



<http://dx.doi.org/10.11646/zootaxa.3893.4.6>

<http://zoobank.org/urn:lsid:zoobank.org:pub:B129D1F1-8F03-43BC-A5AA-FB76D6C257B0>

Description of the female and notes on distribution, habitat, nymphal development, song and chromosomes of *Tropidonotacris grandis* Ragge (Orthoptera: Phaneropteridae)

CLAUDIA HEMP^{1,5}, KLAUS-GERHARD HELLER², ELŻBIETA WARCHAŁOWSKA-ŚLIWA³
& ANDREAS HEMP⁴

¹University of Würzburg, Dept. Animal Ecology and Tropical Biology (Zoology III), Am Hubland, 97974 Würzburg, Germany.
E-mail: claudia.hemp@uni-wuerzburg.de

²Grillenstieg 18, 39120 Magdeburg, Germany

³Institute of Systematics and Evolution of Animals Polish Academy of Sciences, Kraków, Poland

⁴Department of Plant Systematics, University of Bayreuth, Germany

⁵Corresponding author

Abstract

The female of *Tropidonotacris grandis* is described and information on distribution, habitat, song, chromosomes and nymphal development of this species given. The populations of northern Tanzania all occur in deciduous dry forest, a habitat highly endangered by destruction and therefore *T. grandis* must be regarded at least as a vulnerable species according to the IUCN red list.

Key words: Phaneropteridae, distribution, habitat, acoustics, chromosomes

Introduction

The genus *Tropidonotacris* was erected by Chopard (1954) on *T. carinatus*. Both sexes of this genus may be easily recognized by the uniquely prominent median carina on the vertex and pronotum (Ragge 1980). Ragge (1957) revised the genus and described another two species, *T. amabilis* and *T. grandis*. *T. grandis*, however, remained known only from the male holotype coming from the Mahenge range of central Tanzania. Thus currently three species are known distributed throughout eastern Africa. The males are easily distinguished by the genitalia. At present only the female of *T. amabilis* is described.

Aim of this study is to describe the female of *T. grandis*, to provide information on biology, habitat, song, chromosomes and to allude to the conservation status of this species.

Material and methods

Measurements. The total body length refers to the body length of the insect without tegmina. In females the ovipositor is not included in the body length. Length of tegmina are taken from above, not considering the curvature. For the male the "total length" is given since Ragge (1957) provided this data. The total length refers to the distance from the most anterior part of the head to the tips of the flexed wings.

Depositories. MfN, Museum für Naturkunde, Zentralinstitut der Humboldt-Universität zu Berlin; BMNH, British Museum, Natural History, London, UK. All other material remains in the collection of C. Hemp.

Acoustics. Songs of one male and two females 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

Morphology, distribution and threat. *Tropidonotacris grandis* is a large Phaneropterid species with a conspicuous sexual dimorphism. Males are fully alate with normal developed tegmina and alae while females are flightless with oval-round tegmina and reduced alae. From the other two known species of *Tropidonotacris*, *T. grandis* is easily distinguished because of its large size (> 40 mm), the deeply incised male subgenital plate (Fig. 5 B) and the shape of the male cerci (Fig. 5 A). Since the holotype comes from central Tanzania (Little Mahenge, Fig. 6) the species is very likely more wide-spread occurring in suitable savanna habitats between the records Mahenge and Kilimanjaro and North Pare Mountains in northern Tanzania - and probably also covering southern Kenya in similar habitats. At night the species is easily perceivable because of the male song and was therefore collected on a deciduous dry savanna woodland in fair numbers at the southern slopes of Mt Kilimanjaro. However, in similar other savanna habitats on Mt Kilimanjaro screened for this species *T. grandis* could not be detected. Another population was found in deciduous dry forest at the southern foothills of the North Pare Mountains. This forest type is highly endangered by destruction (burning, overgrazing, conversion into agricultural fields) in Tanzania and southern Kenya and with it its typical fauna depending on this vegetation type. Thus, one reason why *T. grandis* is so rarely collected is because of its special habitat demands being dependent on deciduous dry forests. With the females being flightless a reduced mobility is assumed and therefore this species must be considered as being at least vulnerable since only three populations are known at present. Therefore this species should be included in the IUCN red list.

Acknowledgements

We gratefully acknowledge grants from the Deutsche Forschungsgemeinschaft. 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 us to visit the Natural History Museum London, UK where the types of all *Tropidonotacris* species are stored. We also thank the Commission for Science and Technology, Tanzania and the Tanzania Wildlife Research Institute, Tanzania for granting research.

References

- Chopard, L. & Kevan, D.K.McK. (1954) Orthoptera-Ensifera from northern Kenya and Jubaland. London, *Transactions of the Royal Entomological Society*, 105, 315–353.
<http://dx.doi.org/10.1111/j.1365-2311.1954.tb00767.x>
- Heller, K.-G. (1988) *Bioakustik der europäischen Laubheuschrecken*. Verlag Josef Margraf, Weikersheim, 358 pp.
- Hemp, C., Vojte, K.L., Heller, K.-G., Warchałowska-Śliwa, E. & Hemp, A. (2010a) A new genus in African Acrometopini (Tettigoniidae: Phaneropterinae) based on morphology, chromosomes, acoustics, distribution, and molecular data, and the description of a new species. *Zoological Journal of the Linnean Society*, 158, 66–82.
<http://dx.doi.org/10.1111/j.1096-3642.2009.00542.x>
- Hemp, C., Heller, K.-G., Warchałowska-Śliwa, E. & Hemp, A. (2010b) A new genus and species of African Phaneropterinae (Orthoptera: Tettigoniidae), with data on its ecology, bioacoustics and chromosomes. *Organisms, Diversity and Evolution*, 10, 215–226.
<http://dx.doi.org/10.1007/s13127-010-0013-3>
- Ragge, D.R. (1957) A revision of the genus *Tropidonotacris* Chopard, 1954 (Orthoptera) Tettigoniidae. *Proceedings of the Royal Entomological Society of London (B)*, 26, 119–122.
- Ragge, D.R. (1980) A review of the African Phaneropterinae with open tympana (Orthoptera: Tettigoniidae). *Bulletin of the British Museum (Natural History)*, 40 (2), 1–192.
- Sumner, S.G. (1972) A simple technique for demonstrating centromere heterochromatin. *Experimental Cell Research*, 75, 304–306.
[http://dx.doi.org/10.1016/0014-4827\(72\)90558-7](http://dx.doi.org/10.1016/0014-4827(72)90558-7)
- Warchałowska-Śliwa, E. (1998) Karyotype characteristics of katydid orthopterans (Ensifera, Tettigoniidae) and remarks on their evolution at different taxonomic levels. *Folia biologica (Kraków)*, 46, 143–176.