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On the type locality of *Fornasinius fornasini* Bertoloni, 1853 (Coleoptera, Scarabaeidae: Cetoniinae)

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Abstract
The Goliath beetles are large and iconic Cetoniinae (Coleoptera: Scarabaeidae), comprising a small number of closely related genera broadly distributed across sub-Saharan Africa. The genus *Fornasinius* was erected in 1853 by Giuseppe Bertoloni to receive a new species collected by Carlo Antonio Fornasini, reportedly in Inhambane, on the southern coast of Mozambique. However, the type locality of *Fornasinius fornasini* Bertoloni, "Magnárra river", has long remained untraceable, and its traditional association with Inhambane is inconsistent with modern distributional data, which indicate that the species occurs in north-central Mozambique and southern Tanzania. Here, we integrate historical cartography, archival sources, linguistic evidence, and biogeography to reassess the identity of "Magnárra". The available evidence indicates that this name most likely corresponds to "Mangara" or "Mangarra", a now-vanished locality situated along the Mutu canal and the Quilimane (Cuacua) River in the Zambezi delta, near its confluence with the main Zambezi system in east-central Mozambique.

Key words: Goliathini; *Fornasinius*; lectotype; Mozambique; Magnárra; type locality; toponym; cartography.

Fornasinius fornasini Bertoloni, 1853

Fornasinius fornasini is exceedingly rare in collections, with only a few specimens known. Its apparent rarity may reflect a combination of factors, including the poorly surveyed distributional range and ecological adaptations inferred from related *Fornasinius* species, which are strictly associated with hyrax middens (Ajong et al. 2024).

Fornasinius fornasini has long been confused with the much better-known *Fornasinius hauseri* Kraatz, 1896 and its subspecies, and its identity has only recently been clarified (De Palma & Takano 2018; De Palma 2018). One of us designated a male lectotype and a female paralectotype from two of the four original syntypes housed at the University of Bologna, Italy (De Palma 2018). Although the syntypes lacked data labels, their identity and provenance are beyond doubt (Bertoloni 1853a). The male lectotype is illustrated in Fig. 1. The potential whereabouts of the remaining two syntypes – both females – have been discussed previously (De Palma & Takano 2018; De Palma 2018).

Identification of the type locality "Magnárra"

The type locality of *Fornasinius fornasini* has long been attributed to Inhambane in southern Mozambique. Bertoloni's original statement, "Habitat in palmetis riparum fluminis Magnárra Mozambici" (Bertoloni 1853a), clearly indicates a riverine habitat with palms, but provides no geographically resolvable reference. No river bearing this name appears on modern or historical maps in standardized form, suggesting that "Magnárra" represents either a phonetic transcription or a now-obsolete toponym.

Historical cartography provides important clues. "Magnárra" (or "Magnarrà"; Bertoloni 1864) very likely corresponds to "Mangara" or "Mangarra", a locality recorded along the Mutu canal and the Quilimane River – corresponding to the modern Cuacua distributary – within the Zambezi delta. Based on 19th-century maps (Fig. 2-3), this locality can be placed approximately 20–30 km southeast of present-day Mopeia (17.58.38S, 35.42.12E), in Zambézia Province, central Mozambique, in the low-lying

Fig. 1 – Lectotype of *Fornasinius fornasini* Bertoloni, 1853, housed at the University of Bologna (Italy).

deltaic zone near the junction of the Cuacua distributary with the main Zambezi system (Fig. 4).

The locality "Mangara" appears on several mid- to late-19th century maps, including those of Livingstone & Livingstone (1865), Burton (1873), and Johnston (1878), and as "Mangarra" in Sá da Bandeira (1867). By the 1880s, however, this locality – like many minor settlements and hydronyms in the Zambezi delta – had disappeared from British and Portuguese maps (e.g., UKHO 1882, 1884; d'Oliveira 1886), with only rare later survivals (Bianconi 1899), reflecting both cartographic standardization and the highly dynamic nature of deltaic environments, where channels, settlements, and associated toponyms frequently shifted or disappeared.

Until the late 1850s, the principal route from the coast to Sena and Tete followed the Quilimane (Cuacua) River via Quelimane, with contemporaneous maps often depicting this distributary as the main outlet of the Zambezi (Mudie 1840). The navigability of waterways in the delta – particularly the Mutu canal – was strongly seasonal. When David Livingstone traversed the region in 1855, he found the Mutu canal dry and, despite reports that the Luabo River was wider and navigable, instead followed the Cuacua River to Quelimane (Livingstone 1857). In the 1840s, this was therefore the most likely route taken by travellers moving between the coast and the interior, including naturalists and traders, and it is likely that Fornasini himself followed this route from Quelimane inland, as suggested by the itineraries and collecting localities of Wilhelm Carl Hartwig Peters in Mozambique during the same period (Bauer et al. 1995).

Fornasini's collections in Mozambique

Carlo Antonio Fornasini, an Italian trader and naturalist based in Mozambique, supplied zoological specimens to Giuseppe Bertoloni in Bologna. Bertoloni himself never visited Mozambique, and his descriptions were based entirely on material received from correspondents.

Little is known of Fornasini's travels beyond the information provided by Bertoloni and Giovanni Giuseppe Bianconi in their descriptions of Mozambican fauna and flora. Fornasini was certainly based at Inhambane and undertook three collecting "expeditions" in 1842, 1845, and 1848 (Bertoloni 1861). He appears to have shipped all his material from Inhambane (Bianconi 1850), leading Bertoloni (1857) to infer that most collecting occurred in coastal areas. Consequently, there has been a long-standing perception in the literature that Fornasini's material originated exclusively from southern Mozambique (Bianconi 1852; Peters 1882; Emery et al. 1894). Indeed, specimens from the first two expeditions likely did originate in the Inhambane region and even further south at "Baja di Lagoa" (Maputo Bay) (Bertoloni 1853b).

However, several lines of evidence indicate that Fornasini's collections were not restricted to this region. In addition to material from Maputo Bay, he sent specimens originating from the Monomotapa region ("Monomôtapa o di provincie a questa vicine"; Bertoloni 1850), corresponding to areas south of the Zambezi in present-day Zimbabwe and Tete Province, Mozambique (Wilmot 1896), a region historically associated with ivory trade (Phiri 1979). In a letter dated 9 October 1843, Fornasini stated that he had already spent 12 years in Mozambique (Bertoloni 1853b), making extensive travel within the region highly plausible. He is also reported to have travelled inland and directly interacted with local populations in the context of ivory trade (Bertoloni 1849), rather than relying exclusively on intermediaries.

Additional indirect evidence supports a more northerly origin for part of the material. Peters (1882) questioned the attribution of certain conspicuous taxa to Inhambane, notably a lizard described as *Agama armata* Peters, 1855 from Tete and Sena, which had been listed by Bianconi (1850) among Fornasini's material. Peters argued that this species, being "not easily overlooked", was absent from Inhambane despite his own prolonged stay there, and therefore must have originated from further inland. There is also a record that Fornasini obtained the distinctive

Fig. 2 – Map indicating the locality “Mangara”, from Johnston (1878).

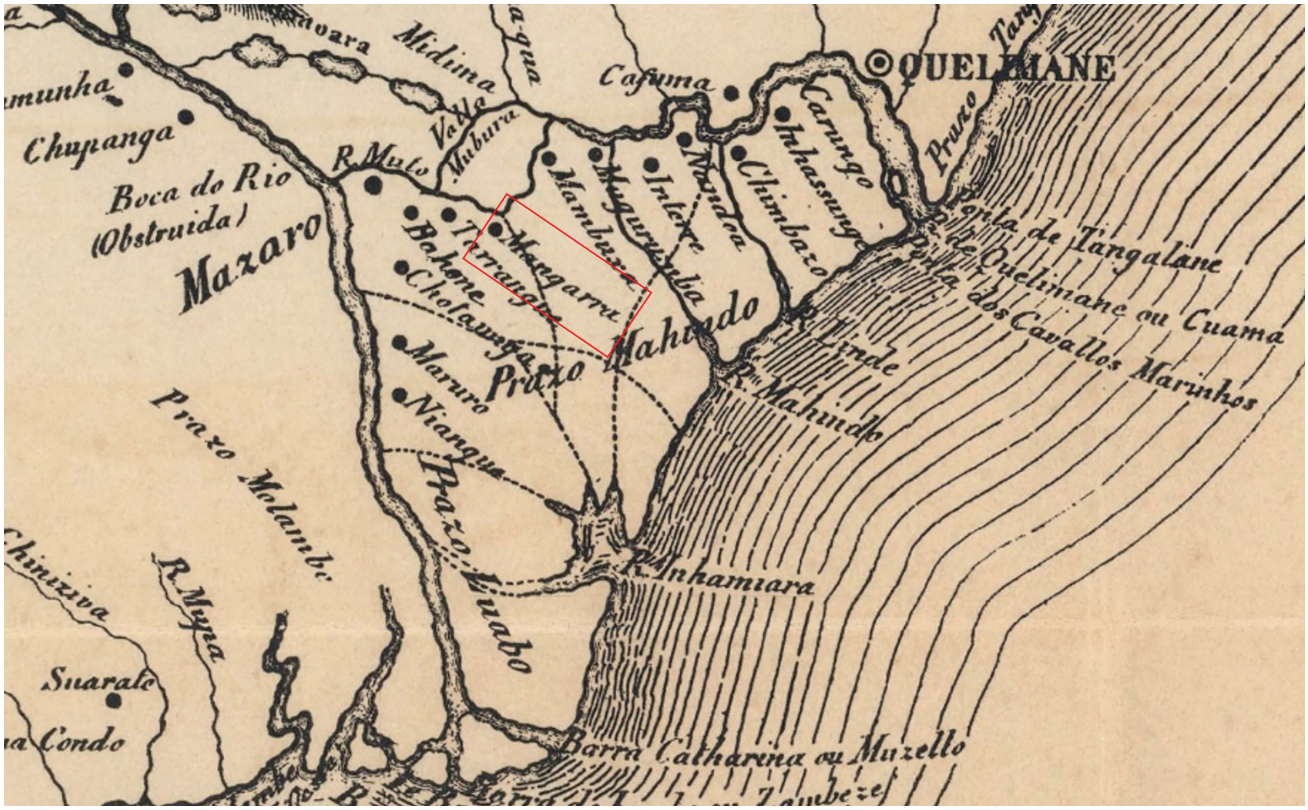

Fig. 3 – Map indicating the locality “Mangarra”, from Sá da Bandeira (1867).

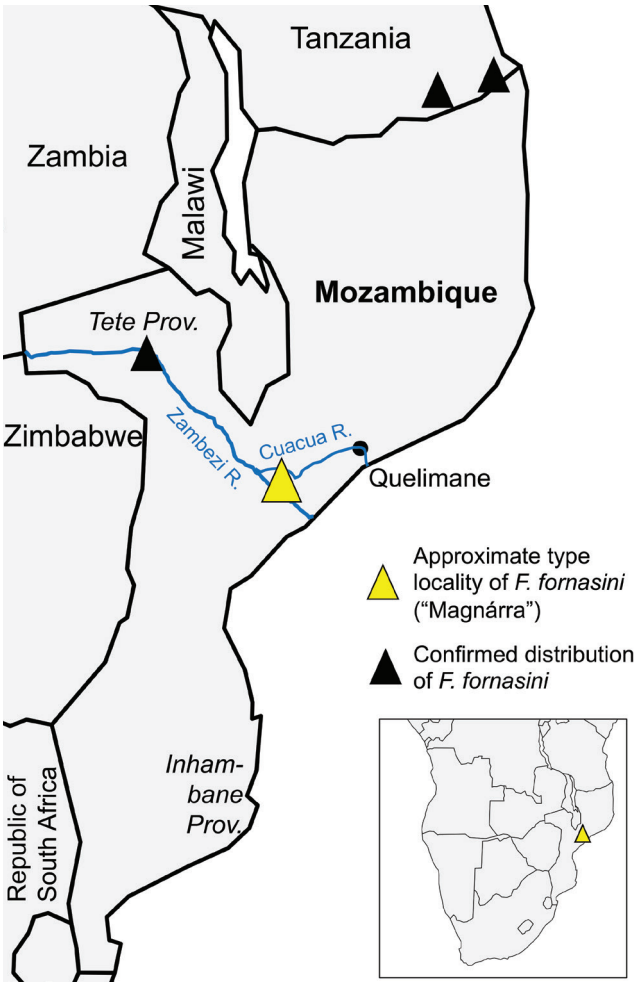

Fig. 4 – Approximate location of "Magnárra" (corresponding to the location shown in Figs. 2–3), the type locality of *Fornasinus fornasini*, in Zambézia Province, central Mozambique (yellow triangle). Additional records of *F. fornasini* are indicated by black triangles. The inset shows the approximate location of the type locality within southern Africa.

weevil *Brachycerus sacer* Latreille, 1827 from a necklace worn by a Landin individual at "città del Mozambico" (Ilha de Moçambique, Nampula Province, northern Mozambique) (Alessandrini 1845), although this locality was not repeated in later accounts by Bertoloni (1849) and may be erroneous given that the Landin people were native to regions south of the Zambezi (Livingstone 1857).

The locality "Magnárra" is associated specifically with Fornasini's third expedition (1848), and all specimens bearing this locality likely derive from a single collecting event. Bertoloni's references to this locality vary over time: initially "fluminis Magnárra Mozambici" (1853a), later "Inhambane del Mozambico, e precisamente dalle ripe del fiume Magnarrà" (1855), and "in ripis fluminis Magnárra provinciae Inhambanensis Mozambici" (1857), before being shortened to "Habui ex Inhambane Mosambici anno 1848" with an additional mention of "lungo il fiume Magnarrà" (1864). While these formulations associate "Magnárra" broadly with Inhambane, they do not demonstrate that it lies within that region. Indeed, Emery et al. (1894) explicitly distinguished between Inhambane and Magnarra as separate localities. By the early 20th century, the name could no longer be traced (Wheeler 1922).

Linguistic considerations

The interpretation of "Magnárra" as derived from "Mangara/Mangarra" is supported by phonetic considerations. European transcription of Bantu names in the 19th century was highly variable, particularly for nasal consonants. In Italian orthography, the palatal nasal /ɲ/ is represented by "gn", whereas in many Bantu languages similar sounds are rendered as "ng" or "ng'". The interchange between "Magn-" and "Mang-" is therefore entirely consistent with contemporary transcription practices. Bertoloni himself provides a clear parallel in his rendering of Lake Ngami as "Lago Gnami" (Bertoloni 1861).

Biogeographic considerations

The known distribution of *Fornasinius fornasini* (De Palma 2018; De Palma & Takano 2018) provides strong support for a central Mozambican origin of the type series. The species is reliably recorded from Tete Province and extends into southern Tanzania, corresponding to the miombo woodland and riverine systems associated with the Zambezi basin. Notably, a male specimen of *F. fornasini* is housed in the collections of the Muséum national d'Histoire naturelle, Paris, France (De Palma & Takano 2018). This specimen is the same one described and illustrated by Westwood (1874) from the collection of James Aspinall Turner under the name of *Goliathus* (*Goliathinus*) *Fornassinii*. According to Westwood (1874), the specimen was collected by John Kirk on the Zambezi River. Kirk was part of the David Livingstone Zambezi Expedition (1858–64), and many of his specimens would have been collected somewhere between Tete and Cahora Bassa in northern Mozambique (Livingstone 1865). Thus, this specimen confirms the presence of the species along the river corridor between Tete and the lower Zambezi. More recently, a few *F. fornasini* specimens have been collected in the Mtwara Region (e.g., Newala district) of southern Tanzania (De Palma 2018; De Palma & Takano 2018),

This distribution pattern (Fig. 4) is inconsistent with an Inhambane coastal origin for the type series of *F. fornasini*. Rather, the distribution of associated fauna – including taxa discussed above from the Fornasini material – suggests a central Mozambican origin within the Zambezi delta and adjacent inland regions. It is plausible that major

river systems such as the Save River delimit the southern extent of *F. fornasini*'s distribution in Mozambique.

Conclusions

Taken together, the cartographic, historical, linguistic, and biogeographic evidence indicates that "Magnárra" does not refer to any locality in Inhambane, but rather to a now-vanished site in the Zambezi delta. The most plausible identification is with "Mangara" or "Mangarra", a locality recorded on 19th-century maps along the Mutu canal and Quilimane (Cuacua) River, near its junction with the Zambezi. This interpretation resolves the long-standing ambiguity surrounding the type locality of *Fornasinius fornasini* and aligns it with both historical geography and the species' present-day distribution.

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