



A new species of *Philoscirtus* (Orthoptera: Phaneropteridae: Mecopodinae) from the West Usambara Mountains of Tanzania and its conservation status

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Abstract

A new *Philoscirtus* species, *P. viridulus* n. sp. from forests of the West Usambara Mountains is described and the genus revised. Both species of the genus are known from few localities only. Their habitats are under pressure due to an increasing human population in the East and West Usambara Mountains. Both taxa should be included thus in the IUCN red list of globally threatened taxa to attract more attention to the importance of small forest patches. The biogeographical distribution of species from West Usambaran forests is discussed indicating on one hand that there must have been isolating mechanisms within the West Usambara Mountains and that part of the observed biodiversity in flightless Orthoptera is due to speciation processes not older than approximately 2 million years.

Key words: new species, distribution, habitat, acoustics, chromosomes, speciation, conservation

Introduction

Philoscirtus was monotypic with *P. cordipennis* Karsch restricted to the East Usambara Mountains and coastal Tanzania around Tanga (Karsch 1896, La Baume 1911). This species is known from few specimens only stored in the Naturkunde Museum Berlin, Germany and in the Natural History Museum London, UK. Except for locality data noted on the labels no further information on this genus was known.

One aim of this study is to review the genus *Philoscirtus* and to describe a second species. Data on habitat, bioacoustics and chromosomes are provided and the biogeography of the genus discussed. The forest area of Lutindi, in which the new species was found is of special biogeographical interest and another aim of this paper is to highlight the importance of the small forest patches in this part of the West Usambara Mountains for biodiversity.

Material and methods

Measurements. The total body length refers to the body length of the insect from head to the tip of the abdomen including the male subgenital plate in males but without the ovipositor of the female.

Depositories. MfN: Museum für Naturkunde, Zentralinstitut der Humboldt-Universität zu Berlin. One male paratype of *P. viridulus* n. sp. remains in the collection of C. Hemp.

Acoustics. Songs were recorded in the laboratory using a digital batdetector (Pettersson D1000X) with sampling rates between 100 and 192 kHz. Song measurements and sonograms were obtained using AMADEUS II and AMADEUS Pro (Martin Hairer; <http://www.hairersoft.com>). Oscillograms of the songs were prepared using TURBOLAB (Bressner Technology, Germany). All recordings were made at temperatures of about 20°C. The

(Phaneropterinae), a new *Eulioptera* and one new *Amytta* (Meconematinae) species were collected. The biogeographical pattern and the relationship of the Orthoptera fauna recorded in Lutindi now allows some insight into time scales and mechanisms of speciation in the area. The Lutindi forest, situated intermediary between lowland and montane forests harbours a mix of species from the East Usambara Mountains on one hand and forest reserves such as the Mazumbai forest reserve (Fig. 8) of higher elevations (Hemp *et al.*, in prep).

Philoscirtus species are poorly collected, only the Naturkunde Museum Berlin (MfN) and the Natural History Museum London (BMNH) harbour some few specimens. This group is probably so rarely collected because both known species are night active, are very sensitive to disturbance and both are probably canopy dwellers. When studying the specimens from the Lutindi forest and the sole male specimen from the Mazumbai forest reserve morphological differences were detected. Both Lutindi specimens of *P. viridulus* **n. sp.** have a similar subgenital plate being more slender than the one in the Mazumbai specimen. Differences in the morphology were seen also in other Orthoptera taxa occurring both in Lutindi and Mazumbai, e.g. in the monotypic phaneropterine taxon *Euryastes jagoi* (Hemp *et al.*, in prep.). Some flightless species are even represented by own, very closely related species suggesting a long isolation of these West Usambaran forests from each other. Thus in the Mazumbai forest reserve *Afroanthracites discolor* Hemp is present while Lutindi harbours *Afroanthracites pseudodiscolor* (Hemp *et al.*, 2014). Both taxa are morphologically and molecularly sister species. A molecular phylogeny calculated on three genes suggested, that the split of the taxa should be less than 2 million years old since a species endemic for the Kilimanjaro/Meru area was also investigated. These inland volcanoes are geologically young but still harbour an endemic *Afroanthracites* species. Also the bioacoustics support this assumption. The *Afroanthracites* species from Lutindi and Mazumbai are the only two species having a song that is perceivable with the human ear and not in the ultrasonic range as in all other investigated species of *Afroanthracites* so far (Hemp *et al.*, 2014) suggesting a recent evolution. Therefore it would be most interesting to analyse ecologically, acoustically and molecularly *Philoscirtus* and other flightless endemics of these forest reserves to further illuminate the climatic and vegetation history of this area which is a hotspot of biodiversity and endemism.

Most forested areas in East Africa are under strong pressure by a constantly increasing human population, exploiting forest by extracting timber and other goods, encroaching and clearing forest for agriculture. The tiny Lutindi forest and adjacent patches of submontane forest in the area and with it their endemic fauna must therefore be regarded as being highly threatened especially since the protection of these forest patches depend on the current management of the Lutindi Mental Hospital, the Lutheran Diocese (church forest) or have no conservation status at all. Species only found in this part of the West Usambara Mountains such as the here described *P. viridulus* **n. sp.** should therefore be included on the IUCN red list of globally threatened species.

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