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The geographical pattern of distribution of the genus *Tityobuthus* Pocock, 1890, a typical Ananterinae element endemic to Madagascar (Scorpiones: Buthidae)

Schéma de distribution géographique du genre Tityobuthus *Pocock, 1890, Ananterinae endémique typique de Madagascar (Scorpiones: Buthidae)*

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ABSTRACT

New comments are proposed for the Ananterinae (sensu Pocock) or the '*Ananteris* Group'. The worldwide pattern of distribution of the elements associated with the Ananterinae, as well as aspects of their ecology, is discussed. The biogeographic patterns presented by extant and fossil elements of this group confirm not only the characteristics of a lineage representing a typical Gondwanian distribution, but correspond also to older Pangean patterns. One new species is described in the genus *Tityobuthus* Pocock. This new species is also a possible endemic element to the Island of Nosy-Be or at least to the Sambirano region. Generally, the Madagascar pattern of *Tityobuthus* is following the *Neogrosphus* rule, showing typical high species richness with low dispersal when the ancestral population had a large niche breadth.

Mots clés :
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Modèle biogéographique
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RÉSUMÉ

De nouvelles considérations sur les Ananterinae (sensu Pocock) ou le « groupe *Ananteris* » sont proposées. Le modèle très élargi de distribution des éléments associés aux Ananterinae, ainsi que des aspects de leur écologie, sont discutés. Les modèles biogéographiques présentés par des éléments, aussi bien fossiles que modernes, associés à ce groupe confirment non seulement les caractéristiques d'une lignée gondwanienne, mais aussi celles d'un groupe avec des traits datant de la Pangée. Une nouvelle espèce est décrite pour le genre *Tityobuthus* Pocock. Cette nouvelle espèce est également un possible élément endémique de l'île de Nosy-Be ou pour le moins de la région du Sambirano. Le genre *Tityobuthus* de Madagascar se conforme globalement à la « *Neogrosphus* rule » en

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montrant une richesse spécifique élevée, avec une dispersion limitée lorsque la niche de la population ancestrale était étendue.

1. Introduction

The genus *Tityobuthus* appears as a particular element within the Malagasy scorpion fauna. Despite being an endemic element to Madagascar, *Tityobuthus* has a close relationship with other genera of the Ananterinae, or '*Ananteris* Group' [1], which are only present in quite distinct geographical regions of the world. The most marked example is the genus *Ananteris* Thorell, 1891, an element of the Neotropical scorpion fauna, which, however, clearly appears as quite distinct from the other buthid elements of this fauna.

Tityobuthus was established by Pocock [2] for *Tityobuthus baroni* (Pocock, 1890) previously included in the genus *Rhoptrurus* Karsch, 1886, because this name was already preoccupied by that of a snake genus, *Rhoptrura* Peters, 1858 [3]. Confusion existed about the genera *Tityobuthus* Pocock, *Pseudobuthus* Pocock and *Odonturus* Karsch until they were revised by Vachon [3], who finally included only two species in the genus *Tityobuthus*: *Tityobuthus baroni* (Pocock, 1890) and *Tityobuthus gracilis* (Fage, 1946). The latter was originally described in the genus *Babycurus* Karsch 1886. *T. gracilis* was finally accommodated in its own genus by Lourenço [4] as *Troglotityobuthus gracilis*. Subsequently, several other species of *Tityobuthus* have been described from the island [5].

In this current paper, we bring some new insights into the biogeographic patterns presented by the genus *Tityobuthus* in Madagascar. One new species is also described, attesting to the high levels of diversity presented by this genus in Madagascar [5]. For further historical details about this genus and its increasing species richness, see Lourenço [5].

2. The Ananterinae or 'Ananteris Group'; history, composition and known distribution

As outlined in recent papers [1,6], the position of subfamilies within the family Buthidae has always been a controversial matter [7,8]. The subfamily Ananterinae was proposed by Pocock [9] to accommodate the genus *Ananteris* Thorell. Pocock wrote: 'I propose to eliminate from this subfamily (Buthinae) the isolated Neotropical genus *Ananteris*, which differs strikingly from the rest of the family in the structure of the pectines. The subfamily Ananterinae may be created for its reception'. Kraepelin [10] added Ananterinae, previously described by Pocock [9] and the Tityinae, within the Buthidae family. The definition of a subfamily Ananterinae, or of one '*Ananteris* group', remains to be decided. For more details, see Lourenço [1,6].

A number of genera may be accommodated within the Ananterinae or '*Ananteris* Group'. Some are strongly speciose, as *Ananteris*, *Tityobuthus* or *Lychas* C.L. Koch, and can be distributed over broad geographical ranges, whereas others may be represented by only one or two species such as *Lychasioides* Vachon or *Troglotityobuthus* Lourenço and are endemic to rather narrow ranges. The global extant distribution of the *Ananteris* group is tropical in South America, tropical and subtropical in Asia, Oceania

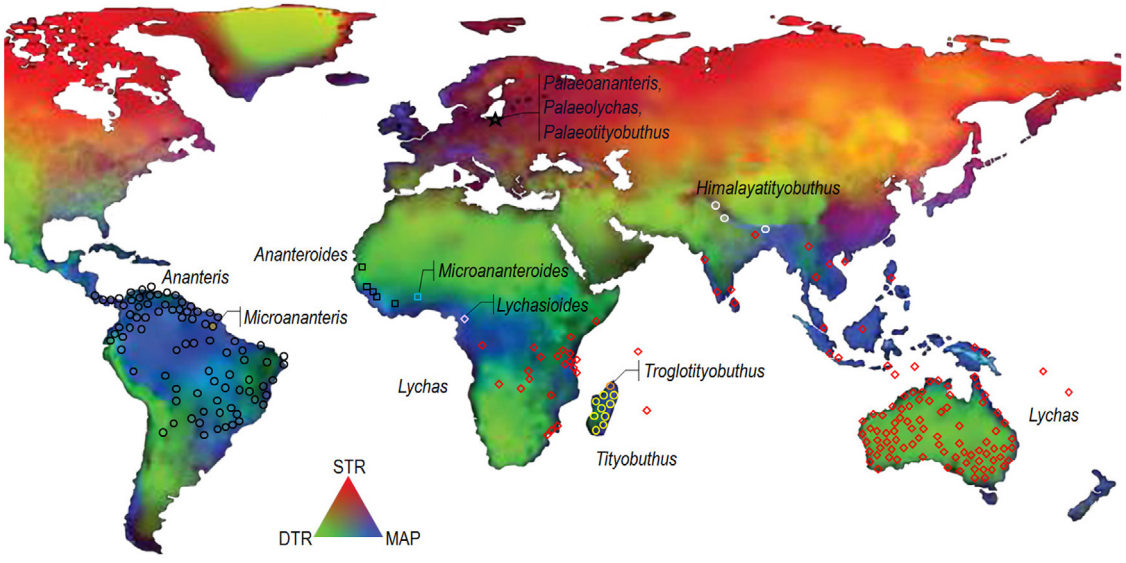

Fig. 1. Distribution of the nine genera in the *Ananteris* group, as well as the three fossil Cenozoic genera on the global map of climate variability modified from Chan et al. [11]. (STR: seasonal temperature range; MAP: mean annual precipitation; DTR: diurnal temperature range).

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