

## Clarification of the type locality of *Pandinus ulderigoi* with notes on the scorpions protected by CITES (Scorpiones: Scorpionidae)

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doi: 10.5431/aramit4905

**Abstract.** Discoveries of new species of giant scorpion (more than 14 cm in total length) are considered extremely rare. Among the largest scorpions in the world there are some species from West Africa, very popular in the pet trade and, for this reason, protected by the Washington Convention (CITES). Besides the three well-known protected species – *Pandinus imperator* (C. L. Koch, 1841), *Pandinopsis dictator* (Pocock, 1888) and *Pandinus gambiensis* Pocock, 1900 – a fourth giant species, *Pandinus ulderigoi* Rossi, 2014, was recently described from a supposedly unknown locality in the Central African Republic. Unpublished notes, just discovered, allow clarification of the exact type locality of this species. Besides newly examined material from the type locality, representative of both sexes, allows better definition of the characters of this species including its unusual trichobothrial pattern. A fifth giant species, *Pandinus roeseli* (Simon, 1872), recently revalidated from *Pandinus imperator*, is automatically included among the protected species. In light of the vulnerable status, the similar general appearance, the possibly restricted and continuous distribution with regards to the four protected species as well as the recent import suspension of *P. imperator* from Ghana, *P. ulderigoi* should be added to the *Pandinus* species protected by the Washington Convention.

**Keywords:** *Pandinopsis dictator*, *Pandinus gambiensis*, *Pandinus imperator*, *Pandinus roeseli*

Since the 19<sup>th</sup> century scientists have reported the existence of giant scorpions from West Africa (Koch 1841, Simon 1872, Thorell 1876, Becker 1880, Pocock 1888, 1900). Poor descriptions and loss of type material, in many cases generated confusion around these giant species resulting in a significant number of synonyms. The first officially described giant species of the genus *Pandinus* was published by Koch (1841) as *Buthus imperator* (now *Pandinus imperator*) based on a single adult specimen from an unknown locality, deposited in the Berlin Museum. Later, Simon described *Heterometrus roeseli* from Guinea (1872) and Becker (1880) described *Scorpio simoni* from an unknown locality. The latter two species were synonymized with *P. imperator* by Thorell (1893), but recently Lourenço (2014) revalidated the first one as *Pandinus roeseli*. According to Fet (2000), the holotype of *Pandinus imperator* is lost while the holotype of *Scorpio simoni* (now regarded as a synonym of *P. imperator*) could be deposited in the Bruxelles Museum, but in fact this type is not available (Baert pers. comm.). Even the holotype of *Pandinus roeseli*, apparently deposited in the Museum in Paris, is most certainly lost (Lourenço pers. comm.). In a major revision of the genus *Pandinus* –

including the descriptions of several new subgenera and species – Rossi (2015) elevated the subgenera of *Pandinus* defined by Vachon (1974) to genera. Thus *Pandinopsis dictator* (Pocock, 1888) remained the only species of the monotypic genus *Pandinopsis* Vachon, 1974. Among the giant species from West Africa only the two species described by Pocock (1888, 1900) are clearly diagnosed (Vachon 1967, 1974, Lourenço & Cloudsley-Thompson 1996) even with a precise distribution map (Prendini 2004, Rossi 2014a).

The large species *Pandinus imperator* (C. L. Koch, 1841), *Pandinopsis dictator* Pocock, 1888 and *Pandinus gambiensis* Pocock, 1900 are now protected by the Washington Convention and were added to the CITES list, Appendix II (Lourenço & Cloudsley-Thompson 1996) because their vulnerable status is unquestionably endangered by exportation for the pet trade, especially to Europe, the USA and Japan (Prendini et al. 2003). A fourth giant species, *P. roeseli*, was already cited among the names on the CITES list, as the protected species *Heterometrus roeseli*; in fact it was expressly mentioned together with a second synonym of *Pandinus imperator*, namely *Pandinus africanus* Thorell, 1876, among the protected names (Inskipp & Gillett 2005). Since *P. roeseli* is now regarded as a valid species, it is automatically protected by CITES, taking into account the fact that it shares the same threats as *P. imperator*. An additional species from the Central African Republic,

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submitted 15.2.2015, accepted 1.6.2015, online: 10.6.2015

recently described as *Pandinus ulderigoi* Rossi, 2014, is also of very large size, with a typical adult length of between 125 and 145 mm. Unpublished notes allow clarification here of its exact type locality: Bangui. Besides newly examined material, representative of both sexes, allow a better definition of its unusual trichobothrial pattern. In consideration of its vulnerable status, similar general appearance, and possibly restricted distribution and the recent import suspension of *P. imperator*, *P. ulderigoi* should also now be added to the list of scorpions protected by the Washington Convention.

### Material and methods

Descriptions and measurements (in mm) mostly follow, respectively, Hjelle (1990) and Sissom et al. (1990). The species *Pandinus ulderigoi* Rossi, 2014 is compared with the other four species protected by the Washington Convention and an updated identification key for these five species is proposed.

Abbreviations: ARPC = Andrea Rossi, Private Collection, Massa, Italy; BMNH = Natural History Museum, London, United Kingdom; HNHM = Hungarian Natural History Museum, Budapest, Hungary; MHNG = Muséum d'Histoire Naturelle de Genève, Switzerland; MSNM = Museo Civico di Storia Naturale di Milano, Italy; MZUF = Museo di Storia Naturale dell'Università degli Studi di Firenze, Sezione di Zoologia "La Specola", Italy.

### Material examined

*Pandinus ulderigoi* Rossi, 2014

CENTRAL AFRICAN REPUBLIC: 7 km west of Bangui, X1992, leg. R. P. L. Godart, ♀ holotype, (ARPC: 0025); without locality and data, leg. local collector, ♀, (ARPC: 0026); Bangui, 2013, leg. local collector, ♀, (ARPC: 0222); Bangui, 2013, leg. local collector, ♀, (ARPC: 0223); Bangui, 2013, leg. local collector, ♀, (ARPC: 0224); Bangui, 2013, leg. local collector, ♀, (ARPC: 0225); Bangui, 2013, leg. local collector, ♀, (ARPC: 0226); Bangui, 2013, leg. local collector, ♂, (ARPC: 0227); Bangui, 2013, leg. local collector, ♀, (ARPC: 0228); Bangui, IV2006, leg. French military, ♀, (ARPC: 0245); Bangui, 1999, leg. Gianpiccolo, ♂, (ARPC: 0210); Bangui, without data, leg. local collector, ♀, (ARPC).

*Pandinus imperator* (C. L. Koch, 1841)

LIBERIA: without locality and data, 2 ♂♂, 2♀♀ (MHNG); IVORY COAST: without locality, about 1970, ♂, (ARPC: 0243).

*Pandinus gambiensis* Pocock, 1900 [for the year of description see the note in the references]

SENEGAL: Saint Louis, 18?? [illegible data but surely before 1893], ♀, (MZUF: 1016); without locality and data, ♂, (ARPC: 0264); GUINEABISSAU: Lugadjole, Boè oriental, IX1977, dono Dr. Lacchini, ♂, (MSNM).

*Pandinus roeseli* (Simon, 1872)

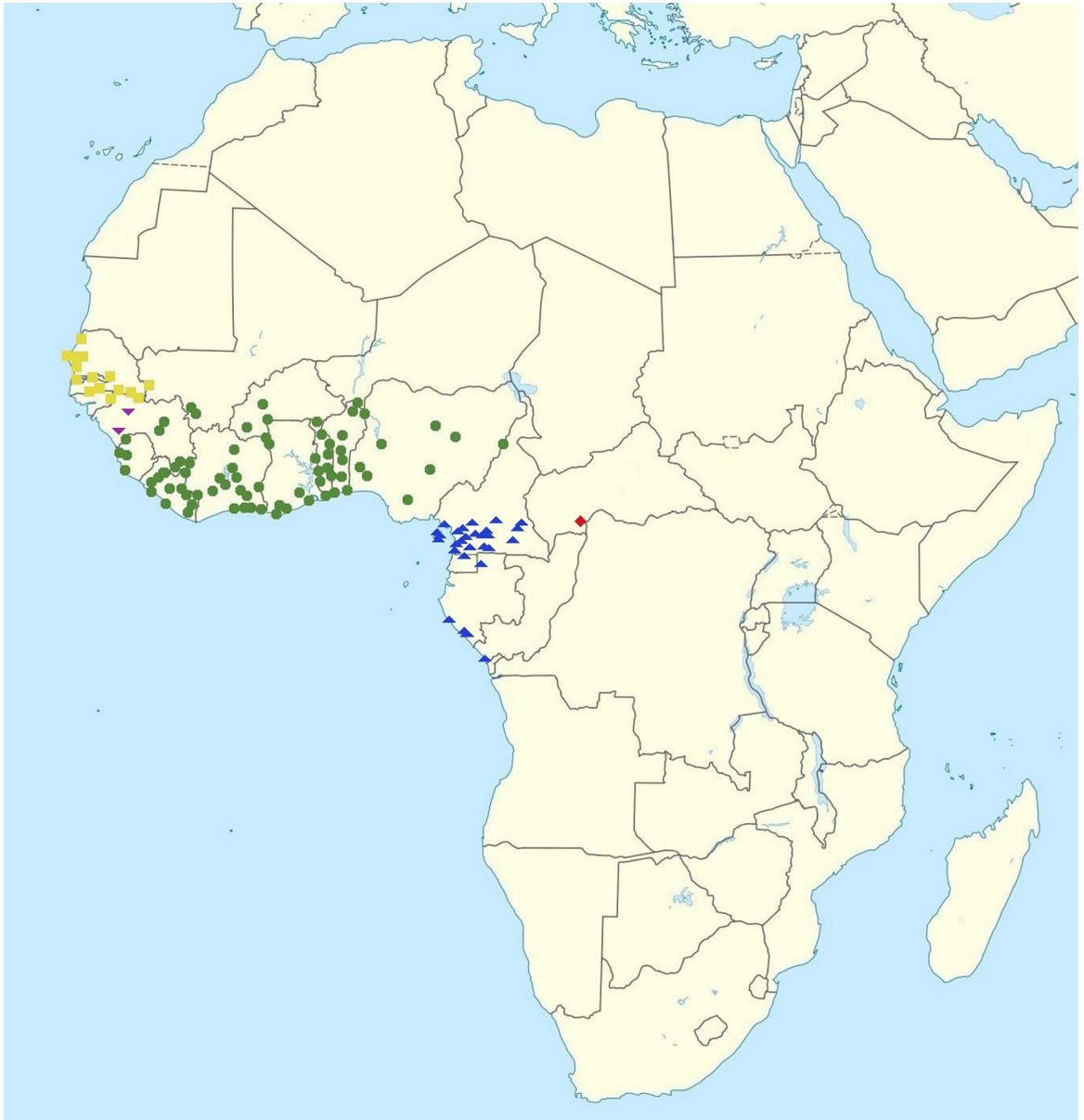
GUINEA: Fouta Djallon, leg. local collector, 1994, ♀, (ARPC: 0244).

*Pandinopsis dictator* (Pocock, 1888)

CAMEROON: without locality, 1931, leg. Dr. R. Tusek, ♂, (HNHM: 1444); Yaoundé, about 1985, leg. local collector, ♂, (ARPC: 0254); "WESTAFRICA": without locality, purchased Stevens, ♀ syntype, (BMNH: 65.33).

### Results and discussion

As explained by Rossi (2014a), *P. ulderigoi* was described from the Central African Republic, where scorpions of the genus *Pandinus* had never before been recorded, except for a single specimen of an undetermined species cited by Prendini et al. (2003). Unfortunately, when it was described, the label of the female holotype did not indicate a precise locality and thus the type locality remained unknown. A second female specimen from the Central African Republic, cited in the original description, but not included in the type series, again has a label without a precise locality. The original attached data for the holotype were only: "Rep. Centrafricana" (equivalent to "Repubblica Centrafricana", which means Central African Republic, in Italian), "X-1992" (evidently equivalent to October 1992), "R. P. G." (equivalent to "Révérend Père Godart"; in fact previously I was not able to interpret this acronym). Only recently was it possible to contact the person who gave me, in the year 1996, the specimen which eventually became the holotype of *Pandinus ulderigoi*. Thanks to the valuable help of Mr. Giuliano Russo, who kept the specimen for several years, I am now able to clarify the precise type locality of *Pandinus ulderigoi*. The specimen was collected, together with a large number of insects (mainly Lepidoptera), by Louis Godart, a French Catholic missionary, who spent 43 years of his life in the Central African Republic. The exact locality where the specimens were collected is located about 7 km west of Bangui, the capital city of the Central African Republic, in a forest near Bimbo. Thus, according to the ICZN article 76.1: "The type locality



**Fig. 1:** Map of Africa with the known distribution of the four species protected by CITES and *Pandinus ulderigoi*. Yellow square = *Pandinus gambiensis* Pocock, 1900; inverted purple triangle = *Pandinus roeseli* (Simon, 1872); green circle = *Pandinus imperator* (C. L. Koch, 1841); blue triangle = *Pandinopsis dictator* (Pocock, 1888); red rhombus = *Pandinus ulderigoi* Rossi, 2014. Data from Prendini (2004), Rossi (2014a), Lourenço (2014) and the present contribution.

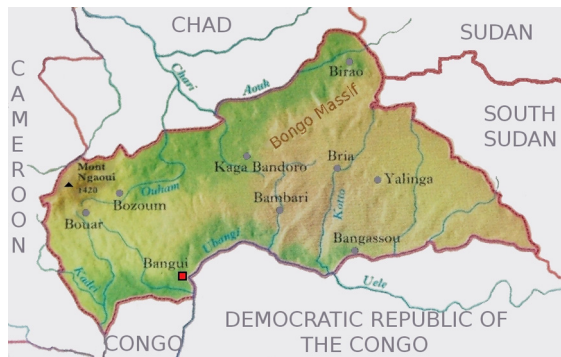
of a nominal species-group taxon is the geographical [...] place of capture, collection or observation of the name-bearing type [...]” and according to all its Recommendations such as 76A.1: “In ascertaining or clarifying a type locality [...] an author should take into account: data accompanying the original material; collector’s notes, itineraries, or personal commu-

nications; the original description of the taxon; and as a last resort, and without prejudice to other clarification, localities within the known range of the taxon or from which specimens referred to the taxon had been taken”.and 76A.2: “A statement of a type locality that is found to be erroneous should be corrected”, the type locality of *Pandinus ulderigoi* Rossi, 2014

is hereby clarified and restricted to Bangui, Central African Republic. Besides newly examined material, a representative of both sexes was collected in the region of Bangui, the type locality (Fig. 1). The locality is near the course of the Ubangi River which is the largest right-bank tributary of the Congo River and represents the political border between the Central African Republic and the Democratic Republic of the Congo: it could be a natural barrier for scorpion dispersion and thus this species may not be present in the Democratic Republic of the Congo. The distribution of *Pandinus* seems to be divided in two large areas of distribution, one in West Africa, and another in East Africa. However two recently described species, *P. ulderigoi* and *P. camerounensis* Lourenço, 2014, brought new evidence to the suggestion that species of this genus are also present in Central Africa (Rossi 2014a, Lourenço 2014). *Pandinus camerounensis* is recorded from a zone of transition between the Sahel and the savannahs in the northern Cameroon while *P. ulderigoi* in an area of transition between moist savannah and rain forest on the borders between the Central African Republic and the Democratic Republic of the Congo (Fig. 2). As reported by Lourenço & Cloudsley-Thompson (1999) and more recently by Lourenço (2014), scorpions of the genus *Pandinus* occupy well defined ecological zones in West Africa represented by dry savannah or moist rain forests. Some species of *Pandinurus* from East Africa and Yemen, previously included in the genus *Pandinus*, can also occupy semidesert habitat (Rossi 2014a, 2014b, 2014c, 2015).

#### Addition to the description of *Pandinus ulderigoi* Rossi, 2014, based on topotypes

Short diagnosis: Total length 125–145 mm. Colour of adults uniformly reddish brown to greenish black: legs coloured like body. Number of pectinal teeth 14–16 in males, 13–16 in females. Chela with 3 internal and 10–11 ventral trichobothria. The 3 internal trichobothria have the most basal (ib) separated from the other two by twice (or even more) the distance which separate the first two (it, ist). Dorsal surface of chela manus with many granules, usually not pointed, and dense setation. Spiniform formula of tarsomere II = 456/3: 56/3: 56/3: 56/3. Tarsomere II with 2 spines on the inclined anteroventral surface. Length to height ratio of 4th metasomal segment always lower than 2. Width to height ratio of 5th metasomal segment lower than 1.



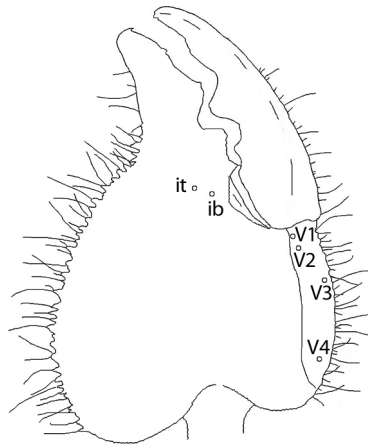
**Fig. 2:** Physical map of the Central African Republic with the type locality of *Pandinus ulderigoi* Rossi, 2014 indicated by a red square

#### Identification key for the species of scorpions in CITES list and *Pandinus ulderigoi* Rossi, 2014

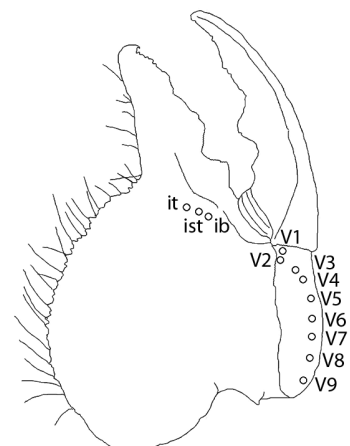
1. Chela with 2 internal and 4 ventral trichobothria (Fig. 3) ..... *Pandinopsis dictator* (Pocock, 1888) (Fig. 4)
  - Chela with 3 internal and 9–14 ventral trichobothria (Fig. 5) ..... 2
2. Internal trichobothria dispersed in a straight line and of equal distance apart (Fig. 5, 7) ..... 3
  - Internal trichobothria have the most basal (ib) separated from the other two by twice (or even more) the distance which separate the first two (it, ist) (Fig. 9, 11) ..... 4
3. Distal lamina of hemispermatophore weakly curved with basal portion larger than the distal one; presence of a tubercular structure in the apex ... *Pandinus imperator* (C. L. Koch, 1841) (Fig. 6)
  - Distal lamina of hemispermatophore not curved; completely large over its entire surface; absence of a tubercular structure in the apex ..... *Pandinus roeseli* (Simon, 1872) (Fig. 8)
4. Tarsomere II with three spines on the inclined anteroventral surface; dorsal surface of chela and metasomal carinae strongly tuberculated with spinoid granules ..... *Pandinus gambiensis* Pocock, 1900 (Fig. 10)
  - Tarsomere II with two spines on the inclined anteroventral surface; dorsal surface of chela and metasomal carinae weakly tuberculated ..... *Pandinus ulderigoi* Rossi, 2014 (Fig. 12)

(for the illustrations of the hemispermatophores, see Lourenço 2014)

**Fig. 3:** Chela of *Pandinopsis dictator* (Pocock, 1888) showing internal and ventral trichobothria



**Fig. 5:** Chela of *Pandinus imperator* (C. L. Koch, 1841) showing internal and ventral trichobothria



**Fig. 4:** *Pandinopsis dictator* (Pocock, 1888) ♂ from Cameroon, 115 mm (HNHM)



**Fig. 6:** *Pandinus imperator* (C. L. Koch, 1841) ♂ from Liberia, 180 mm (MHNG)

## Conclusions

*P. ulderigoi* can be considered as being among the largest scorpion species in the world and it could be subject to massive exportation from the Central African Republic to avoid CITES regulation, especially given that since 2012 the European Union have suspended imports of *P. imperator* from Ghana, which was the main supplier. The *Pandinus* species are not easily identified by customs officers and their continuous

geographical distribution does not help to distinguish them by their origins alone. *P. ulderigoi* can be distinguished from *P. imperator* and *P. roeseli* mainly by the different position of the internal trichobothria of the pedipalp chela. *P. ulderigoi* can be distinguished from *P. gambiensis* by the different number of spines on the inclined anteroventral surface of tarsomere II and by the spinoid granules on the dorsal surface of the pedipalp chela and on the metasomal carinae. Fi-

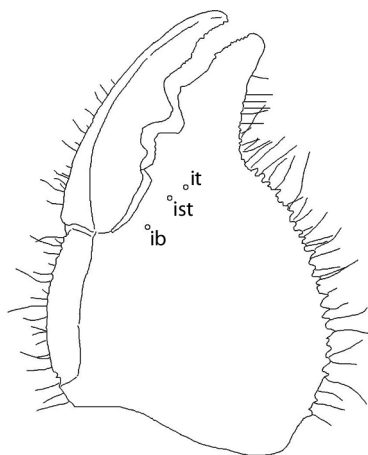




**Fig. 7:** Chela of *Pandinus roeseli* (Simon, 1872) showing internal trichobothria



**Fig. 8:** *Pandinus roeseli* (Simon, 1872) ♀ from Guinea, 170 mm (ARPC)



**Fig. 9:** Chela of *Pandinus gambiensis* Pocock, 1900 showing internal trichobothria



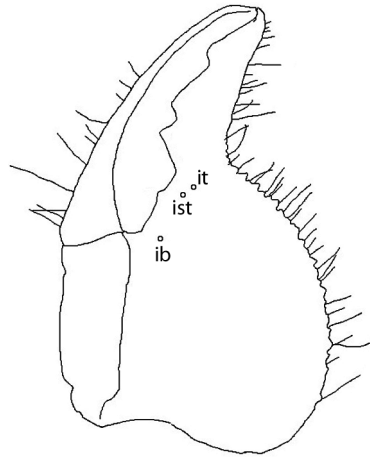
**Fig. 10:** *Pandinus gambiensis* Pocock, 1900 ♀ from Senegal, 165 mm (MZUF)

nally *Pandinus ulderigoi* can be easily distinguished from *Pandinopsis dictator* by a different number of internal and ventral trichobothria.

In consideration of the vulnerable status, the similar general appearance, the possibly restricted and

continuous distribution with regards to the four protected species, as well as the recent import suspension of *P. imperator* from Ghana, I strongly urge that *P. ulderigoi* be added to the *Pandinus* species protected by the Washington Convention.

**Fig. 11:** Chela of *Pandinus ulderigoi* Rossi, 2014 ♀ holotype, showing internal trichobothria



**Fig. 12:** *Pandinus ulderigoi* Rossi, 2014 ♀ from Central African Republic, 145 mm (ARPC)

### Acknowledgments

I am very grateful to Dr Janet Beccaloni (BMNH), Dr László Dányi (HNHM), Dr Peter Schwendinger (MHNG), Dr Monica Leonardi (MSNM) and Dr Luca Bartolozzi (MZUF) for allowing me to study the material in their care, and to Dr Léon Baert and to Prof. Wilson R. Lourenço

for information about historical type material. I also thank Gérard Dupré for his kind help in many ways, Alessandro R. Theunissen for a preliminary revision of the manuscript and Dr. Maria Chiara Merendino for legal advice. Besides this work was possible thanks to the valuable help of Giuliano Russo, who gave me precious information on the holotype of *Pandinus ulderigoi*, and Dr Alberto Ballerio (ICZN Commissioner), who gave me important support in understanding ICZN Articles and Recommendations as well as CITES regulations.

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