giglio-Tos, 1907)

Distribution.— Sierra Leone, Uganda, Tanzania, Kenya, Port. E. Africa, Sudan, Congo (Johnston 1956); Nigeria, Cameroon, Fernando Po, Sao Tome, Mozambique (Ferreira 1964).

Recorded from Mt Kilimanjaro as *E. plorans* by Sjöstedt (1909); identified as *E. ibandana* by Uvarov (1921); listed as subspecies of *E. plorans* by Baccetti 2004.

Habitat.—See Kevan & Knipper 1961; savanna to plantation belt (Sjöstedt 1909). Uncommon species in savanna grasslands and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.— 900-1000-1100-1600-1700-1800 m.

Remarks.— *E. plorans ibandana* is restricted to open grasslands; therefore it occurs on the southern and southeastern slopes in the colline zone of the mountain, while savanna grasslands on the northern slope of Kilimanjaro reach to elevations up to 1800 m. Here, on the northern slopes, *E. plorans ibandana* has its main occurrence in these grasslands at altitudes of 1700-1800 m.

Heteracris juliea Grunshaw, 1991

Distribution.—Ethiopia, Somali Republic (Grunshaw 1991); Tanzania.

Habitat.—Very rare species in grassland and bushland savanna on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.— 1000-1100 m.

Heteracris coeruleescens (Stål, 1876)

Distribution.—Somalia, Eritrea, Sudan, Uganda, Kenya, Tanzania, Zanzibar, S.W. Asia (Dirsh 1965); Saudi Arabia, Yemen, Socotra, Senegal, Nigeria, Ethiopia, Zaire, Mozambique (Grunshaw 1991). Recorded as *Eyprepocnemis coeruleescens* by Sjöstedt (1909) from Mt Meru.

Habitat.—See Kevan & Knipper 1961; see Hemp 2005a; uncommon species on Mt Kilimanjaro occurring in savanna grasslands, preferably intermingled with bushes and in tree savanna; also found in *Hyparrhenia* grasslands with bushes and trees in the submontane zone; rarely in plantations.

Altitudinal range, Mt Kilimanjaro.— 900-1200-1300 m.

Metaxymecus gracilipes (Brancsik, 1895)

Distribution.—Recorded for most African countries south of the Sahara. Somalia, Ethiopia, Sudan, Uganda, Kenya, Tanzania, Malawi, Zambia, Zimbabwe, Mozambique, Transvaal, Zaire, Angola, Sierra Leone, Liberia, Ghana, Nigeria, Burkina Faso (Dirsh 1965); Botswana, Gambia, Swaziland, Mali, Senegal, Guinea, Rwanda (Johnston 1968 in Johnsen 1990); Chad (Descamps 1968 in Johnsen 1990); Ivory Coast (Gollon 1974 in Johnsen 1990); Malawi (Whellan 1975 in Johnsen 1990); Togo (Jago 1968); Congo (Descamps & Donskoff 1968 in Johnsen 1990); Benin (Fishpool & Popov 1984); Eritrea, Cameroon, Namibia, South Africa, Mauritania, Niger (Grunshaw 1995).

Recorded from Mt Kilimanjaro as *Tylotropidius gaugeri* by Sjöstedt (1909).

Ecology and biology.—Common and widespread in Sierra Leone, often with *E. plorans* amongst grass, mainly at thicket edges (Phipps 1970); fairly common species in August, October, December and January in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925).

Habitat.—See Hemp 2005a; common in savanna and *Hyparrhenia* grasslands on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1300-1500 m.

Oxyaidea poultoni Ramme, 1929

Distribution.—Kenya, Tanzania (Dirsh 1965); Somalia (Baccetti & Hollis 1996, Johnsen & Schmidt 1982).

Habitat.—Lowland forest clearing; *Diospyros cornei/Dobera loranthifolia* woodland, dry salt marsh, forest scarp road, bush and grasses at forest edge, thicket clumps, *Brachystegia* woodland, riverine forest and thicket, open thicket and tall grass, open field and coconut plantation, dry thicket and lush roadside grass, damp grass sedges and bushes, fallow in old maize, savanna-forest mosaic, clearing with tall grass clumps, lowland rainforest, riverine grassland in degraded woodland, sisal plantation (Jago 1994a); on Mt Kilimanjaro only found twice in a remnant of colline wet forest (Kahe forest) and on a swampy montane grassland near Marangu.

Altitudinal range, Mt Kilimanjaro.—900-1700 m.

Taramassus cunctator (Ramme, 1931)

Subspecies *T. cunctator sjoestedti* (Ramme, 1931)

Distribution.—"Meru-Niederung" (Sjöstedt 1932); lower parts of Mt Kilimanjaro and Mt Meru (Schmidt 1996).

Described as *Eucerohippus cunctator sjoestedti* by Ramme (1931) from Mt Kilimanjaro.

Subspecies *T. cunctator flabellatus* (Ramme, 1931)

Distribution.—Tanzania (Mt Kilimanjaro, Kibonoto), Kenya (Malindi) (Schmidt 1996).

Described as *Eucerohippus cunctator flabellatus* by Ramme (1931) from Mt Kilimanjaro.

Habitat.—From Hemp 2005a: very common geophilous species in colline and submontane grasslands, waste land, dry open areas in the cultivation belt, and along roadsides.

Altitudinal range, Mt Kilimanjaro.—900-1300-1800 m.

Remarks.—*T. cunctator* is a widespread species in dry and open habitats in East Africa. However, morphology, ecology and distribution suggest that this taxon is in recent radiation and molecular analyses combined with ecological and morphological studies are necessary to clarify its status.

Subfamily Catantopinae

Abisares depressus Uvarov, 1938

Distribution.—Kenya (Dirsh 1965); northern Tanzania (Mt Kilimanjaro, Mt Meru, Mt Longido).

Habitat.—Very rare species in bush and tree savanna on eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1100 m.

Abisares viridipennis viridipennis (Burmeister, 1838)

Distribution.—In most parts of tropical Africa (Baccetti 1997).

Described as subspecies *A. viridipennis var. azurea* from Mt Kilimanjaro by Sjöstedt (1909) and recorded again by Kevan (1955) from Kware near Moshi.

Ecology and biology.—Adults from February to April, nymphs from December to March (Sjöstedt 1909); very abundant species from October to January in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925).

Habitat.—On bushes at thicket edges and in forest clearings in Sierra Leone, one generation per year, eggs hatching at the end of the rains (Phipps 1970); on low trees and bushes (Miller 1925); undergrowth of coconut plantation, on grass in clearings and wet grassland at Kifumangao and Msala, Rufiji Delta, (0 m a.s.l.) Tanzania (Kevan & Knipper 1961); cultivation belt at SW Kilimanjaro (Sjöstedt 1909); see Hemp 2005a; on Mt Kilimanjaro common inhabitant of shady plantations from the colline to submontane zone; nymphs on meadows, lush undergrowth of plantations while adults are found on bushes and small trees of adjacent locations; common also in wet riverine forests of the colline zone and forest remnants of the submontane zone.

Altitudinal range, Mt Kilimanjaro.—900-1000-1400-1600 m.

Allotriusia luteipennis Ramme, 1929

Distribution.—Belgian Congo, Tanzania, Kenya (Dirsh 1965); Angola (Dirsh 1970).

Habitat.—Savanna habitats in Congo (Dirsh 1970); tree savanna on the foothills of the North Pare Mts.; very rare species at edges of savanna grasslands to riverine bushy vegetation at East Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1100-1200 m.

Brachycatantops emalicus (Kevan, 1950)

Distribution.—Kenya, Ethiopia (Johnston 1956); Somalia (Johnsen & Schmidt 1982); Tanzania.

Habitat.—Uncommon species in the undergrowth of areas with grasslands with denser bush and tree cover in the colline to submontane zone on the eastern and northern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1300-1400 m.

Remarks.—Three subspecies are described for this taxon. *C. emalicus emalicus* (Emali Range and Kenya coast), *C. e. robustus* (northern Kenya), and *C. e. gracilis* (Somalia, Kenya). Probably the population on Mt Kilimanjaro belongs to a new subspecies of *Brachycatantops emalicus*.

Catantops momboensis momboensis Sjöstedt, 1931

Distribution.—E. and C. Kenya, NE and SW Tanzania (Jago 1984).

Recorded as *Catantops humeralis* by Sjöstedt (1909) from Mt Kilimanjaro and the West Usambaras (Mombo).

Habitat.—Cultivation belt at SW Kilimanjaro (Sjöstedt 1909) see Hemp 2005a; in bush and tree savanna, waste land and ruderal vegetation, road sides and plantations in the colline and submontane zone; common species on the lower slopes of Mt Kilimanjaro.

Altitudinal range at Mt Kilimanjaro.—900-1200-1900 m.

Remarks.—Sjöstedt (1932) described *C. momboensis* from material collected during the Meru-Kilimanjaro expedition (Sjöstedt 1909). Thus the record of *C. humeralis*, which is an South African species, belongs to *C. momboensis*.

Jago (1984) pointed out that *C. momboensis momboensis* occupies central and western Kenya, noncoastal areas of eastern and south-eastern Tanzania and an oblique central belt through to Mbeya. Those individuals from Mt Kilimanjaro where the male epiphallus was investigated, all belonged to *C. momboensis momboensis*.

C. melanostictus and *C. momboensis* can be separated with certainty only by genitalic dissections comparing the epiphalli. Kevan (1995) recorded *Catantops melanostictus* from Kware Hill (southern slopes of Mt Kilimanjaro). *C. melanostictus* is not listed in this study since it was never found on the mountain and the area of occurrence as given by Jago (1984) fits *C. momboensis*.

Cryptocatantops sp.

Distribution.—Tanzania, Mt Kilimanjaro.

Habitat.—Very rare species in savanna bushland on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000 m.

Remarks.—Probably a new *Cryptocatantops* species.

Diabolocatantops axillaris (Burmeister, 1838)

Distribution.—Widespread in the driest African grasslands between the equator and the Sahara (Kevan 1967); Arabian peninsula, So-

cotra and Iran (Ingrisch 1999).

Ecology and biology.—On *Echinocloa* sp. in swamp in Kenya (Kevan 1967); on Mt Kilimanjaro development in savanna grasslands, dispersion to higher altitudes when adults emerge.

Habitat.—Sparse seasonal grass in lava desert, desert shrub, desert grass-thorn bush, semi-upland grassland (Kevan 1967); rare on Mt Kilimanjaro in grass and bush savanna.

Altitudinal range, Mt Kilimanjaro.—900-1500 m.

Epacrocatantops curvicerus (Miller, 1929)

Distribution.—Kilimanjaro (Sjöstedt 1931), Ethiopia to Tanzania (Jago 1984).

Synonymously described as *Catantops kilimensis* by Sjöstedt (1931) from Mt Kilimanjaro.

Ecology and biology.—Adults mainly present from December to March.

Habitat.—Upland grassland and shrub and semidesert grassland and shrub in Kenya (Kevan 1967); common to very common in savanna and *Hyparrhenia* grasslands, especially on the eastern slopes of Mt Kilimanjaro. Also found in ruderal vegetation.

Altitudinal range, Mt Kilimanjaro.—1700 m (Sjöstedt 1931); 900-1300-1500 m.

Eupropacris vana (Karsch, 1896)

Distribution.—Kenya, Tanzania, Zanzibar (Dirsh 1965).

Recorded as *Catantops viridulus* by Sjöstedt (1909) from Mt Kilimanjaro.

Habitat.—Cultivation belt SW Kilimanjaro (Sjöstedt 1909); see Hemp 2005a; uncommon in the cultivation belt of the western, southern and eastern slopes of Mt Kilimanjaro; nymphs in lush undergrowth and shady meadows, adults on bushes and trees. Also in wet forests of the colline and forest remnants of the submontane zone.

Altitudinal range, Mt Kilimanjaro.—900-1100-1200-1500-1600 m.

Hadroleocatantops kilimandjaricus (Ramme, 1929)

Distribution.—Tanzania, Kenya (Johnston 1956); NE Tanzania: Mt Meru to Mt Kilimanjaro (Jago 1994a); Emali Range (Kevan 1950); Chyulu Hills (Uvarov & Van Someren 1941); Mt Hanang (Hemp *et al.* 2009).

Recorded as *Catantops humeralis* from the region by Sjöstedt (1909); described by Ramme (1929) from Mt Kilimanjaro.

Ecology and biology.—Adults mainly from November to March on Mt Kilimanjaro.

Habitat.—On montane open grasslands on the Chyulu Hills at altitudes between 1650 and 2000 m (Uvarov & Van Someren 1941 & personal observations). On Mt Kilimanjaro restricted to grasslands of the upper submontane and lower montane zone, but here a common species.

Altitudinal range, Mt Kilimanjaro.—1500-2700 m (Uvarov & Van Someren 1941); 1500-1600-1800-2800 m.

Ixalidium sjostedti Kevan, 1950

Distribution.—Mt Kilimanjaro (Dirsh 1965); Mt Meru.

Recorded by Sjöstedt (1909) as *I. haematoscelis* from Mt Kilimanjaro. Described by Kevan (1950) as *I. sjostedti*.

Ecology and biology.—See Hemp & Hemp 2003 and Hemp 2005a.

Habitat.—See Hemp 2005a; savanna to cultivation belt at SW Kilimanjaro (Sjöstedt 1909); in colline and submontane forest remnants; very common in litter of banana-coffee and forest plantations from the colline to montane zone; on *Bulbostylis* grasslands at the lower border of the montane forest.

Altitudinal range, Mt Kilimanjaro.—900-1300-1800-1900 m.

Remarks.—Johnsen & Forchhammer (1975) recorded *I. bicoloripes* Uvarov, 1941 for Mt Kilimanjaro in their checklist of Acridomorpha of Tanzania. Regarding the present study, *Ixalidium* specimens from Mt Kilimanjaro and other mountainous areas of East Africa were intensively sampled and partly molecularly screened. All specimens from Mt Kilimanjaro belonged to *I. sjostedti*. The study revealed that each mountain range sampled in East Africa harbored its own *Ixalidium* species, most of them new to science (unpub. data). *I. bicoloripes* was described from the Emali Range (Kenya), an area geographically separated from Mt Kilimanjaro. Thus the record of *I. bicoloripes* from Mt Kilimanjaro probably was a misidentification by Johnsen & Forchhammer (1975) and therefore this species is not listed here.

Phaeocatantops concolor (Karny, 1915)

Distribution.—Tanzania, Mt Kilimanjaro (Karny 1915), Mt Meru; Kenya, Mt Elgon (Uvarov 1938).

Described from Mt Kilimanjaro by Karny (1915).

Habitat.—See Hemp 2005a; submontane forest on Mt Meru; uncommon species of lush banana-coffee plantations, forest remnants of the colline and submontane zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1500-1700-1800 m.

Occurring at an altitude of 2000 m at Mt Elgon (Uvarov 1938); recorded between 1400-1500 m on Mt Meru.

Phaeocatantops decoratus decoratus (Gerstäcker, 1869)

Distribution.—Uganda, Kenya, Zaire, Tanzania, Malawi, Zambia Zimbabwe, Botswana, Mozambique (Dirsh 1966); Ethiopia, Kenya (Jago 1982); Zanzibar (Saussure 1899).

Recorded from Mt Kilimanjaro by Karny (1915) and both Mt Meru and Mt Kilimanjaro by Sjöstedt (1909).

Habitat.—Cultivation belt to montane forest SW Kilimanjaro (Sjöstedt 1909); uncommon in bush and tree savanna, ruderal vegetation of the colline zone, and dry riverine forests; rare in dry and sparsely planted coffee-banana plantations of the submontane zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1100-1700 m.

Trichocatantops villosus (Karsch, 1893)

Distribution.—Togo, Nigeria, Cameroon, Nyasaland (Dirsh 1965); Uganda, Tanzania, Angola, Ruanda, Zaire (Dirsh 1970); Ivory Coast (Gillon 1974 in Johnsen 1984); Senegal, Ghana, Zanzibar, Guinea, Kenya (Johnston 1968).

Habitat.—On herbage in woodland (*Brachystegia*) and adjacent grassland (Johnsen 1982c). On Mt Kilimanjaro rare species in dry grasslands and ruderal vegetation, mostly on the western and northern side of the mountain. In the North Pare Mts recorded in grasslands of the submontane zone.

Altitudinal range, Mt Kilimanjaro.—1000-1700 m.

Subfamily Cyrtacanthacridinae

Acanthacris deckeni (Gerstäcker, 1869)

Distribution.—Tanzania, Kenya (Kevan 1955).

Recorded from West Kilimanjaro by Kevan (1955).

Habitat.—West Kilimanjaro, Ngare Nairobi (Kevan 1955). In dry forest on the northern slopes of the North Pare Mts at an elevation of about 1000 m.

Altitudinal range, Mt Kilimanjaro.—1500-1600 m (Kevan 1955).

Remarks.—Not found again in Mt Kilimanjaro localities during the period of 1996-2009.

Acanthacris ruficornis ruficornis (Fabricius, 1787)

Distribution.—Recorded from most African countries south of the Sahara (Chopard 1943; Johnston 1956, 1968; Descamps 1968; Descamps & Donskoff 1968 in Johnsen 1984; Dirsh 1966, 1970; Gillon 1974 in Johnsen 1984; Mungai 1987b; Johnsen 1984, 1987, 1991; Baccetti 1997); Comoro Isl. (Johnston 1968 in Johnsen 1984); Spain (Harz 1975); SW Arabia (Uvarov 1936).

Synonymously described by Sjöstedt (1909) as *Acridium* (*Cyrtacanthacris*) *fulvum* from Mt Kilimanjaro and recorded as *A. ruficornis lineata* by Kevan (1955).

Ecology and biology.—One generation per year in Sierra Leone, adults throughout the year except July, adults becoming adult in March and April (Phipps 1970). On Mt Kilimanjaro and the North Pare Mts nymphs are often found in herbaceous vegetation of the ground, while adults dwell on bushes and small trees.

Habitat.—See Kevan & Knipper (1961) and Kevan (1967); savanna to cultivation belt at SW Kilimanjaro (Sjöstedt 1909); see Hemp 2005a; common in coffee-banana plantations of the submontane and montane zone, ruderal vegetation and roadsides, and montane grasslands bordering bushland or forest. On Mt Hanang (1950 m), N Pare Mts (1400-1750 m), W Usambara Mts (1480 m), Chyulu Hills (1800-1900 m), and Ngong Hills (1700-2200 m) and at similar localities — mostly along the edges of the lower border of the montane forest — as on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1400-1800-2700 m.

Occurring at an altitude of 1700-4000 m on Mt Elgon (Uvarov 1938).

Remarks.—Sjöstedt (1909) also recorded *Acridium* (*Cyrtacanthacris*) *citrinum* from Mt Kilimanjaro, stating that it is frequent in the cultivation belt. Mungai (1987), in his revision of *Acanthacris*, pointed out that species status was given to color forms of *A. ruficornis*. *A. ruficornis citrina* is distributed throughout West Africa and thus it is very probable that the record of Sjöstedt (1909) refers to a color form of *A. ruficornis ruficornis*, especially since this subspecies is very frequent on the mountains, as already noted by Sjöstedt himself.

Acridoderes laevigatus Bolivar, 1889

Distribution.—Belgian Congo, Transvaal, Cape (Dirsh 1965); Tanzania.

Habitat.—Rare species within tree and bush savanna on the eastern slopes of Mt Kilimanjaro. Also in dry forests on the southern slopes of the North Pare Mts.

Altitudinal range, Mt Kilimanjaro.—900-1200 m.

Anacridium wernerellum (Karny, 1907)

Distribution.—Cape Verde Is., Mauritania, French Guinea, French Sudan, Sudan, N Nigeria, Ghana, Chad, Ethiopia, Uganda, Kenya, Tanzania, Nyasaland, Belgian Congo, Zambia, Mozambique (Dirsh 1965).

Habitat.—Rare species in savanna bushland and tree savanna on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1300 m.

Cyrtacanthacris tatarica tatarica (Linné, 1758)

Distribution.—Whole African continent except N. Africa and Sahara, SW Asia, S Asia, Sri Lanka, Thailand, Hainan, Philippines, Sumatra, Madagascar, Seychelles (Dirsh 1965).

Recorded from Mt Kilimanjaro by Sjöstedt (1909), Ritchie (1936) and Kevan (1955).

Ecology and biology.—Nymphal development in savanna grasslands, dispersion to higher zones after adult emerges.

Habitat.—Kevan & Knipper 1961; Kevan 1967; very common in savanna grasslands of the colline zone. Adults also found in *Hyparrhenia* grasslands to the submontane zone and *Bulbostylis* grasslands of the montane zone, as well as in afro-alpine tussock grasslands.

Altitudinal range at Mt Kilimanjaro.—900-1200-1800 m and 2400-3100 m.

Remarks.—*C. tatarica* occurs on Mt Kilimanjaro from the savanna to the lower border of the montane forest belt. Adults pass the forest belt and are found again in the afroalpine zone of the mountain to altitudes of 3100 m. However, nymphs of this species were only found in colline and submontane grasslands.

Ornithacris cyanea (Stoll, 1813)

Distribution.—Zimbabwe, Mozambique, Transvaal, Natal, Zululand, Malawi, Zambia, Botswana, Ethiopia, Uganda, Kenya, Tanzania, Central African Republic, Congo, Zaire (Dirsh 1965); Rwanda, Angola (Dirsh 1966); South Africa, Namibia (Mungai 1987a).

Recorded by Sjöstedt (1909) as *Ornithacris magnificum var. orientalis* from Mt Kilimanjaro.

Habitat.—Lower cultivation belt SW Kilimanjaro (Sjöstedt 1909); rare species of savanna and *Hyparrhenia* grassland, especially on the eastern slopes of Mt Kilimanjaro

Altitudinal range, Mt Kilimanjaro.—1100-1500 m.

Schistocerca gregaria gregaria (Forskål, 1775)

Distribution.—Whole of Africa, SW Asia (Dirsh 1965).

Recorded from Mt Kilimanjaro by Sander (1902) and by Sjöstedt (1909) as *S. peregrina*.

Remarks.—Not found during the study.

Subfamily Acridinae

Acrida bicolor (Thunberg, 1815)

Distribution.—Mediterranean area including islands, Canary Isl., Africa in most countries south of the Sahara, Asia Minor (compiled from: Dirsh 1966; Dirsh 1970; Johnston 1968 in Johnsen 1991a; Roy 1971 in Johnsen 1991a; Johnston 1956 in Johnsen 1991a; Lecoq 1978 in Johnsen 1991a; Johnsen 1984; Johnsen 1991a). Recorded from Mt Kilimanjaro by Kevan (1955).

Habitat.—Common in savanna and *Hyparrhenia* grasslands, road sides and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1200-1800 m.

Acrida sulphuripennis (Gerstäcker, 1869)

Distribution.—Ethiopia, Sudan, Uganda, Kenya, Tanzania, Zanzibar, Zaire, Mozambique, Zimbabwe, South Africa, Senegal, Ghana, Togo (Dirsh 1965), Angola, Malawi (Dirsh 1966), Sierra Leone, Cameroon, Nigeria, Namibia (Johnston 1956 in Johnsen 1991a), Mali, Lesotho (Johnston 1968 in Johnsen 1991a), Botswana, Gambia, Somalia, Liberia, Guinea, Zambia (Johnsen 1991a). Recorded for Kilimanjaro by Sjöstedt (1909).

Ecology and biology.—Occurring from September to December in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925).

Habitat.—See Kevan & Knipper 1961; common in savanna and *Hyparrhenia* grasslands, roadsides and ruderal vegetation; adults spread uphill during the hot season of the year to the lower border of the montane forest.

Altitudinal range, Mt Kilimanjaro.—900-1000-1800 m.

Cannula gracilis (Burmeister, 1838)

Distribution.—Africa south of the Sahara (Baccetti 1977).

Recorded for Kilimanjaro by Sjöstedt (1909) as *Calamus linearis* Saussure.

Ecology and biology.—Adults in March, September to December (Sjöstedt 1909).

Habitat.—Savanna grassland, tree savanna and "Obstgartensteppe" SW-Kilimanjaro (Sjöstedt 1909); uncommon in savanna and *Hyparrhenia* grasslands, especially on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1100-1300-1700 m.

Occurring at an altitude of 2210 m Mt Elgon (Uvarov 1938).

Coryphosima stenoptera stenoptera (Schaum, 1853)

Distribution.—Africa south of the Sahara (Baccetti 1997).

Recorded for Kilimanjaro by Sjöstedt (1909) as *Paracomacris deceptor* and as *Rodunia deceptor f. kilimana* again by Sjöstedt (1931). Kevan (1955) recorded *Paracomacris centralis centralis* from Kware Hill. *C. centralis* was synonymized under *C. stenoptera* by Dirsh (1970).

Ecology and biology.—Abundant in October and November, nymphs in September and January (Sjöstedt 1909).

Habitat.—See Kevan & Knipper 1961. Common and widespread species in Sierra Leone, can be found everywhere amongst grass, short or long, including all roadsides and patches of grass in forest (Phipps 1970). From the savanna to the cultivation belt at SW Kilimanjaro (Sjöstedt 1909); Hemp 2005a; rare in savanna grasslands, common in *Hyparrhenia* grasslands of the submontane zone and very common, building up high population densities in *Bulbostylis* grasslands of the montane zone; found on open patches with vegetation everywhere in the cultivation belt; rarely also a species of tussock grasslands of the moorland zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1200-1800-1900 m, 2500-3100 m.

Remarks.—Species with the largest altitudinal span on Mt Kilimanjaro.

Sjöstedt (1931) stated *C. stenoptera* is, in terms of body size, a geographical very variable species. He looked at series of specimens and remarked that there are transitions in sizes, indicating that these specimens all belong to one species. However, on Mt Kilimanjaro specimens of this species are so tiny they may be regarded as an distinct form. Thus he described the montane form as *Rodunia deceptor f. kilimana*. This tiny form occurs on the southern slopes of Mt Kilimanjaro at an elevation of 1700-1900 m, mainly in *Bulbostylis* grasslands and again above the montane forest belt in the upper montane zone. Molecular studies would be of interest to show whether the large form of *C. stenoptera* occurring in the colline to submontane zone is different from the small form of higher elevations.

Duronion chloronota (Stål, 1876)

Distribution.—Whole African continent except N. Africa and Sahara, Madagascar (Dirsh 1965).

Recorded for Kilimanjaro by Sjöstedt (1909) as *Phlaeoba tricolor* and as *Duronion tricolor* by Kevan (1955).

Ecology and biology.—Grass feeders (Phipps 1970); rare species occurring in June at about 900 m and in March in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925).

Habitat.—In long grass near a river in Sierra Leone (Phipps 1970); uncommon on Mt Kilimanjaro, occurring mainly in the colline zone in savanna grasslands, more rarely also in *Hyparrhenia* grasslands of the submontane zone. Occurs on Mt Hanang in montane grasslands at 2100 m, and the Nou forest reserve on montane grasslands at 1800 m. On the Ngong Hills (Kenya) at 1800 m, also on montane grasslands.

Altitudinal range, Mt Kilimanjaro.—900-1000-1700 m.

Gymnobothroides levipes (Karsch, 1896)

Distribution.—Tanzania (Dirsh 1965); Mt Meru and Mt Kilimanjaro (Jago 1968).

Described as *Chrysochraon levipes* by Karsch (1896) from Mt Kilimanjaro and recorded again by Sjöstedt (1909) as *Chortoicetes levipes*.

Ecology and biology.—Adults in January, March, October, November (Sjöstedt 1909).

Habitat.—From the savanna to the montane forest (Sjöstedt 1909); Hemp 2005a; on Mt Kilimanjaro common in *Bulbostylis* grasslands of the montane zone; also on wet grasslands of the montane zone, montane ruderal vegetation and at forest edges along the lower border of the forest; rarely in submontane and montane plantations, especially at West Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1300-1600-1700-2700 m.

Gymnobothrus cruciatus Bolivar, 1889

Distribution.—Sudan, Uganda, Kenya, Tanzania, Zanzibar, Congo, Zaire, Angola (Dirsh 1965), Zambia (Johnsen 1984), Ethiopia, Somalia (Baccetti 1997).

Recorded as *Chortoicetes fallax* by Sjöstedt (1909) from the Mts. Kilimanjaro and Meru area. Synonymously described as *Pseudochirista meruensis* by Sjöstedt (1929) for Mt Meru.

Habitat.—Very rare species of savanna grasslands at east Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m.

Gymnobothrus longicornis (Ramme, 1929)

Distribution.—Nigeria, Cameroon (Dirsh 1965); Uganda, Tanzania (Popov, 1995, unpub.); Togo, Sudan (specimens NHML)

Habitat.—Very rare species of savanna grass and bushland at the

southern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000 m.

Remarks.—Popov (1995, unpub.) listed 3 subspecies of *G. longicornis*: *G. l. ephippinotus* Jago, 1996, *G. l. sellatus* (Uvarov, 1953) and *G. l. longicornis* (Ramme, 1931) of which the latter occurs on Mt Kilimanjaro.

Gymnobothrus anchietae Bolivar, 1889

Distribution.—Zambia, Congo (Dirsh 1965).

Recorded as *Gymnobothrus gracilis* by Kevan (1955) from Mt Kilimanjaro.

Habitat.—Rare in savanna grassland, main occurrence in *Hyparrhenia* grasslands on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1200-1300-1400 m.

Occurring at an altitude of 1700-2000 m on Mt Elgon (Uvarov 1938).

Remarks.—In Popov (1995, unpub.) *G. flaviventris* is a subspecies of *G. anchietae* and *G. gracilis* a synonym of *G. anchietae anchietae*.

Gymnobothrus lineaalba Bolivar, 1889

Distribution.—Guinea, Cameroon, Tanzania, Ethiopia, Uganda, Kenya, Zaire, Angola, Zimbabwe, Transvaal, Zululand, Orange Free State (Dirsh 1965); Sudan, Zambia, Sierra Leone (Dirsh 1966); Rwanda (Dirsh 1970); Ghana (Jago 1967); Swaziland (Johnsen 1984); Malawi (Whella 1975 in Johnsen 1984); Lesotho (Johnston 1968 in Johnsen 1984); Congo (Descamps & Donskoff 1968 in Johnsen 1984); Ivory Coast (Gillon 1974 in Johnsen 1984); Nigeria (Cornes & Riley 1972 in Johnsen 1984).

Habitat.—Savanna and *Hyparrhenia* grasslands, common especially on eastern Kilimanjaro. In submontane grasslands in the North Pare Mts.

Altitudinal range, Mt Kilimanjaro.—1000-1100-1300-1600 m.

Gymnobothrus temporalis temporalis (Stål, 1876)

Distribution.—Senegal, Guinea Bissau, Mali, Guinea, Liberia, Sierra Leone, Togo, Benin, Ivory Coast, Ghana, Nigeria, Chad, Cameroon, Ethiopia, Somalia, Sudan, Uganda, Kenya, Tanzania, Congo, Zaire, Rwanda, Malawi, Zambia, Zimbabwe, Namibia, Mozambique, Botswana, South Africa (Popov, unpub.).

Recorded for Kilimanjaro by Sjöstedt (1909) as *Chortoicetes temporalis*.

Ecology and biology.—Very abundant species from August to December in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925); does not rest on bare soil as *G. flexuosus* (Phipps 1970); strategy of adult quiescence, 1-2 generations annually (Popov, unpub.). On Mt Kilimanjaro abundant especially in September to November (Sjöstedt 1909).

Habitat.—Among long grass, near bushes and thicket edges in Sierra Leone (Phipps 1970); savanna to cultivation belt at SW Kilimanjaro

(Sjöstedt 1909); Hemp 2005a; very common in savanna, *Hyparrhenia* and *Bulbostylis* grasslands, ruderal vegetation, road sides and open coffee-banana plantations of the colline and submontane zone.

Altitudinal range, Mt Kilimanjaro.—900-1000-1500-1800 m.

Occurring at an altitude of 2000-2110 m at Mt Elgon (Uvarov 1938).

Remarks.—*G. temporalis temporalis* and *G. temporalis flexuosus* are listed here separately because they are ecologically well separated. Both subspecies occur sometimes syntopically. Popov (1995, unpub.) listed both subspecies as separate species. Regrettably the paper has not been published.

Gymnobothrus temporalis flexuosus (Schulthess, 1898)

Distribution.—Distributed over East Africa (Baccetti 1997).

Habitat.—On Mt Kilimanjaro common in habitant of bush- and tree savanna, ruderal vegetation and roadsides of the colline and lower submontane zone, colline and submontane coffee-banana plantations (Hemp 2005a).

Altitudinal range, Mt Kilimanjaro.—900-1200-1800 m.

Lobopoma ambages Karsch, 1896

Distribution.—Kenya, Tanzania (Fishpool & Popov 1992); Ethiopia (Baccetti 1997).

Habitat.—Undergrowth of coconut plantation at Kifumangao (Kevan & Knipper 1961); on Mt Kilimanjaro uncommon in savanna and *Hyparrhenia* grasslands, preferably with bushes or trees.

Altitudinal range, Mt Kilimanjaro.—900-1000-1100-1800 m.

Odontomelus brachypterus (Gerstäcker, 1869)

Distribution.—Tanzania, Mt Meru (Jago 1994b); Kilimanjaro, North Pare Mts.

Habitat.—Grass in disturbed evergreen forest at altitudes of 1600 m (Jago 1994b); Hemp 2005a; uncommon in savanna and common in *Hyparrhenia* grasslands, ruderal vegetation and road sides; very common in coffee-banana plantations. Rarely in *Bulbostylis* grasslands of the montane zone.

Altitudinal range, southern slopes of Mt Kilimanjaro.—900-1000-1500-1800 m.

Orthochtha dasyncnemis dasyncnemis (Gerstäcker, 1869)

Distribution.—Kenya, Tanzania, Somalia, Ethiopia, Uganda, Botswana, Zaire, Zambia, Malawi, Zimbabwe, Angola, Mozambique, Namibia, Lesotho, South Africa, Swaziland (Popov & Fishpool 1992).

Recorded by Sjöstedt (1909) and Popov & Fishpool (1992) from Kilimanjaro.

Ecology and biology.—Very abundant species from September to December in upland (about 1500 m) Tukuyu District of Tanzania

(Miller 1925).

Habitat.—On Mt Kilimanjaro common species in savanna and *Hyparrhenia* grasslands. Also in ruderal vegetation.

Altitudinal range, Mt Kilimanjaro.—1200-1500 m (Popov & Fishpool 1992); 900-1300-1700 m.

Paracinema tricolor tricolor (Thunberg, 1815)

Distribution.—Whole of Africa except Sahara, SW Asia, S. Europe (Dirsh 1965), Comoro Isl. (Chopard 1958 in Johnsen 1991a).

Recorded from Kilimanjaro by Sjöstedt (1909) and Kevan (1955).

Ecology and biology.—Frequent on Kilimanjaro especially in November (Sjöstedt 1909); in upland (about 1500 m) Tukum District of Tanzania common from August to December (Miller 1925); see Kevan & Knipper 1961.

Habitat.—In Sierra Leone, swamps, wet grassland (Kevan & Knipper 1961); amongst long grass in damp places, usually near standing water (Phipps 1970); along riversides, swamps from the savanna to the cultivation belt at SW Kilimanjaro (Sjöstedt 1909); common in swamps, along rivers, moist grasslands and ruderal vegetation in the colline zone, uncommon in similar habitats in the submontane and montane zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1700-1800 m.

Parga cyanoptera Uvarov, 1926

Distribution.—Sudan, French West Africa, Upper Volta, Nigeria, Cameroon, Angola, Natal, Cape Province (Dirsh 1965); Zaire (Johnsen 1984); Kenya, Tanzania.

Habitat.—Rare species in savanna grasslands and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m.

Rhabdoplea munda Karsch, 1893

Distribution.—Guinea, Nigeria, Cameroon, Togo, Kenya, Sudan (Dirsh, 1965); Tanzania.

Habitat.—Very rare species found only once on the eastern slopes of Mt Kilimanjaro in the submontane zone in a *Hyparrhenia* grassland.

Altitudinal range, Mt Kilimanjaro.—1500-1600 m.

Truxalis burtti Dirsh, 1951

Distribution.—Botswana (Houston 1978 in Johnsen 1991b); Somalia, Ethiopia, Kenya, Tanzania, Mozambique, South Africa, Angola (Dirsh 1950); Zambia (Dirsh 1965); Zimbabwe, Cape Province, Namibia (Dirsh 1966); Eritrea (Baccetti 1997).

Recorded as *T. nasuta* (Linné, 1758) for Kilimanjaro by Sjöstedt (1909) and by Kevan (1955).

Ecology and biology.—Nymphal development in savanna habitats, adults also occasionally found at higher elevations.

Habitat.—Rare to uncommon in savanna grasslands and savanna bushlands with grassy patches on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1300-1800 m.

Truxalis conspurcata somalia Burr, 1902

Distribution.—Africa, South Arabia (Baccetti 1997).

Ecology and biology.—Nymphal development in savanna habitats, adults also occasionally found at higher elevations.

Habitat.—Dry savanna grassland with sparse vegetation cover near Mogadishu, Somalia (0 m a.s.l.) (Kevan & Knipper 1961); very rare to rare species on Mt Kilimanjaro, found mainly in the colline zone on open areas with sparse vegetation and on waste lands.

Altitudinal range, Mt Kilimanjaro.—900-1500 m.

Uganda kilimandjarica (Sjöstedt, 1909)

Distribution.—Kilimanjaro (Sjöstedt 1909, Dirsh 1965); endemic to the mountain.

Described from Mt Kilimanjaro as *Chrysochraon kilimandjaricus* by Sjöstedt (1909).

Ecology and biology.—Adults in February (Sjöstedt 1909). Adults from January to March (pers. observ.).

Habitat.—Endemic; uncommon species in the afro-alpine zone of Mt Kilimanjaro in tussock grasslands of the moorland zone and in *Erica trimera* bushland.

Altitudinal range, Mt Kilimanjaro.—3000-3500 m (Sjöstedt 1909); 2600-3200-4400 m.

Subfamily Oedipodinae

Acrotylus trifasciatus trifasciatus Kevan, 1961

Distribution.—Kenya, Tanzania (Kevan & Knipper 1961).

Habitat.—Rare species in savanna grasslands on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1200 m.

Acrotylus ndoloi Kevan, 1956

Distribution.—Kenya (Dirsh, 1965); Somalia (Johnsen & Schmidt 1982); Tanzania.

Habitat.—Rare species in savanna grasslands of East Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000 m.

Acrotylus meruensis Sjöstedt, 1932

Distribution.—East Africa, Somalia (Massa 2009).

Recorded as *A. longipes* by Sjöstedt (1909) and later described by Sjöstedt (1932) as *A. longipes* var. *meruensis* from Mt Meru.

Habitat.—Uncommon in savanna grasslands sparse in vegetation, along paths and earth roads, waste lands and ruderal vegetation, mainly on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1100-1300 m.

Remarks.—For differentiating characters of the complex *A. longipes/incarnatus/meruensis*, see Massa 2009.

Acrotylus patruelis (Herrich-Schaeffer, 1838)

Distribution.—Whole African continent, Canary Isl., Europe, SW Asia, Arabia, Comoro Isl., Cape Verde Isl. (Dirsh 1965, 1966, 1970; Jago 1967; Johnsen 1991a).

Recorded by Sjöstedt (1909) for Mt Kilimanjaro.

Ecology and biology.—Not very abundant species; seen only in August in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925); graminivorous (Chapman in Johnsen 1986) or ambivorous (Fishpool & Popov 1984).

Habitat.—See Kevan & Knipper 1961 and Johnsen 1986; common species in savanna grasslands sparse in vegetation, ruderal vegetation, roadsides and waste lands, more rarely in *Hyparrhenia* grasslands and waste lands of the submontane zone. Only occasionally in the montane zone.

Altitudinal range, Mt Kilimanjaro.—900-1100-1800 m.

Recorded from Ethiopia at elevations of 2000 to 2400 m (Uvarov 1934). Occurring at an altitude of 1700-2000 m at Mt Elgon (Uvarov 1938).

Aiolopus longicornis Sjöstedt, 1909

Distribution.—Uganda, Kenya, Tanzania, Zanzibar, Nigeria (Dirsh 1965); Ethiopia, Somalia, Burundi, Chad, Zaire, Rwanda (Dirsh 1970); Zambia (Hollis 1968 in Johnsen 1991a).

Described from Mt Kilimanjaro by Sjöstedt (1909) and recorded by Kevan (1955) from Kware near Moshi.

Habitat.—See Kevan & Knipper 1961; rare to uncommon species from savanna to montane habitats, then mostly in coffee-banana plantations.

Altitudinal range, Mt Kilimanjaro.—900-1100-1500-1700 m.

Aiolopus meruensis Sjöstedt, 1909

Distribution.—Distributed over east Africa to South Africa (Baccetti 1997).

Described from Mt Meru by Sjöstedt (1909).

Habitat.—Rare to uncommon in various dry to moist savanna grasslands and roadsides on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1300 m.

Aiolopus thalassinus thalassinus (Fabricius, 1781)

Distribution.—Whole of Africa, Europe, Asia (Dirsh 1965); East Asia, Australia, Madagascar, Oceania (Johnsen 1991a).

Recorded by Sjöstedt (1909) for Mt Kilimanjaro.

Ecology and biology.—Common species in September, November and February in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925); at altitudes of 1400 up to 1500 m in Ethiopia (Uvarov 1934).

Habitat.—Savanna grasslands SW Kilimanjaro (Sjöstedt 1909); common species on wet and moist grasslands, roadsides and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1200-1700 m.

Remarks.—Under-represented in this study, probably more common, especially along roadsides, waste land and more humid openland habitats, especially in the colline zone.

Gastrimargus africanus africanus (Saussure, 1888)

Distribution.—Tropical Africa and Asia (Ingrisch 1999).

Sjöstedt (1909) recorded *Gastrimargus marmoratus* from Mt Kilimanjaro, but stated (1928) that these specimens belonged to *G. africanus*.

Ecology and biology.—Adults from February to April and August, November (Sjöstedt 1909); abundant species in September in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925); only locally found at the coastal areas of Tanzania (Kevan & Knipper 1961); at altitudes of 1800 to 2100m in Ethiopia (Uvarov 1934).

Habitat.—Near thicket margins, and in open woodland, usually rests on the ground in Sierra Leone (Phipps 1970); savanna to cultivation belt at SW Kilimanjaro (Sjöstedt 1909); common in savanna and *Hyparrhenia* grasslands, roadsides and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1400-1800 m.

Gastrimargus determinatus vitripennis (Saussure, 1888)

Distribution.—Distributed in Africa south of the Sahara and the Arabian peninsula (Baccetti 1997).

Synonymously described as *G. volkensi* by Sjöstedt (1909) from Mts Kilimanjaro and Meru.

Ecology & Biology.—Rare in coastal areas of Tanzania, more frequent inland (Kevan & Knipper 1961); on the southern and eastern slopes of Mt Kilimanjaro adults spread uphill during the hot season of the year and are then found in montane grasslands of the lower border of the montane forest.

Habitat.—Common species in savanna and *Hyparrhenia* grasslands, especially on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1300-1800 m.

Gastrimargus verticalis verticalis (Saussure, 1884)

Distribution.—South Africa, Tanzania, Ethiopia, Kenya, Uganda, Sudan, Ethiopia, Somalia, Rwanda, Zaire, Zimbabwe, Madagascar (Ritchie 1982), Eritrea (Baccetti 1997).

Recorded as *G. determinatus* for Mt Kilimanjaro and Mt Meru by Sjöstedt (1909). Described again as *G. brevipes* from Mt Kilimanjaro by Sjöstedt (1928); *G. brevipes* was synonymized as *G. verticalis verticalis* by Ritchie (1982).

Ecology and biology.—Adults from November to February, nymphs in November (Sjöstedt 1909); abundant species in September in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925).

Habitat.—Savanna to cultivation belt at SW Kilimanjaro (Sjöstedt 1909); SE slope and W slope of Mt Kilimanjaro (Ritchie 1982); restricted to *Hyparrhenia* and *Bulbostylis* grasslands; common on the southern and eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1300-1900 m at SW Kilimanjaro, 1200-1800 m at N Kilimanjaro, and 1200-1500 m at W Kilimanjaro (Ritchie 1982); 1100-1400-1800-1900 m.

Heteropternis coulouiana (Saussure, 1884)

Distribution.—Somalia, Kenya, Uganda, Tanzania, Malawi, Zaire, Congo, Zimbabwe, Angola, Sierra Leone, Ghana, Togo, Nigeria, Cameroon (Dirsh 1965); Gambia (Johnsen 1982b in Johnsen 1984); Liberia (Johnsen 1971 in Johnsen 1984); Guinea (Johnsen 1984); Senegal, South Africa (Johnston 1968 in Johnsen 1984); Rwanda (Dirsh 1970); Ivory Coast (Gillon 1974 in Johnsen 1984).

Recorded for Mt Kilimanjaro by Sjöstedt (1909, 1912, 1933).

Ecology and biology.—Throughout the year in uplands (about 1500 m) Tukuyu District of Tanzania (Miller 1925); at 2000 on Mt Bambouto in Cameroon (Chopard 1945).

Habitat.—Savanna to afro-alpine zone (Sjöstedt 1909); found in subalpine meadows of Mt Kilimanjaro at 3000 m (Sjöstedt 1933); (Hemp 2005a); common species on *Bulbostylis* grasslands of the montane zone and on ruderal vegetation, more rarely on *Hyparrhenia* grasslands of the submontane zone. Also found in tussock grasslands of the afro-alpine zone on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1200-1500-1800-3400 m.

Occurring at 2000-4000 m on Mt Elgon (Sjöstedt 1933); 1700-4000 m at Mt Elgon (Uvarov 1938).

Heteropternis pudica (Serville, 1838)

Distribution.—Mauritius (Johnston 1968); South Africa (Dirsh 1965); Kenya, Mozambique, Angola, Tanzania (Dirsh 1966).

Ecology and biology.—Imago in VIII in Zambia (Johnsen 1984).

Habitat.—*Brachystegia-Isobertinia* woodland; dense shrub on mountains (Key 1930 in Johnsen 1984); very rare species in savanna grasslands at East Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1100 m.

Heteropternis pugnax Bolivar, 1912

Distribution.—Cameroon, Zaire, Angola, Zimbabwe, Zambia (Dirsh 1965); Kenya, Tanzania (Dirsh 1966); Rwanda (Dirsh 1970); Somalia (Johnsen & Schmidt 1982).

Habitat.—Rare species in savanna and *Hyparrhenia* grasslands on the eastern slopes of Mt Kilimanjaro.

Altitudinal range at Mt Kilimanjaro.—1100-1400 m.

Heteropternis thoracica (Walker, 1870)

Distribution.—Africa south of the Sahara. Somalia, Sudan, Uganda, Kenya, Tanzania, Zanzibar, Zaire, Congo, Zambia, Angola, Mozambique, Transvaal, Natal, Cape Province, Senegal, Guinea, Sierra Leone, Togo, Nigeria, Cameroon (Dirsh 1965); Ghana (Jago 1967); Botswana, Gambia, Liberia, Swaziland (Johnsen 1984); Chad (Descamps 1968 in Johnsen 1991a); Lesotho (Dirsh 1956b in Johnsen 1991a); Zimbabwe, Mali (Johnston 1968 in Johnsen 1991a); Malawi (Whellan 1975 in Johnsen 1991a); Ivory Coast (Gillon 1974 in Johnsen 1991a); Equatorial Guinea, Somalia (Johnston 1956 in Johnsen 1991a); Rwanda, Burundi (Dirsh 1970); Burkina Faso (Lecoq 1978 in Johnsen 1991a); Benin (Fishpool & Popov 1984).

Synonymously described as *Heteropternis kilimandjarica* by Sjöstedt (1909) from Mt Kilimanjaro.

Ecology and biology.—Imagines in I, III-IV and VII-X in Zambia (Johnsen 1984); food: grass, a few forbs (Chapman 1964 in Johnsen 1984), eggplant (Johnsen 1984); usually associated with bare soil, common amongst cultivation in Sierra Leone (Phipps 1970).

Habitat.—Geophilous in various ecological conditions. Grassland. In grass underlying forest. *Brachystegia-Isobertinia* woodland. On bare soil in cultivations (Phipps 1970 in Johnsen 1984). On beans, cassava and *Brachystegia* (Johnsen 1984). On Mt Kilimanjaro common in savanna grassland, uncommon in *Hyparrhenia* grasslands, especially on the eastern slopes; also found in ruderal vegetation.

Altitudinal range, Mt Kilimanjaro.—900-1000-1200-1500 m.

Humbe tenuicornis Bolivar, 1881

Distribution.—Senegal, Mali, Ghana, Nigeria, Eritrea, Somalia, Ethiopia, Malawi, Zambia, Zimbabwe, Mozambique, Natal, Transvaal, Cape Province, Angola (Dirsh 1966); Botswana, Gambia (Johnsen 1991a); Guinea, Cameroon, Burkina Faso (Johnston 1956 in Johnsen 1991a); Rwanda, Congo (Johnston 1968 in Johnsen 1991a); Chad (Descamps 1968 in Johnsen 1991a); Benin, Togo (Fishpool & Popov 1984).

Recorded for Mt Kilimanjaro by Brunner v. Wattenwyl (1894) and Sjöstedt (1909).

Ecology and biology.—Fairly common species in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925); euryoecious (Kevan & Knipper 1961); at altitudes of 1600-1800 m in Ethiopia (Uvarov 1934).

Habitat.—Kevan & Knipper 1961; common in savanna and *Hyparrhenia* grasslands and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1200-1400 m.

Jasomenia sansibara (Karsch, 1896)

Distribution.—Ethiopia, Kenya, Zambia, Zimbabwe, Belgian Congo (Dirsh 1965); Tanzania (Kevan 1955); Eritrea, Somalia (Baccetti 1997); distributed over tropical Africa (Baccetti 1997).

Recorded as *J. dimidiata* (Bolívar, 1909) by Kevan (1955) from Mt Kilimanjaro.

Habitat.—Similar habitat demands as *Paracinema tricolor tricolor*; found in wet locations with sedges (Kevan & Knipper 1961); burnt coastal grasslands near Pangani, Tanzania (Hemp 2005b); a rare species of lush savanna grasslands, usually in wet grasslands on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1100 m.

Locusta migratoria migratorioides (Reiche & Fairmaire, 1849)

Distribution.—Africa south of the Sahara (Johnsen 1991a; Eades & Otte 2009).

Habitat.—Rare in savanna grasslands sparse in vegetation and in *Hyparrhenia* grasslands on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1600 m.

Morphacris fasciata (Thunberg, 1815)

Distribution.—All of Africa, southeast Asia and S. Europe (Dirsh 1965, 1966, 1970, Jago 1967, Johnsen 1991a, Baccetti 1997).

Recorded for Mt Kilimanjaro by Brunner v. Wattenwyl (1894), Kirby (1902), Sjöstedt (1909, 1912), and Kevan (1955).

Ecology and biology.—Very abundant species in November in uplands (about 1500 m) Tukuyu District of Tanzania (Miller 1925); widespread amongst grass, especially on bare patches in Sierra Leone, probably continuous breeding (Phipps 1970); recorded from Ethiopia at altitudes of 1600 to 2100 m (Uvarov 1934).

Habitat.—Kevan & Knipper 1961; savanna to cultivation belt (Sjöstedt 1909); (Hemp 2005a) very common geophilous species indicating disturbed habitats; found on Mt Kilimanjaro in all habitats with open patches sparse in vegetation from the colline to the montane zone.

Altitudinal range, Mt Kilimanjaro.—900-1800-2500 m.

Oedaleus flavus somaliensis (Sjöstedt, 1931)

Distribution.—Somalia, Kenya, Uganda, Sudan, Tanzania (Ritchie 1981); Ethiopia (Baccetti 1997).

Diet.—*O. flavus* recorded as pest of tobacco in Malawi (Ballard 1914 in Ritchie 1981).

Habitat.—Uncommon in savanna grasslands on Mt Kilimanjaro, especially on the eastern slopes.

Altitudinal range, Mt Kilimanjaro.—900-1000-1100-1200 m.

Remarks.—A species which is present only in years with sufficient precipitation, especially during El Niño years.

Oedaleus instillatus Burr, 1900

Distribution.—Somalia, Ethiopia, Kenya, Tanzania (Ritchie 1981). Recorded from Mt Meru by Ritchie (1981).

Habitat.—Very rare in grasslands on the western side of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1300-1400 m.

Oedaleus nigeriensis Uvarov, 1926

Distribution.—Senegal, French Sudan, French West Africa, Ghana, Niger, Nigeria, Upper Volta, Cameroon, Sudan, Uganda, Kenya, Angola (Dirsh 1965); Tanzania, Zaire, Mali, Kenya, Ethiopia, Mauritania, Togo, Central Afr. Rep., Congo Rep., Comoro Isl., Gambia, Chad, Botswana (Johnsen 1986).

Diet.—Records of attack on millet, rice, groundnuts, sweet potato, tobacco, yams, maize and cabbage (Johnsen 1986).

Habitat.—Geophilous; in open grassland, and in grassland with scattered trees, along roadsides, in meadows, dense dry forest, flood plains, semi-arid lands, fallows, in *Eucalyptus* groves. Along streams and rivers, on sea shore (Johnsen 1986); very rare species on Mt Kilimanjaro, found in savanna grasslands on the eastern slopes.

Altitudinal range, Mt Kilimanjaro.—1100-1200 m.

Oedaleus senegalensis (Krauss, 1877)

Distribution.—Distributed over Africa and most parts of Asia (Baccetti 1997).

Recorded for Mt Kilimanjaro by Sjöstedt (1909).

Ecology, biology, diet and habitat.—See Batten (1969), Lecoq (1978), Launois (1979), Launois-Luong (1976), Ritchie (1981), Venkatesh *et al.* (1971), Voßeler (1902), Abushama & El Khider (1973), Nickerson (1958), and Roy (1970); all cited in Ritchie (1982), Kevan & Knipper 1961; on Mt Kilimanjaro in savanna grasslands and ruderal vegetation; adults spread to higher altitudes during the warm period of the year; nymphal development in the colline zone.

Altitudinal range, Mt Kilimanjaro.—900-1100-2000 m.

Remarks.—A species which builds up local rich populations especially in years with sufficient precipitation (*e.g.*, during El Niño years).

Pyncodictya galinieri galinieri (Reiche & Fairmaire, 1850)

Distribution.—Southwest Arabia, East and South Africa (Ingrisch 1999).

Recorded by Sjöstedt (1909) for Mt Meru.

Habitat.—Kevan & Knipper 1961; uncommon in savanna grasslands and grassland patches in bushland savanna.

Altitudinal range, Mt Kilimanjaro.—900-1100-1800 m.

Sphingonotus turkanae Uvarov, 1938

Distribution.—Ethiopia, Kenya (Dirsh 1965); Somalia, Socotra, South Arabia (Uvarov 1957); Tanzania.

Ecology and biology.—Not found every year, probably only emerging for nymphal development under suitable weather conditions. Males make a sexual display by buzzing their wings displaying their blue color.

Habitat.—Very rare species in savanna grasslands, very sparse in vegetation on Mt Kilimanjaro. In same habitat between Mt Longido and northern foothills of Mt Meru.

Altitudinal range, Mt Kilimanjaro.—1000-1100 m.

Remarks.—Only found occasionally on regularly visited plots in some years, especially during December-February, this while it was not being recorded during other years at these same times of the year.

Trilophidia conturbata (Walker, 1870)

Distribution.—Recorded for most African countries south of the Sahara and Arabia (Hollis 1965, Dirsh 1966, 1970, Johnsen 1991a, Baccetti 1997).

Recorded as *T. annulata* by Sjöstedt (1909, 1933) for Mt Kilimanjaro.

Habitat and biology.—Always associated with bare soil or sand in Sierra Leone; probably continuous breeding (Phipps 1970); cultivation belt SW Kilimanjaro (Sjöstedt 1909); geophilous species of ruderal vegetation, occurring sparsely in vegetation and along roadsides on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1100-1500 m.

Remarks.—Under-represented in this study. A common species of bare open ground, e.g., on earthen roads and waste land of the colline zone.

Subfamily Gomphocerinae

Aulacobothrus dorsatus (Bolivar, 1912)

Distribution.—Ethiopia, Kenya, Tanzania, Zambia, Angola, Zimbabwe, South Africa, Transvaal (Hollis 1966).

Habitat.—Rare species of savanna grasslands, mainly on the eastern slopes of Mt Kilimanjaro.

Altitudinal range at Mt Kilimanjaro.—1100-1200-1400 m.

Brachycrotaphus sjostedti Uvarov, 1932

Distribution.—Kenya, Tanzania (Dirsh 1965).

Described from Mt Kilimanjaro by Uvarov (1932).

Habitat.—Common species in savanna and *Hyparrhenia* grasslands, mainly on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1200-1400 m.

Brachycrotaphus tryxalicerus (Fischer de Waldheim, 1853)

Distribution.—S Europe, Senegal, Gold Coast, Nigeria, Cameroon, Chad, Belgian Congo, Tanzania, Transvaal (Uvarov 1932); Ethiopia, Sudan, Kenya, Zimbabwe, Mozambique, Namibia, French Guinea, Ghana (Dirsh 1965).

Recorded from Kilimanjaro by Sjöstedt (1909) and Kevan (1955).

Habitat.—Rare species in savanna grasslands on the eastern slopes of Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1000-1200-1300 m.

Dnopherula obliquifrons (Bolivar, 1912)

Distribution.—Uganda, Kenya, Congo, Tanzania, Zambia, Angola (Hollis 1966).

Habitat.—Rare species in savanna grasslands at West Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1400-1500 m.

At 1800 m in "Obstgartensteppe" on Mt Kitumbeine.

Mesopsis laticornis (Krauss, 1877)

Distribution.—Africa south of the Sahara (Dirsh 1966, 1970, Jago 1967, Johnsen 1991b).

Recorded from Kilimanjaro by Sjöstedt (1909).

Habitat.—Rare species in savanna and *Hyparrhenia* grasslands and ruderal vegetation at Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1300-1800 m.

Minihippus reductus (Uvarov, 1941)

Distribution.—Kenya, Tanzania (Jago 1996).

Habitat.—Very rare species on Mt Kilimanjaro, only found once in ruderal vegetation.

Altitudinal range, Mt Kilimanjaro.—1000-1100 m.

Ochrilidia gracilis nyuki (Sjöstedt, 1909)

Distribution.—Ethiopia, Kenya, Tanzania (Dirsh 1965); Socotra (Jago 1977).

Described by Sjöstedt (1909) as *Platypterna* (*Ochrilidia*) *nyuki* for Mt Meru and recorded by Kevan (1955) as *Ochrilidia nyuki* from Kware Hill on the southern slopes of Mt Kilimanjaro.

Habitat.—In savanna grasslands between Mt Meru and Mt Longido, in grassland on the northern slopes of the North Pare mountains. Rare species in savanna grasslands on the eastern side of Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m.

Pnorisa squalus squalus (Stål, 1860)

Distribution.—Distributed throughout Africa south of the Sahara (Jago 1996).

Synonymously described for Kilimanjaro by Sjöstedt (1909) as *P. montium*.

Habitat and phenology.—Very common species in savanna and *Hyparrhenia* grasslands and ruderal vegetation. Moderately abundant from July to September in upland (about 1500 m) Tukuyu District of Tanzania (Miller 1925). On Mt Kilimanjaro a very common species in savanna and *Hyparrhenia* grasslands, also in ruderal vegetation.

Altitudinal range, Mt Kilimanjaro.—900-1300-1500 m.

Recorded from altitudes of 1060 to 1800 m in Ethiopia (Uvarov 1934). Occurring at 1700-2210 m at Mt Elgon (Uvarov 1938).

Remarks.—Sjöstedt described (1909) *P. montium* from Mt Kilimanjaro and Meru localities. In 1938 Sjöstedt described the subspecies *P. montium elgonensis* from Mt Elgon, which Dirsh (1970) subsequently synonymized with *P. squalus*. However, Dirsh (1970) did not mention the subspecies *P. montium montium*. Jago (1996) in his review of the eastern African genera of the *Dnopherula* complex omitted mention of *P. montium*, obviously assuming it was synonymized with *P. squalus*. *P. squalus* is a variable species in respect to size and color and therefore was synonymously described several times.

Rhaphotittha levis Karsch, 1896

Distribution.—Mali to Ethiopia, Kenya, Tanzania, Mozambique, South Africa (Jago 1996).

Synonymously described as *R. meruensis* (variety "*virgulatus*") and *R. nyuki* (variety "*marginellus*") by Sjöstedt (1909) from Mt Kilimanjaro and Mt Meru

Habitat.—Savanna near river at Mt Meru, plantation belt SW Kilimanjaro (Sjöstedt 1909); common species on Mt Kilimanjaro in savanna and *Hyparrhenia* grasslands and ruderal vegetation.

Altitudinal range, Mt Kilimanjaro.—900-1100-2000 m.

Remarks.—*R. levis* occurs in two varieties: the variety "*marginellus*" with straight almost parallel lateral carinae and the variety "*virgulatus*" with a constricted prozona (Jago 1996).

Rhaphotittha subtilis Karsch, 1896

Distribution.—Kenya, Tanzania (Dirsh 1965).

Habitat.—Uncommon in bush and grassland savanna on Mt Kilimanjaro, especially its eastern slopes.

Altitudinal range at Mt Kilimanjaro.—1000-1200-1400 m.

Stenohippus maculifemur Jago, 1996

Distribution.—Ethiopia, Kenya, Somalia (Jago 1996); Tanzania.

Habitat and phenology.—Present every month except January, with peaks in April-May and September-October, corresponding with rainfall maxima near the equator (Jago 1996); in savanna grass-

lands of eastern Kilimanjaro, preferring open patches. Adults also in January.

Altitudinal range, Mt Kilimanjaro.—900-1100-1200 m.

Stenohippus trochilus Jago, 1996

Distribution.—Kenya (Jago 1996); Tanzania.

Habitat.—Grass plains, thornbush with bare ground, stream side, mosaic woodland, slopes below cliffs with woodland, sparse vegetation (Jago 1996); confined to habitats at or above 300 m (Jago 1996); in savanna grasslands and ruderal vegetation on Mt Kilimanjaro.

Altitudinal range, Mt Kilimanjaro.—900-1800 m.

Stenohippus xanthus (Karny, 1907)

Distribution.—Somalia, Sudan, Uganda, Kenya, Mauritania, French West Africa, Aïre, Nigeria, Cameroon (Dirsh 1965); Ethiopia, Benin, Burkina Faso, Mali, Niger, Senegal, Oman, Pakistan, Yemen, Saudi Arabia, Muscat, Iran (Jago 1996); Tanzania.

Habitat.—In thorn scrub, savanna grassland, on bare ground, coconut farms, flood plains, *Combretum/Commiphora/Acacia* woodland, lush grass and herbs, roadsides, fixed dune, cultivated grassland (Jago 1996); on Mt Kilimanjaro in savanna habitats.

Altitudinal range, Mt Kilimanjaro.—1000-1200 m.

Stenohippus sp.

Distribution.—Tanzania; Mt Kilimanjaro.

Habitat.—Only found at one locality on eastern Kilimanjaro on open patches devoid of vegetation within bush savanna.

Altitudinal range, Mt Kilimanjaro.—1100-1200 m.

Remarks.—Morphologically, *Stenohippus* species are difficult to identify. Easier is separating them by their songs. However, in this study habitats of *Stenohippus* were not sufficiently investigated, so that the genus *Stenohippus* may be under-represented.

Discussion

Mt Kilimanjaro harbors 139 Caelifera species. This is about 25% of the Caelifera fauna recorded for Tanzania (Johnsen & Forchhammer 1975, Eades & Otte 2009 and various literature mentioned in the species list). Six species (4%) of Caelifera are endemic to Mt Kilimanjaro (Table 5). Mt Kilimanjaro is connected with Mt Meru by a submontane ridge running from West Kilimanjaro to East Meru, enabling an exchange of colline and submontane elements, while the montane and alpine zones of the mountains are separated under present-day climate. Thus both mountains share seven endemic species of the colline and submontane zones. Together with these species the share of endemic species of the Caelifera fauna of Mt Kilimanjaro comes to 9.4%.

The majority of Caelifera species found on Mt Kilimanjaro are widespread, fully alate savanna species. Due to clearing of forest on the slopes of Mt Kilimanjaro, many species, formerly restricted to

colline openland are found today at higher elevations (see Hemp & Hemp 2008b). In some savanna species only the adults spread to higher elevations during the hot and dry time of the year upon the southern slopes of the mountain. To this group belongs, for example, *Cataloipus oberthuri*, *Acrida sulphuripennis*, *Truxalis burtti*, *Diabolocantops axillaris*, *Gastrimargus determinatus vitripennis*, *Gastrimargus africanus* and *Oedaleus senegalensis*. Nymphs of these species are found exclusively in grasslands of the colline and lower submontane zone on the southern slopes, while adults move uphill, sometimes even reaching grasslands at the lower border of the montane forest (see Hemp & Hemp 2003). The huge and very flight-active *Cyrtacanthacris tatarica*, even manages to pass the montane forest belt and is then found in tussock grasslands of the moorland zone at elevations of over 2700 m. However, some species adapted to higher elevations, moving upslope with anthropogenic opening of the forest, even manage to perform nymphal development at higher elevations: such as the pyrgomorphids *Chrotogonus hemipterus*, *Zonocerus elegans* and *Atractomorpha acutipennis*, or the oedipodines *Trilophidia conturbata*, *Morphacris fasciata*, and *Acrotylus patruelis*.

With the aid of historical data it is even possible to observe an elevational upshift of an endemic of the Mts Kilimanjaro-Meru area. Sjöstedt (1909) recorded *Ixalidium sjostedti* on Mt Kilimanjaro as an inhabitant among litter in savanna habitats, mixed forest and the cultivation belt. Sjöstedt stated that it was most common in semishade of the cultivation zone, which he defined beginning at about 1000 m upwards to the lower border of the montane forest at about 1900 m. Nowadays *I. sjostedti* can only be found occasionally in remnants of colline forest, and is otherwise rare in the colline and lower submontane zone. The forest type which Sjöstedt (1909) described as "mixed forest" is now cleared away, replaced by banana-coffee plantations. *I. sjostedti* was recorded during this study, occurring more frequently from 1300 m upwards at the southern slopes of Mt Kilimanjaro, with its main area of occurrence to elevations of 1800 m. Compared with the records of Sjöstedt (1909) this is several hundred meters higher than 100 years ago.

Due to a different precipitation regime on the northern slopes of Mt Kilimanjaro, vegetation is different on that side of the mountain: the ecological zones are positioned several hundred meters higher on the mountain's northern side than on its southern slopes (see Table 1). Thus grasslands of the colline zone reach up to 1600 m and the submontane zone up to 2000 m. This difference is reflected also in Caelifera species typically occurring at lower elevations in grasslands of the colline and submontane zones on the southern slopes. Thus species such as *Eyprepocnemis plorans* (having a second maximum of occurrence at 1700 m, as per the records of the northern slopes), *Trichocatantops villosus*, *Phymeurus granulatus*, *Catantops momboensis*, *Acrida sulphuripennis* and many other grassland species, occur several hundred meters higher on the northern slopes (Table 3).

This upshift of savanna openland species was also observed on other mountains of East Africa where, either due to insufficient precipitation on the northern sides of the mountains or because of the anthropogenic opening of forest savanna grassland, communities reach up to 1800 m and higher, e.g., on Mt Kenya, the Ngong Hills, the Chyulu Hills, the Taita Hills and Mt Sabuk in Kenya or the North and South Pare Mts., Mt Meru, the Monduli Range, Mt Kitumbeine or Mt Hanang in Tanzania.

Acknowledgements

I am much obliged to Dr. Nick Jago (Acridomorpha) for the initial help to identify acridoids, and Mr. Hendrik Devriese (Tetrigidae) for identifying Saltatoria collected on Mt Kilimanjaro. I am grateful for the support of Mrs. Judith Marshall and George Beccaloni, both Natural History Museum London, Dr. Eliane de Coninck, Tervuren, and Mr. Michael Mungai, National Museums Nairobi, for enabling my work in the collection of the Museums. Many thanks to Bruno Massa for reviewing the paper minutely. Part of this research received support from the Synthesys Project <http://www.synthesys.info/> which is financed by the European Community Research Infrastructure Action under the FP6 "Structuring the European Research Area Programme", enabling me to visit the Natural History Museum London, UK and the Africamuseum, Tervuren.

References

- Baccetti B. 1997. Notulae orthopterologicae. 52. La collezione de ortotteri acridimorfi dell'Africa orientale conservata nel museo civico di storia naturale G. Doria di Genova. Annali del Museo Livico di Storia Naturale Giacomo Doria 91: 227-292.
- Baccetti B., Hollis D. 1966. Orthoptera-Acridoidea (Notulae Orthopterologicae, XXIII). Monitore zoologico italiano (Suppl.) (Italian Journal of Zoology) 74: 273-284.
- Bolívar I. 1884. Monografía de los Pirgomorfinos. Anales de la Sociedad Española de Historia Natural 13:1-73, 418-500.
- Bolívar I. 1904. Notas sobre los pirgomórfidos (Pyrgomorphidae). IV. Taphronotinae. V. Phymateinae. Boletín de la Real Sociedad Española de Historia Natural 4: 393-418.
- Braun-Blanquet J. 1964. Pflanzensoziologie. Springer, Wien.
- Brunner v. Wattenwyl C. 1894. Orthoptera, pp. 348-349. In: Baumann O. (Ed.): Durch Massailand zur Nilquelle, Berlin.
- Bullen F.T., MacQuaig R.D. 1969. In: Williams J.R. et al. (Eds) Pest of Sugar Cane: 391-409. London.
- Burr M. 1899. Essai sur les Eumastacides. Anales de Historia Natural 28: 75-112, 253-304, 345-50.
- Butani D.K. 1961. Annotated list of insects on sugar cane in India. Indian Journal of Sugar Cane Research 5: 126-127.
- Chopard L. 1921. Voyage de M. Guy Babault dans L'Afrique Orientale Anglaise. Orthopteres 1-64.
- Chopard L. 1943. Contribution a l'étude des Orthopteroïdes du Nord de l'Afrique (4e note). Revue Française d'Entomologie 9: 144-146.
- Coutts H.H. 1969. Rainfall of the Kilimanjaro area. Weather 24: 66-69.
- Descamps M. 1977. Monographie des Thericleidae (Orthoptera Acridomorpha Eumastacoidea). Musée Royal de L'Afrique Centrale-Tervuren, Belgique. Annales 8, Sciences Zoologiques 216. 475 S.
- Dirsh V.M. 1965. The African Genera of Acridoidea. Antilocust Centre, London. 579 pp.
- Dirsh V.M. 1966. Acridoidea of Angola. Museo do Dundo. Publicações culturais de Companhia de Diamantes de Angola 74: 15-511.
- Dirsh V.M. 1970. Acridoidea of the Congo (Orthoptera). Musée Royal de L'Afrique Centrale, Tervuren, Belgique. Annales 8 Sciences Zoologiques 182. 605 pp.
- Eades D.C., Otte D. 2009. Orthoptera Species File Online. Version 2.0/3.5. <<http://Orthoptera.SpeciesFile.org>>.
- Ferreira G.DaV. 1964. Catálogo dos Ortópteros de Mocambique. Revista de Entomologia de Moçambique 7: 217-296.
- Fishpool L.D.C., Popov G.B. 1984. The grasshopper faunas of the savannahs of Mali, Niger, Benin and Togo. Bulletin de L'Í.F.A.N. 43: 275-410.
- Gerstäcker A. 1869. Beitrag zur Insektenfauna von Zanzibar. II. Archiv für Naturgeschichte 35: 201-23.
- Gerstäcker A. 1872. Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin 3: 35-37.

- Gerstäcker A. 1873. Insecta. In: Baron Carl Claus von der Decken's Reisen in Ost-Afrika in den Jahren 1859-1865, 3: 33-49; 438-70.
- Green S.V. 1998. Revision of the African grasshopper genus *Parepistaurus* Karsch 1896 (Orthoptera Acrididae Coptacridinae). *Tropical Zoology* 11: 259-332.
- Grunshaw J.P. 1991. A revision of the grasshopper genus *Heteracris* (Orthoptera: Acrididae: Eyprepocnemidinae). *Natural Resources Institute (NRI)* 38: 1-106.
- Grunshaw J.P. 1995. The taxonomy of *Tylotropidius* Stal 1873 and related genera (Orthoptera Acrididae Eyprepocnemidinae). *Tropical Zoology* 8: 401-433.
- Grunshaw J.P. 1996. A taxonomic revision of the genus *Leptacris* Walker 1870 and allied genera (Orthoptera: Acrididae: Hemiacridinae). *Journal of Orthoptera Research* 5: 131-157.
- Günther K. 1979. Die Tetrigoidea von Afrika südlich der Sahara (Orthoptera: Caelifera). *Beiträge zur Entomologie* 29: 7-183.
- Harz K. 1975. Die Orthopteren Europas II. *Series Entomologica* 11:1-939, 3519 figs.
- Hemp A. 2001. Ecology of the pteridophytes on the southern slopes of Mt. Kilimanjaro. Part II: Habitat selection. *Plant Biology* 3: 493-523.
- Hemp A. 2005. Continuum or zonation? Altitudinal diversity patterns in the forests on Mt. Kilimanjaro. *Plant Ecology* 184: 27-42.
- Hemp A. 2006a. Vegetation of Kilimanjaro: hidden endemics and missing bamboo. *African Journal of Ecology* 44: 305-328.
- Hemp A. 2006b. The banana forests of Kilimanjaro. *Biodiversity and conservation of the agroforestry system of the Chagga Homegardens*. *Biodiversity and Conservation* 15: 1193-1217.
- Hemp A. 2008. Introduced plants on Kilimanjaro: Tourism and its impact. *Plant Ecology* 197: 17-29.
- Hemp C. 2005a. The Chagga Home Gardens — relict areas for endemic Saltatoria Species (Insecta: Orthoptera) on Mt. Kilimanjaro. *Biodiversity and Conservation* 125: 203-210.
- Hemp C. 2005b. The influence of fire on Saltatoria diversity in coastal habitats near Pangani, Tanzania (East Africa). *Ecotropica* 11: 53-61.
- Hemp C. 2009. Revision of the East African genus *Chromothericles* (Orthoptera: Eumastacoidea: Thericleidae): data on morphology, distribution, habitat and the description of four new species. *Journal of Orthoptera Research* 18: 127-136.
- Hemp C., Hemp A. 2003. Saltatoria coenoses of high altitude grasslands on Mt. Kilimanjaro, Tanzania (Orthoptera: Saltatoria). *Ecotropica* 9: 71-97.
- Hemp C., Hemp A. 2008a. A new *Usambilla* (Sjöstedt) species from the north-western highlands of Tanzania and distribution data on the genus *Usambilla*. *Journal of Orthoptera Research* 17: 37-42.
- Hemp C., Hemp A. 2008b. The Chagga homegardens on Kilimanjaro. *IHDP Update. Magazine of the International Human Dimensions Programme on Global Environmental Change*: 12-17.
- Hemp C., Hemp A., Wägele J.W. 2009. Biogeography, coenology, habitat and morphology of the East African genus *Parasphena* Bolivar, 1884 (Orthoptera: Pyrgomorphidae) and the description of a new species from north-western Tanzania. *Journal of Orthoptera Research* 18: 113-119.
- Hemp C., Schultz O., Hemp A., Wägele J.W. 2007. New Lentulidae species from East Africa (Orthoptera: Saltatoria). *Journal of Orthoptera Research* 16: 85-96.
- Hochkirch A. 1996. Habitat Preference of Grasshoppers (Orthoptera: Acridoidea, Eumastacoidea) in the East Usambara Mountains, NE Tanzania, and their use for Bioindication. *Ecotropica* 2: 195-217.
- Hollis D. 1965. A revision of the genus *Trilophidia* Stal (Orthoptera: Acridoidea). *Transactions of the Royal Entomological Society London* 117: 245-262.
- Hollis D. 1966[1965]. A revision of the genus *Dnopherula* Karsch (Orth. Acridoidea). *EOS, Revista española de Entomología* 41: 267-329.
- Hollis D. 1970. A revision of the genus *Tristia* (Orthoptera: Acridoidea). *Journal of Natural History* 4: 457-480.
- Hollis D. 1971. A preliminary revision of the genus *Oxya* Audinet-Serville (Orthoptera: Acridoidea). *Bulletin of the British Museum (Natural History) Entomology* 26: 269-343.
- Ingrisch S. 1999. Orthopteroid insects of Jemen. *Esperiana* 7: 349-376.
- Jago N.D. 1966. A key, check list and synonymy to the species formerly included in the genera *Caloptenopsis* I. Bolivar, 1889, and *Acorypha* Krauss, 1877. *EOS, Revista española de Entomología* 42: 397-462.
- Jago N.D. 1967. A key to the grasshopper species (Orthoptera: Acridoidea) recorded from Ghana. *Transactions of the Royal Entomological Society of London* 119: 235-266.
- Jago N.D. 1968. New East African taxa in the genus *Gymnobothroides* (Acridinae: Acrididae: Orthoptera). *Notulae Naturae Philadelphia* 417: 1-14.
- Jago N.D. 1977. Revision of the genus *Ochridia* Stal, 1873, with comments on the genera *Sporobolius* Uvarov, 1941 and *Platypternodes* I. Bolivar, 1908. *Acrida* 6: 163-217.
- Jago N.D. 1981. A revision of the genus *Usambilla* Sjöstedt (Orthoptera, Acridoidea) and its allies. *Bulletin of the British Museum (Natural History) Entomology* 43: 1-38.
- Jago N.D. 1994a. Review of the genus *Oxya* I. Bolivar, 1914 and its close allies in the genera *Neritius* I. Bolivar, 1914 and *Paraneritius* gen. nov. in Eastern Africa (Orthoptera, Acrididae, Eyprepocnemidinae). *Journal of Orthoptera Research* 3: 43-54.
- Jago N.D. 1994b. *Odontomelus* I. Bolivar 1890 (Orthoptera Acridoidea Acrididae Acridinae): savanna-woodland grasshoppers with a major radiation of flightless species in Eastern Africa. *Tropical Zoology* 7: 367-450.
- Jago N.D. 1996. Review of Western and Eastern African genera of the *Dnopherula* complex (Orthoptera, Acridoidea, Gomphocerinae) with description of new genera and species. *Journal of Orthoptera Research* 5: 69-124.
- Jago N.D., Masinde S.K. 1968. Aspects of the ecology of the montane evergreen forest near Amani, East Usambaras. *Tanzania Notes and Records* 68: 1-30.
- Johnsen P. 1982a. Acridoidea of Zambia. Part 1: 1-81. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1982b. Acridoidea of Zambia. Part 2: 82-162. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1982c. Acridoidea of Zambia. Part 3: 163-241. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1984. Acridoidea of Zambia. Part 5: 267-354. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1986. Acridoidea of Zambia. Part 6: 355-442. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1987. Acridoidea of Zambia. Part 7: 443-505. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1990. Acridoidea of Botswana. Part 1: 1-129. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1991a. Acridoidea of Botswana. Part II: 130-284. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P. 1991b. Acridoidea of Botswana. Part III: 285-372. *Zoological Laboratory, Aarhus University, Denmark*.
- Johnsen P., Forchhammer P. 1975. Checklist of the Acridomorpha of Tanzania. *Natura Jutlandica* 18: 26-52.
- Johnsen P., Schmidt G.H. 1982. Notes on, and a checklist of Acridoidea (Saltatoria) collected in Somalia (East Africa). *Italian Journal of Zoology* 16: 69-119.
- Johnston H.B. 1956. *Annotated catalogue of African grasshoppers*. 833 pp. Cambridge.
- Johnston H.B. 1968. *Annotated catalogue of African grasshoppers*. Supplement. 448 pp. Cambridge.
- Karny H. 1907. Ergebnisse der mit Subvention aus der Erbschaft Treilt unternommenen zoologischen Forschungsreise Dr Franz Werner's nach dem aegyptischen Sudan und Nord-Uganda. IX. Die Orthopteren-fauna des Aegyptischen Sudans und von Nord-Uganda (Saltatoria, Gressoria, Dermaptera) mit besonderer Berücksichtigung der Acridoideengattung *Catantops*. *Sitzungsberichte der Österreichischen Akademie der Wissenschaften Wien* 116: 267-378.

- Karny H. 1915. Ergebnisse der Forschungsreise des Herrn Dr. Adalbert Klapotcz nach Französisch Guinea. Orthoptera und Oothecaria. Zoologische Jahrbücher. (Systematik) 40: 119-46.
- Karsch F. 1888. Beiträge zu Bolivar's Monografia de los Pirgomorfinos. Entomologische Nachrichten Berlin 14: 328-335.
- Karsch F. 1896. Neue Orthopteren aus dem tropischen Afrika. Stettiner Entomologische Zeitung 57: 242-359.
- Kevan D.K.McE. 1950. Orthoptera from the hills of South-East Kenya. Journal of the African Natural History Society and Natural Museum 1947-1948. 21: 3-22.
- Kevan D.K.McE. 1955. East African Blattodea, Phasmatodea and Orthoptera. Ergebnisse der Deutschen Ostafrika-Expedition 1951/52, Gruppe Lindner, Stuttgart, Nr. 5. Beiträge zur Entomologie 5: 472-485.
- Kevan D.K.McE. 1962. Pyrgomorphidae (Orthoptera: Acridoidea) collected in Africa by E.S. Ross and R. E. Leech, 1957-1958, with descriptions of new species. Proceedings of the California Academy of Sciences 4: 227-248.
- Kevan D.K.McE. 1967. Orthoptera-Caelifera from Northern Kenya and Jubaland. IV. Acrididae s.str.: Calopteninae, Euryphyminae, Eyprepocnemidinae, Catantopinae, Cyrtacanthacridinae. Journal of Natural History 1: 75-96.
- Kevan D.K.McE., Knipper H. 1961. Geradflügler aus Ostafrika (Orthopteroida, Dermapteroida und Blattopteroida). Beiträge zur Entomologie 11: 356-413.
- Kirby W.F. 1902. List of Orthoptera from Uganda, pp. 467-468. In: Johnston H.H. (Ed.): The Uganda Protectorate 1.
- Krauss H.A. 1877. Orthoptera von Senegal, gesammelt von Dr. Franz Steindachner. Sitzungsberichte der Österreichischen Akademie der Wissenschaften. Mathematisch-Naturwissenschaftliche Klasse (Abt. 1). 76: 29-38.
- Lee R.F. 1972. A preliminary account of the biology and ecology of *Plagiotriptus* ssp. (Orthoptera: Eumastacidae). Malawi Research Institute 48: 1-100.
- Massa B. 2009. New and less known Orthoptera (Insecta) from the island of Socotra (Yemen). Zootaxa 2132: 53-64.
- Miller N.C.E. 1925. A list of Acrididae (Orthoptera) collected in the Tukuyu (New Langenburg) District, Tanganyika Territory. Annals and Magazine of Natural History 15: 618-634.
- Miller N.C.E. 1929. Acrididae collected in Tanganyika Territory. Transactions of the entomological Society London 77: 61-97.
- Mungai M.N. 1987a. A taxonomic revision of the genus *Ornithacris* based on the internal morphology of male genitalia. EOS, Revista española de Entomología 63: 153-169.
- Mungai M.N. 1987b. The African grasshopper genus *Acanthacris* (Orthoptera: Acrididae: Cyrtacanthacridinae). Journal of Natural History 21: 807-823.
- Okelo R.O. 1987. Some aspects of grasshopper feeding ecology in semi-arid *Acacia* woodland. African Journal of Ecology 25: 231-239.
- Phipps J. 1959. Studies on East African Acridoidea (Orthoptera) with special reference to egg production, habitats and seasonal cycles. Transactions of the Royal entomological Society London 111: 27-56.
- Phipps J. 1966. The habitat and seasonal distribution of some East African grasshoppers (Orthoptera: Acridoidea). Proceedings of the Royal entomological Society London (A) 41: 25-36.
- Phipps J. 1968. The ecological distribution and life-cycles of some tropical African grasshoppers. Bulletin of the entomological Society Nigeria 1: 71-97.
- Phipps J. 1970. Notes on the biology of grasshoppers (Orthoptera: Acridoidea) in Sierra Leone. Journal of Zoology London 161: 317-349.
- Popov G.B. (2005, 2007, unpublished manuscript): A review of the Acridinae s. str. (Orthoptera, Acridoidea, Acrididae) of Eastern Africa with some taxonomic changes and description of new taxa. Agricultural Resources Management Department, Natural Resources Institute, University of Greenwich.
- Popov G.B., Fishpool L.D.C. 1992. A revision of the grasshopper genus *Orthochtha* and allies (Orthoptera: Acrididae: Acridinae). Natural Resources Institute (NRI) 54: 1-153.
- Ramme W. 1929. Afrikanische Acrididae. Revisionen und Beschreibungen wenig bekannter und neuer Gattungen und Arten. Mitteilungen aus dem zoologischen Museum Berlin 15: 247-492.
- Ramme W. 1931. Ergänzungen und Berichtigungen zu meiner Arbeit "Afrikanische Acrididae" (Orth.). Mitteilungen aus dem zoologischen Museum Berlin 16: 918-947.
- Rehn J.A.G., Rehn J.W.H. 1945. A contribution to our knowledge of the Eumastacidae (Orthoptera, Acridoidea) of Africa and Madagascar. Part I. Proceedings of the Academy of Natural Sciences Philadelphia 97: 179-248.
- Ritchie A.H. 1936. Report of the Entomologist: 1935. Report Department Agriculture, Tanganyika 1935: 95-103.
- Ritchie J.M. 1981. A taxonomic revision of the genus *Oedaleus* Fieber (Orthoptera: Acrididae). Bulletin of the British Museum (Natural History) Entomology 42: 83-183.
- Ritchie J.M. 1982. A taxonomic revision of the genus *Gastrimargus* Saussure (Orthoptera: Acrididae). Bulletin of the British Museum (Natural History) Entomology 44: 239-329.
- Robertson I.A.D. 1967. Field records of Saltatorial Orthoptera collected in Western Tanzania. Proceedings of the Royal entomological Society London (A) 42: 1-17.
- Robertson I.A.D., Chapman R.F. 1962. Notes on the biology of some grasshoppers from the Rukwa Valley S.W. Tanganyika (Orthoptera, Acrididae). EOS, Revista española de Entomología 38: 51-114.
- Roffey J. 1964. Note on gregarious behaviour exhibited by *Phymateus aegrotus* Gerstäcker (Orthoptera: Acrididae). Proceedings of the Royal entomological Society (A) 39: 47-49.
- Rowell C.H.F. 1967. Experiments on aggregations of *Phymateus purpurascens* (Orthoptera, Acrididae, Pyrgomorphinae). Journal of Zoology London 152: 179-193.
- Sander L. 1902. Die Wanderheuschrecken und ihre Bekämpfung in unseren afrikanischen Kolonien. Berlin: 1-137.
- Saussure H. de 1899. Orthoptera. Abhandlungen der Senckenbergischen naturforschenden Gesellschaft. 21: 569-664.
- Schmidt G.H. 1996. The African genus *Taramassus*: taxonomy, reproduction and stridulation. Beiträge zur Entomologie 46: 67-94.
- Schultz O., Hemp C., Hemp A., Wägele J.W. 2007. Molecular phylogeny of the endemic East African flightless grasshoppers *Altiusambilla* Jago 1981, *Usambilla* (Sjöstedt 1909) and *Rhainopomma* Jago 1981 (Orthoptera: Acridoidea). Systematic Entomology 32: 712-719.
- Sjöstedt Y. 1909. 17. Orthoptera. 6. Locustodea: 125-148, 7. Acridoidea: 149-200. In: Sjöstedt, Y. (Ed.): Wissenschaftliche Ergebnisse der Schwedischen Zoologischen Expedition nach dem Kilimanjaro, dem Meru und den umgebenden Massaistepfen Deutsch-Ostafrikas 1905-1906.
- Sjöstedt Y. 1912. Über einige von Herrn Prof. E. Lönnberg in Britisch-Ostafrika eingesammelte Orthopteren. Arkiv för Zoologi 7: 1-28. 3pls.
- Sjöstedt Y. 1918. Neue Orthopteren aus Afrika und Madagaskar. Arkiv för Zoologi 12: 1-18.
- Sjöstedt Y. 1923. Acridoidea. Zoological Results of the Swedish Expedition to Central-Africa. 1921. Insecta I. Arkiv för Zoologi 15: 1-39.
- Sjöstedt Y. 1923. West- und Südafrikanische Acridiiden. Arkiv för Zoologi 15: 1-20.
- Sjöstedt Y. 1928. Monographie der Gattung *Gastrimargus* Sauss. (Orthoptera, Oedipodidae). Kongliga Svenska Vetenskaps-Akademiens Handlingar 3 6: 1-51, 11 pls.
- Sjöstedt Y. 1929. Acridiidea aus Zentralafrika gesammelt von R. Grauer während seiner Expedition 1909-1911. Arkiv för Zoologi 20 A: 1-41.
- Sjöstedt Y. 1931. Acridoidea aus Kongo und anderen Teilen von Afrika. Arkiv för Zoologi 22 A: 64pp.
- Sjöstedt Y. 1932. Orthoptertypen in Naturhistorischen Reichsmuseum zu Stockholm. 2. Acrididae. Arkiv för Zoologi 24A: 1-89, 22 pls.
- Sjöstedt Y. 1933. Sammlungen der Schwedischen Elgon-Expedition im Jahre 1920. Acrididae, Mantidae und Phasmidae. Arkiv för Zoologi 26A: 1-35.
- Uvarov B.P. 1928. Locusts and grasshoppers. A handbook for their study and control. 352 pp. London.

- Uvarov B.P. 1921. Notes on the Orthoptera in the British Museum. 1 The group of Eupreopcnemini. Transactions of the entomological Society London 1921: 106-144.
- Uvarov B.P. 1932. A revision of the genus *Brachycrotaphus* Krauss (Orthoptera Acridiidae). Societe entomologique de France. Livre du Centenaire: 285-300.
- Uvarov B.P. 1934. Entomological expedition to Abyssinia, 1926-7: Orthoptera of the families Mantidae, Gryllidae, Tettigoniidae, and Acrididae. Zoological Journal of the Linnean Society London 38: 591-614.
- Uvarov B.P. 1936. Studies in the Arabian Orthoptera I. Description of new genera, species, and subspecies. Zoological Journal of the Linnean Society, London. 39: 531-554, pl. 10-11.
- Uvarov B.P. 1938. Orthoptera III Acrididae. Mémoires du Muséum National d'Histoire Naturelle, Paris 8: 145-176.
- Uvarov B.P. 1943. African genera of the group *Oxyrrhopes* (Orthoptera: Acrididae). Annals and Magazine of Natural History, London. 11 10: 577-589.
- Uvarov B.P. 1953. Grasshoppers (Orthoptera, Acrididae) of Angola and Northern Zimbabwe, collected by Dr. Malcolm Burr in 1927-1928. Publicações culturais de Companhia de Diamantes de Angola 21: 9-217.
- Uvarov B.P. 1957. In: Uvarov B.P., Popov G.B. The saltatorial Orthoptera of Socotra. Zoological Journal of the Linnean Society, London. 43: 359-389.
- Uvarov B.P., van Someren V.G.L. 1941. Coryndon Memorial Museum Expedition to the Chyulu Hills, 1938. VIII. Grasshoppers (Orthoptera, Acrididae). Journal of the East Africa History Society 15: 171-180.
- Vesey-Fitzgerald D.F. 1964. An ecological survey of grasshoppers of the subfamily Catantopinae in eastern central Africa. Revista de Entomologia Moçambique 7: 333-378.