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## Further notes on the scorpions inhabiting the savannas of the Lamto Ecological Station in Côte d'Ivoire

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(With 12 figures)

### Abstract

The scorpion fauna of the Lamto Ecological Station (Côte d'Ivoire) is discussed and the *Babycurus* population redefined as belonging to a new subspecies, *Babycurus buettneri savanicola* ssp. n. The results of a quantitative ecological survey conducted between 1962 and 1966 are also presented.

**Key words:** Scorpion fauna, *Babycurus buettneri savanicola* ssp. n., ecological survey, Côte d'Ivoire.

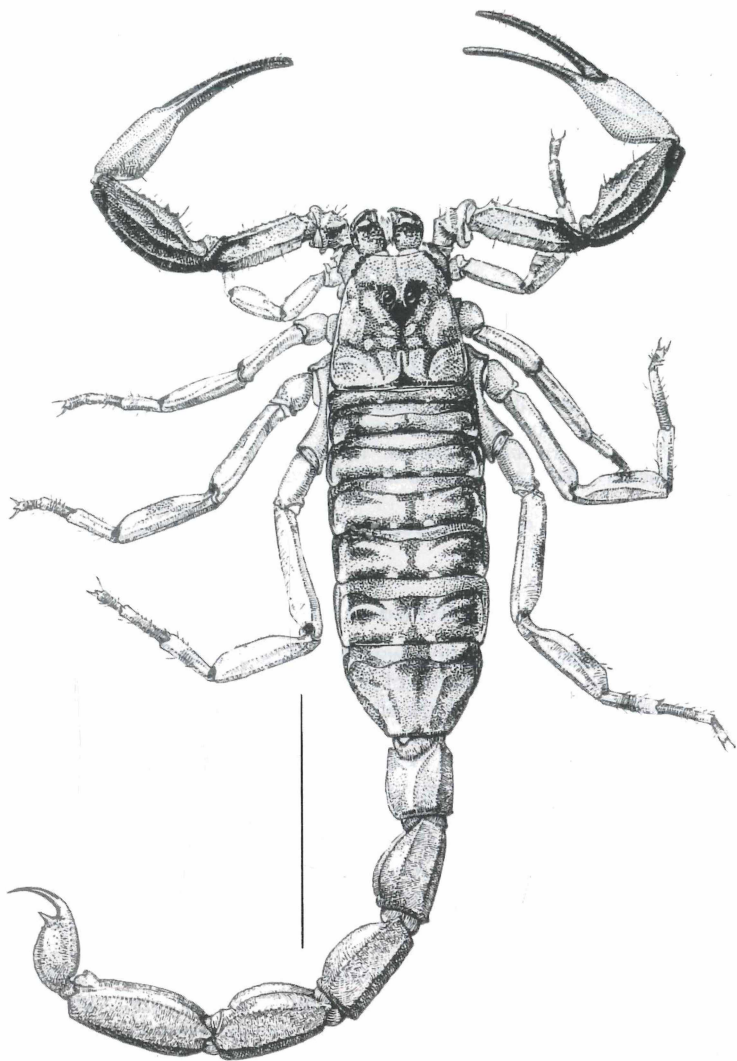
### Introduction

The Lamto Ecological Station was founded in 1961, in the region of Sangrobo-Pacobo, 50 km south of Toumodi in Côte d'Ivoire. Since its establishment, this savannicolous area has been the subject of intensive ecological investigation by many botanical and zoological groups (Lamotte 1967). Several scorpions have been collected in the area, but only one precise study of the scorpion fauna has been made by Lourenço (1986). Three species were then confirmed from the Ecological Station: *Pandinus imperator* (C. L. Koch, 1841) (the Scorpionidae), *Butheoloides annieae* Lourenço, 1986 and *Babycurus kirki* (Pocock, 1890), (both the Buthidae). The precise status of the *Babycurus* species remained unclear however and it was suggested that further investigation would be necessary to define it unambiguously.

Subsequent to the publication of Lourenço (1986), many undetermined scorpions, collected in the Ecological Station during the 1960s, have been located. Study of this material allows the taxonomic position of the *Babycurus* population to be clearly defined. The results of a quantitative ecological survey carried out between 1962 and 1966 are also presented.

The taxonomic status of the *Babycurus* population in the Lamto Ecological Station

Lourenço (1986) made the following statement: "L'étude comparative des exemplaires collectés à Lamto et de celui correspondant au type de Pocock (*B. kirki*) démontre l'existence de quelques différences, en particulier



**Fig. 1.** *Babycurus buettneri savanicola* sp. nov., paratype ♀ (scale bar = 10 mm).

pour les valeurs morphométriques, mais aussi dans la morphologie des dents des chélicères, la forme de la vésicule.... et le nombre de séries de granulations des doigts mobiles... Cela suggère l'existence d'au moins deux populations différentes..." He also suggested that *Babycurus buettneri* Karsch, 1886 and *B. kirki* should be considered as distinct species. This claim was not recognised in the Catalog of the Scorpions of the World (Fet & Lowe, 2000), but was accepted by Kovarik (2000) in his revision of the genus *Babycurus*. Examination of several new specimens of *B. buettneri* from Gabon (the type locality of this species), and of new specimens of the *Babycurus* population from Lamto, confirms their morphological differences. The position of *B. kirki* remains unclear, however, mainly because the species was described from an undefined location in West Africa, and the type specimen is poorly preserved. *B. kirki* could therefore be a synonym for *B. buettneri*. For this reason, we propose a new subspecies of *B. buettneri* to define the Lamto population of *Babycurus*. Ecological evidence also favours this decision, since the typical *B. buettneri* inhabits dense forests while the Lamto subspecies lives in grassland savanna.

### Description of new subspecies

Genus *Babycurus* Karsch, 1886

*Babycurus buettneri* (Karsch, 1886)

*Babycurus buettneri savanicola* ssp. n.  
(Figs. 1-10)

TYPE MATERIAL: Holotype (♂), paratypes (♀, 3♂) Côte d'Ivoire, Lamto, 3 Oktober 1962, coll. R. Vuattoux. Deposited in the Zoologisches Museum Hamburg, Germany [ZMH Acc. No. A43/05 (holotype), A44/05 (paratypes)].

ETYMOLOGY: The specific name makes reference to the savannas which the new subspecies inhabit.

DIAGNOSIS: Scorpions of medium size, reaching a total length of 47 to 50 mm. General coloration yellowish to reddish-yellow with brownish spots over carapace, tergites, pedipalps and legs. Carinae and granulations weak. Fixed and movable fingers with 8-9 rows of granules. Pectines with 21-21 teeth in males and 20-20 in females (modal values).

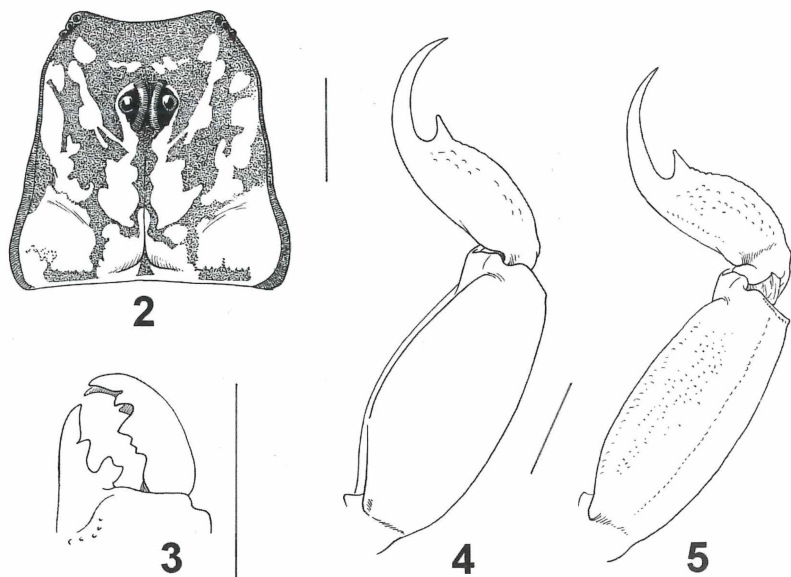
DESCRIPTION [based on holotype (♂) and female paratype (♀); Morphometric measurements in Table 1].

Coloration. Basically yellowish to reddish-yellow. Prosoma: carapace yellowish with brownish spots; eyes surrounded by black pigment. Mesosoma: yellowish with confluent brownish spots. Metasoma: all segments and vesicle yellowish with light brown spots only vestigial; aculeus yellowish with a reddish tip. Venter pale yellow. Chelicerae yellowish with brownish variegated pigmentation; fingers yellowish with reddish denticles. Pedipalps: yellowish; chela hand reddish in males; fingers dark; femur and patella with dark spots more marked on males. Legs pale yellow, with diffused spots.

**Table 1.** Morphometric values (in mm) of the holotype and paratype of *Babycurus buettneri savanicola* ssp. n. and the holotype of *Babycurus kirki* (Pocock).

	<i>B. b. savanicola</i> ssp. n.		<i>B. kirki</i>
	♂	♀	♂
Total length	47.4	49.0	63.8
Carapace:			
- length	5.3	5.3	6.9
- anterior width	3.3	3.6	5.0
- posterior width	5.5	5.5	7.6
Metasomal segment I:			
- length	3.3	3.4	4.9
- width	3.2	3.2	4.2
Metasomal segment V:			
- length	6.5	6.1	8.2
- width	3.7	2.8	4.6
- depth	2.9	2.5	3.9
Vesicle:			
- width	1.7	1.6	3.2
- depth	1.6	1.6	2.7
Pedipalp:			
- femur length	4.7	4.7	6.9
- femur width	1.5	1.6	2.0
- patella length	5.6	5.5	7.4
- patella width	2.1	1.9	2.8
- chela length	9.9	9.5	14.1
- chela width	2.7	1.7	4.0
- chela depth	2.8	1.7	3.9
Movable finger: length	5.9	6.0	8.6

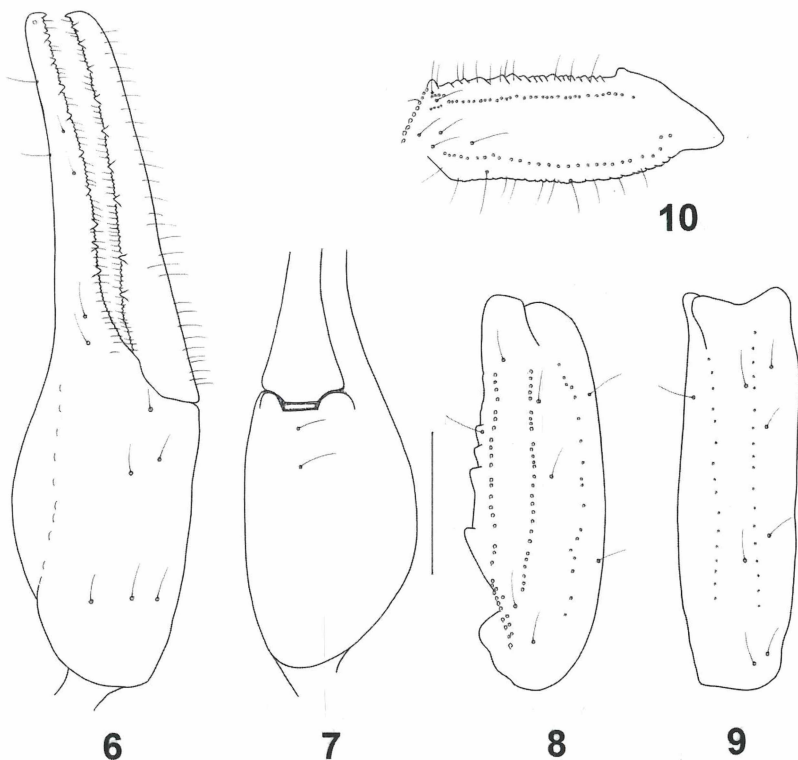
**MORPHOLOGY.** *P r o s o m a*: Carapace weakly granular; anterior margin with a weak concavity; carinae weak to obsolete; furrows weak. Median ocular tubercle anterior to the centre of carapace; median eyes separated by one and half ocular diameters. Three pairs of lateral eyes. Sternum triangular. *M e s o s o m a*: tergites with very weak granulation, almost smooth. Median carina weak to moderate in all tergites. Tergite VII pentacarinata, but all carinae moderately marked. Venter: genital operculum divided longitudinally, forming two oval plates. Pectines: pectinal tooth count 21-21 (male), 20-20 (female); basal middle lamellae of each pecten not dilated. Sternites smooth with elongate spiracles; carinae vestigial to obsolete on VII. *M e t a s o m a*: all segments smooth and round; segment I with ten carinae, not crenulate; segments II to IV with eight carinae, almost obsolete; segment V smooth with only vestigial dorsal carinae. Tegument not granular, almost smooth. Telson with some vestigial granules ventrally; other surfaces smooth; aculeus shorter



**Figs 2-5.** *Babycurus buettneri savanicola* ssp. n. (2-4: holotype ♂): **2** – carapace; **3** – chelicera. **4** – metasomal segment V and telson, lateral aspect. **5** – paratype (♀), idem (scale bar = 2 mm).

than the vesicle in males; of same length in females; strongly curved. Subaculear tooth very strong and spinoid. Cheliceral dentition characteristic of the family Buthidae (Vachon 1963); basal teeth on movable finger small but not fused; ventral aspect of both finger and manus with long dense setae. Pedipalps: femur pentacarinat but weakly crenulate; patella with six carinae, very weakly crenulated; chela with some vestigial carinae; all faces smooth. Fixed and movable fingers with 8-9 almost linear rows of granules. Trichobothriotaxy; A-a., orthobothriotaxy (Vachon 1974, 1975). Legs: tarsi with numerous fine setae ventrally. Tibial spurs reduced on leg IV, and absent on leg III; pedal spurs present on all legs, but reduced.

**REMARKS:** *Babycurus buettneri savanicola* ssp. n. can be distinguished from other species of the genus *Babycurus*, particularly from *Babycurus buettneri* Karsch, by the following characters: (i) significantly different size and morphometric values (see Table 1); (ii) a totally different pattern of coloration, yellowish but with less conspicuous spots, in particular over the metasomal segments and telson; (iii) absence of tibial spurs on leg III.

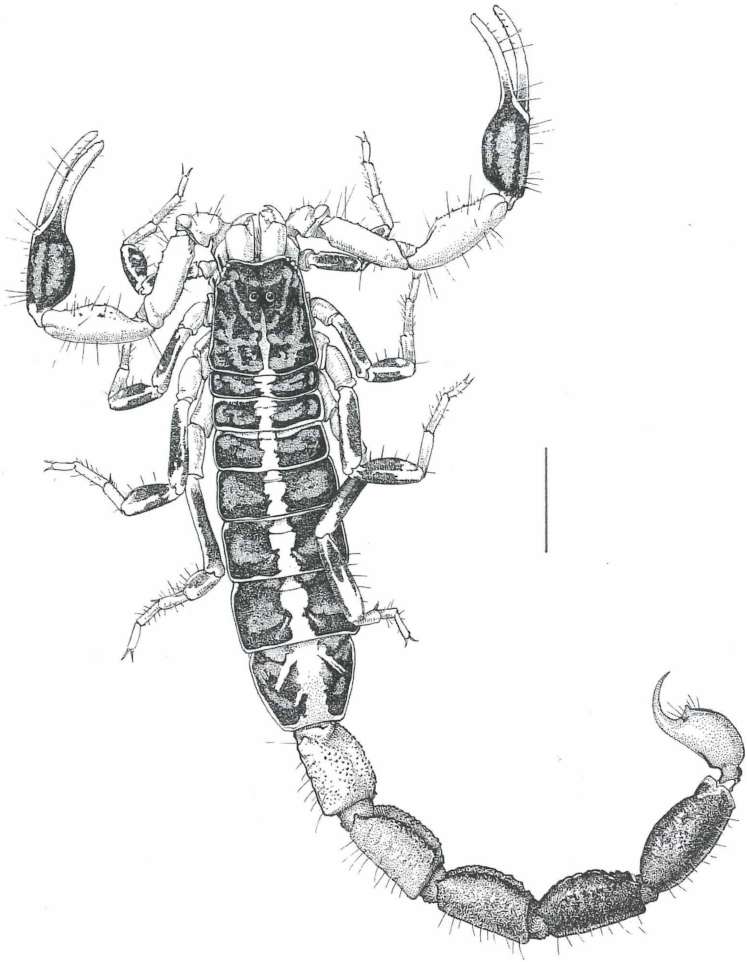


**Figs 6-10.** *Babycurus buettneri savanicola* ssp. n. (holotype ♂, trichobothrial pattern): **6+7** – chela, externo-dorsal and ventral aspects; **8+9** – patella, dorsal and external aspects. **10** – femur, dorsal aspect (scale bar = 2 mm).

### Ecological aspects

Ecological studies on scorpion populations inhabiting tropical savannas are rare in the literature. Exceptions include the studies by Lourenço (1981, 1995, 2000) on certain savannicolous Brazilian scorpions, namely *Tityus fasciolatus* Pessôa, 1935 (the Buthidae) and *Opisthacanthus cayaporum* Vellard, 1932 (the Liochelidae). In the first precise report about the scorpions of the Lamto Ecological Station (Lourenço 1986) very little comment was made on the ecology of the species. More recently (Lourenço & Cloudsley-Thompson 1999) the results of a comparative study between forest and savanna populations of *P. imperator* in Côte d'Ivoire were presented. These were, however, mainly concerned with aspects of the reproductive strategies of two distinct populations.

During the period of 1962-1966, an intensive ecological research was carried in the savannas of the Lamto Ecological Station (Gillon & Gillon



**Fig. 11.** *Butheoloides annieae* Lourenço, habitus of a male (scale bar = 2 mm).

1967). Its purpose was to estimate the total numbers of several arthropod populations. The main technique used was the delimitation of a number of quadrats of 1, 10, 24 and 100 m<sup>2</sup> (*l.c.*), which were sampled for epygean arthropods. It is important to note that samples were obtained both during the dry season (December to February), and the rainy season (March to November). The latter is often interrupted by a short dry season in August. Moreover, during the main dry season, man-made fires take place in the savannas. Only a few sites are spared from these fires,

namely, gallery forests and some wetter zones which can be used by animals as refuges.

The scorpions from those samples have never been analysed until now. The results are presented here as they concern the two species of Buthidae: *Babycurus buettneri savanicola* ssp. n. and *Butheoloides annieae*. The second species is largely dominant in the savanna habitat (Lourenço 1981, Polis 1990).

Quadrats of only 1 m<sup>2</sup> were apparently too small to contain a significant number of scorpions. In more than eight quadrats examined in unburned savannas, only two contained scorpions. One contained a single female of *B. annieae*, another two males and one female of this species.

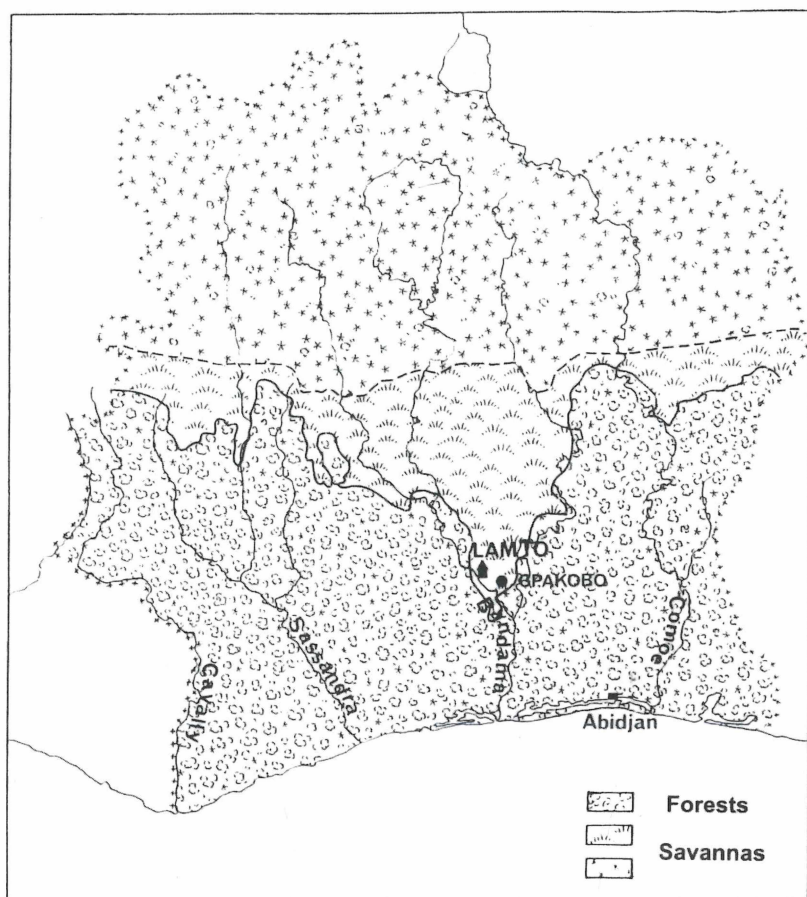
Two quadrats of 100 m<sup>2</sup> have also been analysed: the first, on savannas that had not been burned and the second, on burned savannas. In the first, nine males, six females and eight juveniles of *B. annieae* and one male of *B. b. savanicola* ssp. n. were counted. In the second, three males and one female of *B. b. savanicola* ssp. n. were found.

The most precise investigation was carried on the 25 m<sup>2</sup> square quadrats. A total of 8 plots on unburned savannas and 12 plots on burned savannas was investigated. The results are presented in the Table 2, here below.

**Table 2.** Occurrence of scorpions in 25 m<sup>2</sup> square quadrats of savannas (M = male; F = female; J = juvenile; NB = not burned; B = burned; \* = 1F with brood).

No. of the quadrat	Condition	Species	
		<i>B. annieae</i>	<i>B. b. savanicola</i> ssp.n.
01	NB	1J	
02	NB	1F	
03	NB	1F	
04	NB	1F	
05	NB	2F	
06	NB	1M	
07	NB	1F	
08	NB	2F	
09	B	1M, 1F*	1M, 1F
10	B	1M, 2F	1M
11	B	1M, 1J*	
12	B	1F	
13	B	1M, 1F, 1J	2M, 1F
14	B	2M	
15	B	1F	
16	B	2M	
17	B	2M, 2F*	2M
18	B	2F	
19	B	2M, 1F	1M
20	B	2M, 2F*	1M, 2F





**Fig. 12.** Map of Côte d'Ivoire, with Lamto ecological reservation, the type locality of the new subspecies.

### Conclusions

From the results of the 100 m<sup>2</sup> quadrats and specially for the 25 m<sup>2</sup> quadrats, a certain number of conclusions are possible: *B. annieae* is the predominant species in the guild. Only a small difference was observed in the sex ratio of *B. annieae*. However, since males are more vagile than females, they are more readily collected. Sex ratio should therefore be slightly favourable to females. This is in accordance with what has been observed in several other species of buthids (Lourenço 2002).

Females of *B. annieae* with offspring were only observed in burned savannas during the period of December and January (dry season). This may well indicate that courtship and mating take place during the rainy season, taking into account the fact that embryonic development in small species of buthids averages about three months (Lourenço 2002). We have no data about the number of broods produced by *B. annieae* per year, but there could well be only one brood annually. The average size of the broods observed was rather small, varying from three to eight. This is also in accordance with what has previously been observed in other small species of buthids (Lourenço 2002).

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