

**CONSERVATION STATUS OF THE ELEGANT YELLOW-BLACK
BUSH-CRICKET *MERUTERRANA ELEGANS* (ORTHOPTERA:
PHANEROPTERINAE)—A CRITICALLY ENDANGERED SPECIES
ON MOUNT KENYA**

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ABSTRACT

Two populations of *Meruterrana elegans*, a monotypic bush-cricket genus, endemic to Mount Kenya in Kenya were surveyed. The species is restricted to *Cassipourea* forest, a forest community vanishing rapidly on Mount Kenya and with it *Meruterrana elegans*, which therefore should be included to the IUCN red list of threatened species as Critically Endangered.

Keywords: Red list, insects, East Africa

INTRODUCTION

For the elegant yellow-black bush-cricket *Meruterrana elegans* Sjöstedt, 1912 (figure 1) no information is at present available except for its species description. Sjöstedt (1912) erected the new genus *Meruterrana* for four male specimens collected during an expedition of Prof E. Lönnberg through central and northern Kenya. As locality only “British East Africa: Mount Meru” was given on the labels, but in the introduction of the paper it is mentioned that all specimens were collected by Lönnberg north of Nairobi (and south of Guaso Nyiro in the North East). Ragge (1968), when compiling an index-catalogue of African Phaneropterinae, believed that Mount Meru in northern Tanzania would be the locality of *Meruterrana elegans*, but stated later in his treatment of the African Phaneropterinae with open tympana (Ragge, 1980) that he now assumed that Meru at Mount Kenya in Kenya was the true locality of this species.

The genus is monotypic. A distinctive character is a much-enlarged ventral internal apical spur on the mid tibia. The genus is morphologically related to the flightless genera *Monticolaria* Sjöstedt and *Odonturoides* Ragge, but differs from these genera by having an

additional ventral internal apical spur and the hind femur having ventral spinules (Ragge, 1980). Sjöstedt (1912) compared it with the genera *Dioncomena* Brunner von Wattenwyl and *Poecilogramma* Karsch (and the South American *Burgilis* Stål).

The aim of this study is to confirm the locality of Mount Kenya in Kenya for *Meruterrana elegans*, provide data on its habitat and assess its conservation status.



Figure 1. Male of *Meruterrana elegans*, a critically endangered species endemic to Mount Kenya in Kenya.

MATERIAL & METHODS

Botanical and orthopterological field work was carried out in 2003, 2015 and 2017. Using the Braun-Blanquet (1964) method, 15 relevés were made in montane forest communities on Mount Kenya. Special attention was given to homogeneity. The relevé size was 0.1 ha. The first relevés were taken at the lower border of the forest reserve and successively every 100 m in elevation, another inventory was conducted through the forest belt. Mount Kenya was screened in this way on the south-eastern slopes along the Chogoria Route in February 2003 (1740 m (0°14'22"S, 37°35'26"E) to 3010 m (0°09'34"S, 37°27'01"E)), along the Sirimon (2423 m (0°01'36"S, 37°14'01"E) to 2620 m (0°00'36"S, 37°14'41"E)) and Naro

Moru (2440 m ($0^{\circ}10'18''S$, $37^{\circ}08'47''E$) to 3230 m ($0^{\circ}10'05''S$, $37^{\circ}13'24''E$)) Routes on the northern slopes in November 2014 and in the Meru Forest Reserve (1746 m ($0^{\circ}06'10''S$, $37^{\circ}37'15''E$) to 2000 m ($0^{\circ}03'5''S$, $37^{\circ}34'28''E$)) on the eastern slopes in May 2017.

Orthoptera were recorded during daytime by sight and by sweeping with a net through the vegetation as well as by shaking understory trees. The species was identified with the key of Ragge (1980) and compared to the holotype in the entomological collection of the Natural History Museum Stockholm, Sweden (The following ‘hyperlink’ leads to the Orthoptera Species File (OSF) online (<http://orthoptera.speciesfile.org>) (Cigliano *et al.*, 2017) following procedures described in Cigliano & Eades (2010). Life Science Identifiers (LSIDs) are globally unique identifiers used for biodiversity data and provide a way to track and find metadata of taxa on the internet. Holotype data of *M. elegans* may be accessed at: <http://lsid.speciesfile.org/urn:lsid:Orthoptera.speciesfile.org:TaxonName:12055>).

On the Chogoria Route 3 males and 2 females were collected at 1720 m in February 2003 and 11 males and 8 females at 1750 m in May 2017 in the Meru Forest Reserve. All specimens are stored in the collection of C. Hemp, Bayreuth. One male and one female specimen caught in the Meru Forest Reserve has been deposited at the Natural History Museum London, U.K. with the numbers NHMUK 013454515 (male) and NHMUK 013454473 (female).

RESULTS

During transect studies of the vegetation and the Orthoptera fauna along the Chogoria Route on the eastern slopes of Mount Kenya we encountered this Phaneropterinae species for the first time in 2003. We detected a population of *M. elegans* in a strongly disturbed—almost secondary—forest community around 1750 m at the lower border of the montane forest. A second population—in even more degraded forest—was detected in May 2017 at 1750 m when screening the Meru Forest Reserve at the north-eastern slopes. During other surveys on the northern slopes deforested below 2000 m the species was not found (*e.g.* along the Sirimon and Naro Moru Routes). So, at present, only two populations are known for *M. elegans*, both at the lower border of the montane forest.

Forest communities

Our transect studies along the Chogoria Route and in the Meru Forest Reserve showed that *Meruterrana elegans* only occurs in *Cassipourea* forest, a forest community receiving about 1400–1800 mm annual precipitation, stretching between drier *Croton-Calodendrum* forest below 1600–1700 m and moister *Podocarpus* and *Ocotea* forests above about 1800 m. The lower slopes of Mount Kenya are densely populated these days and completely clear-felled, thus *Croton-Calodendrum* forest is present only as a very narrow band in a few spots. Figure 2 shows the area on the north-eastern slopes of Mount Kenya around the town Meru. A fenced corridor was established during the past couple of years in this area to prevent further human encroachment and to guarantee migration paths for large mammals of the area, especially to minimize human-elephant conflicts.

However, plenty of livestock was seen inside the fenced area continuing to degrade the corridor (figure 3) and numerous people openly cut trees for firewood inside the forest when our survey was conducted. Above the main road the corridor consisted of a small patch of heavily degraded *Calodendrum* forest along a river (figure 4) while further up-slope

plantations of introduced trees prevailed with large open areas of heavily grazed grasslands (figure 5). Further up-slope indigenous but disturbed *Podocarpus* forest followed.



*Figure 2. Map of the Meru area on the north-eastern slopes of Mount Kenya in Kenya. Nicely seen is the corridor as a narrow band with heavily disturbed patches of forest and agricultural areas scattered along the area. Only the lower slopes dry Croton-Calodendrum forest stretches below 1700 m. A population of *Meruterrana elegans* was found above the main road passing through the forest corridor (red dot) in an almost to bushland degraded patch of Calodendrum forest. Further up and lower down no individuals were encountered. (Source of image: Google maps, October 2017).*

The second population of *Meruterrana elegans* is known from transitional *Cassipourea-Podocarpus* forest directly at the border of the forest reserve in the area of the village Chogoria (figure 6). Here only very few individuals of *M. elegans* were noted in February 2003 when studying the Orthoptera fauna along the Chogoria Route. Only about 50 m higher in altitude in less disturbed forest no *M. elegans* were seen, suggesting that this species is at the upper limit of its ecological niche in this area. Arrows in figure 7 point to potential habitats of *M. elegans*, but these areas have not yet been screened for *Calodendrum* forest suitable for *Meruterrana*.

DISCUSSION

A molecular phylogeny of the morphologically related genus *Monticolaria* (Voje *et al.*, 2009) showed that the phylogenetically most basal species *M. kilimandjarica* Sjöstedt occurs on a geological young volcano, Mount Kilimanjaro. Kilimanjaro is not older than 1.5–2 million



Figure 3. Fenced area of the corridor further down-slope below the main road (see Fig 1).



Figure 4. Calodendrum forest remain (area of red dot on figure 1) along a river. Meruterrana was found on semi-shaded branches of bushes and small trees.



Figure 5. Area of the corridor further up (see figure 1). Mostly Cypress plantations and open heavily grazed grasslands prevail here. No *Meruterrana* individuals were found here.

years (Nonnott *et al.*, 2008). However, *Monticolaria kilimandjarica*, endemic to this volcano, seems to be several million years old. The other two investigated *Monticolaria* species, *M. meruensis* Sjöstedt and *M. manyara* Hemp, had more than a 12% genetic distance to *M. kilimandjarica*, suggesting that *Monticolaria* is an old genus, older than Mount Kilimanjaro or other volcanic mountains in the area, on which this genus is exclusively found at present (Hemp *et al.*, 2009). The same could be the case for the monotypic genus *Meruterrana*. Less reduced wings suggest that this genus might even be older than the fully flightless *Monticolaria* with strongly reduced wings. Only further investigation, especially on the molecular phylogeny, will bring light into the question why a monotypic genus is present on a geologically young volcano. So this colourful phaneropterine species, *Meruterrana elegans*, should not only be protected since it is a unique species endemic to Mount Kenya, but also because such species may help to understand large scale speciation patterns.

Only two populations of *M. elegans* are known at present. One of them very likely will disappear during the next few years (Meru Forest Reserve) and the known area of occupancy is estimated to be less than 10 km² (Criteria B2a and b and E of the IUCN Red List 2017). Thus *M. elegans* should be listed as Critically Endangered on the IUCN Red List to hopefully give it more attention for better conservation measures.

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Figure 6. Map in area of Chogoria Route on eastern slopes of Mt Kenya, Kenya. Red dots indicates where *Meruterrana* individuals were found. This population is located at 1750 m at the border where the Cassipourea forest changes to moister Ocotea forest (however Ocotea is depleted in this area and replaced by most secondary pioneer tree species). Only very few individuals of *M. elegans* were seen in this area (Source of image: Google maps, October 2017).

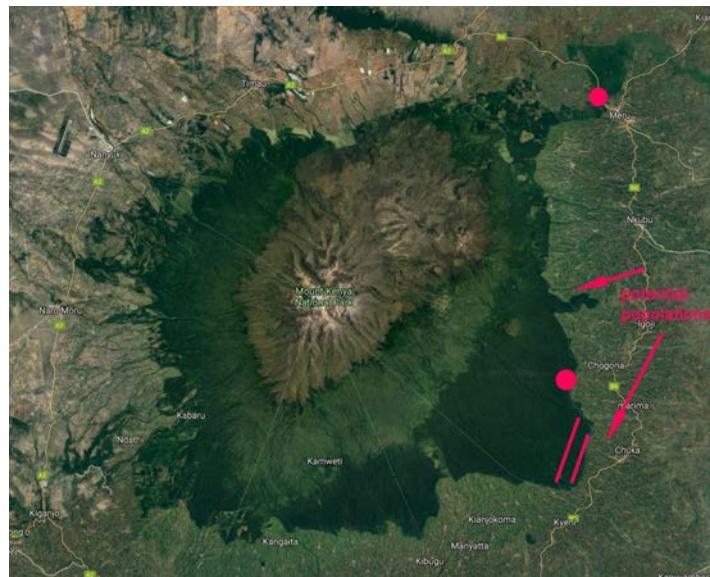


Figure 7. Satellite image (source: google maps, October 2017) of Mt Kenya. The red dots indicate the two known populations of *M. elegans*. Arrows point to further potential populations of *M. elegans*.

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