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The new stick insect genus *Medauromorpha* gen. nov. with one new species from Vietnam and notes on *Medauroidea* Zompro, 2000 (Phasmida: Phasmatidae: Clitumninae)

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Front cover: *Medauromorpha baviensis* sp. nov., captive reared female (photograph by B. Kneubühler).

**The new stick insect genus *Medauromorpha* gen. nov. with one
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Abstract

The new genus *Medauromorpha* gen. nov. is described from Vietnam and southern China to accommodate the new species *M. baviensis* sp. nov. (North Vietnam) and two species previously placed in the genus *Ramulus* Saussure, 1862, *R. foedatus* (Brunner von Wattenwyl, 1907) and *R. reginus* (Brunner von Wattenwyl, 1907). The new combinations *M. foedata* (Brunner von Wattenwyl, 1907) comb. nov. and *M. regina* (Brunner von Wattenwyl, 1907) comb. nov. are subsequently proposed. The new genus is placed in the tribe Medaurini of the subfamily Clitumninae. *Baculum spinicornum* Chen & He, 2000 is proposed as a junior synonym of *M. regina*. Lectotypes are designated for *Clitumnus foedatus* Brunner von Wattenwyl, 1907 and *Cuniculina regina* Brunner von Wattenwyl, 1907. The holotype of *Cuniculina regula* Brunner von Wattenwyl, 1907 is recognized and the species is transferred to the genus *Medauroidea* Zompro, 2000. The new combination *Medauroidea regula* (Brunner von Wattenwyl, 1907) comb. nov. is subsequently proposed. Males, females and eggs of the three known species of *Medauromorpha* are described and comprehensively illustrated. Intraspecific variability in *M. regina* is discussed and illustrated and the species is removed from the egg-based *Baculum hyphereon* species group. Identification keys to the species as well as distribution maps and biological data are given. The placement in the Medaurini and the relationships with *Lobofemora* Bresseel & Constant, 2015 (Clitumninae, Clitumnini) are discussed.

Keywords: Phasmatodea, Medaurini, Clitumnini, Vietnam, China, Global Taxonomic Initiative

Introduction

The identification of specimens of stick insects collected in the framework of the Global Taxonomic Initiative project “A step further in the entomodiversity of Vietnam” revealed that a new genus needs to be erected to include a new species from North Vietnam, together with two other species currently placed in the genus *Ramulus* Saussure, 1862: *R. foedatus* (Brunner von Wattenwyl, 1907) and *R. reginus* (Brunner von Wattenwyl, 1907).

The new genus belongs to the subfamily Clitumninae Brunner von Wattenwyl, 1893, which currently contains three tribes: Clitumnini Brunner von Wattenwyl, 1893, Medaurini Hennemann & Conle, 2008 and Pharnaciini Günther, 1953. The tribe Pharnaciini contains the so-called “giant stick insects” and is the best defined tribe within Clitumninae (HENNEMANN & CONLE, 2008; BRESSEEL & CONSTANT, 2014). The tribe Medaurini was separated from Clitumnini by HENNEMANN & CONLE (2008) mostly based on egg morphology and genital features.

The keys given by HENNEMANN & CONLE (2008) to separate the tribes of Clitumninae, place *Medauromorpha* gen. nov. in the tribe Medaurini for the adult specimens. However, the eggs do not clearly fit any of the tribes of Clitumninae and are unique within the whole order: (1) they are elongated, up to 16.5 mm, placing them among the longest recorded insect eggs, and circular in cross section, (2) they have a grass-seed appearance, (3) the operculum has a definite rim-like structure and (4) the polar area is shaped as the operculum.

This study also leads us to assess the status of two other species currently placed in the inconsistent and very speciose genus *Ramulus* Saussure, 1862 (Clitumnini):

- (1) *R. spinicornus* (Chen & He, 2000) is synonymized under *M. regina*;
- (2) *R. regulus* (Brunner von Wattenwyl, 1907) is transferred to the genus *Medauroidea* Zompro, 2000.

The present paper aims to describe the new genus *Medauromorpha* gen. nov. together with the three included species, and to update the taxonomic status of *Ramulus regulus*.

Material and methods

Due to their nocturnal behaviour, like most Phasmida, the specimens of *Medauromorpha* gen. nov. were collected at night. A light-weight and water-proof Petzl MYO RXP head torch was used during collecting. The females were kept alive in a mesh pop up cage (Exo Terra explorarium™) for producing eggs. Hatchlings were reared to adulthood by Mr Rob Krijns (Netherlands), Dr Bruno Kneubühler (Switzerland), Mrs Kristien Rabaey and Mr Rob Simoens (Belgium) and Mr Tim Bollens (Belgium). The wild caught specimens were euthanized by an injection with ethanol. The specimens were then stored in airtight plastic “zip”-bags in wood chips (used in rodent cages) and sprinkled with ethylacetate (EtOAc) to prevent rotting, mould and keeping the specimens flexible. The bags were frozen on arrival and the specimens mounted later on.

Photographs were taken with a Canon 700D camera equipped with a Sigma 50 mm Macro lens (adult specimens) or a Tamron 90 mm Macro lens (eggs), and staked with CombineZ software. They were optimized with Adobe Photoshop CS3. Observations were done with a Leica MZ8 stereo- microscope. Measurements were taken with an electronic calliper.

The nomenclature for the morphological characters follows BRAGG (2001) and SNODGRASS (1935); the egg morphology follows that of CLARCK-SELLICK (1997; 1998). The description of the colouration is based on live specimens.

Measurements of eggs based on one egg for each species.

Acronyms used for the collections:

CAU	=	China Agricultural University, Beijing, China.
MMUM	=	Manchester Museum, University of Manchester, U.K.
NHMW	=	Naturhistorisches Museum, Vienna, Austria.
RBINS	=	Royal Belgian Institute of Natural Sciences, Brussels, Belgium.
VNMN	=	Vietnam National Museum of Nature, Hanoi, Vietnam.

Abbreviations:

B.S.:	Biodiversity Station
N.P.:	National Park
N.R.:	Nature Reserve
ST:	syntype
HT:	holotype
PT:	paratype

Taxonomy

Family **Phasmatidae** Gray, 1835
Subfamily **Clitumninae** Brunner von Wattenwyl, 1893
Tribe **Medaurini** Hennemann & Conle, 2008

Genus ***Medauromorpha* gen. nov.**

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Type species: *Cuniculina regina* Brunner von Wattenwyl, 1907 by present designation.

ETYMOLOGY. The genus name is formed by the combination of “*Medaur-*”, referring to the genera *Medaura* Stål, 1875 and *Medauroidea* Zompro, 2000, and “*-morpha*”, derived from the Ancient Greek “*μορφή*” meaning shape, appearance. The name refers to the close relation of the new genus with *Medaura* and *Medauroidea*.

It is feminine in gender.

DESCRIPTION.

MALE AND FEMALE.

Measurements: length of body [in mm]: ♂♂: 78.3–101.6; ♀♀: 99.3–155.2.

Body: elongated, slender and stick shaped. Males have quite a constant colour, mainly brown to black and with pale or black streaks according to the species. Females range more in colour and are mainly brown, often with black markings scattered over body and legs. Some specimens with paler streaks or completely white patches. Posterior part of prosternum and/or basal part of mesosternum with a dark longitudinal line or dot.

Head: longer than wide, slightly tapering posteriorly and granulose. Vertex slightly elongated, slightly raised and medially split by a median line. Dorsal portion of head flattened with a pair of spines between the eyes. Eyes circular and strongly projecting hemispherically. Antennae reaching less than halfway along profemora in females; in males, reaching more than halfway, up to apices of profemora. Scapus strongly flattened dorsoventrally with lateral margins expanded and rounded. Pedicellus shorter, narrower and flattened.

Thorax: pronotum trapezoidal, widest subapically; shorter than head and sparsely granulose. Anterior margin concave and raised, followed by a shallow median longitudinal impression, which does not reach posterior margin. Central transverse impression not

reaching lateral margins of pronotum. Mesonotum cylindrical and elongated. Metanotum as metonotum.

Legs: strongly elongated and slender. Mesofemora of females with posterodorsal carina armed with at least one large lobe. Meso- and metatibiae with small saw-like teeth, more numerous towards the apex. Tarsi with basitarsi as long or longer than following tarsomeres combined and distinctly setose. Arolium and claw relatively small in relation to body size.

Abdomen: median segment very short and transverse in females; slightly longer than wide in males. Abdominal segments gradually increasing in length to tergum IV or V. Abdominal terga III-VIII with a small lobe antero-laterally covering the spiracles. Spiracles only visible in ventral aspect. Females with tergum X tectiform, with a raised mediolongitudinal carina and facing obliquely downwards. Posterolateral margins of tergum X slightly rounded. Epiproct short with median longitudinal carina. Sternum VII sometimes with a distinct praepercular organ. Subgenital plate elongated, laterally compressed, not reaching apex of abdomen, smooth and with apex rounded. Cerci small, laterally compressed, not reaching apex of tergum X. Tergum X of males with a median longitudinal carina, notched apically and conspicuously setose. Inner portion of semi-tergite swollen apically and armed with several short denticles; posterolateral angles rounded. Poculum rounded; posterior half with a distinct mediolongitudinal carina; apex narrowing and blunt. Cerci short, laterally flattened and setose, not reaching apex of tergum X with apex rounded. Vomer well developed, visible as an elongated or triangular sclerite with acute, darkened apex.

EGG.

Capsule light to dark brown, strongly elongated, gently curved in lateral aspect and up to 16 mm long. Slightly convex ventrally and slightly concave dorsally. Broadest centrally and slightly narrowing towards anterior and posterior ends. Capsule surface with an irregular network of smooth, raised ridges which fuse around the micropylar plate. ridges with some minute mushroom and/or hook-like structures. Polar area very distinct, shaped like a “pseudo-operculum”, tube-shaped or cylindrical with apex excavated. Operculum tube-shaped with a raised, crown-like opercular rim. Micropylar plate small, round to lanceolate, positioned close to polar area and notched posteromedially; surface smooth. Micropylar cup black and distinct, followed by an elongated median line.

DIFFERENTIATION.

Differing from all other known genera of Medaurini Hennemann & Conle, 2008 by the following combination of characters:

- 1) Elongated and stick-like, light to dark brown with sometimes paler markings or clear white areas.
- 2) Head with two spines, granulose and with vertex slightly raised and elongated posteriorly.
- 3) Posterior part of prosternum and/or basal part of mesosternum with a dark longitudinal line or dot.
- 4) Mesofemora with at least one pronounced lobe on the posterodorsal carina in females; often furnished with several very large, irregularly foliaceous lobes
- 5) Abdominal terga III-VIII with a small lobe antero-laterally covering the spiracles. Spiracles only visible in ventral aspect.
- 6) Subgenital plate in females plate elongated, laterally compressed, not projecting beyond apex of abdomen. Surface smooth, apex bluntly rounded.
- 7) Egg capsule very elongated, cylindrical and gently curved in lateral aspect. Polar area shaped like a “pseudo-operculum”. Opercular rim pronounced.

BIOLOGY. All species were collected in tropical evergreen rainforest, at low to medium altitude (50-1000 m). The specimens were observed in lower vegetation, never higher than 1.5 m off the ground, and seemed to feed on different plant species, hence are believed to be rather polyphagous. In captivity, eggs are sometimes inserted into the fine mesh of the cages and at least *Fagus sylvatica* L. (Fagaceae), *Rubus* spp. (Rosaceae), *Rosa* spp. (Rosaceae) are well accepted as alternative food-plants. Breeding of all three known species has proven fairly easy.

DISTRIBUTION. Currently known from different localities in northern Vietnam and from Guangxi Province, southern China (Fig. 1).

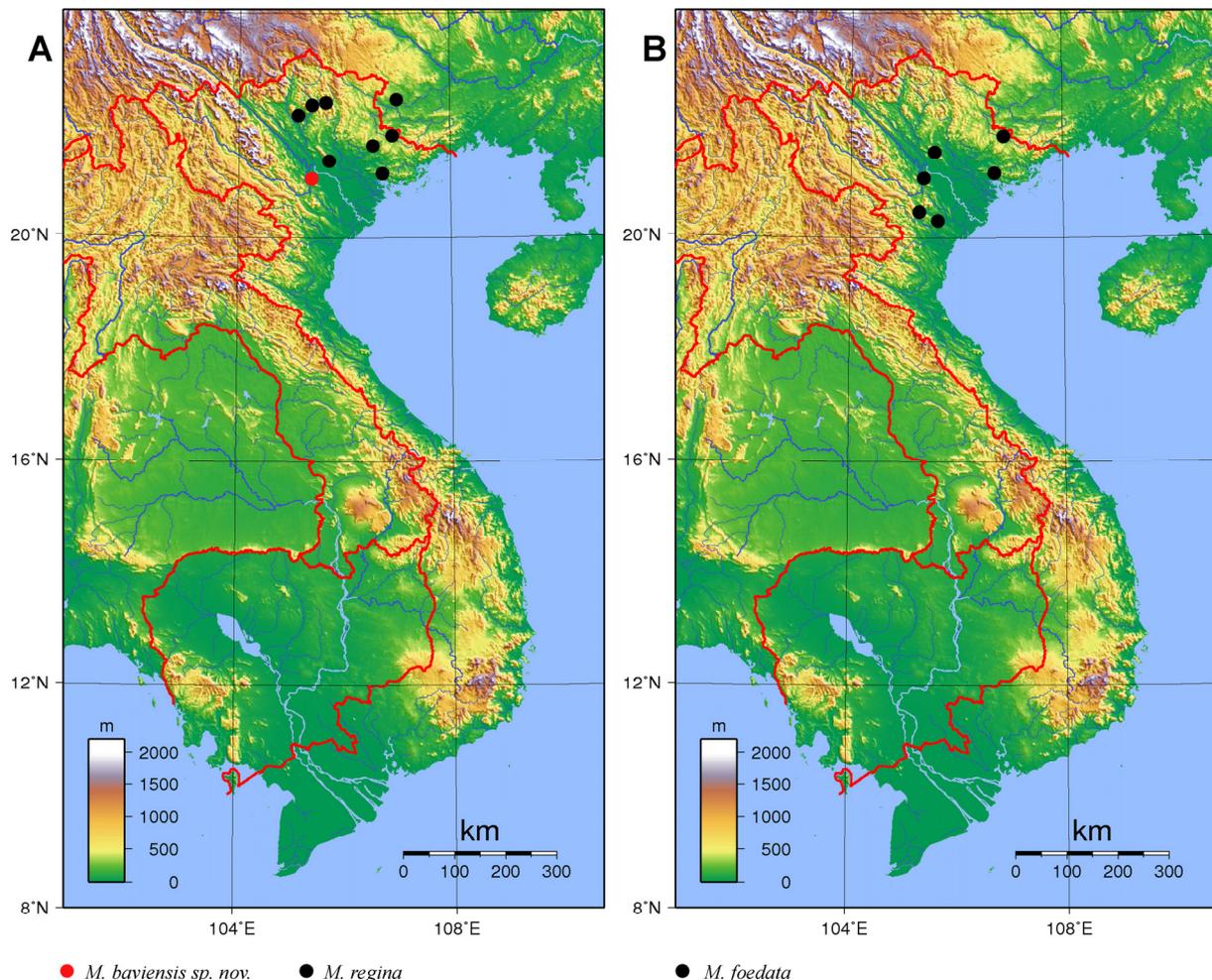


Fig. 1. *Medauromorpha* gen. nov. spp., distribution maps. A, *M. baviensis* sp. nov. and *M. regina* (Brunner von Wattenwyl, 1907) comb. nov. B, *M. foedata* (Brunner von Wattenwyl, 1907) comb. nov.

Species included

1. *Medauromorpha baviensis* sp. nov. [Vietnam: Ba Vi N.P.]
2. *Medauromorpha foedata* (Brunner von Wattenwyl, 1907) comb. nov. [Vietnam: Tam Dao N.P., Cuc Phuong N.P., Tay Yen Tu N.R., Ngo Luong N.R., Ba Vi N.P., Mt. Mauson]
3. *Medauromorpha regina* (Brunner von Wattenwyl, 1907) comb. nov. [Vietnam: Ba Be N.P., Cham Chu N.P., tay Yen Tu N.R., Me Linh B.S., Than Moi, Mt. Mauson, Na Hang; China: Longzhou County, Longgang]
= *Baculum spinicornum* Chen & He, 2000 syn. nov.



Fig. 2. *Medauromorpha baviensis* sp. nov., holotype ♂. A, habitus, dorsal view. B, habitus, lateral view. C, habitus, ventral view. D, head and thorax, dorsal view. E, terminalia, dorsal view. F, terminalia, ventral view. G, terminalia, posteroventral view. H, terminalia, lateral view. I, head and thorax, lateral view.

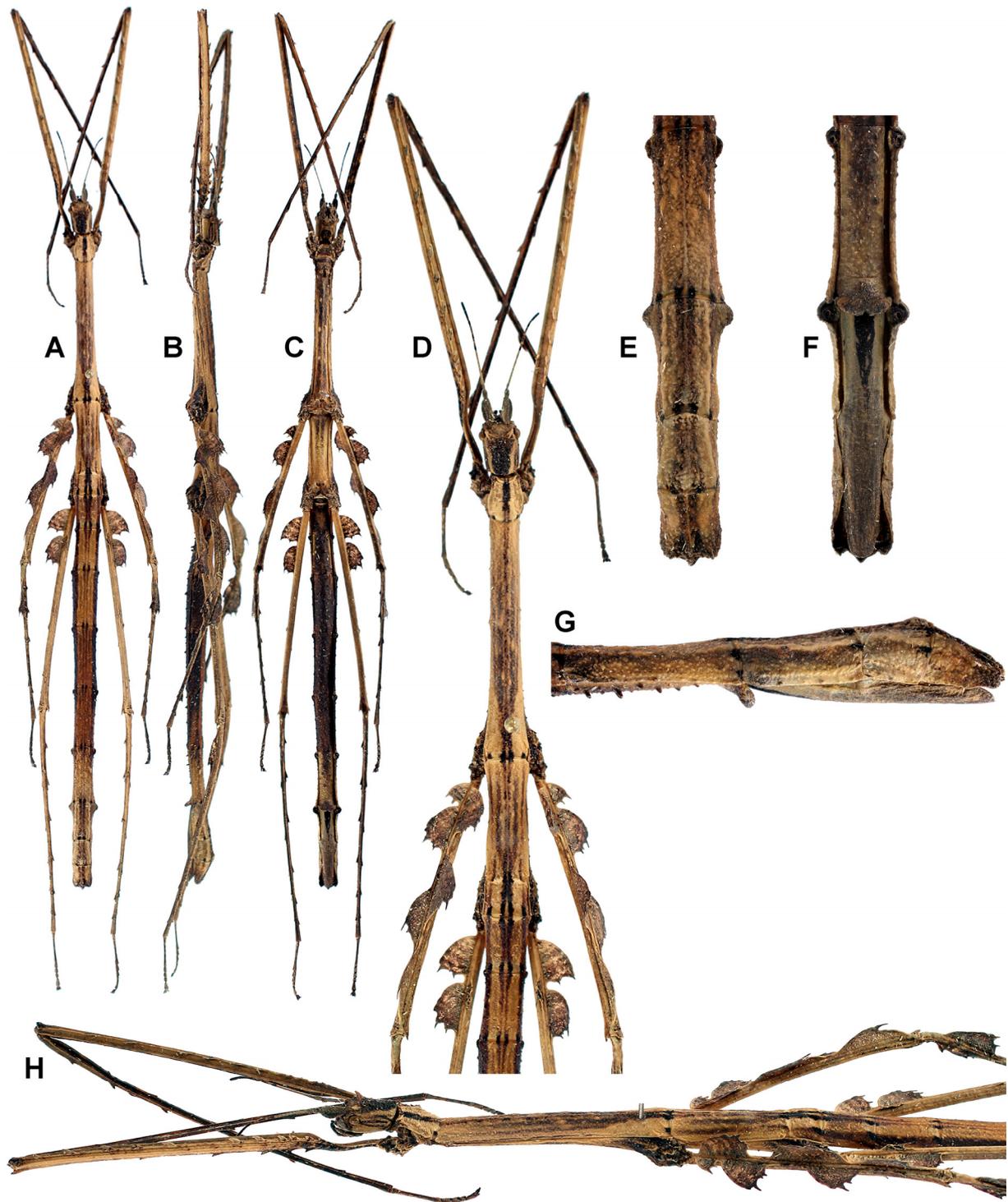


Fig. 3. *Medauromorpha baviensis* sp. nov., paratype ♀. A, habitus, dorsal view. B, habitus, lateral view. C, habitus, ventral view. D, head and thorax, dorsal view. E, terminalia, dorsal view. F, terminalia, ventral view. G, terminalia, lateral view. H, head and thorax, lateral view.

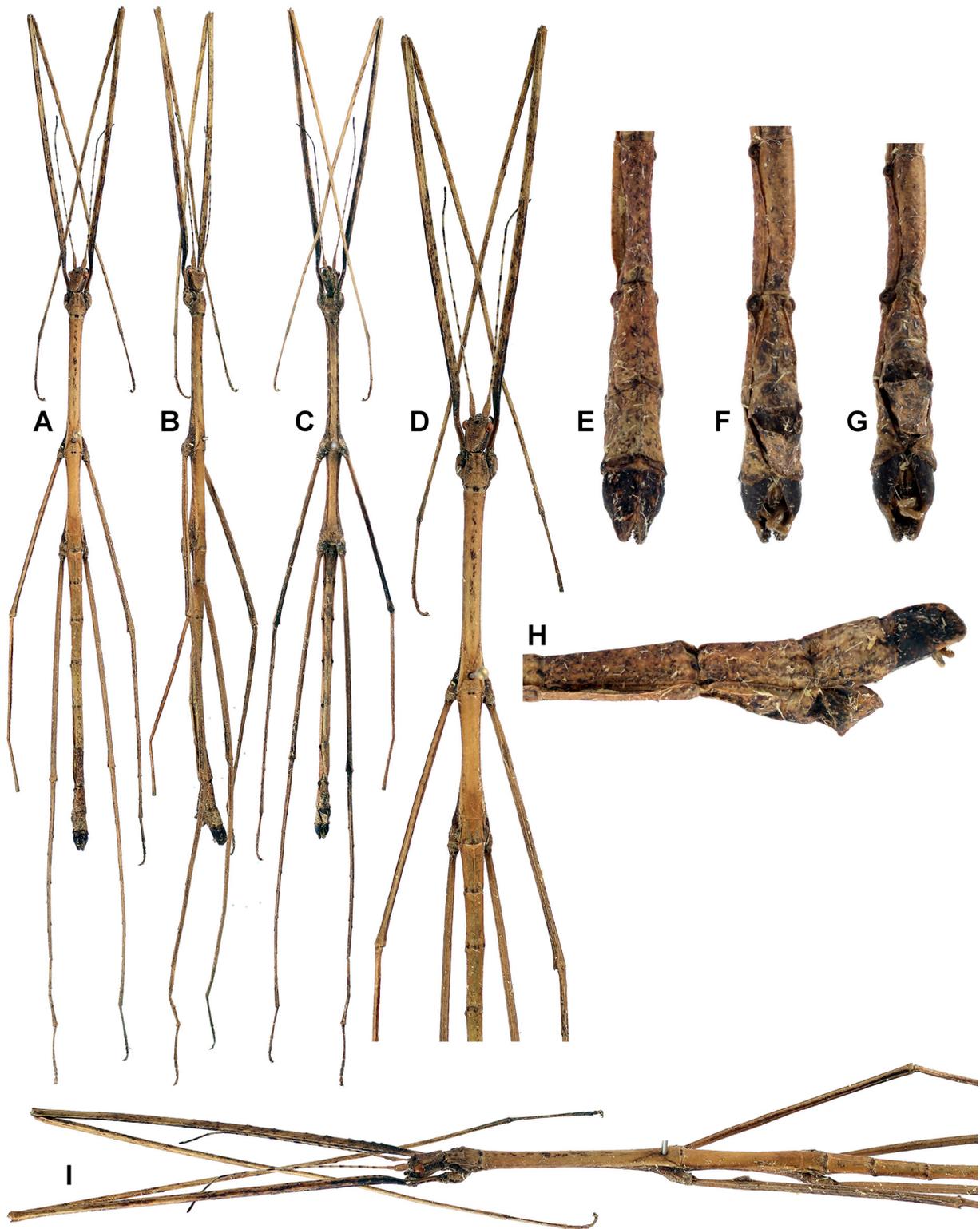


Fig. 4. *Medauromorpha foedata* (Brunner von Wattenwyl, 1907) comb. nov., ♂, Cuc Phuong N.P. A, habitus, dorsal view. B, habitus, lateral view. C, habitus, ventral view. D, head and thorax, dorsal view. E, terminalia, dorsal view. F, terminalia, ventral view. G, terminalia, posteroventral view. H, terminalia, lateral view. I, head and thorax, lateral view.



Fig. 5. *Medauromorpha foedata* (Brunner von Wattenwyl, 1907) comb. nov., ♀, Cuc Phuong N.P. A, habitus, dorsal view. B, habitus, lateral view. C, habitus, ventral view. D, head and thorax, dorsal view. E, terminalia, dorsal view. F, terminalia, ventral view. G, terminalia, lateral view. H, head and thorax, lateral view.



Fig. 6. *Medauromorpha regina* (Brunner von Wattenwyl, 1907) comb. nov., ♂, Me Linh B.S. A, habitus, dorsal view. B, habitus, lateral view. C, habitus, ventral view. D, head and thorax, dorsal view. E, terminalia, dorsal view. F, terminalia, ventral view. G, terminalia, posteroventral view. H, terminalia, lateral view. I, head and thorax, lateral view.

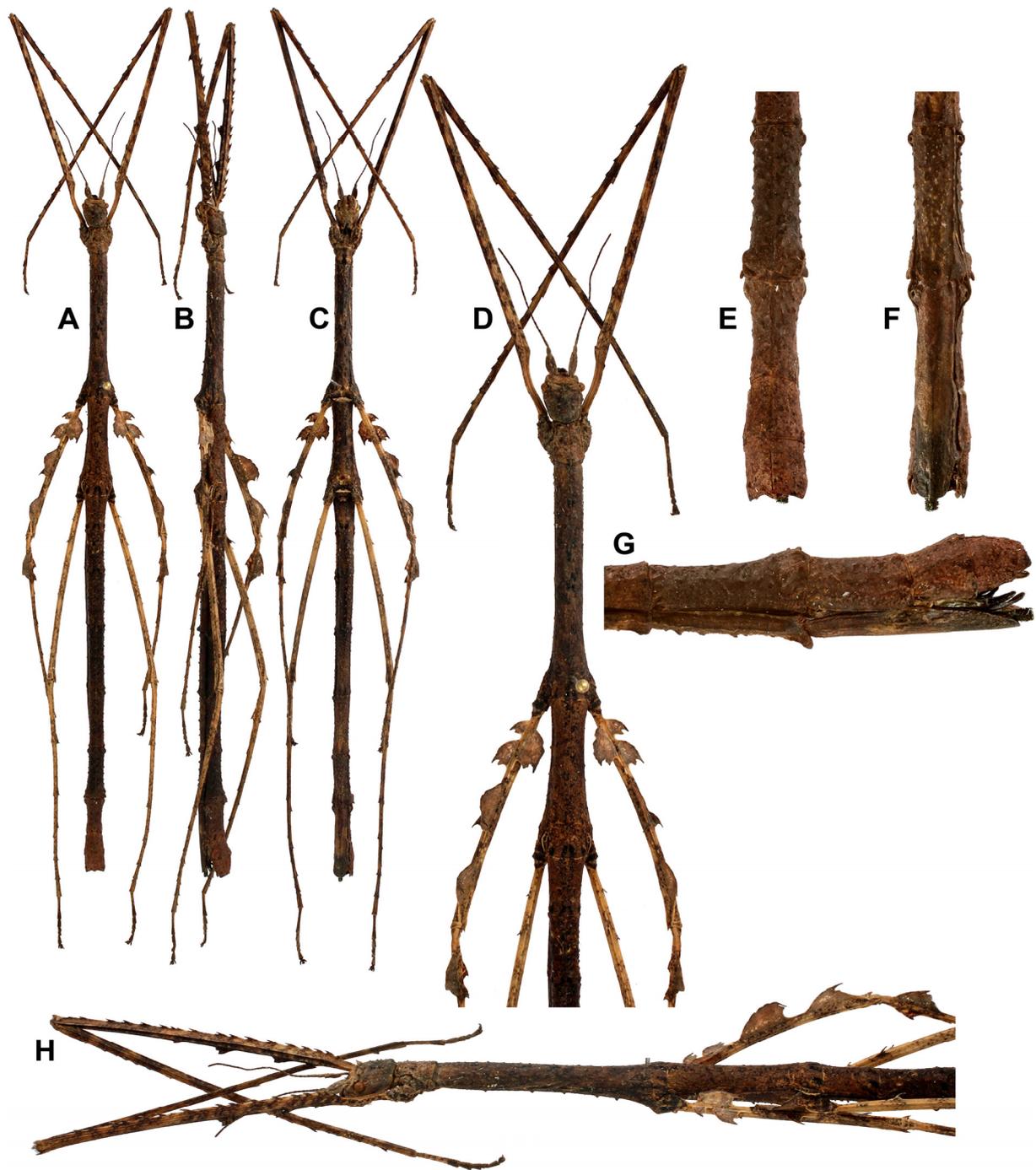


Fig. 7. *Medauromorpha regina* (Brunner von Wattenwyl, 1907) comb. nov., ♀, Me Linh B.S. A, habitus, dorsal view. B, habitus, lateral view. C, habitus, ventral view. D, head and thorax, dorsal view. E, terminalia, dorsal view. F, terminalia, ventral view. G, terminalia, lateral view. H, head and thorax, lateral view.



Fig. 8. *Medauromorpha* gen. nov. spp., eggs (above scale bar, lateral view; below scale bar, dorsal view). A, *M. baviensis* sp. nov. — B–D, *M. foedata* (Brunner von Wattenwyl, 1907) comb. nov. B, Cuc Phuong N.P. C, Tam Dao N.P. D, Tay Yen Tu N.R. — E–H, *M. regina* (Brunner von Wattenwyl, 1907) comb. nov. E, Ba Be N.P. (operculum missing). F, Cham Chu N.R. G, Me Linh B.S. H, Tay Yen Tu N.R. (operculum missing in 3 above pictures).

Keys to the species of *Medauiromorpha* gen. nov.

MALES

1. Abdominal sterna II-VII with conspicuous enlarged tubercles (Fig. 2 C), mesonotum with several enlarged granules (Fig. 2 D)..... *M. baviensis* sp. nov.
- Abdominal sterna II-VII at best with two longitudinal ridges posteriorly (Figs 4 C, 6 C), mesonotum smooth (Figs 4 D, 6 D) **2**

2. Head with two definite black spines between eyes (Fig. 6 I), antennae reaching apex profemora (Fig. 6 D) and meso- and metanotum with two longitudinal black lines (Fig. 6 D, I)..... *M. regina* (Brunner von Wattenwyl, 1907) comb. nov.
- Head with an inconspicuous transverse elevation between eyes (Fig. 4 I), antennae reaching to about 2/3 along profemora (Fig. 4 D) and with meso- and metanotum brown with pale, longitudinal markings posterolaterally (Fig. 4 D, I)
..... *M. foedata* (Brunner von Wattenwyl, 1907) comb. nov.

FEMALES

1. Mesofemora with anterodorsal carina unarmed and posterodorsal carina with a single lobe followed posteriorly by a tooth (Fig. 5 D, H), praeopercular organ indistinct (Fig. 5 F, G)...
..... *M. foedata* (Brunner von Wattenwyl, 1907) comb. nov.
- Mesofemora with three lobes on anterodorsal carina having and two lobes on posterodorsal carina (Figs 3 D, H; 7 D, H), praeopercular organ distinct (Figs 3 F, G; 7 F, G) **2**

2. Posterior portion of abdominal tergum VII with a wart-like swelling (Fig. 7 E, G).....
..... *M. regina* (Brunner von Wattenwyl, 1907) comb. nov.
- Abdominal tergum VII unarmed (Fig. 3 E, G)..... *M. baviensis* sp. nov.

EGGS

1. Opercular rim short, less than 1/15 the length of the capsule (Fig. 8 E-H).....
..... *M. regina* (Brunner von Wattenwyl, 1907) comb. nov.
- Opercular rim strongly elongated, more than 1/8 times the length of capsule (Fig. 8 A-D)..
..... **2**

2. Opercular rim smooth basally, with granules that become more numerous towards the apex (Fig. 8 A) *M. baviensis* sp. nov.
- Opercular rim not smooth basally and strongly wrinkled (Fig. 8 B-D).....
..... *M. foedata* (Brunner von Wattenwyl, 1907) comb. nov.

***Medauromorpha baviensis* sp. nov.**

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Figs 1 A; 2–3; 8 A; 9–10.

ETYMOLOGY. The species epithet refers to Ba Vi National Park, the type-locality of the species in North Vietnam.

TYPE MATERIAL. Holotype ♂ (Fig. 2): Vietnam, Hanoi pr., Ba Vi N.P., 21°4'4''N 105°21'30''E, 25-29.VI.2015, leg. J. Constant & J. Bresseel, I.G.: 33.092 (RBINS).

Paratypes (5♂♂, 9♀♀, eggs): 4♂♂, 6♀♀, eggs: Vietnam, Hanoi pr., Ba Vi N.P., 21°4'4''N 105°21'30''E, 25-29.VI.2015, leg. J. Constant & J. Bresseel, I.G.: 33.092 (2♂♂, 4♀♀, eggs: RBINS; 2♂♂, 2♀♀: VNMN); 2♀♀: Ex breeding Bruno Kneubühler 2016, origin: Vietnam, Hanoi pr., Ba Vi N.P., 21°4'4''N 105°21'30''E, 25-29.VI.2015, leg. J. Constant & J. Bresseel (RBINS); 1♂, 1♀: Ex breeding Bruno Kneubühler 2016 DNA BK 16-123, origin: Vietnam, Hanoi pr., Ba Vi N.P., 21°4'4''N 105°21'30''E, 25-29.VI.2015, leg. J. Constant & J. Bresseel (RBINS).

DESCRIPTION.

MALE (Figs 2; 9 A–H; 10 C–D).

Measurements: see Table 1.

Body: head, thorax and abdomen reddish brown to dark brown and with black markings laterally. Thorax and abdomen with blunt white spines. Tergum X with lateral black spot. Profemora pale basally turning black to brown towards the apex. Other femora and tibiae pale brown with black markings.

Head: longer than wide, slightly tapering posteriorly and rugose. Vertex slightly elongated, raised apically and split by a longitudinal median furrow. Dorsal portion of head flattened with area between of eyes slightly raised. Raised area with two short spines. Eyes circular and strongly projecting hemispherically. Antennae shorter than profemora with about 20 segments. Scapus strongly flattened dorsoventrally and rounded laterally. Pedicellus slightly flattened, narrowing towards the posterior. Apical antennomere about as long two preceding antennomeres combined.

Thorax: pronotum trapezoidal and rugose, shorter than head and widening posteriorly. Anterior margin strongly incurved and raised, followed by a transverse impression, incurving and getting deeper towards anterolateral angles. Median longitudinal groove starting behind anterior transverse depression, not reaching posterior margin. Centrally with a short transverse impression not reaching lateral margins of pronotum. Posterior margin convex. Mesonotum about 2.5 times as long as pronotum and head combined. Posteriorly rugulose, later with several large, pale, irregularly scattered tubercles and nodes. Metanotum with few small pale tubercles, longer than half the length of mesonotum. Meso- and metasterna with an irregular amount of small but distinct blunt spines.

Legs: profemora slightly shorter than head and thorax combined; compressed and curved basally. Anterodorsal carina with several small saw-like teeth. Anteroventral carinae raised and laterally flattened. Posteroventral carina with some small saw-like teeth, other carinae simple. Mesofemora longer than head, pro- and mesonotum combined. Dorsal carinae armed with two to three small saw-like spines. Other carinae simple. Metafemora distinctly longer than profemora. Carinae indistinct, more distinct towards the posterior. Dorsal carinae with few, minute saw-like spines, more distinct on the posterodorsal carina. Protibiae considerably longer than profemora, triangular in cross section and with few minute teeth on the

posteroventral and on the dorsal carinae. Probasitarsus much longer than all following tarsomeres combined. Mesotibiae longer than mesofemora, all carinae armed with minute saw-like spines more densely armed towards apex. Metatibiae with dorsal carinae unarmed, except in apical portion. Antero- and posteroventral carinae with minute saw-like spines, especially in apical half. Claws very small when compared to body size. Tarsomeres with a small posteromedian lobe and distinctly setose ventrally. Fourth tarsomere very short.

Abdomen: median segment short and simple. Abdominal segments II-IV gradually increasing in length; IV-VI about uniform in length, II-VI slightly granulose and with few pale tubercles. Tergum VII about as long as tergum III, considerably more granulose than preceding and a transverse line of pale tubercles medially. Tergum VIII slightly shorter than tergum II, slightly widening posteriorly. Abdominal terga III-VIII with a small lobe anterolaterally covering the spiracles. Spiracles only visible from in ventral aspect. Tergum IX shorter than VIII and conspicuously wider anteriorly. Tergum X about as long as IX and with median longitudinal carina, apically notched and conspicuously setose. Inner portion of semi-tergite swollen apically and armed with several short denticles. Posterolateral angles rounded. Poculum rounded, reaching apex of abdominal tergum IX. Posterior half with a distinct mediolongitudinal carina. Apex of poculum narrowing and blunt. Cerci short, flattened and setose, not reaching apex of tergum X and with apex rounded. Vomer well developed, visible as an elongated triangular sclerite with acute apex, apex darkened. Base slightly swollen with shallow longitudinal impression. Shape and size of vomer variable, sometimes an isosceles triangle (Fig. 2 E-H). Abdominal sterna II-VII with a irregular amount of small but distinct blunt spines.

FEMALE (Figs 3; 9 I-Q; 10 A-B).

Measurements: see table 1.

Body: females vary in colour; main colour is various shades of brown. Sometimes the legs are of a different brown colour than the body (legs darker or paler). They have darker markings scattered over the body and legs and a conspicuous black mediolongitudinal marking on the posterior portion of the prosternum and base of the subgenital plate. Median segment sometimes paler to white.

Head: longer than wide, slightly tapering posteriorly and granulose. Vertex slightly elongated, slightly raised and medially split by median line creating two apical bumps. Dorsal portion of head flattened with area just behind eyes slightly raised. Raised area with transverse ridge, with outer apices spinose and slightly incurving. Eyes circular and strongly projecting hemispherically. Antennae not reaching halfway profemora with 23-25 segments. Scapus strongly flattened dorsoventrally and laterally rounded. Pedicellus shorter, narrower and flattened. Antennal segment IV shorter than half the length of III, apical antennomere about as long three preceding antennomeres combined.

Thorax: pronotum trapezoidal, widest part subapically; shorter than head and slightly granulose. Anterior margin incurved and raised, followed by a shallow median longitudinal impression which does not reach posterior margin. Central transverse impression not reaching lateral margins of pronotum. Mesonotum more than four times the length of pronotum, granulose and "wrinkled" with a fine mediolongitudinal line. Metanotum more than three times the length of median segment with a fine mediolongitudinal line and slightly granulose.

Legs: profemora about as long as meso-, metanotum and median segment combined; compressed and curved basally. Anterodorsal carina with small serrations, more prominent and concentrated anteriorly. Posterodorsal carina indistinct anteriorly, becoming more distinct towards the posterior. Anteroventral carina present, slightly raised and laterally compressed. Posteroventral carina with some small saw-like teeth anteriorly. Mesofemora with

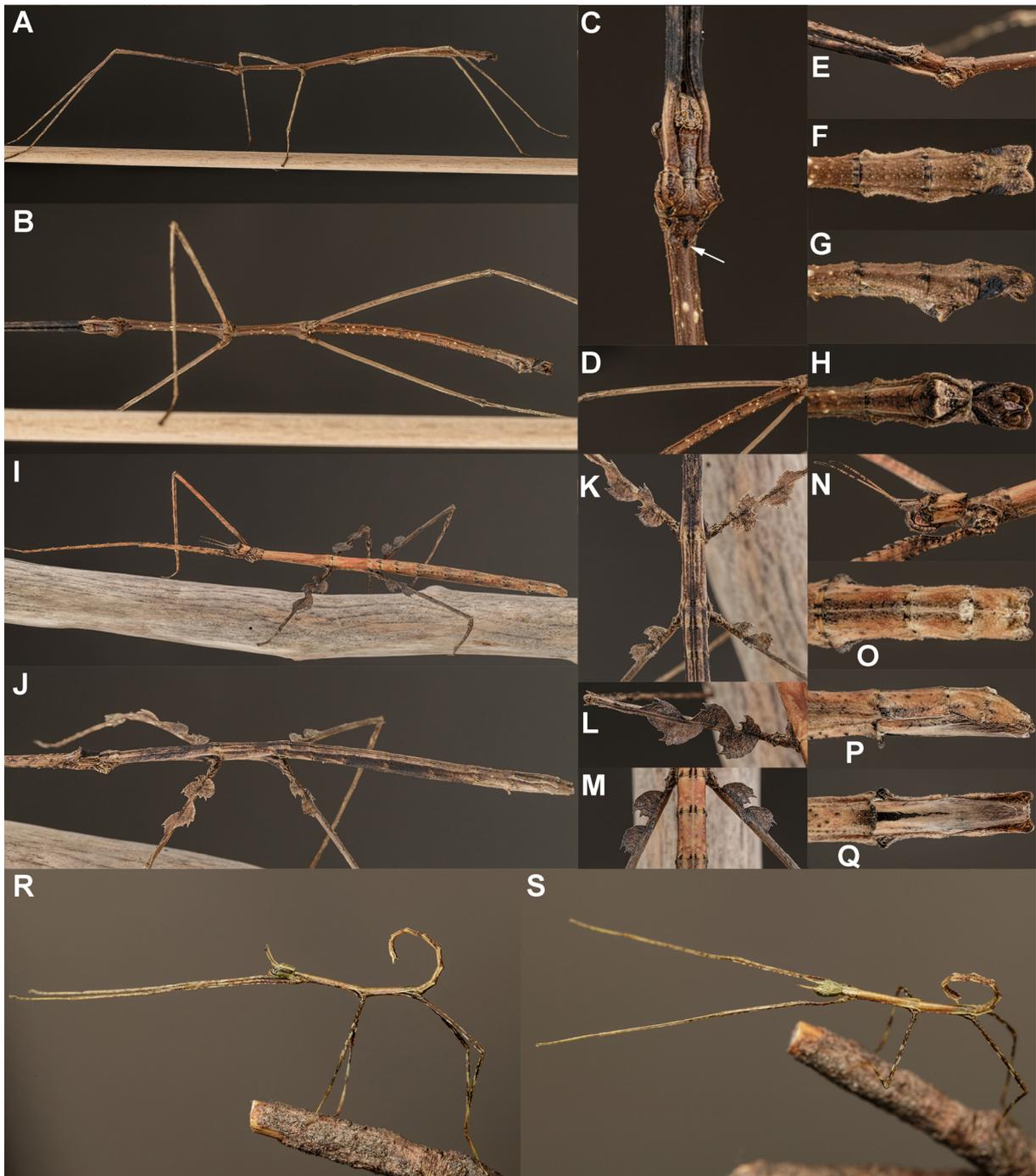


Fig. 9. *Medauromorpha baviensis* sp. nov., captive reared (B. Kneubühler), from Ba Vi N.P. (photographs by B. Kneubühler). A–H, ♂. A, lateral view. B, ventral view. C, head, prosternum and base of mesosternum with typical black marking. D, abdominal terga with tubercles and metafemur. E, head and pronotum, lateral view. F, terminalia, dorsal view. G, terminalia, lateral view. H, terminalia, ventral view. — I–Q, ♀. I, dorso-lateral view. J, dorso-lateral view. K, mesonotum and meso- and metafemora. L, lobes on mesofemur. M, lobes on metafemora. N, head and pronotum, lateral view. O, terminalia, dorsal view. P, terminalia, lateral view. Q, terminalia, ventral view. — R–S, newly hatched nymph. R, lateral view. S, dorso-lateral view.

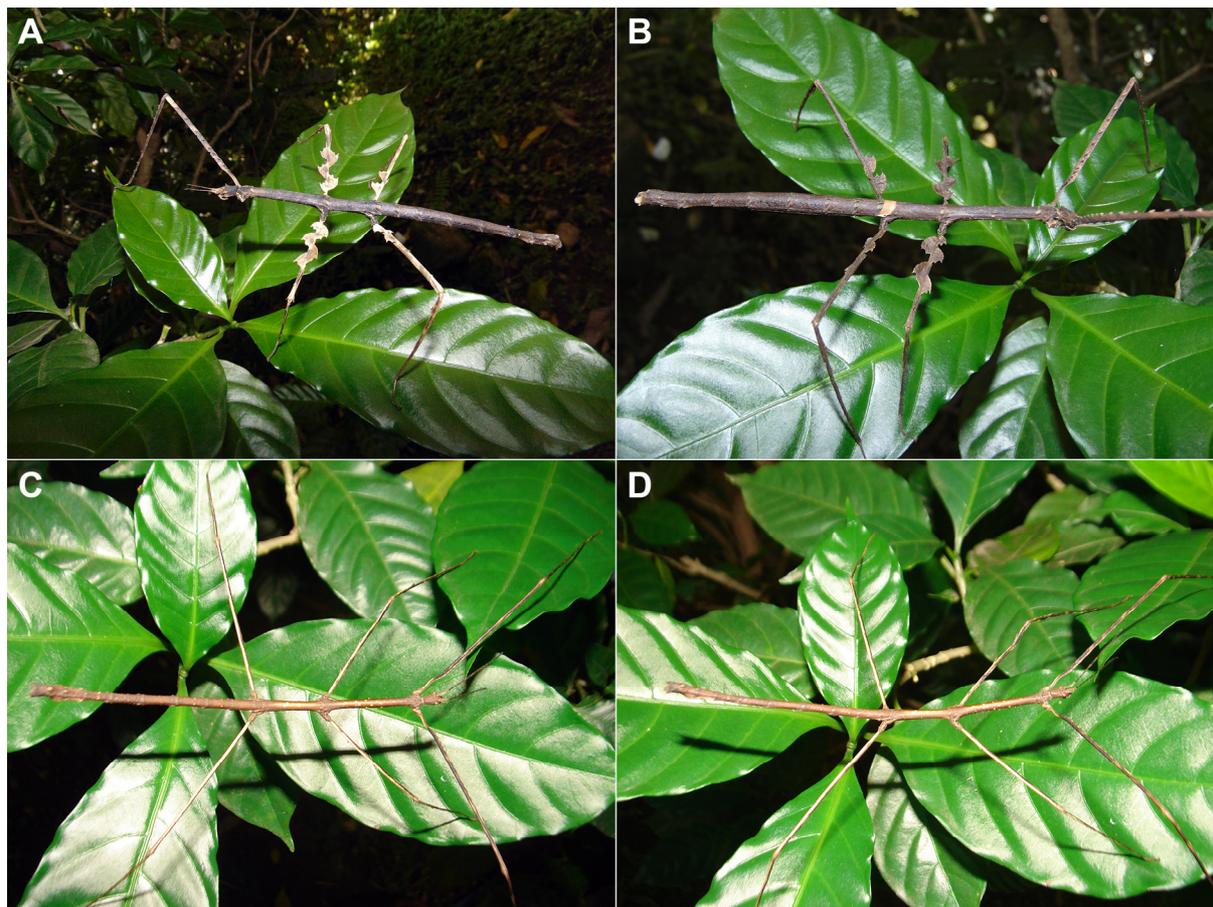


Fig. 10. *Medauromorpha baviensis* sp. nov., in nature, Ba Vi N.P., 27.VI.2015. A–B, ♀. — C–D, ♂.

posterodorsal carina armed with three large lobes. First lobe positioned anteriorly and resulting into two spines. Median lobe as anterior lobe and posterior lobe positioned more vertically on carina, resulting in a single saw-like spine. Anterodorsal carina also with three distinct lobes, but smaller than the ones on the posterodorsal carina. Two lobes positioned in the basal half and bearing two saw-like spines. The third lobe positioned medially, also bearing two saw-like spines. Subapically with a small spine. Ventral carinae indistinct and unarmed. Metafemora with dorsal carinae indistinct. Posterodorsal carina with two enlarged lobes basally. Both lobes bearing two spines. Medially and subapically with a small spine. Anterodorsal carina with a small elongated lobe basally resulting into two spines. Ventral carinae indistinct, anteroventral carina with a single small spine in the posterior half. Protibiae about as long as thorax (median segment included), almost triangular in cross section. Anterodorsal carinae with few small, saw-like spines at regular intervals. Posterodorsal carina with slightly larger, but fewer saw-like spines. Ventral carinae distinct. Medioventral carina strongly raised and laterally flattened. Outer ventral carina with few minute saw-like spines. Inner ventral carina unarmed. Mesotibiae about as long as mesofemora. Posterodorsal carina with a conspicuous lobe in anterior part and bearing two spines, apically with few saw-like teeth. Anterodorsal carina with few small saw-like teeth subapically. Ventral carinae distinct. Medioventral carinae raised and laterally flattened with one conspicuous lobe anteriorly resulting in a single spine. Other portions of ventral carinae, armed with minute saw-like teeth. Metatibiae slightly longer than metafemora, almost triangular in cross section. Dorsal carinae with few small saw-like spines, more concentrated posteriorly. Ventral carinae distinct. Medioventral carinae raised and laterally flattened with one lobe-like spine anteriorly. Other portions, especially outer carinae, armed with minute saw-like spines. Tarsi

with basitarsi as long or longer than following tarsomeres combined and distinctly setose. Arolium and claw relatively small in relation to body size.

Abdomen: median segment transverse. Abdominal segments II-V gradually increasing in length, granulose and with fine median, longitudinal line. Tergum VI about as long as IV; VII slightly shorter than VI; VIII two thirds the length of VII. Abdominal terga III-VIII with a small lobe anterolaterally covering the spiracles. Spiracles only visible in ventral aspect. Tergum IX about half the length of III and posteromedially with a definite hump, not projecting over apex. X tectiform with a raised mediolongitudinal carina and facing obliquely downwards. Epiproct short with median longitudinal carina, triangular and tectiform. Posterolateral margins of tergum X slightly rounded. Abdominal sterna II – VI with an irregular amount of several blunt spines, more definite in anterior sterna. Sternum VII with a distinct praeopercular organ present as an almost horizontal plate that is notched posteriorly. Subgenital plate elongated, laterally compressed, not reaching apex of abdomen. Smooth rounded at apex. Anteriorly with a distinct black marking. Cerci small, laterally compressed, not reaching apex tergum X (Fig. 3 E–G).

NYMPH (Fig. 9 R–S).

Newly hatched nymphs are slender, mostly pale brown with a greenish head. Head bigger than pronotum, with a greenish tinge and a broad black postocular line continuing on the sides of pronotum and basal part of mesonotum. Antennae very short with apical antennomere oval, knob-like and black. Legs long, lobes not yet developed. Legs mottled dark brown and white. Tarsi with paler colouration.

EGG (Fig. 8 A).

Measurements [in mm]. Length: 14.0; length without opercular rim: 11.9; width: 1.4; height: 1.4.

Capsule light to dark brown, strongly elongated and gently curved in lateral aspect. Slightly convex ventrally and slightly concave dorsally. Broadest centrally, slightly narrowing towards anterior and posterior ends. Capsule surface with a network of smooth, broad ridges. Ridges fused around the micropylar plate, creating a smooth surface around the plate. Smooth portions with some minute mushroom and hook-like structures. Polar area tube-shaped, very distinct; shaped much like the operculum and about 1.4 mm long; surface without network or smooth areas, wrinkled and armed with several hook-like tubercles and a fringe like structure apically; broadening towards apex. Operculum with elongated, tube-shaped, opercular rim. More or less parallel sided, smooth basally, later with minute mushroom and hook-like structures. Micropylar plate positioned close to the polar area. Small, drop like, tapering towards the operculum and rounded towards the polar area. Micropylar plate surface smooth. Micropylar cup black and distinct, followed by an elongated median line.

Table 1. Measurements [mm] of *Medauromorpha baviensis* sp. nov.

	HT ♂	PT ♂♂	PT ♀♀
Body:	85.8	81.3-87.8	106.3-119.9
Head:	4.0	4.2-4.3	6.7-6.9
Pronotum:	3.4	3.1-3.2	4.5-5.0
Mesonotum:	19.2	17.7-19.3	20.3-24.5
Metanotum:	12.8	12.0-12.5	10.8-12.3
Median segment:	2.4	2.2-2.3	3.2-3.4
Profemora:	37.6	35.0-38.9	34.5-40.2
Mesofemora:	26.4	25.2-28.3	24.3-27.0
Metafemora:	33.4	31.5-35.2	31.8-35.0
Protibiae:	44.2	41.3-47.4	39.9-45.8
Mesotibiae:	30.7	26.9-30.0	25.4-28.1
Metatibiae:	39.7	35.3-40.5	35.5-39.4

DISTRIBUTION. Fig. 1 A.

***Medauromorpha foedata* (Brunner von Wattenwyl, 1907) comb. nov.**

Figs 1 B; 4–5; 8 B–D; 11–12.

Clitumnus foedatus BRUNNER VON WATTENWYL, 1907: 190 [description].

Clitumnus foedatus – GIGLIO-TOS, 1910: 16 [redescription].

Baculum foedatum – BROCK, 1998: 29 [catalogued].

Ramulus foedatus – OTTE & BROCK, 2005: 302 [catalogued].

TYPE MATERIAL EXAMINED. HT ♂ (examined from photographs – BROCK *et al.*, 2016): Tonkin, Montes Mauson, April-Mai, 2-3000, H. Fruhstorfer; det. Br.v.W. *Clitumnus foedatus*; 24.304 (NHMW, No. 313).

ADDITIONAL MATERIAL (40♂♂, 37♀♀, eggs). 2♂♂, 2♀♀: Vietnam: Cuc Phuong, 11->18.VIII.2010, I.G.: 31.668 leg. J. Constant & P. Limbourg (RBINS); 22♂♂, 10♀♀: Vietnam, Cuc Phuong N.P., 20°19'00''N 105°36'30''E, 19-23.VII.2011, leg. J. Constant & J. Bresseel, I.G.: 31.933 (20♂♂, 8♀♀: RBINS; 2♂♂, 2♀♀: VNMN); 3♂♂, 1♀: Vietnam, Ninh Binh prov. Cuc Phuong Nat. Park, 20°20'53''N 105°35'52''E, 31.VII-3.VIII.2016, GTI Project, Leg. J. Constant & J. Bresseel, I.G.: 33.282 (RBINS); 6♂♂, 10♀♀, eggs: Coll. I.R.Sc.N.B., Ex breeding Rob Krijns 2012, origin: Vietnam, Cuc Phuong N.P., 20°19'00''N 105°36'30''E, VII.2011, J. Constant & J. Bresseel, I.G.: 32.387. (RBINS); 3♀♀: Coll. I.R.Sc.N.B., Vietnam, Tam Dao N.P., 21°31'N 105°33'E, 25-30.VII.2011, leg. J. Constant & J. Bresseel, I.G.: 31.933 (RBINS); 1♀, 3 eggs: Coll. I.R.Sc.N.B., Vietnam, Tay Yen Tu Nat. Res., 21°11'10''N 106°43'25''E, 7-11.VII.2013, night collecting, leg. J. Constant & J. Bresseel, I.G.: 32.454 (RBINS); 6♂♂, 7♀♀: Vietnam, Hanoi pr., Ba Vi N.P., 21°4'4''N 105°21'30''E, 25-29.VI.2015, night collecting, Leg J. Constant & J. Bresseel, I.G.: 33.092 (RBINS); 1♂, 2♀♀: Vietnam, Hoa Binh prov., Ngo Luong Nat. Res., 20°26'16''N 105°20'15''E, 25-30.VII.2016, GTI Project, Leg. J. Constant & J. Bresseel, I.G.: 33.282 (RBINS).

DESCRIPTION.

MALE (Figs 4; 11 A–F; 12 B–D).

Measurements: see table 2.

Body: brown with black markings. Pale, longitudinal markings posterolaterally on meso- and metanotum; apex of abdomen conspicuously darker.

Head: longer than wide, slightly tapering posteriorly and relatively smooth. Vertex slightly elongated and raised apically, and medially split by median line. Dorsal portion of head flattened with area between of eyes slightly raised. Raised area with two definite tubercles.



Fig. 11. *Medauromorpha foedata* (Brunner von Wattenwyl, 1907) comb. nov., captive reared (F. Hennemann) from Cuc Phuong N.P. (photographs by F. Hennemann & O. Conle). A–F, ♂. A, habitus, dorsal view. B, head and pronotum, dorsal view. C, head and pronotum, dorso-lateral view. D, terminalia, dorsal view. E, terminalia, lateral view. F, terminalia, ventral view. — G–L, ♀. G, habitus, dorsal view. H, head and pronotum, dorsal view. I, head and pronotum, dorso-lateral view. J, terminalia, dorsal view. K, terminalia, lateral view. L, terminalia, ventral view. M, mating pair. N, ♀, head and thorax, dorsal view.



Fig. 12. *Medauomorpha foedata* (Brunner von Wattenwyl, 1907) comb. nov., in nature. A, ♀, Ba Vi N.P., 28.VI.2015. B, ♂, Ba Vi N.P., 28.VI.2015. C, mating pair, Cuc Phuong N.P., 20.VII.2011. D, ♂, Ngo Luong N.R., 25.VII.2016.

Eyes circular and strongly projecting hemispherically. Antennae shorter than profemora, with 20-22 segments. Scapus strongly flattened dorsoventrally and rounded laterally. Pedicellus slightly flattened, narrowing towards the posterior. Antennal segment IV shorter than half the length of III; apical antennomere about as long as two preceding ones combined.

Thorax: pronotum trapezoidal and slightly rugose, shorter than head and widening posteriorly. Anterior margin strongly incurved and thickened, followed by faint transverse impression, curving and getting deeper towards anterolateral angles. Posteriorly of transverse impression, a mediolongitudinal impression which does not reach anterior margin. Central

transverse impression not reaching lateral margins of pronotum and slightly concave. Between anterior and median transverse depression, a small indentation medially. Posterior margin convex. Mesonotum slightly longer than two times pronotum and head combined, almost completely smooth, sometimes slightly rugose laterally. Metanotum smooth, slightly more than four times as long as median segment.

Legs: profemora slightly shorter than head and thorax combined; compressed and curved basally. Anterodorsal carina with few, small serrations. Serrations more numerous anteriorly. Anteroventral carinae raised and laterally flattened, other carinae simple. Mesofemora longer than head, pro- and mesonotum combined. Posterodorsal carina with a single small tooth in the anterior half, carina slightly more raised centrally. Other carinae simple. Metafemora reaching half length of tergum VII. Carinae slightly distinct, more distinct towards the posterior. Protibiae considerably longer than profemora, triangular in cross section and sometimes with few minute teeth on posterodorsal carina. Probasitarsus much longer than following tarsomeres combined; tarsomeres with small posteromedian lobe. Fourth tarsomere very short. Claws very small when compared to body. Mesotibiae longer than mesofemora, all carinae armed with minute saw-like teeth, more densely armed towards apex. Tarsomeres and claws as in forelegs. Metatibiae with dorsal carinae mostly unarmed, except in apical portion. Antero- and posteroventral carinae with minute, saw-like teeth, especially in apical half.

Abdomen: median segment more or less trapezoidal and simple. Abdominal segments II-IV gradually increasing in length; IV-VI about uniform in length, slightly granulose and with fine median, longitudinal line. Tergum VII slightly longer than tergum II; VIII about as long as tergum II, slightly widening posteriorly; III-VIII with a small lobe anterolaterally covering the spiracles. Spiracles only visible in ventral aspect. Tergum IX shorter than VIII and tectiform; tergum X about as long as IX and with median longitudinal carina and notched apically. Inner apical portion of tergum X armed with several short black denticles. Posterolateral angles rounded. Poculum rounded, slightly projecting over apex of abdominal tergum IX. Apex of poculum narrowing and rounded. Cerci short, knob-like, reaching apex of tergum X, with base incurved and apex rounded. Vomer well developed, visible as an elongated tongue-like sclerite with acute apex; apex darkened (Fig. 4 E-H); base with shallow impression and with some transverse lines in the first half.

FEMALE (Figs 5; 11 G-N; 12 A, C).

Measurements: see Table 2.

Body: females vary in colour to a certain extent; overall not so colourful and mostly brown, sometimes very pale or light brown, or even whitish. Most are dark brown with black markings; some dark specimens with white markings, most commonly on median segment, near the trochanter of mid- and hind legs and the tip of the abdomen.

Head: longer than wide, slightly tapering posteriorly with some small granules. Vertex slightly elongated and raised apically, medially split by median line. Dorsal portion of head flattened with area between eyes slightly raised. Raised area with transverse ridge, with outer apices spinose. Eyes circular and strongly projecting hemispherically. Antennae not reaching halfway profemora with 20-24 segments. Scapus strongly flattened dorsoventrally and rounded laterally. Pedicellus slightly flattened, narrowing towards the posterior. Antennal segment IV shorter than half the length of III, apical antennomere about as long three preceding ones combined.

Thorax: pronotum trapezoidal, widening posteriorly; shorter than head and slightly granulose. Anterior margin incurved and raised, followed by a shallow median longitudinal impression which does not reach posterior margin. Central transverse impression not reaching lateral margins of pronotum. Mesonotum more than four times as long as pronotum,

granulose and with a fine median longitudinal line. Metanotum with anterior margin weakly incurved, more than half as long as mesonotum and granulose.

Legs: profemora longer than meso-, metanotum and median segment combined; compressed and curved basally. Anterodorsal carina with small serrations, more prominent and numerous anteriorly. Posterodorsal carina indistinct anteriorly, becoming more distinct towards the posterior. Ventral carina present, slightly raised and mostly unarmed. Anteroventral carina sometimes with few small saw-like teeth anteriorly. Mesofemora with posterodorsal carina with a large lobe anteriorly; medially and subapically with a tooth. Anteroventral carina with two smaller lobe-like spines anteriorly, near lobe on posterodorsal carina. Outer ventral carinae slightly elevated and laterally flattened. Medioventral carina present but indistinct. Metafemora with dorsal carinae indistinct. Anterodorsal carina with few minute saw-like teeth. Ventral carinae unarmed. Protibiae about as long as head, thorax and median segment combined; almost triangular in cross section. Dorsal carinae with few minute, inconspicuous saw-like teeth. Ventral carinae distinct. Medioventral carina strongly raised and laterally flattened. Outer ventral carina with few minute saw-like teeth. Mesotibiae about as long as mesofemora. Posterodorsal carina usually with conspicuous lobe in anterior part; lobe sometimes almost absent. Other parts of dorsal carinae scarcely armed with minute teeth, more numerous posteriorly. Ventral carinae distinct. Medioventral carinae raised and laterally flattened, with one to two conspicuous lobes anteriorly. Other portions, especially outer carinae, armed with minute saw-like teeth. Metatibiae slightly longer than metafemora, almost triangular in cross section; dorsal carinae with few small, saw-like teeth, more concentrated posteriorly. Ventral carinae distinct. Medioventral carinae raised and laterally flattened with one lobe-like spine anteriorly. Other portions, especially outer carinae, armed with minute saw-like teeth. Tarsi with basitarsi as long or longer than following tarsomeres combined. Arolium and claws relatively small in relation to body size.

Abdomen: median segment wider than long and about one third the length of metanotum. Abdominal segments II-V gradually increasing in length, granulose and with fine median, longitudinal line. Tergum VI about as long as IV; VII shorter than VI; VIII shorter than VII. Abdominal terga III-VIII with a small lobe anterolaterally covering the spiracles. Spiracles only visible in ventral aspect. Tergum IX posteromedially raised and projecting over tergum X; X tectiform with an irregular median longitudinal carina and facing obliquely downwards. Epiproct short with median longitudinal carina, triangular and tectiform. Abdominal sterna II-VI with 2 parallel elevations posteriorly. Sternum VII with indistinct praeopercular organ present as a small hump. Subgenital plate elongated, laterally compressed, not reaching apex of abdomen, smooth and apically rounded. Cerci small, laterally compressed, not reaching apex of tergum X (Fig. 5 E-G).

NYPH.

Newly hatched nymphs are slender, mostly pale brown. Head bigger than pronotum, with a broad, black postocular line continuing on the sides of pronotum and basal part of mesonotum. Antennae very short with apical antennomere oval and knob-like. Legs long with lobe not developed. Legs mottled brown and white.

EGG (Fig. 8 B-D).

Measurements [in mm]: length: 13.3; length without opercular rim: 11.7; width: 1.1; height: 1.5.

Capsule light brown to black, strongly elongated and gently curved in lateral aspect. Broadest centrally, slightly narrowing towards anterior and posterior ends. Capsule surface

with a network of smooth, broad ridges. Ridges fused around micropylar plate, creating a broad smooth surface around the plate. Smooth portions with some minute hook-like structures. Polar area very distinct, cylindrical with apex shallowly excavate. Shaped much like the operculum and about 1.5 mm long. Surface wrinkled and armed with minute hook-like and mushroom-like structures, without ridges or smooth areas. Operculum with elongated opercular rim-like and with external walls cauliflower-shaped; strongly wrinkled and with minute hook-like and mushroom-like structures, measuring 1.6 mm; narrowing towards apex; inner part of operculum strongly umbilicate with a central, elongate, vertical irregular structure. Micropylar plate small, drop-shaped, tapering towards the operculum and rounded towards the polar area; surface smooth; micropylar cup black and distinct, followed by an elongated median line, measuring more than 1mm.

NOTE. Eggs from the single female found in Tay Yen Tu Nature Reserve have the capsule and polar area similar to those of the eggs from other localities, but the opercular rim is more knob-like and less wrinkled (Fig 8 D).

Table 2. Measurements [mm] of *Medauromorpha foedata* (Brunner von Wattenwyl, 1907) comb. nov. (* according to BRUNNER VON WATTENWYL, 1907).

	HT ♂*	♂	♀
Body:	84	78.3-94.2	99.3-121.6
Head:	–	3.4-4.5	6.1-7.0
Pronotum:	–	3.1-3.8	4.4-5.6
Mesonotum:	20	17.7-21.4	20.5-23.8
Metanotum:	14	11.7-12.4	10.6-13.3
Median segment:	3	2.1-2.7	3.6-4.0
Profemora:	–	39.0-45.5	35.1-44.5
Mesofemora:	24	25.5-32	24.5-30.1
Metafemora:	30	31.2-40	30.1-38.0
Protibiae:	–	48.5-52.7	41.9-47.0
Mesotibiae:	–	29.2-32.6	25.3-29.5
Metatibiae:	–	40.4-45.1	34.6-45.9

DISTRIBUTION. Fig. 1 B.

***Medauromorpha regina* (Brunner von Wattenwyl, 1907) comb. nov.**

Figs 1 A; 6–7; 8 E–H; 13 A–C; 14–17.

Cuniculina regina BRUNNER VON WATTENWYL, 1907: 201 [described].

Baculum spinicornum CHEN & HE, 2000: 396 [described (in Chinese)], Fig. 3 [male habitus and terminalia illustrated]. syn. nov.

Baculum reginum – HAUSLEITHNER, 1988: 195; fig. 2 I [transferred to *Baculum*; egg described, illustrated; placed in *Baculum hyphereon* group]. — BROCK, 1998: 53 [2 female syntypes catalogued; male syntype not traced].

Ramulus reginus – OTTE & BROCK, 2005: 306 [catalogued].

Ramulus spinicornus – OTTE & BROCK, 2005: 307 [transferred to *Ramulus*, catalogued]. — HENNEMANN *et al.*, 2008: 33 [catalogued from China].

Baculum spinicornum – CHEN & HE, 2008: 269 [described (in Chinese)], Fig. 232 [male habitus and terminalia illustrated].

non *Baculum reginum* — BROCK, 1998: 53 [typo for *B. regulum*].

TYPE MATERIAL EXAMINED. LT ♂ of *Cuniculina regina*, by present designation (examined from photographs, Fig. 13 A–C): Tonkin, Than-Moi, Juni-Juli, H. Fruhstorfer; Collectio Br. v. W.; det. Br. v. W. *Cuniculina regina* (NHMW, No. 343).

PLT (2♀♀, examined from photographs – BROCK *et al.*, 2016): 1♀: Tonkin, Montes Mauson, April-Mai, 2-3000 m, H. Fruhstorfer; Collectio Br. v. W.; det. Br. v. W. *Cuniculina regina* (NHMW, No. 343); 1♀: Tonkin, Than-Moi, Juni-Juli, H. Fruhstorfer; Collectio Br. v. W.; det. Br. v. W. *Cuniculina regina* (NHMW, No. 343).

ADDITIONAL MATERIAL (17♂♂, 28♀♀, 2♀♀ nymphs, eggs). 4♀♀: Vietnam, Tay Yen Tu Nat. Res., 21°11'10"N 106°43'25"E, 7-11.VII.2013, night collecting, leg. J. Constant & J. Bresseel, I.G.: 32.454 (3♀♀: RBINS, 1♀: VNMN); 3♂♂, 5♀♀: Ex breeding Bruno Kneubühler 2014, origin: Vietnam, Tay Yen Tu Nat. Res., 21°11'10"N 106°43'25"E, 7-11.VII.2013, night collecting, leg. J. Constant & J. Bresseel (RBINS); 4♂♂, 3♀♀, 3 eggs: Vietnam Vinh Phuc pr., Me Linh B.S., 21°23'38"N 105°45'56"E, 30.VI-1.VII.2015, night collection, Leg. J. Constant & J. Bresseel, I.G.: 33.092 (3♂♂, 2♀♀: RBINS, 1♂, 1♀: VNMN); 6♂♂, 10♀♀, 3 eggs: Vietnam, Bac Kan pr., Ba Be N.P., 22°24'19"N 105°36'55"E, 2-7.VII.2015, night collecting, Leg. J. Constant & J. Bresseel, I.G.: 33.092 (4♂♂, 8♀♀: RBINS, 2♂♂, 2♀♀: VNMN); 4♂♂, 4♀♀, 5 eggs: Vietnam, Cham Chu N.R., 22°12'N 105°06'E, 8-12.VII.2015, night collecting, Leg. J. Constant & J. Bresseel, I.G.: 33.092 (1♂, 3♀♀: RBINS; 1♂, 1♀: VNMN); 1♀: Ex breeding Tim Bollens 2016, origin: Vietnam, Cham Chu N.R., 22°12'N 105°06'E, 8-12.VII.2015, night collecting, Leg. J. Constant & J. Bresseel (RBINS); 2♀♀ nymphs: Vietnam, Tuyen Quang prov. 5 km E of Na Hang, 22°20'59"N, 105°25'36"E, 290m asl; 4-13 Nov. 2015, Coll D.V. Logunov (MMUM).

NOTES. (1) One additional female of *M. regina* labelled “Tonkin, Than-Moi, Juni-Juli, H. Fruhstorfer” in the RBINS collections, was also examined. It bears a “syntype” label typically added by some RBINS staff and is placed in the collections together with two syntypes of *Myronides magnificus* Brunner von Wattenwyl, 1907. However, the specimen does not match in any way the description given by BRUNNER VON WATTENWYL (1907). The female in the collection at RBINS has a body length of 141.1 mm while Brunner von Wattenwyl’s specimen of *M. magnificus* measures 128 mm. Its typical status was already questioned by VANSCHUYTBROECK & COOLS (1981). However, it was erroneously mentioned in the type series of *M. magnificus* given by BROCK (1998).

We here exclude this specimen from the type-series of *M. magnificus*.

(2) *Baculum spinicornum* Chen & He, 2000 was described from a single male preserved in the collections of CAU, with the following data: China, Guangxi Province, Longzhou County, Longgang, 240m, 19.v.1982, leg. Li Fasheng. It is here synonymized under *M. regina* based on the examination of the illustrations of the habitus and terminalia given in CHEN & HE (2000; 2008).

(3) BRUNNER VON WATTENWYL (1907) described *Cuniculina regina* from two females and one male. In his catalogue of the phasmid types in the collections of NHMW, BROCK (1998) stated that he had not been able to trace the male ST of *C. regina*. However, he erroneously listed two female ST for *Cuniculina regula* Brunner von Wattenwyl, 1907. The species *regula* was actually described on a single female HT (BRUNNER VON WATTENWYL, 1907), and one of the two “ST” recognized by BROCK (1998) is actually a male specimen. This male is conspecific with the two female *C. regina* ST and represents the missing male ST of the latter species, as confirmed by the examination of the labels attached to the specimen (Fig. 13 C). We designate this male as LT of *C. regina* in order to stabilize the nomenclature in the group. The status of the female HT of *C. regula* is treated *infra*.

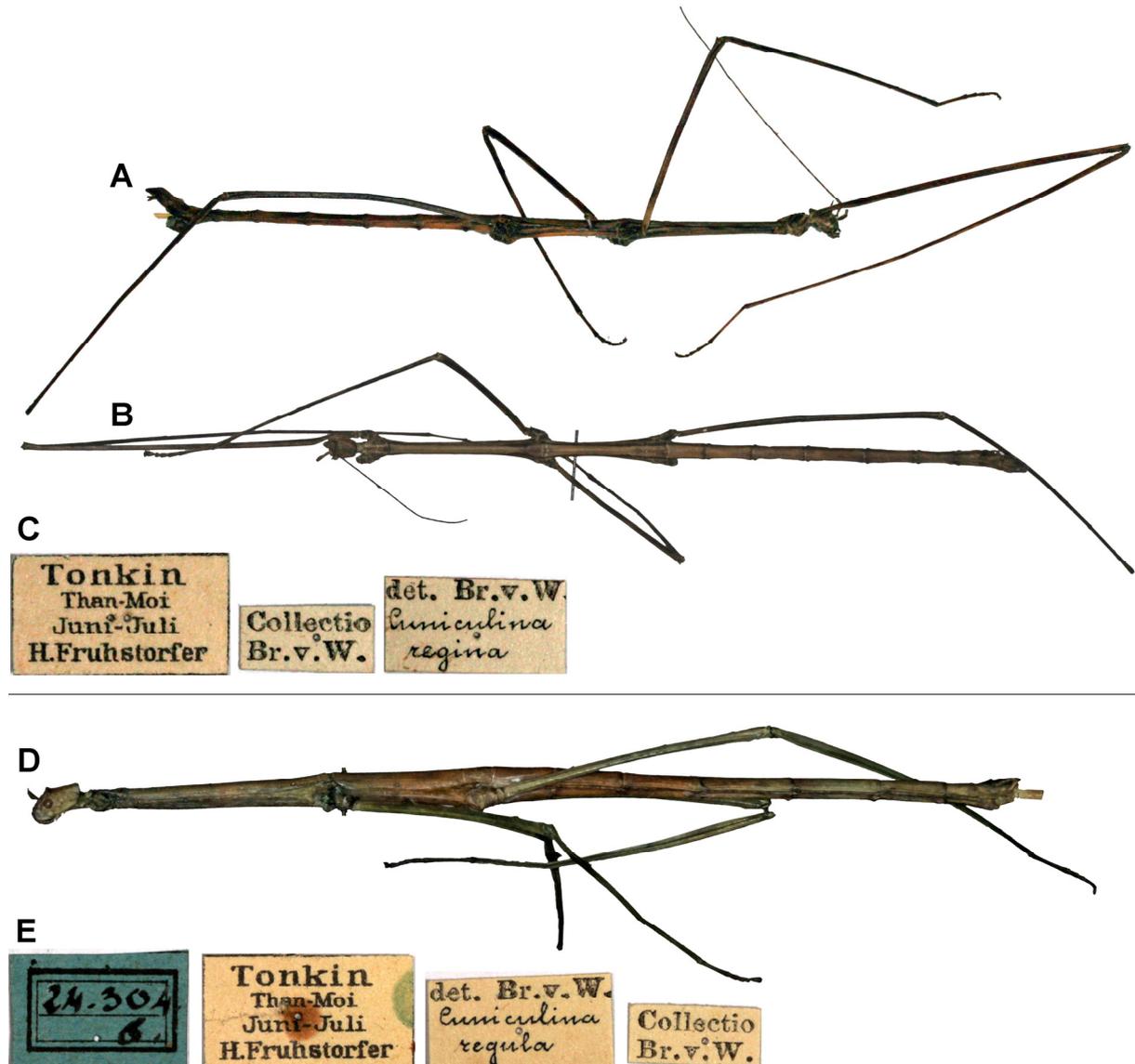


Fig. 13. Type specimens in NHMW (©Natural History Museum Vienna, Orthoptera Image Collection, published with permission). A–C, *Cuniculina regina* Brunner von Wattenwyl, 1907, LT ♂. A, lateral view. B, dorsal view. C, labels. D–E, *Cuniculina regina* Brunner von Wattenwyl, 1907, HT ♀. D, lateral view. E, labels.

(4) HAUSLEITHNER (1988) described the egg of *M. regina* based on a broken egg from a Than-Moi specimen, and placed the species in his “*Baculum hyphereon*” (erroneously spelled “hypereon”) species group. The species group was defined by the same author in a previous paper (HAUSLEITHNER, 1986), from the shape of the eggs, and contained four species from Sri-Lanka. The eggs of *M. regina* is much more elongated and shows a network-like structure, minute hooks and mushroom-like structures which are absent in *B. hyphereon* group eggs. On this basis, *M. regina* is excluded from the group.

DESCRIPTION.

MALE (Figs 6; 14 A–G; 15 A; 16 A–H).

Measurements: see Table 3.



Fig. 14. *Medauromorpha regina* (Brunner von Wattenwyl, 1907) comb. nov., captive reared (B. Kneubühler) from Tay Yen Tu N.R. (photographs by B. Kneubühler). A–G, ♂. A, lateral view. B, dorsal view. C, ventral view with typical black marking. D, head and pronotum, lateral view. E, terminalia, dorsal view. F, terminalia, lateral view. G, terminalia, ventral view. — H–Q, ♀. H, lateral view. I, dorsal view. J, dorsal view. K, lateral view. L, ventral view with typical black marking. M, lobes on metafemora. N, head and pronotum, lateral view. O, terminalia, dorsal view. P, terminalia, lateral view. Q, terminalia, ventral view. — R–T, ♀ nymph. R, dorsal view. S, dorsal view. T, head and thorax, dorsal view.

Body: consistent in colour following the localities. Mostly brown with irregular small black spots. Pro-, meso-, metasternum and first four abdominal segments with black longitudinal line laterally. Black line thickened at the apex of each segment.

Head: longer than wide, slightly tapering posteriorly with few minute granules. Vertex slightly elongated, raised apically and split by a longitudinal median furrow creating two “bumps”. Dorsal portion of head flattened. Between eyes two definite, thick black spines. Shape of spines variable. Eyes circular and strongly projecting hemispherically. Antennae about as long as profemora with about 22 segments. Scapus strongly flattened dorsoventrally and slightly rounded laterally. Pedicellus slightly flattened. Apical antennomere slightly shorter than two preceding ones combined.

Thorax: pronotum trapezoidal and rugose, shorter than head and widening posteriorly. Anterior margin strongly incurved and raised, followed by a transverse impression, curving and getting deeper towards anterolateral angles. Median longitudinal groove starting behind anterior transverse depression, not reaching posterior margin. Centrally with a short transverse impression not reaching lateral margins of pronotum. Posterior margin convex. Mesonotum more than six times longer than pronotum, slightly widening towards the posterior. Smooth with a mediolongitudinal line. Metanotum as mesonotum, about four times longer than pronotum. Meso- and metasterna smooth.

Legs: profemora slightly shorter than head and thorax combined; compressed and curved basally. Dorsal carina faint, more definite towards apex. Anteroventral carinae raised and laterally flattened. Mesofemora shorter than head, pro- and mesonotum combined. Carinae indistinct and simple. Metafemora distinctly shorter than profemora. Carinae indistinct, more distinct towards the posterior. Protibiae considerably longer than profemora, triangular in cross section and with few minute teeth on the posteroventral carinae. Probasitarsus much longer than following tarsomeres combined; tarsomeres with small posteromedian lobe and distinctly setose ventrally. Fourth tarsomere of all legs very short. Claws very small in relation to body size. Mesotibiae longer than mesofemora, all carinae armed with minute saw-like teeth; more densely armed towards apex, tarsomeres and claws as in forelegs. Metatibiae as mesotibiae.

Abdomen: median segment short and simple. Abdominal segments II-IV gradually increasing in length; IV-VI about the same length. Tergum VII about as long as tergum II; II-VII smooth with a definite mediolongitudinal carina; VIII shorter than II, slightly widening posteriorly; III-VIII with a small lobe anterolaterally covering the spiracles; spiracles only visible in ventral aspect. Tergum IX shorter than VIII and tectiform; X apically notched, about as long as VII and with median longitudinal carina. Inner portion of semi-tergite swollen apically and armed with several short denticles. Posterolateral angles rounded. Poculum rounded, reaching apex of tergum IX; apex of poculum narrowing and rounded. Cerci short, laterally flattened and slightly setose, reaching apex of tergum X and with apex rounded. Vomer well developed, visible as an elongated sclerite, narrowing towards apex; apex acute and darkened (Fig. 6 E-H). Abdominal sterna II-VII rugose.

FEMALE (Figs 7; 14 H-Q; 15; 16 I-L; 17).

Measurements: see Table 3.

Body: females vary in colour; main colour is various shades of brown. Sometimes completely brown, often with darker markings scattered over body and legs, and a conspicuous black mediolongitudinal marking on posterior part of prosternum and on base of subgenital plate. Some specimens with darker longitudinal markings and some with paler streaks or with almost white patches.

Head: longer than wide, slightly tapering posteriorly and granulose. Vertex slightly elongated, slightly raised apically, and split by median line creating two apical bumps. Dorsal portion of head flattened with area just behind eyes slightly raised; raised area with transverse ridge, and a spine at each side. Eyes circular and strongly projecting hemispherically. Antennae reaching less than half length of profemora, with 24-28 segments. Scapus strongly flattened dorsoventrally and rounded laterally. Pedicellus shorter, narrower and flattened. Apical antennomere about as long as three to four preceding ones combined.

Thorax: pronotum trapezoidal, widest part subapically; shorter than head and slightly granulose. Anterior margin incurved and raised, followed by a shallow median longitudinal impression which does not reach posterior margin. Central transverse impression not reaching lateral margins of pronotum. Mesonotum about five times the length of pronotum, granulose and “wrinkled” with a fine median longitudinal line. Metanotum with a fine mediolongitudinal line and slightly granulose, more than three times longer than median segment.

Legs: profemora about as long as meso-, metanotum and median segment combined; compressed and curved basally. Anterodorsal carina with small serrations, more prominent and numerous anteriorly. Posterodorsal carina indistinct anteriorly, becoming more distinct towards the posterior. Anteroventral carina present, slightly raised and laterally compressed. Posteroventral carina with some small saw-like teeth anteriorly. Mesofemora with posterodorsal carina armed with three large lobes. First lobe positioned anteriorly and resulting into two spines. Median lobe as anterior lobe and posterior lobe positioned more vertically on carina, resulting in a single curved tooth. Anterodorsal carina also with three distinct lobes, but smaller than the ones on posterodorsal carina. Two lobes positioned in the basal half and bearing two saw-like teeth; third lobe positioned medially, also bearing two saw-like teeth. Mesofemora a small spine subapically. Ventral carinae unarmed. Metafemora with dorsal carinae armed with some minute teeth. Ventral carinae unarmed. Protibiae slightly longer than thorax and median segment combined, almost triangular in cross section. Anterodorsal carinae with few minute, saw-like teeth at regular intervals. Posterodorsal carina with fewer saw-like teeth. Ventral carinae distinct. Medioventral carina strongly raised and laterally flattened. Outer ventral carina with few minute saw-like teeth. Inner ventral carina unarmed. Mesotibiae slightly longer than mesofemora. Posterodorsal carina with a conspicuous lobe in anterior part and bearing two spines; some saw-like teeth subapically. Anterodorsal carina with few small saw-like teeth subapically. Ventral carinae distinct. Medioventral carinae raised and laterally flattened with one conspicuous lobe anteriorly, resulting into one to two teeth. Other portions of ventral carinae, armed with minute saw-like teeth. Metatibiae slightly longer than metafemora, almost triangular in cross section. Dorsal carinae with few small saw-like teeth, more numerous posteriorly. Ventral carinae distinct. Medioventral carinae raised and laterally flattened with one lobe-like tooth anteriorly. Other portions, especially outer carinae, armed with minute saw-like teeth, more numerous posteriorly. Tarsi setose, with basitarsi as long or longer than following tarsomeres combined. Arolium and claw relatively small in relation to body size.

Abdomen: median segment transverse. Abdominal segments II-V gradually increasing in length, granulose and with fine mediolongitudinal line. Tergum VI about as long as IV; VII slightly shorter than VI and with a wart-like structure posteriorly; VIII two thirds as long as VII. Terga III–VIII with a small lobe anterolaterally, covering the spiracles; spiracles only visible in ventral aspect. Tergum IX about half as long as III and with a posteromedian definite hump, not projecting over apex; X tectiform with a raised mediolongitudinal carina, and facing obliquely downwards. Epiproct short, triangular and tectiform, with a median longitudinal carina. Sterna II–VI with a variable number of blunt spines; posteriorly with two symmetric, laterally compressed, ridges. Sternum VII with a distinct praeopercular organ

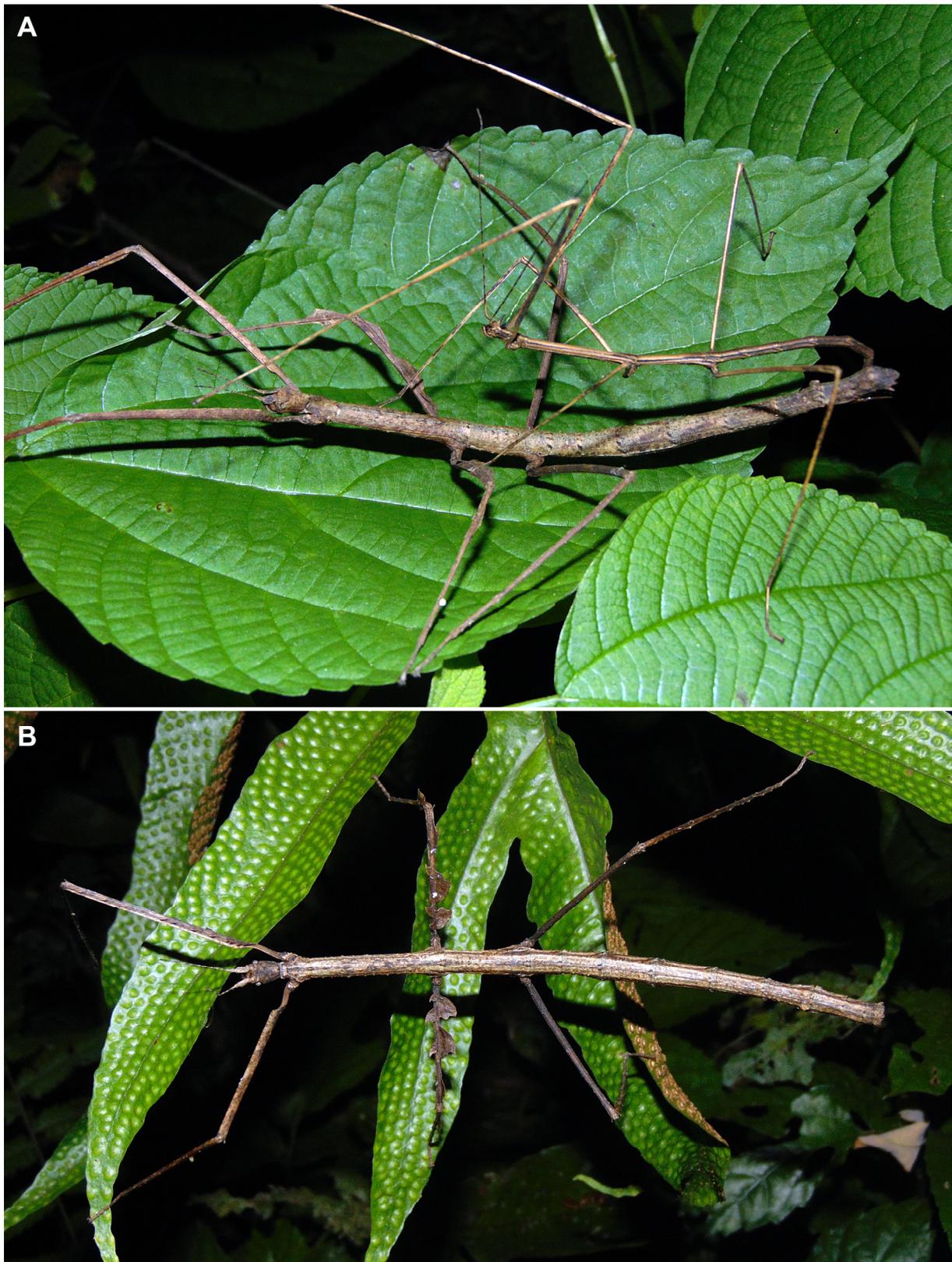


Fig. 15. *Medauromorpha regina* (Brunner von Wattenwyl, 1907) comb. nov., in nature. A, mating pair, Ba Be N.P., 2.VII.2015. B, ♀, Cham Chu N.R., 8.VII.2015.

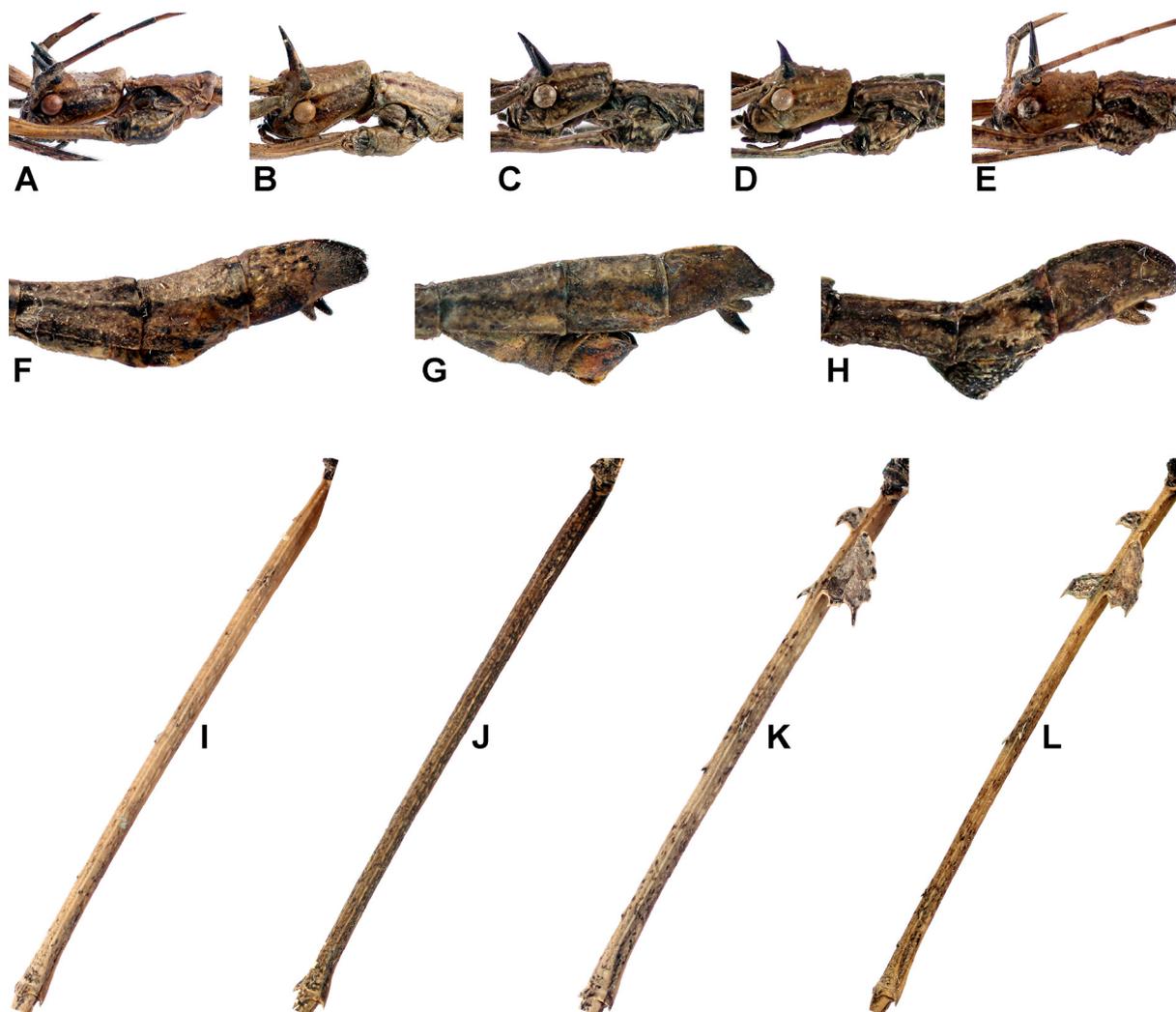


Fig. 16. *Medauomorpha regina* (Brunner von Wattenwyl, 1907) comb. nov., intraspecific variability. A–E, ♂, head, lateral view. A, Ba Be N.P. B, Cham Chu N.R. C, Me Linh B.S. D, Me Linh B.S. E, Tay Yen Tu N.R. — F–H, ♂, terminalia, lateral view. F, Ba Be N.P. G, Cham Chu N.R. H, Tay Yen Tu N.R. — I–L, ♀, left metafemur. I, Ba Be N.P. J, Cham Chu N.R. K, Me Linh B.S. L, Tay Yen Tu N.R.

present as a large black hump slightly notched posteriorly. Subgenital plate elongated, laterally compressed and not reaching apex of abdomen; smooth, with a small posteromedian carina and with apex rounded. Anteriorly with a distinct black marking. Cerci small, laterally compressed, not reaching apex of tergum X (Fig. 7 E–G).

NYMPH (Fig. 14 R–T).

Newly hatched nymphs slender and rather large, 20 to 25 mm long; mostly pale brown with a greenish tinge on head. Head bigger than pronotum and with a broad black postocular line continuing on sides of pronotum and basal part of mesonotum. Antennae very short with apical antennomere oval, knob-like and black. Legs long, lobes not developed. Legs mottled dark brown and white.

EGG (Fig. 8 E–H).

Measurements [in mm]: length: 16.5; length without opercular rim: 15.9; width: 1.5; height: 1.4.



Fig. 17. *Medauromorpha regina* (Brunner von Wattenwyl, 1907) comb. nov., in nature, ♀, Tay Yen Tu N.R., 10.VII.2013.

Capsule light to dark brown, strongly elongated and gently curved in lateral aspect. Slightly convex ventrally and slightly concave dorsally. Broadest centrally, slightly narrowing towards anterior and posterior ends. Capsule surface with a network of smooth ridges fusing around the micropylar plate, creating a smooth surface around the plate. Ridges with minute mushroom and hook-like structures. Polar area very distinct, cylindrical with apex shallowly excavated; shaped much like operculum and about 1 mm long; surface wrinkled and armed with several hook-like tubercles and a fringe-like structure apically; broadening towards apex. Operculum with thickened opercular rim; smooth basally, later with minute mushroom- and hook-like structures; apex deeply excavated. Micropylar plate small and almost round, positioned close to polar area. Micropylar plate surface smooth. Micropylar cup black and distinct, followed by an elongated median line.

NOTE. Eggs from Tay Yen Tu N.R. have a drop-shaped micropylar plate, tapering towards the operculum.

INTRASPECIFIC VARIABILITY. The redescription of this species is based on specimens from Ba Be N.P. because these agree completely with BRUNNER VON WATTENWYL's (1907) specimens. Following the localities, several small differences can be seen between the populations. Variation between specimens of the same location is also observed.

Horns of males: (Fig. 16 A–E) the horns on the males' head can vary to a certain extent. Specimens from Tay Yen Tu N.R. have horns longer than scapus, incurving, thickened at base and gradually tapering towards apex. One specimen from Me Linh B.S. has the spines short,

not longer than scapus, and straight. Another specimen has the spines longer than scapus and slightly incurving. Specimens from Cham Chu N.R. have the spines slender, narrowing, strongly tapering and incurving, and not completely black, but brown on the posterior side. Some specimens from Ba Be N.P. have conspicuously thickened spines; others are like those from Cham Chu N.R.

Male terminalia: (Fig. 16 F–H) the anal segment in male varies only slightly, being sometimes more elongated and less rounded.

Female legs: (Fig. 16 I–L) in females, lobes on the metafemora are absent in specimens from Cham Chu N.R. and Ba Be N.P. Specimens from Me Linh B.S. can have no lobes or a small lobe basally on the anteroventral carina of the metafemora. Specimens from Tay Yen Tu N.R. can have a developed lobe on the anterodorsal and posterodorsal carina on the basal portion of the metafemora, or, more often, two developed lobes on the posterodorsal carina and one on the anteroventral carina. The lobe on the anteroventral carina is between the other two lobes and always the biggest of the three.

Size: varies considerably. In Tay Yen Tu N.R., only females were collected and breeding the species in captivity (B. Kneubühler) gave us access to additional material including males. One captive reared female measures 155.2 mm whereas the wild caught females and all other captive bred specimens measure between 119.5-139.6 mm. The two female PLT studied by BRUNNER VON WATTENWYL (1907) differ also considerably in length (see measurements table 3).

Shape of eggs: (Fig. 8 E–H) eggs from Cham Chu N.R, Ba Be N.P. and Me linh B.S. have the micropylar plate almost round. Eggs from Tay Yen Tu N.R. have a drop-shaped micropylar plate, tapering towards the operculum. Eggs from Tay Yen Tu are also the largest ones (measurements above).

Table 3. Measurements [mm] of *Medauiomorpha regina* (Brunner von Wattenwyl, 1907) comb. nov. (* according to BRUNNER VON WATTENWYL, 1907).

	LT ♂*	PLT ♀*	Ba Be N.P. ♂♂	Ba Be N.P. ♀♀	Tay Yen Tu N.R. ♂♂	Tay Yen Tu N.R. ♀♀	Cham Chu N.R. ♂♂	Cham Chu N.R. ♀♀	Me Linh B.S. ♂♂	Me Linh B.S. ♀♀
Body:	94	100-140	88.96-92.5	118.7-133.7	90.6-101.6	119.5-155.2	91.0-95.0	121.7-143.4	85.3-86.8	116.2-123.1
Head:	–	–	3.8-3.9	6.6-7.8	4.7-4.8	6.9-7.8	4.2-4.3	6.0-7.9	4.0-4.1	6.2-6.7
Pronotum:	–	–	3.6-3.7	5.1-5.9	3.6-3.7	4.6-6.4	3.4-3.5	5.2-6.3	3.3-3.5	5.0-5.1
Mesonotum:	20	21-30	20.7-21.2	24.7-27.7	21.0-23.8	25.6-32.0	21.8-22.6	25.7-30.3	19.1-20.0	23.7-25.5
Metanotum:	17.5	14-20	12.6-13.1	12.5-13.3	13.7-14.2	13.7-16.4	13.4-13.6	12.9-14.7	11.7-12.8	12.5-13.9
Median segment:	4	3.5-5	2.7-2.8	3.9-4.4	2.7-2.8	4.0-4.6	2.7-2.8	3.9-4.6	2.2-2.4	3.6-3.7
Profemora:	45	34-49	40.4-41.7	42.2-46.8	45.0-48.8	42.7-56.0	43.8-47.2	41.1-52.6	38.1-39.0	39.2-43.3
Mesofemora:	28	24-31	25.6-25.7	26.4-29.3	32.7-33.2	28.0-35.6	26.6-27.3	26.3-33.4	22.9-26.0	26.6-27.7
Metafemora:	39	30-42	33.6-34.9	37.5-39.0	36.5-42.1	36.8-48.4	34.3-35.9	32.5-44.3	27.4-32.4	33.2-35.6
Protibiae:	–	–	52.5-54.1	53.3-55.6	55.9-63.5	54.0-63.6	50.4-57.8	49.0-63.2	45.6-50.7	47.9-55.5
Mesotibiae:	–	–	28.7-34.1	29.1-31.0	33.6-33.9	31.7-36.6	27.9-30.5	29.7-38.1	27.5-30.5	29.4-32.0
Metatibiae:	–	–	43.8-44.5	42.9-46.2	44.6-48.0	42.8-52.6	39.5-45.7	40.9-53.8	35.7-41.3	42.5-44.8

DISTRIBUTION. Fig. 1 A.

Genus *Medauroidea* Zompro, 2000

Medauroidea ZOMPRO, 2000: 68 [described; compared with *Medaura* and *Ramulus*].

Type species: *Clitumnus extradentatus* Brunner von Wattenwyl, 1907, by original designation.

***Medauroidea regula* (Brunner von Wattenwyl, 1907) comb. nov.**

Fig. 13 D–E.

Cuniculina regula BRUNNER VON WATTENWYL, 1907: 201 [described].

Cuniculina regula – BROCK, 1998: 53 [type specimens catalogued].

Baculum reginum – BROCK, 1998: 53 [transferred to *Baculum*; type specimens catalogued (typo for *B. regulum*)].

Ramulus regulus – OTTE & BROCK, 2005: 306 [transferred to *Ramulus*; catalogued].

TYPE MATERIAL EXAMINED. HT ♀ (nymph) of *C. regula* (examined from photographs, Fig. 13 D): Tonkin, Than-Moi, Juni-Juli, H. Fruhstorfer (NHMW).

NOTES: (1) the species is here transferred to the genus *Medauroidea* based on the following characters: body elongate and slender; mid and hind legs mostly unarmed, showing only a few small triangular lobes, but no strongly enlarged lobe(s); dorsal part of head flattened with a pair of spines between the eyes; vertex slightly projecting posteriorly and split by a shallow median groove; dorsal part of thorax fairly smooth; sides of mesonotum with a row of small tubercles; subgenital plate convex, not reaching half length of anal segment; anal segment notched.

The genus *Medauroidea* is close to *Medaura* and *Medauromorpha* gen. nov. However, the females of *Medaura* Stål, 1875 have none of the abdominal terga two times longer than wide (in *Medauroidea* Zompro, 2000 several terga are distinctly longer than wide as it is the case in *Medauroidea regula*). Females of *Medauromorpha* gen. nov. have the anal segment pointing obliquely downwards and strongly tectiform (horizontal and only slightly tectiform in *Medauroidea*).

(2) BROCK (1998) erroneously listed two female ST for *Cuniculina regula*, although BRUNNER VON WATTENWYL (1907) based his description on a single female. One specimen is indeed a female (nymph) which is here recognized as the HT of the species. The second listed specimen is a male ST of *Cuniculina regina* and its status is treated *supra*.

Discussion

The tribal placement proposed for *Medauromorpha* gen. nov. is based on a set of characters which key out to the tribe Medaurini Hennemann & Conle, 2008: head rugose with distinct spines or scale-like tubercles between the eyes; mesothorax at best 2.5 times (females) or 3 times (males) longer than head and pronotum combined; males with external vomer produced; subgenital plate of females longitudinally keeled and not reaching to apex of anal segment; mid- and hind-legs mostly unarmed but sometimes with a few dorsal lobes [when identifying specimens of *Medauromorpha* gen. nov., one must be aware that regenerated legs do not show the specific features of the “normal” specimens: lobes and spines are less developed and can even be absent]; egg capsule covered with a raised, net-like structure; the micropylar plate

is small, oval or rhomboidal and covers less than half of the capsule length; the median line is distinct.

However, *Medauromorpha* gen. nov. exhibits some morphological features previously unknown in Medaurini as defined by HENNEMANN & CONLE (2008): body length exceeding 110 mm; eggs not small or ovoid but strongly elongated and grass seed-shaped; operculum with a rim like structure.

These features are unique within the Medaurini and warrant further investigation. BRESSEEL & CONSTANT (2015) already discussed several overlapping tribal characters of Clitumnini and Medaurini when describing *Lobofemora* Bresseel & Constant, 2015 (Clitumninae, Clitumnini). Head and leg morphology suggest a close relation between *Lobofemora* and *Medauromorpha*. Also the conspicuous dark longitudinal line or dot on the posterior part of the prosternum and/or basal part of the mesosternum is present in both genera, as well as the minute hooks and mushroom-shaped structures of the eggs.

However, *Lobofemora* has no external sclerotised vomer and can have developed tegmina and/or alae in males. More material and forthcoming DNA-based phylogenetic studies will deal with these interesting genera to clarify their phylogenetic position and relationships.

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