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## Identification of sand frogs (Anura: Pyxicephalidae: *Tomopterna*) from Kenya with the description of two new species

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### Abstract

African sand frogs in the genus *Tomopterna* presently include 13 species. These are known to be highly cryptic and morphologically similar. Despite increased effort in the recent past, the taxonomy of the group is still unresolved and some populations e.g. in Kenya have remained largely unstudied. This paper starts to address this gap using molecular, advertisement call and morphological comparisons. We test the boundaries of the Kenyan species based on mitochondrial 16S rRNA sequence data. Two new species are recognised and described: *Tomopterna wambensis* sp. nov. and *Tomopterna gallmanni* sp. nov. Further molecular and advertisement call studies of *Tomopterna* populations in Kenya are recommended, especially for those populations previously identified as *T. cryptotis* and *T. tandyi*.

**Key words:** Amphibia, Kenya, new species, *Tomopterna wambensis*, *Tomopterna gallmanni*

### Introduction

Sand frogs in the genus *Tomopterna* Dumeril and Bibron, 1841 occur widely in the sandy areas of Africa. Presently 13 named species are recognized: *T. cryptotis*, *T. damarensis*, *T. delalandii*, *T. elegans*, *T. kachowskii*, *T. krugerensis*, *T. luganga*, *T. marmorata*, *T. milletihorsini*, *T. monticola*, *T. natalensis*, *T. tandyi* and *T. tuberculosa* (Frost 2013). A recent study of the relationships of the group (Dawood & Uqubay 2004) indicated that there were at least two undescribed species present among their samples, one from Beira (Mozambique) and the other from Shankara (Namibia). Recent work undertaken on this genus includes descriptions of new species (Channing & Bogart 1996, Dawood & Channing 2002, Channing *et al.* 2004), studies on sand frog tadpoles (Haas *et al.* 2006), and phylogeny determination (Dawood *et al.* 2002, Dawood & Uqubay 2004). *Tomopterna* is recognized within a morphologically heterogenous but geographically coherent family, the Pyxicephalidae of Bonaparte, 1850, on the basis of molecular evidence (Frost *et al.* 2006).

These frogs are cryptic in nature and they do not present obvious morphological distinctions. Furthermore, they are widely distributed. As such, the need to investigate species boundaries and relationships using data other than morphology has been emphasized (Dawood *et al.* 2002, Zimkus & Larson 2011).

The Kenyan populations have variously been identified as *T. cryptotis* and *T. tandyi* but these identifications require more robust data to validate. In the current study, we aim to identify *Tomopterna* species from Kenya using molecular data.

### Materials and methods

**Sampling.** Fieldwork was conducted by DVW in Kenya between August 2009 and June 2010. At least three specimens were obtained from each locality. Muscle tissue was obtained using flame sterilized equipment and preserved in 95% ethanol. Five samples from Turkana were obtained from Museo di Storia Naturale dell'Università di Pavia (MCNPV), Italy, and two samples were derived from the NMK tissue collection. The

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**APPENDIX 1.** A list of taxa used in the molecular analysis, their catalogue numbers, locality information and the GenBank accession numbers for the 16S rRNA sequences. Sequences generated as part of this study are marked by an asterisk (\*).

Taxon	Voucher	Locality	GenBank 16S
<i>Pyxicephalus adspersus</i>	ZFMK 66446	KwaBonambi, South Africa	AF215505
<i>Tomopterna cryptotis</i>	no voucher	Bredell, South Africa	AF215506
<i>Tomopterna cryptotis</i>	AC 1154	Bloemfontein, South Africa	AY255099
<i>Tomopterna cryptotis</i>	AC 1100	Bubi, Zimbabwe	AY255090
<i>Tomopterna damarensis</i>	AC 1668	Khorixas, Namibia	AY255091
<i>Tomopterna damarensis</i> (as <i>T. "cf. tandyi"</i> )	no voucher	no locality (Bossuyt <i>et al.</i> 2006)	DQ347301
<i>Tomopterna damarensis</i> (as <i>T. "cf. tandyi"</i> )	ZFMK 66403	Khorixas, Namibia	AF215419
<i>Tomopterna damarensis</i>	no voucher	Khorixas, Namibia	DQ019610
<i>Tomopterna delalandii</i>	AC1134	Stellenbosch, South Africa	AY454372
<i>Tomopterna delalandii</i>	KTH 076	Anysberg, South Africa	EF136565
<i>Tomopterna delalandii</i>	AC 1114	Stellenbosch, South Africa	AY255085
<i>Tomopterna delalandii</i>	AC 944	Stellenbosch, South Africa	AY255086
<i>Tomopterna elegans</i>	MVZ:Herp:242739	Buq Village, Somalia	HQ700692
<i>Tomopterna gallmanni</i>	NMK A5045	Lewa Wildlife Conservancy, Kenya	JX088642*
<i>Tomopterna gallmanni</i>	NMK A5154/1	Mogwooni Ranch, Nanyuki, Kenya	JX088641*
<i>Tomopterna gallmanni</i>	NKM A5159	Road from Baragoi to South Horr, Kenya	JX088645*
<i>Tomopterna gallmanni</i>	NMK A5039/2	Laikipia Nature Conservancy, Kenya	JX088643*
<i>Tomopterna gallmanni</i>	NMK A5151/1	Maralal, Baawa Village, Kenya	JX088644*
<i>Tomopterna krugerensis</i>	AC 1506	Tembe Elephant Park, South Africa	AY255094
<i>Tomopterna krugerensis</i>	AC 1508	Tembe Elephant Park, South Africa	AY255098
<i>Tomopterna luganga</i>	AC 2063	Kigwembimbe, Iringa, Tanzania	AY547275
<i>Tomopterna luganga</i>	AC 2060	Dodoma, Tanzania	AY547276

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