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Nuovi dati sul genere *Androctonus* Ehrenberg, 1828 (Scorpiones, Buthidae), con la descrizione di una nuova specie dall'Etiopia

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## Abstract

New considerations are proposed on some North African species of *Androctonus* Ehrenberg, 1828. The status of *Androctonus aeneas* C. L. Koch, 1839 is reevaluated and its type locality is confirmed as the area of Oran, in Algeria. Since the two original specimens used both for the description and illustration of *A. aeneas* are considered lost, one neotype is designated, in order to stabilize the nomenclature within the genus, according to ICZN. New data on the geographical distribution and ecology of *A. aeneas* are also provided and *Androctonus turieli* Teruel *et* Kovařík 2014 is considered as a junior synonym of *A. aeneas*. *Androctonus tigray* sp. n. is also described on the basis of two males and one female collected in the Province of Tigray, in Ethiopia.

**Key-Words:** Scorpiones, *Androctonus aeneas*, neotype, *Androctonus tigray* sp. n., Ethiopia.

### Riassunto

Sono proposte nuove considerazioni su alcune specie di *Androctonus* Ehrenberg, 1828 del Nord Africa. Lo status di *Androctonus aeneas* C. L. Koch, 1839 viene rivalutato e la sua località tipica viene confermata come l'area di Oran, in Algeria. Dato che i due esemplari originali usati sia per la descrizione che per l'illustrazione di *A. aeneas* sono considerati persi, viene designato un neotipo, in ordine a stabilizzare la nomenclatura all'interno del genere, in accordo con l'ICZN. Nuovi dati sulla distribuzione e l'ecologia di *A. aeneas* vengono inoltre forniti ed *Androctonus turieli* Teruel et Kovařík 2014 viene considerato come un sinonimo junior di *A. aeneas*. *Androctonus tigray* sp. n. viene inoltre descritta sulla base di due maschi ed una femmina raccolti nella provincia di Tigray, in Etiopia.

**Parole-chiave:** Scorpiones, *Androctonus aeneas*, neotipo, *Androctonus tigray* sp. n., Etiopia.

### Introduction

As already pointed out in several previous papers (Lourenço, 2005, 2008, 2015; Lourenço *et al.*, 2009, 2012) the taxonomy of the genus *Androctonus* Ehrenberg 1828 has long remained complex and confused. In his contributions to the study of North African scorpions, Vachon (1948, 1952) attempted to establish a better definition of the genus *Androctonus* and its species. His results, however, remained unsatisfactory. Only more than half century later, Lourenço (2005) attempted again to characterise the distinct populations of *Androctonus*. In fact few species have been synonymised, some subspecies raised to the rank of species and two new species described. After the publication of that preliminary clarification on the taxonomy of *Androctonus*, more new species have been added to the genus (Lourenço, 2008, 2015; Lourenço & Qi, 2006, 2007; Lourenço *et al.*, 2009, 2012).

During the entire period between the monograph by Vachon (1952) and the tentative revision by Lourenço (2005), no other authors proposed any major modification on the classification of the species of *Androctonus*. For example, Levy and Amitai (1980) in their monograph 'Fauna Palaestina', maintained a totally conservative position with only some minor remarks on some species. Nevertheless, after the tentative revision by Lourenço (2005), publications on *Androctonus* species both from Asia and Africa by other authors followed (Kovařík & Ahmed, 2013; Teruel *et al.*, 2013; Teruel & Kovařík, 2014). In several aspects, the decisions taken by these authors were not always fortunate and in some cases these add more confusion, based on solid mistakes. We will explore this point further in the next section on the taxonomy of *Androctonus aeneas* C. L. Koch, 1839.

In the present contribution, a new species of *Androctonus* is also described on the basis of two males and one female collected in the Province of Tigray, in Ethiopia.



**Fig. 1.** The original habitus of *Androctonus aeneas*, as proposed by C. L. Koch, 1839 = figure 432. Below in figure 433 the habitus of *Androctonus hector*.



### Taxonomic position of *Androctonus aeneas* C. L. Koch, 1839

In his tentative revision of the *Androctonus* species, Lourenço (2005) insisted about the major difficulty in clearly identify the populations of blackish *Androctonus* species from north Africa. He suggested the possible existence of a gradient of variation within some populations and decided *a priori* that *A. aeneas* should be placed in synonymy with *A. bicolor* Ehrenberg, 1828, as already proposed by Kraepelin (1899), until further investigations. He did not, however, attempt to fully clarify the status of *A. aeneas*. This species was in fact considered by previous authors as a subspecies, or only a variety, of *A. bicolor* (e. g. Vachon, 1952; Levy & Amitai, 1980). In two recent publications, the question of the identity of *A. aeneas* was once again debated (Teruel *et al.*, 2013; Teruel & Kovařík, 2014), however, as we will demonstrate below, these authors committed a number of mistakes that biased their final decisions and conclusions.

#### 1. The type locality of *A. aeneas*

In the already cited publication by Teruel *et al.* (2013) these authors firstly suggested that *A. aeneas* should be considered a *nomen dubium*. In their following publication (Teruel & Kovařík, 2014), this species was definitely considered as a *nomen dubium* based on a number of arguments that proved to be erroneous. These authors stated: “Most of this problematic situation is due to the loss of the types (Fet & Lowe, 2000) and that the original description of C. L. Koch (1839) lacks any useful character that allows the distinction of *A. aeneas* from its close relatives. The only other choice would have been to examine topotypes, but the type-locality is simply “North Africa”, a very large and ecologically complex area that actually hosts several closely related species of this complex.”

Apparently these authors never consulted the original publication of C. L. Koch (1839), where the species is clearly described and illustrated (Fig. 1.), taking in account the age of publication. As for the type locality, they simply based their conclusions on the data supplied by the ‘Catalog of the Scorpions of the World’ (Fet & Lowe, 2000), which unfortunately contains several mistakes.

The citation of C. L. Koch (1839) as “Vaterland: Das nördliche Afrika” was reprised by Vachon (1952) as “cette forme, originaire d’Afrique du Nord...” However, Vachon (1952) did not suggest at any moment that North Africa was the type locality of this species. In fact, just after this first citation, C. L. Koch (1839) provided all the necessary information about the type material used in his description. He stated: “Herr Dr. Friedr. Moritz Wagner entdeckte diesen ungemein schönen Scorpion in der Gegend von Oran und brachte zwei Exemplare nach Deutschland, beide in Weingeist aufbewahrt und sehr gut erhalten. Die gegenwärtige Beschreibung und Abbildung sind von diesen Exemplaren, die mir gefälligst von dem Besitzer mitgeteilt worden sind, entnommen”. Sentence which can be translated as: “Doctor Friedr. Moritz Wagner discovered this very beautiful species of scorpion in the area of Oran and he brought two specimens to Germany, quite well preserved in alcohol. The description and the illustration provided here have been produced based on these specimens that he kindly entrusted me”.

It is well known that Moritz Wagner (Bayreuth, 3 October 1813 - Munich, 31 May 1887) was a German explorer, collector, geographer and natural historian. Wagner devoted three years (1836 - 1839) to the exploration of Algiers; it was here that he made important observations in natural history, which he later supplemented and developed: the geographical isolation could play a key role in speciation (Wagner, 1841).

## 2. The status of *A. aeneas*

Teruel & Kovařík (2014) equally stated as follows: “Further, Vachon (1952) attempted a detailed taxonomic interpretation of *A. aeneas*, but unfortunately it was not based on the (already lost) types and it clearly included more than one taxon. Thus, as we have demonstrated that the original binomen *Androctonus aeneas* C. L. Koch, 1839 cannot be applied to any actual taxon unambiguously (or at least not arbitrarily), that its types are lost, and that the type locality is not precise, we regard it formally as a *nomen dubium*”.

The statement by Teruel & Kovařík (2014), about the status of *A. aeneas*, is again erroneous in many points. I) Surely there is no evidence that Vachon (1952) examined the original types (deposited in the Zoologische Staatssammlung, Munich, Germany) but, this, for a precise reason. Until after the World War II, it was not a common procedure to consult type material from foreign Museums, which was only possible by direct visits. Besides this, during the World War II, many German Museums suffered terrible destructions, and this was also the case of the Munich Museum. In fact, most probably, the types were already lost at the time of Vachon’s monograph (1952). II) The main purpose of Vachon (1952) in regard to the blackish species of *Androctonus* from North Africa was to clearly define the status of both *A. aeneas aeneas* and *A. aeneas liouvillei* (Pallary, 1924). In fact, Vachon (1952) dealt only with western north Africa, mainly the zone concerned by the past French colonies. He never invested on the eastern sector of North Africa (or Middle East), where *A. bicolor* ‘*typicus*’ is present. The definition of the status and the ranges of distribution of these two subspecies were clearly defined, and in no case different taxa were mixed as suggested by Teruel & Kovařík (2014). III) Moreover, specimens of *A. aeneas* (= *Buthus aeneas*), previously identified by E. Simon and K. Kraepelin existed in the collections of the Museum in Paris, and M. Vachon was able to consult it. K. Kraepelin directly stated to E. Simon that he personally examined the type material of *A. aeneas* and was able to identify co-specific material from Algeria in the Museum in Paris (E. Simon, personal notes). IV) The distribution of both *A. aeneas aeneas* and *A. aeneas liouvillei*, is precise in the map supplied by Vachon (1952), figure 169 (here reproduced as Fig. 2), with *A. aeneas* covering a large zone ranging from north Algeria to north central Tunisia. The present zone of distribution of this species differs little from that proposed by Vachon (1952) and is only slightly enlarged. V) Besides it is important to note that Lourenço (2005) finally recognized the specific rank of *A. liouvillei* (Pallary, 1924). This shows that the precise diagnosis already proposed by Vachon (1952) for *A. liouvillei*, but also for *A. aeneas*, was trustworthy and no taxa were mixed since the two distinct species were clearly differentiated.

In conclusion, somebody could wonder if the decision taken by Teruel & Kovařík (2014) in considering *A. aeneas* as a *nomen dubium* is due to ignorance of previous correct facts, or maybe as a fallacious strategy. Besides, one more point can call the attention: in their acknowledgements the authors express their thanks to “the late Max Vachon”. This decision appears as quite bizarre, not to say totally out of any legitimacy, since none of the authors knew or had contacts with the late Professor M. Vachon who died in 1991 (the senior author [W. R. L.] of the present paper worked under the direction of M. Vachon for more than 15 years, and also prepared his Ph. D. dissertation under his direction). Somebody could suppose that by citing Vachon these authors tried to bring support to their decisions.

In order to clarify the taxonomic status of *Androctonus aeneas*, we herein designate a neotype for this species, according to article 75 of ICZN, based on material collected in the original area of Oran, morphologically consistent with the original description, and preserved in the Museum in Paris. Moreover, *Androctonus turieli* Teruel & Kovařík, 2014 syn. n. is considered as a junior synonym of *Androctonus aeneas* C. L. Koch, 1839 since the comparisons between the neotype of *A. aeneas* and a large number of specimens from Algeria and Tunisia (listed below) confirm that they represent a single species, with a continuous distribution from northern and western Algeria to eastern Tunisia.

### Distribution and ecology of *A. aeneas*

According to the original description (Koch, 1839), the types of *A. aeneas* were collected in the area of Oran city, an ancient and very important town on the Mediterranean coast of Algeria. The neotype, here designated, was collected in Aïn El Turk, a city very close (only 15 km far) to the city of Oran and clearly in the Oran suburbs.

Vachon (1952) examined material of *A. liouvillei* from the Oran department but these specimens were without a precise locality. It is important to recall about the historical administrative division of Algeria. The Oran department existed from 1848 until 1962 and it was extremely bigger than the actual Oran province, extending more in the south and in the west. The specimens of *A. liouvillei* cited by Vachon (1952) from Sidi Bel Abbes and El Bayadh (Géryville) are within the ancient Oran department. It is quite evident that the specimens from Oran department collected by Dr. Foley and examined by Vachon (1952) came from the southern portion of the old department since *A. liouvillei* is really present in the southern part of the department while only *A. aeneas* is present in the suburbs of the Oran city, located more to the north. The presence of *A. liouvillei* in localities in western Algeria, very far from the Oran city and located more southern, was reported not only by Vachon (1952) with specimens from Arbaouat but also by Teruel *et al.* (2013) and Teruel & Kovařík (2014). Besides Vachon (1952) reported the presence of *A. liouvillei* also from localities near to the borders with Morocco.

The distribution proposed by Vachon (1952) for *A. aeneas* seems to range from the centre of northern Algeria, extending to north and central Tunisia, including the island of Djerba (Fig. 2). The

precise limit between the populations of *A. aeneas* and *A. liouvillei* remains to be precisely defined. This will request more precise field studies both in western Algeria and Morocco, over the Atlas Mountain range. It is also quite possible that the distribution range of *A. aeneas*, recovers part of Libya. The study of material from this country should bring a better clarification about the status of the Libyan populations which presently are unclear (Di Caporiacco, 1932; Levy & Amitai, 1980).

If Vachon (1952) neglected the suburbs of Oran (city) as locality for *A. aeneas*, it is mainly because he could not see any material from this area. The present studied material from Oran's area was collected after the publication of Vachon's monograph in 1952. With the recent collections of one of the authors [S. E. S.], the known range of distribution is slightly broader, covering some new localities in Algeria (Fig. 3).

According to Sadine *et al.* (2012), *A. aeneas*, shows a distribution in north Africa ranging from Tunisia to the high Plateaux region in Algeria. Ecological observations showed that the abundance of this species is negatively correlated with the density of forest vegetation (structure of the vegetation), but also with the altitude that determines the climatic conditions of the site. Ecological observations suggest that *A. aeneas* has strong affinities with more or less warm herbaceous habitats with surfaces dominated by large boulders. In the Lower Sahara these authors observed that *A. aeneas* is distributed in more or less specific habitats such as regs or plain lands with stony bottoms (Figs. 4 and 5).



**Fig. 2.** Map showing the known distribution (blue area) of *A. aeneas*, according to Vachon (1952).





Fig. 3. Map showing the present supposed distribution (red area) of *A. aeneas*.

### Material and Methods

Illustrations and measurements were made with the aid of a Wild M5 stereo-microscope with a drawing tube (camera lucida) and an ocular micrometer. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations are after Vachon (1974) and morphological terminology mostly follow Vachon (1952) and Hjelle (1990).

The neotype designated for *Androctonus aeneas* fulfils precisely all the requirements defined by the article 75 of the International Code of Zoological Nomenclature. The lost of the original types of *A. aeneas* was confirmed by the former curator of Munich Museum, Prof. Dr. E. J. Fittkau, about 20 years ago while the senior author [W. R. L.] was prospecting about the yet existence of numerous old types.

**Abbreviations:** MCVR = Museo Civico di Storia Naturale di Verona, Verona, Italy; MNHN = Muséum nationale d'Histoire naturelle, Paris, France.

Comparative material of *Androctonus aeneas* from both Algeria and Tunisia was also examined during the present study. At least part of it corresponds to the material listed by Vachon (1952) and yet available in the collections of MNHN.

**Algeria:** Ain El Turk, Oran area, 15/VII/1952, leg. F. Petter, 1 ♀ (MNHN RS-2570); Bou Saâda, no date, no collector, 3 ♂♂, 4 ♀♀ (MNHN RS-2176 – Coll. Simon, n° 1452); X/1955, IFA, 2 ♂♂, 1 ♀ (MNHN RS-2573); Chellala, 3/V/1954, IFA, 2 ♀♀ (MNHN RS-2576); V/1954, IFA, 1 ♂, 7 ♀♀ (MNHN RS-2571); Ghardaïa, 1957, IFA, 1 ♂, 2 ♀♀ (MNHN RS-2693); Oran, no date, leg. Coquerel, 1 ♂ (MNHN RS-2186); Ouargla, 1885, leg. M. Lechatelier, 1 ♂ (MNHN RS-2192).

**Tunisia:** Djebel oum Ali, no date, leg. Mayet, 1 ♀ (MNHN RS-2178); El May-Djerba, V/1948, leg. Truchy & S. Ben Hamibane, 2 ♂♂, 1 ♀ (MNHN RS-2174); Gabés, 1906, leg. A. Weiss, 1 ♂ (MNHN RS-2191); Gafsa, 1887, leg. Mosiman, 1 ♂, 1 ♀ (MNHN RS-2182); Maknassi, VI-X/1929, leg. Dumont, 1 ♂ (MNHN RS-2179); Sfax, 1922, leg. G. Babault, 1 ♂, 5 ♀♀ (MNHN RS-2175); Tozeur, 1922, leg. G. Babault, 1 ♂, 1 ♀ (MNHN RS-2184).



**Fig. 4.** Typical natural habitat of *A. aeneas* in El-Oued, Algeria.



**Fig. 5.** Adult male of *A. aeneas* from Souf, Algeria, in natural habitat.

## Taxonomic treatment

Family **Buthidae** C. L. Koch, 1837

Genus **Androctonus** Ehrenberg, 1828

### Designation of a neotype for *Androctonus aeneas* Koch, 1839 (Figs. 6-13)

*Androctonus aeneas* C. L. Koch, 1839: 3-6, pl. 181, fig. 432.

*Buthus aeneas* Kraepelin, 1899: 17 (under *Buthus bicolor*).

*Androctonus aeneas*: Vachon, 1952: 122-128.

*Androctonus bicolor aeneas*: Levy & Amitai, 1980: 22.

*Buthus aeneas*: Simon, 1879: 99; Simon, 1885: 50; Kraepelin, 1901.

*Prionurus aeneas*: Sergent, 1941: 354, fig. 2.4, pl. 34, fig. 4.

*Androctonus turieli* Teruel & Kovařík, 2014: 8-13. **New synonymy.**

**Type material:** Algeria, Ain El Turk, Oran area, 15/VII/1952, leg. F. Petter, ♂ neotype (MNHN RS-9024), herein designated.

### Redescription based on male neotype

A scorpion of medium to large size in relation to the other species of the genus. Adult male designated as neotype has a total length of 70.1 mm (see Table 1). General coloration mainly dark-brown to blackish. Prosoma: carapace dark brown; carinae and eyes marked by dark pigment. Mesosoma dark brown. Metasomal segments I to V dark reddish-brown to blackish; carinae blackish; vesicle dark reddish-brown; aculeus reddish at its base and dark reddish-brown at its extremity. Venter reddish-brown; pectines and genital operculum yellow; sternites IV and V, in male, with large white spots. Chelicerae brownish-yellow with intense dark variegated spots; fingers brownish with dark teeth. Pedipalps dark brown to blackish with very dark carinae; fingers brownish-yellow with the oblique rows of granules dark red. Legs dark brown. Morphology. Carapace strongly granular; anterior margin without any median concavity, almost straight. Carinae moderately to strongly marked; anterior median, central median and posterior median carinae strongly granular. All furrows moderate to strong. Median ocular tubercle slightly anterior to the centre of carapace. Eyes separated by more than two ocular diameters. Three or four pairs of lateral eyes; the fourth pair inconspicuous. Sternum triangular and narrow; slightly longer than wide. Mesosoma: tergites moderately to strongly granular. Three longitudinal carinae moderately to strongly crenulate in all tergites; lateral carinae reduced in tergite I. Tergite VII pentacarinat. Venter: genital operculum divided longitudinally, forming two semi-oval plates. Pectines: pectinal tooth count 30-30 in male neotype; middle basal lamella of the pectines not dilated in both sexes. Sternites only weakly granular laterally with very elongated spiracles; four moderately to strongly marked carinae on sternite VII; two on sternite VI; other sternites acarinate and with two weakly marked furrows. Metasoma: segments I with 10 carinae, strongly crenulated; segments II to IV with 8 carinae, crenulated; lateral inframedian carinae on segments II-III reduced to 3-5 distal granules; the first four segments with a strongly marked dorsal depression, intensely granulated

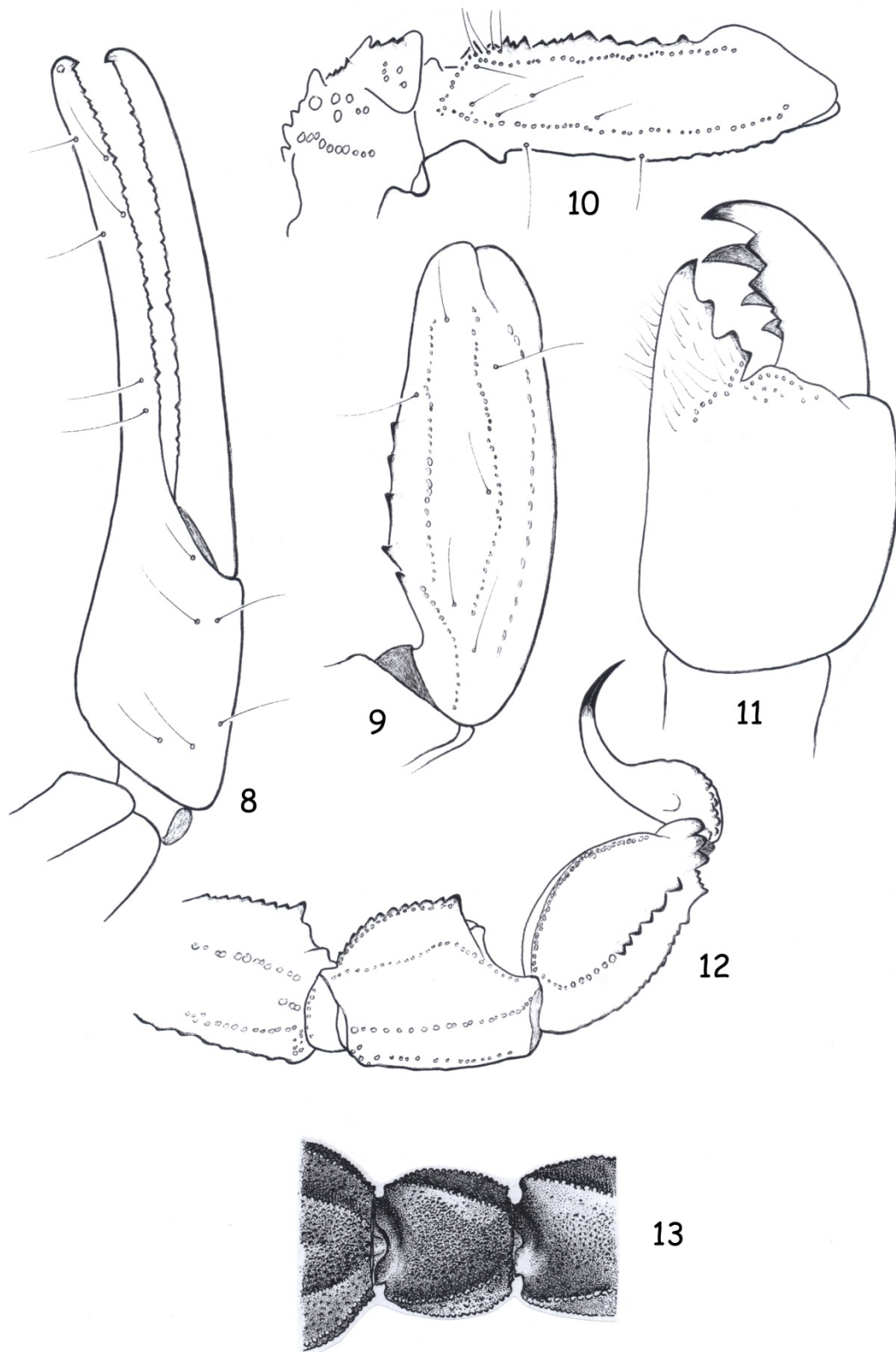
on I and II; segment V with five carinae; the latero-ventral carinae crenulate with several lobate denticles; ventral median carina not divided posteriorly; anal arc composed of 15-16 inconspicuous ventral teeth, and three strongly marked rounded lateral lobes. Intercarinal spaces moderately to weakly granular. Telson with some weak granulations on ventral surface; other surfaces smooth; aculeus moderately curved and with almost the same length as the vesicle; subaculear tooth absent. Cheliceral dentition as defined by Vachon (1963) for the family Buthidae; external distal and internal distal teeth approximately the same length; basal teeth on movable finger small but well marked and not fused; ventral aspect of both fingers and manus covered with long dense setae. Pedipalps: femur pentacarinat; patella with eight carinae; internal face of both femur and patella with spinoid granules; chela with only vestigial carinae; all faces weakly granular to smooth; femur and patella with an inconspicuous setation. Fixed and movable fingers with 14-15 oblique rows of granules. Internal and external accessory granules present; internal more strongly marked; three accessory granules on the distal end of the movable finger next to the terminal denticle. Legs: tarsus with numerous thin setae ventrally; tibial spur strong on legs III and IV; pedal spurs moderate to strong on legs I to IV. Trichobothriotaxy: trichobothrial pattern of Type A, orthobothriotaxic as defined by Vachon (1974). Dorsal trichobothria of femur arranged in  $\beta$ -configuration (Vachon, 1975).

**Note:** adults from other localities than that of neotype can reach 75 to almost 90 mm in total length. The number of pectinal teeth is 27-32 in males and 21-27 in females. Sternites IV and V with inconspicuous white spots in females.

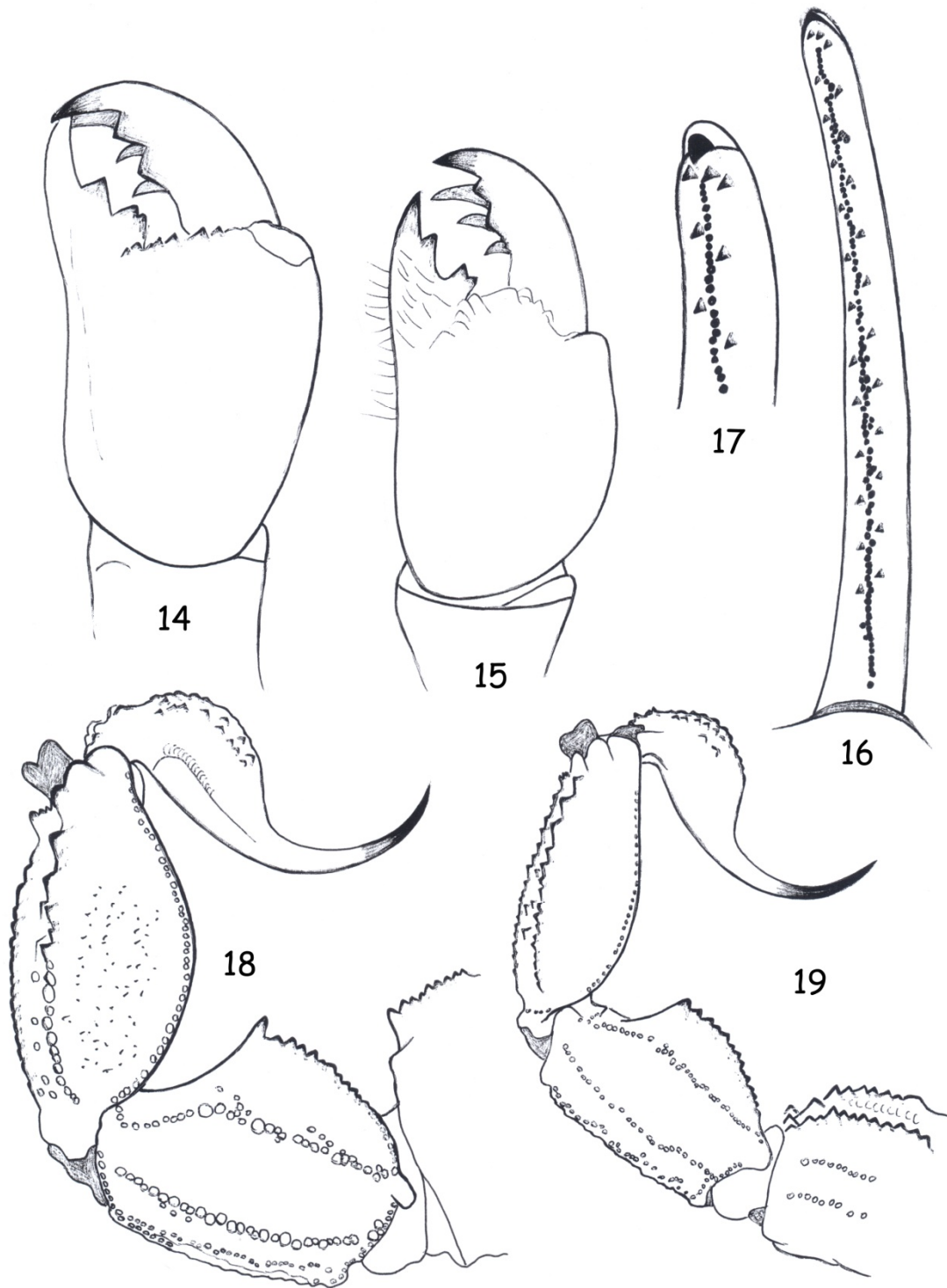


**Figs. 6-7.** *Androctonus aeneas*, male neotype, habitus, dorsal and ventral aspects.



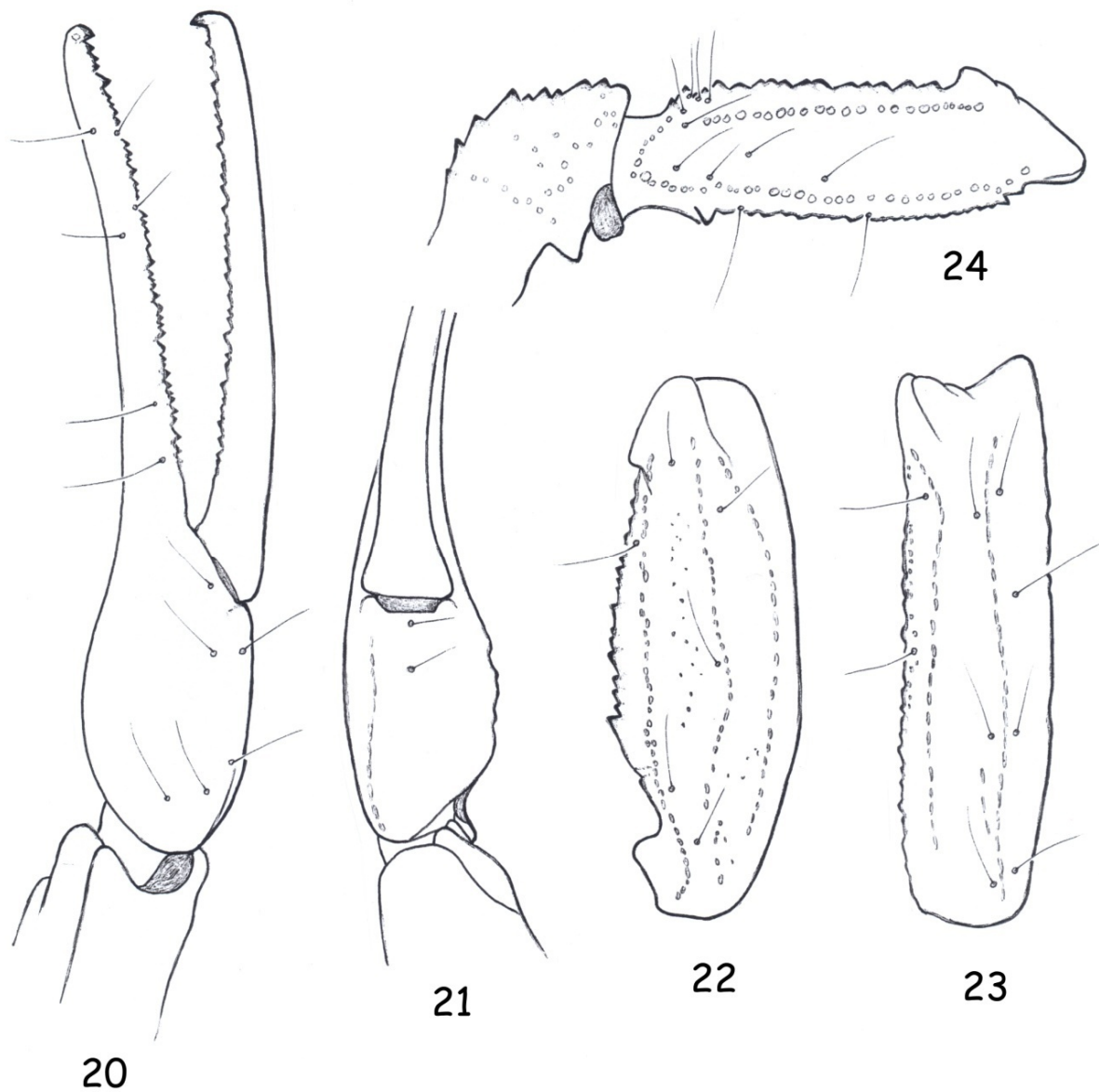


**Figs. 8-12.** *Androctonus aeneas*, male neotype. **8-10.** Trichobothrial pattern. **8.** Chela dorso-external aspect. **9.** Patella, dorsal aspect. **10.** Femur, dorsal aspect. **11.** Chelicera, dorsal aspect. **12.** Metasomal segments III-V and telson, lateral aspect. **13.** Dorsal aspect, of tergite VII and metasomal segments I-II of a male *A. aeneas* from Tunisia, showing granulations (after Vachon, 1952).



**Figs. 14-19.** *Androctonus tigris* sp. n. Male holotype (14, 16-18). Female paratype (15, 19). 14-15. Chelicera, dorsal aspect. 16-17. Cutting edge of movable finger showing series of granules, and extremity of the finger in detail. 18-19. Metasomal segments IV-V and telson, lateral aspect.

**Relationship:** the most closely related species to *Androctonus aeneas* Koch, 1839 is *Androctonus bicolor* Ehrenberg, 1828, from Egypt. The differences between the two species were discussed repeatedly in literature (e. g. Levy & Amitai, 1980; Teruel & Kovařík, 2014). Note that the latter authors redescribed *A. bicolor* and compared it with *A. turieli* (= *A. aeneas*).



**Figs. 20-24.** *Androctonus tigris* sp. n. Male holotype. Trichobothrial pattern. **20-21.** Chela, dorso-external and ventral aspects. **22-23.** Patella, dorsal and external aspects. **24.** Femur, dorsal aspect.

## Description of the new species

### *Androctonus tigray* sp. n. (Figs. 14-24)

**Type material:** ♂ holotype, ♂ and ♀ paratypes, Ethiopia, Tigray Province [Tigray, according to the Italian original label], leg. Dr. Enrico Cartolari, 1906, (MCVR).

**Etymology:** the specific name is a noun in apposition to the generic name and refers to the region where the new species was found.

### Diagnosis

A scorpion of medium size, with adult male holotype reaching a total length of 65.3 mm (the adult females could reach 70 mm in total length). General coloration reddish-brown to blackish (the specimens clearly show a paler coloration than that of *A. bicolor*); legs dark red; metasomal carinae dark, almost black. Carinae and granulations on carapace and tergites moderately developed; sternite VI with two inconspicuous carinae. Metasomal segments I to V only moderately enlarged distally; dorsal depression on segments I to IV moderately marked; depression on segments I and II with minute granulations; segments I to III with 10 carinae; inframedian carinae complete on segments II-III. Anal arc with three moderately to weakly marked rounded lobes. Pedipalps with an inconspicuous setation on femur and patella; fixed and movable fingers with 12-12 rows of granules. Pectines with 28-28 teeth in the male holotype; male and female paratypes with 26-27 and 22-23 teeth respectively.

### Relationships

*Androctonus tigray* sp. n. can be distinguished from the other species of *Androctonus*, and in particular from *Androctonus bicolor*, by a number of characters: I) paler general coloration, from reddish-brown to blackish; II) different morphometric values (see Table I); chela length/width ratio in males is equal to 5.40 to 5.50 in the new species whereas in *A. bicolor* these values range from 5.95 to 6.20; III) carapace and tergites only weakly to moderately granulated; dorsal depression on metasomal segments I and II with only minute granulations; IV) chela fingers with 12-12 rows of granules while they are 13-14 in *A. bicolor*.

### Description based on male holotype and paratypes

Measurements in Table I. Coloration. Mainly dark-brown. Prosoma: carapace dark brown; carinae and eyes marked by dark pigment. Mesosoma: dark brown. Metasoma: segments I to V dark brown; carinae darker than tegument; vesicle dark brown; aculeus reddish at its base and dark brown at its extremity. Venter yellow to brown-yellow; pectines and genital operculum pale yellow; sternites III to VI, in male, with large white spots. Chelicerae brownish-yellow with inconspicuous variegated spots; fingers brownish-yellow with red teeth. Pedipalps dark brown with dark carinae; fingers brownish-yellow with the oblique rows of granules dark red. Legs brownish-yellow.



Morphology. Carapace moderately granular; anterior margin without any median concavity, straight. Carinae moderately marked; anterior median, central median and posterior median carinae moderately granular. All furrows moderate to weak. Median ocular tubercle slightly anterior to the centre of carapace. Eyes separated by slightly more than two ocular diameters. Three pairs of lateral eyes. Sternum triangular and narrow; slightly longer than wide. Mesosoma: tergites moderately granular. Three longitudinal carinae moderately to strongly crenulate in all tergites; lateral carinae reduced in tergites I and II. Tergite VII pentacarinat. Venter: genital operculum divided longitudinally, forming two semi-oval plates. Pectines: pectinal tooth count 28-28 in male holotype; middle basal lamella of the pectines not dilated. Sternites without granules, smooth with elongated spiracles; four moderately marked carinae on sternite VII; two vestigial carinae on sternite VI; other sternites acarinate and with two weakly marked furrows. Metasoma: segments I to III with 10 complete carinae, strongly crenulated; ventral strongly marked; segment IV with 8 carinae, crenulated; the first four segments with a moderately marked dorsal depression, with minute granulations on I and II; segment V with 5 carinae; the latero-ventral carinae crenulate with several lobate denticles; ventral median carina not divided posteriorly; anal arc composed of 17-18 totally inconspicuous ventral teeth, and three moderately to weakly marked rounded lateral lobes. Intercarinal spaces moderately to weakly granular. Telson with moderately marked granulations on ventral surface; other surfaces smooth; aculeus moderately to strongly curved and with about the same length as the vesicle; subaculear tooth absent. Cheliceral dentition as defined by Vachon (1963) for the family Buthidae; external distal and internal distal teeth approximately the same length; basal teeth on movable finger reduced in males but not fused; ventral aspect of both fingers and manus covered with long dense setae. Pedipalps: femur pentacarinat; patella with nine carinae, some weakly marked; internal face of femur and patella with spinoid granules; chela with only vestigial carinae; all faces weakly granular to smooth; setation on pedipalp inconspicuous. Fixed and movable fingers with 12-12 oblique rows of granules. Internal and external accessory granules present but weakly to moderately marked; internal better marked than external; three accessory granules on the distal end of the movable finger next to the terminal denticle. Legs: tarsus with numerous thin setae ventrally; tibial spur moderately marked on legs III and IV; pedal spurs moderate to strong on legs I to IV. Trichobothriotaxy: trichobothrial pattern of Type A, orthobothriotaxic as defined by Vachon (1974). Dorsal trichobothria of femur arranged in  $\beta$ -configuration (Vachon, 1975).

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**Table 1.** Morphometric values (in mm) of the adult male holotype of *Androctonus tigris* sp. n. from Ethiopia and of male neotype and female topotype of *Androctonus aeneas* from Algeria.

	<i>A. tigris</i> sp. n. ♂ holotype	<i>A. aeneas</i> ♂ neotype	<i>A. aeneas</i> ♀ topotype
<b>Total length</b> (telson included)	65.3	70.1	74.8
<b>Carapace</b>			
length	7.7	8.5	9.2
anterior width	4.8	5.4	5.7
posterior width	7.8	8.8	9.6
<b>Mesosoma length</b>	16.5	18.5	20.2
<b>Metasomal segment I</b>			
length	5.2	5.4	6.2
width	5.8	7.2	6.8
<b>Metasomal segment II</b>			
length	6.3	6.4	6.7
width	6.8	8.1	7.7
<b>Metasomal segment III</b>			
length	6.6	6.9	7.2
width	7.5	8.4	8.1
<b>Metasomal segment IV</b>			
length	7.7	7.8	8.3
width	7.4	8.2	7.7
<b>Metasomal segment V</b>			
length	8.5	8.8	9.2
width	6.2	7.4	7.0
depth	4.1	5.2	5.2
<b>Telson length</b>	6.8	7.8	7.8
<b>Vesicle</b>			
width	2.9	2.8	3.2
depth	2.4	2.3	2.4
<b>Pedipalp</b>			
Femur length	6.6	7.3	7.6
Femur width	1.9	2.1	2.2
Patella length	8.0	8.6	8.8
Patella width	2.6	2.9	3.0
Chela length	12.1	13.4	13.8
Chela width	2.2	2.2	2.2
Chela depth	2.4	2.6	2.4
Movable finger length	8.8	9.8	10.0

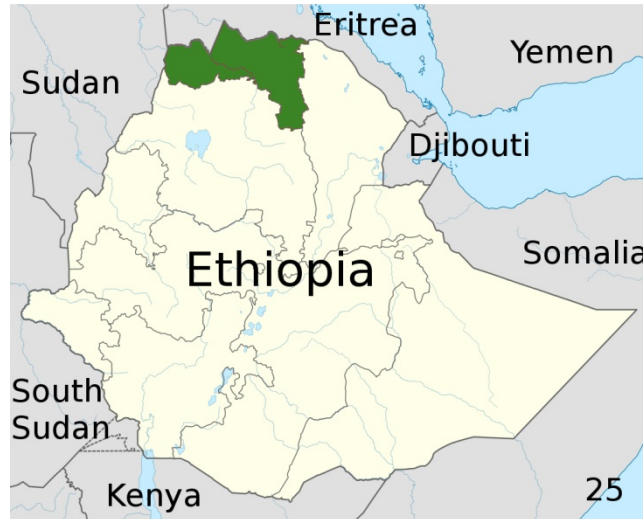


Fig. 25. Map of Ethiopia showing the Tigray province (green colour), type locality of *Androctonus tigray* sp. n.

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