

# Scorpions collected in the island of Espiritu Santo (Vanuatu) and description of a new species of *Lychas* C. L. Koch, 1845 (Arachnida, Scorpiones, Buthidae)

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## ABSTRACT

Two species of scorpions were collected during the SANTO 2006 Expedition: *Liocheles australasiae* (Fabricius, 1775), family Liochelidae Fet & Bechly, 2001 and, *Lychas santoensis* n. sp., family Buthidae C. L. Koch, 1837. The new species is characterized by: moderate to small size for the genus (from 29 to 31 mm in total length); general colouration reddish-yellow to reddish-brown with intense blackish variegated pigmentation throughout body and appendages; pectines with 10 to 12 teeth; fulcra absent or inconspicuous; telson moderately elongated; aculeus moderately curved; subaculear tooth moderate and, between rhomboid and spinoid in shape; granules on the ventral surface inconspicuous; tibial spurs present on legs III and IV; pedipalp fixed and movable fingers with 6-7 (6) rows of granules, and with one very inconspicuous external accessory granule next to the most basal row of granules.

## KEY WORDS

Arachnida,  
Scorpiones,  
Buthidae,  
*Lychas*,  
Vanuatu,  
Espiritu Santo,  
new species.

## RÉSUMÉ

*Scorpions récoltés sur l'île d'Espiritu Santo (Vanuatu) et description d'une nouvelle espèce de Lychas C. L. Koch, 1845 (Arachnida, Scorpiones, Buthidae).*

Deux espèces de scorpions ont été collectées dans l'île d'Espiritu Santo : *Liocheles australasiae* (Fabricius, 1775), famille des Liochelidae Fet & Bechly, 2001 et *Lychas santoensis* n. sp., famille des Buthidae C. L. Koch, 1837. La nouvelle espèce est caractérisée par : taille totale petite à moyenne pour le genre (longueur totale de 29 à 31 mm) ; coloration générale jaune-rougeâtre à rouge-brunâtre avec une intense trame de pigments noirâtres sur toute la surface du corps et des appendices ; peignes avec 10 à 12 dents ; fulcra absents ou à peine marqués ; telson peu allongé ; aiguillon faiblement courbé ; tubercule sous-aiguillonnaire de taille modeste et entre rhomboïdal et spinoid ; granules sur la face ventral peu marqués ; éperons tibiaux présents sur les pattes III et IV ; tranchant des doigts fixe et mobile des pédipalpes avec 6-7 (6) séries de granules, et avec un granule accessoire externe très peu marqué près de la série de granules la plus basale.

## MOTS CLÉS

Arachnida,  
Scorpiones,  
Buthidae,  
*Lychas*,  
Vanuatu,  
Espiritu Santo,  
espèce nouvelle.

## INTRODUCTION

Scorpions collected in Vanuatu remain rare in collections, and very few cases have been precisely documented in the literature. One precise example is given by Monod (2000) and concerns exclusively the species *Liocheles australasiae* (Fabricius, 1775) which belongs to the family Liochelidae Fet & Bechly, 2001.

The SANTO 2006 Expedition allowed the collection of several scorpion specimens. A large majority of the specimens were, once again, identified as belonging to the species *L. australasiae*. Two specimens, however, proved to be a new species of the genus *Lychas* C. L. Koch, 1845. The new species is described below. It also corresponds to the first record of the genus *Lychas* in Vanuatu Islands. Species of this genus have been previously described or reported from New Guinea, Solomon Islands and Fiji Islands (Koch 1977; Francke & Lourenço 1991; Lourenço & Qi 2007).

## MATERIAL AND METHODS

Illustrations and measurements were produced using 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 follow Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990).

For a narrative of the SANTO 2006 expedition, see Bouchet *et al.* (2008), and for a review of the geography and natural history of Santo, we refer to Bouchet *et al.* (in press).

Material is deposited in the MNHN.

## ABBREVIATIONS

- BMNH Natural History Museum, London;  
 MCSN Museo Civico di Storia Naturale "G. Doria",  
 Genova;  
 MNHN Muséum national d'Histoire naturelle, Paris.

## SYSTEMATICS

Family LIOCHELIDAE Fet & Bechly, 2001  
 Genus *Liocheles* Sundevall, 1833

*Liocheles australasiae* (Fabricius, 1775)  
 (Fig. 1)

MATERIAL EXAMINED. — **Vanuatu**. Espiritu Santo Island, Camp Perouse, L. Albenga, 11.XI.2006, 1 ♀ (dry specimen). — Bill's cave, under stone, 151.7514°S, 166.95854°E, 25.XI.2006, C. Rollard, 1 ♀. — Latautei, in forest, 512 m, 151.9596°S, 166.68676°E, 11.XI.2006, C. Rollard, 1 juvenile. — Mangrove Palikoulo, 154.9780°S, 167.25135°E, 28.XI.2006, C. Rollard, 3 juveniles. — Matantas Reserve, in forest, 151.6906°S, 166.94731°E, 24.XI.2006, C. Rollard, 2 ♀♀. — Pénaoru, Soustéo, in forest, 149.6448°S, 166.63662°E, 14.XI.2006, C. Rollard, 6 ♀♀, 1 juvenile, brood with 5 juveniles. — West road, 155.5676°S, 166.96789°E, 10 m, 30.XI.2006, C. Rollard, 2 ♀♀. — Tasmate Village, Mamasa River, 152.1629°S, 166.66442°E, under stone, 8.XI.2006, C. Rollard, 1 female. — *Idem*, 10.XI.2006, local children, 10 ♀♀. — Wonakum, near River Pélapa, in forest, 60 m, 151.7161°S, 166.66528°E, 10.XI.2006, C. Rollard, 5 ♀♀. — Wurahawo, in forest soil, 66 m, 152.1124°S, 166.67564°E, 9.XI.2006, C. Rollard, 2 juveniles. — Wurahawo, in forest, under stones, 112 m, 152.1087°S, 166.67939°E, 9.XI.2006, C. Rollard, 2 ♀♀, 1 juvenile. — In forest, 400 m, 151.95839°S, 166.68536°E, 11.XI.2006, C. Rollard, 3 ♀♀, 1 juvenile.

## REMARK

Considering that a total of 31 females were collected but no males, most certainly this population is also parthenogenetic. This phenomenon has already been observed for other populations of *Liocheles australasiae*, in distinct islands of the Pacific zone. For details see Lourenço (2008).

Family BUTHIDAE C. L. Koch, 1837  
 Genus *Lychas* C. L. Koch, 1845

*Lychas santoensis* n. sp.  
 (Figs 2-5)

MATERIAL EXAMINED. — **Vanuatu**. Espiritu Santo Island, Pénaoru, Camp I, 149.6931°S, 166.65665°E, 900 m, low dense humid forest, 16.XI.2006, C. Rollard, ♀ holotype. — Pénaoru, 149.6700°S, 166.6622°E, 1100 m, transition forest, 17.XI.2006, C. Rollard, ♀ paratype.

COMPARATIVE MATERIAL EXAMINED. — *Lychas perfidus* (original name *Isometrus perfidus* Keyserling, 1885) (= *Archisometrus perfidus*): **Fiji**. Viti Levu – e Mus. Godefroy. Kpt. Pöhl det., 20.II.1894, 3 paralectotypes, 1 ♀ (lectotype), 2 ♂♂ juveniles (BMNH).

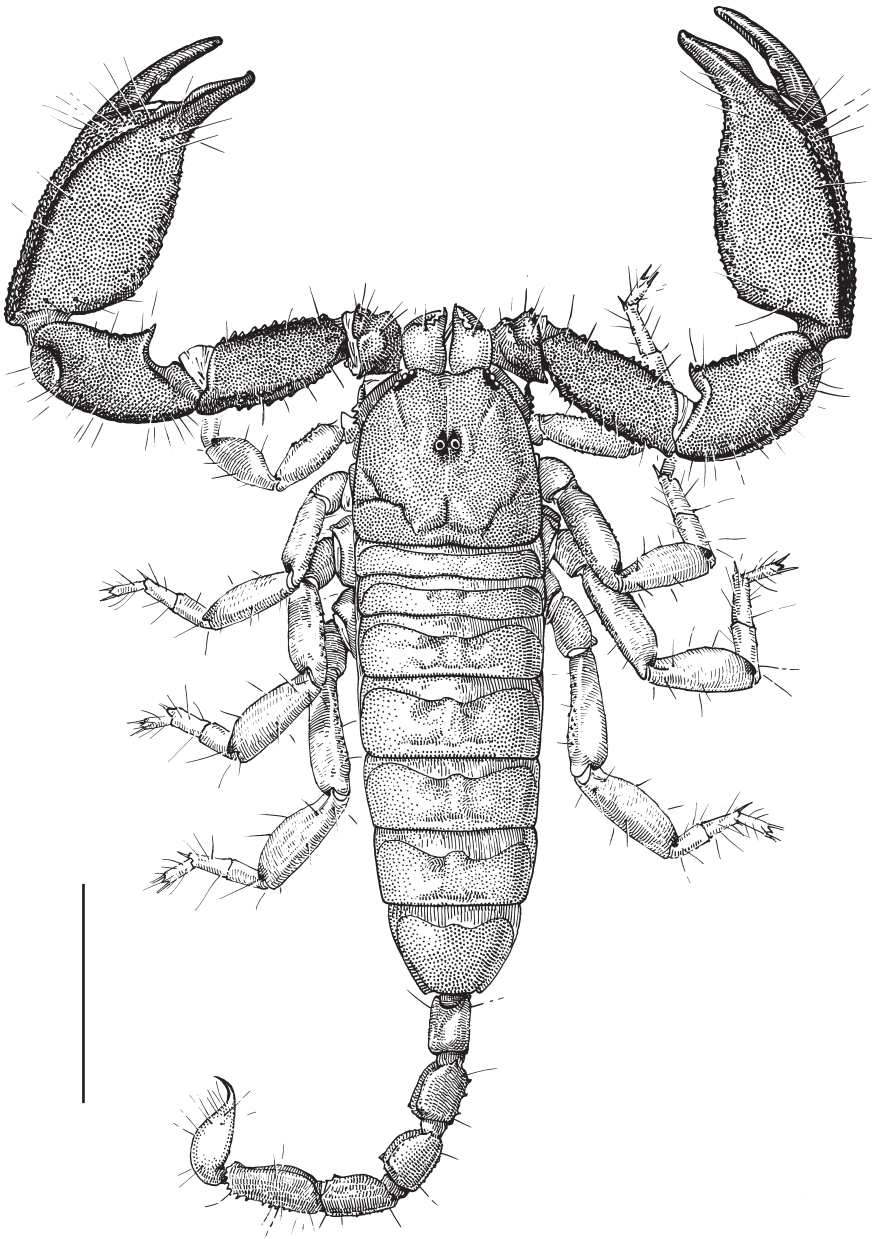


FIG. 1. — Habitus of *Liocheles australasiae* (Fabricius, 1775), ♂ (from Lourenço 1985). Scale bar: 1 cm.

*Isometrus variatus papuanus* Thorell, 1888: New Guinea. Yule, C. York (Somerset) leg. L. M. D'Albertis, 2 ♀♀, lectotype and paralectotype (MCSN).

DIAGNOSIS. — Scorpions of moderate to small size, with respect to the genus, measuring 31 mm for females. General

colouration reddish-yellow to reddish-brown with very intense blackish variegated pigmentation over the body and appendages. Carinae and granulations moderate to strong. Pectines small; pectinal tooth count 12 or 11 for female holotype and 10 or 11 for female paratype; fulcra absent or inconspicuous. Dentate margins of fixed and movable

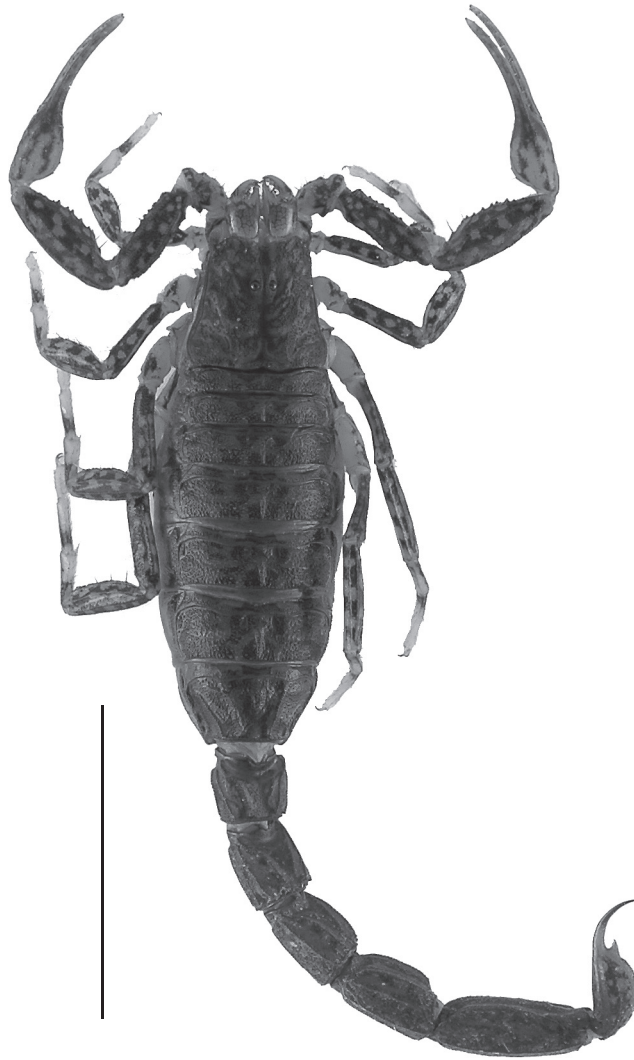


FIG. 2. — *Lychas santoensis* n. sp., ♀ holotype, habitus, dorsal aspect. Scale bar: 1 cm.

fingers of pedipalp chela with 6 or 7 (6 – see remarks) almost linear rows of granules; one very inconspicuous external accessory granule next to the most basal row of granules. Subaculear tubercle moderate, between rhomboid and spinoid in shape; ventral granules inconspicuous.

ETYMOLOGY. — The specific name refers to the Island of Espiritu Santo (Vanuatu) where the new species was collected.

#### RELATIONSHIPS

From its general morphology, *Lychas santoensis* n. sp. is certainly related to *Lychas variatus papuanus* (Thorell,

1888), described from Yule Island in New Guinea, but also to *Lychas perfidus* (Keyserling, 1885), described from Viti Levu Island, Fiji. In fact, the new species appears to occupy an intermediate morphological position between the two other species, what is also consistent with their respective geographical areas of distribution. *Lychas santoensis* n. sp. can, however, be distinguished from the other two species by the following characters: 1) darker overall colouration and a much more intense blackish variegated pigmentation on body and appendages; 2) distinct shape of the



FIG. 3. — *Lychas santoensis* n. sp., ♀ holotype, habitus, ventral aspect. Scale bar: 1 cm.

subaculear tooth, between rhomboid and spinoid; and 3) fulcra absent or inconspicuous (see also taxonomic remarks after the description).

DESCRIPTION BASED ON FEMALE HOLOTYPE AND PARATYPE

*Colouration*

Generally reddish-yellow to reddish-brown with intense blackish variegated pigmentation. Prosoma: reddish-yellow, globally covered with blackish pigmented zones; eyes surrounded by black pigment. Mesosoma: tergites reddish-yellow with several

blackish spots forming approximately three longitudinal strips. Venter yellowish, with dense variegated dark spots covering coxapophysis, sternum, genital operculum pectines and all sternites. Metasoma: segments reddish-yellow to reddish-brown intensely marked with blackish variegated spots. Ventral aspect of segments IV and V almost blackish. Vesicle reddish-yellow with intensely marked blackish spots; aculeus yellow at the base and reddish at its extremity. Chelicerae yellowish, intensely marked with blackish variegated spots which cover its entire surface; teeth reddish. Pedipalps: yellowish to reddish-yellow;

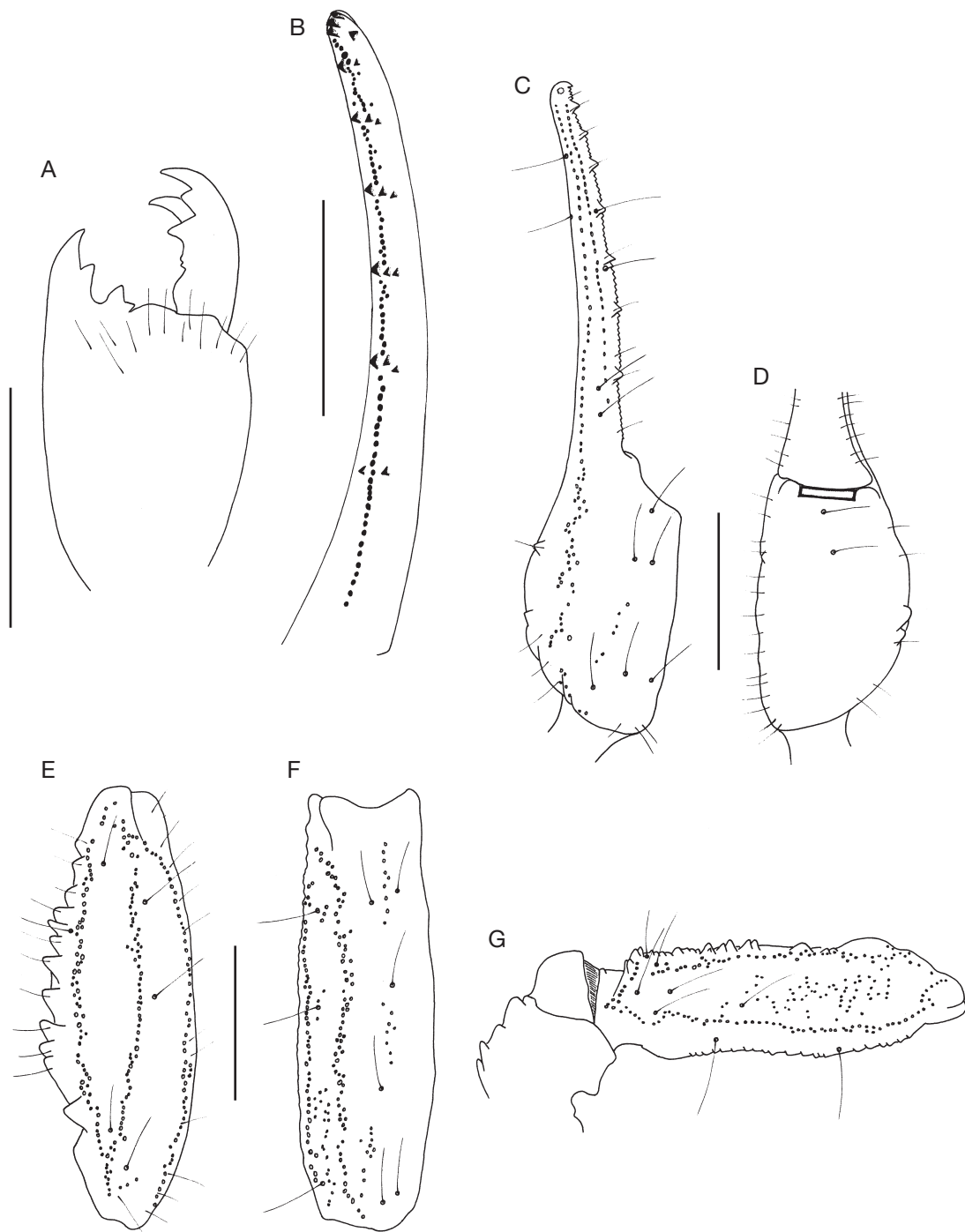


FIG. 4. — *Lychas santoensis* n. sp., ♀ holotype: **A**, chelicera, dorsal aspect; **B**, dentate margin of movable finger, showing rows of granules; **C-G**, trichobothrial pattern; **C, D**, chela, dorso-external and ventral aspects; **E, F**, patella, dorsal and external aspects; **G**, femur, dorsal aspect. Scale bars: 1.5 mm.

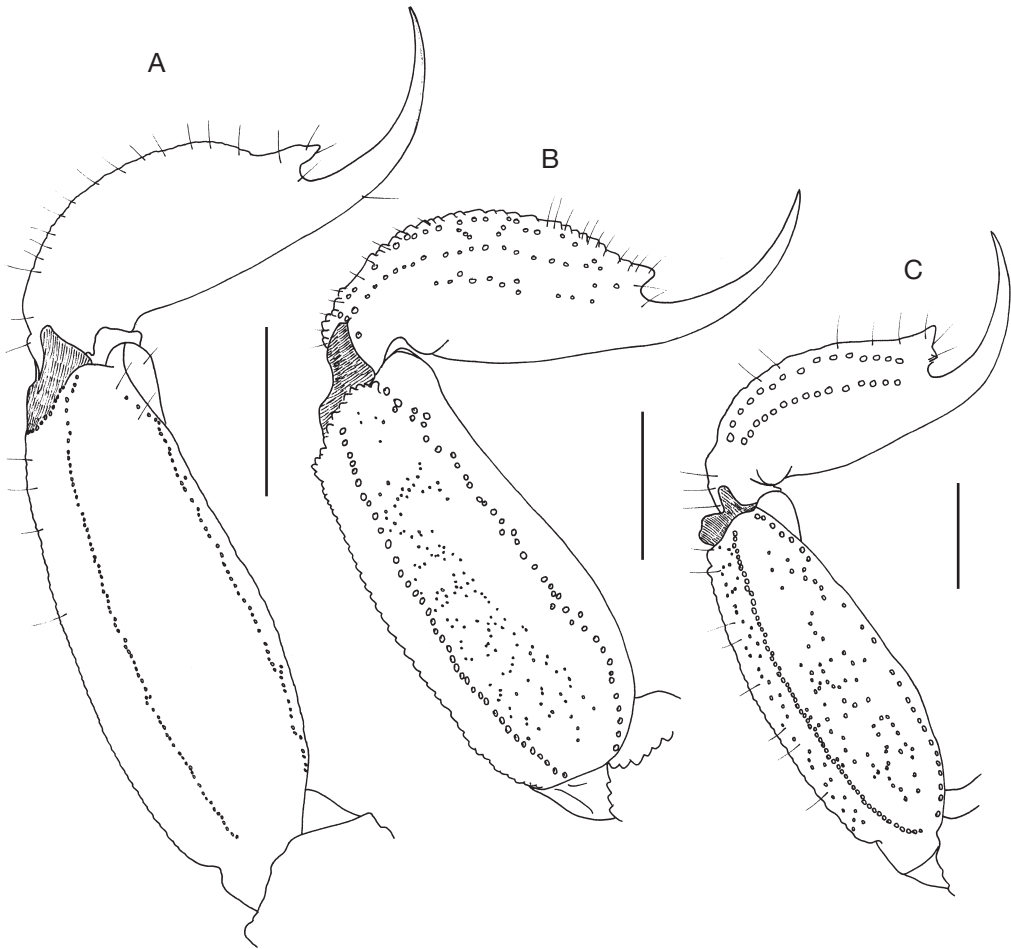


FIG. 5. — Metasomal segment V and telson, lateral aspect: **A**, *Lychas santoensis* n. sp., ♀ holotype; **B**, *L. perfidus* (Keyserling, 1885), ♀ paralectotype; **C**, *L. variatus papuanus* (Thorell, 1888), ♀ lectotype. Scale bars: 1.5 mm.

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

#### *Morphology*

Prosoma: anterior margin of carapace moderately to strongly emarginate. Carapace carinae moderate to weak; anterior median and posterior median carinae moderately developed; other carinae weak to obsolete. Intercarinal spaces moderately granular. Median ocular

tubercle anterior to the centre of the carapace; median eyes separated by 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 pentacarinat, with lateral pairs of carinae moderate to strong; median carinae present in proximal half, moderately developed. Intercarinal spaces with a moderately to strongly marked granulation; similar to that of carapace. Sternites with moderately to weakly marked granulations; spiracles rather short; sternite VII more intensely granulated than other sternites and with four carinae. Pectines moderately long to small; pectinal teeth count 12 or 11 in holotype

TABLE 1. — Morphometric values (in mm): male holotype and female paratype of *Lychas variatus canopensis* Lourenço & Qi, 2007; female lectotype of *L. variatus papuanus* (Thorell, 1888); female lectotype of *L. perfidus* (Keyserling, 1885) and female holotype of *L. santoensis* n. sp.

	<i>L. variatus canopensis</i>		<i>L. variatus papuanus</i>	<i>L. perfidus</i>	<i>L. santoensis</i> n. sp.
	Holotype	Paratype	Lectotype	Lectotype	Holotype
Total length	27.3	28.6	44.0	33.9	31.0
Carapace:					
length	3.9	4.1	5.2	4.3	4.1
anterior width	2.8	3.2	3.8	3.2	2.9
posterior width	3.6	4.5	5.5	4.7	4.3
Metasomal segment I:					
length	2.1	2.6	2.8	2.3	2.0
width	2.2	2.5	3.0	2.7	2.5
Metasomal segment V:					
length	4.7	5.2	6.2	5.2	4.9
width	1.7	2.1	2.5	2.2	1.9
depth	1.7	2.1	2.4	2.1	1.9
Vesicle:					
width	1.2	1.4	2.0	1.8	1.4
depth	1.4	1.5	1.9	1.8	1.5
Pedipalp:					
Femur length	3.8	4.3	4.8	4.0	3.8
Femur width	1.1	1.2	1.4	1.2	1.1
Patella length	4.3	5.1	5.6	4.5	4.3
Patella width	1.4	1.6	2.1	1.6	1.5
Chela length	6.1	6.9	8.4	6.7	6.8
Chela width	1.0	1.1	1.7	1.3	1.3
Chela depth	1.0	1.1	1.6	1.3	1.3
Movable finger:					
length	4.2	4.9	5.9	4.8	4.5

and 10 or 11 for paratype; fulcra absent or totally inconspicuous. Metasoma: segments I and II with 10 carinae, crenulate; III and IV with eight carinae, crenulate. Segment V with five carinae; absence of any 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 moderately granular. Telson moderately elongated and weakly granular, with one ventral and two lateral carinae; aculeus moderately curved; subaculear tubercle moderate and between rhomboid and spinoid in shape; ventral granules inconspicuous. 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; dorso-internal carinae with 6 or 7 spinoid granules. Chela with vestigial dorso-external carinae weakly crenulated,

and no internal granules. Intercarinal spaces weakly granular on femur and patella; almost smooth on chela. Dentate margins on movable and fixed fingers composed of 6-7 (6) 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 to strongly developed; pedal spurs present on all legs; reduced on legs I and II.

#### *Morphometric measurements*

See Table 1.

#### TAXONOMIC REMARKS

1) In the very 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: 845, statement number 8: “fulcres externes présents, ces derniers rarement absents”). In the subsequent, but very superficial diagnosis proposed by Kovařík (1997), fulcra are indicated as always present. This assumption by Kovařík (1997) seems, however, to be based on a previous statement by Sissom (1990). The absence of fulcra in *Lychas santoensis* n. sp. seems to bring further evidence to the observations done by Vachon (1986).

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

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