

SCORPIONS FROM MANDENA EAST COASTAL RAIN FOREST IN MADAGASCAR, AND DESCRIPTION OF A NEW SPECIES OF *GROSPHUS* SIMON (SCORPIONES, BUTHIDAE)

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Abstract: A short synopsis is proposed for the scorpions of the East Coastal rain forest in the region of Mandena, south-east of Madagascar. A new species of *Grosphus* Simon, associated to the *G. madagascariensis* / *G. hirtus* group of species is described from this area.

Key words: Scorpions, *Grosphus*, Madagascar.

Taxonomy: *Grosphus mandena* sp. n.

Escorpiones del bosque lluvioso de Mandena East Coastal en Madagascar y descripción de una nueva especie de *Grosphus* Simon (Scorpiones, Buthidae)

Resumen: Se presenta una breve sinopsis de los escorpiones del bosque lluvioso de la costa oriental de Mandena (sureste de Madagascar). Procedente de esta región, se describe una nueva especie del género *Grosphus* Simon asociada al grupo de especies *G. madagascariensis* / *G. hirtus*.

Palabras clave: Escorpiones, *Grosphus*, Madagascar.

Taxonomía: *Grosphus mandena* sp. n.

Introduction

Although intensive studies on the Malagasy scorpion fauna have been carried since the early 1990s with the publication of several papers, and the description of a relevant number of new genera and species, some areas of the island remained poorly prospected. For some examples refer to the "Fauna of Madagascar" (Lourenço, 1996). This is particularly true for some remnant patchy areas of the East Coastal rain forest such as the one present in the region of Mandena.

A single study dealt with scorpions collected in the region of Mandena (Lourenço, 2000), and revealed the presence of only two species of the family Buthidae C.L. Koch, 1837. In this study, the first species, *Tityobuthus manonae* Lourenço, 2000 was described as new, whereas the second one was preliminarily associated to *Grosphus hirtus* Kraepelin, 1900. Recent detailed investigations, however, have showed that in some cases closely related species have similar morphological features (Lourenço, 2003; Lourenço & Goodman, 2003; Lourenço *et al.*, 2004). On this basis some populations, which have been attributed to widely distributed species, such as *G. madagascariensis* (Gervais, 1843) or *G. hirtus*, remained undescribed until recently (Lourenço *et al.*, 2004). Nevertheless, problems of faulty species identification remains possible in morphologically similar taxa, particularly those named in the early stages of the taxonomy. This is certainly the case for *G. madagascariensis* and *G. hirtus*.

In this chapter, *Tityobuthus manonae* is recharacterized and the *Grosphus* population present in Mandena is described as a new species. Most certainly these two species represent endemic elements to the region of Mandena. With continued exploration of portions of the Mandena forest in the coming years, that have not been previously prospected for scorpions, it can be expected that the number of scorpion taxa within this region maybe higher than observed.

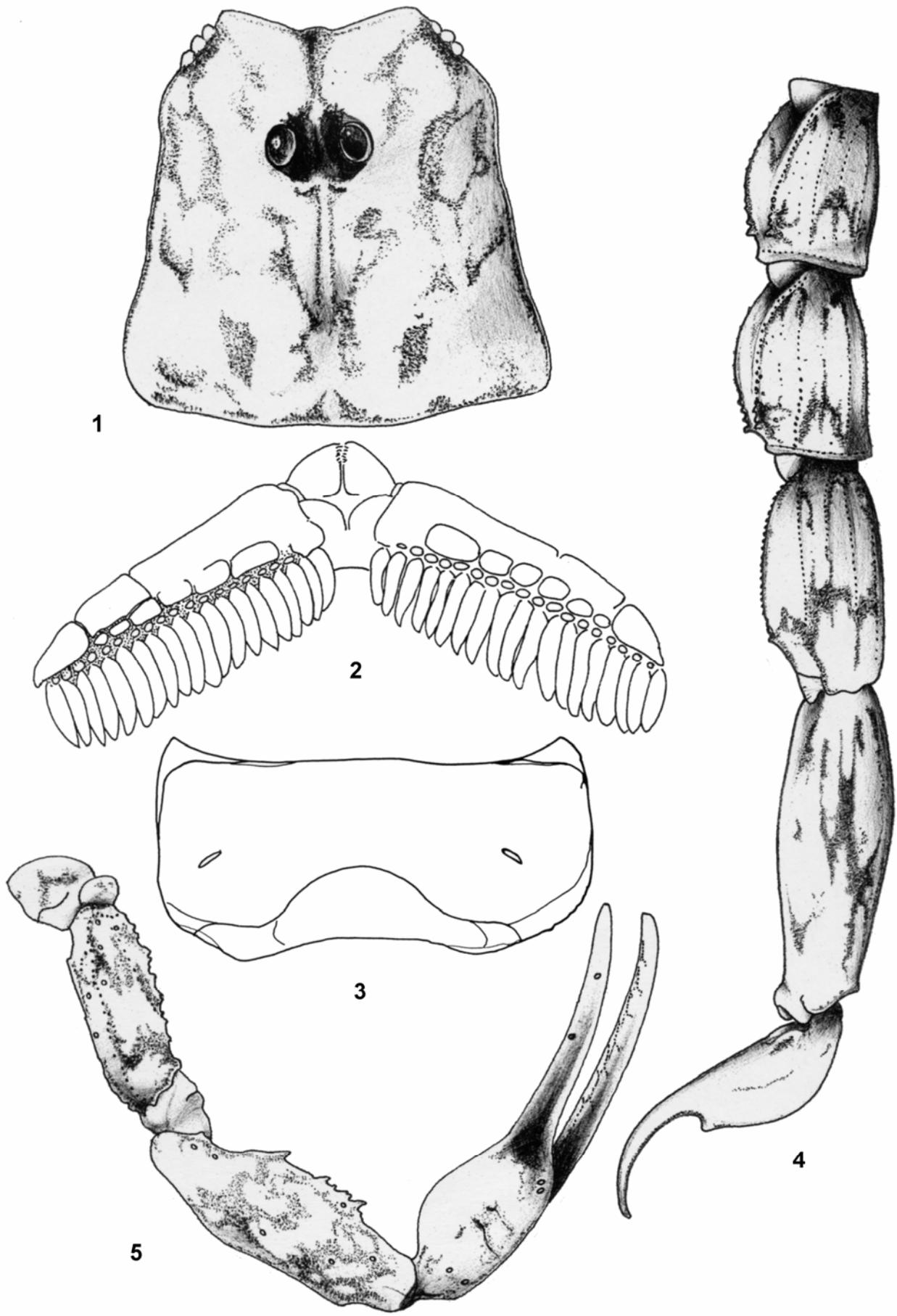
Genus *Tityobuthus* Pocock, 1893

Tityobuthus manonae Lourenço, 2000 (Figs. 1-5, 14)

Tityobuthus manonae: Lourenço, 2000: 722.

Madagascar, Toliara Province, Mandena - Fort Dauphin (littoral forest 10 km north of Fort Dauphin), one male (holotype), 6-12/I/1999 (J.-B. Ramanamanjato leg.); deposited in the Muséum d'histoire naturelle, Geneva.

Scorpions of small size, with in average 25 mm in total length. Coloration. Ground colour yellowish, symmetrically marbled with a dark reddish-brown, giving an overall spotted appearance. Prosoma: carapace yellowish, moderately spotted; eyes surrounded by black pigment. Mesosoma: yellowish, with four longitudinal brown stripes, i.e. two central and two lateral ones. Metasoma: segments I to IV yellowish; V yellowish to reddish-yellow. Vesicle as segment V. Venter yellowish, with a number of spots on sternites VI and VII. Chelicerae yellowish, with dark spots on the lateral edges; fingers reddish. Pedipalps: yellowish, with several dark spots on femur and patella; chela less densely spotted; hands yellowish; fingers much darker, reddish-brown, with the extremities yellowish. Legs yellowish, with diffuse fuscous spots. Morphology. Carapace moderately to weakly granular; anterior margin with a weakly to moderately pronounced median concavity. Anterior median superciliary, posterior median carinae and all furrows moderate to weak. Median ocular tubercle distinctly anterior to the center of the carapace; median eyes separated by one ocular diameter. Three pairs of lateral eyes. Sternum subtriangular. Mesosoma: tergites moderately granular. Median carina moderate to strong on all tergites; confluent vestigial carinae present. Tergite VII pentacarinata. Venter: genital operculum longitudinally divided. Pectines: pectinal tooth count 19-20; basal middle lamellae not dilated; fulcra present. Sternites smooth or with very weak granulations and small,



Figs. 1-5. Male holotype of *Tityobuthus manonae*. 1. Carapace. 2. Pectines. 3. Sternite V. 4. Metasoma and telson, lateral aspect. 5. Pedipalp, dorsal aspect showing the trichobothrial pattern.

elongate stigmata; VII with two carinae. Sternite V with a large smooth, bright zone on posterior edge. Metasoma: segments I to III with 10 carinae, crenulate. Segment IV with 8 carinae, crenulate. Intercarinal spaces weakly to moderately granular. Segment V smooth and rounded. Telson smooth, without punctuations, with a long but moderately curved aculeus; subaculear tooth very small and slightly rhomboid. Cheliceral dentition characteristic of the family Buthidae (see Vachon, 1963); basal teeth of movable fingers reduced and almost fused; ventral surfaces of finger and manus almost without setae. Pedipalps: femur pentacarinata; patella and chela with some carinae, moderately crenulate; internal face of patella with six spinoid granules; all faces moderately granular; fixed and movable fingers with 8-9 oblique rows of granules. Trichobothriotaxy; orthobothriotaxy A- α (alpha) (Vachon, 1974, 1975). Legs: tarsus with numerous fine median setae ventrally. Pedal and tibial spurs present but reduced.

Genus *Grosphus* Simon, 1880

Grosphus mandena sp. n. (Figs. 6-14)

Grosphus hirtus: Lourenço, 2000: 722.

MATERIAL EXAMINED: Madagascar, Province de Toliara, Mandena - Fort Dauphin (littoral forest 10 km north of Fort Dauphin), 1 male holotype, 9 males and 1 female paratypes, 6-12/I/1999 (J.-B. Ramanamanjato leg.); deposited in the Muséum d'histoire naturelle, Geneva.

ETYMOLOGY: The specific name makes reference to the type locality, Mandena, and is placed in apposition to the generic name.

DIAGNOSIS: Scorpions of medium size with a total length of 50 to 53 mm. General coloration yellowish to reddish-yellow. Certain morphological characters indicate that *G. mandena* sp. n. is close to the *G. madagascariensis* / *G. hirtus* group, but it can be readily distinguished from the other species of this group, and in particular from *Grosphus simoni* Lourenço *et al.*, 2004, by the following characters: (i) a paler coloration overall with the appendages reddish-yellow to yellowish and the presence of a dark inverted triangle on the anterior region of the carapace; (ii) metasomal carinae and granulations less strongly marked; (iii) dorsal carinae of metasomal segments II to IV with one strong posterior spinoid granules; (iv) vesicle more intensely granulated.

DESCRIPTION based on male holotype and female paratype.

Coloration. Basically reddish-yellow to yellowish; darker in female. Prosoma: carapace reddish-yellow with one inverted dark triangle extending from the median eyes to lateral eyes; eyes surrounded by black pigment. Mesosoma: reddish-yellow in male, dark-reddish in female, with dark strips on the posterior margins of tergites. Metasoma: all segments reddish in male, dark-reddish in female. Telson reddish without spots; aculeus with reddish base and dark-reddish tip. Venter: coxapophysis, sternum, genital operculum and

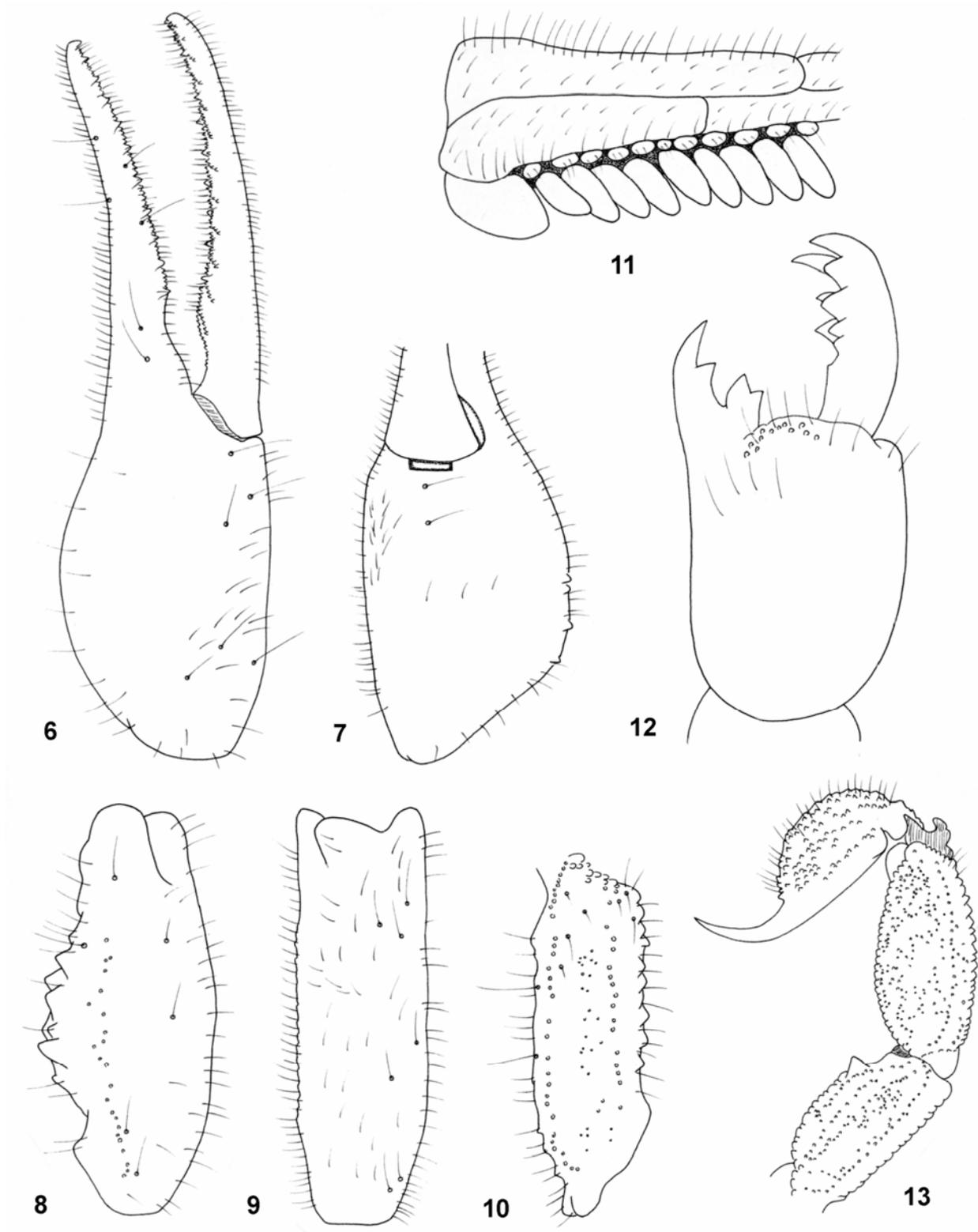
pectines yellowish; sternites pale yellow in male with greenish zones in female; VII dark-reddish. Chelicerae yellowish with dark variegated pigmentation over the entire surface; fingers and teeth reddish. Pedipalps: reddish to reddish-yellow. Legs yellowish without spots.

Morphology. Carapace moderately to strongly granular; anterior margin almost straight, with a weak median concavity. All carinae weak; furrows moderately developed. Median ocular tubercle anterior to the center of carapace; median eyes separated by a little more than one ocular diameter. Three pairs of lateral eyes. Sternum sub-triangular in shape. Mesosoma: tergites with thin but intense granulation, specially in female. Median carina moderately developed in all tergites. Tergite VII pentacarinata. Venter: genital operculum consisting of two semi-oval plates. Pectines: pectinal tooth count 20-19 in male, 17-15 in female (variation 18 to 20 in males); basal middle lamellae of each pecten not dilated in male, strongly dilated in female, with a semi-oval shape. Sternites smooth, with elongated spiracles; VII with four vestigial carinae and some diffused granulations. Metasoma: segments I and II with ten carinae, crenulate; segments III and IV with eight carinae, crenulate. Segment V with five carinae. Dorsal carinae on segments II to IV with one strong posterior spinoid granule. Intercarinal spaces strongly granular. Telson strongly granular over latero-ventral and ventral surfaces; its dorsal surface smooth; aculeus moderately curved and shorter than the vesicle; subaculear tooth represented by a minute granule. Cheliceral dentition characteristic of the family Buthidae (Vachon, 1963); two distinct basal teeth present on the movable finger; ventral aspect of both fingers and of manus with dense, long setae. Pedipalps: femur pentacarinata; patella with a dorsointernal carina and with 7/8 strong spinoid granules on the internal face; chela smooth, without carinae, only the internal face shows some isolated granules. Fixed and movable fingers with 12-13 oblique rows of granules. Trichobothriotaxy; orthobothriotaxy A- α (alpha) (Vachon, 1974, 1975). Legs: tarsus with numerous short thin setae ventrally. Tibial spurs present on legs III and IV; pedal spurs present on legs I to IV; all spurs moderate to strong.

Morphometric values (in mm) of the male holotype and female paratype of the new species described. Total length, 52.7/51.4. Carapace: length, 6.5/6.6; anterior width, 4.7/4.8; posterior width, 7.1/7.3. Metasomal segment I: length, 4.1/4.1; width, 3.6/3.5. Metasomal segment V: length, 7.2/6.6; width, 3.3/3.2; depth, 3.2/3.2. Vesicle: width, 2.9/2.9; depth, 3.0/3.0. Pedipalp: femur length, 6.0/5.5; width, 1.9/2.2; patella length, 6.9/6.6, width, 2.6/2.7; chela length, 11.9/11.1, width, 3.4/2.7, depth, 2.9/2.4; movable finger length, 7.1/6.8.

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Figs. 6-13. *Grosphus mandena* sp. n. **6-10.** Trichobothrial pattern of pedipalp (male holotype). **6-7.** Chela, dorso-external and ventral aspects. **8-9.** Patella, dorsal and external aspects. **10.** Femur, dorsal aspect. **11.** Pecten of female paratype, showing basal middle lamella. **12.** Chelicera, dorsal aspect (male holotype). **13.** Metasomal segments IV-V and telson, lateral aspect (male holotype).

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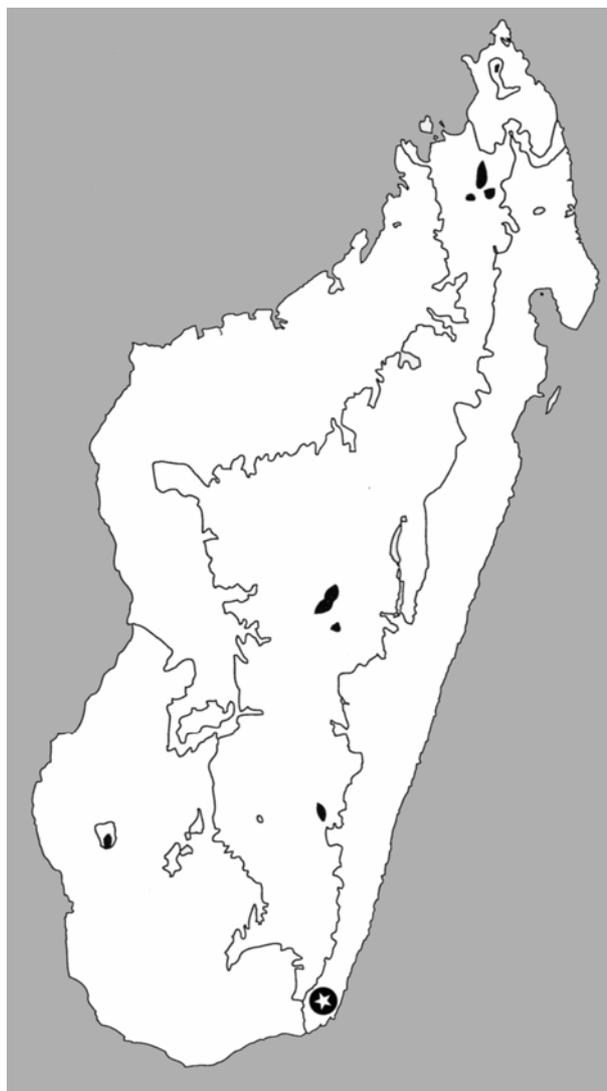


Fig. 14. Map of Madagascar showing the location of the East Coastal rain forest in the region of Mandena (k).