

## THE “ANANTERIS GROUP” (SCORPIONES: BUTHIDAE); SUGGESTED COMPOSITION AND POSSIBLE LINKS WITH OTHER BUTHIDS

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**Abstract:** The composition of the “*Ananteris* group” (sense Fet *et al.*, 2005) is tentatively proposed. The worldwide geographical pattern of distribution of the elements associated to this “phylogenetic group” is discussed. The biogeographic patterns presented by extant and fossil elements of this group confirm a model of panbiogeographic distribution which clearly corresponds with old Pangaeian patterns. Two new species are described in the genus *Lychas* C. L. Koch. These suggest possible links between elements of the most basal “*Ananteris* group” and other buthids.

**Key words:** Scorpiones, Buthidae, “*Ananteris* group”, biogeographic patterns, *Lychas*, new species, links.

**El “grupo *Ananteris*” (Scorpiones: Buthidae); hipótesis sobre su composición y posibles relaciones con otros bütidos**

**Resumen:** Se propone la posible composición del “grupo *Ananteris*” (sense Fet *et al.*, 2005). Se discute el patrón mundial de distribución de los elementos asociados con este “grupo filogenético”. Los patrones biogeográficos de los elementos actuales y fósiles de este grupo confirman un modelo de distribución panbiogeográfica que corresponde claramente a los viejos patrones de Pangea. Se describen dos especies nuevas del género *Lychas* C. L. Koch, que sugieren posibles relaciones entre elementos del “grupo *Ananteris*”, el más basal, y otros bütidos.

**Palabras clave:** Scorpiones, Buthidae, “grupo *Ananteris*”, patrones biogeográficos, *Lychas*, especies nuevas, relaciones.

**Taxonomy / Taxonomía:** *Lychas eliseanneae* sp. n., *Lychas inexpectatus* sp. n.

### Introduction

The position of subfamilies within the family Buthidae has always been a subject of controversy. This aspect of the classification of scorpions has often been based on few and/or unreliable characters. Consequently, none of the attempts made to recognize subfamilies is satisfactory. This leads many if not most current authors not to recognize subfamilies within the family Buthidae (Stahnke, 1972; Lamoral & Reynders, 1975; Sissom, 1990; Fet & Lowe, 2000).

The history of buthid subfamilies has been particularly well summarized by Fet and Lowe (2000) in the *Catalog of the Scorpions of the World*. For this reason, I decided to reprise parts of their comments here.

Kraepelin (1891) recognized three subfamilies in the family Androctonidae (Androctonini, Isometrini and Centurini). Later, using the family name Buthidae, he listed only the subfamilies Buthinae and Centurinae, distinguishing between them according to the presence or absence of tibial spurs on the legs (Kraepelin, 1899). Subsequently, he added the Ananterinae, previously described by Pocock (1900), and the Tityinae (Kraepelin, 1905). The Ananterinae was itself diagnosed by the absence of fulcra on the pectines, while the other subfamilies were recognized by differences in the dentition of the pedipalp chela fingers. Birula (1917) distinguished three subfamilies (Buthinae, Isometrinae and Orthochirinae) using a completely different set of diagnostic characters: the shape of cephalothorax, the number of lateral eyes, and the pattern of ventral spination of the tarsus. This treatment was followed by Hoffmann (1932) in his monograph on the Mexican fauna. However, the majority of subsequent authors working with the Old World Buthidae (Werner, 1934; Millot & Vachon, 1949; Vachon, 1952; Koch, 1977; Levy & Amitai, 1980)

accepted Kraepelin's (1905) arrangement without any discussion of Birula's (1917). Pavlovsky (1924, 1925) recognized three subfamilies on the basis of male genital apparatus structure: Isometrinae, Centurinae and Buthinae.

Mello-Leitão (1945), the last author to discuss this issue in detail, rejected the arrangement of Kraepelin (1905) and explicitly accepted Birula's, listing all Neotropical buthids under the name Isometrinae. Mello-Leitão (1945), however, used the presence or absence of tibial spurs as the major diagnostic character by which to separate subfamilies. He also pointed out that Centurinae was not an available name, considering it a *nomen nudum*. He rejected, however, two possible available names, Centruroidinae and Rhopalurinae to replace Centurinae, as he considered that the taxonomic positions of these two groups were unclear. Certain names, however, were subsequently used by a number of authors who tried to combine Kraepelin's and Birula's schemes without a detailed discussion of the issue. Recent authors such as Lamoral (1980) recognized as many as five subfamilies of Buthidae.

In recent years, only the subfamily Ananterinae has been the subject of any new discussion. Attempts to propose a diagnosis to this subfamily have not, however, been successful (Lourenço, 2005), since the used characters were generally unreliable. In the present paper, I prefer not to retain the subfamily Ananterinae until further studies on the totality of the buthoid elements may be available. Instead, I will refer to the “*Ananteris* phylogenetic group” as defined by Fet *et al.* (2005). The group is used as an informal notion, whereas the notion of subfamily has to be used as a compulsory category. The worldwide geographical pattern of distribution of the

elements of this “group” is also discussed. The biogeographic patterns presented by extant and fossil elements of the group confirm not only a typical model of Panbiogeographic distribution, but also correspond with old Pangaeian patterns. Two new species are described in the genus *Lychas* C. L. Koch. These suggest possible links between elements of the most basal “*Ananteris* group” and other buthids. In fact, as already pointed out by Lourenço (2000a), the large number of genera currently accepted as being valid within the Buthoidea cannot be classified at a single evolutionary level. At least four or five different evolutionary gradients need to be defined. This was already attempted by Fet et al. (2005) in their definition of groups within the Buthoidea.

## Methods

Illustrations and measurements were produced using a Wild M5 stereo-microscope with a drawing tube and an ocular micrometer. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990).

## Systematics

### Possible characters associated with the “*Ananteris* group”

A number of characters can be listed in association with the elements that I suggest to be placed within the “*Ananteris* group”:

1. Absence of fulcra in the pectines (Figs 1-2). This character was the one that originally defined the Ananterinae (Pocock, 1900; Lourenço, 1982). It can, however, be found in at least some species of the genus *Tityobuthus* Pocock from Madagascar (Lourenço et al., 2008).
2. Pedipalp chela fingers with 6 or 7 rows of granules. This character is also present in the genus *Lychas* C. L. Koch. Some species of this genus, however, presents other well defined characteristics (Fig. 9) which are less basal in relation to the “group *Ananteris*” (Lourenço, 1982, 1985, 1997, 1999, 2003a; Vachon, 1974, 1986).
3. Carapace with weakly marked carination and, in general, weak to moderate granulations everywhere; median ocular tubercle very distinctly anterior to the centre of the carapace (Lourenço, 1982, 1985, 1997, 1999).
4. Tergites with a median carina only, moderate to weak.
5. Telson with fusiform shape in most cases, or bulbous in some cases; aculeus always shorter than vesicle; subaculear tooth in most cases strong, with a spinoid or rhomboid shape (Lourenço, 1982, 1985, 1997, 1999) (Figs. 3 to 8).
6. Tibial spurs present in the majority of species of all genera. A few exceptions can, however, be observed in some species of *Tityobuthus*, in which spurs may be absent (Lourenço, 1996; Lourenço et al., 2008).
7. Trichobothrial pattern always orthobothriotaxic; disposition of the dorsal trichobothria of the femur is beta in almost all genera except for *Tityobuthus*, *Troglotityobuthus* Lourenço and *Palaeoananteris* Lourenço & Weitschat a Cenozoic fossil group. For these genera the disposition is alpha (Lourenço, 1982, 1985, 1999, 2000b, 2003a; Lourenço et al., 2008; Lourenço & Weitschat, 2001, 2009).
8. Very weak sexual dimorphism. Males and females of most species have an extremely similar morphology. Male pectines

are generally longer than those of the females and have a larger number of pectinal teeth. Males may also possess slightly thinner and longer pedipalps, metasomal segments and telson (Lourenço, 1982, 1985, 1999; Lourenço et al., 2008; Lourenço & Weitschat, 2001, 2009). One other genus presents some characters similar to those of the “*Ananteris* group”; *Isometrus* Ehrenberg, 1828. In this genus, however, sexual dimorphism is usually strongly marked (Lourenço & Zhu, 2008).

### Genera which are tentatively placed in the “group *Ananteris*”

*Ananteris* Thorell, 1891  
*Tityobuthus* Pocock, 1893  
*Ananteroides* Borelli, 1911  
*Lychas* C. L. Koch, 1845  
*Lychasioides* Vachon, 1974  
*Himalayotityobuthus* Lourenço, 1997  
*Troglotityobuthus* Lourenço, 2000  
†*Palaeoananteris* Lourenço & Weitschat, 2001  
*Microananteris* Lourenço, 2003

The previous list of genera differs from that proposed by Fet et al. (2005) for their “*Ananteris* group”. This is certainly due to the characters initially used to define the group.

Another Cenozoic fossil scorpion, *Palaeotityobuthus longiaculeus* Lourenço & Weitschat was related to the extant genus *Tityobuthus*. This fossil, however, is extremely incomplete and insufficient information is available on its complete morphology (Lourenço & Weitschat, 2000). Consequently, I have not taken this group into consideration in the present study.

### Geographical distribution of the “*Ananteris* group”

A paper dealing with genera *Ananteris* and *Ananteroides*, proposed synonymy of the monotypic genus *Ananteroides* with *Ananteris* (Lourenço, 1985). More recently, the study and redescription of another African genus, *Lychasioides* Vachon, led me to conclude that this last genus was closer to *Ananteris* than to *Ananteroides* (Lourenço, 1999). Consequently, I have decided to revalidate the genus *Ananteroides*. In fact, its synonymy with *Ananteris* was based exclusively on their common trichobothrial patterns. This single character, however, seems insufficient justification, since many morphological differences do exist between the two genera (Lourenço, 1985).

### Diagnosis for the genus *Ananteroides* Borelli, 1911.

TYPE SPECIES by original designation: *Ananteroides feae* Borelli, 1911.

DIAGNOSIS: Scorpions of small size, reaching 35 mm in total length. Carinae and granulations strongly developed on body and appendages. Disposition of the granulations on the dentate margin of the pedipalp chela fingers not linear but rather oblique. Basal teeth of movable finger of chelicerae reduced and sometimes fused in a single tooth. Telson’s vesicle bulbous. Trichobothriotaxy, orthobothriotaxy A-beta.

DISTRIBUTION: East Africa, from Côte d’Ivoire to Guinea.

In several recent publications (e. g. Lourenço, 1996; Lourenço et al., 2008), the Malagasy genus *Tityobuthus* Pocock has been studied exhaustively. These publications suggest clear affinities with the genus *Ananteris*. Other new ge-

nera, such as *Himalayotityobuthus* Lourenço from the Himalayas, are clearly related to the genera *Tityobuthus* from Madagascar, and *Microananteris* Lourenço from French Guiana (Lourenço, 1997, 2003a). Clear affinities were also suggested among *Lychasioides*, *Ananteris* and *Tityobuthus* (Lourenço, 1999).

The validity of the genus *Microananteris* was recently rejected by Botero-Trujillo and Noriega (2011) who considered this genus as only a synonymy of *Ananteris*. For a certain number of reasons, I do not accept this decision, and explain it as follows. (a) Most, if not all, data proposed by these authors was simply collected in the literature (mainly from my own publications). The type of *Microananteris* was not examined, and not either material of the different groups used to support their argumentation. I doubt myself that these authors ever examined any material of most groups they cited in their paper. (b) The key points in the comparative analysis of both genera are shape of peg sensillae and presence of seta-like structure of the tegument. The authors stated as follow: "Nevertheless, the round and bottle like shape of the peg sensillae of *Microananteris* appeared to be still supporting its validity, as was markedly different from the spatulate shape reported for *Ananteris balzanii* Thorell, 1891; such spatulate shape, which according to Lourenço (2003a) was also observed in other species of *Ananteris*, **was not depicted for any other species, however**" (bold indicated by me). This statement is fallacious since at least for two other *Ananteris* species, *A. sabineae* Lourenço and *A. elisabethae* Lourenço, the peg sensillae proved to be similar in shape to those of *A. balzanii* (Lourenço, 2003b). Besides, the seta-like structure of the tegument was also present in both species. The SEM photos presented by Botero-Trujillo and Noriega (2011) suggest that the material used was most certainly not ideally preserved for SEM use (in particular the one of the new species *A. palmari*). This could explain the absence of some structures, such as the seta-like tegument, possibly lost during the preparation of the material for SEM observation. New material of the "*Ananteris* group" from French Guiana is presently in study (Lourenço in preparation) and should bring further evidence about the identities of both *Ananteris* and *Microananteris*. Two extra remarks may be interesting. Several months before the publication by Botero-Trujillo and Noriega (2011), one of the authors (Botero-Trujillo) wrote me several times insisting about a possible new species of *Microananteris* from Brazil. After the examination of photos send by him, I confirmed this species as belonging to the genus *Ananteris*. The new species *A. palmari* was collected in a Natural Reserve in Brazil in 2009. The name of the collector (?) is not indicated in the publication. I don't know if this specimen was collected with legal permits (what was probably not the case). The indicated depository of the holotype is a Colombian Institution what is illegal according to Brazilian Federal laws. This 'detail' should be repaired by the responsible curator of the Colombian collection.

The association of all these genera within the "*Ananteris* group" clearly indicates a Panbiogeographic pattern of distribution for this undoubtedly ancient lineage of buthid scorpions. The recent discovery of a fossil genus in Baltic amber, namely *Palaeoananteris* Lourenço & Weitschat, closely related to *Ananteris* added further confirmation of

both the panbiogeographic pattern of distribution and antiquity of the "*Ananteris* group" lineage (Lourenço & Weitschat, 2000, 2001).

#### Possible links between the "*Ananteris* group" and other buthids

The genus *Lychas* C. L. Koch, contains species showing different grades of evolutionary development. Some authors (Vachon, 1986, in litt.) suggest a close relationship between *Lychas* and *Ananteris*. This is also indicated by fossil amber evidence from the Baltic region (Lourenço & Weitschat, 1996, 2000, 2001). The study of a few specimens belonging to the genus *Lychas*, has revealed two new species with basal characteristics, clearly allying it to the "*Ananteris* group". These new species may represent a 'link' between the elements of the "*Ananteris* group" and other more evolved buthids. They are described below.

#### Descriptions of new taxa

##### Buthidae C. L. Koch, 1837

##### *Lychas* C. L. Koch, 1845

##### *Lychas eliseanneae* sp. n. (Fig. 10 to 18)

**MATERIAL EXAMINED.** Female holotype. Indonesia, Prov. Raja Ampat, Misool Island, SW Distr. Misool Utara, Aduwey (Adua) vill. ~5 km NNW valley of River Hakau (01°58'46"S, 129°54'37"E), 29/III/2009, primary mountain forest, in litter (D. Telnov & K. Greke). Type material deposited in the Muséum national d'Histoire naturelle, Paris.

**DIAGNOSIS.** Scorpions of moderate to small size, with respect to the genus, measuring 32 mm in the female. General coloration yellowish with a moderately marked brownish variegated pigmentation over the body and appendages. Carinae and granulations moderate. Carapace strongly emarginated. Pectines small; pectinal tooth count 10-11 for female holotype; fulcra absent. Dentate margins of fixed and movable fingers of pedipalp chela with 6-7 almost linear rows of granules (see Taxonomic Remarks); one very inconspicuous external accessory granule next to the most basal row of granules. Subaculear tubercle strong, between rhomboid and spinoid in shape; ventral granules conspicuous.

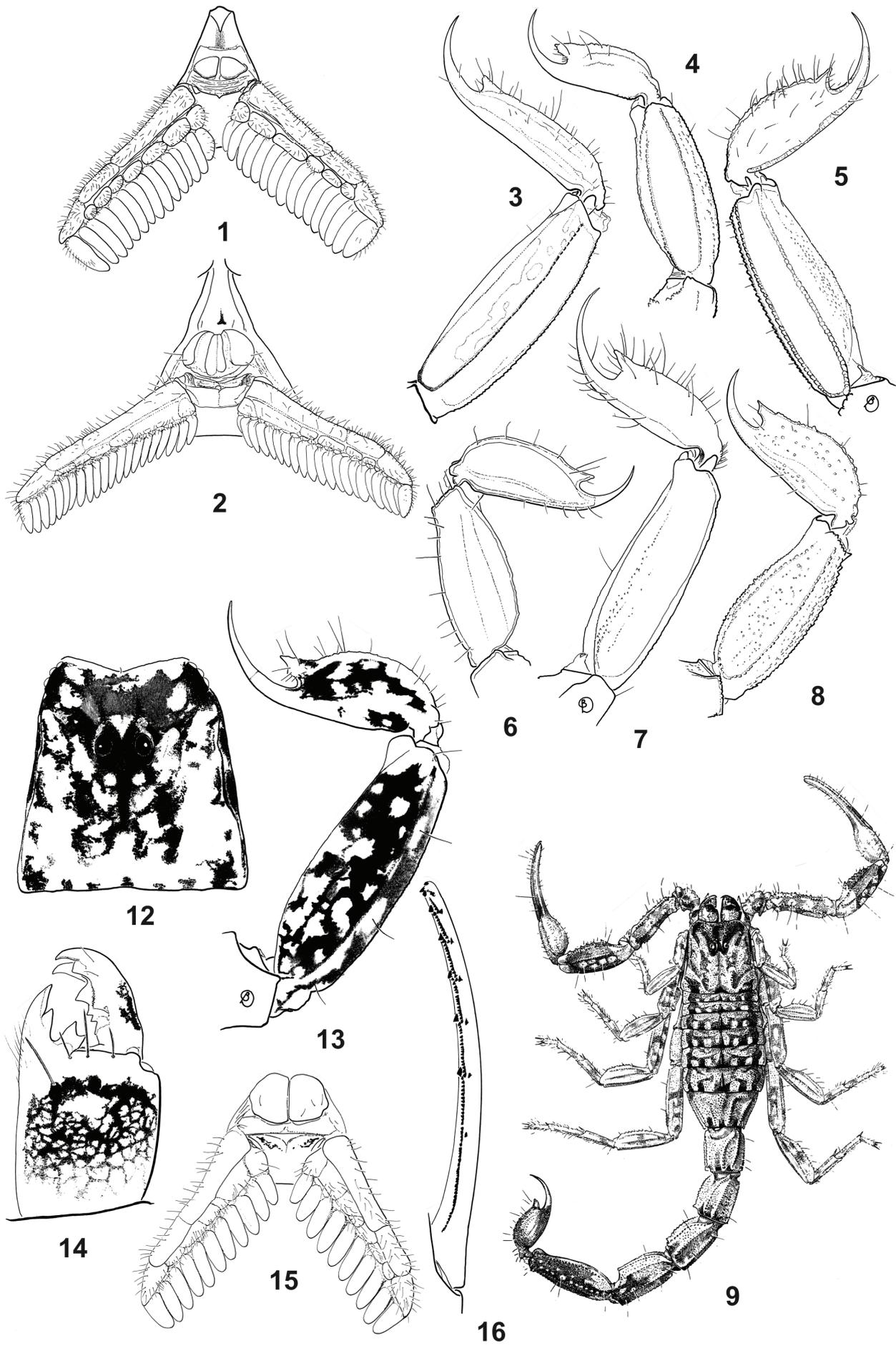
**RELATIONSHIPS.** From a consideration of its general morphology, *Lychas eliseanneae* sp. n. may well be related to *Lychas variatus canopenensis* Lourenço & Qi, 2007 described from Papua New Guinea, and to *Lychas santoensis* Lourenço, 2009 described from Vanuatu. *Lychas eliseanneae* sp. n. can, however, be distinguished from the other species by the following characters: (i) much more pale overall coloration and much less intense brownish variegated pigmentation on body and appendages, (ii) carapace very strongly emarginated, (iii) fulcra totally absent (see Taxonomic Remarks).

**ETYMOLOGY:** Patronym in honour of Miss Elise-Anne Lequin (Muséum, Paris) for her continuous efforts to study and organize the scorpion collection of the Muséum national d'Histoire naturelle, Paris.

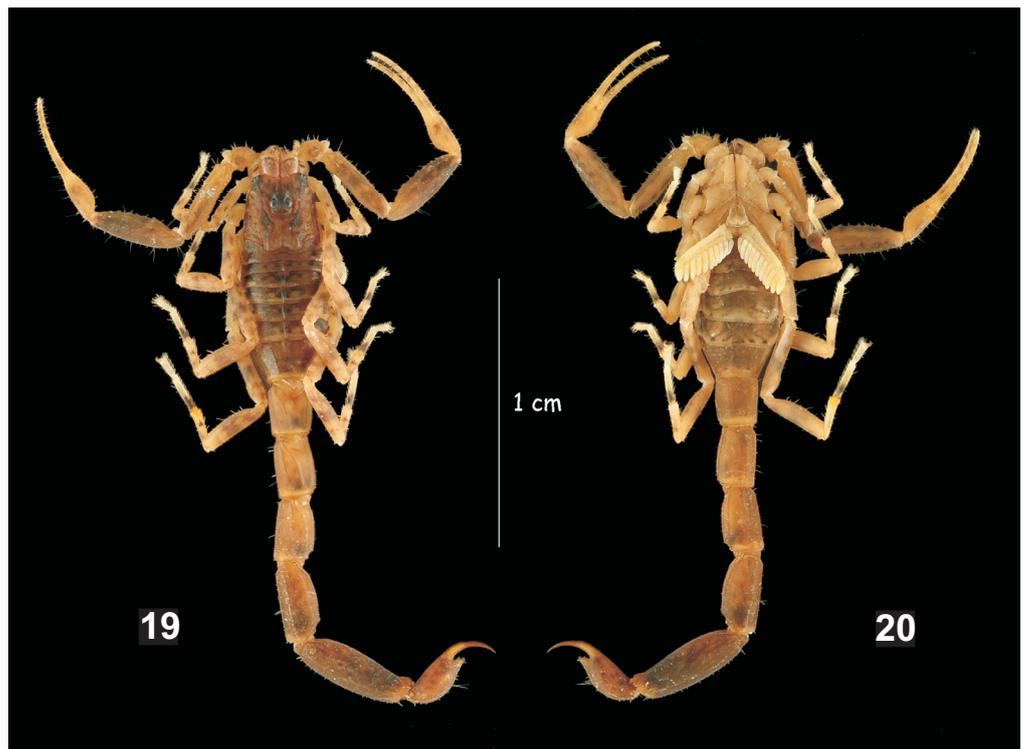
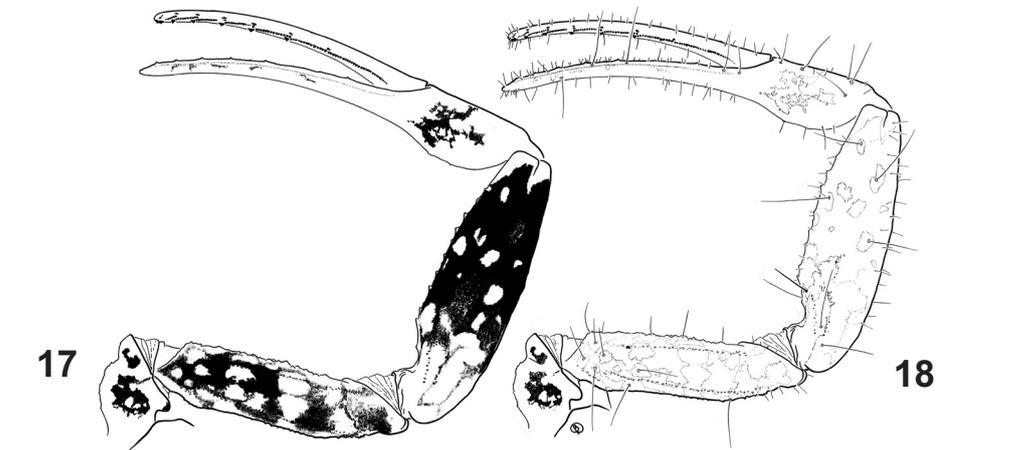
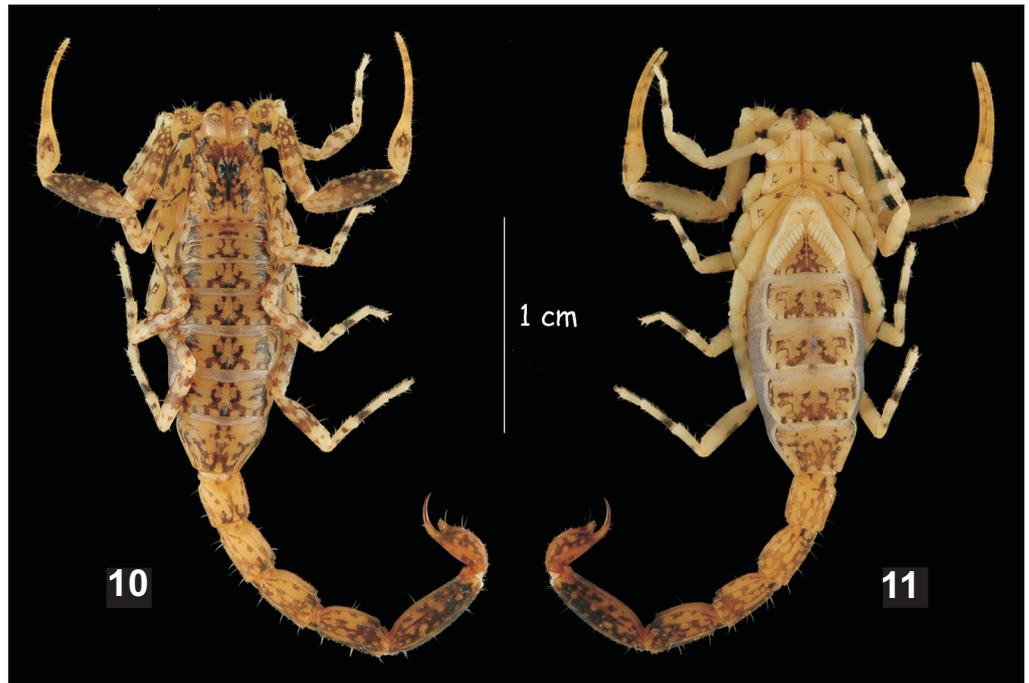
##### DESCRIPTION BASED ON FEMALE HOLOTYPE.

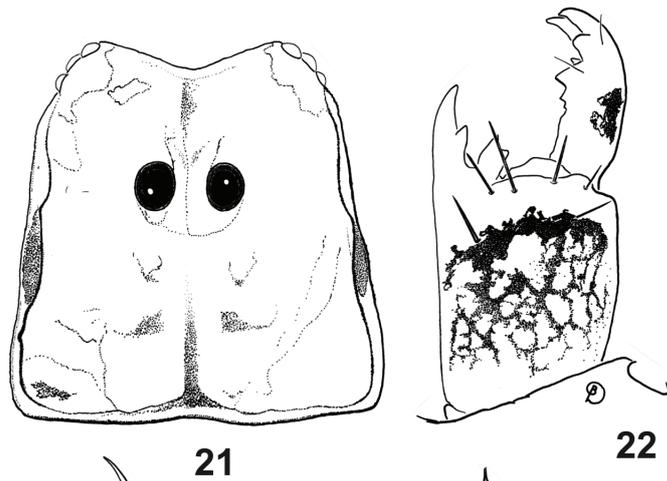
**Morphometric measurements** in Table I.

**Coloration.** Generally yellowish with moderately marked

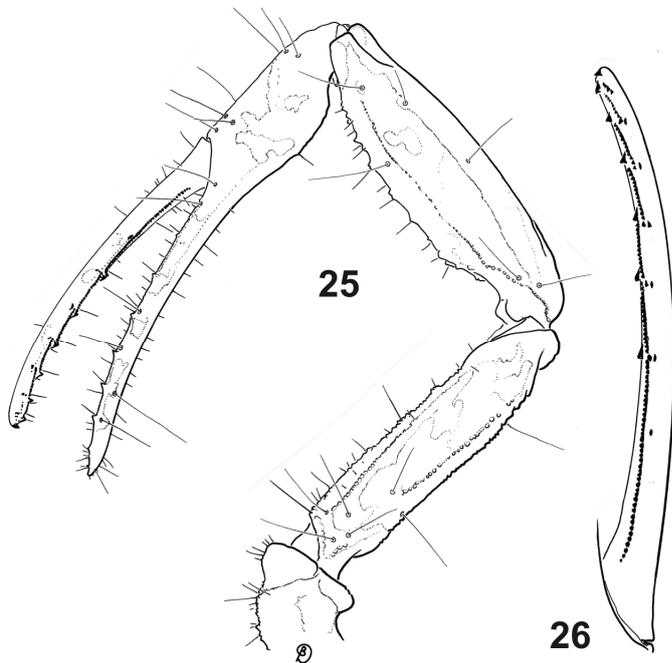
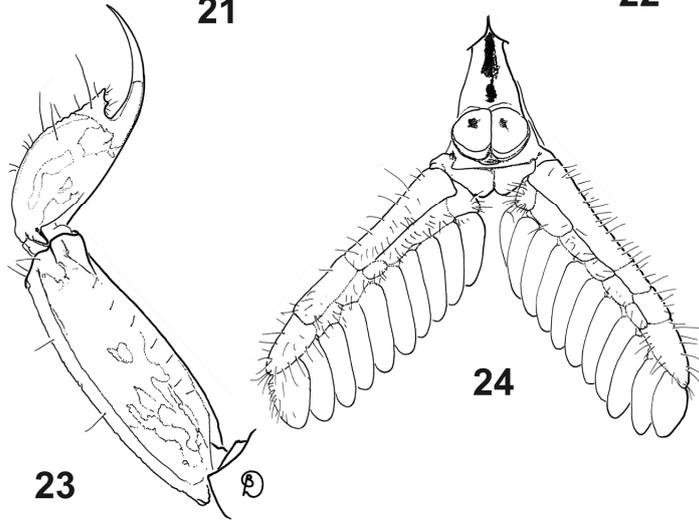


- **Fig. 1-2.** Sternum, genital operculum and pectines.
  1. *Ananteris madeirensis* Lourenço & Duhem, male holotype from Brazil.
  2. *Lychas mucronatus*, male from Laos.
- **Fig. 3-8.** Metasomal segment V and telson, lateral aspect.
  3. *Ananteris madeirensis*, male holotype.
  4. *Himalayotityobuthus martensi* Lourenço, female paratype from Nepal.
  5. *Lychasioides amieti* Vachon, female holotype from Cameroon.
  6. *Microananteris minor* Lourenço, female holotype from French Guiana.
  7. *Tityobuthus darainensis* Lourenço & Goodman, female from Madagascar.
  8. *Ananteroides feae* Borelli, female from Guinea.
- **Fig. 9.** Habitus of *Lychas mucronatus*, male from Jakarta (from Vachon, 1986).
- **Fig. 10-11.** *Lychas eliseanneae* sp. n., female holotype. Dorsal and ventral aspects.
- **Fig. 12-16.** *Lychas eliseanneae* sp. n., female holotype.
  12. Carapace, dorsal aspect.
  13. Metasomal segment V and telson, lateral aspect.
  14. Chelicera, dorsal aspect.
  15. Genital operculum and pectines.
  16. Disposition of the granulations on the dentate margin of the pedipalp chela movable finger.
- **Fig. 17-18.** *Lychas eliseanneae* sp. n., female holotype. Pedipalp, dorsal aspect.
  17. Showing the pigmentation pattern.
  18. Showing the trichobothrial pattern.
- **Fig. 19-20.** *Lychas inexpectatus* sp. n., male holotype. Dorsal and ventral aspects.





**Fig. 21-24.** *Lychas inexpectatus* sp. n., male holotype. **21.** Carapace, dorsal aspect. **22.** Chelicera, dorsal aspect. **23.** Metasomal segment V and telson, lateral aspect. **24.** Genital operculum and pectines.



**Fig. 25-26.** *Lychas inexpectatus* sp. n., male holotype. **25.** Pedipalp, dorsal aspect, showing the trichobothrial pattern. **26.** Disposition of the granulations on the dentate margin of the pedipalp chela movable finger.

brownish variegated pigmentation. Prosoma: yellowish covered with dark pigmented zones centrally; eyes surrounded by black pigment. Mesosoma: tergites yellowish with several dark spots forming approximately three longitudinal strips. Venter pale yellow, with small dark spots covering coxapophysis, sternum and sternites. Metasomal segments yellowish,

moderately marked with brownish variegated spots. Ventral aspect of segments IV and V almost totally dark. Vesicle reddish-yellow with dark spots; aculeus yellow at the base and reddish at its extremity. Chelicerae yellowish, intensely marked with dark variegated spots which cover almost its entire surface; teeth reddish. Pedipalps yellowish; femur and

patella intensely marked with variegated brownish spots; chela yellowish with some dark spots, much less marked than those of the femur and patella; rows of granules on dentate margins of the fingers reddish. Legs yellowish, intensely marked with brownish variegated spots.

**Morphology.** Prosoma: Anterior margin of carapace strongly emarginated. Carapace carinae moderate to weak; anterior median and posterior median carinae weakly developed; other carinae weak to obsolete. Intercarinal spaces moderately to weakly granular. Median ocular tubercle anterior to the centre of the carapace; median eyes separated by more than one ocular diameter. Three pairs of lateral eyes. Mesosoma: tergites I-VI with a median carina; weak to obsolete on I, moderate on II-VI. Tergite VII pentacarinata, with lateral pairs of carinae moderately marked; median carinae present in proximal half, moderately developed. Intercarinal spaces with moderately to weakly marked granulation, similar to that of carapace. Sternites without granulations, smooth; spiracles moderately long; sternite VII with four carinae weak to obsolete. Pectines small; pectinal teeth count 10-11; fulcra absent. Metasoma: Segment I with 10 carinae, crenulate; II to IV with 8 carinae, crenulate. Segment V with five carinae; one vestigial posterior spinoid granule on the dorsal carinae of segments I-IV. Dorsal furrows of all segments weakly developed and with some thin granulations; intercarinal spaces weakly granular. Telson moderately elongated and weakly granular, with one ventral and two lateral carinae; aculeus moderately curved and shorter than the vesicle; subaculear tubercle strong, between rhomboid and spinoid in shape; ventral granules conspicuous. Chelicerae with the dentition characteristic of the buthids (Vachon, 1963); two small but well distinct basal teeth on movable finger. Pedipalps: Femur pentacarinata; all carinae moderately crenulate. Patella with seven carinae, weakly crenulate; dorsointernal carinae with 7-8 spinoid granules. Chela with vestigial. Intercarinal spaces weakly granular on femur and patella; smooth on chela. Dentate margins on movable and fixed fingers composed of 6-7 linear rows of granules; one very inconspicuous external accessory granule next to the most basal row of granules. Trichobothrial pattern type A, orthobothriotaxic (Vachon, 1974); dorsal trichobothria of femur in  $\beta$  (beta) configuration (Vachon, 1975). Legs: ventral aspect of tarsi with a brush-like group of setae. Tibial spurs present on legs III-IV, moderately developed; pedal spurs present on all legs; reduced on legs I and II.

***Lychas inexpectatus* sp. n.** (Fig. 19 to 26)

**MATERIAL EXAMINED.** Male holotype: Indochina (now Laos), Xiang Kuang (1560 m), III/1946 (C. Dawydoff leg.), Type material deposited in the Muséum national d'Histoire naturelle, Paris.

**DIAGNOSIS.** Scorpions small size, with respect to the genus, measuring 21 mm for male. General coloration yellowish to reddish-yellow with some dark spots over the body and appendages. Carinae and granulations moderately marked. Carapace strongly emarginated. Median ocular tubercle markedly anterior to the centre of the carapace; median eyes large and globular. Pectines moderate to large; pectinal tooth count 11-10 for male holotype; fulcra absent. Dentate margins of fixed and movable fingers of pedipalp chela with 6-7 (see Taxonomic Remarks) almost linear rows of granules; one

**Table I. Morphometric values (in mm) of the holotypes of *Lychas eliseanneae* sp. n. (*L. eli*) and *Lychas inexpectatus* sp. n. (*L. ine*)**

	<i>L. eli</i> ♀	<i>L. ine</i> ♂
Total length (telson not included)	32.0	21.2
Carapace:		
- length	3.9	3.1
- anterior width	2.8	2.1
- posterior width	4.2	2.9
Mesosoma length	10.8	4.8
Metasomal		
segment I:		
- length	2.3	1.8
- width	2.3	1.6
Metasomal		
segment V:		
- length	5.4	4.3
- width	1.8	1.4
- depth	1.7	1.5
Telson		
- length	4.4	3.4
- width	1.3	1.2
- depth	1.4	1.1
Pedipalp:		
- Femur length	4.3	3.2
- Femur width	1.1	0.8
- Patella length	4.8	3.6
- Patella width	1.4	1.0
- Chela length	6.6	4.8
- Chela width	1.1	0.8
- Chela depth	1.0	0.7
Movable finger:		
- length	4.7	3.6

very inconspicuous external accessory granule next to the most basal row of granules. Subaculear tubercle strong, between rhomboid and spinoid in shape; ventral granules conspicuous.

**RELATIONSHIPS.** From its general morphology, *Lychas inexpectatus* sp. n. is markedly different from all the other species of the genus. It can, however, be characterized by a number of features: (i) an overall faded reddish-yellow coloration with weakly marked dark spots, (ii) carapace strongly emarginated, (iii) median ocular tubercle markedly anterior to the centre of the carapace; median eyes of large size and globular. (iv) fulcra absent (see Taxonomic Remarks).

**ETYMOLOGY.** The specific name refers to the unexpected discovery of the new species.

**DESCRIPTION BASED ON MALE HOLOTYPE.**

**Morphometric measurements** in Table I.

**Coloration.** Generally yellowish to reddish-yellow with some dark spots. Prosoma: reddish-yellow with some darker zones; eyes surrounded by black pigment. Mesosoma: tergites reddish-yellow with some dark spots forming approximately confluent zones. Venter reddish-yellow with some dark spots covering the distal portion of the sternites. Metasomal segments reddish-yellow, marked with dark spots; ventral segments IV and V more intensely marked. Vesicle reddish-yellow with dark spots; aculeus yellow at the base and reddish at its extremity. Chelicerae yellowish, intensely marked with dark variegated spots which cover its entire surface; teeth reddish. Pedipalps: reddish-yellow; femur and patella marked with dark spots; chela yellowish with some dark spots; rows of granules on dentate margins of the fingers reddish. Legs yellowish marked with dark spots.

**Morphology.** Prosoma: Anterior margin of carapace strongly emarginate. Carapace carinae weak; anterior median and posterior median carinae weak; other carinae obsolete. Intercarinal spaces weakly granular. Median ocular tubercle markedly anterior to the centre of the carapace; median eyes of large size and globular, separated by less than one ocular diameter. Three pairs of lateral eyes. Mesosoma: tergites I-VI

with a median carina; weak to obsolete on I, moderate on II-VI. Tergite VII pentacarinata, with lateral pairs of carinae moderate to strong; median carinae present in proximal half, moderately developed. Intercarinal spaces with a moderately marked granulation; similar to that of carapace. Sternites with weakly marked granulations, almost smooth; spiracles moderately long; sternite VII with four carinae. Pectines moderate to long; pectinal teeth count 11-10; fulcra absent. Metasomal segment I and II with 10 carinae, weakly crenulate; III and IV with 8 carinae, weakly crenulate. Segment V with five vestigial carinae, rounded; absence of any posterior spinoid granule on the dorsal carinae of segments I-IV. Dorsal furrows of all segments very weakly developed and with some thin granulations; intercarinal spaces moderately to weakly granular. Telson moderately elongated and weakly granular, with one ventral and two lateral carinae; aculeus moderately curved, shorter than vesicle; subaculear tubercle strong, between rhomboid and spinoid in shape; ventral granules conspicuous. Chelicerae with the dentition characteristic of the buthids (Vachon, 1963); two small but well distinct basal teeth on movable finger. Pedipalps: femur pentacarinata; all carinae moderately crenulate. Patella with seven carinae, moderately crenulate; dorsointernal carinae with 9-10 spinoid granules. Chela with vestigial internal granules. Intercarinal spaces weakly granular on femur and patella; smooth on chela. Dentate margins on movable and fixed fingers composed of 6-7 linear rows of granules; one very inconspicuous external accessory granule next to the most basal row of granules. Trichobothrial pattern type A, orthobothriotaxic (Vachon, 1974); dorsal trichobothria of femur in  $\beta$  (beta) configuration (Vachon, 1975). Legs: ventral aspect of tarsi with a brush-like group of setae. Tibial spurs present on legs III-IV, weakly to moderately developed; pedal spurs present on all legs; reduced on legs I and II.

#### TAXONOMIC REMARKS TO THE GENUS *LYCHAS*

(1) In the precise diagnosis proposed by Vachon (1986) for the genus *Lychas*, the absence of fulcra is assumed to be observed only in very rare cases (Vachon, 1986: page 845, statement number 8: “**fulcres externes présents, ces dermiers rarement absents**”). In the subsequent, but very superficial diagnosis proposed by Kovařík (1997), fulcra are indicated as being always present. This assumption by Kovařík (1997) seems, however, to be based on a previous statement by Sissom (1990). The absence of fulcra from *Lychas eliseanneae* sp. n. and from *Lychas inexpectatus* sp. n. is further evidence of the validity of the observations made by Vachon (1986).

(2) According to Vachon (1986), the dentate margins of the movable finger of the pedipalps bear a fundamental number of 6 linear rows of granules. In fact, the most distal row of granules is not included in this count. Since this distal row can, in many cases be rather conspicuous, the actual number of rows counted of granules should be 7 instead of 6 (Lourenço, 2009).

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