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## Studies on Philippine Lonchodinae, with the descriptions of two new genera and eleven new species

(Phasmatoidea: Phasmatidae: Lonchodinae)

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### Abstract

The subfamily Lonchodinae is a large but still rather poorly studied group of Old World Phasmatoidea. The collections of the authors include numerous species of Lonchodinae from the Philippine Islands of Samar, Mindoro, Panay, Babuyan and Luzon, some of which are here studied in detail. Two new genera and eleven new species are described. Keys to the genera and a checklist of Philippine Lonchodinae are presented which lists 28 described species in nine distinct genera.

The genus *Mithrenes* STÅL, 1877 is re-described and distinguished from related genera. Two new species are described based on both sexes and the eggs: *Mithrenes mindorensis* **sp. n.** from Mindoro and *Mithrenes panayensis* **sp. n.** from Panay. A lectotype is designated for *Mithrenes asperulus* STÅL, 1877. The paralectotype of *Lonchodes systropedon* WESTWOOD, 1859 is conspecific with *Mithrenes whiteheadi* (KIRBY, 1896) and *Lonchodes nodulosus* BRUNNER V. WATTENWYL, 1907 is the opposite sex and a junior synonym as is *Dixippus bilobatus* BRUNNER V. WATTENWYL, 1907 (**syn. n.**). A lectotype is designated for *Dixippus bilobatus* BRUNNER V. WATTENWYL and e-descriptions are provided for both sexes. Keys are presented to distinguish between the four described species in the genus.

The new species *Lonchodes philippinicus* **sp. n.** from Panay is described and illustrated based on both sexes and the eggs. As currently treated the genus *Lonchodes* GRAY, 1835 is shown to be polyphyletic. A critical discussion of the genus is presented, which briefly summarizes the generic units or specific groups recognized within the genus. Species subsequently attributed to *Lonchodes* GRAY are here transferred to the genera *Lonchodiodes* **gen. n.**, *Mnesilochus* STÅL, 1877 and *Hermagoras* STÅL, 1875. A list of species which belong in *Lonchodes* (sensu strictu) is provided.

The new genus *Lonchodiodes* **gen. n.** (type-species: *Lonchodiodes samarensis* **sp. n.**) and five new species are described and illustrated. Four species are known from both sexes and the eggs: *Lonchodiodes atrovirens* **sp. n.** and *Lonchodiodes grandis* **sp. n.** from Panay, *Lonchodiodes samarensis* **sp. n.** from Samar and *Lonchodiodes babuyanensis* **sp. n.** from the Babuyan Islands. *Lonchodiodes eurycanthoides* **sp. n.** from Mindoro is described from the male and female alone. Three species are transferred from *Lonchodes* GRAY, 1835 to *Lonchodiodes* **gen. n.**: *Lonchodes putingmantsa* ZOMPRO, 2003 **comb. n.**, *Lonchodes tagalicus* STÅL, 1877 **comb. n.** and *Lonchodes trollius* WESTWOOD, 1859 **comb. n.**. The female and egg of *L. trollius* (WESTWOOD, 1859) are described and illustrated for the first time and a re-description is provided of the male. Keys are presented to distinguish between the eight known species in the genus.

A list of species is presented for *Periphetes* STÅL, 1877. One new species, *Periphetes quezonicus* **sp. n.**, is described from Luzon based on the female and male. A detailed description and illustrations of the egg of *Periphetes forcipatus* (BATES, 1865) from Sulawesi are provided. *Dixippus furcatus* BRUNNER V. WATTENWYL, 1907 and *Periphetes duivenbodei elongatus* GÜNTHER, 1938 from Sulawesi and *Periphetes sangirensis* DOHRN, 1910 from Sangihe Island shown to be junior synonyms of *P. forcipatus* (BATES) (**syn. n.**). Lectotypes are designated for *Lonchodes analis* BRUNNER V. WATTENWYL, 1907 and *Lonchodes forcipatus* BATES, 1865.

The new genus *Matutumetes* **gen. n.** is described for two new species from Mindanao, both of which are known from the male and female: *M. amoenus* **sp. n.** and *M. mindanaensis* **sp. n.**. This new genus is well characterized by the strikingly prominent praepopercular organ of females. The eggs of *Matutumetes* **gen. n.** remain unknown.

*Mnesilochus* STÅL, 1877 is re-established (**stat. rev.**), re-described and distinguished from related genera. A list is presented of the 13 species currently included, 11 of which are here transferred from either *Lonchodes* GRAY, 1835 (sensu lato) or *Phenacephorus* BRUNNER V. WATTENWYL, 1907 (**comb. n.**). The female and egg of *Mnesilochus headulus* STÅL, 1877 are described and illustrated for the first time and a re-description is provided of the male. *Prisomera tuberculatum* BRUNNER V. WATTENWYL, 1907 is synonymised with *Mnesilochus mindanaense* (BRUNNER V. WATTENWYL, 1907) **syn. n.**. *Prisomera modestissimum* BRUNNER V. WATTENWYL, 1907 was synonymised with *Mnesilochus modestus* (BRUNNER V. WATTENWYL, 1907) in error and is shown to be a synonym of *Paraprisomera coronata* (BRUNNER V. WATTENWYL, 1907) **syn. n.**. The type-locality "S.O. Borneo" is shown to be wrong, the specimens most certainly originating from Sri Lanka.

A review is presented of the genus *Manduria* STÅL, 1877, along with a re-description and brief notes on its systematic position. A key is provided to distinguish the females. The female paralectotype of *Lonchodes systropedon* WESTWOOD, 1859 in BMNH is shown to be a specimen of *M. bilobatus* (BRUNNER V. WATTENWYL, 1907).

Holotypes of most new taxa are deposited in the State Zoological Collection Munich, Germany (ZSMC), paratypes in various public and private collections.

Postscript: *Lonchodes jenswilhelmjanzeni* ZOMPRO, 2007 is transferred to *Mnesilochus jenswilhelmjanzeni* (ZOMPRO, 2007) **comb. n.**.

### Introduction

Of the very rich and distinct faunal subregions of the Oriental Region, the Philippines represent close to the optimum conditions for a high biodiversity, due to consisting of more than 7000 different islands and expanding by more than 1000 kilometres from west to east and about 1800 kilometres from north to south. Although situated in the northern portion of the Oriental Region, these islands display a biodiversity equalled by only a very few other areas of the world. At the same time however, their fauna is still poorly studied, which can be seen in the frequent discovery of new taxa of various insect-orders during the past years.

So far, about 220 species of Phasmatodea have been described and recorded from the Philippine Islands. The latest more extensive work on the archipelagos fauna is that of REHN & REHN (1939) studying the Obriminae of the Philippines Islands. Since REHN & REHN's revision of the Philippine Obriminae in 1939 it was until recent years that specialists continued to work on the archipelagos Phasmid fauna. The latest contributions are the works of BROCK; HENNEMANN & CONLE; ZOMPRO and ZOMPRO & EUSEBIO which in total, described 4 new genera and 13 new species. The most recent descriptions of Philippine Phasmatodea of the subfamily Lonchodinae were those of HENNEMANN & CONLE (1997), ZOMPRO (2003) and ZOMPRO & EUSEBIO (2000) which described 5 new species and one new genus. Numerous species of WESTWOOD (1859) and STÅL (1875a, b & 1877a, b), were unfortunately described without exact locality, which is perhaps the most serious difficulty in studying the archipelago's Phasmatodea. In addition to the description of new taxa, future studies should also aim the recognition of these older taxa in the more comprehensive representation now available. However, extensive collections in the Philippines need to be conducted in order to re-discover these species, defining their exact distribution in the Philippines and to trace the numerous so far unknown sexes and eggs of many species.

A considerable number of Phasmatodea from the Islands of Luzon, Panay, Mindoro, Mindanao, Samar and Babuyan in the collections of the authors (coll. FH & OC) contains series of several species of the subfamily Lonchodinae BRUNNER V. WATTENWYL, 1893. Further species of Lonchodinae are represented by captive reared material. Examination of these and comparison with described taxa has shown at least eleven of the seventeen species represented, to be as yet undescribed. Two further certainly undescribed species, both from Luzon, are only represented by single specimens. This emphasises the great richness but poor degree of exploration of the Philippine Islands phasmid fauna and still several new species of the genera here discussed are known to the authors.

The present paper describes eleven new species of Lonchodinae from the Islands of Luzon, Samar, Panay, Mindoro, Mindanao, Luzon and Babuyan, contained in the author's collections. Further research and comparison with closely related taxa has shown the necessity to establish two new genera, which include seven of the newly described taxa, as well as some Philippine species formerly all included in the genus *Lonchodes* GRAY, 1835. It is meant to be a first step towards the systematization of Philippine Lonchodinae

and it is hoped, that future studies are conducted to broaden our still poor knowledge on this interesting and highly diverse group of Oriental Phasmatodea in the Philippines. Certainly, many new species will still be discovered once further collecting is carried out in so far lesser prospected areas and islands.

### Material & methods

The present work is based on examination of the necessary type material which has received much support from curators of all corresponding European museums and institutions. All material used in this study has been pinned and dried. Measurements were taken using a long ruler or digital caliper and are given to 0.1 mm. If more than one egg has been examined, average measurements are given. If not differently mentioned and no live specimens were available for examination the colouration of the insects is described from dried specimens. Therefore, attention has to be drawn as specimens may have changed colour during the process of preservation. Examinations of the insects were carried out using a stereoscope and an entomological lens (4x magnification). Eggs were examined at 10x magnification. All examined eggs were fully developed and already laid or taken from the female's ovipositors. The terminology used to describe egg structures follows that of CLARK-SELLICK (1997).

### Abbreviations

BMNH:	British Museum of Natural History, London / England.
ETHZ:	Eidgenössische Technische Hochschule, Entomologisches Institut, Zürich / Switzerland.
HNHM:	Hungarian Natural History Museum, Budapest / Hungary.
MHNG:	Museum d'Histoire Naturelle, Geneva / Switzerland.
MNCN:	Museo Nacional de Ciencias Naturales, Madrid / Spain.
MNHN:	Museum National d'Histoire Naturelle, Paris / France.
NHMW:	Naturhistorisches Museum, Vienna / Austria.
NHRs:	Naturhistoriska Riksmuseet, Sektion für Entomology, Stockholm / Sweden.
OXUM:	Oxford University Museum, Oxford / England.
RMNH:	Nationaal Natuurhistorisch Museum, Leiden / Netherlands.
SMNG:	Staatliches Museum für Naturkunde, Görlitz, Germany.
SMTD:	Staatliches Museum für Tierkunde, Dresden / Germany.
UPPC:	Museum of Natural History, University of the Philippines, Los Baños, Laguna / Philippines.
ZMPA:	Polish Academy of Sciences, Warsaw / Poland
ZSMC:	Zoologische Staatssammlung, Munich / Germany.
CLC:	Private collection of C. L. CHAN, Kota Kinabalu, Sabah / Borneo.
FH:	Private collection of Frank H. HENNEMANN, Kaiserslautern / Germany.
OC:	Private collection of Oskar V. CONLE, Bolsterlang / Germany.
OZ:	Private collection of Oliver ZOMPRO, Kiel / Germany.
PEB:	Private collection of Phil E. BRAGG, Nottinghamshire / England.
HT:	Holotype.
AT:	Allotype.
PT:	Paratype.
LT:	Lectotype.
PLT:	Paralectotype.
ST:	Syntype.

### Lonchodinae BRUNNER v. WATTENWYL, 1893

The subfamily Lonchodinae BRUNNER v. WATTENWYL is one of the largest subgroups of Phasmatodea, presently containing more than 30 described genera and over 250 known species. Its distribution extends from India to New Caledonia and the Solomon Islands as far north as Japan. Presently, the subfamily is not sub-divided into tribes but at least two distinct generic groups can be easily recognized. Several genera, e.g.

*Lonchodes* GRAY, 1835 and *Carausius* STÅL, 1875, have become real “collective genera” which contain several not closely related species, hence being highly polyphyletic in their present recognition. Thus, and as even the monophyly of the present Lonchodinae remains questionable a revision of this subfamily at least at the generic level is urgently required.

A natural arrangement and classification of Lonchodinae is apparently difficult, due to ♀♀ of certain genera are masters of camouflage, and often seen to be extremely polymorphic, showing a wide range of intraspecific variability. This concerns to the size and colouration as well as to the sculpturing of the dorsal body surface, which may bear large tubercles, spines and swellings or not, and the length and shape of the supraanal plate. While ♂♂ do not show such intraspecific variability and are difficult to distinguish on specific and even generic level, the polymorphy in ♀♀ of certain species and misinterpretation of these variable features by former authors (e.g. BRUNNER v. WATTENWYL, 1907) has resulted in numerous synonyms. As most of the morphological features of the insects underlie considerable adaptional variation, the structures of the genitalia and the eggs in particular, appear to be of great importance for a natural re-arrangement of Lonchodinae.

The so far 28 described species of Lonchodinae in the Philippines are currently attributed to nine distinct genera. Keys to distinguish between the adults appear warranted for easier identification of taxa and are presented below. These keys however exclusively define to Philippine taxa, with all non-Philippine taxa not taken into consideration. Therefore, certain features used below to distinguish between the Philippine representatives of *Lonchodes* GRAY, 1835 (s. str.) and *Periphetes* STÅL, 1877 in particular may not be true for other non-Philippine species contained in these concerned genera.

### Keys to the genera of Philippine Lonchodinae

♀♀\*

1. Anal segment short with a ± distinct median indentation or excavation; supraanal plate visible in dorsal aspect ..... 2
  - Apex of anal segment strongly elongated and lanceolate, together with the elongated subgenital plate forming a beak-like ovipositor; supraanal plate hidden under anal segment ..... *Manduria*
2. Keel of subgenital plate unarmed; mesofemora smooth dorsally; profemora simple ..... 3
  - Keel of subgenital plate dentate apically; mesofemora with distinct, dentate dorsal lobes; dorsal carinae of protibiae elevated and ledge- or lamella-like ..... *Mnesilochus*
3. Abdominal tergite VII not dilated; mesotibiae slender; probasitarsus simple ..... 4
  - Abdominal tergite VII strongly expanded and rounded laterally; mesotibiae lobed dorsally; probasitarsus with a rounded lobe dorsally ..... *Lonchodes*
4. Praeopercular organ absent or indistinct ..... 5
  - Praeopercular organ very prominent, formed by a prominent lobe which extends over posterior margin of sternite VII. .... *Matutumetes* **gen. n.**
5. Abdominal tergites smooth or with a tubercle posteromedially ..... 6
  - Abdominal tergites each with a prominent rounded posteromedian hump ..... *Spinophetes*
6. Body surface ± densely covered with minute, rounded granules; dorsal body segment unarmed posteromedially ..... 7
  - Body surface strongly granulate and tuberculose; abdominal tergites with a ± distinct tubercle or spine posteromedially ..... *Mithrenes*
7. Ventral body surface simple; subgenital plate strongly keeled and boat shaped, acute apically .....
  - ..... *Lonchodiodes* **gen. n.**
  - Ventral body surface with a ± distinct longitudinal median keel; subgenital plate scoop-shaped, broadly rounded apically and with a distinct median impression basally ..... *Periphetes*

\* ♀♀ of *Diangelus* BRUNNER v. WATTENWYL, 1907 are not known

	♂♂	
1.	Probasitarsus with a dorsal lobe; protibiae elevated and lamellate dorsally	2
–	Probasitarsus simple; protibiae slender	3
2.	Metanotum with two knot-like structures posteriorly; mesofemora unarmed and slender	<i>Diangelus</i>
–	Metanotum without posterior knots; mesofemora thickened and with a ± distinct tooth dorso-medially	<i>Mnesilochus</i>
3.	Dorsal body segments each with a posteromedian tubercle or elevated hump	4
	Dorsal body surface unarmed	6
4.	Body tectiform dorsally; meso- and metasternum with a longitudinal median keel	5
–	Body not tectiform dorsally; meso- and metasternum simple	<i>Spinophetes</i>
5.	Semi-tergites of the anal segment broad, laterally compressed and rounded apically	<i>Manduria</i>
–	Semi-tergites with apices strongly tapered, down-angled and finger-like	<i>Mithrenes</i>
6.	Distinctly bi-colourous (green combined with yellow, orange or rusty red)	7
–	Colouration never distinctly bi-colourous, often plain	8
7.	Head with spines between the eyes; semi-tergites of the anal segment elongated, laterally compressed and broadly rounded apically; semi-tergites of anal segment black	<i>Lonchodes</i>
–	Head unarmed; semi-tergites of the anal segment short, strongly tapered and acute apically; three terminal abdominal segments black	<i>Periphetes</i>
8.	Semi-tergites of the anal segment slender, tapered and ± elongated, apex slender and finger-like; poculum small	<i>Matutumetes</i> <b>gen. n.</b>
–	Semi-tergites broader with a distinct lateral impression, moderately elongated, apex broadly rounded; poculum bulgy	<i>Lonchodiodes</i> <b>gen. n.</b>

### *Mithrenes* STÅL, 1877

**Type-species:** *Mithrenes asperulus* STÅL, 1877: 40, by monotypy.

*Mithrenes* STÅL, 1877: 39.

KIRBY, 1904a: 319.

OTTE & BROCK, 2005: 205.

*Mithrenus*, BRUNNER V. WATTENWYL, 1907: 263. [Misspelling of *Mithrenes* STÅL]

BRUNER, 1915: 39.

*Carausius*, OTTE & BROCK, 2005: 82. (in part – **not** STÅL, 1875)

*Dixippus*, BRUNNER V. WATTENWYL, 1907: 276. (in part – **not** STÅL, 1875)

*Lonchodes*, WESTWOOD, 1859: 44. (in part – **not** GRAY, 1835)

KIRBY, 1896: 450.

BRUNNER V. WATTENWYL, 1907: 256. (in part)

OTTE & BROCK, 2005: 178. (in part)

*Pachymorpha*, BRUNNER V. WATTENWYL, 1907: 212. (in part – **not** GRAY, 1835)

*Staelonchodes*, KLANTÉ, 1960: 96, figs 5-7 (♀).

*Stheneboea*, BRUNNER V. WATTENWYL, 1907: 249. (in part – **not** STÅL, 1875)

BRUNER, 1915: 38.

**Description:**

♀♀, ♂♂: Medium-sized (body length ♂♂ 54.8-79.0 mm, ♀♀ 72.0-102.0 mm) elongate and slender Lonchodinae; very similar to *Myronides* STÅL, 1875. Distinct sexual dimorphism with ♂♂ considerably shorter and much more slender than ♀♀. Colouration brown or green, sometimes with pale markings in ♀♀; ♂♂ unicolorous. Complete body surface irregularly covered with granules and tubercles of variable sizes in ♀♀ and very minutely and sparingly granulose in ♂♂. Meso-, metanotum and all abdominal tergites of ♀♀ with a ± distinct longitudinal median keel; less distinct in ♂♂. Head elongate, at least 1.3x longer than wide, sub-cylindrical and conspicuously narrowed towards the posterior; broadest at the eyes. Vertex flat and ± decidedly granulose. Between the eyes with a pair of blunt humps ± spiniform tubercles or spines. Eyes of moderate size, circular and projecting hemispherically. Antennae very long and filiform, distinctly projecting posterior margin of median segment; relatively longer in ♂♂. Scapus at least 1.5x longer than wide and strongly dorsoventrally flattened. Pedicellus much shorter than scapus, round in cross-section and ± club-like. Pronotum shorter and narrower than the head and longer than wide; posterior margin with one or two ± decided granules or spiniform tubercles (sometimes lacking in ♂♂). Mesothorax elongate, at least 2x longer than head and pronotum combined, usually longer. Mesonotum very gently widened posteriorly. Metanotum about half as long as mesonotum. Meso- and metasternum with a longitudinal median keel (indistinct in ♂♂). Median segment very short, less than 2/5 the length of metanotum; ± quadrate. Abdomen including median segment roughly equal to combined length of head and complete thorax. Segments II-VI 1.5-3x longer than wide and parallel-sided (relatively shorter in ♀♀). Median segment and tergites II-IX each with a ± prominent posteromedian node or spiniform tubercle, and occasionally with a tooth at each posterolateral angle; less distinct or may almost be absent in ♂♂. Praeopercular organ of ♀♀ very indistinct, at best represented by a minute median tubercle close to posterior margin of sternite VII. Tergites VIII and IX considerably shorter than previous; in ♂♂ only slightly broader than II-VII. Anal segment of ♀♀ with a prominent concave or broadly triangular posteromedian excavation; lateral angles acute and roughly triangular. Supraanal plate of moderate size, rounded triangular with a distinct median keel and at best slightly projecting over apex of anal segment. Anal segment of ♂♂ at best 1.5x longer than IX, strongly tectiform and split over about 2/3 of its length to form two semi-tergites. Semi-tergites posteriorly angled downward to at least 60°, the ventral apex extended into a short but slender and finger-like appendage; interior surfaces covered with minute teeth. No visible vomer. Poculum of ♂♂ of moderate size, convex, cup-like and not considerably extending over posterior margin of tergite IX. Subgenital plate of ♀♀ strongly keeled, boat-like and at best projecting slightly over apex of anal segment. Cerci very small and tapered towards the apex, oval to round in cross section. All legs very long and slender. Profemora longer than mesothorax, mesofemora longer than metathorax and metatibiae reaching to or projecting over apex of abdomen. Profemora strongly compressed and curved basally. All unarmed except for a more or less prominent sub-apical tooth or obtuse, dentate lobe on the outer ventral carinae of the meso- and femora (usually less distinct in ♂♂ and less decided on metafemora). Medioventral carina of femora very faint. Tarsi moderately elongate and simple. Basitarsi at least as long as following three tarsomeres combined.

**Description of the eggs:**

Characteristic for the obscure general shape and distinct colouration. Small to medium-sized for the subfamily, oval in cross-section, dorsally and ventrally with a blunt keel and with several prominent impressions. Surface ± glabrous and minutely granulose. Impressed sections of capsule black or with irregular, black impressions; raised portions straw to pale yellowish brown. Micropylar plate positioned centrally on dorsal surface of the egg capsule and covering about half of capsule length. Longer than wide and posteromedially with a distinct notch or gap. Operculum oval to rhombic, flat and with a more or less prominent, knob or disc-like capitulum. Capitular stalk very short.

**Differentiation:**

Closely related to *Myronides* STÅL, 1875 (type-species: *Lonchodes pfeifferae* WESTWOOD, 1859, by subsequent designation of REHN, 1904: 38) but distinguished by: the shorter median segment of both sexes, which is at best 2/5 the length of the metanotum (about half as long as metanotum in *Myronides*); more elongate and more distinctly posteriorly narrowed head; more slender legs with the meso- and metafemora less prominently laterally compressed, and differently shaped semi-tergites of the anal segment of ♂♂, which are angled downward by at least 60° and have the posterior angle with a short, finger-like appendage (straight and apically tapered in *Myronides*). The eggs clearly differ by their obscure general shape (more or less

ovoid in *Myronides*) and lacking a stalk of the capitulum. *Myronides* STÅL has so far been recorded from the Moluccas, Bourou, Sulawesi, Batjan Id., the Bismarck Archipelago, New Guinea, Ceram and Ambon, while *Mithrenes* STÅL is presumed endemic in the Philippines.

STÅL (1877: 39) originally placed the genus in close relation to *Lonchodes* GRAY, 1835 (type-species: *Lonchodes brevipes* GRAY, 1835: 19, by subsequent designation of KIRBY, 1904: 373) and *Phraortes* STÅL, 1875 (type-species: *Phasma elongata* THUNBERG, 1815, by monotypy). From these two genera *Mithrenes* is however easily distinguished by: the head being distinctly narrowed towards the posterior; longitudinal median keel of the meso- and metasternum; the posterior margin of the abdominal tergites I-VI either with a posteromedian tubercle or a spine at each lateral angle as well as the shape of the anal segment of ♂♂ and ♀♀ having only a very indistinct praeopercular organ.

*Mithrenes* is also similar to *Manduria* STÅL, 1877, also endemic in the Philippines, but this genus differs at once from *Mithrenes* by structures of the genitalia, ♀♀ having the anal segment and subgenital plate conspicuously elongated and lanceolate to form a bird beak-like ovipositor and a distinct praeopercular organ, and ♂♂ having the semi-tergites of the anal segment rather broad and roughly triangular in lateral aspect with the apex broadly rounded. The eggs furthermore clearly distinguish *Manduria* from *Mithrenes* by being strongly elongate, bullet-shaped with a hollow polar extension, round in cross-section and having a long, lanceolate micropylar plate.

#### Distribution:

Philippines (believed to be endemic).

#### Species included:

1. *Mithrenes asperulus* STÅL, 1877: 40. [“Philippines”]
2. *Mithrenes mindorensis* **sp. n.** [Mindoro Id.]
3. *Mithrenes panayensis* **sp. n.** [Panay Id.]
4. *Lonchodes whiteheadi* KIRBY, 1896: 450. [Luzon & Sibuyan Id.]  
     = *Dixippus bilobatus* BRUNNER V. WATTENWYL, 1907: 281. **syn. n.**  
     = *Lonchodes nodulosus* BRUNNER V. WATTENWYL, 1907: 261. **syn. n.**
5. *Staelonchodes* sp. KLANTE, 1960: 96, figs 5-7. [Philippines ?]

#### Keys to the species of *Mithrenes* STÅL

♀ ♀

1. Posterolateral angles of abdominal tergites II-VI unarmed ..... 2  
 – Posterolateral angles of abdominal tergites II-VI with a distinct triangular tooth ..... *M. asperulus*
2. Body surface not glabrous, distinctly granulose and tuberculose; armature of thorax brown or black; spines between the eyes distinct; not Mindoro ..... 3  
 – Body surface glabrous, sparingly granulose; large granules of the thorax white; spines between the eyes indistinct; Mindoro ..... *M. mindorensis* **sp. n.**
4. Very slender species, mesothorax > 7x longer than wide; clypeus whitish; sub-apical lobe of meso- and metafemora small; Panay ..... *M. panayensis* **sp. n.**  
 – More robust species; mesothorax < 7x longer than wide; clypeus brown; sub-apical lobe of meso- and metafemora obtuse, rounded; Luzon & Sibuyan ..... *M. whiteheadi*

♂ ♂

1. Posterolateral angles of abdominal tergites II-VI unarmed; brown ..... 2  
 – Posterolateral angles of abdominal tergites II-VI with a triangular tooth; green ..... *M. asperulus*
2. Body surface not glabrous; anal segment not considerably larger than IX; spines between the eyes distinct; not Mindoro ..... 3  
 – Body surface glabrous; anal segment distinctly larger than IX; spines between the eyes indistinct; Mindoro ..... *M. mindorensis* **sp. n.**

3. Large species (body length > 68.0 mm); clypeus whitish; posteromedian tubercle of tergites II-IX indistinct; Panay ..... *M. panayensis* **sp. n.**  
 – Smaller species (body length < 65.0 mm); clypeus brown; posteromedian tubercle of tergites II-IX prominent, spiniform; Luzon & Sibuyan. .... *M. whiteheadi*

***Mithrenes asperulus* STÅL, 1877**

*Mithrenes asperulus* STÅL, 1877: 40. **LT** [by present designation], ♂: Ins. Philipp., Type, *Mithrenes asperulus* STÅL ♂ (NHRS); **PLT**, ♀: Ins. Philipp., Type, *Mithrenes asperulus* STÅL (NHRS); **PLT**, ♀: Ins. Philipp. (NHRS).

KIRBY, 1904: 319.

OTTE & BROCK, 2005: 205.

*Mithrenus asperulus*, BRUNNER V. WATTENWYL, 1907: 263. [Misspelling of *Mithrenes* STÅL]

BRUNER, 1915: 39.

**Comments:**

This, the type-species of *Mithrenes* STÅL, is characteristic for the distinct posterolateral teeth (♂) or triangular lobes (♀) of the abdominal tergites II-VI, green general colouration, bi-dentate sub-apical lobe of the two outer ventral carinae of the meso- and metafemora of ♀♀ and tri-tuberculate posterior margin of the metanotum of ♂♂. Body lengths according to STÅL: ♂ 61.0 mm, ♀ 72.0 mm.

STÅL's original syntype-series in NHRS does not bear any more precise data than "Ins. Philipp.". The almost perfect and complete ♂ is here designated as the lectotype. One ♀ PLT does not bear a hand-written determination label by STÅL, but appears to be part of the type-series. As no further specimens have since been recorded, the exact distribution of *M. asperulus* in the Philippines remains unknown. STÅL's type-specimens were examined from photos kindly taken and forwarded to the authors for examination by Dr. K. A. JOHANSON (NHRS) and P. D. BROCK (Slough, England).

***Mithrenes mindorensis* sp. n.**

(Figs 1-7)

**Holotype**, ♂: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 6.IV.-27.V.1996, ex coll. FH (ZSMC).

**Paratypes** (15 ♂♂, 15 ♀♀, 1 ♀ (penultimate instar nymph), 1 egg): 1 ♂ Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 6.IV.-27.V.1996, ex coll. FH (UPPC); 1 ♂, 1 ♀ : Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 6.IV.-27.V.1996, ex coll. FH (NHMW); 1 ♀: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 6.IV.-27.V.1996, ex coll. FH (ZSMC); 1 ♂, 1 ♀ : Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 6.IV.-27.V.1996, ex coll. FH (BMNH); 10 ♂♂, 6 ♀♀, 1 ♀ (penultimate instar nymph), 1 egg (ex ovipositor): Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 6.IV.-27.V.1996 (coll. FH, No's 0320-1 to 17 & E); 2 ♂♂, 6 ♀♀: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 6.IV.-27.V.1996 (coll. OC).

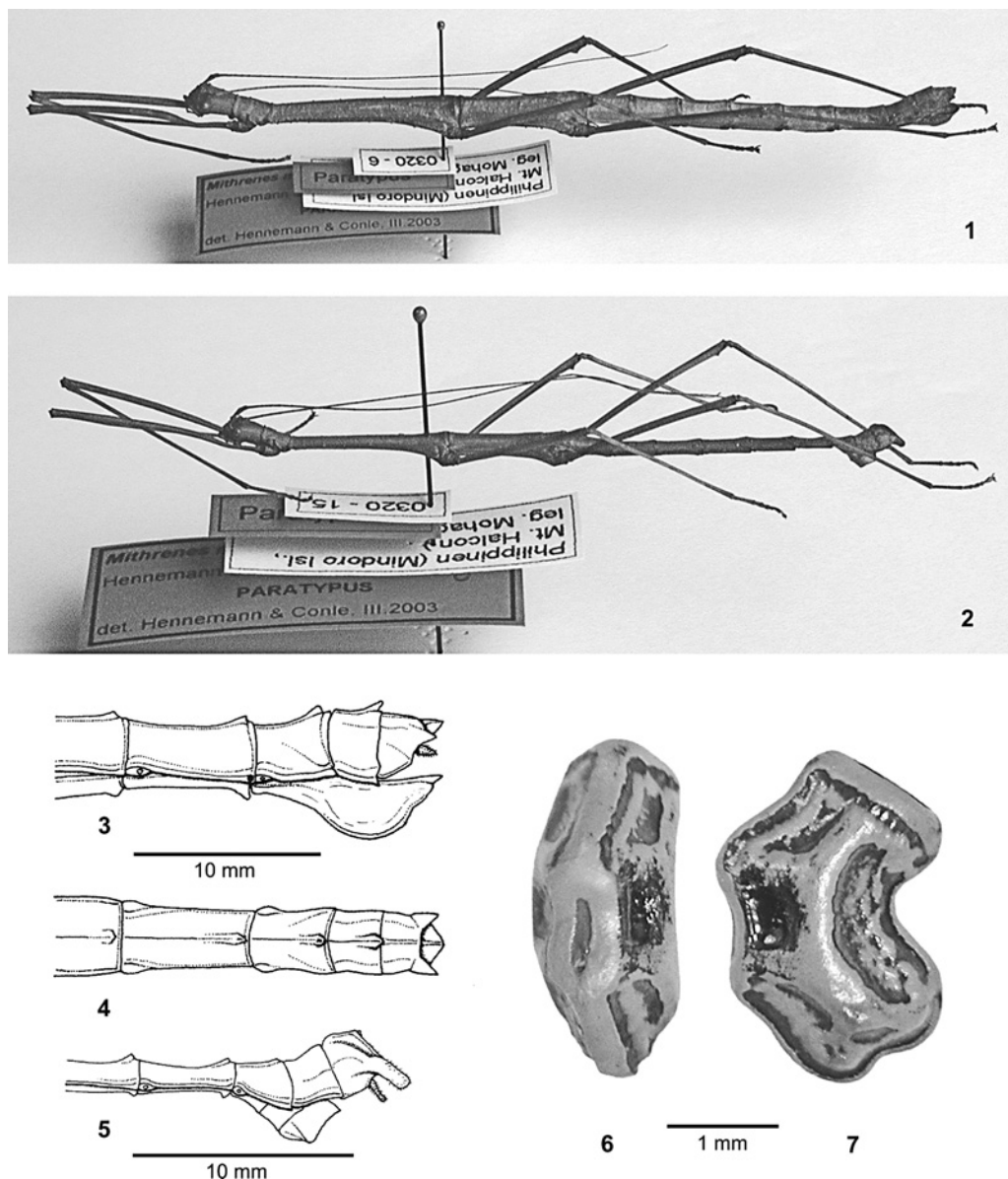
**Etymology:**

Named after the type-locality Mindoro Island.

**Differentiation:**

Well distinguished from *M. whiteheadi* (KIRBY, 1896) from Luzon and *M. panayensis* **sp. n.** from Panay by: the shiny body surface; less prominent posteromedian tubercle of abdominal tergites II-IX and relatively shorter legs of both sexes; more distinct longitudinal median carina of the dorsal body surface of ♀♀ as well as the relatively larger anal segment of ♂♂ which is longer and higher than tergite IX. From *M. panayensis* **sp. n.** it additionally differs by the considerably smaller size and more robust body of both sexes as well as the differently shaped eggs.





**Figs 1-7:** *Mithrenes mindorensis* sp. n.: 1. ♀ PT (coll. FH); 2. ♂ PT (coll. FH); 3. apex of abdomen ♀ (lateral view); 4. apex of abdomen ♀ (dorsal view); 5. apex of abdomen ♂ (lateral view); 6. egg dorsal view; 7. egg lateral view.

### Description:

♀ ♀ (**Fig. 1**): Moderately sized (body length 83.8-88.5 mm) and rather robust (average body width 2.9-3.1 mm) for the genus, with a glabrous and very sparingly granulose body surface; entire dorsal body surface except head and pronotum with a very distinct longitudinal median keel. General colouration plain grass or olive green to yellowish mid brown. All sternites except subgenital plate yellowish straw. Mesosternum with an olive green or pale brown line along lateral margins. Metapleurae and posterior third of mesopleurae with irregular, bold black markings. Granules of the thorax whitish. Apices of femora black and all tibiae with

very faint darker annulations. Clypeus brown. Eyes chesnut-brown. Antennae except scapus greenish to yellowish mid brown with several irregular and faint, pale annulations; apex whitish.

Head: Rather short, 1.3x longer than wide, gently narrowing towards the posterior. Between the eyes with a pair of small but acute spines. In front of these spines with two minute, oval impressions. Vertex flat with a slightly impressed coronal-line and set with a few minute granules in posterior portion. Eyes small, their length contained almost 4x in that of cheek. Antennae reaching to or slightly projecting over posterior margin of abdominal tergite II. Scapus roughly rectangular and about 2x longer than wide. Pedicellus cylindrical, half as long as scapus. Following antennomeres first increasing then decreasing in length towards apices of antennae.

Thorax: Pronotum slightly shorter than head, almost of equal width, rectangular and slightly medially constricted; about 1.3x longer than wide. Transverse median depression distinct, slightly curved and extending to lateral margins of segment. Median line distinct and conspicuously impressed in median portion. Anterior margin with two distinct node-like granules medially, posterior margin with two minute, black posteromedial median granules. Surface otherwise sparingly granulose. Mesothorax about 2.2x longer than combined length of head and pronotum. Mesonotum with a distinct longitudinal median keel, surface irregularly set with rounded granules of variable sizes, usually with 2-6 slightly enlarged granules along lateral margins. Posterior margin with two minute tubercles medially. Mesopleurae with a longitudinal row of rounded granules, mesosternum minutely and very sparingly granulose. Metanotum about half the length of mesonotum and a little more than 3x longer than wide. Metathorax otherwise structured like mesothorax.

Abdomen: Median segment slightly longer than  $\frac{1}{4}$  the length of metanotum, slightly wider than long and tectiform. Posterior margin with a two rather well decided, conical tubercles medially. Tergites II-X with a distinct longitudinal median keel, II-IX each with a slight posteromedian nodule or hump, which is most prominent on II, VIII and IX. Segment II and VII very gently narrowed towards the posterior, remaining parallel-sided; all roughly 1.8x longer than wide. II-V slightly increasing in length, VI and VII shorter than previous and about equal in length. Sternites II-VII each with a small transverse posteromedian hump; II and III with a very faint, longitudinal median carina. Tergite VIII  $\frac{2}{3}$  the length of VII, tectiform, rectangular with the anterolateral angles gently widened; about 1.3x longer than wide. IX  $\frac{2}{3}$  the length of VIII, transverse and distinctly tectiform. Anal segment longer than IX and with a broad, concave posteromedian excavation; outer angles acutely triangular. Supraanal plate semi-circular to slightly triangular, tectiform and slightly projecting over apex of anal segment (Fig. 4). Cerci very small, laterally compressed, oval in cross-section and tapered towards a rather pointed apex; indistinctly projecting underneath anal segment. Subgenital plate strongly convex, bulgy and longitudinally keeled in the posterior half; apex reaching to or very slightly projecting over apex of supraanal plate (Fig. 3).

Legs: All moderately elongate and slender; profemora about as long as mesothorax, mesofemora slightly longer than metanotum and median segment combined and metatibiae reaching to or slightly projecting over apex of abdomen. Two outer ventral carinae of the meso- and metafemora with a triangular sub-apical tooth, which has the hinder margin bi-dentate (metafemora) or tri-dentate (mesofemora). Basitarsi as long as (mesobasitarsus) or slightly longer than following three tarsomeres combined.

♂♂ (**Fig. 2**): Small (body length 54.8-60.8 mm) and rather robust (average body width 1.0-1.2 mm) for the genus, body surface only very sparingly and minutely set with granules. Colouration of body and legs plain yellowish or reddish mid brown. Knees and posterior margin of coxae black, tibiae with very faint darker markings. Clypeus brown. Antennae mid to dark reddish brown and becoming blackish brown towards the apex; apex white. Eyes creamish mid brown with a faint darker brown ocular line.

Head: Generally as in ♀♀ but without distinct granules on vertex. Eyes more prominent and relatively larger, their length contained about 3x in that of cheek. Antennae as in ♀♀ but projecting over posterior margin of abdominal tergite IV.

Thorax: Pronotum generally as in ♀♀ but tubercles of anterior margin less prominent and posteromedian granules lacking. Mesothorax about 2.3x longer than head and pronotum combined, mesonotum with longitudinal median carina rather well decided and surface irregularly set with a few small whitish granules. Median keel of mesosternum most decided in anterior portion of segment and becoming gradually less distinct towards the posterior. Metanotum about 0.6x the length of mesonotum and gently constricted medially, longitudinal median carina blunt; surface otherwise set with a very few and very minute granules. Longitudinal median carina of metasternum blunt. Meso- and metapleurae smooth.

Abdomen: Median segment roughly quadrate, about  $\frac{1}{4}$  the length of metanotum and smooth except for a fine, longitudinal median carina. Segments II to IV and VI roughly of equal length, about 2.5x longer than wide; V almost 3x longer than wide. VII slightly shorter than VI and gently widened in the posterior half. Tergites II-VII parallel-sided and with a fine, but well decided longitudinal median carina which posteriorly terminates in a minute posteromedian granule. Anterolateral angles of each tergite with a distinct, rounded expansion which covers the tracheae. Sternites II-VII simple. Tergite VIII about  $\frac{3}{4}$  the length but broader than VII, indistinctly longer than wide, rectangular and with the longitudinal median keel distinct. IX  $\frac{3}{4}$  the length and of same width as VIII, slightly transverse and tectiform. Anal segment large and bulgy, distinctly higher and longer than IX, strongly tectiform; posteroventral angle expanded into a rather long but broad, strongly in-curving, finger-like appendage (Fig. 5). Interior surfaces of semi-tergites set with numerous minute, curved black teeth. Cerci rather elongate, slightly in-curving and cylindrical with the apex slightly club-like; finely bristled. Poculum of moderate size, strongly convex and cup-like with the anterior margin elevated into a prominent transverse hump; posterior margin not projecting over tergite IX.

Legs: Generally as in ♀♀ but relatively longer and more slender. Profemora slightly longer than mesothorax, mesofemora reaching half way along abdominal segment II, metafemora reaching to posterior margin of abdominal tergite V and metatibiae projecting considerably over apex of abdomen. Tarsi as in ♀♀.

### Nymph:

A penultimate instar ♀ nymph in coll. FH measures a body length of 66.8 mm. It is of a bright apple green general colouration with the ventral body surface yellowish. The meso- metapleurae and legs are marked with conspicuous black speckles and patches. Otherwise it corresponds with the adult ♀♀.

### Eggs (Figs 6 & 7):

A single egg was taken from the ovipositor of a ♀ PT. Unfortunately the capitulum is broken off and missing.

Of a very characteristic shape. Complete surface very minutely granulose and glabrous. Capsule laterally compressed, oval in cross-section, surrounded by a blunt, rounded keel and almost 2x longer than wide. In lateral aspect, the capsule is strongly curved, forming an 80° angle and has the polar-area with a wide, concave impression. Lateral surfaces with a blunt, raised, curved, longitudinal median keel, which is surrounded by five conspicuous impressions. A large, shallow ventrolateral impression, which extends over most of the capsule length; a minute, oval impression near the polar-area; a wide, oval impression each antero- and posterodorsally, and a very deep dorsomedial impression next to the micropylar plate. Ventrolateral with irregular, raised areas. All intervening areas strongly raised and convex. Micropylar plate placed centrally on dorsal surface, covering about half of capsule length, roughly oval with lateral margins parallel-sided. Central region slightly impressed, micropylar plate placed near posterior end at the end of a distinct, parallel-sided median notch. Operculum oval, flat with outer margin raised; disc with a very slightly raised, net-like structure. General colouration an ochraous drab with all impressed regions shiny black. Keel of capsule on each side with a longitudinal black line. Outer raised area of operculum coloured like capsule, disc blackish brown. Micropylar plate coloured like capsule, the outer margin yellow and the impressed central region sepia.

Measurements (in mm): Length 3.2 width 1.6, height 3.1, length of micropylar plate 1.5.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	60.8	54.8-60.3	83.8-88.5
Head:	3.3	3.0-3.2	4.9-5.1
Pronotum:	2.9	2.6-2.8	3.8-4.0
Mesonotum	14.0	12.9-14.0	20.0-21.3
Metanotum:	8.0	7.0-7.9	10.4-10.9
Median segment:	2.1	1.8-2.0	2.8-3.0
Profemora:	17.9	15.5-18.1	21.3-23.2
Mesofemora:	12.6	11.1-12.9	15.1-16.8
Metafemora:	16.9	13.7-16.2	19.0-20.5
Protibiae:	20.3	17.3-19.8	22.1-25.2
Mesotibiae:	14.1	11.8-14.1	16.5-18.6
Metatibiae:	19.0	16.2-19.8	21.6-25.0
Antennae:	> 34.0	41.0-43.0	47.0-54.0

**Table 1:** Measurements of *Mithrenes mindorensis* sp. n. [mm]

***Mithrenes panayensis* sp. n.**

(Figs 8-16, 135-136)

**Holotype**, ♂: ex Zucht F. H. HENNEMANN, IV. 2002, Philippinen, Panay Id., ex coll. FH (ZSMC).**Paratypes (51 ♂♂, 48 ♀♀, eggs)** : 1 ♂, 1 ♀, 4 eggs: ex Zucht F. H. HENNEMANN, IV. 2002, Philippinen, Panay Id. (UPPC); 1 ♂, 1 ♀, 4 eggs: ex Zucht F. H. HENNEMANN, IV. 2002, Philippinen, Panay Id. (ZSMC); 3 ♂♂, 3 ♀♀, 4 eggs: ex Zucht F. H. HENNEMANN, IV. 2002, Philippinen, Panay Id. (BMNH); 1 ♂, 1 ♀, 4 eggs : ex Zucht F. H. HENNEMANN, IV. 2002, Philippinen, Panay Id. (NHMW) ; 15 ♂♂, 13 ♀♀, 1 ♂, ♀ in copula & eggs: ex Zucht F. H. HENNEMANN, IV. 2002, Philippinen, Panay Id., PSG No. 232 (coll. FH, No's 0502-1 to 29, E & ED); 25 ♂♂, 25 ♀♀: ex Zucht O. CONLE 2001-2003, Philippinen, Panay Id. (coll. OC); 2 ♂♂, 2 ♀♀, eggs: PSG 232 *Stheneboea* sp., Origin Philippines, captive bred P.E. BRAGG 2002 (coll. PEB, No's 3362 to 3366); 2 ♂♂, 1 ♀: PSG 232 *Stheneboea* sp., Origin Philippines, captive bred P.E. BRAGG 2004 (coll. PEB, No's 3426, 3432 & 3433).**Etymology:**

Named after the type-locality Panay Island.

**Differentiation:**

Very similar to *M. whiteheadi* (KIRBY, 1896) from Luzon and Sibuyan but distinguished by: the in general larger size, proportionally longer body segments (mesonotum > 7x longer than wide) and legs; considerably less distinct posteromedian tubercle of the pro-, mesonotum and abdominal tergites II-IX and white clypeus of both sexes; less distinct sub-apical lobe of the outer ventral carinae of the meso- and metafemora of ♀♀, as well as the more slender lower appendages of the semi-tergites of the anal segment of ♂♂.

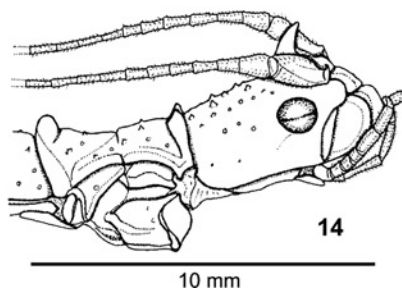
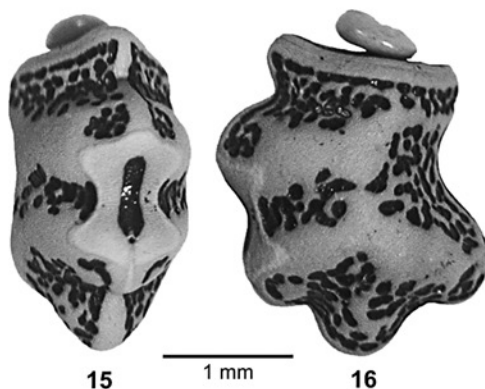
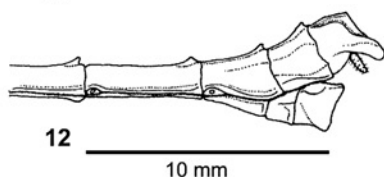
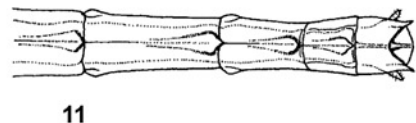
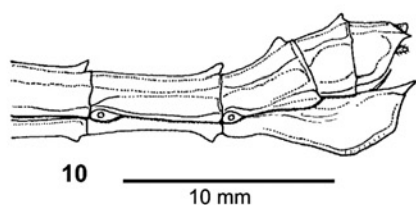
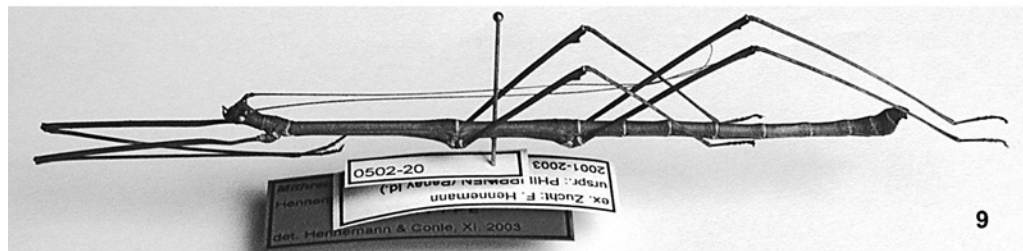
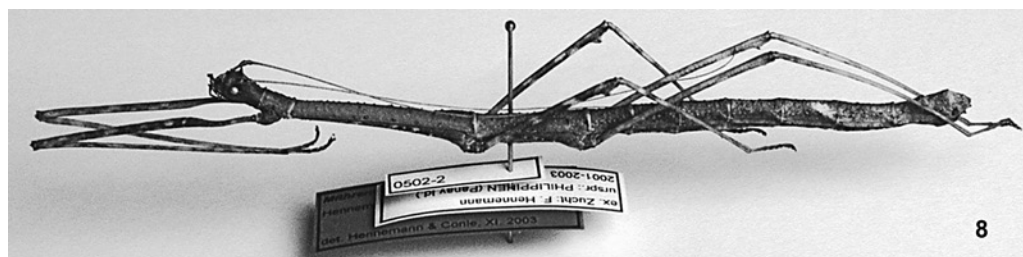
**Description:**

The colouration is described from live insects.

♀♀ (**Fig. 8**): Large (body length 91.5-99.0 mm), very elongate and slender (average body width 3.8-4.2 mm) for the genus, with an acutely and irregularly granulose and tuberculose body surface; entire dorsal body surface except head and pronotum with a fine longitudinal median keel (more distinct on abdominal tergites). General colouration of the body creamish mid to dark brown, slightly paler brown ventrally; abdomen darker. Anterior 2/3 of mesopleurae blackish brown with 3-5 conspicuous pale straw markings; metapleurae similar but with coloration less distinct. Head with a faint blackish transverse band between the eyes and a very indistinct dark postocular stripe, which disappears towards the posterior of head capsule. Clypeus and ventral bases of scapi creamish white. Dorsal surface of scapus as well as dorsal and ventral surfaces of pedicellus blackish brown. Rest of antennae mid brown except for pale straw apices. Abdominal sternites II- VII each with a black, posteromedian spot. Largest granules and tubercles of the thorax black. Legs mid to dark brown with irregular straw markings and speckles. Eyes pale creamish brown with a dark, longitudinal ocular line. Two distinct colour-forms can be distinguished: 1) specimens which are more or less plain brown with a prominent, straw, triangular marking on tergite VI, and 2) specimens which have several, pale straw or whitish longitudinal, parallel lines running along the complete length of the dorsal body surface. The striped variety is apparently less common.

Head: Elongate, about 2x longer than wide and distinctly narrowed towards the posterior.. Between the eyes with two acute, forward directed horns; these less than half as long as scapus. An oval, slightly raised area between the bases of antennae. Vertex with a distinctly impressed coronal line and otherwise sparingly set with granules; usually with two slightly larger tubercles in posterior portion. Cheeks often with a more or less distinct longitudinal row of minute granules. Eyes of moderate size, their length contained about 3x in that of cheek. Antennae very long and reaching about half way along abdominal tergite IV. Scapus almost 2.5x longer than wide, club-like thickened apically and slightly oval in dorsal aspect; ventral surface with a minute sub-basal granule. Pedicellus less than half the length of scapus, indistinctly longer than wide, cylindrical. Following antennomeres first increasing, then decreasing in length; all sparingly setose.

Thorax: Pronotum ¾ the length of head but slightly narrower, about 1.3x longer than wide; posterior margin rounded. Transverse median depression distinct, slightly curved and reaching to lateral margins of segment. Median line impressed in central portion of segment. Anterior margin with two small, pointed tubercles medially; posterior margin with a single prominent and rather acute or rounded median tubercle (Fig. 14). Otherwise surface irregularly granulose. Mesothorax about 2.3x longer than head and pronotum combined, mesonotum about 7.3x longer than wide. Complete surface of mesonotum irregularly set with



**Figs 8-16:** *Mithrenes panayensis* sp. n.: **8.** ♀ PT (coll. FH); **9.** ♂ PT (coll. FH); **10.** apex of abdomen ♀ (lateral view); **11.** apex of abdomen ♀ (dorsal view); **12.** apex of abdomen ♂ (lateral view); **13.** apex of right mesofemur ♀ (dorsal view); **14.** head and pronotum of ♀; **15.** dorsal view; **16.** lateral view.

scattered granules and tubercles of variable sizes and with several enlarged, acute tubercles along lateral margins; these often with black bases and straw in the centre. Posterior margin with a prominent, conical median tubercle. Metathorax structured like mesothorax but slightly medially constricted and with the posteromedian tubercle considerably less decided. Metanotum about half as long as mesonotum and roughly 3.5x longer than wide. Meso- and metasternum with the longitudinal median keel well decided.

Abdomen: Median segment slightly wider than long, about  $\frac{1}{4}$  the length of metanotum with a median keel which posteriorly terminates in a prominent, conical median tubercle; surface granulose. Segments II-VII of uniform width, VII very slightly narrowing towards the posterior. II-VII slightly increasing in length, II 1.5x and VII slightly more than 2x longer than wide. All tergites except X with a distinct, longitudinal median keel and a conical posteromedian tubercle; this most distinct on IX. Otherwise surface irregularly granulose; granules roughly set in longitudinal rows. VI-X with a faint, longitudinal lateral carina. Sternites II-VII smooth except for a very few minute granules and each with a distinct, black posteromedian granule. Tergite VIII about  $\frac{2}{3}$  the length of VII, 1.5x longer than wide, strongly convex and very gently narrowed towards the posterior. IX roughly quadrate,  $\frac{2}{3}$  the length of VIII, tectiform. Anal segment about as long as IX with a distinct median keel and a broad, concave excavation at posterior margin; outer angles acutely triangular and tooth-like. Supraanal plate transverse, broadly rounded and with a sharp median keel; not or very slightly projecting over anal segment (Fig. 11). Cerci very small, oval in cross-section and tapered towards the apex; finely setose. Subgenital plate strongly convex in posterior half, keeled over complete length and very slightly projecting over posterior margin of anal segment (Fig. 10).

Legs: All very long and slender, profemora slightly shorter than mesothorax, mesofemora longer than metanotum and median segment combined and hind legs distinctly projecting over apex of abdomen. All carinae minutely setose. Outer ventral carinae of meso- and metafemora with an obtuse, roughly triangular, indistinctly denticulate sub-apical lobe (Fig. 13); very indistinct and usually bi-dentate on profemora. Basitarsi as long as following three tarsomeres combined.

♂♂ (Fig. 9): Large (68.5-79.0 mm), very elongate and slender (average body width 1.8-2.0 mm) for the genus. Longitudinal median carina of dorsal body surface indistinct. General colouration of body and legs plain yellowish or orange mid brown; head darker brown than rest of body. Anterior margins of semi-tergites of anal segment dark brown. Clypeus creamish creamish white. Eyes pale creamish brown with a dark ocular line. Antennae as in ♀♀.

Head: General shape as in ♀♀ but without distinct granulation on vertex. Eyes more prominent than in ♀♀ and strongly projecting from head capsule, their length contained less than 2.5x in that of cheek. Antennae as in ♀♀ but projecting over posterior margin of abdominal tergite V.

Thorax: Pronotum as in ♀♀ but with a distinctly impressed median line; tubercles of the anterior and posterior margins less decided. Mesothorax very elongate, about 3x longer than head and pronotum combined. Complete surface very minutely and sparsely granulose, mesonotum usually with a few slightly enlarged granules laterally; lateral margins carinate. Posterior margin with a small, conical median tubercle. Metathorax structured like mesothorax but shorter, its length contained about 1.3x in that of mesothorax. Metanotum about half as long as mesonotum and almost 5x longer than wide; posteromedian tubercle lacking. Mesosternum decidedly tectiform, median keel of metasternum shallow.

Abdomen: Median segment less than  $\frac{1}{4}$  the length of metanotum, roughly quadrate with a faint, longitudinal median carina which terminates in an acute median tubercle posteriorly. Complete abdomen very minutely and sparingly granulose. Segments II-VI very indistinctly increasing in length; in average about 3x longer than wide. VII shorter than VI and very gently widening towards the posterior. Tergites II-IX with a fine, longitudinal median carina which becomes increasingly more decided towards the hinder segments. Posteromedially these tergites with a small, conical median tubercle which becomes increasingly less decided towards the hinder segments and finally almost lacking on IX. Sternites II-VII smooth and with a minute posteromedian granule. Tergite VIII  $\frac{2}{3}$  the length of VII, longer than wide, tectiform and gently broadening towards the posterior. IX  $\frac{2}{3}$  the length of VIII, strongly tectiform and slightly wider than long. Anal segment smaller than IX, strongly tectiform. In lateral aspect the semi-tergites are strongly angled downward (about 80°) and narrowed towards the posterior, lower finger-like apical appendage short, slender and gently in-curving (Fig. 12). Interior surfaces covered with several very minute teeth. Cerci of moderate length, cylindrical in cross-section and very indistinctly tapered. Poculum strongly convex, cup-like, angled in lateral aspect and with a conical central hump; posterior margin reaching to or very slightly projecting over posterior margin of tergite IX.

Legs: Generally as in ♀♀ but relatively longer and more slender. Profemora longer than mesothorax, mesofemora as long as metanotum, median segment and tergite II combined, metafemora projecting over posterior margin of abdominal segment V and hind legs projecting considerably over apex of abdomen. All carinae setose. Two outer ventral carinae of meso- and metafemora with a small, triangular sub-apical tooth (less decided on metafemora). Basitarsi longer than following three tarsomeres combined.

**Nymphs:**

Newly hatched nymphs are green with brown speckles. They do not take on the typical brown colouration of the adults until 3<sup>rd</sup> instar.

**Eggs (Figs 15 & 16):**

Of a very characteristic shape. General colouration plain creamish beige. Capsule almost 2x longer than wide, oval in cross-section and with several conspicuous impressions. In lateral aspect a prominent impression is seen ventromedially, anterodorsally between the anterior margin and the micropylar plate, posterodorsally below the micropylar plate, and posteroventrally between the ventromedian impression and the polar-area. A further, shallow impression is seen dorsomedially. Polar-area strongly convex and rounded. Complete capsule surface minutely and densely granulose. The impressed areas with irregular, bold, impressed, glabrous black markings. Micropylar plate situated centrally, covering about half of capsule length and of an obscure shape; medially constricted with the antero- and posterolateral sections elevated and with a distinct, triangular posteromedian gap. Outer margin slightly raised, the central section distinctly impressed and median line distinct. Micropylar cup small and knob like, positioned at the end of the posteromedial gap. Operculum rhombic, flat and with the outer margin slightly raised; disc smooth. Capitulum prominent, knob-like and with a central impression. Capsule, micropylar plate and outer margin of operculum plain creamish beige. Impressed central region of micropylar plate dark glabrous brown. Inner section of operculum black, capitulum pale orange.

Measurements of an average egg (in mm): Length 3.2, length (including capitulum) 3.3, width 1.8, height 2.7, length of micropylar plate 1.4.

**Comments:**

Specimens of *Mithrenes panayensis* sp. n. were first collected by A. MALUCHE (Philippines) in 2001 on Panay Island and reported to feed on various fern-species (Polypodiaceae) in their natural habitat. Subsequently, culture-stock was imported to Europe and successfully reared in captivity using bramble (*Rubus* spp., Rosaceae), rose (*Rosa* spp., Rosaceae) and various ferns (Polypodiaceae) as alternative food-plants. It was included on the Phasmid Study Group culture-list as culture No. 232 "*Lonchodes* sp." and can be easily maintained in culture, if kept humid with daily spraying of fresh water and at temperatures not below 22°C.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	72.0	68.5-79.0	91.5-99.0
Head:	43	3.9-4.4	5.9-6.4
Pronotum:	3.0	2.9-3.1	4.3-4.9
Mesonotum	18.0	17.3-19.8	21.4-24.7
Metanotum:	10.5	10.2-11.4	10.8-12.2
Median segment:	2.2	2.1-2.3	3.0-3.1
Profemora:	24.8	22.0-24.8	25.8-30.0
Mesofemora:	18.0	16.3-18.1	19.0-21.9
Metafemora:	20.9	20.0-21.8	23.0-26.2
Protibiae:	28.7	25.6-29.5	29.3-33.0
Mesotibiae:	21.0	18.1-21.6	21.0-22.6
Metatibiae:	28.1	26.3-29.0	29.5-30.4
Antennae:	58.0	51.0-57.0	63.0-66.0

**Table 2:** Measurements of *Mithrenes panayensis* sp. n. [mm]

***Mithrenes whiteheadi* (KIRBY, 1896)**

(Figs 17-23)

*Lonchodes whiteheadi* KIRBY, 1896: 451. HT, ♀: Type, 95-22, *Lonchodes whiteheadi* KIRBY, *whiteheadi* KB. Type, *Mithrenes* (BMNH).

*Stheneboea whiteheadi*, BRUNNER V. WATTENWYL, 1907: 249.  
BRUNER, 1915: 38.

*Mithrenes* ? *whiteheadi*, KIRBY, 1904: 319.

*Mithrenes whiteheadi*, OTTE & BROCK, 2005: 205.

*Dixippus bilobatus* BRUNNER V. WATTENWYL, 1907: 281. **LT** [by present designation], ♀: Bulusan Irocin Maranedo; *Dixippus bilobatus* Br.; Sintipo; MNCN Cat. Tipos No. 7619 (MNCN); **PLT**, ♀: Sibuyan, Maranedo; *Dixippus bilobatus* Br.; Sintipo; MNCN Cat. Tipos No. 7619 (MNCN). [**not: PLT**, ♂: M<sup>lc</sup> Mararaga, Albay, Maranedo; Puidémment determine comme sp. spéciale sous le nom de "*Dix. simplex*".; Sintipo; MNCN Cat. Tipos No. 7619 (MNCN) → this is an unidentified species of *Lonchodiodes* **gen. n.**] **syn. n.**  
BRUNER, 1915: 39.

*Carausius bilobatus*, OTTE & BROCK, 2005: 83.

*Lonchodes nodulosus* BRUNNER V. WATTENWYL, 1907: 261. **HT**, ♂: Museum Paris, Manille 346-#, Type, 174. *Lonchodes nodulosus* Br. **type** (MNHN). **syn. n.**

BRUNER, 1915: 38.

OTTE & BROCK, 2005: 183.

*Lonchodes systropeodon* WESTWOOD, 1859: 44, pl. 3: 8 & 8b (in part – **not LT**). **PLT**, ♀: Phil. Isl. 42-22;

*Systropeodon* WESTW ♀ var.; *Lonchodes Systropeodon* WESTW. Philippine Islands (BMNH).

*Pachymorpha systropeodon* BRUNNER V. WATTENWYL, 1907: 214.

### Differentiation:

Very similar to *M. panayensis* **sp. n.** from Panay, but distinguished by: the in general smaller size; broader body; proportionally shorter body segments (mesonotum < 7x longer than wide) and legs; more prominent, acute posteromedian tubercle of the pro-, mesonotum and abdominal tergites I-IX and brown clypeus of both sexes; largerm obtusely rounded sub-apical lobe of the two outer ventral carinae of the meso- and metafemora of ♀♀, as well as the broader lower appendages of the semi-tergites of the anal segment of ♂♂.

### Description:

♀♀ (**Figs 17 & 18**): Medium-sized to large (body length 81.8-92.7 mm), moderately elongate and slender (average body width 4.0-4.2 mm) for the genus, with an irregularly granulose and tuberculose body surface; entire dorsal body surface except head and pronotum with a rather dsitinct longitudinal median keel (more distinct on abdominal tergites). General colouration of the body creamish mid to dark brown, slightly paler brown ventrally; abdomen darker. Most portions of dorsal body surface, except for pronotum and terminal abdominal tergites with large straw to pale yellowish brown markings. Head pale dorsally with cheeks mid to dark brown, between the eyes with a bold blackish transverse marking. Mesonotum with only posterior 1/5 dark brown and with bold mid to dark brown markings along the lateral margins. Metanotum with two small dark spots at anterior margin and two rather broad, and converging dark brown stripes which terminate in a bold, transverse dark brown median marking at the posterior margin. Anterior 2/3 of mesopleurae blackish brown with 3-5 conspicuous elongate pale straw markings; metapleurae similar but with coloration less distinct. Meso- and metasternum with irregular darker markings. Granules of thorax dark brown to black. Antennae pale to mid brown, very faintly annulated with paler brown. Ventral surface of scapus and pedicellus blackish brown. Abdominal tergites II-VI each with a bold triangular dark brown marking and two weakly defined dark spots close to posterior margin; these becoming increasingly indistinct towards the apex of abdomen. Legs mid to dark brown with irregular straw markings, speckles and annulations. Eyes creamish mid brown with a dark, longitudinal ocular line. More rarely plain mid brown specimens occur.

Head: Elongate, almost 2x longer than wide and slightly narrowed towards the posterior. Between the eyes with two rather distinct, acute and forward pointing horns, which are at least half as long as the scapus. Between the bases of antennae with an oval impression. Vertex with a slightly impressed coronal line in posterior half, otherwise sparingly set with rounded granules. A longitudinal row of minute granules along cheeks. Eyes circular and projecting hemispherically from head capsule. Antennae long, filiform and reaching to posterior margin of abdominal tergite II. Scapus about 2.3x longer than wide, club-like thickened and gently widened towards the apex. Pedicellus about 1/3 the length of scapus, indistinctly longer than wide, cylindrical. Following antennomeres first increasing, then decreasing in length; all finely setose.

Thorax: Pronotum slightly shorter and narrower than the head, about 1.3x longer than wide. Posterior margin rounded and slightly raised. Transverse median depression distinct, curved and reaching to lateral margins of segment. Median line impressed over entire length of segment. Posterior margin with a pointed median tubercle. Otherwise irregularly and rather densely set with granules. Mesothorax about 2.2x longer



than head and pronotum combined, mesonotum almost 7x longer than wide. Mesonotum und sternum very gently tectiform; the notum with a distinct, spiniform posteromedian tubercle. Metanotum less than half as long as mesonotum, about 4x longer than wide; posteromedian tubercle less decided than on mesonotum. Complete surface of meso- and metathorax irregularly but rather densely set with scattered granules and tubercles of variable sizes; granulation less decided on sterna. Mesonotum with several conical tubercles along lateral margins.

Abdomen: Median segment slightly wider than long, its length contained more than 5x in that of metanotum; posterior margin with a prominent median tubercle; surface granulose. 2<sup>nd</sup> segment slightly longer than median segment, about 1.6x longer than wide and gently narrowed towards the posterior. II-V slightly increasing in length and in average about 1.7x longer than wide, VI to VIII slightly decreasing in length. All tergites except X with a distinct, longitudinal median keel which posteriorly terminates in a  $\pm$  disitinct, spiniform medial tubercle; most prominent on IX. Otherwise tergites irregularly but rather sparingly covered with granules of variable sizes; VII-IX with a fine, longitudinal dorso-lateral carinae. Sternites II-VII smooth except for a very few minute granules, each with a distinct and blunt, black posteromedian tubercle. Tergite IX about as wide as long and very gently widened posteriorly, slightly less than half the length of VIII. Anal segment shorter than IX with a distinct median keel and a wide, roundly triangular excavation at posterior margin; outer angles acutely triangular. Supraanal plate transverse, broadly rounded and with a sharp median keel; not or very slightly projecting over anal segment (Fig. 21). Cerci small, oval in cross-section and tapered towards the apex; finely setose. Subgenital plate very strongly convex and prominently keeled in posterior half and not projecting over posterior margin of anal segment (Fig. 20).

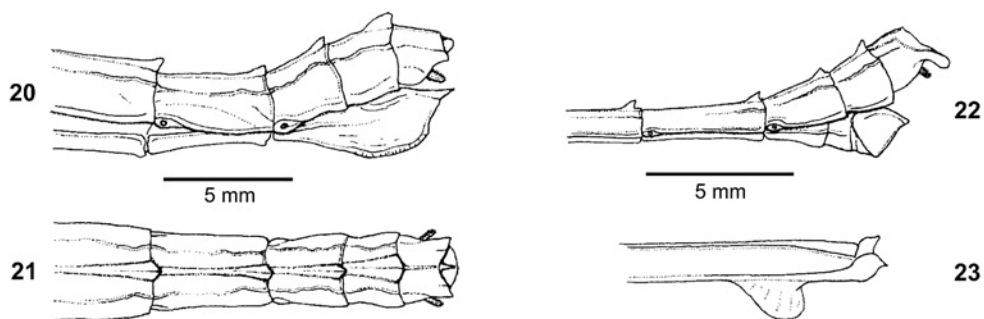
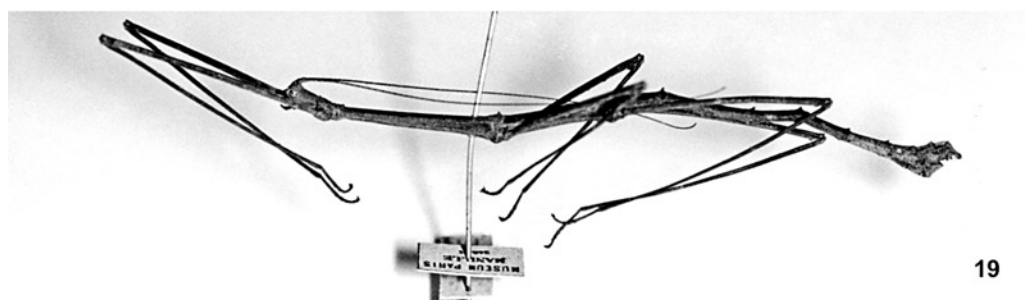
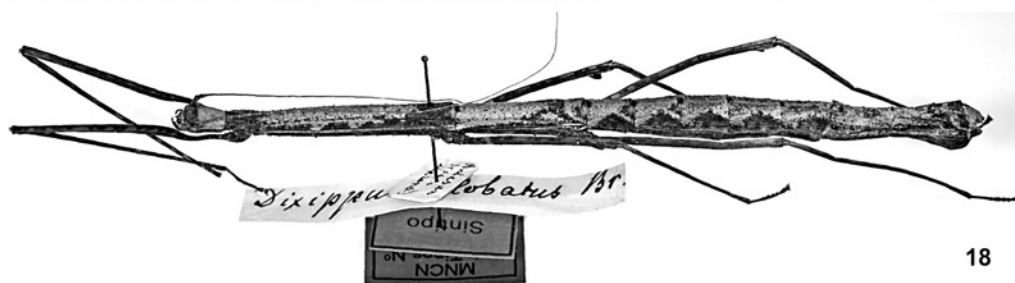
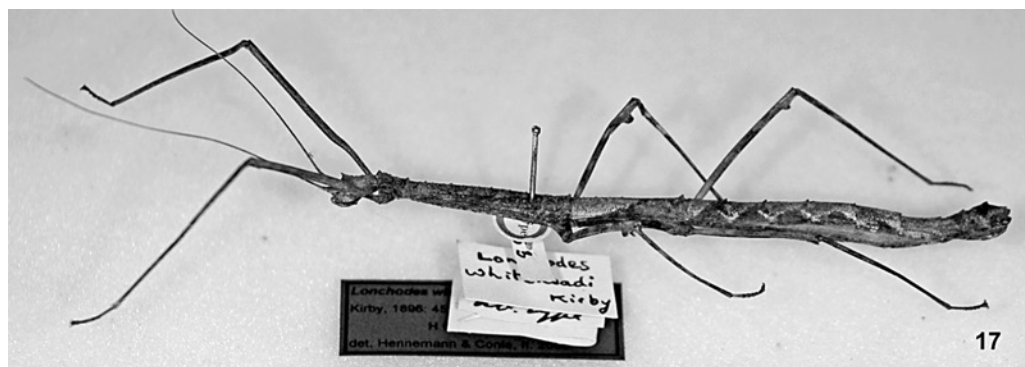
Legs: All moderately long and slender, profemora slightly longer than mesothorax, mesofemora longer than metanotum and median segment combined and metatibiae projecting indistinctly over apex of abdomen. All carinae very minutely setose. Two outer ventral carinae of meso- and metafemora with an obtuse, rounded sub-apical lobe (Fig. 23). Basitarsi slightly longer than following three tarsomeres combined.

♂♂ (**Fig. 19**): Medium-sized (62.0 mm), moderately elongate and slender (average body width 1.8-2.0 mm) for the genus. General colouration of body and legs mid to dark brown with indistinct darker mottling. Head with a very indistinct dark brown longitudinal streek along the lower portion of the cheeks; frons pale brown. Metanotum very dark brown laterally. Eyes dull yellow with a distinct, dark brown ocular line. Antennae blackish brown.

Head: General shape as in ♀♀ but more decidedly narrowed towards the posterior and without distinct granulation. Vertex with a shallow, slightly impressed coronal line and two acute spines between the eyes. Eyes more prominent than in ♀♀ and strongly projecting from head capsule, their length contained almost 3x in that of cheeks. Antennae as in ♀♀ and projecting over posterior margin of abdominal tergite III (apices broken in the HT).

Thorax: Pronotum generally as in ♀♀ but with a distinctly impressed median line; tubercles of the anterior and posterior margins less distinct; narrower and about  $\frac{3}{4}$  the length of head. Mesothorax almost 3x longer than head and pronotum combined, complete surface very minutely and sparingly granulose. Posterior margin with a small but acute, spiniform median tubercle. Mesosternum slightly tectiform. Metathorax structured like mesothorax, metanotum a little more than half as long as mesonotum and about 5x longer than wide; posteromedian tubercle indistinct.

Abdomen: Median segment slightly more than  $\frac{1}{4}$  the length of metanotum, 1.2x longer than wide and with a faint longitudinal median carina which posteriorly terminates in a small spiniform median tubercle. Complete abdomen very minutely and very sparingly granulose. Segments II-VI of uniform width and indistinctly increasing in length; in average slightly less than 3x longer than wide. Tergites II-VIII each with a faint, longitudinal median carina and an acute, spiniform posteromedian tubercle. Sternites II-VII simple and with a small posteromedian node. Tergite VII almost as long as VI and slightly widening towards the posterior. VIII about  $\frac{3}{4}$  the length of VII, slightly longer than wide, tectiform and gently broadened towards the posterior. IX  $\frac{3}{4}$  the length of VIII, strongly tectiform and about as long as wide. Anal segment about as large as IX, strongly tectiform. Semi-tergites in lateral aspect strongly angled downward (about 70°) and slightly narrowed towards the posterior, lower angle expanded into a short, finger-like and gently in-curving appendage (Fig. 22). Interior surfaces covered with several, minute teeth. Cerci very small, conical and round in cross-section. Poculum strongly convex, cup-like and slightly projecting over posterior margin of tergite IX.



**Figs 17-23:** *Mithrenes whiteheadi* (WESTWOOD, 1859): 17. ♀ HT (BMNH); 18. ♀ LT of *D. bilobatus* BRUNNER V. WATTENWYL, 1907 (MNCN); 19. ♂ HT of *L. nodulosus* BRUNNER V. WATTENWYL, 1907 (MNHN); 20. apex of abdomen ♀, HT (lateral view); 21. apex of abdomen ♀, HT (dorsal view); 22. apex of abdomen ♂, HT of *L. nodulosus* BRUNNER V. WATTENWYL, 1907 (lateral view); 23. apex of right mesofemur ♀, HT.

Legs: Generally as in ♀♀ but relatively longer and more slender. Profemora almost as long as combined length of head, pro- and mesonotum, mesofemora almost as long as metanotum, median segment and tergite II combined, metafemora reaching about half way along tergite VI. All carinae very minutely setose. Outer ventral carinae of mesofemora with an obtuse, roughly triangular sub-apical tooth (smaller on metafemora). Basitarsi about as long as remaining tarsomeres combined.

#### Comments:

*Lonchodes whiteheadi* KIRBY, 1896 was described from a single ♀ collected by the Whitehead Expedition to Albay in southeast Luzon and *L. nodulosus* BRUNNER V. WATTENWYL, 1907 from a single ♂ (Fig. 18) also from Luzon (Manila). Examination and comparison of the two type-specimens leave no doubt that they are the opposite sexes of the same species (**syn. n.**).

BRUNNER V. WATTENWYL (1907: 281) described *Dixippus bilobatus* from a two ♀♀ in MNCN and cited no more precise locality than “Ins. Philippinae” although both specimens bear much more sufficient data. One ♀ is from Bulusan in southeast Luzon, the other from the nearby island of Sibuyan. Comparison with the type of *M. whiteheadi* leaves no doubt they are the same species, although comparably longer (→ see table 4 below). The larger specimen from Bulusan, which exhibits several pale markings on the dorsal body surface, is here selected as the LT in order to confirm the new synonymy.

With doubt BRUNNER V. WATTENWYL (1907: 281) assigned a ♂ from Albay also in MNCN. This specimen is from Mount Mararaga, which is close to the type-locality of the ♀ LT (Bulusan), but clearly represents a distinct species. It is not even congeneric and obviously belongs in *Lonchodiodes* **gen. n.**, being closely related or even identical with *L. tagalicus* (STÅL, 1875). On a hand-written label BRUNNER V. WATTENWYL suggested the specific name “*simplex*” if it should turn out to be specifically different from the ♀♀ of *bilobatus*. Detailed investigation of the MNCN Phasmatodea-collection has revealed two more ♂♂ with the same data, obviously overseen by BRUNNER V. WATTENWYL.

WESTWOOD (1859: 44) described *Lonchodes systropedon* based on two ♀♀ which are clearly two distinct species. The here designated LT represents *Manduria systropedon* (WESTWOOD), the type-species of *Manduria* STÅL, 1877 (→ see below) and the PLT (body length 82.5 mm) obviously belongs in the genus *Mithrenes* STÅL, 1877. BRUNNER V. WATTENWYL (1907: 214 & 300) recognized that WESTWOOD’s two syntypes represented two distinct species and listed the PLT in the genus *Pachymorpha* GRAY, 1835, as “*Pachymorpha systropedon* (WESTWOOD)”.

The HT of *L. nodulosus* BRUNNER V. WATTENWYL in MNHN was examined but no measurements taken. Therefore, only the measurements provided by BRUNNER V. WATTENWYL (1907: 261) along with the original description are included in table 3 below.

Eggs unknown.

	HT, ♀ of <i>whiteheadi</i> (BMNH)	HT, ♂ of <i>nodulosus</i> (MNHN)*	LT, ♀ of <i>bilobatus</i> (MNCN)	PLT, ♀ of <i>bilobatus</i> (MNCN)
Body:	81.8	62.0	92.7	88.5
Head:	4.4	-	4.9	4.8
Pronotum:	3.9	-	4.3	4.2
Mesonotum	19.3	15.5	22.1	21.7
Metanotum:	10.8	9.5	12.2	11.3
Median segment:	2.7	2.5	2.3	2.3
Profemora:	22.8	22.0	24.0	24.6
Mesofemora:	16.6	16.0	18.0	18.0
Metafemora:	20.3	20.0	22.6	24.5
Protibiae:	24.8	-	27.1	28.3
Mesotibiae:	17.2	-	19.1	20.8
Metatibiae:	23.8	-	26.8	27.6
Antennae:	> 43.0	-	> 50.0	> 53.0

According to BRUNNER V. WATTENWYL (1907: 261)

**Table 3:** Measurements of *Mithrenes whiteheadi* (KIRBY) [mm]

*Mithrenes* sp.

*Staelonchodes* sp. KLANTE, 1960: 96, figs 5-7 (♀). 1 ♀: Philippinen? (SMNG)

**Comments:**

The ♀ described and illustrated by KLANTE (1960, figs 5-7) as “*Staelonchodes* KIRBY, 1904 sp.” is obviously a member of *Mithrenes* STÅL. KLANTE was in doubt about the exact locality of the specimen and stated: “In einem Kasten, der außen die Vermerke ‘Philippinen’ und ‘Geschenk des Herrn Consul Dr. von MÖLLENDORFF in Manila’ trägt. [In a cabinet drawer which is marked ‘Philippines’, and ‘Present of Mr. Consul Dr. von MÖLLENDORFF in Manila’.]”. The precise description of KLANTE however leaves no doubt about its generic position, and thus the Philippines are the most likely locality. Most certainly the specimen represents a so far undescribed species, characteristic for its large size (body length 102.0 mm), slender body, reddish ochraous colouration (apex of abdomen yellowish green) as well as the red meso- and metapleurae. It appears to be similar to *M. panayensis* sp. n.

*Lonchodes* GRAY, 1835

**Type-species:** *Lonchodes brevipes* GRAY, 1835: 19, by subsequent designation of KIRBY, 1904a: 373.

*Lonchodes* GRAY, 1835: 19.

KIRBY, 1904a: 321. (in part)

GÜNTHER, 1934: 369, 382 “*pterodactylus*-group”. (in part)

HAUSLEITHNER, 1989: 102ff. (in part)

BRAGG, 2001: 435. (in part)

OTTE & BROCK, 2005: 178. (in part)

*Dixippus*, BRUNNER V. WATTENWYL, 1907: 276. (in part - **not** STÅL, 1875).

*Phasgania* KIRBY, 1896: 461. [Type-species: *Phasgania everetti* KIRBY, 1896: 461, pl. 40: 2, 2a, by original designation of KIRBY, 1896: 461.] (Synonymised by BRAGG, 2001: 435)

*Prisomera*, BRUNNER V. WATTENWYL, 1907: 282. (in part – **not** GRAY, 1835)

*Staelonchodes* KIRBY, 1904b: 372. [Type-species: *Lonchodes geniculatus* GRAY, 1835: 19, by original designation of KIRBY, 1904b: 372.] (Synonymised by BROCK, 1995: 86) KIRBY, 1904a: 317. (in part)

[**not** *Hermagoras* STÅL, 1875: 8 (footnote). Type-species: *Lonchodes personatus* BATES, 1865 [= *Mantis foliopeda* OLIVIER, 1792], by subsequent designation of KIRBY, 1904a: 322. Synonymised **in error** with

*Prisomera* BRUNNER V. WATTENWYL, 1907 (**not** GRAY, 1835) by BRUNNER V. WATTENWYL, 1907: 282. Re-established by HENNEMANN, 1998: 126]

The systematics of the genus *Lonchodes* GRAY, 1835 are very confusing and as presently treated the genus is obviously polyphyletic. HENNEMANN (1998: 126) resurrected *Hermagoras* STÅL, 1875 in order to split the genus and transfer several of those taxa which were currently missplaced in *Lonchodes* GRAY to *Hermagoras* STÅL. This concerns to most species, which GÜNTHER (1934) placed in his *femoratus*-group, and some other species not referred to by GÜNTHER (→ see below). BROCK (2000) described the genus *Austrocarausius* to contain the Australian *Lonchodes nigropunctatus* KIRBY, 1896.

In his revision of *Lonchodes*, GÜNTHER (1934: 369) divided the genus into two groups on the basis of features of the ♀♀. Species of the *femoratus*-group have the probasitarsus at best with a small, apically pointed lobe, the mesofemora strongly laterally compressed and with prominent toothed or foliceous dorsal lobes as well as the praeopercular organ indistinct and at best represented by a simple spine. In the *pterodactylus*-group (which includes the type-species of *Lonchodes* GRAY, *L. brevipes* GRAY) ♀♀ have the probasitarsus with a large, rounded lobe, the mesofemora not distinctly laterally compressed but more or less prominently thickend and without prominent dorsal lobes as well as a prominent, often complex praeopercular organ. HAUSLEITHNER (1989) splitted the genus into four groups based on the general shape of the eggs. HAUSLEITHNER's group I widely corresponds to GÜNTHER's *pterodactylus*-group while group II corresponds to the *femoratus*-group of GÜNTHER.

Indeed, several features of the insects and eggs prove *Lonchodes* GRAY in its present recognition to be polyphyletic, but with the present still limited knowledge consequences are hard to draw with confirmation for still many species. At least however, there can be no doubt that *Hermagoras* STÅL, 1875 was synonymised with *Lonchodes* in error and is a distinct and valid genus. *Mnesilochus* STÅL, 1877 (**stat. rev.**) is here re-established and contains another 11 species misplaced in *Lonchodes* (→ see discussion of *Mnesilochus* below). A detailed comparison and differentiation of *Lonchodes* (s. str.) from the genera mentioned below is presented in table 15.

Species of former *Lonchodes* GRAY can preliminary be attributed to the following three genera:

### 1. *Hermagoras* STÅL, 1875

This is distinguished from *Lonchodes* GRAY by numerous obvious features of the insects and eggs, some of which have been summarized by GÜNTHER (1934) for his *femoratus*-group. A reliable distinguishing feature not mentioned by GÜNTHER, is the keeled mesosternum of *Hermagoras* (simple in *Lonchodes*). ♂♂ often bear a posterior pair of humps, tubercles or prominent spines on the metanotum. The eggs are globose and lack a polar mound. HENNEMANN (1998) resurrected *Hermagoras* but did not provide a list of species included in the genus. So far, six species can be attributed to the genus with certainty, but it is likely that further species will prove to be members of *Hermagoras* STÅL once both sexes and the eggs become known (e.g. *Prisomera spurcum* BRUNNER V. WATTENWYL, 1907 from Java). For a detailed differentiation from *Lonchodes* (s. str.) and related genera see table 15.

In addition to the type-species *H. foliopedæ* (OLIVIER, 1792) and a subspecies from Sulawesi the following five Bornean species formerly attributed to *Lonchodes* are certainly members of *Hermagoras* STÅL:

1. *Carausius cultrato-lobatus* BRUNNER V. WATTENWYL, 1907: 273. [Borneo]  
= *Lonchodes hosei herberti* BRAGG, 2001: 462, figs 178, 179, 180 a & b.
2. *Mantis foliopedæ* OLIVIER, 1792: 638. [Wallacea]  
= *Prisomera eximium* BRUNNER V. WATTENWYL, 1907: 285.  
= *Prisomera expulsum* BRUNNER V. WATTENWYL, 1907: 285.  
= *Phasma femorata* STOLL, 1788: 46, pl. 15: 57 & 1813: 54.  
= *Phasma latipes* LICHTENSTEIN, 1796: 11.  
= *Dixippus longithorax* BRUNNER V. WATTENWYL, 1907: 280.  
= *Prisomera objectum* BRUNNER V. WATTENWYL, 1907: 285.  
= *Lonchodes personatus* BATES, 1865: 336, pl. 44: 7.
3. *Hermagoras foliopedæ celebensis* HENNEMANN, 1998: 100, fig. 6, pl. 3: 8-10. [S-Sulawesi]
4. *Lonchodes haematomus* WESTWOOD, 1859: 39, pl. 24: 8 & 8a. [Borneo]
5. *Prisomera sigillatum* BRUNNER V. WATTENWYL, 1907: 287. [Borneo]
6. *Hermogenes hosei* KIRBY, 1896: 457, pl. 40: 1. [Borneo]  
= *Hermogenes cristatus* KIRBY, 1896: 457.  
= *Prisomera strumosum* BRUNNER V. WATTENWYL, 1907: 287.
7. *Lonchodes megabeast* BRAGG, 2001: 483, figs 191 a-e, 192 a-e, 193 a-d, pl. 1: C, D. [Borneo]

### 2. *Mnesilochus* STÅL, 1877

The genus *Mnesilochus* STÅL, 1877 was described for two Philippine species and erroneously synonymised with *Carausius* STÅL, 1875 by BRUNNER V. WATTENWYL (1907: 264). As the newly discovered ♀♀ and eggs of *Mnesilochus* STÅL reveal its systematic status and show it to represent a valid genus, clearly distinct from both, *Carausius* STÅL and *Lonchodes* GRAY, *Mnesilochus* is here re-established (**stat. rev.**). Further research has shown eight species formerly missplaced in *Lonchodes* to belong to *Mnesilochus* STÅL (→ see review of *Mnesilochus* below). For a detailed differentiation from *Lonchodes* (s. str.) and related genera see table 15.

### 3. *Lonchodes* GRAY, 1835 (sensu lato)

As based on the type-species of *Lonchodes* GRAY (*Lonchodes brevipes* GRAY, 1835, = *L. pterodactylus* GRAY, 1835), GÜNTHER's *pterodactylus*-group is what must actually be regarded *Lonchodes* (= *Lonchodes* GRAY sensu stricto). All other species, except those now attributed to either *Hermagoras* STÅL or *Mnesilochus* STÅL, and presently treated as *Lonchodes*, which do not show the key-features of GÜNTHER's *pterodactylus*-group are not congeneric and belong in other genera. This concerns to several species, e.g. *L. amaurops* WESTWOOD, 1859 and *L. harmani* BRAGG & CHAN, 1993, and has also been indicated by BRAGG

(2001: 438). BROCK (1995: 86) synonymised *Staelonchodes* KIRBY, 1904 by transferring the type-species back to *Lonchodes* GRAY. However, as the identity of the type-species of *Staelonchodes*, *Lonchodes geniculatus* GRAY, is doubtful, the synonymy established by BROCK requires confirmation. If BROCK is right in his treatment of *L. geniculatus* GRAY, *Staelonchodes* KIRBY needs to be re-established, if not then a new genus will become necessary to include *L. geniculatus* GRAY, the Bornean *L. amaurops* WESTWOOD, *L. harmani* BRAGG & CHAN and a few further species. However, as the status of *Staelonchodes* KIRBY remains questionable, all other species formerly attributed to *Lonchodes* GRAY remain in the genus, but as indicated the genus is still polyphyletic and deserves further splitting.

Species that can be regarded as true *Lonchodes* (sensu stricto) are:

1. *Entoria bobaiensis* CHEN, 1986: 401, figs 1-3. [S-China: Guangxi]
2. *Lonchodes brevipes* GRAY, 1835: 19. [Malay Penin., Singapore & Sumatra]
  - = *Prisomera gestroi* BRUNNER V. WATTENWYL, 1907: 289.
  - = *Lonchodes pterodactylus* GRAY, 1835: 19.
  - = *Phasma (Bacteria) sumatranum* DE HAAN, 1842: 133, pl. 13: 6.
  - = *Phasma (Lonchodes) uniforme* WESTWOOD, 1848: 79, pl. 39: 3.
  - = *Dixippus validior* BRUNNER V. WATTENWYL, 1907: 279.
3. *Phasmania everetti* KIRBY, 1896: 461, pl. 40: 2. [N-Borneo]
  - = *Lonchodes catori* KIRBY, 1896: 454.
4. *Dixippus hainanensis* CHEN & HE, 2002: 103, figs 3a-c. [S-China: Hainan Province]
5. *Dixippus incertus* BRUNNER V. WATTENWYL, 1907: 280. [Peninsular Malaysia ?]
6. *Dixippus jejunos* BRUNNER V. WATTENWYL, 1907: 278. [Borneo]
7. *Dixippus margaritatus* BRUNNER V. WATTENWYL, 1907: 279. [N-Vietnam]
8. *Dixippus nigroantennatus* CHEN & HE, 2002: 102, figs 2a & b. [S-China: Hainan Province]
9. *Lonchodes philippinicus* **sp. n.** [Philippines: Panay Id.]
10. *Lonchodes stomphax* WESTWOOD, 1859: 38, pl. 4: 8a-c. [Hong Kong]
11. *Lonchodes viridis* KIRBY, 1904b: 373. [N-Vietnam]
12. *Lonchodes* sp.\* [S-Myanmar: Tenasserim]

\* This species from Tenasserim in southern Myanmar was referred to as *Lonchodes geniculosus* WESTWOOD, 1848 by HENNEMANN (2003: 24, figs 1-10), based on comparison of ♂♂ with the ♂ HT from Pulau Penang in OXUM. Although these clearly represent the same species and the identification of HENNEMANN (2003) is obviously correct, BROCK & SEOW-CHOEN (2005: 8) were in doubt about this species, however without having seen any material from Tenasserim in the Mergui District of South Myanmar at all. Therefore, the concerned species is here provisionally left without a specific name.

At this point, any broader discussion on this subject deserves a detailed revision of the complete genus and closely related genera at the species level. Although, numerous species have now been removed from *Lonchodes* GRAY and placed either in *Austrocarausius* BROCK, *Hermagoras* STÅL or *Mnesilochus* STÅL, the remaining still form an artificial group.

### *Lonchodes philippinicus* **sp. n.**

(Figs 24-33, 138)

**Holotype**, ♂: Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII. 1997, ex coll. FH (ZSMC).

**Paratypes (29 ♂♂, 30 ♀♀, 45 Eggs):** 1 ♀, 3 eggs (ex abdomen): Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII. 1997, ex coll. FH (UPPC); 1 ♂, 1 ♀, 3 eggs (ex abdomen): Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII. 1997, ex coll. FH (ZSMC); 1 ♂, 1 ♀ : Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII. 1997, ex coll. FH (NHMW); 4 ♂♂, 4 ♀♀, 1 egg (ex ovipositor), 12 eggs (ex abdomen): Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII. 1997 (FH 0235-1 to 8, E1 & E2); 15 eggs: ex Zucht: B. Kneubühler (Schweiz) 2006, Herkunft: Philippinen, Panay Id. (coll. FH 0235-E3); 15 ♂♂, 12 ♀♀ (coll. OC); 8 ♂♂, 10 ♀♀, 11 eggs: ex Zucht B. Kneubühler 2006, Zuchtstamm aus Philippines, Panay Island (coll. OC); 1 ♀: Philippines, Panay Island, 17.VI.1998, purchased from dealer, IV.2000 (coll. PEB, No. 3030).

**Etymology:**

The name refers to the Philippine Islands as this is the first member of *Lonchodes* GRAY, 1835 (s. str.) recorded from the archipelago.

**Differentiation:**

This new species generally keys in *Lonchodes* GRAY, 1835 (s. str.) which is seen in the globose head, dense but minute body granulation, lack of a dorsal or ventral median keel of the body and broadened mesofemora of both sexes, as well as the roundly elevated carinae of the mesotibia, broadened abdominal tergite VII, prominent praeopercular organ and lobed probasitarsus of ♀♀. However, apart from the eggs being more laterally compressed and having the capsule surface covered with distinct impressions, the following features of the insects differ from other species of *Lonchodes* GRAY (s. str.): head with two acute spines between the eyes; basitarsi longer than following two tarsomeres combined; probasitarsus of ♂♂ not lobed.

The laterally dilated and rounded tergite VII ♀♀ resembles the species from Myanmar (Tenasserim) referred to as *Lonchodes geniculosus* WESTWOOD, 1848 by HENNEMANN (2003). Apart from the features mentioned above, it is however easily distinguished from this species by: the much more convex and distinctly keeled subgenital plate; short, triangular supraanal plate of ♀♀ and not considerably broadened tergites VIII-IX; more prominent and elongate lobes of the anal segment and different colouration of ♂♂.

The striking colouration of ♂♂ shows similarity to certain members of *Periphetes* STÅL, 1877, e.g. *P. magayon* (ZOMPRO, 2003) from Mindanao.

**Description:**

The colouration is described from photos of live captive reared specimens (Fig. 138).

♀♀ (**Fig. 24**): Moderately sized (body length 124.0-131.5 mm) and rather elongate (average body width 4.5 mm) for the genus with a distinctly dilated abdominal tergite VII. Complete body-surface very finely but densely granulate. General colouration of body and legs plain yellowish or olive green; abdominal segments III-X paler. Great parts of prothorax, posterior portions of meso-, metathorax, the pleurae and all coxae dull green. Abdominal sternites II-VI with a bold, black posteromedian spot. Legs greenish brown with the basal 1/3 of all femora dark green. Antennae mid brown but soon becoming darker and finally black towards the apices. Eyes reddish dark brown.

Head: Strongly globose, slightly longer than wide, vertex rounded, irregularly set with minute granules and with a slightly impressed coronal line. Between the eyes with a pair of minute, forward directed spines. Eyes rather small, circular and projecting hemispherically from head capsule; their length contained about 3x in that of cheek. Antennae long and filiform, almost reaching posterior margin of abdominal tergite II. Scapus dorsoventrally compressed, 2.5x longer than wide, parallel-sided. Pedicellus cylindrical, slightly longer than wide and about 1/3 the length of scapus. Third antennomere shorter and narrower than pedicellus, following antennomeres first slightly increasing, then decreasing in length towards apex of antennae.

Thorax: Pronotum shorter and distinctly narrower than head, 1.5x longer than wide and rectangular, with posterior margin gently rounded; complete surface densely granulate. Anterior margin with a pair of distinct, dark green tubercles medially. Transverse median depression prominent but not reaching lateral margins of segment. Anterior 2/3 with a slightly impressed, longitudinal median line. Mesothorax very elongate, 2.6x longer than head and pronotum combined, cylindrical and gradually widened in posterior portion; complete surface densely granulate. Mesonotum with a very faint longitudinal median line. Mesopleurae strongly convex in posterior portion and forming a small, blunt spine just in front of mesocoxae. Metathorax structured like mesothorax, but posterior of pleurae less distinctly convex. Metanotum slightly widened towards the posterior, almost 2/3 the length of mesonotum and 5x longer than wide. Meso- and metasternum simple.

Abdomen: Median segment very short, about 1.5x wider than long and only about 1/5 the length of metanotum. Anterior margin rounded, complete surface densely granulate and in posterior half with a very faint median line. All tergites with a fine, longitudinal median line, which is most decided on VII-X. Granulation of II as dense as on thorax, on III-X becoming increasingly less distinct. Sternites II-VII very minutely granulate, granulation becoming less decided towards VII. Segments II-VI cylindrical, parallel-sided and of equal width. II-V of equal length and 2.5x longer than wide, VI slightly longer and about 3x longer than wide. VII shorter than previous, in posterior half dilated into a broad, rounded lobe which extends by as much as half of body width (Fig. 27). Praeopercular organ formed by a prominently raised, black, transverse carina at posterior margin of sternite VII which is medially protuded into a distinct, posteriorly

directed spine (Fig. 28). Tergite VIII less than 2/3 the length of VII, distinctly narrower, strongly convex, parallel-sided and about 1.5x longer than wide. IX shorter than VIII, indistinctly longer than wide. Anal segment about as long as VIII, roughly parallel-sided and posterior margin with a broadly triangular median excavation; posterolateral angles rounded triangular. Supraanal plate rounded and slightly transverse with a median keel. Cerci very small, round in cross-section and gradually tapered to a rather pointed apex. Gonapophyses elongate, up-curving and slightly projecting over anterior margin of subgenital plate. Subgenital plate strongly keeled and very prominently convex post-medially, roughly triangular in lateral aspect; apex slightly projecting over anal segment (Fig. 26).

**Legs:** All of moderate length, profemora shorter than mesonotum, mesofemora almost as long as metanotum and median segment combined, hind legs projecting over posterior margin of tergite VI; all trapezoidal in cross-section. Meso- and metafemora slightly thickened and constricted basally, antero- and posteroventral carinae with a tri-dentate sub-apical lobe; the first tooth being largest (Fig. 31). Medioventral carina of all femora faint, in meso- and metafemora with a longitudinal row of minute granules. Medioventral carina of all tibiae distinctly rounded sub-basally (very shallow on protibiae). Dorsal carinae of mesotibiae forming a more or less prominent, rounded lobe about ¼ off the base. Probasitarsus longer than following three tarsomeres combined, dorsal carina distinctly raised and rounded. Meso- and metabasitarsi simple and slightly shorter than combined length of following three tarsomeres.

♂♂ (**Fig. 25**): Medium-sized (body length 88.0-98.5 mm), moderately slender and elongate (average body width 1.3-1.4 mm) and attractively coloured for the genus. Body, apices of all femora and complete tarsi bright orange to reddish brown, abdominal tergites VIII-X slightly darker brown. Pronotum, prosternum, anterior and posterior sections of meso-, metathorax and pleurae, all coxae as well as great parts of the femora bluish green. Median segment predominantly dark green with two indistinct brown markings. Apex of anal segment glabrous black. Antennae reddish brown but soon becoming darker and finally black towards the apices. Eyes reddish dark brown.

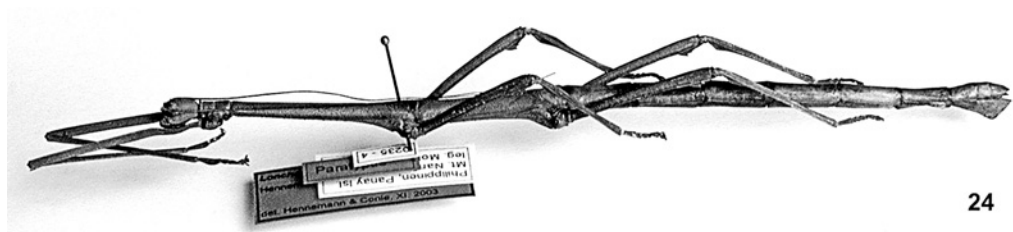
**Head:** Generally as in ♀♀. Eyes relatively larger and more prominent, their length contained about 2.5x in that of cheeks. Spines between the eyes acute, but smaller than in ♀♀. Antennae as in ♀♀ but reaching to posterior margin of abdominal tergite IV.

**Thorax:** Pronotum generally as in ♀♀. Mesothorax very elongate, cylindrical and distinctly broadened at the posterior; about 3.4x longer than head and pronotum combined. Complete surface minutely but densely granulose, mesonotum with a very fine longitudinal median line. Mesopleurae convex posteriorly and forming a blunt spine just in front of mesocoxae. Metathorax structured like mesothorax, slightly constricted medially. Metanotum ¾ the length of mesonotum and almost 9x longer than wide.

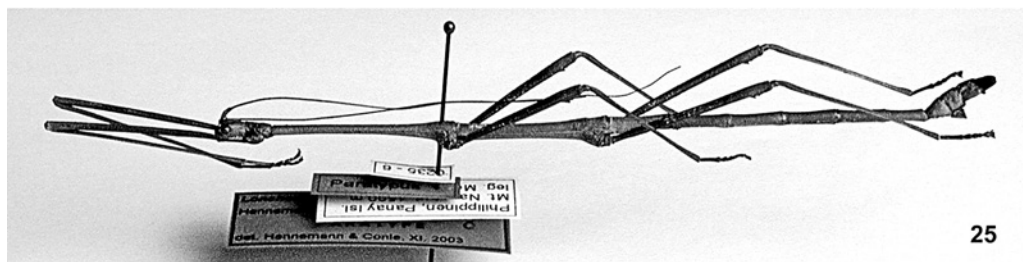
**Abdomen:** Median segment roughly quadrate with anterior margin strongly rounded, its length contained almost 5x in that of metanotum; complete surface minutely granulose. All tergites with a fine longitudinal median line, which is most distinct on VIII and IX; otherwise complete surface very minutely but densely granulose; granules becoming less in size and number towards the hinder segments and almost extinct on VIII-X. Segment II-VI of equal length and width; II slightly longer. II almost 4x, III-VI 3.5x longer than wide. VII shorter than VIII and slightly gradually widened towards the posterior. VIII half the length of VI, indistinctly longer than wide and strongly widening towards the posterior. IX about as long as VIII, roughly quadrate and slightly constricted at the posterior. Anal segment slightly longer than VIII and IX combined, strongly tectiform. Semi-tergites moderately elongate, gradually tapered with the apex broadly rounded; lateral surfaces strongly convex anteriorly, dorsal margin raised (Fig. 29). Interior surfaces slightly hollow and outer margin covered with distinct black, back-curving teeth (Fig. 30). Cerci small, round in cross-section, tapered towards a rather slender and slightly in-curving apex. Poculum small, cup-like and with a fine longitudinal median carina; reaching about ¼ the way along anal segment (Fig. 29).

**Legs:** All of moderate length and rather slender, meso- and metafemora slightly thickened. Profemora a little longer than mesothorax, mesofemora about as long as mesothorax and median segment combined, hind legs very slightly projecting over apex of abdomen. Medioventral carina of all femora indistinct, in meso- and metafemora with a longitudinal row of very minute granules. Antero- and posteroventral carinae of meso- and metafemora with three sub-apical teeth, the first being considerably larger than the apical ones. Probasitarsus as long as remaining tarsomeres combined except claw. Meso- and metabasitarsi as long as following three tarsomeres combined.

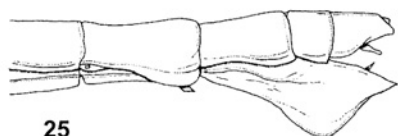




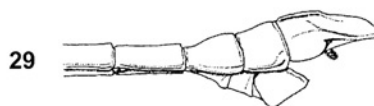
24



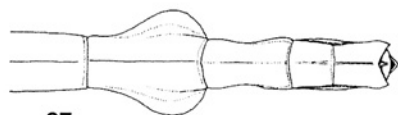
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29



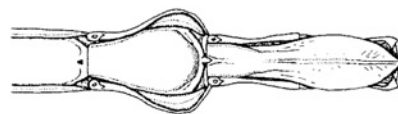
27



30

10 mm

10 mm

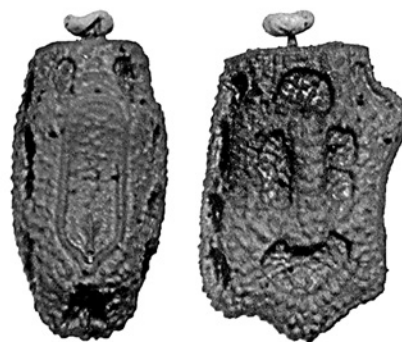


28



31

10 mm



32

1 mm

33

**Figs 24-33: *Lonchodes philippinus* sp. n.:** 24. ♀ PT (coll. FH); 25. ♂ PT (coll. FH); 26. apex of abdomen ♀ (lateral view); 27. apex of abdomen ♀ (dorsal view); 28. apex of abdomen ♀ (ventral view); 29. apex of abdomen ♂ (lateral view); 30. apex of abdomen ♂ (dorsal view); 31. right mid leg ♀; 32. egg dorsal view; 33. egg lateral view.

#### Eggs (Figs 32 & 33):

Small and rather untypical for the genus. Capsule 2x longer than wide and laterally compressed with the lateral surfaces almost parallel-sided. In lateral aspect with a distinct anterodorsal impression between anterior margin of capsule and micropylar plate, and an impression dorsally and ventrally of the polar-area,

which itself is rounded and convex. Complete surface densely rugulose. Lateral surfaces with several, irregular, roughly circular or halfmoon-shaped impressions, which are generally situated in three longitudinal rows. Micropylar plate situated centrally on a raised section of dorsal egg surface, covering slightly more than half of capsule length, slightly impressed and with outer margin raised. General shape oval, 3x longer than wide and lateral margins almost parallel-sided. Posteromedian gap very indistinct, median line short but prominent. Operculum oval, flat and with irregular, slightly raised radial ridges. Capitulum prominent, knob-like and on a short, black stalk. General colouration greyish with all raised granules and ridges black. Lateral impressions of the capsule, micropylar plate and operculum orange brown. Capitulum creamish white.

Measurements (in mm): Length 2.8, length (including capitulum) 3.2, width 1.4, height 1.8, length of micropylar plate 1.9.

#### Comments:

This species has recently become cultured in Europe, from eggs imported from Panay Island by Dr. B. KNEUBÜHLER (Switzerland) in 2005. It appears to be rather easy to rear in moderately humid but well ventilated conditions and accepts bramble (*Rubus fruticosus*, Rosaceae) and privet (*Ligustrum japonicum* & *L. ovalifolium*, Oleaceae) as alternative food-plants.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	90.0	88.0-98.5	124.0-131.5
Head:	3.9	3.5-3.8	5.5-6.0
Pronotum:	2.9	3.0-3.1	4.0-4.6
Mesonotum	20.0	19.9-21.8	25.0-26.6
Metanotum:	14.8	14.0-16.0	16.9-18.7
Median segment:	2.9	2.7-2.9	2.9-3.1
Profemora:	22.0	21.9-24.2	25.0-25.5
Mesofemora:	16.8	16.4-18.0	17.2-19.4
Metafemora:	19.9	19.5-21.6	20.5-22.8
Protibiae:	22.2	23.3-25.2	24.0-25.0
Mesotibiae:	15.8	16.1-16.3	16.2-17.6
Metatibiae:	19.8	20.0-21.5	19.9-21.5
Antennae:	54.0	> 59.0	> 60.0

**Table 4:** Measurements of *Lonchodes philippinicus* sp. n. [mm]

### *Lonchodiodes* gen. n.

**Type-species:** *Lonchodiodes samarensis* sp. n., by present designation.

*Lonchodes*, WESTWOOD, 1859: 36. (in part).

BRUNNER V. WATTENWYL, 1907: 256. (in part)

OTTE & BROCK, 2005: 178. (in part)

ZOMPRO, 2003: 28, 29.

*Staelonchodes*, KIRBY, 1904a: 317. (in part)

#### Description:

♀♀, ♂♂: Medium-sized to large (body length ♂♂ 76.8-115.0 mm, ♀♀ 111.0-148.5 mm), elongate and slender, cylindrical Lonchodinae; very similar to *Phraortes* STAL, 1875. Complete body surface (except head) very finely and more or less densely granulose; granules rounded. Complete dorsal body surface except head and pronotum with a very fine longitudinal median carina. Head longer than wide, subcylindrical to slightly globose and parallel-sided to slightly narrowing towards the posterior; vertex flat to very gently rounded and unarmed. Between the eyes usually with a pair of blunt humps, acute tubercles or spines; sometimes unarmed. Antennae very long and filiform, distinctly exceeding posterior margin of median segment. Scapus strongly flattened dorsoventrally, distinctly longer than wide and parallel-sided. Pedicellus round in cross-section, ± club-shaped and less than half as long as scapus. Antennomeres gradually

decreasing in length towards apex of antennae. Mesothorax very elongate, at least 2.2x longer than head and pronotum combined. Metanotum less than 2/3 the length of mesonotum. Meso- and metasternum simple, no median keel. Median segment very short and roughly 1/4 the length of metanotum; transverse or at best indistinctly longer than wide. Abdomen including median segment as long as, or usually longer than head and complete thorax combined. Segments II-VI at least 2x longer than wide; parallel-sided in ♀♀, slightly constricted medially in ♂♂. Tergite VII of ♀♀ parallel-sided and a little shorter than previous, of ♂♂ distinctly shorter than II-VI. Sternites II-VII simple. Praeopercular organ of ♀♀ very indistinct, at best represented by a minute posteromedian tubercle on sternite VII. Tergite VIII of ♀♀ with anterolateral angles ± roundly elevated; trachea conspicuously enlarged. Tergites VIII and IX of ♂♂ distinctly shorter and broader than II-VII, IX broadest. Anal segment of ♂♂ strongly tectiform and split over complete length to form two separate semi-tergites, these > 1.3x longer than tergite IX. Semi-tergites laterally flattened, ± tapered towards a rounded apex; outer lateral surfaces with a ± prominent elongate impression in apical portion; interior surfaces covered with minute teeth. No visible vomer. Anal segment of ♀♀ with a ± decided posteromedian excavation. Supraanal plate small and not projecting considerably over posterior margin of anal segment; roundly triangular and keeled. Poculum of ♂♂ of moderate size, cup-like and not considerably extending over posterior margin of tergite IX; no central hump or spine. Subgenital plate of ♀♀ strongly keeled, ± boat-shaped and at best slightly projecting over apex of abdomen. Cerci small, round to slightly oval in cross-section and ± tapered towards the apex. All legs moderately long and slender, all unarmed except for 1-3 sub-apical teeth on the two outer ventral carinae of the meso- and metafemora; meso- and metafemora may be thickened and considerably broader than corresponding tibiae. All decidedly carinate and trapezoidal in cross-section. Medioventral carina of femora indistinct; may bear some minute granules on two posterior femora. Profemora strongly compressed and curved basally, about as long as mesothorax. Mesofemora at least as long as metathorax. Metatibiae of ♀♀ not extending over apex of abdomen, in ♂♂ the metatibiae may slightly exceed the abdomen. Tarsi elongate, slender and simple. Basitarsi at least as long as following three tarsomeres combined.

#### Description of the eggs:

Of moderate size and typical for the subfamily; general shape variable. Capsule longer than wide, oval in cross-section and with a ± strongly convex or conical polar-area. Capsule surface ± distinctly sculptured, either punctured or with irregular wrinkles. Micropylar plate elongate, at least 1.5x longer than wide and with a notch posteromedially. Median line ± distinct. Operculum flat, oval. Capitulum prominent, hat- or knob-like and on a distinct stalk.

#### Differentiation:

This new genus belongs in relation to *Phraortes* STÅL, 1875 (type-species: *Phasma elongata* THUNBERG, 1815, by monotypy), *Periphetes* STÅL, 1877 (type-species: *Lonchodes graniferum* WESTWOOD, 1859: 35), *Matutumetes* **gen. n.** and *Lonchodes* GRAY, 1835 (s. str.). A differentiation from these genera is provided in table 5 below.

Superficially, the new genus also shows similarity to *Carausius* STÅL, 1875 (type-species: *Carausius strumosus* STÅL, 1875, by subsequent designation of REHN, 1904: 42) but from this it is clearly distinguished by the lack of a longitudinal median keel on the metasternum and structures of the egg, such as the protuberance of the polar-area and raised, net-like structure or wrinkles of the capsule (smooth or pitted in *Carausius*).

#### Etymology:

The name is meant to mirror the relation to *Lonchodes* GRAY, 1835 (s. str.).

#### Distribution:

Philippines (endemic).

#### Species included:

- |   |                 |
|---|-----------------|
| 1. <i>Lonchodiodes atrovirens</i> <b>sp. n.</b>                           | [Mindoro Id.]   |
| 2. <i>Lonchodiodes babuyanensis</i> <b>sp. n.</b>                         | [Babuyan Ids.]  |
| 3. <i>Lonchodiodes eurycanthoides</i> <b>sp. n.</b>                       | [Mindoro Id.]   |
| 4. <i>Lonchodiodes grandis</i> <b>sp. n.</b>                              | [Panay Id.]     |
| 5. <i>Lonchodes putingmantsa</i> ZOMPRO, 2003: 20, 29, figs 37-40, 54-55. | [Aroroy]        |
| 6. <i>Lonchodiodes samarensis</i> <b>sp. n.</b>                           | [Samar Id.]     |
| 7. <i>Lonchodes tagalicus</i> STÅL, 1877: 39.                             | [“Philippines”] |
| 8. <i>Lonchodes trollius</i> WESTWOOD, 1859: 40, pl. 23: 1.               | [Luzon Id.]     |

	<i>Lonchodiodes</i> <b>gen. n.</b>	<i>Matutumetes</i> <b>gen. n.</b>	<i>Phraortes</i>	<i>Lonchodes</i> (s. str.)	<i>Periphetes</i>
Head	Oval; with or without interocular spines	Moderately globose; unarmed	Distinctly longer than wide; rarely with interocular spines	Globose; rarely with interocular spines	Moderately globose; unarmed
Ventral body surface (♀♀)	Simple	Simple	Simple	Simple	Longitudinally keeled
Tergite VI and / or VII (♀♀)	Parallel-sided	Parallel-sided	Parallel-sided	± swollen and / or laterally elevated	Parallel-sided
Praeopercular organ (♀♀)	No (at best a minute granule)	Very prominent and covering base of subgenital plate	A spine-like process	A distinct, spine-like process	Indistinct; scale-like structure
Supraanal plate (♀♀)	Small, rounded	Small, triangular	Small, rounded to triangular	Prominent; may be elongated and ± lanceolate	Very small and rounded, wider than long
Subgenital plate (♀♀)	Boat-shaped and keeled	Boat-shaped and keeled	Boat-shaped and keeled	Boat-shaped and keeled	Scoop-shaped and rounded posteriorly, with a basal impression
Cerci (♂♂)	Small and tapered apically	Very small; conical	Prominent; strongly incurving or hook-like	Small and tapered apically	Small and tapered apically
Protibiae	Slender	Slender	Slender	± elevated and ledge-like dorsally; may be lobed	Slender
Mesotibiae (♀♀)	Slender	Slender	Slender	Dorsal and / or medioventral carina roundly elevated in basal half	Slender
Probasitarsus	Slender	Slender	Slender	With a rounded dorsal lobe (may be lacking in ♂♂)	Slender
Eggs (polar-area)	Polar-mound ± decided, conical or rounded	-*	No polar mound	With a centrally impressed polar mound; often bearing a spine centrally	No polar mound
Distribution	Philippines (endemic)	Philippines (endemic)	China, Taiwan, Korea & Japan	Sundaland, S-China & Philippines	Philippines, Sulawesi & Sangihe Id.

\* Eggs of *Matutumetes* **gen. n.** are not known

**Table 5:** Comparison of *Lonchodiodes* **gen. n.**, *Matutumetes* **gen. n.**, *Phraortes* STÅL, *Lonchodes* GRAY (s. str.) and *Periphetes* STÅL.

### Keys to the species of *Lonchodiodes* gen. n.

♀♀\*

1. Head with a pair of humps or horns between the eyes ..... 4
- Head unarmed ..... 2
2. Moderately robust insects, meso- and metathorax widened posteriorly; meso- and metafemora thickened, distinctly broader than corresponding tibiae; metafemora reaching at best half way along abdominal segment IV; not Babuyan Islands ..... 3
- Very long and slender insects, meso- and metathorax not considerably broadened posteriorly; meso- and metafemora slender; metafemora reaching to abdominal segment V; Babuyan Islands ..... *L. babuyanensis* **sp. n.**
3. Large (body length > 120.0 mm); plain green; apices of femora without distinct colouration; head granulose ..... *L. atrovirens* **sp. n.**
- Smaller (body length < 110.0 mm); greenish brown with a black transverse posterior band on each body segment; apices of femora black; head smooth ..... *L. eurycanthoides* **sp. n.**
4. Femora without distinctly coloured apices; not Aroroy ..... 5
- Apices of femora black; Aroroy ..... *L. putingmantsa*
5. Spines between the eyes distinct, > 1/3 the length of scapus; meso- and metafemora with a pale sub-apical transverse band ..... 6
- Spines between the eyes minute, < 1/3 the length of scapus; meso- and metafemora unicolourous Panay ..... *L. grandis* **sp. n.**
6. Green; sternite VII with a bold whitish marking; meso- and metafemora slender; Samar ..... *L. samarensis* **sp. n.**
- Brown; sternite VII without a white marking; meso- and metafemora thickened; Luzon ... *L. trollius*

\* ♀♀ of *L. tagalicus* (STÅL) are not known

♂♂

1. Head unarmed ..... 2
- Head with a pair of humps or spines between the eyes ..... 4
2. Metafemora at best slightly thickened; metatibiae straight ..... 3
- Metafemora prominently swollen and broadened, about 3x broader than metatibiae; basal quarter of metatibiae down-curving; Panay ..... *L. eurycanthoides* **sp. n.**
3. Reddish brown; head almost 2x longer than wide, vertex flat; mesonotum 2.8x longer than head and thorax combined; Babuyan Islands ..... *L. babuyanensis* **sp. n.**
- Green; head 1.5x longer than wide; vertex gently convex; mesonotum 2.5x longer than head and pronotum combined; Mindoro ..... *L. atrovirens* **sp. n.**
4. Cheeks, posterior portions of meso- and metanotum and tergites VIII-IX with distinct, white spots; apices of femora black; Aroroy ..... *L. putingmantsa*
- Colouration different, without white spots; femora without black apices; not Aroroy ..... 5
5. Plain brown insects ..... 6
- Body greenish or reddish brown, head dark grey, femora green with brown apices; tergites III-X dark brown to black ..... 7
6. Very slender species; mesothorax 3.5x longer than head and pronotum combined; profemora almost as long as combined length of head, pro- and mesonotum; apex of semi-tergites strongly tapered and almost straight; bases of femora dull reddish ..... *L. tagalicus*
- More robust species; mesothorax 3.3x longer than head and pronotum combined; profemora indistinctly longer than mesothorax; apex of semi-tergites slightly down-curving; femora without reddish bases ... *L. trollius*
7. Large (body length > 100.0 mm); anal segment < 1.5x longer than tergite IX; semi-tergites roughly triangular, apex short and broad; Panay Id. .... *L. grandis* **sp. n.**
- Smaller (body length < 95.0 mm); anal segment almost 2x longer than tergite IX; semi-tergites long, slender and slightly angled downward; Samar Id. .... *L. samarensis* **sp. n.**

***Lonchodiodes atrovirens* sp. n.**

(Figs 34-41)

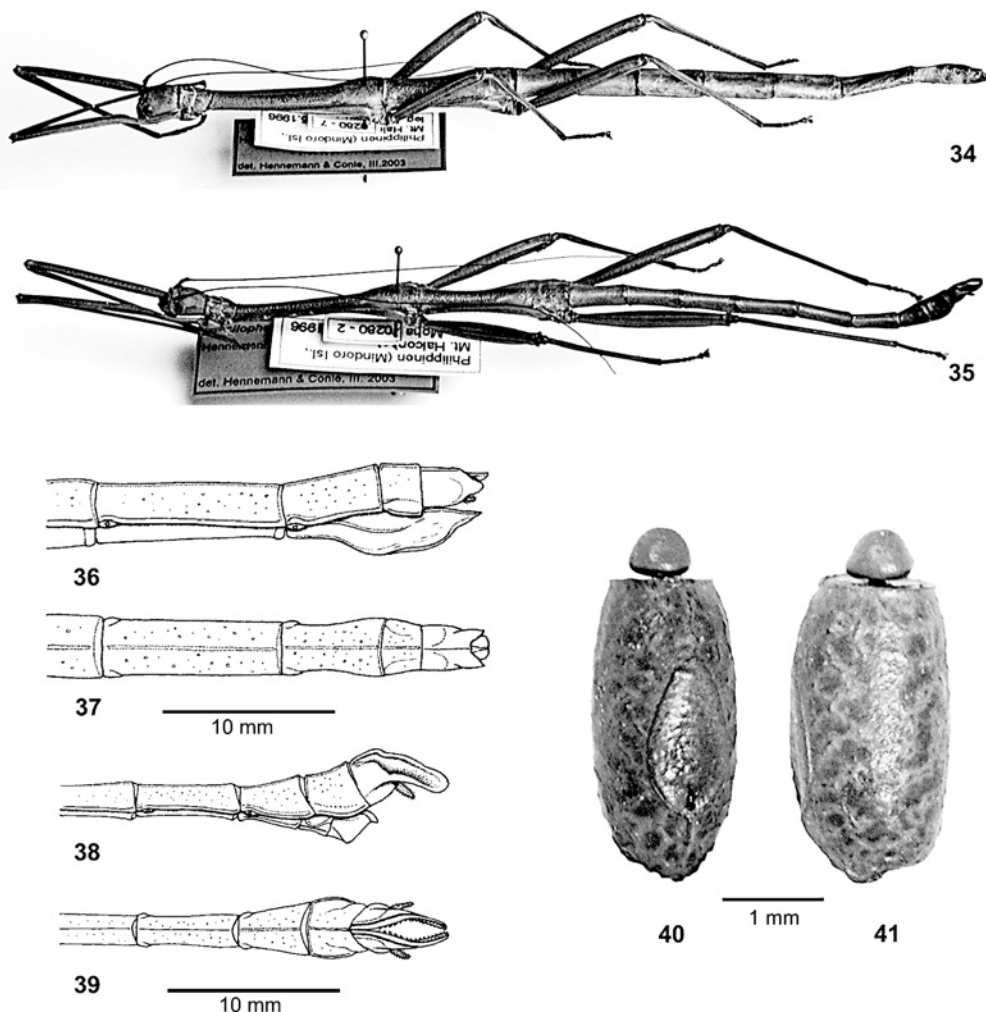
**Holotype**, ♂: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 1.-26.V.1996, ex coll. FH (ZSMC).**Paratypes (34 ♂♂, 22 ♀♀, 1 ♀ (penultimate instar nymph), 3 eggs)**: 1 ♀: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 1.-26.V.1996, ex coll. FH (UPPC); 1 ♂, 1 ♀: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 1.-26.V.1996, ex coll. FH (NHMW); 1 ♂, 1 ♀: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 1.-26.V.1996, ex coll. FH (ZSMC); 5 ♂♂, 5 ♀♀, 1 ♀ (penultimate instar), 3 eggs (ex ovipositor): Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 1.-26.V.1996 (coll. FH 0280-1 to 9, E & ED); 27 ♂♂, 14 ♀♀: Philippinen, Mindoro Isl., Mt. Halcon, leg. Mohagan 1.-26.V.1996 (coll. OC).**Etymology:**The name “*atrovirens*” (lat. = dark / dull green) refers to the beautiful, dull green colouration of this new species.**Differentiation:**Characterized amongst the other members of the genus by the broadened meso- and metafemora of both sexes and dull green colouration. Very similar to *G. putingmantsa* (ZOMPRO, 2003) from Aroroy Island but distinguished by: the slightly larger size, more robust body, more distinctly thickened meso- and metafemora and lack of black knees in both sexes as well as the more elongate semi-tergites of the anal segment, lack of white spots on the genae, meso-, metathorax, median segment and terminal abdominal segments of ♂♂.**Description:**

♀ (Fig. 34): Rather large (body length 120.6-136.0 mm) and moderately slender (average body width 5.2-5.8 mm) for the genus with thickened meso- and metafemora. Body surface densely granulose (more minutely on abdomen) and slightly glabrous. General colouration of body and legs plain mid to dull green. Meso-, metasternum and all abdominal sternites pale yellowish green. Tergites IX and X, supraanal plate and cerci dark brown. Femora green but becoming brown in apical third. Intersegmental skins and joints of the coxae yellow (often brown in preserved specimens). Scapus dark brown, rest of antennae black but with a straw sub-apical transverse band. Eyes mid to dark brown.

Head: Suboval, slightly globose, 1.5x longer than wide and broadened behind the eyes. Vertex gently rounded with four longitudinal, parallel rows of very minute granules; the interior ones more distinct. Between the bases of the antennae with an oval impression. Between the eyes with an oval, slightly raised and granulose area. Eyes circular, projecting hemispherically and rather small, their length contained about 4x in that of cheeks. Antennae almost reaching to posterior margin of abdominal tergite II. Scapus parallel-sided and almost 2x longer than wide with the apex club-like. Pedicellus about 1/3 the length of scapus, slightly club-like and indistinctly longer than wide. 3<sup>rd</sup> antennomere gradually narrowing, longer than pedicellus. Following antennomeres first increasing, then decreasing in length.

Thorax: Pronotum narrower and shorter than head, 1.3x longer than wide. Transverse median depression very distinct and reaching to lateral margins of segment. Anterior margin slightly raised and followed by a transverse furrow. Over complete length with a slightly impressed median line and complete surface densely granulose. Mesothorax slightly widened in posterior portion, about 2.3x longer than head and pronotum combined. Metathorax structured like mesothorax, about 2/3 the length of mesonotum and roughly 3x longer than wide.

Abdomen: Median segment about ¼ the length of metanotum, slightly wider than long. Granulation of tergites becoming more minute towards apex of abdomen, the longitudinal median line becoming more well decided. Sternites very minutely and sparsely granulose. Segments II-VII slightly increasing in length, II about 2x and VII more than 3x longer than wide. II widened anteriorly. Tergite VIII half the length of VII and 1.8x longer than wide, weakly constricted medially and with posterior margin slightly wider than anterior margin; more convex than previous. IX half the length of VIII, about as long as wide and very gently narrowed towards the posterior. Anal segment about 1.3x longer than IX, roughly parallel-sided, the posterior margin with a broad, concave excavation, posterolateral angles acutely triangular (Fig. 37). Supraanal plate rounded and slightly transverse with a distinct median carina; slightly projecting over anal segment. Subgenital plate strongly narrowed in basal half, keeled and boat-like in posterior half and very slightly projecting over posterior margin of anal segment; apex rounded (Fig. 36).



**Figs 34-41:** *Lonchodiodes atrovirens* sp. n.: 34. ♀ PT (coll. FH); 35. ♂ PT (coll. FH); 36. apex of abdomen ♀ (lateral view); 37. apex of abdomen ♀ (dorsal view); 38. apex of abdomen ♂ (lateral view); 39. apex of abdomen ♂ (dorsal view); 40. egg dorsal view; 41. egg lateral view.

**Legs:** Of moderate length and rather stout, profemora as long as mesothorax, metafemora as long as metanotum and median segment combined and metatibiae reaching to anterior margin or half way along tergite VII. Meso- and metafemora slightly thickened with the lateral surfaces convex. Medioventral carina of all femora distinct, in meso- and metafemora on each side accompanied by a parallel-longitudinal row of minute granules. Two outer ventral carinae of meso- and metafemora with a rounded and dentate lobe subapically, which bears 3-5 minute teeth. Medioventral carina of meso- and metatibiae slightly rounded subbasally. Basitarsi as long as following three tarsomeres combined.

**♂♂ (Fig. 35):** Medium-sized to large (body length 97.0-113.5 mm), rather robust (average body width 2.8-3.1 mm) for the genus with thickened meso- and metafemora. Body surface densely granulose (more minutely on abdomen) and glabrous. Longitudinal median carina of dorsal body surface rather well decided. General colouration of the body and legs plain mid to dull green; abdomen becoming brown towards the

apex. Tergites VIII and IX dark brown, each with a small pale spot at the posterolateral angle. Anal segment black except for a triangular, brown marking at anterior margin. Sternites pale yellowish green but becoming brown towards apex of abdomen. Subgenital plate with a trapezoidal, pale posterior marking. Posterior sections of meso- and metathorax and median segment yellowish. Metanotum with two elongate, triangular, yellow markings in posterior half of segment. All intersegmental skins and joints of the coxae yellow (often brown in preserved specimens). Femora green but becoming brown towards the apex. Pedicellus brown, rest of antennae black with a straw sub-apical transverse band. Eyes dark reddish brown.

Head: Generally as in ♀♀, but antennae projecting over posterior margin of abdominal tergite III.

Thorax: Pronotum generally as in ♀♀. Mesothorax strongly broadened posteriorly, almost 2.5x longer than head and pronotum combined; mesopleurae in particular strongly convex in posterior portion. Metathorax structured like mesothorax and distinctly constricted medially. Metanotum about 3/5 the length of mesonotum and roughly 5.5x longer than wide.

Abdomen: Median segment indistinctly longer than wide and its length contained more than 4x in that of metanotum. Granulation of tergites becoming much more minutely and sparsely towards apex of abdomen, IX destitute of granules; longitudinal median line becoming more decided on VII-IX. Segment II 2x longer than median segment and gradually narrowing. II-VI of roughly equal width and slightly increasing in length; II about 2.5x, III-VI in average about 3x longer than wide. VII shorter than previous. VIII 2/3 the length of VII, 1.5x longer than wide and gradually widening towards the posterior. IX 1.5x broader than II-VII and broadest segment, strongly convex, slightly longer than VIII, and with lateral margins gently rounded. Anal segment roughly 1.5x longer than IX. Semi-tergites elongate, conspicuously finger-like, in-curving and slightly down-curving; apex rounded (Figs 38 & 39). Interior surfaces with a row of black teeth along outer margins and densely set with minute black teeth in posterior portion. Outer lateral surface with lower margin swollen and a prominent, longitudinal median impression. Cerci elongate, tapered towards a narrow apex and slightly in-curving. Poculum rather small, cup-like and slightly projecting over posterior margin of tergite IX.

Legs: Generally as in ♀♀ but relatively longer and meso- and metafemora more distinctly thickened with the medioventral carina much more prominent and forming a distinct keel.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	103.5	97.0-113.5	120.6-136.0
Head:	5.6	5.0-6.0	6.3-6.8
Pronotum:	3.9	3.8-4.3	4.8-5.2
Mesonotum	22.5	21.3-24.5	24.7-27.5
Metanotum:	15.3	13.6-16.2	14.7-16.4
Median segment:	2.9	2.8-3.4	3.9-4.0
Profemora:	22.6	20.0-24.2	23.0-26.1
Mesofemora:	16.9	15.8-18.0	17.2-18.3
Metafemora:	19.8	18.0-21.4	20.8-22.0
Protibiae:	23.2	21.2-25.3	21.6-27.0
Mesotibiae:	17.4	15.5-18.8	16.2-18.2
Metatibiae:	22.1	21.1-24.7	21.0-23.8
Antennae:	60.0	56.0-69.0	61.0-75.0

**Table 6:** Measurements of *Lonchodiodes atrovirens* sp. n. [mm]

### Eggs (Figs 40 & 41):

Small, cylindrical in cross-section and elongate, being almost 3x longer than wide. Seen laterally the polar-areas has a wide impression with the dorsal angle conical. Capsule surface very minutely granulose (16x magnification) and irregularly covered with a wide network of shallow, raised ridges. Micropylar plate positioned centrally on dorsal egg surface, prominent, roughly oval with anterior end slightly tapered and covering about half of capsule length. Outer margin raised and inner surface structured similar to capsule but



with less distinct ridges. Median line short but distinct and raised. Micropylar cup small, knob-like and placed near posterior end of capsule. Operculum flat, almost circular and very minutely granulose with outer margin raised. In its center with a prominent, conical capitulum which has a small central impression and a short stalk. General colouration of capsule and micropylar plate greyish mid brown; raised ridges dull beige. Operculum and outer margin of micropylar plate dark brown. Micropylar cup black. Capitulum orange.

Measurements (in mm): Length 2.9, length (including operculum) 3.4, width 1.4, height 1.5, length of micropylar plate 1.7.

***Lonchodiodes babuyanensis* sp. n.**

(Figs 42-50)

**Holotype**, ♂: N- Philippinen, Babuyan Islands, Calayan Id., VI.2003, via. I. O. Lumawig, ex coll. FH (ZSMC).

**Paratypes (3 ♂♂, 5 ♀♀, 1 ♀ (penultimate instar nymph), 1 egg):** 1 ♀: N- Philippinen, Babuyan Islands, Calayan Id., VI.2003, via. I. O. Lumawig, ex coll. FH (ZSMC); 1 ♂, 2 ♀♀, 1 ♀ (penultimate instar), 1 egg (ex ovipositor): N- Philippinen, Babuyan Islands, Calayan Id., VI.2003, via. I. O. Lumawig (FH 0515-1 to 4 & E); 2 ♂♂, 2 ♀♀: N- Philippinen, Babuyan Islands, Calayan Id., VI.2003, via. I. O. Lumawig (coll. OC).

**Etymology:**

Named after the type-locality the Babuyan Islands in the very Northern Philippines.

**Differentiation:**

Similar to *L. grandis* sp. n. from Panay but easily distinguished by: the more elongate and completely smooth head; relatively smaller eyes and more decided longitudinal median carina of the tergites of both sexes; more elongate and slender body; differently shaped anal segment and relatively longer legs of ♀♀, as well as the slightly broader body; thickened meso- and metafemora; longer semi-tergites of the anal segment; smaller poculum; red meso- and metasternum and large, elongate red marking of the meso- and metanotum of ♂♂.

The eggs resemble those of *L. troilius* (WESTWOOD, 1859) but differ by the smaller size, much less prominent punctations of the capsule, conspicuous radial ridges around the micropylar plate and the micropylar plate being more slender and elongate.

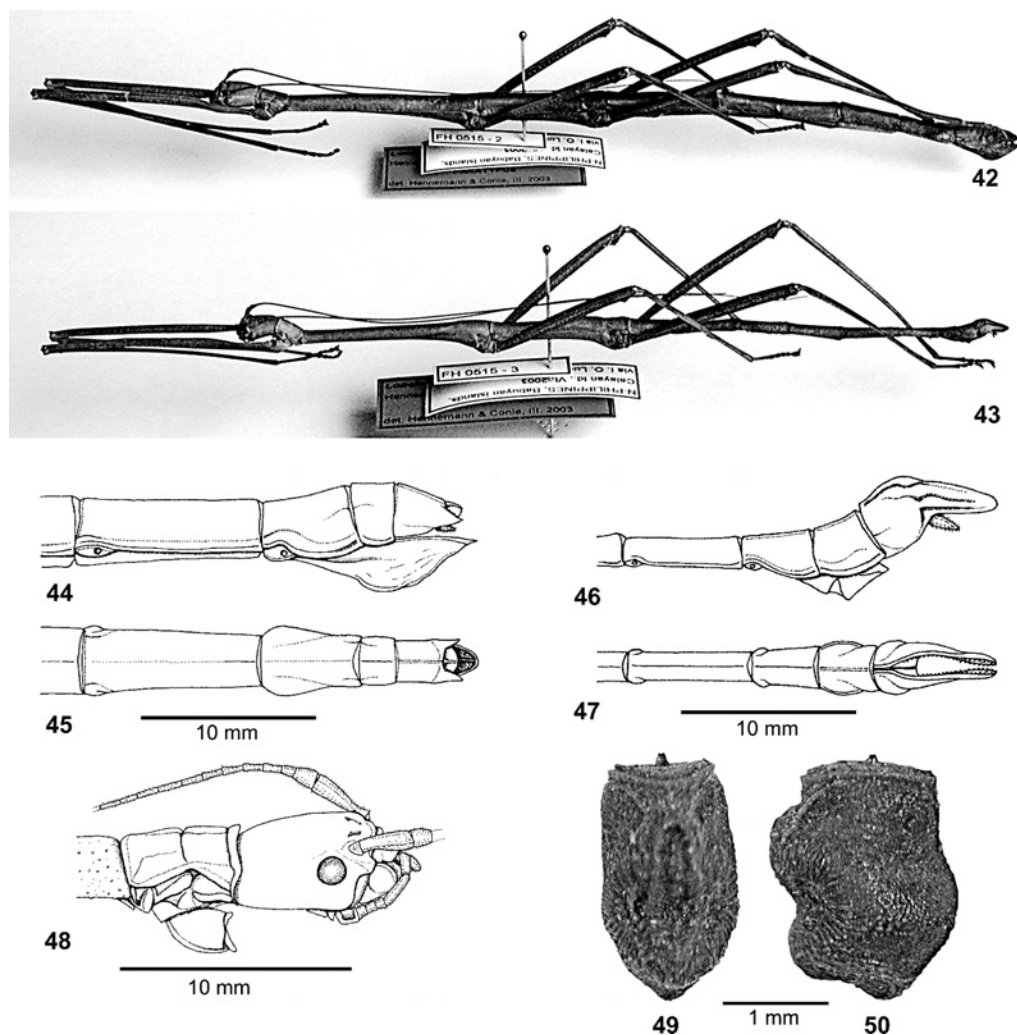
**Description:**

♀♀ (**Fig. 42**): Very large (body length 129.0-145.0 mm), conspicuously elongate and slender (average body width 4.5-4.9 mm) for the genus. Body surface just sparingly granulose and slightly glabrous. General colouration of body and legs plain mid to dark brown (perhaps greenish brown when alive), abdomen slightly darker brown (due to preservation). Eyes reddish brown. Scapus and pedicellus greenish brown to brown, remaining antennomeres dark reddish brown.

Head: Subcylindrical and elongate, almost 2x longer than wide, broadest at the eyes, vertex flat and surface almost entirely smooth (Fig. 48). Between the bases of the antennae with an oval impression. Eyes very small, circular and projecting hemispherically, their length contained more than 4x in that of cheeks. Antennae very long and reaching about half way along abdominal tergite V. Scapus parallel-sided and about 2.5x longer than wide. Pedicellus half the length of scapus, cylindrical, slightly club-like and about 1.5x longer than wide. Third antennomere narrowing towards the apex and about as long as pedicellus. Following antennomeres first increasing then decreasing in length towards apex of antennae.

Thorax: Pronotum 2/3 the length and about as broad as head, 1.2x longer than wide, rectangular. Transverse median depression very distinct and almost reaching to lateral margins of segment. Anterior margin raised and followed by a deep transverse furrow. Over complete length with an impressed median line. Mesothorax parallel-sided except for mesopleurae being slightly swollen at the posterior; about 2.7x longer than head and pronotum combined. Complete surface very sparingly covered with minute granules (mesosternum almost smooth). Metathorax structured like mesothorax, metanotum almost 2/3 the length of mesonotum.

Abdomen: Median segment less than ¼ the length of metanotum, slightly broader than long. All sternites smooth, without granulation. Segments II-V slightly increasing in length, V longest, VI and VII decreasing in length; II 2.2x and V 2.5x longer than wide. Praeopercular organ formed by an indistinct, trans-



**Figs 42-50:** *Lonchodiodes babuyanensis* sp. n.: 42. ♀ PT (coll. FH); 43. ♂ PT (coll. FH); 44. apex of abdomen ♀ (lateral view); 45. apex of abdomen ♀ (dorsal view); 46. apex of abdomen ♂ (lateral view); 47. apex of abdomen ♂ (dorsal view); 48. head and prothorax of ♀; 49. egg dorsal view; 50. egg lateral view.

verse median hump at posterior margin of sternite VII. Tergite VIII half as long as VII and 2x longer than wide, the anterolateral angles prominently elevated; trachea very prominent. IX  $\frac{2}{3}$  the length of VIII, strongly convex and gently constricted towards the posterior. Anal segment longer than IX, slightly narrowed towards the posterior and slightly tectiform. Posterior margin with a deep, triangular excavation, posterolateral angles acutely triangular and strongly pointed (Fig. 45). Supraanal plate rounded and with a distinct median carina; not projecting over apex of anal segment. Subgenital plate strongly keeled and boat-like, projecting over posterior margin of anal segment (Fig. 44); apex rounded.

Legs: All very long and slender, profemora longer than pro- and mesothorax combined, metafemora longer than metanotum and median segment combined and hind legs projecting over apex of abdomen.

Medioventral carina of all femora distinct. Two outer ventral carinae of meso- and metafemora with a blunt triangular sub-apical tooth followed by two considerably smaller teeth. Basitarsi slightly longer than following three tarsomeres combined.

♂♂ (**Fig. 43**): Medium-sized (body length 110.5-115.0 mm) and moderately slender (average body width 2.6-3.0 mm) for the genus. Body surface very minutely but densely granulose (more sparingly on abdomen), meso- and metafemora slightly thickened. General colouration of the body and legs plain yellowish or greyish mid brown, abdomen slightly darker (due to preservation). Anterior 2/3 of meso- and metapleurae dark brown. Meso- and metasternum and great parts of meso- and metanotum (except the anterior and posterior portions) red. Eyes orange brown. Knees straw. Scapus and pedicellus pale brown, remaining antennomeres dark reddish brown.

Head: Generally as in ♀♀. Eyes more prominently projecting from head capsule, their length contained almost 5x in that of cheeks. Antennae as in ♀♀ but reaching to abdominal tergite VI.

Thorax: Pronotum generally as in ♀♀. Mesothorax distinctly broadened at the posterior, 2.8x longer than head and pronotum combined. Metathorax structured like mesothorax, gently constricted medially. Metanotum about 2/3 the length of mesonotum and almost 7x longer than wide.

Abdomen: Median segment roughly quadrate with anterior margin slightly rounded, 5x shorter than metanotum. Segment II almost 3x longer than median segment. II-VII of roughly equal length and width, in average about 3.5x longer than wide. VIII slightly longer than wide, 2/3 the length of VII and conspicuously widening towards the posterior. IX 1.5x broader than II-VII, slightly shorter than VIII, roughly quadrate. Anal segment about 1.5x longer than IX, strongly tectiform. Semi-tergites elongate, the apex slightly tapered, straight and slightly angled downward; interior surfaces densely covered with minute, back-curving black teeth (**Fig. 47**). Cerci moderately elongate and gently in-curving. Poculum small, just slightly convex and scoop-like; reaching posterior margin of tergite IX (**Fig. 46**).

Legs: All very long and moderately slender, meso- and metafemora slightly thickened and constricted towards the base. Profemora longer than mesothorax, mesofemora  $\frac{3}{4}$  the length of mesothorax and hind legs projecting over apex of abdomen. Medioventral carina of all femora distinct. Two outer ventral carinae of meso- and metafemora with a small, tri-dentate sub-apical lobe. All ventral carinae of meso- and metafemora granulose. Basitarsi slightly longer than following three tarsomeres combined.

#### **Eggs (Figs 49 & 50):**

Small for the genus but of a very characteristic shape with distinct structures of the capsule. Capsule almost 2x longer than wide, oval to slightly rhombic in cross-section and with several conspicuous impressions. In lateral aspect a shallow, concave impression is seen ventromedially, a distinct impression anterodorsally between the anterior margin and the micropylar plate, posterodorsally below the micropylar plate, and posteroventrally between the ventromedian impression and polar-area. A further, shallow impression is seen dorsomedially at the micropylar plate. Ventral surface with a distinct, longitudinal keel and two roughly oval, flattened, rugulose areas. Polar-area strongly convex and forming a conspicuous conical hump. Capsule surface roughly pitted. On both sides of the micropylar plate with two to three prominent, deep impression which are laterally surrounded by a semi-circle of raised, radial ridges. Anteromedially these ridges reach to the anterior margin of the capsule. Ventrolaterally three ridges are seen to be strongly elongated, circling the capsule and melting with each other on ventral egg surface. Micropylar plate elongate, parallel-sided and covering about 2/3 of capsule length; surface strongly rugulose. Posterior end with an indistinct median gap and a short but raised median line. Operculum flat, slightly rhombic, structured like capsule and with outer margin raised. Capitulum distinct, knob-like with a central impression and on a short stalk. General colouration of capsule and operculum very slightly glabrous mid brown. Micropylar plate slightly darker brown. Raised ridges of capsule greyish. Capitulum black.

Measurements (in mm): Length 2.9, length (including capitulum) 3.3, width 1.6, height 2.0, length of micropylar plate 2.0.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	111.0	110.5-115.0	129.0-145.0
Head:	6.0	5.8-5.9	7.1-7.9
Pronotum:	4.2	4.0-4.1	4.9-5.2
Mesonotum	26.7	26.1-27.0	29.0-32.0
Metanotum:	15.8	15.9-16.8	15.9-18.0
Median segment:	3.7	3.8-4.0	3.7-3.9
Profemora:	31.3	31.0-31.2	31.1-39.8
Mesofemora:	23.3	23.2-23.5	23.0-28.0
Metafemora:	27.5	26.6-27.0	25.4-33.7
Protibiae:	32.6	32.4-33.8	34.0-44.9
Mesotibiae:	23.4	23.1-24.0	24.3-31.7
Metatibiae:	29.3	29.6-30.2	30.0-39.2
Antennae:	> 72.0	85.0-90.0	86.0-108.0

**Table 7:** Measurements of *Lonchodiodes babuyanensis* sp. n. [mm]

***Lonchodiodes eurycanthoides* sp. n.**  
(Figs 51-58)

**Holotype**, ♂: Philippinen, Mindoro Id., Mt. Halcon, leg. Mohagan 26.V.1995, ex coll. FH (ZSMC).

**Paratypes** (31 ♂♂, 21 ♀♀): 1 ♂, 1 ♀ : Philippinen, Mindoro Island, Mt. Halcon IV.2006 (coll. FH 220-1 & 2); 30 ♂♂, 20 ♀♀: Philippinen, Mindoro Island, Mt. Halcon IV.2006 (coll. OC).

**Etymology:**

The name “*eurycanthoides*” refers to the strongly thickened metafemora and basally curved metatibiae (♂♂ in particular) which resemble those of certain members of the subfamily Eurycanthinae, in particular the genus *Thaumtobactron* GÜNTHER, 1929.

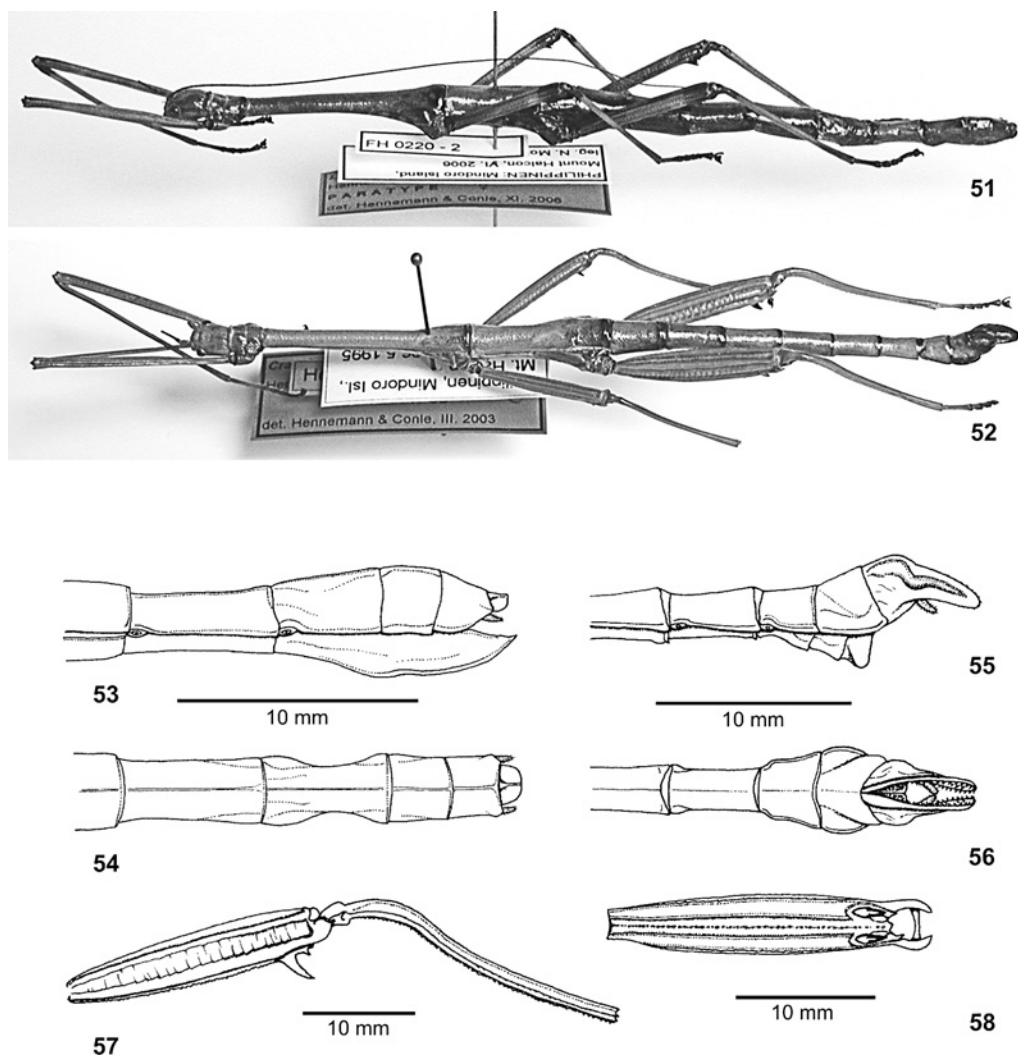
**Differentiation:**

This distinctive species is well characterized among all known members of the complete subfamily Lonchodinae by the prominently thickened metafemora and conspicuously widened basal angle and distinctly tuberculose medioventral carina of the metatibiae of ♂♂. Furthermore, the just gently compressed and curved bases of the profemora, prominent medioventral carina of the meso- and metafemora and posteriorly widened metathorax of both sexes distinguish it well from other members of the genus. It appears to be related to *L. atrovirens* sp. n. from the same locality.

**Description:**

♀♀ (**Fig. 51**): Medium-sized (body length 95.2-115.4 mm), rather robust Lonchodinae (maximum body width measured just before metacoxae 8.0-8.4 mm), with a very minutely granulose (almost extinct on abdomen) and strongly glabrous body surface. General colouration of body yellowish to greenish mid brown and each body segment (except metanotum) with a broad transverse black band at posterior margin. Meso- and metapleurae as well as posterior section of and metasternum black with conspicuous pale spots of variable size. Legs greyish green with apices of all femora as well as bases and apices of tibiae (not apices of protibiae) black. Femora with a broad pale cream transverse sub-apical band, which is most distinct ventrally. Basitarsi mid brown in basal half, rest of tarsi very dark brown. Scapus mid brown. Pedicellus and following eight antennomeres brown basally and black apically. Rest of antennae black except for a transverse white band just before the apex. Eyes mid to dark brown.

Head: Suboval, 1.5x longer than wide, broadest just behind the eyes. Vertex flat, smooth and with an impressed median line. At posterior margin four short, impressed longitudinal lines. Between the bases of the antennae with a distinct, roughly semi-circular impression. Eyes circular and projecting hemispherically, their length contained about 3x in that of cheek. Antennae very long, almost reaching to posterior margin of abdominal tergite IV. Scapus about 1.5x longer than wide. Pedicellus gradually narrowed towards the apex and about 2/3 the length of scapus. 3<sup>rd</sup> antennomere as long but distinctly narrower than pedicellus, cylindrical. Following antennomeres first increasing then slightly decreasing in length towards apex of antennae.



**Figs 51-58:** *Lonchodiodes eurycanthoides* sp. n.: **51.** ♀ PT (coll. FH); **52.** ♂ HT (ZSMC); **53.** ♂ HT, apex of abdomen ♂ (lateral view); **54.** apex of abdomen ♂ (dorsal view); **55.** apex of abdomen ♀ (lateral view); **56.** apex of abdomen ♀ (dorsal view); **57.** right hind leg; **58.** metafemur (ventral view).

Thorax: Pronotum shorter and narrower than head, very slightly narrowing towards the posterior and about 1.2x longer than wide. Transverse median depression distinct and almost straight, just not reaching to lateral margins of segment. Over complete length of segment with a slightly impressed longitudinal median line. Mesothorax widened posteriorly and almost 2.5x longer than head and pronotum combined. Metathorax structured like mesothorax but distinctly broader, constricted medially and conspicuously broadened in posterior portion. Metanotum slightly less than half as long as mesonotum; roughly 3.5x longer than wide.

Abdomen: Median segment slightly less than 1/3 the length of metanotum, slightly wider than long, very indistinctly granulose. Longitudinal median carina rather distinct on VII-X. Sternites smooth. Segments II-VI slightly increasing in length, II 1.5x and VI almost 2.5x longer than wide. VII slightly shorter and narrower than VI. Tergite VIII 2/3 the length of VII and 1.8x longer than wide, strongly convex and constricted medially; anterolateral angles gently rounded. IX 3/5 the length of VIII, strongly convex, parallel-sided and indistinctly longer than wide. Anal segment slightly longer than IX, parallel-sided and the posterior margin with a shallow,

concave excavation; posterolateral angles obtuse. Supraanal plate prominent, rounded, slightly wider than long and with a distinct median keel; projecting considerably over apex of anal segment (Fig. 54). Subgenital plate strongly narrowed basally, strongly keeled over complete length and boat-like in posterior half; apex rounded and very slightly projecting over posterior margin of anal segment (Fig. 53).

**Legs:** All of moderate length, profemora slightly shorter than mesothorax, mesofemora about as long as metanotum and median segment combined and metatibiae slightly projecting over posterior margin of abdominal tergite VI. Profemora just very gently compressed and curved basally, medioventral carina distinct. Mesofemora and metafemora distinctly broader than corresponding tibiae, the two outer ventral carinae with a distinct, straight, black sub-apical spine, followed by one or two further very minute tooth (more distinct on metafemora). Lateral surfaces of metafemora gently convex. Medioventral carina prominent and set with a longitudinal row of minute granules. Ventral carinae of meso- and metatibiae granulose. Meso- and metabasitarsi slightly longer than following three tarsomeres combined, probasitarsus almost as long as remaining tarsomeres.

♂♂ (**Fig. 52**): Medium-sized to large (body length 78.5-110.1 mm), very robust (maximum body width measured just before metacoxae 6.5-7.5 mm) for the genus, with prominently thickened metafemora and basally down-curving metatibiae. Body surface densely but very minutely granulose (more sparingly on abdomen) and strongly glabrous. General colouration of body and great parts of femora pale greyish green, abdomen slightly brownish, tergites VIII and IX pale brown. Head, pronotum, prosternum, posterior sections of meso- and metanotum, median segment, Subgenital plate, all coxae, knees and apices of all tibiae yellowish mid brown. Lateral margins of abdominal tergite IX and anal segment glossy black, the latter with a triangular, brown lateral marking close to anterior margin. Posterior margin of median segment and anterior margins of tergites VII-IX with a transverse black band, broadest on VIII. Bases of all femora and most parts of tibiae apple green. Tarsi brown and becoming black towards apices. Cerci black. Scapus, pedicellus and following 8 antennomeres mid brown, remaining black except for a transverse white band just before the apex. Eyes creamish mid brown.

**Head:** Generally as in ♀♀ but eyes projecting more prominently, length contained about 2.5x in that of cheek. Antennae reaching to posterior margin of abdominal tergite V.

**Thorax:** Pronotum generally as in ♀♀. Mesothorax conspicuously widened posteriorly, 2.8x longer than head and pronotum combined. Metathorax structured like mesothorax but broader, medially constricted and widened anterior and posteriorly, posterior portion swollen. Metanotum about half as long as mesonotum and with median carina more distinct; about 3.5x longer than wide.

**Abdomen:** Median segment roughly quadrate and  $\frac{1}{4}$  the length of metanotum. Tergites II-VIII very minutely granulose and with a very shallow median line, IX destitute of granules. Segment II about 2x longer than median segment and gradually narrowing towards the posterior. II-VI of equal length, all slightly constricted medially and in average about 2x longer than wide. VII somewhat shorter than previous. Tergite VIII slightly shorter but broader than VII, gradually widening towards the posterior and trapezoidal in dorsal aspect. IX shorter than VIII, transverse and almost 2x broader than III-VII, lateral margins gently rounded. Anal segment prominently cleft over complete length, almost as long as VIII and IX combined. Semi-tergites in-curving, the posterior half slender, down-curving and slightly tapering towards a rounded tip (Fig. 55). Interior surfaces densely armed with minute black teeth (Fig. 56). Outer lateral surfaces with a prominent longitudinal median impression and lower outer margin swollen. Cerci elongate and slightly in-curving. Poculum small, cup-like and not reaching to posterior margin of tergite IX.

**Legs:** Fore and mid legs generally as in ♀♀. Metafemora very prominently thickened with the lateral surfaces convex, more than 3x wider than corresponding tibiae. Two outer ventral carinae sparingly granulose and with the same black sub-apical spines seen on the mesofemora, but much more prominent and with the anterior spine often conspicuously enlarged. Medioventral carina forming a prominent longitudinal keel, armed with a dense row of minute tubercles (Fig. 58). Metatibiae conspicuously curved basally (Fig. 57), the two outer ventral carinae sparingly granulose, the medioventral carina with a dense row of minute tubercles. Tarsi as in ♀♀.

**Comments:** Eggs unknown.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	94.8	78.5-110.1	95.2-115.4
Head:	5.1	4.8-5.4	5.5-6.5
Pronotum:	4.0	3.8-4.4	4.3-4.5
Mesonotum	23.0	19.3-26.0	21.1-25.5
Metanotum:	11.8	11.1-14.5	10.2-12.8
Median segment:	3.0	2.9-3.8	3.8-4.4
Profemora:	21.6	18.2-23.5	18.9-22.6
Mesofemora:	15.9	14.2-16.9	15.3-17.1
Metafemora:	19.3	17.5-21.4	17.8-19.0
Protibiae:	23.1	22.0-26.7	21.1-24.5
Mesotibiae:	16.9	14.6-19.7	16.3-17.3
Metatibiae:	21.9	19.7-24.5	19.7-21.1
Antennae:	> 4.0	67.0-76.0	68.0-77.0

**Table 8:** Measurements of *Lonchodiodes eurycanthoides* sp. n. [mm]

***Lonchodiodes grandis* sp. n.**

(Figs 59-67)

**Holotype**, ♂: Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII.1997, ex coll. FH (ZSMC).

**Paratypes (50 ♂♂, 50 ♀♀, 10 Eggs):** 1 ♂, 1 ♀: Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII.1997, ex coll. FH (UPPC); 1 ♂, 2 ♀♀: Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII.1997, ex coll. FH (ZSMC); 1 ♂, 1 ♀: Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII.1997, ex coll. FH (NHMW); 1 ♂, 2 ♀♀: Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII.1997, ex coll. FH (BMNH); 20 ♂♂, 18 ♀♀, 1 egg (ex ovipositor), 5 eggs (ex abdomen): Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII.1997 (coll. FH 0374-1 to 38, E & ED), 25 ♂♂, 25 ♀♀, 4 eggs: Philippinen, Panay Isl., Mt. Nangtud, 1500 m, leg. Mohagan VII.1997 (coll. OC); 1 ♂: Philippines, Panay Island, 17.VI.1998, purchased from dealer, IV.2000 (coll. PEB, No. 3031); 1 ♀: Philippines, Panay Island, P.E. BRAGG 19.VI.1998, purchased from dealer, IV.2000 (coll. PEB, no. 3032).

**Etymology:**

The name “*grandis*” (lat. = large) refers to the large size of this new species.

**Differentiation:**

Closely related to *Lonchodiodes samarensis* sp. n. from Samar and *L. tagalicus* (STÅL, 1877). From the first it is easily distinguished by: the larger size, relatively longer body segments and lack of distinct spines on the head of both sexes as well as shorter cerci and shorter, broader and roughly triangular lobes of the anal segment of ♂♂. The eggs differ by their larger size, finer network of raised ridges of the capsule, less posteriorly broadened micropylar plate and much higher, distinctly stalked capitulum.

From *L. tagalicus* (STÅL) ♂♂ are at once distinguished by: the distinctly larger size; less elongate head; relatively shorter and slightly broader legs; much shorter, roughly triangular lobes of the anal segment; green legs and lacking red bases of the meso- and metafemora.

**Description:**

♀♀ (**Fig. 59**): Large to very large (body length 116.0-148.5 mm), very elongate and slender (average body width 4.7-5.5 mm) for the genus. Body surface very finely granulose (more sparingly on abdomen) and slightly glabrous. General colouration of body and legs plain yellowish pale to mid brown or dull green. Head greenish brown or brown, eyes dark reddish brown. Meso- and metapleurae and sterna slightly darker than rest of body. Abdominal tergite VIII with a faint pale posterolateral marking. Meso- and metafemora with a more or less distinct pale transverse band close to the apex. Scapus and pedicellus greenish brown to brown, following antennomeres brown but soon becoming darker and finally black in the apical half of antennae; apices straw.

Head: Slightly oval, 1.5x longer than wide, broadest behind eyes. Vertex flat, sparingly and very minutely granulose, and dorsally with an impressed median coronal line. Posterior margin with a pair of lateral longitudinal impressions and two rounded  $\pm$  distinct tubercles. Between the bases of the antennae with a prominent semi-circular impression and between the eyes with a pair of small spiniform tubercles. Eyes circular and projecting hemispherically, their length contained slightly less than 3x in that of cheek. Antennae reaching about half way along abdominal tergite II. Scapus becoming almost cylindrical towards the apex, 2x longer than wide. Pedicellus about 1/3 the length of scapus, distinctly club-like and just slightly longer than wide. Third antennomere narrower and about 2x longer than pedicellus. Following antennomeres decreasing in length towards apices of antennae.

Thorax: Pronotum  $\frac{3}{4}$  the length and slightly narrower than head, 1.3x longer than wide and slightly constricted medially. Transverse median depression very distinct, slightly curved and covering complete width of segment. Anterior margin raised and followed by a distinct transverse furrow; occasionally with a pair of median tubercles. Median line impressed and well decided in anterior  $\frac{2}{3}$  of segment. Mesothorax about 2.8x longer than head and pronotum combined, complete surface minutely but densely granulose. Longitudinal median carina of mesonotum moderately well decided. Metanotum less than half the length and structured like mesonotum.

Abdomen: Median segment about  $\frac{1}{5}$  the length of metanotum, 1.3x broader than long, densely granulose and with a fine longitudinal median carina. Segments II-VI of uniform width, II-V slightly increasing in length, II 1.8x and V more than 2x longer than wide. VI as long as IV. VII narrower than previous and about 3.5x longer than wide. Praeopercular organ formed by a short and faint median ridge at posterior margin of sternite VII. Tergite VIII slightly less than  $\frac{2}{3}$  the length of VII about 2.5x longer than wide and with the anterolateral angles considerably expanded. IX less than half the length of VIII, strongly convex and parallel-sided. Anal segment slightly longer than IX, gently narrowed towards the posterior and with the median carina more distinct than on previous tergites. Posterior margin excavated broadly triangular, posterolateral angles triangular. Supraanal plate rounded and with a distinct median keel, often with a slight posteromedian notch; slightly projecting over apex of anal segment (Fig. 62). Subgenital plate strongly narrowed in basal half, strongly keeled and boat-like in posterior half and very slightly projecting over posterior margin of anal segment; apex acute (Fig. 61).

Legs: All long and slender, profemora shorter than mesothorax, metafemora slightly longer than metanotum and metatibiae reaching about half way along tergite VIII. Medioventral carina of all femora distinct. Two outer ventral carinae of meso- and metafemora each with a black, triangular sub-apical tooth, followed by one or two further but much smaller teeth (Fig. 65). Basitarsi about as long as following three tarsomeres combined.

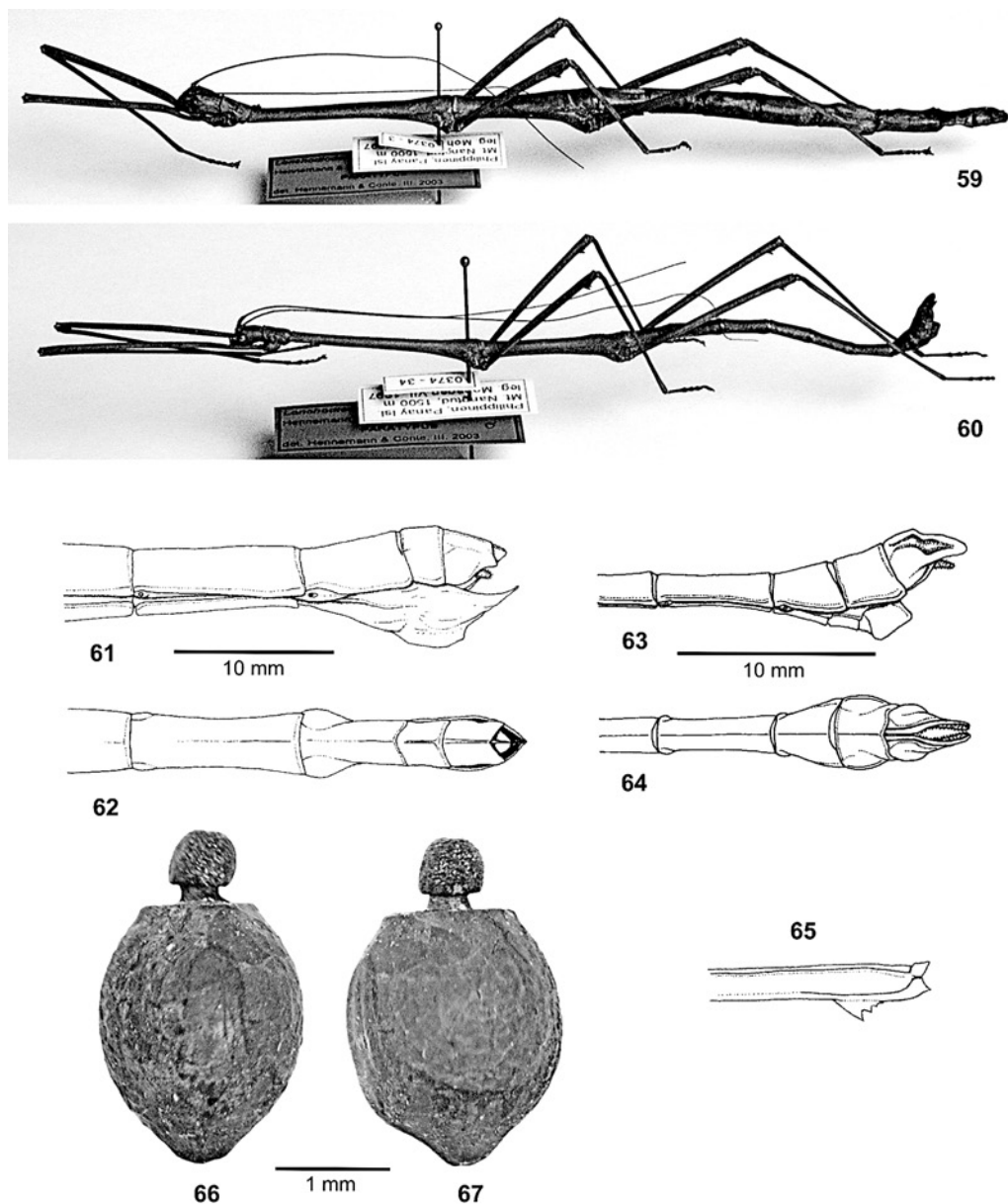
$\sigma\sigma$  (Fig. 60): Medium-sized to large (body length 100.0-115.0 mm), very slender and elongate (average body width 1.7-2.1 mm) for the genus. Body surface densely but minutely granulose (more sparingly on abdomen). General colouration of the body plain yellowish pale to mid brown, abdomen darker. Head greyish brown, eyes dark yellowish to orange brown. Abdominal tergites VIII-X dark brown, apex of anal segment black. Femora and tibiae mid green and brown apically. Femora with a very faint pale, transverse band shortly before the apex. Antennae brown and becoming black towards the apices; these straw.

Head: Generally as in  $\text{♀♀}$ , but less granulose and with the spiniform tubercles between the eyes just represented by blunt tubercles. Eyes prominent, relatively larger than in  $\text{♀♀}$  and projecting hemispherically, their length contained less than 2.5x in that of cheek. Antennae as in  $\text{♀♀}$  but reaching to posterior margin of abdominal tergite V.

Thorax: Pronotum as in  $\text{♀♀}$ . Mesothorax very elongate and distinctly broadened posteriorly, about 3.2x longer than head and pronotum combined. Mesonotum with longitudinal median carina very faint. Metathorax structured like mesothorax, broadened at anterior and posterior margins. Metanotum less than  $\frac{2}{3}$  the length of mesonotum and almost 10x longer than wide, anterolateral angles with a small, rounded swelling.

Abdomen: Median segment roughly quadrate with anterior margin slightly rounded, its length contained about 6x in that of metanotum. Complete surface densely granulose and with a faint longitudinal median carina. Segment II 2x longer than median segment. II-VII of equal width. II-VI very slightly increasing in length, in average 4x longer than wide. VII very gently widened towards the posterior and as long as VI. Tergite VIII  $\frac{2}{3}$  the length of VII and decidedly widened towards the posterior. IX 2x broader





**Figs 59-67: *Lonchodiodes grandis* sp. n.: 59. ♀ PT (coll. FH); 60. ♂ PT (coll. FH); 61. apex of abdomen ♀ (lateral view); 62. apex of abdomen ♀ (dorsal view); 63. apex of abdomen ♂ (lateral view); 64. apex of abdomen ♂ (dorsal view); 65. apex of right mesofemur ♀; 66. egg dorsal view; 67. egg lateral view.**

than II-VII, about as long as VIII, lateral margins gently convex. Anal segment slightly longer than IX, strongly tectiform. Semi-tergites moderately elongate, gradually tapered, roughly triangular and with the apex rounded (Fig. 63); interior surfaces densely covered with back-curving black teeth (Fig. 64). Cerci short, slender, gradually tapered towards and with the apex slightly club-like and in-curving. Poculum with a faint median carina in posterior half and slightly projecting over posterior margin of tergite IX.

Legs: All very long and slender, profemora slightly longer than mesothorax, mesofemora as long as mesonotum und median segment combined, hind legs projecting considerably over apex of abdomen. Medioventral carina of all femora distinct. Two outer ventral carinae of meso- and metafemora with two sub-apical spines, the apical one much smaller. Basitarsi slightly longer than following three tarsomeres combined.

#### Eggs (Figs 66 & 67):

Large for the genus, very similar to the type-species *L. samarensis* **sp. n.**. General colouration of capsule and operculum very slightly glabrous mid to dark brown; raised ridges of capsule paler brown. Micropylar plate dark greyish brown, capitulum glabrous black. Capsule ovoid, 1.3x longer than wide and slightly oval in cross-section. Polar-area strongly convex and forming a roughly conical hump. Complete surface very minutely granulose, the capsule with an irregular network of fine raised ridges. Micropylar plate positioned centrally on dorsal egg-surface, slightly raised from capsule and covering almost 2/3 of capsule length. Longer than wide, oval and very slightly narrowed towards anterior end; broadest at micropylar cup. Outer margin broadly raised. Posterior end with a minute, triangular median gap and a short but distinctly raised median line. Micropylar cup positioned in tip of posterior gap of plate, granule-like. Operculum oval, slightly concave with outer margin raised and disc very minutely granulose. Capitulum very prominent, mushroom-like about half as broad as operculum, rugulose in anterior half and with a faint central impression. Stalk prominent and broadened towards the base.

Measurements (in mm): Length 3.2, length (including capitulum) 4.4, width 2.6, height 2.8, length of micropylar plate 2.1.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	107.0	100.0-115.0	116.0-148.5
Head:	4.9	4.8-5.0	6.2-7.9
Pronotum:	3.7	3.6-4.0	4.8-5.2
Mesonotum	26.9	24.8-28.0	17.3-31.5
Metanotum:	17.8	15.3-18.0	15.0-19.6
Median segment:	3.2	3.2-3.4	4.2-4.9
Profemora:	28.0	25.0-30.0	25.8-33.0
Mesofemora:	21.5	19.6-22.3	19.8-23.0
Metafemora:	25.0	24.1-27.0	23.5-26.4
Protibiae:	36.9	28.4-32.2	27.3-31.8
Mesotibiae:	22.5	20.1-22.2	18.7-21.1
Metatibiae:	30.1	26.1-30.0	24.0-27.4
Antennae:	82.0	77.0-84.0	76.0-87.0

**Table 9:** Measurements of *Lonchodiodes grandis* **sp. n.** [mm]

#### *Lonchodiodes samarensis* **sp. n.**

(Figs 68-76, 137)

**Holotype**, ♂: ex. Zucht F. H. HENNEMANN, 2003, Philippines, Northern Samar Id., Bobon, sealevel, ex coll. FH (ZSMC).

**Paratypes (55 ♂♂, 52 ♀♀, eggs):** 2 ♂♂, 2 ♀♀, 4 eggs: ex. Zucht F. H. HENNEMANN, 2003, Philippines, Northern Samar Id., Bobon, sealevel, ex coll. FH (UPPC); 2 ♂♂, 2 ♀♀, 4 eggs: ex. Zucht F. H. HENNEMANN, 2003, Philippines, Northern Samar Id., Bobon, sealevel, ex coll. FH (NHMW); 2 ♂♂, 2 ♀♀, 4 eggs: ex. Zucht F. H. HENNEMANN, 2003, Philippines, Northern Samar Id., Bobon, sealevel, ex coll. FH (BMNH); 1 ♂, 2 ♀♀, 4 eggs: ex. Zucht F. H. HENNEMANN, 2003, Philippines, Northern Samar Id., Bobon, sealevel, ex coll. FH (ZSMC); 21 ♂♂, 18 ♀♀, 2 ♂♂, 2 ♀♀ in copula, eggs: ex. Zucht F. H. HENNEMANN, 2003, Philippines,

Northern Samar Id., Bobon, sealevel (coll. FH 0491-1 to 40 & E); 25 ♂♂, 25 ♀♀: ex Zucht O. CONLE 2003-2004, Philippinen, Samar Id., Bobon (coll. OC); 2 ♂♂, 2 ♀♀, 2 eggs: PSG 230, Origin Philippines, captive bred P.E. BRAGG 2001 (coll. PEB, No's 3258, 3259, 3354 & 3355).

#### **Etymology:**

Named after the type-locality Samar Island.

#### **Differentiation:**

Similar to *L. grandis* **sp. n.** from Panay, *L. trollius* (WESTWOOD) from Luzon and *L. tagalicus* (STÅL). From the first it differs by: the smaller size; less elongate and relatively shorter body segments; distinct but blunt spines on the head and colouration of both sexes; more elongate cerci and longer, more slender semi-tergites of the anal segment of ♂♂. The eggs are very similar to those of *L. grandis* **sp. n.** but differ by the smaller size, more prominent raised ridges and wrinkles of the capsule, more prominently posteriorly broadened micropylar plate and smaller capitulum.

From *L. trollius* (WESTWOOD) it differs by: the less prominent spines of the head and relatively longer, more slender legs of both sexes, less strongly keeled subgenital plate of ♀♀; more elongate and slender lobes of the anal segment and different colouration of ♂♂ which have the femora green and great parts of the anal segment black instead of being entirely plain reddish brown. The eggs are easily distinguished by the smaller size, more ovoid general shape and wrinkled instead of deeply punctured capsule surface.

From *L. tagalicus* (STÅL) ♂♂ are easily distinguished by: the less elongate and slender body; relatively shorter legs; blunt horns between the eyes; distinctly downcurving lobes of the anal segment and green legs (brown with reddish bases of meso- and metafemora in *L. tagalicus*).

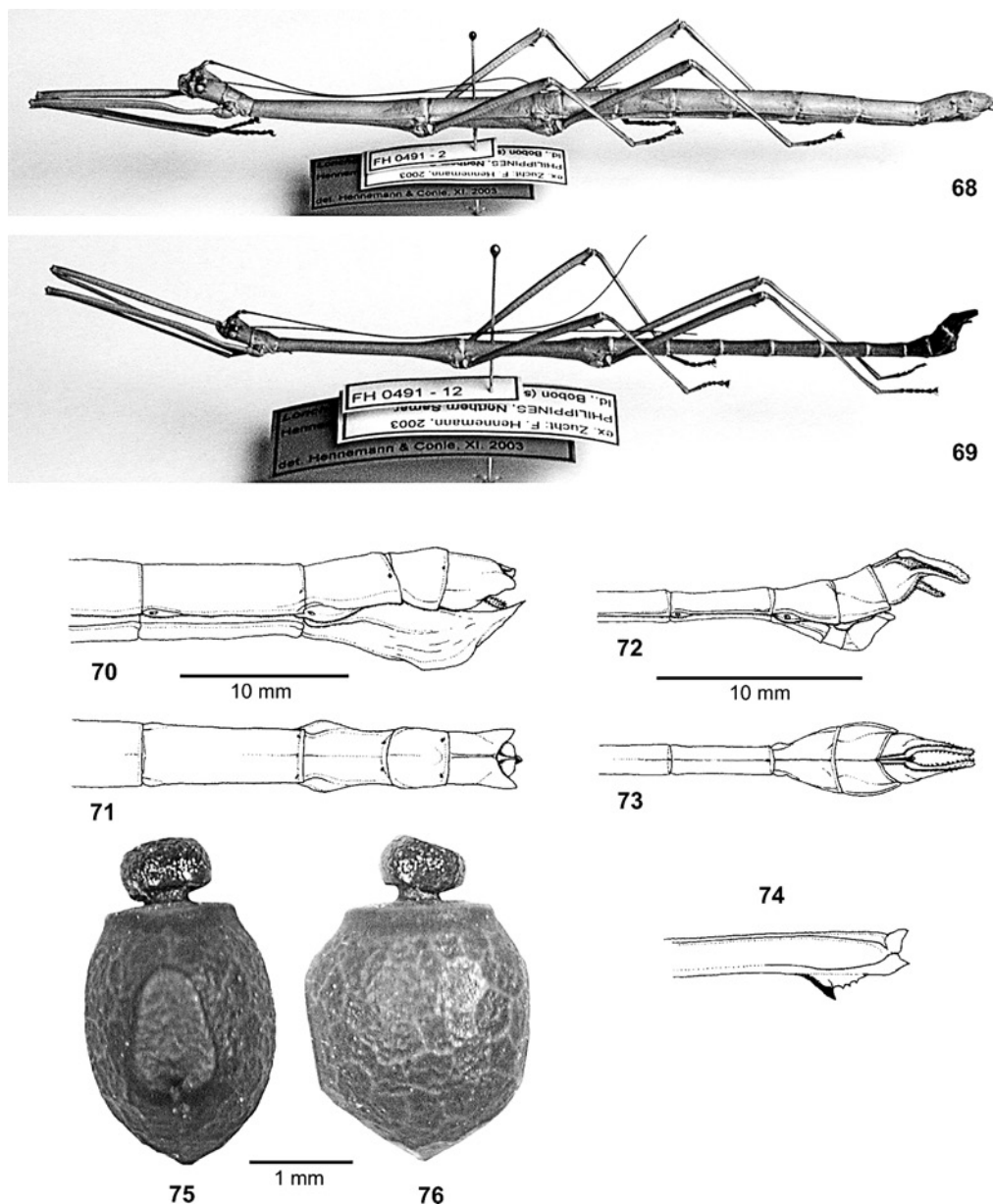
#### **Description:**

The colouration is described from live insects.

♀♀ (**Fig. 68**): Medium-sized (body length 111.0-134.5 mm), moderately elongate and slender (average body width 4.7-5.2 mm) for the genus. Body surface very minutely granulose (sparingly on abdomen) and slightly glabrous. General colouration of body and legs plain mid to dull green or brownish (darkening with age). Head greyish dark green (brown in older specimens), eyes reddish brown. Posterior margin of abdominal tergites II-VII pale grey (only in young specimens) and with four dark greyish spots. All sternites with irregular darker speckles and mottling, abdominal sternites II-IX with a bold, black posteromedian spot. Sternite VII darker than remaining, with lots of black mottling and a bold, roughly triangular white anteromedian marking. Meso- and metafemora with a more or less distinct pale transverse sub-apical band (distinct and whiteish in young and almost absent in older specimens), apex of each femur dark brown. Tarsi brown. Scapus and pedicellus very pale green (young specimens) or straw (older specimens) following antennomeres dark brown and soon becoming black, apex of each antennae with a white sub-apical band. The preserved specimens have slightly faded colours, are of a more yellowish colouration and have the described patterns less distinct.

Head: 1.5x longer than wide, broadest behind the eyes and slightly narrowed towards the posterior. Vertex flat and with a slightly impressed median coronal line. Between the bases of the antennae with two small but distinct and deep impressions. Between the eyes with a pair of blunt, forward pointing spines. Eyes circular and projecting hemispherically, their length contained slightly more than 2.5x in that of cheek. Antennae projecting over posterior of abdominal tergite II. Scapus with the apex club-like thickened and almost 2.5x longer than wide. Pedicellus about 1/3 the length of scapus, moderately club-like and indistinctly longer than wide. Third antennomere gradually narrowing and slightly longer than pedicellus. Following antennomeres first increasing then decreasing in length towards apices of antennae.

Thorax: Pronotum slightly shorter and narrower than head, 1.3x longer than wide and distinctly constricted medially. Transverse median depression prominent but not reaching lateral margins of segment. Anterior margin slightly raised and followed by a decided, transverse furrow. Anterior half of segment with an impressed median line. Mesothorax about 2.5x longer than head and pronotum combined, mesonotum with the longitudinal median carina very indistinct. Metathorax structured like mesothorax, 2/3 the length of mesonotum and more than 3x longer than wide.



**Figs 68-76:** *Lonchodiodes samarensis* sp. n.: 68. ♀ PT (coll. FH); 69. ♂ PT (coll. FH); 70. apex of abdomen ♀ (lateral view); 71. apex of abdomen ♀ (dorsal view); 72. apex of abdomen ♂ (lateral view); 73. apex of abdomen ♂ (dorsal view); 74. apex of right mesofemur ♀; 75. egg dorsal view; 76. egg lateral view.

Abdomen: Median segment about 1/4 the length of metanotum, slightly broader than long, densely granulose and with a very faint longitudinal median carina. Segments II-VII slightly increasing in length, II 1.8x and VII almost 3x longer than wide. Praeopercular organ formed by a faint posteromedian hump on sternite VII. Tergite VIII about 2/3 the length of VII and 2x longer than wide, the anterolateral angles roundly elevated. IX less than half the length of VIII, strongly convex and parallel-sided, slightly wider than long.

Anal segment almost 1.5x longer than IX, roughly parallel-sided, with the median carina more decided than on previous tergites. Posterior margin with a broad, roundly triangular excavation, posterolateral angles acutely triangular. Supraanal plate rounded and slightly transverse with a distinct median carina; not projecting over anal segment (Fig. 71). Subgenital plate strongly narrowed in basal half, keeled and boat-like in posterior portion and just reaching to posterior margin of anal segment; apex triangular (Fig. 70).

Legs: All moderately long and slender, profemora about as long as mesothorax, metafemora as long as metanotum and median segment combined and metatibiae reaching about 2/3 the way along tergite VI. Medioventral carina of femora faint. Two outer ventral carinae of meso- and metafemora with a triangular sub-apical spine, followed by 2-3 very minute teeth; all black (Fig. 74). Basitarsi about as long as following three tarsomeres combined.

♂♂ (**Fig. 69**): Medium-sized (body length 76.8-90.5 mm), slender and elongate (average body width 1.6-2.0 mm) for the genus. Body surface densely but minutely granulose (more sparingly on abdomen). Head greyish brown, eyes dark yellowish to orange brown. Pro-, meso- and metathorax pale greenish brown or dull green, anterior and posterior portions of meso- and metanotum pale to mid brown. Abdominal segment II greenish brown, the following turning to dark greyish brown, VII-X very dark brown to almost black. Anterior margin of lobes of anal segment black. Subgenital plate dark brown with a bold, oval whitish marking close to posterior margin. Femora green and becoming brown towards the apex. Tibiae greenish pale brown, tarsi brown. Scapus and pedicellus pale brown or straw, the following antennomeres dark brown and soon becoming black. Apex of each antenna with a white subapical band.

Head: Generally as in ♀♀, but spines between the eyes less prominent and pointed. The two pits between the bases of the antennae united to form a single, roughly semi-circular impression. Eyes relatively larger and projecting hemispherical, their length contained a little more than 2x in that of cheek. Antennae as in ♀♀ but reaching to abdominal tergite V.

Thorax: Pronotum generally as in ♀♀. Mesothorax distinctly broadened posteriorly, about 3.1x longer than head and pronotum combined. Metathorax structured like mesothorax, slightly broadened anteriorly and posteriorly. Metanotum about 2/3 the length of mesonotum and almost 7x longer than wide.

Abdomen: Median segment roughly quadrate with anterior margin strongly rounded, 5x shorter than metanotum. Segment II 2x longer than median segment. II-VII roughly of equal length and width, in average 3.5x longer than wide. All tergites with the longitudinal median carina well decided. VIII slightly longer than wide, 3/4 the length of VII and strongly widened towards the posterior. IX almost 3x broader than II-VII, as long as VIII, lateral margins gently rounded. Anal segment about 1.5x longer than IX, strongly tectiform. Semi-tergites very elongate, strongly tapered and angled down-ward in apical half, apex slender and rounded (Fig. 72). The outer margin swollen and lateral surfaces with a prominent longitudinal central impression; interior surfaces densely covered with back-curving black teeth (Fig. 73). Cerci rather slender, elongate and tapered towards the apex. Poculum with a faint median carina in posterior half; slightly projecting over posterior margin of tergite IX.

Legs: All very long and slender, profemora slightly longer than mesothorax, mesofemora as long as metanotum and median segment combined, hind legs projecting over apex of abdomen. Medioventral carina of femora faint. Two outer ventral carinae of meso- and metafemora with two sub-apical spines, the apical one considerably smaller. Basitarsi slightly longer than following three tarsomeres combined.

### Nymphs:

Newly hatched nymphs have a body length of 16 mm and exhibit an attractive colouration. The body, knees and great parts of the antennae are black, the legs generally dark red and the bases of all femora, apices of the antennae as well as the scapus and pedicellus white. Nymphs of later instars have the body rather dark grey than black and the legs brownish with a bright red sub-apical transverse band, the cerci being white. The pronotum has the lateral margin white in the anterior half and there are antero- and posterolateral white spots on the meso- and metanotum. With growth the nymphs become more greenish.

### Eggs (Figs 75 & 76):

Medium-sized for the genus, very similar to *L. grandis* sp. n.. General colouration slightly glabrous dark sepia brown; raised ridges of capsule paler brown. Operculum and capitulum black. Capsule ovoid, 1.6x longer than wide and slightly oval in cross-section. Polar-area convex and slightly angled if seen laterally. Complete surface very minutely granulose, the capsule with an irregular network of raised ridges. Micropylar plate positioned centrally on dorsal egg-surface, slightly raised from capsule and covering about half of

capsule length. Longer than wide, oval and gradually tapered towards anterior end; broadest at micropylar cup. Posterior end with triangular median gap and a short but distinctly raised median line. Micropylar cup positioned in tip of posterior gap of plate, granule-like. Operculum oval, flat with outer margin slightly raised and disc very minutely granulose. Capitulum prominent, about half as broad as operculum, irregularly knob-like, narrowed towards the base and with a distinct central impression.

Measurements (in mm): Length 3.0, length (including capitulum) 3.6, width 1.8, height 2.5, length of micropylar plate 1.6.

#### Comments:

In 2000 several specimens were collected in Bobon, Northern Samar Island by A. MALUCHE (Philippines). The collector reported this species to be exceptionally abundant in certain locations at sea-level and stated it to feed on a variety of low-growing plants. Subsequently, culture-stock has reached Europe and enthusiasts have been able to rear the species successfully, so it has recently been included on the Phasmid Study Group culture-list as culture No. 230 "*Carausius* sp.". It has proven pretty easy to rear and is productive if a humid environment, temperatures of at least 22°C and plenty of fresh food are offered. Alternative food-plants accepted in captivity in Europe include bramble (*Rubus* spp., Rosaceae), rose (*Rosa* spp., Rosaceae), pyracantha (*Pyracantha* spp., Rosaceae) and oak (*Quercus robur*, Fagaceae).

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	84.4	76.8-90.5	111.0-134.5
Head:	3.8	3.7-4.0	5.5-6.1
Pronotum:	2.8	2.8-3.0	4.3-5.1
Mesonotum:	20.0	17.3-22.9	23.8-28.1
Metanotum:	13.5	11.8-14.7	13.3-16.9
Median segment:	2.3	2.2-2.9	4.0-4.2
Profemora:	22.0	20.0-22.8	22.5-26.8
Mesofemora:	17.2	15.4-17.2	16.3-19.8
Metafemora:	20.1	18.3-24.8	19.2-23.0
Protibiae:	22.4	20.7-23.2	23.0-27.0
Mesotibiae:	16.5	15.0-17.3	16.4-17.9
Metatibiae:	20.7	19.9-22.4	20.3-23.0
Antennae:	± 58.0	57.0-65.0	60.0-70.0

**Table 10:** Measurements of *Lonchodiodes samarensis* sp. n. [mm]

#### *Lonchodiodes tagalicus* (STÅL, 1877) comb. n.

*Lonchodes tagalius* STÅL, 1877: 39. **ST**, 2 ♂♂: Ins. Philipp., Semper, *Lonchodes tagalicus* STÅL, Type (NHRS).

BRUNNER V. WATTENWYL, 1907: 259. [Description of supposed ♀]

BRUNER, 1915: 38.

OTTE & BROCK, 2005: 184.

*Staelonchodes tagalicus*, KIRBY, 1904: 318.

#### Differentiation:

Similar to *L. grandis* sp. n. from Panay and *L. samarensis* sp. n. from Samar. From the first it differs by: the smaller size (body length according to STÅL: 82.0-86.0 mm); more elongate head; relatively longer and more slender legs; more elongate and tapered semi-tergites of the anal segment; black antennae and reddish bases of the meso- and metafemora.

From *L. samarensis* **sp. n.** it can be distinguished by: the more slender and elongate body; relatively longer and more slender legs; more elongate and completely unarmed head; straight not down-curving semi-tergites of the anal segment; black antennae and reddish bases of the meso- and metafemora.

#### Comments:

STÅL (1877: 39) described *L. tagalicus* from two ♂♂ syntypes in NHRS, which do not bear any more precise data than "Ins. Philipp.". The type-specimens were only examined from photos kindly taken by Dr. K. A. JOHANSON (NHRS). The diagnosis given by STÅL is very brief and does not serve to distinguish *L. tagalicus* from related taxa, why a complementary diagnosis is here provided. ♂♂ are typical for the very slender and elongate body and legs, elongate and completely unarmed head, distinctly tapered lobes of the anal segment, plain yellowish brown general colouration with the bases of the meso- and metafemora being dark reddish and entirely black antennae. ♀♀ and eggs are not known.

#### *Lonchodiodes trollius* (WESTWOOD, 1859) **comb. n.** (Figs 77-84)

*Lonchodes trollius* WESTWOOD, 1859: 40, pl. 23: 1 (♂). **HT**, ♂: Phil Isl.; *Bacteria trollius* Westw; *Lonchodes trollius*, Westw., Philippine Islands (BMNH).

BRUNNER V. WATTENWYL, 1907: 261. [Description of supposed ♀]

BRUNER, 1915: 38.

OTTE & BROCK, 2005: 184.

*Staelonchodes trollius*, KIRBY, 1904: 318.

#### Material:

4 ♀♀, 2 eggs (ex ovipositor): Philippinen, N-Luzon Id., Mountain Province, Nueva Viscaya, Balite, leg. I. Lumawig, VII.1996 (coll. FH 0489-1 to 4 & E).

#### Differentiation:

Closely related to *L. samarensis* **sp. n.** but distinguished by: the slightly broader body, thickened meso- and metafemora, more prominent horns and posteromedian pair of tubercles or humps of the head and more densely granulose body surface of both sexes; distinct whiteish annulations and speckles of the legs, densely granulose abdominal tergites and lack of a longitudinal median carina of the body of ♀♀ as well as slightly broader, less elongate semi-tergites of the anal segment and plain reddish brown colouration of ♂♂. The eggs clearly distinguish *L. trollius* (WESTWOOD) from *L. samarensis* **sp. n.** by the distinctive shape of the capsule, having several conspicuous impressions, a conically elevated polar-area and deep punctations of the surface.

#### Description:

The description of ♀♀ is based on the specimens in coll. FH, that of the ♂ on the unique HT in BMNH.

♀♀ (**Fig. 77**): Medium-sized (body length 126.0-135.5 mm), moderately elongate and slender (average body width 5.0-5.3 mm) for the genus. Body surface minutely but densely granulose (more sparingly on abdomen). General colouration of body and legs plain pale to dark brown. Legs with irregular, more or less distinct whitish or pale grey annulations and speckles; meso- and metafemora with a broad pale sub-apical transverse band. Eyes orange brown. Scapus and pedicellus pale to mid brown. Apex of each antenna with a white sub-apical band.

Head: 1.3x longer than wide, broadest at the eyes and weakly narrowed towards the posterior, vertex flat. Posterior margin with two or four blunt median tubercles. Between the bases of the antennae with a shallow, oval impression and between the eyes with a pair of rather prominent and acutely pointed spines (Fig. 82). Eyes circular and projecting hemispherically, their length contained almost 3.5x in that of cheek. Antennae reaching almost to posterior margin of median segment. Scapus about 2x longer than wide. Pedicellus 1/3 the length of scapus and indistinctly longer than wide. Third antennomere narrowing and almost 2x longer than pedicellus. Following antennomeres decreasing in length towards apices of antennae.

Thorax: Pronotum slightly shorter and narrower than head, 1.5x longer than wide and slightly constricted medially. Transverse median depression distinct, slightly curved and almost reaching to lateral

margins of segment. Anterior margin slightly raised and followed by a transverse furrow. Median line impressed and well decided over complete length of segment. Mesothorax about 2.8x longer than head and pronotum combined. Metathorax structured like mesothorax, slightly more than half the length of mesonotum, about 3x longer than wide.

Abdomen: Median segment about 1/4 the length of metanotum and slightly broader than long. Segments II-VII slightly increasing in length, II 1.8x and VII almost 2.5x longer than wide. Praeopercular organ formed by a very indistinct posteromedian granule on sternite VII. Tergite VIII half the length of VII, 2x longer than wide and with the anterolateral angles moderately elevated. IX less than half the length of VIII, strongly convex and slightly wider than long. Anal segment longer than IX, roughly parallel-sided and slightly tectiform. Posterior margin with a broad, concave excavation, the posterolateral angles broadly triangular. Supraanal plate rounded, slightly transverse and with a distinct median carina; just reaching to apex of anal segment (Fig. 80). Subgenital plate boat-like, convex and with a prominently elevated median keel in median portion, the apex acute and just reaching posterior margin of anal segment (Fig. 79).

Legs: All moderately long and rather robust, profemora about as long as mesothorax, metafemora as long as metanotum and median segment combined and hind tarsi reaching to posterior margin of tergite VII. Medioventral carina of femora distinct. Meso- and metafemora slightly thickened and considerably broader than corresponding tibiae; the two outer ventral carinae with a triangular sub-apical tooth, followed by two very minute teeth. Medioventral carina of meso- and metatibiae slightly rounded sub-basally. Basitarsi as long as following three tarsomeres combined.

♂♂ (**Fig. 78**): Medium-sized (body length 95.0 mm), moderately slender and elongate for the genus. Body surface with a densely but very finely granulose body surface (more sparingly on abdomen). Complete body and legs plain reddish mid brown. Vertex with five very fine dark brown longitudinal, parallel lines. Semi-tergites of anal segment more intensely and slightly glabrous reddish brown. Knees and apices of all tibiae dark brown. Eyes greyish mid brown. Antennae excluding the two basal segments dark brown.

Head: Generally as in ♀♀, but spines between their eyes less prominent and less acute. Eyes relatively larger and projecting hemispherically, their length contained about 2.3x in that of cheek. Posterior margin with four small, raised tubercles. Antennae as in ♀♀ and at least reaching to posterior margin of abdominal tergite II (broken in the HT).

Thorax: Pronotum generally as in ♀♀. Mesothorax distinctly broadened at posterior margin and about 3.5x longer than head and pronotum combined. Longitudinal median carina of mesonotum very faint. Metathorax structured like mesothorax, slightly broadened at anterior margin and towards the posterior. Metanotum about 2/3 the length of mesonotum and almost 7x longer than wide.

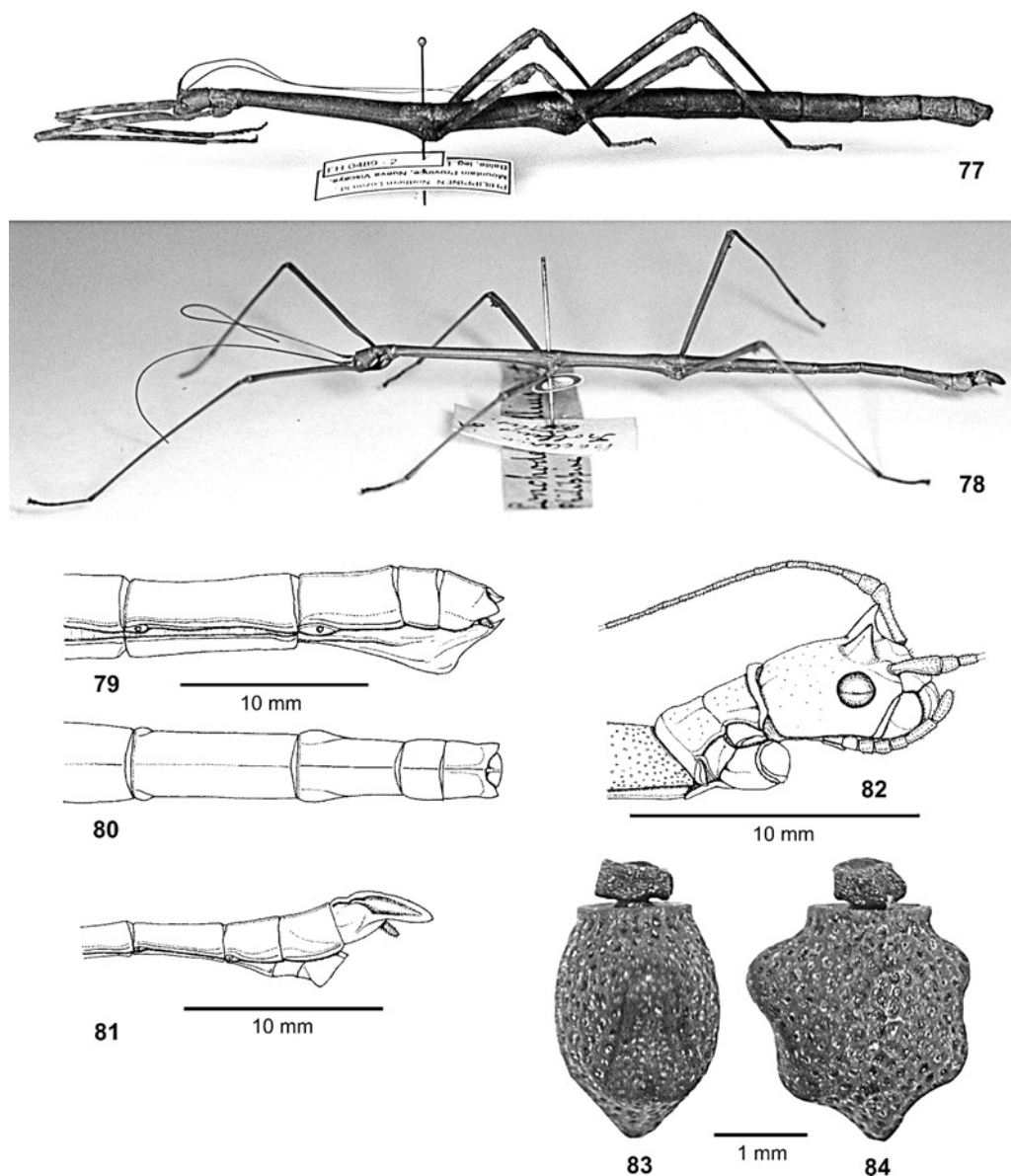
Abdomen: Median segment slightly longer than wide with anterior margin slightly rounded, 5x shorter than metanotum. Complete surface densely granulose and with a faint median carina. Segment II 4x longer than wide and almost 2x longer than median segment. II-VII of equal width and very slightly decreasing in length. All tergites with the longitudinal median carina faint on II-V and distinct on VI-IX. VIII roughly trapezoidal, 2/3 the length of VII and gradually widened towards the posterior. IX strongly broadest segment and almost 3x broader than II-VII, very slightly longer than VIII with lateral margins conspicuously rounded. Anal segment almost 2x longer than IX, strongly tectiform. Semi-tergites very elongate, gradually tapered towards a rather acute apex, slightly down-curving and strongly in-curving, especially in apical portion (Fig. 81). The outer margin swollen and lateral surfaces with a broad, longitudinal central impression; interior surfaces densely covered with minute teeth. Cerci rather short and stout, tapered towards a pointed apex and very gently in-curving. Poculum with a faint median carina in posterior half and slightly projecting over posterior margin of tergite IX.

Legs: All long and moderately slender, profemora slightly longer than mesothorax, mesofemora as long as mesonotum hind legs very slightly projecting over apex of abdomen. Meso- and metafemora slightly thickened. Medioventral carina of femora distinct. Two outer ventral carinae of meso- and metafemora with a distinct, slightly hook-like sub-apical spine and a very minute further spine close to the apex of femur (lacking on metafemora). Basitarsi slightly longer than following three tarsomeres combined.

#### **Eggs (Figs 83 & 84):**

Medium-sized for the genus and of a very distinctive shape. Capsule indistinctly longer than wide, oval in cross-section and with several conspicuous impressions. In lateral aspect a prominent impression is seen ventromedially, anterodorsally between the anterior margin and the micropylar plate, posterodorsally below the micropylar plate, and posteroventrally between the ventromedian impression and polar-area. A further,





**Figs 77-84:** *Lonchodiodes trollius* (WESTWOOD, 1859): 77. ♀ (coll. FH), 78) ♂ HT (BMNH); 79. apex of abdomen ♀ (lateral view); 80. apex of right mesofemur ♀; 81. apex of abdomen ♂ HT (lateral view); 82. head and pronotum of ♀; 83. egg, dorsal view; 84. egg, lateral view.

shallow impression is seen dorsomedially at the micropylar plate. Polar-area strongly convex, forming a conspicuous conical hump. Complete capsule surface covered with a dense network of irregular, raised ridges. Spaces inbetween impressed, smooth and glossy black. Raised ridges mid to dark brown and very minutely granulose (16x magnification). Micropylar plate situated centrally on dorsal egg surface and covering about half of capsule length. Broadest posteriorly at micropylar cup and gradually tapered towards anterior end. Posteriorly with a wide, concave impression and a minute median gap. Micropylar cup distinct,

median line very short. Colouration of micropylar plate dark brown with outer margin black. Surface with irregular, vein-like ridges which melt with each other towards the outer sections of the plate. Operculum oval, flat and minutely granulose; black. Capitulum prominent, irregularly knob-like with numerous distinct impressions and finely granulose; globrous dark brown.

Measurements (in mm): Length 2.8, length (including capitulum) 3.4, width 1.9, height 2.7, length of micropylar plate 1.9.

#### Comments:

WESTWOOD (1859: 40) described *Lonchodes trollius* based on a single ♂ which he recorded from “Manilla” (Luzon Id.) in BMNH and provided a nice illustration of the HT (plate 23: 1). BRUNNER V. WATTENWYL (1907: 261) described the supposed ♀ of *L. trollius* from a specimen in NHMW. Due to being considerably smaller (body length 72 mm compared to 90 mm for the ♂) the specimen described by BRUNNER V. WATTENWYL is clearly not WESTWOOD’s species. The ♀♀ from Northern Luzon (Nueva Viscaya) in coll. FH match very well with WESTWOOD’s ♂.

	HT, ♂ (BMNH)	♀♀ (coll. FH)
Body:	90.0	126.0-135.5
Head:	3.8	6.8-7.4
Pronotum:	2.9	4.9-5.1
Mesonotum	22.1	26.4-30.0
Metanotum:	14.0	16.3-18.0
Median segment:	2.8	3.9-4.0
Profemora:	24.0	25.9-29.1
Mesofemora:	16.3	19.5-20.4
Metafemora:	19.6	22.5-24.8
Protibiae:	25.6	27.0-28.9
Mesotibiae:	17.3	18.1-18.8
Metatibiae:	23.9	23.5-24.7
Antennae:	> 45.0	61.0-64.0

**Table 11:** Measurements of *Lonchodiodes trollius* (WESTWOOD) **comb. n.** [mm]

### *Periphetes* STÅL, 1877

**Type-species:** *Phasma graniferum* WESTWOOD, 1859: 35, pl. 3: 4, by original designation.

This interesting genus shows several typical features, that readily distinguish it from the related *Lonchodes* GRAY and *Lonchodiodes* **gen. n.** both of which are also represented in the Philippines. ♂♂ are typical for being strikingly bi-colourous, usually a combination of green and orange or rusty red, with the three terminal abdominal segments black (exception *P. parastatidon* GÜNTHER, → see below), having the semi-tergites of the anal segment considerably shorter than in these two genera with more acute, down-angled apices, and possessing a rather flat, just weakly convex poculum. ♀♀ are easily distinguished from these two genera by the ventral longitudinal median keel of the body and indistinctly keeled, posteriorly broadly rounded and scoop-shaped subgenital plate, which exhibits a conspicuous median impression basally. ♀♀ of certain species may have the abdomen ± prominent swollen medially. For a more detailed differentiation from related genera see table 5.

Only the eggs of the Sulawesi *P. forcipatus* (BATES) are known so far and differ from those of *Lonchodes* and *Lonchodiodes* **gen. n.** by the rounded polar-area and more prominent sponge-like or prismatic structures of the capsule surfaces.

*P. parastatidon* GÜNTHER, 1935 from the Latimodjong Mountain range of South Sulawesi differs considerably from all other known members of the genus and may prove to represent a distinct generic unity, once more material and the eggs become available for examination. Features which distinguish *P.*

*parastatidon* from the other species in the genus are: the comparatively much larger difference in the size-relation of ♂♂ and ♀♀; the conspicuously elongated abdominal segment VII whose sternite bears a distinct, scale-like structure close to the posterior margin (praeopercular organ) and decidedly down-curving meso- and metafemora of ♀♀, as well as the plain dull green general colouration and more elongate and slender semi-tergites of the anal segment of ♂♂.

The genus *Breviphetes* was established by ZOMPRO (1998: 162) to contain the New Guinean *P. rammei* GÜNTHER, 1929 and two newly described species, *B. rubrus* and *B. viridis*, both from the Torricelli Mountains, West Papua. It is obviously closely related to *Periphetes* but differs by: the much smaller size (body length < 50 mm) and comparatively broader, less elongate body of both sexes. ♂♂ furthermore differ by the differently shaped anal segment, which has the apical portion strongly laterally compressed, and ♀♀ lack the longitudinal median keel of the ventral body surface.

#### Distribution:

Philippines, Sulawesi & Sangihe Island (north of Sulawesi).

#### Species included:

1. *Lonchodes forcipatus* BATES, 1865: 338. [Sulawesi & Sangihe]  
     = *Lonchodes duivenbodei* KAUP, 1871: 30, pl. 2: 3 (♀).  
     = *Dixippus furcatus* BRUNNER V. WATTENWYL, 1907: 279. **syn. n.**  
     = *Periphetes sangirensis* DOHRN, 1910: 408. **syn. n.**  
     = *Periphetes duivenbodei elongatus* GÜNTHER, 1938: 58 & 75. **syn. n.**
2. *Phasma graniferum* WESTWOOD, 1859: 35, pl. 3: 4 (♀). [Philippines]  
     = *Lonchodes analis* BRUNNER V. WATTENWYL, 1907: 260.
3. *Lonchodes magayon* ZOMPRO, 2003: 28, figs 41-42, 56. **comb. n.** [Philippines]
4. *Periphetes parastatidon* GÜNTHER, 1935b: 11, pl. 1: 7 (♀) & 8 (♂). [Sulawesi]
5. *Periphetes quezonicus* **sp. n.** [Philippines]
6. *Periphetes* sp.\* [Sulawesi]

\* The two ♂♂ from Minhasa, Sulawesi in NHMB and referred to as “*Phasgania furcata* Br. 1907 subsp.” by GÜNTHER (1938: 74, fig. 14) were misidentified and are specifically distinct from *P. forcipatus* (BATES), which is confirmed by examination of the NHMB specimen. This was already suggested by GÜNTHER himself who stated they might be the ♂♂ of another, distinct species of *Periphetes*. They differ from *P. forcipatus* by the slightly smaller, size, considerably more slender body and legs, and different shape of the semi-tergites of the anal segment.

#### Keys to the Philippine species of *Periphetes*

♀♀\*

1. Small (body length usually < 100 mm); abdomen gently swollen medially, segment V widest . . . . . *P. graniferum*
- Larger (body length usually > 100 mm); abdominal segments II-VII parallel-sided . . . . . *P. quezonicus* **sp. n.**

\* ♀♀ of *P. magayon* (ZOMPRO) are not known

♂♂

1. Abdominal tergites VIII and IX at best gently widened . . . . . 2
- Abdominal tergites VIII and IX strongly expanded and rounded laterally, forming a large shovel-shaped structure . . . . . *P. graniferum*
2. Small (body length 72.0 mm) and rather broad species; mesothorax 3.5x longer than head and pronotum combined; femora orange brown with green apices . . . . . *P. magayon*
- Larger (body > 88.0 mm) and very slender; mesothorax 3.8x longer than head and pronotum combined; femora entirely green . . . . . *P. quezonicus* **sp. n.**

***Periphetes forcipatus* (BATES, 1865)**

(Figs 85-86, 93-94)

*Lonchodes forcipatus* BATES, 1865: 338. **LT** [by present designation], ♂: Men.; Wallace; E coll. (1830-73) W.W. Saunders, Purchased and pres. '73 by Mrs. F.W. Hope; *forcipatus* BATES (OXUM, No. 566); **PLT**, ♂: Tondano; Wallace; E coll. (1830-73) W.W. Saunders, Purchased and pres. '73 by Mrs. F.W. Hope; *forcipatus* BATES (OXUM, No. 566).

*Staelonchodes forcipatus*, KIRBY, 1904: 317.

HENNEMANN, 1998: 119.

*Periphetes forcipatus*, OTTE & BROCK, 2005: 259.

*Lonchodes duivenbodei* KAUP, 1871a: 30, pl. 2: 3 (♀). **LT**, ♂: Celebes, Menado, R. van Duivenbode (HLDH);

**PLT**, ♀: Celebes, Gorontalo, Riedel (HLDH). [Synonymised by ZOMPRO, 2001 b: 134]

KAUP, 1871b: 19, fig. 7 (egg).

*Periphetes* (?) *duivenbodei*, KIRBY, 1904: 320.

*Periphetes duivenbodei elongatus*, GÜNTHER, 1938: 58. **ST**, ♀: Zentral-Celebes, Posso-see, leg. Sarasin 2.1895;

*Periphetes duivenbodei elongatus* K. GÜNTHER det. (NHMB); **ST**, ♀: Celebes, Palopa (ZMHB – not traced) [mentioned as “*Periphetes duivenbodei* subsp. ?” on p. 75]. **syn. n.**

HENNEMANN & CONLE, 1999: 9.

*Periphetes duivenbodei*, HENNEMANN, 1998: 120.

ZOMPRO, 2001 b: 134, figs 5 & 6.

OTTE & BROCK, 2005: 260. [As synonym of *forcipatus*]

*Dixippus furcatus* BRUNNER V. WATTENWYL, 1907: 279. **HT**, ♂: Museum Paris, Célebes 2.15.77; Type; 70.

*Dixippus furcatus* Br. type (MNHN). **syn. n.**

*Periphetes sangirensis* DOHRN, 1910: 408. **ST**, 2 ♀♀: Insula Sangir, Platen leg. (ZMPA) **syn. n.**

GÜNTHER, 1929: 616.

LIANA, 1996: 5.

[**not** *Phasgania furcata*, GÜNTHER, 1935: 11, pl. 1: 6 (♂). **Misidentification** - This is clearly a distinct species and also not a member of *Periphetes* STÅL. The ♂ specimen from Body, Sulawesi in MNHU is likely to represent an as yet undescribed species of *Hermagoras* STÅL, 1875]

[**not** *Phasgania furcata* subsp., GÜNTHER, 1938: 74, fig. 14 (♂). **Misidentification** - This is clearly a distinct and undescribed species, differing by the smaller size, more elongate and slender body, differently shaped anal segment and colouration.]

**Material examined [23 ♂♂, 24 ♀♀, 4 nymph, 5 eggs]:**

1 ♀: New Guinea; *Periphetes sangirensis* DOHRN, K. GÜNTHER det. (NHMW, No. 552); 1 ♂: S-Sulawesi, Tana Toraja, Rantepao 700 m, leg. Gunawan X.1995 (coll. FH 0315-1); 1 ♂ (subadult): S-Sulawesi, Tana Toraja, leg. Tajuddin X.1995 – III.1996 (coll. FH 0315-2); 5 ♂♂, 5 ♀♀, 4 eggs: SE-Sulawesi, Buton, III.2001 (coll. FH 0315-3 to 12 & E); 16 ♂♂, 17 ♀♀, 1 ♀ nymph, 2eggs: Indonesien, Südost-Sulawesi, Buton, 2.2001 (coll. OC); 1 ♂, 1 ♀: Indonesien, Sulawesi, 6.2001 (coll. OC); 3 nymphs: Indonesien, Südost-Sulawesi, Saddam-Toraya, 2.11.2000 (coll. OC).

**Eggs (Figs 93 & 94):**

Two fully developed eggs were removed from the ovipositor's and three additional eggs extracted from abdomen's of ♀♀ in the author's collections. As the eggs of *Periphetes* STÅL are as yet unknown, a detailed description is provided below, based on the two fully developed examples. KAUP (1871 b: 19, fig. 7) provided a brief description and illustration of an egg extracted from the abdomen of the PLT of *L. duivenbodei* in HLDH, which appears to be lost.

Of moderate size for Lonchodinae, typically egg-shaped, capsule about 1.6x longer than wide, cylindrical in cross-section with the polar-area slightly flattened in lateral aspect. Entire capsule surface strongly sculptured and roughly prosituous, being covered with numerous small, crater-like impressions. Otherwise irregularly set with larger, roughly oval to almost circular impressed areas. Micropylar plate about half as long as capsule and positioned centrally on dorsal egg surface; the outer margin slightly raised. General shape oval, about 2x longer than wide, gradually narrowed in the anterior half with the apex acute, the posterior half broader. Surface with a cluster of irregular wrinkles in the centre some of which terminate

radially towards the outer margin of the plate. Micropylar cup placed at posterior end of plate, small and slightly cup-like. Median line distinct and reaching about half the way to the polar area. Operculum flat and almost cylindrical, in the centre with a prominent, irregularly hat-like capitulum on a distinct stalk. General colouration of the capsule mid grey to cream, the oval impressed areas black. Micropylar plate mid brown, operculum blackish and capitulum dull orange.

Measurements (in mm): Length 3.0, length (including capitulum) 3.4, width 1.9, height 2.0, length of micropylar plate 1.5.

#### Comments:

BATES (1865: 338) originally described *Lonchodes forcipatus* from two ♂♂ from Northern Sulawesi (Tondano & Menado) in OXUM of which the specimen from Menado is here selected as the LT in order to fix BATES's species. KAUP (1871a: 30) described his *Lonchodes duivenbodei* from a ♂ and ♀ also from Northern Sulawesi (Menado & Gorontalo), which is clearly the same as BATES's species and was synonymised by ZOMPRO (2001b: 134). Examination of the ♂ HT of *Dixippus furcatus* BRUNNER V. WATTENWYL, 1907 also from Sulawesi in MNHN leaves no doubt this is as well a junior synonym of *L. orcipatus* BATES species (**syn. nov.**). The two ♀ syntypes of *Periphetes sangirensis* DOHRN, 1910 from Sangihe Island north of Sulawesi are presumed to be deposited in ZMPA but were not examined for this study. Except for being slightly longer than the type ♀ PLT of *L. duivenbodei* KAUP from northern Sulawesi, which is caused by the latter specimen lacking the 8<sup>th</sup> abdominal segment) there are no significant differences that would leave *P. sangirensis* as a valid species. A ♀ with the doubtful data "Neu Guinea" in NHMW matches very well with the description, illustration and measurements given by DOHRN and is clearly conspecific with *L. duivenbodei*, thus confirming the synonymy of *P. sangirensis* with *L. forcipatus* BATES (**syn. nov.**).

*Periphetes duivenbodei elongatus* GÜNTHER, 1938 was described based on two ♀♀ from Central Sulawesi. In the check-list of species GÜNTHER (1938: 58) mentioned this name and at least one of the syntypic ♀♀ in NHMB bears a hand-written determination label of GÜNTHER with this name, but later on in the same paper (1938: 75) described the ♀♀ as "*Periphetes duivenbodei* subsp.?" The question mark and comments of GÜNTHER (1938: 77) show him to have been in doubt about the subspecies status and, if similar size-variation as in the Philippine *P. graniferum* (WESTWOOD, 1859) was taken into account, he stated these two ♀♀ would just be a variation of *P. duivenbodei*. The ♀ ST in NHMB matches very well with ♀♀ from SE-Sulawesi (Buton) in the author's collections, all of which are characteristic for being considerably longer (body lengths 85.0-92.0 mm, compared to 72.0-78.0 mm for specimens from Sangihe) and having the abdomen less prominently swollen than in e.g. the PLT of *P. duivenbodei* and ♀♀ from Sangihe. ♂♂ from Buton however, do not show any significant differences from typical *P. forcipatus* (BATES), except for having the knees less decidedly orange and being somewhat longer (body lengths 77.5-82.0 mm, compared to e.g. 60.0 mm for the LT of *L. duivenbodei*). Consequently, GÜNTHER's subspecies can be regarded merely a geographic variety and is consequently a junior synonym of *P. forcipatus* (BATES).

#### Variation:

*P. forcipatus* (BATES) is quite variable concerning to the size, degree of the median swelling of the abdomen of ♀♀ and colouration of the femora of ♂♂. As discussed above, specimens from Sangihe and Northern Sulawesi are comparatively shorter and ♀♀ have the abdomen much more strongly swollen medially. In general specimens tend to become longer and slightly more slender towards the more southern regions of the geographic pattern of this species, although none of the ♀♀ at hand from Buton is in full egg-production. The specimen here figured (Fig. 85) is a very young ♀ which had not begun to produce eggs when it was captured. The in-curving lateral margins of the abdominal tergites and large intersegmental membranes show the abdomen could become apparently swollen when in full egg-production, perhaps in an almost similar degree to specimens from e.g. Sangihe. The colouration of ♀♀ varies from mid to olive or dull green, more rarely apple green specimens may occur. Some specimens may have a more or less decided brown or aubergine-coloured longitudinal median stripe on the dorsal surface of the thorax, most prominent on pronotum. ♂♂ are rather constantly yellowish to reddish brown with the legs mid to dark green, the head, pronotum and abdomen often greenish to a variable degree. The apices of the femora are distinctly orange in typical *P. forcipatus* from Northern Sulawesi (♂♂ from Sangihe are not known), dark brown in a ♂ from the Tana Toraja Highland, Central Sulawesi, and just with a slight orange hue in specimens from Buton, Southeast Sulawesi. The HT of *Dixippus furcatus* BRUNNER V. WATTENWYL, 1907 in NHMW has lost its typical colours due to a provisional preservation in ethanol.

***Periphetes graniferum* (WESTWOOD, 1859)**

(Figs 95-96)

*Phasma graniferum* WESTWOOD, 1859: 35, pl. 3: 4 (♀). **HT**, ♀: Type; Phil Isl. 42-22; *Phasma graniferum* WESTW.; *Periphetes* (BMNH).

*Periphetes graniferum*, STÅL, 1877: 40.

WOOD-MASON, 1876: 47.

KIRBY, 1904: 320.

BRUNNER V. WATTENWYL, 1907: 262. [Synonymised with *Lonchodes trollius* WESTWOOD, 1859 in error]

OTTE & BROCK, 2005: 260.

*Periphetes granifer*, GÜNTHER, 1935a: 125, fig. 1 (♂).

*Lonchodes analis* BRUNNER V. WATTENWYL, 1907: 260. **LT** [by present designation], ♂: 3222; 62, 3222, Luzon, Jagor, *Lonchodes analis* Brunner det. (MNHU); **PLT**, ♂: 63, 3222, Luzon, Jagor, *Lonchodes analis* Brunner det. (MNHU). [Synonymised by GÜNTHER, 1935a: 125]

**Material examined [4 ♂♂, 3 ♀♀]:**

3 ♂♂, 2 ♀♀: Philippinen, Mindanao Island, 08.2006, (coll. OC); 1 ♂: Philippinen, Northern Luzon, Mountain Province, Nueva Viscaya, Balite, leg. I. O. Lumawig IV. 1996 (coll. FH, No. 0371-1); 1 ♀: 3219, *graniferum* Westw., Luzon, Jagor (MNHU).

WESTWOOD (1859: 35) originally described *Phasma graniferum* from a unique ♀ in the BMNH, which lacks both front legs. STÅL (1877: 40) established the genus *Periphetes* and designated WESTWOOD's species as the genotype. GÜNTHER (1935a: 125) having specimens of both sexes from the same locality at hand, recognised *Lonchodes analis* BRUNNER V. WATTENWYL, 1907 to represent the opposite sex and provided an illustration of the ♂. The HT in BMNH is from an unknown locality and all the specimens at hand for examination originate from differently localities in Luzon. GÜNTHER (1935a: 125) also recorded it from Surigao, Mindanao. Both sexes show considerable size variation even in one locality: body lengths ♂♂ 64.0-94.0 mm, ♀♀ 76.0-98.0 mm.

♂♂ are very well characterized by the strongly laterally expanded abdominal tergites VIII and IX, which in dorsal aspect together form an almost circular, shovel-shaped structure (Fig. 96).

***Periphetes quezonicus* sp. n.**

(Figs 87-92)

**Holotype**, ♂: Philippines, Luzon Id., Infanta, Quezon, VI.2003, leg. I. Lumawig, ex coll. OC (ZSMC).

**Paratypes** (5 ♂♂, 3 ♀♀): 4 ♂♂, 3 ♀♀: Philippines, Luzon Id., Infanta, Quezon, VI.2003, leg. I. Lumawig (coll. OC); 1 ♂: Ex Zucht 2003, Zuchtstamm aus Philippines, Luzon Id., Infanta, Quezon, (coll. OC).

**Etymology:**

Named after the type-locality Quezon, Luzon.

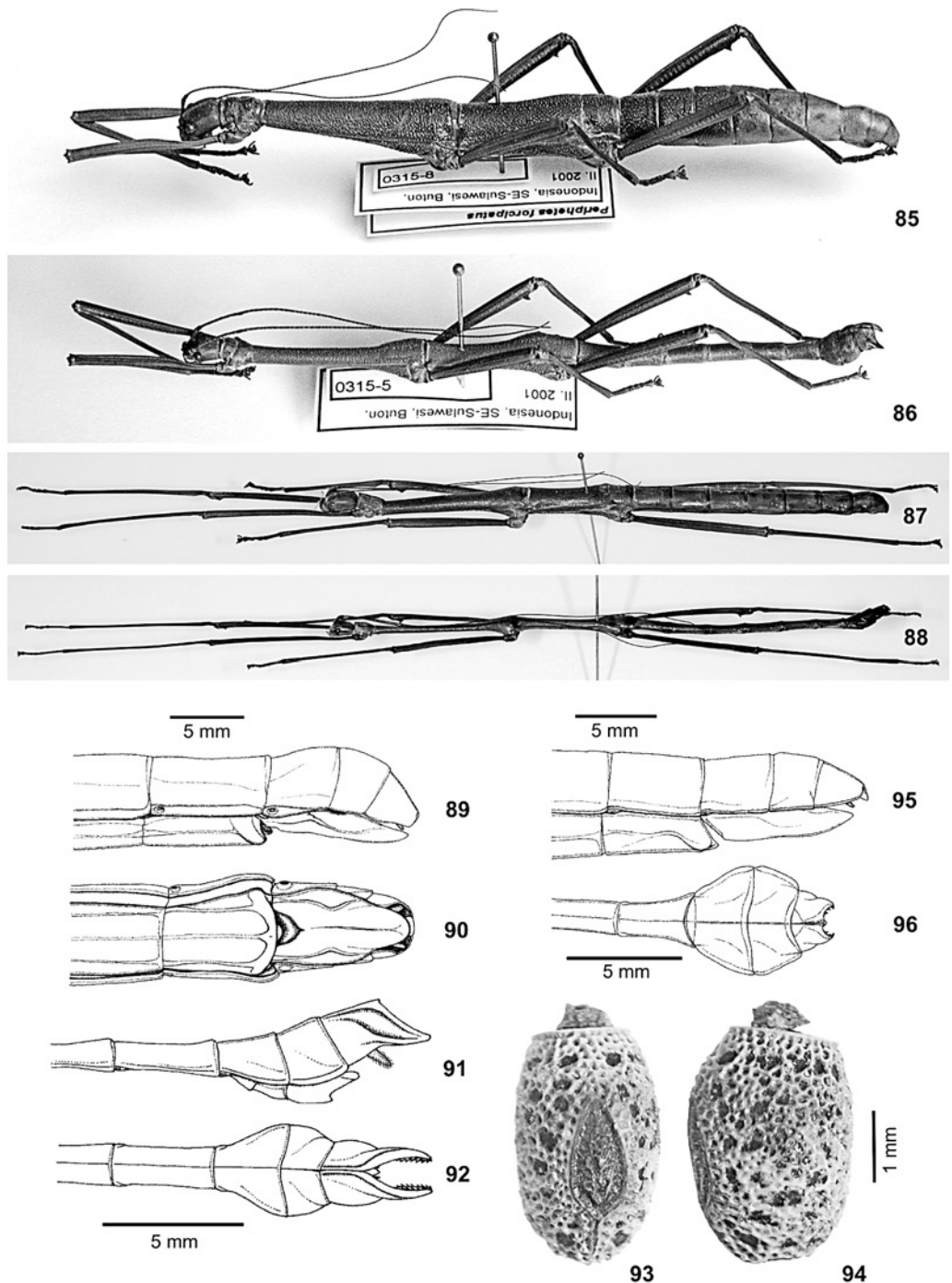
**Differentiation:**

This new species is apparently closely related to *P. graniferum* (WESTWOOD), ♂♂ having an almost identical colouration, but is at once distinguished by the less prominently dilated, not shovel-shaped abdominal tergites VIII and IX, as well as the conspicuously longer semi-tergites of the anal segment, comparably broader legs and in average larger size. ♀♀ are very similar to *P. graniferum* but differ by: the parallel-sided abdominal tergites II to VII; less decided longitudinal median keel of the ventral body surface; smaller spranal plate; slightly broader meso- and metafemora, and differently structured praepopercular organ and base of the subgenital plate.

From *P. magayon* (ZOMPRO) **comb. n.** ♂♂ are easily distinguished by: the considerably larger size and more slender body; green abdominal segments II-VII and entirely green femora.

**Description:**

In addition to the types, the colouration of ♂♂ is described from photos of a live captive reared specimen.



**Figs 85-96: *Periphetes* spp.:** 85. *P. forcipatus* (BATES, 1865) ♀ (coll. FH, Sulawesi); 86. *P. forcipatus* (BATES, 1865) ♂ (coll. FH, Sulawesi); 87. *P. quezonicus* sp. n. ♀, PT (coll. OC); 88. *P. quezonicus* sp. n. ♂, PT (coll. OC); 89. *P. quezonicus* sp. n. apex of abdomen ♀ (lateral view); 90. *P. quezonicus* sp. n. apex of abdomen ♀ (ventral view); 91. *P. quezonicus* sp. n. apex of abdomen ♂ (lateral view); 92. *P. quezonicus* sp. n. apex of abdomen ♂ (dorsal view); 93. *P. forcipatus* (BATES, 1865) egg, dorsal view (coll. FH, Sulawesi); 94. *P. forcipatus* (BATES, 1865) egg, lateral view (coll. FH, Sulawesi); 95. *P. graniferum* (WESTWOOD) apex of abdomen ♀ (lateral view); 96. *P. graniferum* (WESTWOOD) apex of abdomen ♂ (dorsal view).

♀♀ (**Fig. 87**): Large (body length 97.0-104.0 mm), elongate and moderately slender (average body width 7 mm) for the genus, abdomen parallel-sided. As typical for the genus, the head and entire body surface are densely granulose, ventral body surface with a slight longitudinal median keel. General colouration of head, body and legs plain mid to dull green. Pro-, meso-, metasternum and all abdominal sternites pale green. Transverse intersegmental skins and joints of the body dark orange to reddish brown. Ventral surface of coxae bluish green, their outer border towards the femur black, as are the apical margin and sub-apical teeth of all femora. Femora very slightly orange to mid brown basally. Basal quarter of antennae dull green, remaining portion gradually but rather rapidly turning to black. Eyes reddish mid brown.

Head: Oval, broadest just behind the eyes and about 1.5x longer than wide. Vertex unarmed but minutely granulose and gently rounded. Between the bases of antennae a wide but faint V-shaped impression. Eyes rather small, their length contained more than 3x in that of cheek, projecting hemispherically. Antennae long and filiform, reaching to posterior margin of abdominal tergite II. Scapus subcylindrical and about 2x longer than wide. Pedicellus less than half the length of scapus, distinctly narrower, cylindrical and slightly swollen medially. Third antennomere gradually constricted towards the apex and about 1.5x longer than pedicellus. Following antennomeres very short but soon increasing in length towards apex of antennae.

Thorax: Pronotum about  $\frac{3}{4}$  the length and slightly narrower than the head, about 1.3x longer than wide. Transverse median depression prominent, very weakly curved and reaching to lateral margins of segment. Anterior margin slightly raised and followed by a rather decided transverse ridge. Both, anterior and posterior portions with a slightly impressed longitudinal median line. Mesothorax elongate, cylindrical, parallel-sided in anterior  $\frac{3}{4}$  and conspicuously widened at the posterior margin; 2.6x longer than head and pronotum combined. Complete surface densely granulose, mesonotum with a very faint but blunt longitudinal median carina. Metathorax structured like mesothorax, very weakly constricted medially,  $\frac{3}{5}$  the length of mesonotum and about 3x longer than wide. Meso- and metasternum with a slight longitudinal median keel.

Abdomen: Complete abdomen including median segment shorter than combined length of head and thorax. Median segment roughly quadrate, its length contained more almost 4x in that of metanotum. All tergites finely granulose but granulation becoming more minute and less decided towards the apex of abdomen; all with a distinct longitudinal median carina. Segments II-VI parallel-sided, of uniform width and very slightly increasing in length, in average about 1.3x longer than wide. VII slightly shorter than VI and conspicuously widened towards the posterior. Sternites II-VII with a rather well decided, blunt longitudinal median carina; VII with the posterior margin roundly elevated and swollen, forming a transverse bulge; this bulge hides a small scale-like projection. Tergite VIII about  $\frac{3}{4}$  the length of VII, distinctly narrower and gradually tapered towards the posterior. IX very strongly convex, about  $\frac{2}{3}$  the length of VIII, roughly quadrate in dorsal aspect, higher than long in lateral aspect. Anal segment about as long as IX, gently tapered and flattened towards the posterior margin, which is broadly rounded and has a slight concave median excavation. Supraanal plate rounded transverse with a distinct median carina and projecting into medial excavation of anal segment. Cerci very small and almost completely hidden under anal segment; conical and finely bristled. Subgenital plate almost reaching to posterior margin of anal segment, gently convex and slightly keeled in the medial portion; apex rounded. Base with a prominent and deep median impression, lateral surfaces each with a very prominent and curved, lamella-like keel which disappears about  $\frac{1}{3}$  the way off the the apex.

Legs: All of moderate length and rather stout, profemora very slightly longer than mesothorax, metafemora reaching half way along abdominal segment V and metatibiae projecting over apex of abdomen by about the combined length of the two basal tergites. All femora distinctly carinate a slightly trapezoidal in cross-section. Profemora constricted and gently curved basally, meso- and metafemora slightly thickened towards the apex. Medioventral carina of all femora distinct, in meso- and metafemora set with a parallel-longitudinal row of minute granules. Antero- and posteroventral carinae of meso- and metafemora with a rather distinct, triangular sub-apical tooth followed by a very minute further tooth. Medioventral carina of meso- and metatibiae slightly rounded sub-basally. Tarsi of moderate length, their length contained about 3.3x in that of corresponding tibia; basitarsi about as long as following three tarsomeres combined.

♂♂ (**Fig. 88**): Large (body length 88.8-96.2 mm), very slender and elongate (average body width 1.8-2.0 mm) for the genus with long and slender legs. Head, abdominal tergites II-VII, legs and coxae dark green. Meso- and metathorax orange to rusty red, meso-, metanotum and median segment green at the posterior margin and with a very fine, longitudinal green median line. Pronotum and prosternum yellowish brown with a slight greenish wash. Abdominal tergite II with two faint reddish brown markings in anterior half. VIII-X blackish



brown, the semi-tergites of the anal segment black. Sternites II and III yellow, IV-VII pale green, VIII, IX and subgenital plate dark brown. Anterior margin of coxae, bases and apices as well as sub-apical teeth of all femora black. Carinae of all legs with a very faint black line. Tarsi dull green and becoming black towards the apex. Scapus and pedicellus green, following antennomeres becoming darker green and finally black in the apical half of the antennae. Eyes brown.

Head: Generally as in ♀♀, but between the bases of the antennae with two very minute spines. Eyes relatively larger, their length contained almost 3x in that of cheek, projecting hemispherically. Antennae as in ♀♀ but longer, reaching to posterior margin of abdominal tergite VI.

Thorax: Pronotum as in ♀♀. Mesothorax very elongate, cylindrical and distinctly broadened at posterior margin; about 3.8x longer than head and pronotum combined. Complete surface densely granulose. Metathorax structured like mesothorax, slightly broadened at anterior margin and towards the posterior. Metanotum about 2/3 the length of mesonotum and almost 7x longer than wide.

Abdomen: Complete abdomen including median segment shorter than combined length of head and thorax. Median segment 1.2x longer than wide and rectangular, less than ¼ the length of metanotum. Complete surface densely granulose. Segment II 1.7x longer than median segment. II-VI of equal length and width, all cylindrical, II-VI slightly constricted medially; in average 3.5x longer than wide. VII shorter than previous and slightly widened at posterior margin. All tergites with a very fine longitudinal median carina. VIII trapezoidal, strongly widened towards the posterior, transverse. IX almost 2.5x broader than II-VII, as long as VIII, lateral margins convex, transverse. Anal segment slightly longer than IX, strongly tectiform. Semi-tergites of moderate length, truncate anteriorly and tapered towards a pointed apex; very gently up-curving apically. The interior surfaces densely covered with incurving black teeth. Cerci slender, cylindrical, tapered towards the apex and slightly in-curving; staying considerably beyond apex of anal segment. Poculum flat, scoop-like and with a faint median carina; slightly projecting over posterior margin of tergite IX.

Legs: All very long and slender, profemora slightly longer than mesothorax, mesofemora slightly longer than metanotum and median segment combined, hind legs projecting considerably over apex of abdomen. Medioventral carina of all femora faint. Antero- and posteroventral carinae of meso- and metafemora with one sub-apical spine; occasionally 1-2 further very minute spines may be present. Basitarsi longer than following three tarsomeres combined.

#### Comments:

Only one of the ♂ paratypes has the typical colouration of this species fully developed. All other ♂♂ appear to have been newly adult specimens when collected, having the abdomen yellowish brown and the head and legs less distinctly green. One ♂ was raised to adult in captivity using bramble (*Rubus fruticosus*, Rosaceae) as an alternative food plant. Photos of this specimen served for the description of the colouration of the ♂♂ above. The specimen was the only one that hatched from a very few eggs sent by I. O. LUMAWIG (Luzon, Philippines), but could unfortunately not be preserved for examination; the eggs were destroyed by parasites.

	HT, ♂ (ZSMC)	PT, ♂♂ (coll. OC)	PT, ♀♀ (coll. OC)
Body:	93.0	88.8-96.2	97.0-104.0
Head:	3.7	3.5-3.8	6.3-7.0
Pronotum:	2.9	2.8-3.0	3.5-4.9
Mesonotum	25.0	23.5-25.5	24.0-25.5
Metanotum:	17.1	16.2-17.4	14.2-14.5
Median segment:	2.9	2.7-2.9	4.0-4.9
Profemora:	27.0	24.2-26.2	24.4-26.9
Mesofemora:	21.3	20.2-21.8	19.3-20.9
Metafemora:	24.9	22.9-24.2	21.7-23.9
Protibiae:	27.4	24.6-28.7	22.5-26.8
Mesotibiae:	21.6	18.9-22.1	16.3-19.3
Metatibiae:	27.2	23.8-28.1	20.6-24.3
Antennae:	77.0	73.5	45.0-62.0

**Table 12:** Measurements of *Periphates quezonicus* sp. n. [mm]

***Matutumetes* gen. n.**

**Type-species:** *Matutumetes amoenus* sp. n., by present designation.

**Description:**

♀♀, ♂♂: Small to medium-sized (body length ♂♂ 47.1-70.0 mm, ♀♀ 62.0-102.0 mm) moderately elongate and slender, cylindrical Lonchodinae; very similar to *Phraortes* STÅL, 1875 and *Lonchodiodes* gen. n. Complete body surface finely and more or less densely granulose; granules rounded. Meso-, metanotum and abdominal tergites with a fine longitudinal median carina. Head longer than wide, subcylindrical, oval, vertex flat and unarmed; no spines between the eyes. Antennae filiform, very long, exceeding posterior margin of median segment. Scapus and pedicellus simple. Mesothorax very elongate, at least 2.5x longer than head and pronotum combined. Metanotum less than 2/3 the length of mesonotum. Median segment very short, its length contained about 3x in that of metanotum; slightly wider than long. Abdomen about as long or a little longer than head and complete thorax combined. Segments II-VI distinctly longer than wide; parallel-sided. Praeopercular organ of ♀♀ very prominent, formed by a large spatulate or hook-like posterior lobe on sternite VII, which is elevated posteriad and covers the basal portion of the subgenital plate. Tergites VIII and IX of ♂♂ moderately dilated. Anal segment of ♀♀ with a posteromedian excavation; supraanal plate rather prominent and extending over apex of anal segment. Anal segment of ♂♂ strongly tectiform and split over complete length forming two semi-tergites; these ± elongate and slender, finger-like and covered with minute teeth on their interior surfaces. No visible vomer. Poculum of ♂♂ small, cup-like and not considerably extending over posterior margin of tergite IX. Subgenital plate of ♀♀ keeled, boat-like and at best slightly projecting over apex of anal segment. Cerci small, cylindrical or oval in cross section; conical in ♀♀. All legs moderately long and slender, all unarmed except for 1 or 2 sub-apical teeth on the antero- and posteroventral carinae of the femora. Medioventral carina indistinct. Tarsi elongate and simple. Basitarsi at least as long as following three tarsomeres combined.

**Differentiation:**

Close relation of the new genus with *Lonchodiodes* gen. n. and *Phraortes* STÅL, 1875 and *Periphetes* STÅL, 1877 is obvious. It is however characteristic and distinguished from all of these genera by the remarkably prominent praepopercular organ of ♀♀ which is elevated posteriad and covers the basal portion of the subgenital plate. The spatula-like praepopercular lobe seen in the type-species *M. amoenus* sp. n. is the relatively largest and most striking praepopercular organ amongst all known Phasmatodea.

For a more detailed differentiation from related genera see table 5.

**Etymology:**

The generic name refers to the type-locality of the two known species of the genus, the beautiful Mount Matutum Nature Reserve, Mindanao Island.

**Distribution:**

Philippines (endemic). So far only known from Mindanao Island.

**Species included:**

- |   |                |
|---|----------------|
| 1. <i>Matutumetes amoenus</i> sp. n.      | [Mindanao Id.] |
| 2. <i>Matutumetes mindanaensis</i> sp. n. | [Mindanao Id.] |

**Keys to the species of *Matutumetes* gen. n.**

♀♀

- |    |   |                               |
|----|---|-------------------------------|
| 1. | Large (body length > 85 mm); mesonotum 3x longer than head and pronotum combined; praepopercular organ very large and spatulate, reaching about half way along subgenital plate (Figs 99 & 100) . . . . | <i>M. amoenus</i> sp. n.      |
| –  | Smaller (body length < 70 mm); mesonotum 2.5x longer than head and pronotum combined; praepopercular organ scoop-like and pointed apically; only covering base of subgenital plate (Fig. 105) . . . .   | <i>M. mindanaensis</i> sp. n. |

♂♂

1. Large (body length > 60 mm); green; mesonotum > 3x longer than head and pronotum combined; anal segment > 2x longer than tergite IX; semi-tergites very elongate and slender (Fig. 101) ..... *M. amoenus* **sp. n.**
- Smaller (body length < 60 mm); dark brown; mesonotum 2.5x longer than head and pronotum combined; anal segment indistinctly longer than tergite IX; semi-tergites short (Fig. 106) ..... *M. mindanaensis* **sp. n.**

***Matutumetes amoenus* sp. n.**

(Figs 97-102)

**Holotype**, ♂: Philippinen, Mindanao Island, Mount Matutum, III.2006 (ZSMC, ex coll. OC).

**Paratypes** (10 ♂♂, 6 ♀♀): 1 ♂: Philippinen, Mindanao Island, Mount Matutum, Marett, III.2006 (coll. FH, No 0624-1); 9 ♂♂, 6 ♀♀: Philippinen, Mindanao Island, Mount Matutum, Marett, III.2006 (coll. OC); 1 ♂: Philippines, Mindanao Island, bought from dealer, 2001, collected 1999 ♂, Accession Number: PEB-2942 (coll. PEB); 1 ♀: Philippines, Mindanao Island, bought from dealer, 2001, collected 1999 ♀, Accession Number: PEB-2941 (coll. PEB).

**Etymology:**

The name (lat. amoenus = pretty) refers to the nice colouration of this new species.

**Differentiation:**

Differing from *M. mindanaensis* **sp. n.** by: the larger size, more elongate body and relatively longer body segments of both sexes, green general colouration and strongly elongated, slender apices of the semi-tergites of the anal segment of ♂♂, as well as the much more prominent, spatulate praeopercular organ of ♀♀.

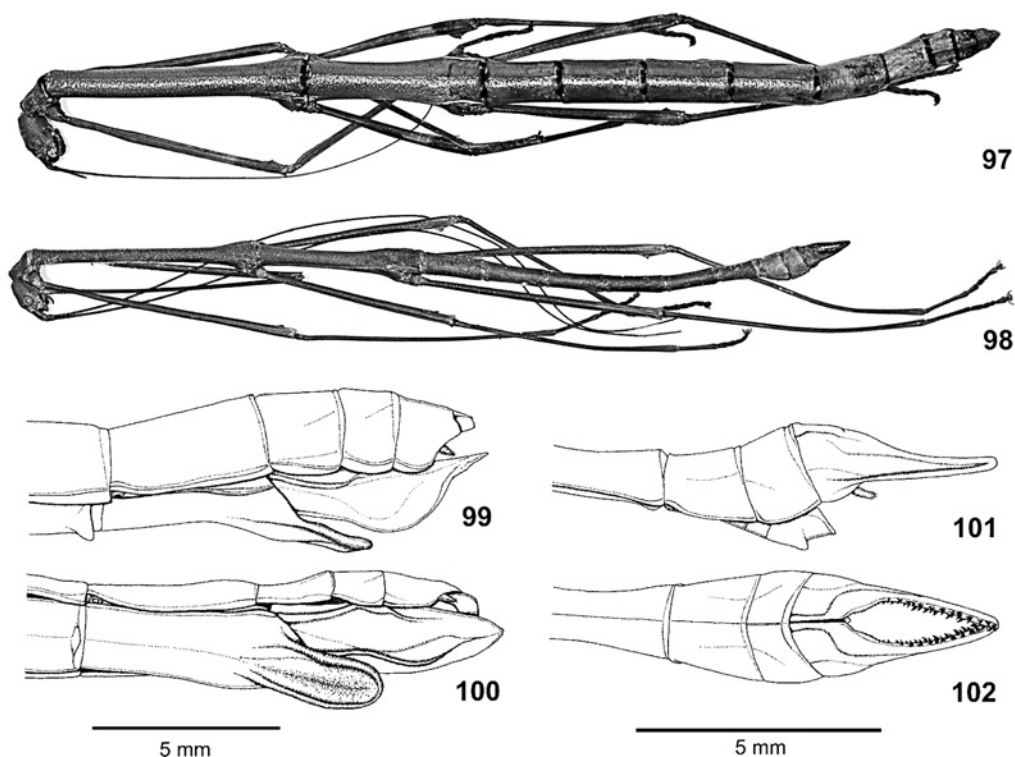
**Description:**

♀ ♀ (**Fig. 97**): Medium-sized (body length 87.0-102.0 mm) moderately slender Lonchodinae (average body width 3.7-3.9 mm). Head and complete body surface densely granulose and slightly glabrous; granulation less decided on abdomen. A very fine longitudinal median carina runs along the complete dorsal body surface, except for the head and pronotum. General colouration of body and legs plain mid green. Posterior margins of mesonotum, median segment and abdominal tergites II-IX each with a distinct, bold black transverse band at posterior margin, which ends shortly before the outer angle of the segment. Meso- and metafemora about 1/3 the way off the apex with a distinct and broad whitish transverse band, which is on both sides bordered by a rather undefined and more narrow dark brown band. Meso- and metatibiae occasionally with faint pale cream annulations. Scapus green, antennomeres II-IV green with a brownish was, following mid brown except for a pale transverse band just before the apex. Eyes reddish mid brown.

Head: Very weakly globose, 1.3x longer than wide. Between the bases of the antennae with two small, but decided oval impressions, and behind antennae with two very shallow, rounded elevations. Eyes rather small, circular and projecting hemispherically, their length contained about 3x in that of cheek. Antennae long and filiform and reaching to posterior margin of median segment. Scapus dorsoventrally compressed, parallel-sided and slightly more than 2x longer than wide. Pedicellus less than half the length of scapus, circular in cross-section and gradually constricted towards the apex. Third antennomere longer but distinctly narrower than pedicellus and gently widened basally with posterior two thirds cylindrical. IV less than 1/3 the length of III, following first gradually increasing, then decreasing in length from mid of antennae onwards.

Thorax: Pronotum slightly shorter and narrower than the head, longer than wide, the posterior gently rounded margin somewhat broader than anterior margin. Transverse median depression very decided, slightly curved and almost reaching to lateral margins of segment. Anterior margin slightly raised and followed by a transverse ridge. Both, anterior and posterior portions with an impressed median line. Mesothorax very elongate, cylindrical and gently widened at posterior margin; almost 3x longer than combined length of head and pronotum. Metanotum slightly more than half the length of mesonotum, weakly constricted in medial portion and about 4x longer than wide. Meso- and metapleurae as well as sterna without specializations.

Abdomen: Median segment slightly less than 1/4 the length of metanotum, roughly quadrate. Segments II-VI cylindrical and of roughly uniform width, II-V slightly increasing, VI-VII decreasing in length. II about 2x longer than median segment and 1.5x longer than wide, V longest and slightly more than 2x longer than



**Figs 97-102:** *Matutumetes amoenus* sp. n.: **97.** ♀ PT (coll. OC); **98.** ♂ PT (coll. OC); **99.** apex of abdomen ♀ (lateral view); **100.** apex of abdomen ♀ (ventral view); **101.** apex of abdomen ♂ (lateral view); **102.** apex of abdomen ♂ (dorsal view).

wide. VII gently deflexed posterolaterally. Sternites II-V without specializations, VI with the posterior margin medially deflexed and forming a small transverse scale-like structure. Sternite VII with a prominent praeopercular organ, formed by a remarkably large dorsoventrally flattened, laterally strongly carinated, roughly spatula-like lobe, which extends posteriorly and covers almost as much as the complete basal half of the subgenital plate (Fig. 100). Outer margin of praeopercular lobe is well produced particularly in the basal portion, the ventral interior section is decidedly concave and the posterior margin broadly rounded (Fig. 99). Tergite VIII about  $\frac{3}{5}$  the length of VII, indistinctly longer than wide, strongly convex and slightly widened towards the posterior; longitudinal median carina obtuse and forming a rather well decided, tectiform keel. IX about  $\frac{3}{4}$  the length of VIII, wider than long and parallel-sided. Both, VIII and IX with a very faint longitudinal carina laterally. Anal segment slightly longer than IX and slightly narrowed towards the posterior. Posterior margin with a large, widely triangular excavation; posterolateral acute. Supraanal plate prominent, broadly rounded and with a distinct median carina; distinctly projecting over apex of anal segment. Cerci very small, conical and laterally compressed. Subgenital plate strongly keeled and boat-like, the longitudinal keel elevated and lamellate in the median portion. Apex tapered and acute, projecting over apex of abdomen by almost the length of the anal segment. Lateral surfaces with a distinct curved and ledge-like carina, which terminates about  $\frac{1}{4}$  of the apex.

**Legs:** All of moderately long and slender. Profemora slightly longer than mesothorax, metafemora slightly shorter than metanotum and median segment combined and metafemora reaching half way along abdominal tergite IV. Profemora prominently curved and compressed basally. Medioventral carina of femora fine but well decided and armed with minute, acute granules. Antero- and posteroventral carinae of femora each with a broad, black triangular tooth sub-apically; less distinct on profemora. Tibiae slender and unarmed, the medioventral carina slightly elevated and rounded sub-basally in the two posterior pairs of

tibiae. Tarsi elongate and slender, slightly more than 1/3 the length of corresponding tibia. Basitarsi slightly longer than following three tarsomeres combined.

♂♂ (**Fig. 98**): Rather small (body length 64.0-70.0 mm) and slender Lonchodinae (average body width 1.3-1.4 mm), with a densely but minutely granulose body surface. A very fine longitudinal median carina runs along the complete dorsal body surface, except for the head and pronotum. General colouration of the head and body pale olive green. Legs mid green with the apices of all femora and tibiae orange. Basitarsi green with the apex orange, remaining tarsomeres pale orange brown. Antennae colored as in ♀♀. Eyes reddish mid brown.

Head: Generally as in ♀♀ but with granules on vertex less numerous and less distinct. Impressions between the eyes forming a roughly C-shaped structure. Eyes relatively larger and projecting hemispherically; their length contained a little more than 2.5x in that of cheek. Antennae as in ♀♀ but reaching half way along abdominal tergite V.

Thorax: Pronotum generally as in ♀♀ but relatively shorter. Mesothorax very elongate, slender and 3.2x longer than head and pronotum combined; parallel-sided except for being widened in the posterior portion. Mesonotum with a very faint, longitudinal median line. Metanotum about 3/5 the length of mesonotum, distinctly constricted.

Abdomen: Median segment roughly quadrate, its length contained about 5x in that of metanotum. Segments II to VI roughly of equal width, III-VI of equal length and slightly constricted medially, II slightly longer and almost parallel-sided. II 2.5x longer than median segment and about 3.6x longer than wide, III-VI about 3.4x longer than wide. Tergite VII 3/4 the length of VI strongly constricted medially and considerably expanded in posterior portion; the posterior margin about 1.5x broader than anterior margin. Sternites II-VII without specializations. Tergite VIII roughly 2/3 the length of VII and trapezoidal being decidedly widened towards the posterior. IX broadest, wider than long, 2/3 the length of VII; longitudinal median carina distinct. Anal segment strongly tectiform and split, forming two very long and slender, finger-like semi-tergites; distinctly longer than combined length of tergites VIII and IX. Semi-tergites gradually narrowed towards a slender but rounded apex; the interior surfaces covered with numerous, minute teeth. Cerci small, slender and cylindrical; finely bristled. Poculum small and cup-like, wider than long and hardly projecting over posterior margin of tergite IX; posterior margin widely rounded.

Legs: Generally as in ♀♀, but relatively longer and more slender. Profemora slightly longer than mesothorax, mesofemora reaching about half way along abdominal tergite II, metafemora reaching to posterior margin of abdominal tergite V and metatibiae projecting considerably over apex of abdomen. Tarsi elongate and slender, slightly more than 1/3 the length of corresponding tibia. Basitarsi longer than following three tarsomeres combined.

**Comments:** Eggs unknown.

	HT, ♀ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	65.0	64.0-70.0	87.0-102.0
Head:	3.5	3.1-3.5	5.4-6.0
Pronotum:	2.7	2.5-2.7	4.0-4.3
Mesonotum	17.5	16.7-18.3	23.7-25.1
Metanotum:	10.7	10.0-11.5	13.1-14.0
Median segment:	2.4	2.1-2.6	3.5-3.9
Profemora:	19.2	19.0-19.4	21.1-22.7
Mesofemora:	14.3	14.7-14.9	15.2-15.9
Metafemora:	17.9	17.4-18.6	18.1-19.3
Protibiae:	20.3	19.5-20.0	19.9-21.2
Mesotibiae:	16.5	16.8-17.4	15.3-15.7
Metatibiae:	22.5	20.6-22.0	19.2-20.7
Antennae:	>40.0	48.0-54.0	>40.0

**Table 13:** Measurements of *Matutumetes amoenus* gen. n., sp. n. [mm]

***Matutumetes mindanaensis* sp. n.**

(Figs 103-106)

**Holotype**, ♂: Philippinen, Mindanao Island, Mount Matutum, III.2006 (ZSMC, ex coll. FH).**Paratypes** (31 ♂♂, 20 ♀♀): 2 ♂♂, 2 ♀♀: Philippinen, Mindanao Island, Mount Matutum, Marett, III.2006 (coll. FH, No's 0596-1 to 4); 29 ♂♂, 18 ♀♀: Philippinen, Mindanao Island, Mount Matutum, Marett, III.2006 (coll. OC).**Etymology:**

Named after Mindanao Island.

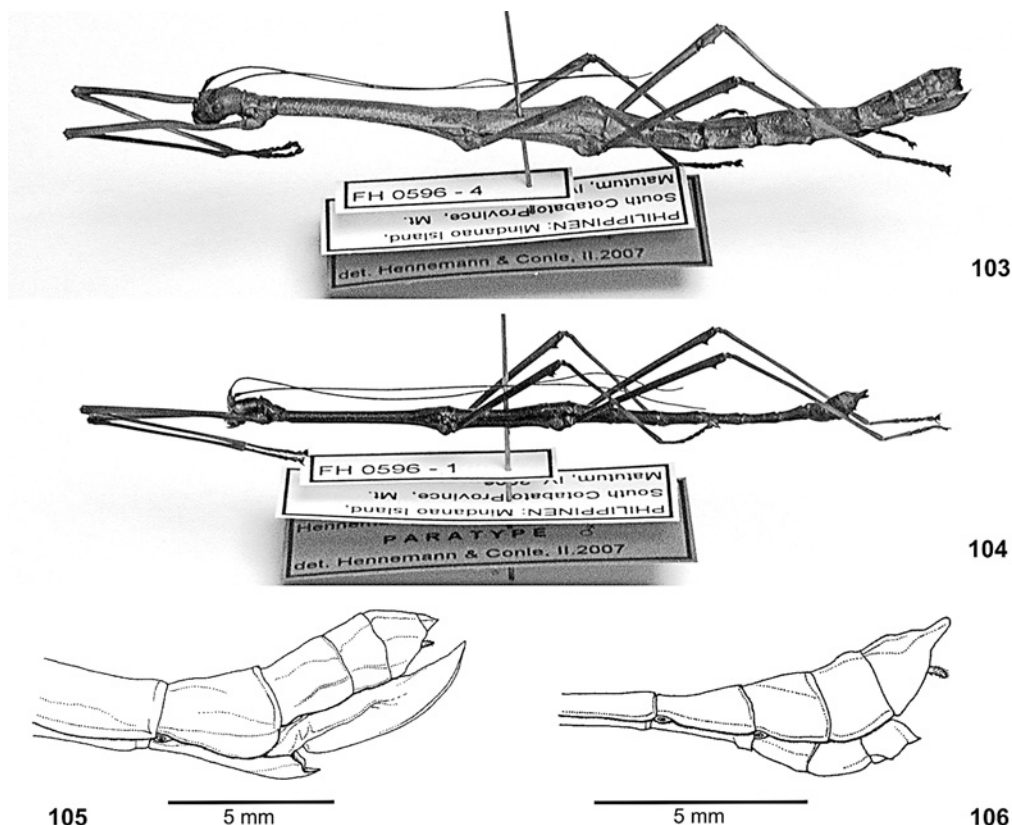
**Differentiation:**Differing from *M. amoenus* sp. n. by: the smaller size and less elongate body of both sexes, dark brown general colouration and distinctly shorter apices of the semi-tergites of the anal segment of ♂♂, as well as the less prominent, hook-like praeopercular organ of ♀♀.**Description:**♀♀ (**Fig. 103**): Small (body length 62.0-67.0 mm) moderately slender Lonchodinae (average body width 3.6-3.8 mm). Body surface densely granulose and slightly glabrous. General colouration of body and legs green. Femora slightly brownish basally and apically with  $2-3 \pm$  distinct, irregular black transverse bands. Meso- and metatibiae occasionally with faint brown annulations. Three basal antennomeres green, the remaining first dark brown then turning to plain black except for a pale transverse band just before the apex. Eyes creamish mid brown.

Head: Suboval, slightly globose, 1.3x longer than wide and roughly parallel-sided behind eyes. Vertex slightly rounded with an impressed coronal line in posterior half and covered with numerous distinct granules. Lateral surfaces smooth. Between the bases of the antennae with two slight impressions. Eyes circular, convex and projecting hemispherically. Antennae filiform and almost posterior margin of abdominal tergite II. Scapus dorsoventrally compressed, parallel-sided and more than 2x longer than wide. Pedicellus less than half the length of scapus, slightly club-like and longer than wide. Third longer but distinctly narrower than pedicellus, cylindrical. Following antennomeres first increasing, then decreasing in length from mid of antennae onwards.

Thorax: Pronotum shorter and slightly narrower than head, almost quadrate. Transverse median depression very prominent, very gently curved and reaching to lateral margins of segment. Anterior margin slightly raised and followed by a transverse ridge. Over complete length with an impressed median line and complete surface granulose. Mesothorax very elongate, cylindrical and slightly widened at posterior margin; about 2.5x longer than head and pronotum combined. Complete surface densely granulose. Mesonotum with a very faint longitudinal median carina. Mesopleurae and mesosternum minutely granulose and covered with distinct setae. Metathorax structured like mesothorax, 3/5 the length of mesonotum and about 2.5x longer than wide.

Abdomen: Median segment less than 1/3 the length of metanotum, broader than long, granulose. All tergites finely granulose dorsally but granulation becoming less distinct and finally absent towards apex of abdomen; all with a faint longitudinal median carina which becomes a keel on VII-X. Sternites very minutely and sparingly granulose. Segments II-VII cylindrical, of uniform width. II-V slightly increasing in length, VI-VII slightly decreasing. II indistinctly longer than wide, V longest and about 1.3x longer than wide. Sternite VII with a prominent praeopercular organ, formed by a broad, hook-like expansion of the posterior margin; this covers the basal section of the subgenital plate and has the lower surface with longitudinal median impression. Tergite VIII about 3/5 the length of VII, indistinctly longer than wide, strongly convex and slightly widened towards the posterior. IX 2/3 the length of VIII, strongly convex, parallel-sided and roughly quadrate. Anal segment slightly longer than IX and narrowed towards the posterior. Posterior margin with a broad, concave excavation, and posterolateral angles triangular. Supraanal plate prominent, tectiform and rounded apically; distinctly projecting over apex of anal segment. Cerci very small and conical. Subgenital plate strongly keeled and boat-like with a distinct irregular ridge laterally and slightly projecting over posterior margin of anal segment; apex pointed.

Legs: All of moderate length and slender. Profemora somewhat shorter than mesothorax, metafemora slightly longer than metanotum and median segment combined and hind legs projecting over apex of abdomen. Profemora prominently curved and compressed basally. Medioventral carina of femora faint. Antero- and posteroventral carinae of meso- and metafemora each with a distinct, black triangular tooth sub-apically. Tibiae simple. Basitarsi slightly longer than following three tarsomeres combined.



**Figs 101-104:** *Matutumetes mindanaense* sp. n.: **101.** ♀ PT (coll. FH); **102.** ♂ PT (coll. FH); **103.** apex of abdomen ♀ (lateral view); **104.** apex of abdomen ♂ (lateral view).

♂♂ (**Fig. 104**): Small (body length 47.1-53.5 mm) moderately slender Lonchodinae (average body width 1.5-1.7 mm), with a densely but minutely granulose body surface. General colouration of the head and body very dark brown, anal segment mid brown. All femora dark reddish brown, the tibiae dark brown basally and soon becoming reddish mid brown. Tarsi straw. Eyes and mouthparts dark yellow. Antennae black except for the three basal segments which are dark brown, and a pale transverse band just before the apex.

Head: Generally as in ♀♀ but with granules on vertex less numerous and less distinct. Eyes more prominent and strongly projecting hemispherically. Antennae as in ♀♀ but projecting over posterior margin of abdominal tergite IV.

Thorax: Pronotum generally as in ♀♀ but with granulation less distinct. Mesothorax very elongate, slender and about 2.5x longer than head and pronotum combined; parallel-sided except for being widened at the posterior. Mesonotum with a very faint, longitudinal median line. Mesosternum slightly tectiform. Metanotum about half the length of mesonotum, distinctly constricted medially and with a very indistinct median carina. Metasternum, as well as meso- and metapleurae unarmed.

Abdomen: Median segment slightly longer than wide, and less than 1/3 the length of metanotum. Segments II to VI parallel-sided and roughly of equal length, 2.2x longer than wide. VII narrower than previous segments and only about 2/3 the length of VI. Tergites II-VII with a fine, longitudinal median carina. Sternites II-VII simple. Tergite VIII 3/4 the length of VII, trapezoidal being strongly widening towards the posterior and with a distinct longitudinal median keel. IX slightly shorter than VII, as broad as posterior margin of VIII, rectangular and slightly broader than long. Anal segment strongly tectiform and split,

forming two semi-tergites. These with apex tapered and elongated into a moderately long, finger-like process. Interior surfaces covered with several, minute teeth. Cerci short, cylindrical and tapered towards the apex; finely bristled. Poculum small and cup-like with posterior margin widely rounded and reaching to posterior of tergite IX.

Legs: Generally as in ♀♀, but relatively longer and more slender. Profemora slightly longer than mesothorax, metafemora reaching to posterior margin of abdominal tergite V and metatibiae projecting considerably over apex of abdomen. Basitarsi longer than following three tarsomeres combined.

#### Comments:

Eggs unknown.

	HT, ♂ (ZSMC)	PT, ♂♂	PT, ♀♀
Body:	50.0	47.1-53.5	62.0-67.0
Head:	3.0	3.2	4.1-4.3
Pronotum:	2.2	2.3	2.3-3.0
Mesonotum:	12.7	12.9-14.2	16.0-16.7
Metanotum:	7.0	7.2-7.4	7.3-8.2
Median segment:	2.2	2.2-2.3	2.1-2.2
Profemora:	13.2	13.5-14.8	12.9-14.1
Mesofemora:	10.3	10.2-10.9	10.0-11.1
Metafemora:	13.0	13.2-13.4	12.9-13.3
Protibiae:	13.8	14.1	13.7-14.4
Mesotibiae:	10.9	10.7-12.1	10.6-11.0
Metatibiae:	14.8	14.2-15.4	14.5-14.8
Antennae:	38.0	39.5	39.5

**Table 14:** Measurements of *Matutumetes mindanaensis* gen. n., sp. n. [mm]

#### *Mnesilochus* STÅL, 1877 stat. rev.

**Type-species:** *Mnesilochus capreolus* STÅL, 1877: 39, by subsequent designation of KIRBY, 1904a: 320.

*Mnesilochus* STÅL, 1877: 39.

KIRBY, 1904a: 320.

OTTE & BROCK, 2005: 83. [Listed as a synonym of *Carausius* STÅL, 1875]

*Mensilochus*, BRADLEY & GALIL, 1977: 181. [Listed as a valid genus but without reasoning - misspelling]

*Carausius*, BRUNNER V. WATTENWYL, 1907: 264. (in part - **not** STÅL, 1875; **erroneous synonym**)

BRUNER, 1915: 39.

OTTE & BROCK, 2005: 82. (in part).

*Lonchodes*, BRUNNER V. WATTENWYL, 1907: 256. (in part - **not** GRAY, 1835)

GÜNTHER, 1934: 384, pl. 8: 10, 15. (in part)

BRAGG, 2001: 435. (in part)

OTTE & BROCK, 2005: 178. (in part)

*Phenacephorus*, BRAGG, 1994: 232. (in part)

BRAGG, 2001: 499. (in part)

HENNEMANN & CONLE, 2003: 21, figs 3, 7 & 8.

OTTE & BROCK, 2005: 267. (in part)

*Prisomera*, BRUNNER V. WATTENWYL, 1907: 282. (in part - **not** GRAY, 1835)

CARL, 1913: 30.

#### Description:

♀♀, ♂♂: Body elongate and cylindrical, in ♀♀ roughly of uniform width, in ♂♂ broadened at meso- and metacoxae. ♂♂ shorter and distinctly more slender than ♀♀. ♀♀ body surface of ± strongly granulose, rugose and covered with irregular wrinkles; often rather polymorphic and with dorsal wart-like projections or struma



on abdomen. Body surface of ♂♂ densely but very minutely granulose. Head longer than wide and ± narrowed towards the posterior. Vertex flat and tuberculose, or vertex slightly raised and set with a few enlarged tubercles or spiniform projections. Between the eyes with a pair of humps, scale-like projections or small spines (less prominent in ♂♂). Antennae filiform and longer than head, pro- and mesonotum combined (relatively longer in ♂♂). Mesothorax elongate, at least 2x (♀♀) or 2.5x (♂♂) longer than head and pronotum combined. Metanotum less than 2/3 the length of mesonotum, longer than wide. Meso- and metapleurae each forming a blunt tubercle or spine close to posterior margin. Meso- and metasternum simple. Median segment short, less than 1/2 (♀♀) or 1/3 (♂♂) the length of metanotum. Abdomen longer than combined length of head and complete thorax. Segments II-VII longer than wide, all parallel-sided or IV-VI slightly broadened in ♀♀. Tergites V and VI often with struma. Praeopercular organ of ♀♀ indistinct, formed by two often converging rugulae, keels or ridges. Anal segment of ♂♂ longer than tergite IX, narrowed towards the posterior, tectiform and split over at least half of its length to form two ± elongate, apically tapered semi-tergites; interior surfaces minutely dentate. Cerci of both sexes very small and ± laterally compressed. Supraanal plate of ♀♀ small and transverse to distinctly elongated and longer than anal segment. Subgenital plate of ♀♀ strongly keeled and boat-shaped, rugose and dentate in posterior portion. Poculum of ♂♂ rather small, moderately convex and cup-like; at best slightly projecting over posterior margin of tergite IX. Legs of moderate length (relatively longer in ♂♂); profemora shorter than mesothorax, mesofemora usually shorter than metanotum and median segment combined (one exception), hind legs not reaching (♀♀) or at best slightly projecting over apex of abdomen (♂♂). Profemora compressed and curved basally. Legs of ♂♂ unarmed, except for a single tooth some 2/3 the way along posterodorsal carina of mesofemora and sub-apical spines on the ventral carinae of the femora. Mesofemora gently constricted towards the base. In ♀♀ anterodorsal carina of profemora raised and lamellate, sometimes lobate, posterodorsal carina strongly reduced; anteroventral carina with 1-2 compressed teeth sub-apically. Medioventral carina very prominent and displaced towards anteroventral carina; both unarmed. Dorsal carinae of protibiae united to form a low and ledge-like (♂♂) or ± prominently raised and lamella-like lobe (♀♀) along the complete length of tibia. Mesofemora of ♀♀ with one or two ± prominent dentate lobes on posterodorsal carina; usually a small lobe sub-basally (may be lacking) and a considerably larger one some 2/3 off the base. Two outer ventral carinae each with 1-2 compressed teeth sub-apically. Medioventral carina indistinct. Mesotibiae with dorsal carinae united and usually with two lobe-like projections dorsally; one sub-basally and one sub-apically. Medioventral carina rounded sub-basally. Hind legs of ♀♀ simple and unarmed, except for minute sub-apical teeth on the two outer ventral carinae of the metafemora. Tarsi short, basitarsi at best as long as following two tarsomeres combined (one exception). Probasitarsus of ♀♀ with a lobe roundly triangular lobe dorsally, slender in ♂♂.

#### Description of the eggs:

Capsule ± laterally compressed and oval to elliptical in cross-section. Dorsal and ventral surfaces with a ± prominent, longitudinal bulge or keel. Opercular collar prominent and just below with a ± distinct constriction and an impression dorsally and ventrally. Polars area with a prominent polar mound which has a central hollow. Capsule surface ± pitted. Micropylar plate strongly projecting from capsule, elongate, ± parallel-sided to oval and covering at least 2/3 of the dorsal capsule surface. Posterior end often gently widened end with a distinct median notch. Median line short. Internal plate open with a short median line. Operculum flat, oval to elliptical and with a prominent, bright yellow, orange or red, hat- or knob-like capitulum on a distinct stalk.

#### Differentiation:

Similar to *Phenacephorus* BRUNNER V. WATTENWYL, 1907, *Lonchodes* GRAY, 1835 and *Hermagoras* STÅL, 1875. A detailed differentiation and comparison of *Mnesilochus* with these genera appears much warranted and is provided in table 15 below.

From *Carausius* STÅL, 1875 (Type-species: *Carausius strumosus* STÅL, 1875), with which it was erroneously synonymised by BRUNNER V. WATTENWYL (1907: 264), *Mnesilochus* obviously differs by: lacking the longitudinal median keel on the mesosternum of both sexes, having distinct foliaceous dorsal lobes (♀♀) or a distinct post-medial dorsal tooth (♂♂) on the mesofemora, and presence of dorsal lobes on the mesotibiae of ♀♀. The eggs clearly differ from those of *Carausius* by the laterally compressed, anteriorly constricted capsule and prominent polar mound.

	<i>Mnesilochus</i>	<i>Phenacephorus</i> (s. str.)*	<i>Hermagoras</i>	<i>Lonchodes</i> (s. str.)
Body surface (♀ ♀)	Irregularly rugose; sometimes with struma or wart-like structures on certain abdominal tergites	Irregularly rugose; often with struma, wart-like or spini-form structures, or foliaceous lobes on mesonotum and certain abdominal tergites	Irregularly rugose; often with struma or wart-like structures on mesonotum and certain abdominal tergites	Very densely granulose, granules rounded; no struma
Variation (♀ ♀)	Moderately polymorphic	Very strongly polymorphic	± strongly polymorphic	No conspicuous polymorphism
Head	Vertex flat to slightly raised; may be tuberculate	Vertex distinctly conical and armed with prominent foliaceous lobes	Vertex flat; unarmed	Vertex ± rounded; unarmed
Pronotum (♀ ♀)	Unarmed	With a pair of ± distinct spini-form projections posteriorly	Unarmed	Unarmed
Mesosternum (♀ ♀)	Simple	Simple	With a longitudinal median keel or bulge	Simple
Metanotum (♂ ♂)	Unarmed	Unarmed	With a posterior pair of faint humps, nodes or spines	Unarmed or with a posterior pair of spines
Praeopercular organ (♀ ♀)	Indistinct; formed by two often converging rugulae, keels or ridges	Indistinct; formed by two converging keels or ridges	Indistinct; at best formed by two small rugulae	A prominent spine- like posteromedian process
Subgenital plate (♀ ♀)	Keel dentate / tuberculate posteriorly	Keel dentate / tuberculate posteriorly	Keel dentate / tuberculate posteriorly	Keel unarmed
Profemora	No conspicuous lobe dorsally	With a prominent foliaceous median lobe dorsally	No conspicuous lobe dorsally	No conspicuous lobe dorsally
Mesofemora (♀ ♀)	Dorsal lobes ± prominent and denticulate	Dorsal median lobe prominent, ± foliaceous and denticulate	Dorsal lobes ± prominent and denticulate	At best with a small, rounded lobe dorsally
Mesofemora (♂ ♂)	With a post-median tooth dorsally	With a post-median tooth dorsally	Smooth or with a very faint post- median tooth dorsally	Smooth dorsally
Protibiae (♀ ♀)	Dorsal carina strongly raised and lamellate; forming a ± dentate apical lobe	Dorsal carina strongly raised and lamellate; sometimes denticulate	Dorsal carina strongly raised and lamellate; forming a ± dentate apical lobe	Smooth or with two rounded lobes dorsally
Mesotibiae (♀ ♀)	With ± distinct and denticulate lobes dorsally	With ± distinct and denticulate lobes dorsally	With ± distinct and denticulate lobes dorsally	Unarmed or with a roundly elevated lobe dorsally
Probasitarsus (♀ ♀)	With a rounded or ± triangular dorsal lobe	With a roundly triangular dorsal lobe	With a ± triangular dorsal lobe	With a ± semi- circular lobe dorsally
Probasitarsus (♂ ♂)	Slender	Lobed dorsally	Lobed dorsally	Slender or lobed dorsally

Eggs (capsule)	± laterally flattened and elliptical in cross section; with a ± decided dorso-ventral keel or bulge	Ovoid and oval in cross-section	Ovoid to spherical; round in cross-section	Ovoid and ± round in cross-section
Eggs (capsule surface)	Minutely punctured	Deeply pitted and covered with short hairy structures	Smooth or covered with a network of irregular ridges or bulges	Minutely punctured; sometimes with a network of irregular rugulae
Eggs (polar-area)	With a centrally impressed, ± conical polar mound	Polar mound distinct	Simple; no conspicuous polar mound	With a centrally impressed polar mound; often bearing a central spine
Eggs (capitulum)	Distinctly stalked; yellow, orange or red	Without a distinct stalk and conspicuous colouration	Distinctly stalked; white, yellow or orange	Distinctly stalked; yellow, orange, red or white
Distribution	Philippines, Palawan, Balabac Id., Borneo & Sumatra	Borneo	Wallacea, Borneo & Java (New Guinea?)	Sundaland, S-China and Philippines

\* *Phenacephorus* BRUNNER V. WATTENWYL, 1907 (type-species: *Ph. cornucervi* BRUNNER V. WATTENWYL, 1907) as treated by former authors contained three distinct generic units. Three species are here transferred to *Mnesilochus* STÅL (**comb. n.**). Only, *Phenacephorus sepilokensis* BRAGG, 1994 and *Phenacephorus parahaematomus* BRAGG, 1995 are congeneric with the type-species *Ph. cornucervi*. The remainder two species currently attributed to *Phenacephorus*, this is *Ph. auriculatus* (BRUNNER V. WATTENWYL, 1907) and *Ph. spinulosus* HAUSLEITHNER, 1991), differ considerably from the type-species in the shape and armature of the head, structures of the genitalia, leg armature and egg morphology. They resemble strongly certain Bornean species of *Carausius* STÅL, 1875 and appear to be provisionally best placed in that genus. **comb. n.**

**Table 15:** Comparison of *Mnesilochus* STÅL, *Phenacephorus* BRUNNER V. WATTENWYL, *Hermagoras* STÅL and *Lonchodes* GRAY (s. str.)

### Comments:

STÅL (1877: 39) established the genus *Mnesilochus* for two newly described Philippine species, *M. capreolus* and *M. haedulus*. KIRBY (1904a: 320) selected *M. capreolus* STÅL as the type species. By transferring the type-species and *M. haedulus* STÅL into the genus *Carausius* STÅL, 1875, BRUNNER V. WATTENWYL (1907: 264) synonymised *Mnesilochus* with *Carausius*. However, a question mark indicates that BRUNNER V. WATTENWYL was unsure whether *Mnesilochus* really represented a synonym of *Carausius* STÅL and therefore commented (1907: 275) "Folgende zwei von STÅL unter dem Genusnamen *Mnesilochus* angeführte Spezies könnten auch zu *Dixippus* gehören [The following two species, which STÅL listed under the generic name *Mnesilochus*, may also belong to *Dixippus*]". BRADLEY & GALIL (1977: 181) listed *Mnesilochus* STÅL (misspelled *Mensilochus*) as a valid genus but without justification, why subsequent authors have since treated it as a synonym of *Carausius* STÅL.

Both species originally placed in the genus by STÅL (1877: 39) were only described from the ♂♂. As these are very similar and difficult to differentiate amongst the closely related genera of Lonchodinae, the true identity of *Mnesilochus* has so far remained unknown. It was only until recently that newly collected material of both sexes of *M. haedulus* STÅL became available for examination. Knowledge of the ♀♀ of at least one of the two species that STÅL placed in *Mnesilochus*, and the fact that *M. capreolus* and *M. haedulus* are clearly congeneric, now reveal the identity of STÅL's genus. ♀♀ of *Mnesilochus* possess large, foliaceous dorsal lobes on the mesofemora and ♂♂ bear a more or less distinct tooth on the posterodorsal carina of the mesofemora (sheldomly lacking). In contrast, *Carausius* has the mid legs of both sexes simple, slender and unarmed except for minute, ventral sub-apical spines on the mesofemora. Furthermore, *Carausius* exhibits a more or less distinct longitudinal keel on the mesosternum, which is not present in *Mnesilochus*. Therefore, *Mnesilochus* is here re-established as a valid genus, and clearly separated from *Carausius* STÅL, with which it was erroneously synonymised by BRUNNER V. WATTENWYL, 1907 (**stat. rev.**).

In fact, the dorsal lobes (♀♀) or tooth (♂♂) of the mesofemora seen in *Mnesilochus*, as well as numerous other features, show strong similarity to sections of *Lonchodes* GRAY, 1835 (sensu lato) and *Phenacephorus* BRUNNER V. WATTENWYL, 1907 instead. Comparison with various species currently listed in *Lonchodes* GRAY s. l. shows *M. capreolus* STÅL and *M. haedulus* STÅL to be closely related and congeneric with the Philippine *L. mindanaense* (BRUNNER V. WATTENWYL, 1907) and *L. palawanica* (CARL, 1913). In addition to these, several Bornean species currently attributed to *Lonchodes* are seen to be closely related and clearly belong in *Mnesilochus* as well. Consequently, *Mnesilochus* STÅL presently contains 13 described species, 8 of which are here transferred from the genus *Lonchodes* GRAY. Three species are transferred from *Phenacephorus* BRUNNER V. WATTENWYL, 1907 (**comb. n.**).

The recognition of *Mnesilochus* STÅL as a valid genus is a further step towards the splitting and systematic re-arrangement of the highly polyphyletic *Lonchodes* GRAY (→ see comments on *Lonchodes*). BRAGG (2001 & 2005) provided detailed descriptions and illustrations for the insects and eggs of all Bornean species except *M. portentosus* (BRUNNER V. WATTENWYL, 1907) **comb. n.** which was described and illustrated by HENNEMANN & CONLE (2003).

#### **Distribution:**

Philippines, Palawan, Balabac Island, Borneo & Sumatra.

#### **Species included (c.f. see also postscript p. 236):**

##### **1. *Mnesilochus bushelli* (BRAGG, 2005: 19, figs 21-36) [*Lonchodes*]. **comb. n.****

**HT**, ♀: Sabah, Kinabalu N.P., Liwagu Trail (Power station end), P.E. BRAGG, 26.VIII.2001, PEB-3283 (BMNH); **PT**, 2 ♂♂: Sabah, Kinabalu N.P., Liwagu Trail (Power station end), P.E. BRAGG, 15.VIII.2001, EB-3191 & 3192 (coll. PEB); **PT**, 2 ♂♂: Sabah, Kinabalu N.P., Liwagu Trail (Power station end), P.E. BRAGG, 17.VIII.2001, PEB-3193 & 3194 (coll. PEB); **PT**, 1 ♂, 2 ♀♀, 1 ♂ (nymph), 1 ♀ (nymph): Sabah, Kinabalu N.P., Liwagu Trail (Power station end), P.E. BRAGG, 26.VIII.2001, PEB-3210, 3211, 3233, 3234 & 3390 (coll. PEB).

##### **2. *Mnesilochus capreolus* STÅL, 1877: 39.**

**HT**, ♂: Insulis Philippinis (NHRS).

##### **3. *Mnesilochus haedulus* STÅL, 1877: 39.**

(Figs 107-113 & 120-121)

**HT**, ♂: Insulis Philippinis (NHRS).

##### **4. *Mnesilochus imitator* (BRUNNER V. WATTENWYL, 1907: 279, pl. 12: 7a (♂) - not ♀ [*Lonchodes*]. **comb. n.**** (Figs 116 & 126-127)

**LT**, ♂: Kina Balu, Borneo Staudinger, det. Br.v.W. *Dixippus imitator* Br., 20.564 (NHMW, No. 540);

**PLT**, ♂: Borneo, leg. Boucard ded., det. Br.v.W. *Dixippus imitator* Br., 10.039 (NHMW, No. 540);

**PLT**, ♂: Coll. Br.v.W., Borneo Frivaldsky; det. Br.v.W. *Dixippus imitator* Br.; 11.024 (NHMW, No. 540). [**not** **PLT**, 2 ♀♀: Sabah, Kinabalu, Staudinger (NHMW, No. 540) → these are *Carausius chani* (HAUSLEITHNER, 1991), synonymised by BRAGG, 2001: 422]

= *Prisomera morbosum* BRUNNER V. WATTENWYL, 1907: 290. **HT**, ♂ (nymph): Coll. Br.v.W. Kina Balu, Borneo, Staudinger, det. Br.v.W. *Prisomera morbosum*, 20.841 (NHMW, No. 568).

[Synonymised by BRAGG, 2005: 24]

##### **5. *Mnesilochus mindanaense* (BRUNNER V. WATTENWYL, 1907: 286) [*Prisomera*]. **comb. n.**** (Figs 114-115 & 121-122)

**LT**, ♀: Dapitan, Mindanao (SMTD); **PLT**, ♂: Dapitan, Mindanao (SMTD).

= *Prisomera tuberculatum* BRUNNER V. WATTENWYL, 1907: 287. Type(s): Philippines, Mindanao (MNHN – not traced). [Synonymised in error with *Prisomera strumosum* BRUNNER V. WATTENWYL, 1907 by GÜNTHER, 1932: 376] **syn. n.**

##### **6. *Mnesilochus modestus* (BRUNNER V. WATTENWYL, 1907: 286) [*Prisomera*]. **comb. n.****

**LT**, ♀: S. Borneo Fruhstorfer, Collectio Br.v.W.; det Br. v. W. *Prisomera modestum*; 22.448 (NHMW, No. 554); **PLT**, ♀: Coll. Br.v.W., Kina Balu, Borneo Staudinger; det. Br.v.W. *Prisomera modestum*; 20.565 (NHMW, No. 554).

= *Prisomera excretum* BRUNNER V. WATTENWYL, 1907: 289. **ST**, ♀♀: Borneo (HNHM – believed to be destroyed in fire). [Synonymised by GÜNTHER, 1932: 384]

- [**not** *Prisomera modestissimum* BRUNNER V. WATTENWYL, 1907: 286. **HT**, ♀: S.O. Borneo ?; Brunner v. Wattenwyl et Redtenbacher det 1903 Type; *Pris. modestissimum* (ETHZ). Synonymised with *Prisomera modestum* BRUNNER V. WATTENWYL, 1907 by GÜNTHER, 1932: 384 in error. Examination of the HT has shown this to be a typical specimen of *Paraprisomera coronata* (BRUNNER V. WATTENWYL, 1907) and most certainly are from Sri Lanka. **syn. n.**]  
**[Comment:** This species has the mesofemora considerably longer than the metanotum and median segment combined, the mesofemora of ♀♀ only with minute lobes and basitarsi comparatively longer than in all other members of the genus.]
7. *Mnesilochus nieuwenhuisi* (BRAGG, 1994: 237, figs 2, 11-12, 19 (♀), 3 & 22 (♂), 6-7 (eggs)) [*Phenacephorus*]. **comb. n.**  
**HT**, ♂: Borneo, Mahakam, 1894, Borneo expedition of Dr. Nieuwenhuis; **PT**, 2 ♂♂: Borneo, Mahakam, 1894, Borneo expedition of Dr. Nieuwenhuis; **PT**, ♀: Borneo, Long, Bloe-oe, XI. 1898, Borneo expedition of Dr. Nieuwenhuis (RMNH).
8. *Mnesilochus palawanicus* (CARL, 1913: 30) [*Prisomera*]. **comb. n.** (Fig. 119)  
**HT**, ♀ (1 egg ex ovipositor): Philippines, Palawan, 1898, Doherty, ex coll. Fruhstorfer (MHNG). (synonymised in error with *Hermogenes hosei* KIRBY, 1896 by GÜNTHER, 1932: 376)  
**[Comment:** This species is likely to be the ♀ of *Prisomera rubrifemur* BRUNNER V. WATTENWYL, 1907. However confirmation is required by knowledge of the ♂ of *P. palawanica* and ♀ and egg of *P. rubrifemur*, or specimens of both sexes from the same locality. ZOMPRO & BROCK (2003: 27, figs 35-36) provided a description and illustration of the egg of *P. palawanica* and erroneously transferred it to the genus *Stheneboea* STÅL, 1875.]
9. *Mnesilochus portentosus* (BRUNNER V. WATTENWYL, 1907: 291) [*Prisomera*]. **comb. n.** (Figs 117 & 124-125)  
**HT**, ♂: Museum Paris, Borneo, R. Oberthur 1898; Coll. Br. v. W.; det Br. v. W., *Prisomera portentosum*; 23.344 (NHMW, No. 571).  
**[Comment:** This species was provisionally placed in *Phenacephorus* BRUNNER V. WATTENWYL, 1907 by HENNEMANN & CONLE, 2003: 21]
10. *Mnesilochus rubrifemur* (BRUNNER V. WATTENWYL, 1907: 291) [*Prisomera*]. **comb. n.**  
**HT**, ♂: Coll. Br. v. W. Balabac (Borneo), Staudinger; det. Br. v. W. *Prisomera rubrifemur*; 20.132 (NHMW, No. 570).  
**[Comment:** This species is likely to be identical with *Prisomera palawanica* CARL, 1913]
11. *Mnesilochus rusticus* (BRUNNER V. WATTENWYL, 1907: 288, pl. 13: 2 (♀)) [*Prisomera*]. **comb. n.** (Fig. 118)  
**HT**, ♀: det. Br. v. W. *Prisomera rusticum*; Coll. Br. v. W., Kina Balu, Borneo, Staudinger; 20.837 (NHMW, No. 560).  
 = *Prisomera indefinitum* BRUNNER V. WATTENWYL, 1907: 290, pl. 13: 3 (♂). **HT**, ♂: Coll. Br. v. W., Kina Balu, Borneo, Staudinger; det. Br. v. W. *Prisomera indefinitum*; 20.840 (NHMW, No. 569).  
**[Synonymised in error with *Phasma femorata* STOLL, 1813 by GÜNTHER, 1932: 371. Synonymised by BRAGG, 2005: 26]**
12. *Mnesilochus thami* (BRAGG, 2001: 495, figs 199 a-j (♂, ♀), 200 a-c (egg)) [*Lonchodes*]. **comb. n.**  
**HT**, ♀ (with eggs): Sabah, Ulu Dusun, C.L. Chan & W.W. Wong, 14.V.1986; **PT**, 2 ♂♂, 2 ♀♀ (nymphs): Sabah, Ulu Dusun, C.L. Chan & W.W. Wong, 14.V.1986; **PT**, ♀: Sabah, Ulu Dusun, C.L. Chan, & W.W. Wong, 18.V.1984; **PT**, ♀: Sabah, Sepilok Forest Reserve, C.L. Chan, 08.X.1982; **PT**, ♂: Sabah, Sepilok Forest Reserve, C.L. Chan, 01.VI.1984; **PT**, ♀: Sabah, Shinji Nagai, 02.II.1983 at light; **PT**, ♀: Sabah, Telupid District, Batung Tawai Forest Reserve, beside Sungai Meliau, Jamal Hassim, 05.IV.1994; Sabah, Sandakan, Shinji Nagai, 02.II.1983 (coll. CLC); **PT**, ♂, ♀: Sabah, Ulu Dusun, C.L. Chan, 02.VI.1984; **PT**, ♀: Sabah, Sepilok Forest Reserve, C.L. Chan, 05.VI.1984 (BMNH).
13. *Mnesilochus verrucosus* (DE HAAN, 1842: 136, pl. 14: 12 (♀)) [*Phasma (Acanthoderus)*]. **comb. n.**  
**HT**, ♀: Sumatra, Batang Singalang, coll. Müller (RMNH).

***Mnesilochus capreolus* STÅL, 1877**

*Mnesilochus capreolus* STÅL, 1877: 39. **HT**, ♂: Ins. Philipp.; Type, *Mnesilochus capreolus* STÅL ♂ (NHRS).  
KIRBY, 1904: 320.

*Carausius capreolus*, BRUNNER V. WATTENWYL, 1907: 275.

BRUNER, 1915: 39.

OTTE & BROCK, 2005: 83.

**Material examined (1 ♂):**

PHILIPPINES:

1 ♂: *Lonchodes* aff. v. Mayon, Maranado; *Mnesilochus capreolus* (MNCN).

♂♂ are similar to the Bornean *M. modestus* (BRUNNER V. WATTENWYL, 1907) **comb. n.** and differ from this and the Philippine *M. haedulus* STÅL, 1877 and *M. mindanaense* (BRUNNER V. WATTENWYL, 1907) **comb. n.** by: the more globose head, two distinct dorsal protuberances of the mesofemora and relatively shorter semi-tergites of the anal segment.

STÅL's HT ♂ in NHRS was only examined from photographs kindly taken by Dr. K. A. JOHANSON (NHRS). STÅL (1877: 39) cited a body length of 89.0 mm. A ♂ from Mayon (SE-Luzon) in MNCN appears to be this species and measures a body length of 83.6 mm

♀♀ and eggs unknown.

***Mnesilochus haedulus* STÅL, 1877**

(Figs 107-113, 120-121)

*Mnesilochus haedulus* STÅL, 1877: 39. **HT**, ♂: Ins. Philipp.; Type, *Mnesilochus haedulus* STÅL ♂ (NHRS).  
KIRBY, 1904: 320.

*Carausius haedulus*, BRUNNER V. WATTENWYL, 1907: 276.

BRUNER, 1915: 39.

OTTE & BROCK, 2005: 85.

**Material examined (6 ♂♂, 5 ♀♀, eggs):**

PHILIPPINES:

2 ♂♂, 2 ♀♀, 5 eggs (ex abdomen): Philippines, Northern Luzon Id., Mountain Province, Nueva Viscaya, Balite, leg. I. O. Lumawig VI.1996 (coll. FH 0262-3 to 6); 2 ♂♂, 3 ♀♀: Philippines, Mountain Prov., N-Luzon, I. Lumawig VII.1996, BMNH(E) 2005-98, *Carausius haedulus* STÅL, det P.D. BROCK (BMNH).

ERRONEOUS DATA:

2 ♂♂: N-Thailand, Chiang Mai, leg. Lehmann 14.V.1988? (coll. FH 0262-1 & 2).

**Differentiation:**

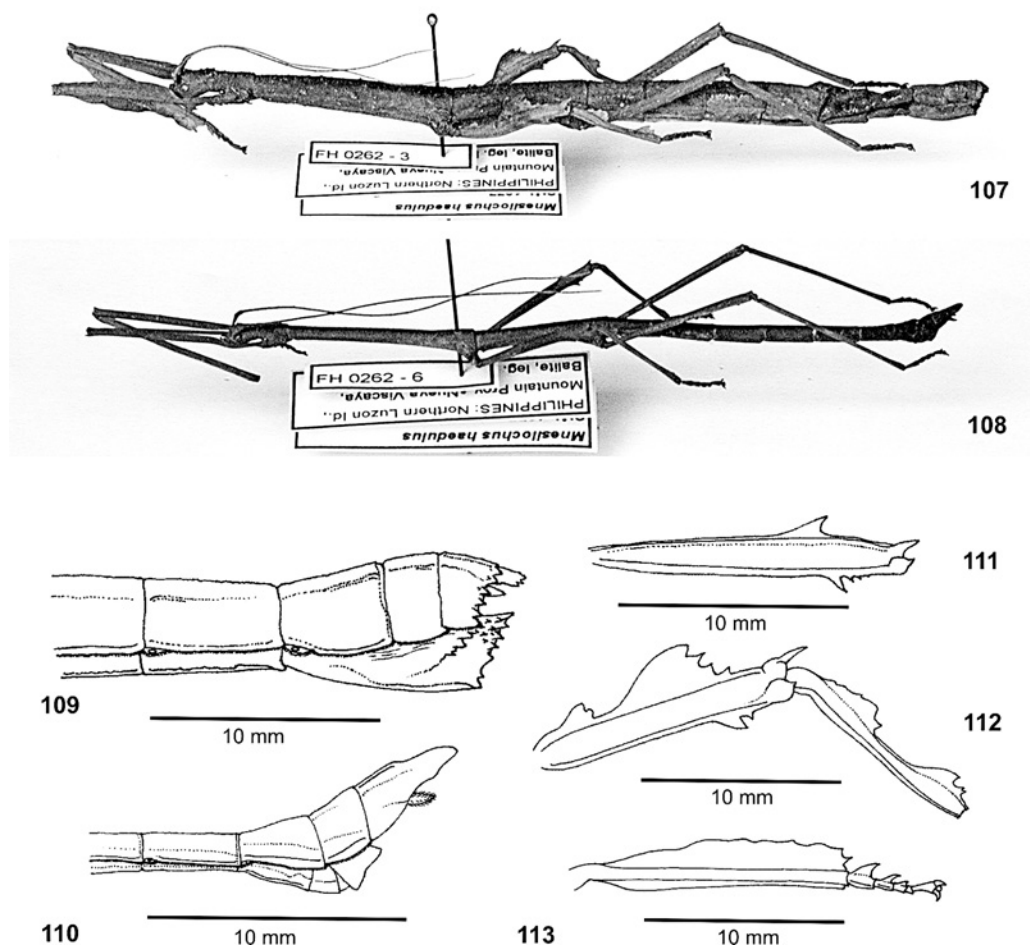
Closely related and very similar to *M. mindanaense* (BRUNNER V. WATTENWYL, 1907) **comb. n.** but differing by: the smaller size, less slender and elongate body and relatively shorter body segments of both sexes; presence of a distinct sub-basal dorsal lobe of the mesofemora and differently shaped praepopercular organ of ♀♀; more prominent dorsal tooth of the mesofemora and slightly more elongate and more distinctly pointed semi-tergites of ♂♂. Eggs differ by the much more distinct dorsal and ventral bulge and polar mound of the egg-capsule.

♂♂ are very similar to *M. rubrifemur* (BRUNNER V. WATTENWYL, 1907) **comb. n.** from Balabac Island prope Borneo but differ by: the more decided dorsal tooth of the mesofemora and comparatively more strongly tapered semi-tergites of the anal segment.

Eggs strongly resemble those of *M. portentosus* (BRUNNER V. WATTENWYL, 1907) **comb. n.**, but differ by the slightly smaller size, less sharp dorsal and ventral bulge of the egg capsule and broader micropylar plate.

**Description:**

♀♀ (**Fig. 107**): Of average size for the genus (body length 88.1-96.5 mm) and moderately slender (maximum body width 5.0 mm). Head and body except ventral surface of abdomen roughly granulose, and rugulose, head and thorax sparingly tuberculate. Abdominal tergite V occasionally with a ± prominent, scale-like lobe



**Figs 107-113: *Mnesilochus haedulus* STAL, 1877: 107. ♀ (coll. FH); 108. ♂ (coll. FH); 109. apex of abdomen ♀ (lateral view); 110. apex of abdomen ♂ (lateral view); 111. left mesofemur of ♂; 112. left midleg of ♀ (lateral view); 113. protibia of ♀.**

or struma at posterior margin. Colouration of body and legs varying from pale over mid to dark brown. Abdominal tergites II, III and VI often with an indistinct dark brown to black lateral marking. Antennae pale brown and straw apically. Eyes mid to dark brown. Basal half of interior surface of metafemora reddish brown.

**Head:** Sub-cylindrical, rectangular in dorsal aspect and about 1.5x longer than wide. Between the eyes with a slightly raised, transverse bulge and two small, blunt and forward pointing spines. Vertex with a slightly impressed coronal line and covered with numerous tubercles of variable size. Posterior margin with two distinct, rounded tubercles. Eyes very small and roughly circular, their length contained almost 4x in that of cheek. Antennae reaching half way along metanotum. Scapus strongly compressed dorsoventrally and dilated laterally, the outer lateral margin gently rounded. Pedicellus cylindrical and about 2/5 the length of scapus. Following antennomeres strongly decreasing in length towards apices of antennae; all bristled.

**Thorax:** Pronotum slightly shorter than the head, rectangular and 1.3x longer than wide. Transverse median depression distinct, very slightly curved and covering complete width of segment. Mesothorax almost 2.4x longer than head and pronotum combined. Mesonotum laterally with a longitudinal row of 3-4 more conspicuous node-like tubercles. Mesopleurae protuded into a small, blunt spine at posterior margin.

Metanotum about half the length of mesonotum, parallel-sided and slightly more than 2x longer than wide. Metapleurae, meso- and metasternum simple.

Abdomen: Median segment slightly less than half the length of metanotum, rectangular and about 1.3x longer than wide. Segments II-V slightly increasing in length and width, VI-VII decreasing, V longest and widest. II-VI in average 1.5x longer than wide, VII shorter. Tergite II occasionally with one or two tubercles laterally. V often with a  $\pm$  prominent scale- or crest-like lobe or struma. Sternites II-VII with two parallel, longitudinal median carinae; these slightly lamellate. Praeopercular organ composed of a median depression and two small lobes on each side. Tergite VIII  $\frac{3}{4}$  the length of VII, strongly convex and trapezoidal with posterior margin wider than anterior margin. IX  $\frac{2}{3}$  the length of VIII and wider than long. Anal segment longer than IX, with a fine median carina and a slight median indentation at posterior margin which is otherwise irregularly tuberculate. Supraanal plate of variable length and distinctly projecting over anal segment; posterior margin notched medially. Cerci very small, sub-cylindrical and tapered towards the apex. Subgenital plate strongly keeled, convex and very slightly projecting over apex of anal segment. Posterior  $\frac{1}{3}$  irregularly tuberculate and with the keel conspicuously dentate.

Legs: Of moderate length, profemora shorter than mesothorax, mesofemora shorter than metanotum and median segment combined, hind legs not reaching apex of abdomen. Anterodorsal carina of profemora roughly lamellate, posteroventral carina protuded into a triangular tooth sub-apically. Dorsal carina of protibiae forming a prominently raised, lamella-like lobe, which slightly increases in height towards apex of tibia; apex of the lobe smooth or dentate. Posterodorsal carina of mesofemora with two lobes, one small often bi-dentate lobe sub-basally and a much larger, dentate lobe some  $\frac{2}{3}$  off the base. Apically the dorsal carina is protuded into a conspicuous, backward-pointing spine. Ventral carinae each undulating into a prominent, laterally compressed, triangular tooth and 1-2 small teeth sub-basally. Medioventral carina unarmed. Dorsal carina of mesotibiae with two dentate lobes, one sub-basally, one sub-apically. Hind legs simple and slender, unarmed except for 1-2 minute sub-apical spines on ventral carinae of metafemora. Probasitarsus and 2<sup>nd</sup> tarsomere each with a triangular lobe dorsally. Basitarsi shorter than following two tarsomeres combined.

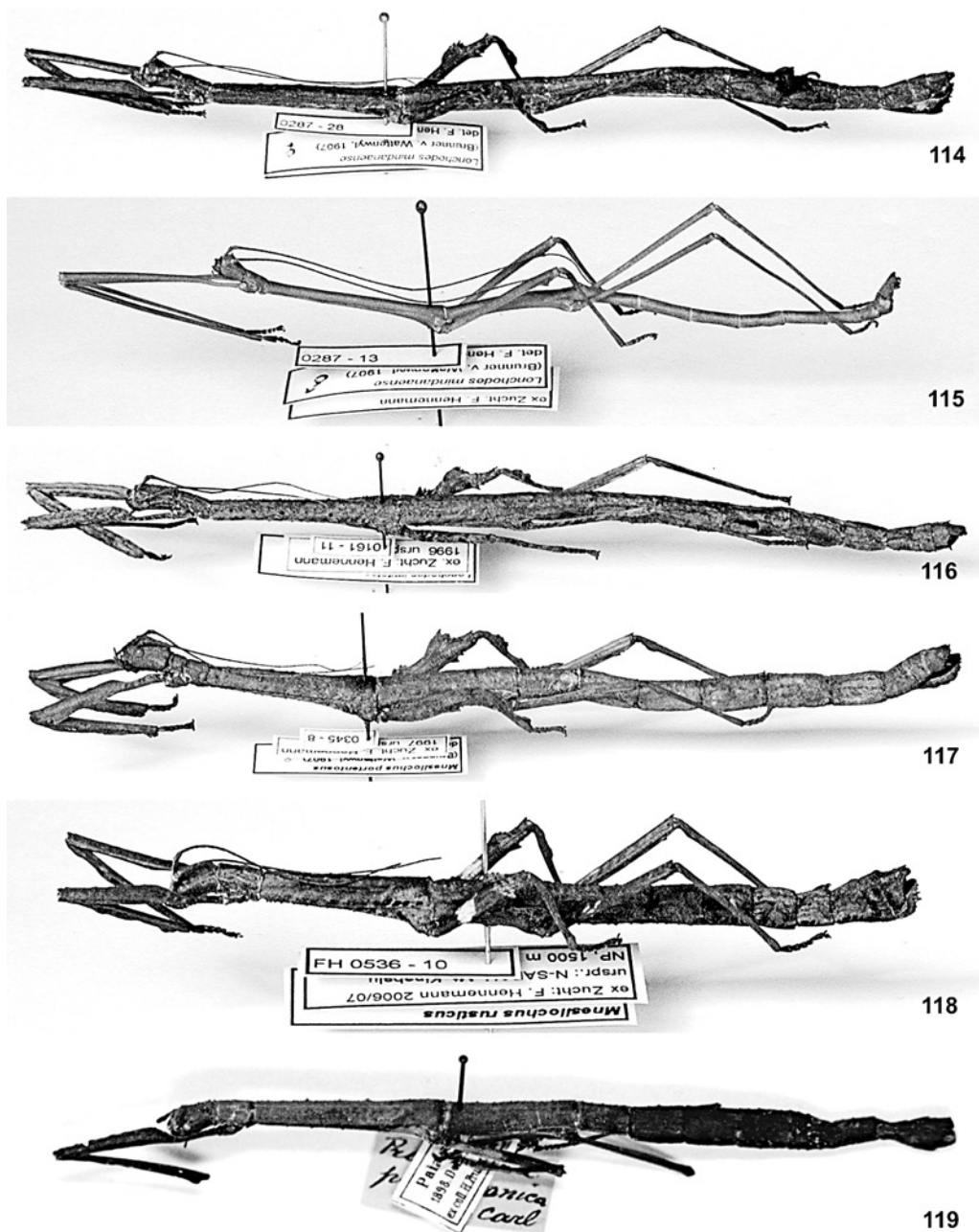
$\sigma\sigma$  (**Fig. 108**): Of average size for the genus (body length 71.0-76.0 mm) and slender (average body width 1.9 mm). Head and thorax densely but minutely granulate, ventral surface of abdomen sparingly granulate. General colouration of head, body and legs mid to dark brown. Abdominal tergite IX with a blackish spot laterally. Bases of meso- and metafemora pale brown to straw, interior surfaces of metafemora reddish brown to red. Antennae mid brown and straw apically.

Head: Subcylindrical, 1.5x longer than wide and slightly narrowing towards the posterior; broadest at the eyes. Between the eyes with a slightly raised, transverse bulge and two small, forward-pointing spines. Vertex with a slightly impressed coronal line and two conspicuous tubercles at posterior margin; otherwise roughly granulate. Eyes of moderate size, circular and strongly projecting hemispherically, their length contained about 2.7x in that of cheeks. Antennae generally as in  $\text{♀♀}$  but relatively longer, projecting slightly over median segment. Scapus comparatively more slender.

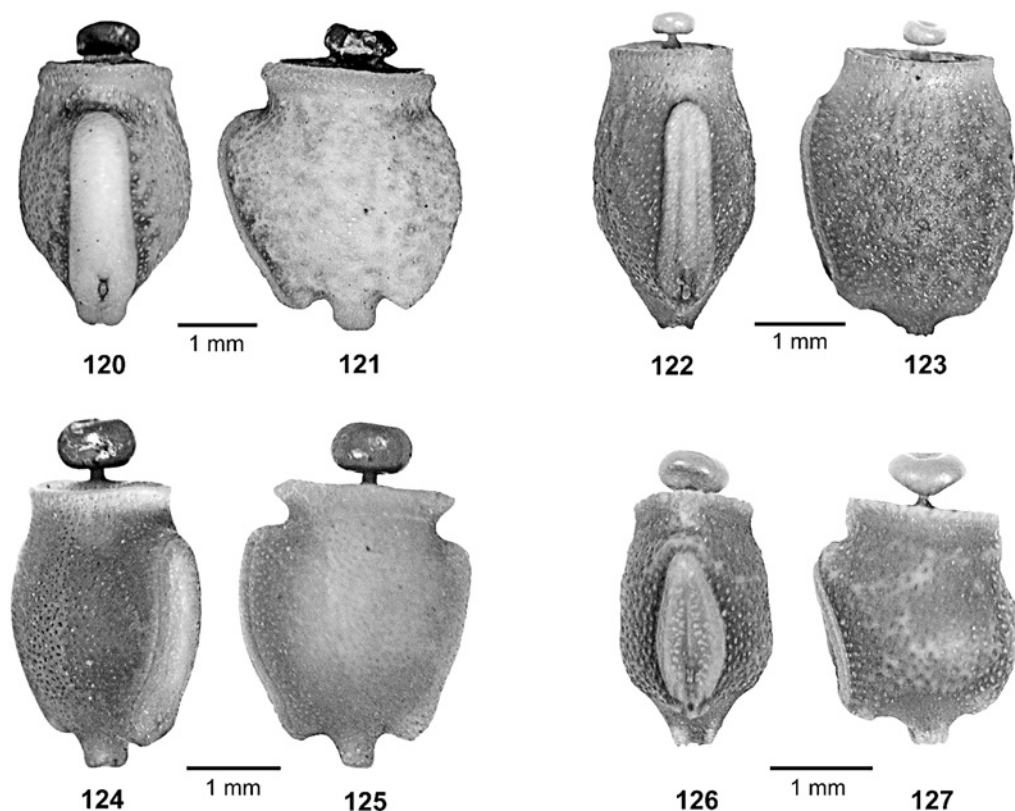
Thorax: Pronotum generally as in  $\text{♀♀}$ . Mesothorax very elongate and slender, about 2.8x longer than head and pronotum combined. Mesonotum occasionally with 2-3 small but pointed tubercles laterally. Mesopleurae protuded into a small, blunt spine at posterior margin. Metanotum about half the length of mesonotum and slightly constricted pre-medially.

Abdomen: Median segment about  $\frac{1}{3}$  the length of metanotum, rectangular and about 1.5x longer than wide. Segments II-VII cylindrical, of uniform width and slightly decreasing in length; II 3.5x, VII 2.5x longer than wide. Tergite VII with four short, sub-parallel, longitudinal carinae close to posterior margin. Sternites II-VII with a very indistinct, longitudinal median carina. Tergite VIII  $\frac{3}{4}$  the length of VII and strongly widening towards the posterior; posterior margin 2x wider than anterior margin. IX  $\frac{3}{4}$  the length of VIII, slightly wider than long, narrowed towards the posterior and with a longitudinal median carina. Anal segment almost as long as tergite VIII and IX combined, strongly tectiform and split, forming two elongate, tapered and apically pointed semi-tergites. Interior surfaces of semi-tergites armed with numerous, hook-like teeth. Cerci small, sub-cylindrical and tapered towards a pointed apex. Poculum strongly convex, cup-like, angular and with a slight median keel in posterior half; reaching  $\frac{1}{3}$  the way along anal segment.





**Figs 114-119: *Mnesilochus* spp.:** 114. *M. mindanaense* (BRUNNER V. WATTENWYL, 1907) **comb. n.**, ♀ (coll. FH, Luzon Id.); 115. *M. mindanaense* (BRUNNER V. WATTENWYL, 1907) **comb. n.**, ♂ (coll. FH, Luzon Id.); 116. *M. imitator* (BRUNNER V. WATTENWYL, 1907) **comb. nov.**, ♀ (coll. FH; N-Borneo: Sabah); 117. *M. portentosus* (BRUNNER V. WATTENWYL, 1907) **comb. n.**, ♀ (coll. FH; Borneo: Sarawak); 118. *M. rusticus* (BRUNNER V. WATTENWYL, 1907) **comb. n.**, ♀ (coll. FH; N-Borneo: Sabah); 119. *M. palawanica* (CARL, 1913) **comb. n.**, ♀, HT (MHNG).



**Figs 120-127:** Eggs of *Mnesilochus* spp. [scale = 1 mm]; **120-121:** *M. haedulus* (STÅL, 1877); **120.** dorsal view; **121.** lateral view. **122-123:** *M. mindanaense* (BRUNNER V. WATTENWYL, 1907); **122.** dorsal view; **123.** lateral view. **124-125:** *M. portentosus* (BRUNNER V. WATTENWYL, 1907); **124.** dorsal view; **125.** lateral view. **126-127:** *M. imitator* (BRUNNER V. WATTENWYL, 1907); **126.** dorsal view; **127.** lateral view.

**Legs:** All rather slender and of moderate length; mesofemora slightly thickened. Profemora slightly shorter than mesothorax, mesofemora slightly shorter than metanotum and median segment combined, metafemora reaching to posterior margin of abdominal segment IV. Posteroventral carina of profemora with 2-3 minute teeth at the apex; remaining unarmed. Dorsal carina of protibiae narrowly elevated. Posterodorsal carina of mesofemora with a triangular tooth some  $\frac{3}{4}$  off the base. Ventral carinae of mesofemora with a distinct, triangular sub-apical tooth and two minute teeth. Dorsal carina of mesotibiae very slightly rounded sub-apically; otherwise simple. Medioventral carina indistinct and unarmed. Ventral carinae of metafemora with 2-3 minute teeth at the apex. Dorsal carina of probasitarsus gently raised towards the apex. Basitarsi about as long as following two tarsomeres combined.

#### **Eggs (Figs 120 & 121):**

Five eggs were extracted from the abdomen of one ♀ in coll. FH (No. 0262-3). The following description is based on one egg which appears to be almost fully developed due to showing obvious surface texture and colour pattern of the chorion and an orange capitulum.

Medium sized, capsule laterally flattened, oval in cross-section and with dorsal and ventral surfaces forming a conspicuous bulge. Capsule distinctly indented dorsally and ventrally at anterior margin and polar-area. The latter with a prominent, conical polar mound, which has a central hollow. Capsule surface very minutely rugose and covered with minute pits. Micropylar plate elongate, very slightly widened posteriorly and with a distinct but narrow posteromedian gap. Micropylar cup very small. Operculum oval, flat and with

a prominent, knob-like capitulum on a distinct stalk. General colouration of capsule pale creamish grey with darker marking along the anterior margin as well as the dorsal and ventral bulge. Micropylar plate yellowish white. Operculum mid brown and capitulum dark orange.

Measurements (in mm): Length 3.7, length (including capitulum) 4.0, width 2.3, height 3.0, length of micropylar plate 2.5.

#### Comments:

Two ♂♂ in coll. FH were bought on an insect fair and bear the data “N-Thailand, Chiang Mai”. Detailed comparison of these two specimens with samples of *M. haedulus* STÅL, 1877 from the Philippines leave no doubt that they are conspecific. Hence, the record for Northern Thailand can be regarded erroneous.

STÅL's HT ♂ in NHRS was only examined from detailed photographs kindly taken by Dr. K. A. Johanson (NHRS). STÅL (1877: 39) cited a body length of 71.0 mm for the HT.

	♂♂ (coll. FH)	♀♀ (coll. FH)
Body:	72.0-76.0	88.1-96.5
Head:	3.7-3.8	5.5-5.7
Pronotum:	2.9	4.3-4.4
Mesonotum	17.9-18.9	21.2-22.8
Metanotum:	9.6-10.1	9.9-11.0
Median segment:	3.3-3.4	4.8-5.0
Profemora:	17.2	17.3-19.3
Mesofemora:	12.4-13.1	12.7-14.0
Metafemora:	15.2-16.0	17.2-18.1
Protibiae:	18.0-18.9	17.1-19.0
Mesotibiae:	10.9-11.7	11.0-11.3
Metatibiae:	16.8-17.9	18.9-19.4
Antennae:	39.0-40.0	37.0-40.0

**Table 16:** Measurements of *Mnesilochus haedulus* STÅL [mm]

#### *Mnesilochus mindanaense* (BRUNNER V. WATTENWYL, 1907) **comb. n.** (Figs 114-115, 122-123)

*Prisomera mindanaense* BRUNNER V. WATTENWYL, 1907: 286. **LT**, ♀: Dapitan, Mindanao (SMTD); **PLT**, ♂: Dapitan, Mindanao (SMTD).

*Prisomera mindanaensis*, BRUNER, 1915: 39.

*Lonchodes mindanaense*, BRAGG, 1996: 44, figs 20-21 (fore and mid leg of LT ♀).

ZOMPRO, 2001 a: 55, figs 14-18 (♂, ♀ abdomen and egg).

OTTE & BROCK, 2005: 183.

*Lonchodes haematomus*, KLANTE, 1969: VII/9, figs 2-4. [Misidentification]

*Lonchodes hosei*, GÜNTHER, 1932: 376. (in part – **erroneous synonym**)

*Prisomera tuberculatum* BRUNNER V. WATTENWYL, 1907: 287. **HT(ST)**, ♀(?): Philippines, Mindanao (MNHN – not traced). [Synonymised in error with *Prisomera strumosum* BRUNNER V. WATTENWYL, 1907 by GÜNTHER, 1932: 376] **syn. n.**

BRUNER, 1915: 39.

*Lonchodes tuberculatum*, OTTE & BROCK, 2005: 182. [As a synonym of *Hermagoras hosei* (KIRBY, 1896)]

#### **Material examined (14 ♂♂, 15 ♀♀, eggs):**

1 ♂, 1 ♀: Philippines, Luzon, Talisay Batangas, 23.II.-13.II.1993, leg. O. ZOMPRO (coll. FH 0287-1 & 2); 1 ♂: Philippines, Mindoro Isl., Mt. Halcon, leg. Mohagan 4.IV.1996 (coll. FH 0287-3); 1 ♀: Philippines, Mindoro Isl., Mt. Halcon, leg. Mohagan 30.IV.1996 (coll. FH 0287-4); 1 ♀: Philippines, Mindoro Isl., Mt. Halcon, leg. Mohagan 25.V.1996 (coll. FH 0287-5); 1 ♂: Philippines, Mindoro Isl., Mt. Halcon, leg. Mohagan 31.IV.1996 (coll. FH 0287-6); 6 ♂♂: Philippines, Mindoro Isl., Mt. Halcon, leg. Mohagan 28.IV.-19.V.1996 (coll. FH 0287-7 to 10); 5 ♂♂, 12 ♀♀, eggs: ex Zucht: F. HENNEMANN, urspr.: Philippines, Luzon Id. Talisay Batangas, 1999-2000 (coll. FH 0287-12 to 29 & E).

**Differentiation:**

Similar to *M. haedulus* STÅL, 1877 from Luzon, *M. palawanica* (CARL, 1913) **comb. n.** from Palawan and *M. imitator* (BRUNNER V. WATTENWYL, 1907) **comb. n.** from Borneo. From the first it differs by: the larger size, more slender and elongate body and relatively longer body segments of both sexes; very indistinct, not dentate sub-basal dorsal lobe of the mesofemora and differently shaped praeopercular organ of ♀♀; less prominent dorsal tooth of the mesofemora and slightly shorter and broader semi-tergites of ♂♂, and much more distinct dorsal and ventral bulge and polar mound of the egg-capsule.

From *M. palawanica* CARL ♀♀ differ by: the more slender and elongate body; relatively longer mesothorax; shorter and broader head, and shape of the mid legs. The eggs differ from those of *M. palawanica* by the larger size, more elongate capsule and more elongate, relatively longer, almost parallel-sided micropylar plate.

From *M. imitator* BRUNNER V. WATTENWYL it is distinguished by: the less elongate head and the pair of spines between the eyes of both sexes; much smaller, not dentate sub-basal dorsal lobe of the mesofemora and differently shaped praeopercular organ of ♀♀; almost straight metathorax (slightly curved in *imitator*) and shorter semi-tergites of the anal segment of ♂♂. Eggs (Figs 120 & 121) differ by the distinctly larger, more elongate egg-capsule, less prominent dorsal and ventral bulge and pale orange instead of dark red capitulum.

**Comments:**

The ♀ type(s) of *Prisomera tuberculatum* BRUNNER V. WATTENWYL, 1907 are not traced in MNHN and presumed lost. GÜNTHER (1934: 376) erroneously synonymised *P. tuberculatum* with the Bornean *P. strumosum* BRUNNER V. WATTENWYL, which is not a member of *Mnesilochus* STÅL. Although the type(s) cannot be examined, the description and measurements given by BRUNNER V. WATTENWYL leave no doubt that these are the same as *M. mindanaense*. The characteristic features mentioned in the original description lie within the range of *M. mindanaense*.

Like in other species of the genus, ♀♀ of *M. mindanaense* show considerable intraspecific variability concerning to the size, colouration and sculpturing of the body. ZOMPRO (2001: 55) briefly discussed the variability and provided a brief description of the egg. Specimens in the first author's collection (coll. FH) measure: ♀♀ 97.0-120.0 mm, ♂♂ 78.0-87.5 mm.

*M. mindanaense* appears to be widely distributed and rather common in the Philippines having so far been recorded from the islands of Mindanao, Luzon and Mindoro. The 2 ♀♀ and 6 ♂♂ in coll. FH (No's 0287-3 to 10) from Mount Halcon represent the first record of *M. mindanaense* from Mindoro Island.

***Manduria* STÅL, 1877**

**Type-species:** *Lonchodes systropedon* WESTWOOD, 1859: 44, by original designation.

*Manduria* STÅL, 1877: 40.

KIRBY, 1904: 341.

BRUNNER V. WATTENWYL, 1907: 300.

HENNEMANN & CONLE, 1997: 342, figs 1-7.

OTTE & BROCK, 2005: 190.

*Lonchodes*, WESTWOOD, 1859: 36. (in part).

**Description:**

♀♀, ♂♂: Medium-sized (body length ♂♂ 52.0-65.5 mm, ♀♀ 66.0-89.2 mm), moderately slender Lonchodinae; ♀♀ with a conspicuous beak-like ovipositor. Head and complete body surface strongly rugose and tuberculate (♀♀) or sparingly granulose (♂♂). Meso- and metanotum as well as dorsal surface of complete abdomen tectiform and with a prominent longitudinal median keel (indistinct in ♂♂). Each dorsal body segment (except abdominal tergite X) with a ± prominent posteromedian tubercle or blunt spine. Head elongate, at least 1.5x longer than wide, cylindrical and conspicuously narrowed towards the posterior; vertex flat. Between the eyes with a pair of tubercles or blunt spines. Antennae long, filiform and distinctly projecting over posterior margin of median segment. Scapus longer than wide, strongly dorso-ventrally flattened and gently expanded exterolaterally. Pedicellus much shorter, cylindrical. Mesothorax elongate and at least 1.8x longer than head and pronotum combined, usually longer; parallel-sided in (♂♂) or very gently

widening towards the posterior (♀♀). Metanotum roughly half the length of mesonotum, slightly constricted medially. Mesosternum tectiform and with a blunt longitudinal median keel (less distinct in ♂♂). Metasternum strongly convex. Median segment short, less than 1/3 the length of metanotum; wider than long (♀♀) or roughly quadrate (♂♂). Abdomen roughly equal in length to head and complete thorax combined (elongated supraanal plate of ♀♀ excluded). Segments II-VII of ♂♂ parallel-sided, of ♀♀ II-IV gently widening, V broadest and parallel-sided and VI-VII narrowing towards the posterior. Segments II-VI slightly increasing in length. II quadrate (♀♀) or indistinctly longer than wide (♂♂), following quadrate to slightly longer than wide in ♀♀, and about 1.5x longer than wide in ♂♂. VII shorter than VI. Sternites II-VII smooth (♂♂) to minutely granulose and rugulose (♀♀). ♀♀ with a prominent praeopercular organ at posterior margin of sternite VII. Tergites VIII and IX shorter than previous, VIII widening towards the posterior. Anal segment of ♂♂ strongly tectiform, split over about half of its length and forming two moderately elongate semi-tergites. These covered with minute teeth on their interior surfaces. Vomer strongly reduced, not visible. Poculum convex, rounded posteriorly and reaching to posterior margin of tergite IX. Anal segment of ♀♀ narrowed towards the posterior and with a broad triangular excavation at posterior margin. Supraanal plate strongly elongated, lanceolate with a pointed apex, tectiform and more than 1.5x longer than anal segment; partly fused with anal segment. Subgenital plate of ♀♀ keeled, boat-shaped, elongated and extending considerably over apex of anal segment. Cerci of both sexes very small and oval in cross section. All legs moderately long and slender, profemora slightly longer than mesothorax, mesofemora longer than metanotum and median segment combined. Profemora strongly curved and compressed basally. All femora and tibiae trapezoidal in cross-section; anterodorsal carina of profemora slightly raised. Medioventral carina of femora very indistinct and unarmed. Antero- and posteroventral carinae of femora each with a small sub-apical tooth or spine. Tarsi elongate and simple. Meso- and metafemora and mesotibiae sometimes with single rounded lobes of variable size dorsally. Tarsi short. Basitarsi at least as long as following three tarsomeres combined.

#### **Description of the eggs:**

Medium-sized (overall length 5.8 mm), elongate and bullet shaped. Capsule more than 2x longer than wide, cylindrical in cross-section and constricted towards polar end. Polar-area with a conspicuous, conical and hollow extension which exhibits two distinct oval holes. Capsule surface covered with several irregular, longitudinal bulgs which bear longitudinal rows of raised, moss-like structures. Micropylar plate very elongate, almost as long as the capsule, tapered and pointed towards the anterior and broadened posteriorly. Posterior end with a distinct and deep median excavation. Micropylar cup prominent and covered with moss-like structures. Median line indistinct. Internal micropylar plate open with a very faint and short median line (Fig. 134). Operculum cylindrical and covered with a raised, irregularly disc or crown-like structure which has a central indentation.

#### **Differentiation:**

This distinctive genus is well distinguished from all other members of Lonchodinae by: the conspicuous beak-like ovipositor of ♀♀ which is formed by elongation of the subgenital plate and an elongated, lanceolate supraanal plate, and the distinctly tectiform dorsal body surface (♀♀ in particular). The very distinctive eggs are rather untypical for Lonchodinae and typical for the elongate, bullet-shaped capsule which exhibits a conspicuous, conical hollow extension on the polar-area.

#### **Comments:**

STÅL (1877: 40) placed *Manduria* as an intermediate between *Medaura* STÅL, 1875 (Phasmatinae: Clitumnini) and *Pachymorpha* GRAY, 1835 (Pachymorphinae), but distinguished it from both genera by the lanceolate supraanal plate, elongated subgenital plate and long, filiform antennae. BRUNNER V. WATTENWYL (1907: 300) placed it in his tribe Lonchodini and in close relation to taxa currently included in the genera *Neopromachus* GIGLIO-TOS, 1912 and *Erinaceophasma* ZOMPRO, 2001 (both Eurycanthinae). The long antennae, split anal segment of ♂♂ which forms two separate semi-tergites, structures of the head, antennae and extremities, and the open internal micropylar plate of the egg place *Manduria* STÅL in Lonchodinae.

BRUNNER V. WATTENWYL (1907: 300) stated that the illustration of WESTWOOD (1859, pl. 3: 8) did not show whether the anal segment or the supraanal plate is elongated, although STÅL (1875: 40) clearly stated the elongation to concern to the latter. In fact, ♀♀ of *Manduria* have an elongated and lanceolate supraanal plate, which is partly fused with the anal segment. Except for *Manduria*, a beak-like ovipositor amongst Lonchodinae is only found in ♀♀ of *Stheneboea verruculosa* BRUNNER V. WATTENWYL, 1907 from Peninsular Malaysia. This species however, has it formed by elongation of the anal segment, with the

supraanal plate being very small and hidden underneath the anal segment. An elongated, lanceolate supraanal plate is also found in certain representatives of *Lonchodes* GRAY, 1835 (e.g. *L. everetti* (KIRBY, 1896) or *L. hainanensis* (CHEN & HE, 2002)) but these taxa do not have an elongated subgenital plate to form a beak-like ovipositor. In Eurycanthinae the ovipositor is formed by a strongly elongated, lanceolate anal segment and supraanal plate (HENNEMANN & CONLE, 2006: 44, figs 1-4) which shuts out a relation to members of this subfamily, as suggested by BRUNNER V. WATTENWYL (1907: 300).

The taxonomic position of *Manduria* within Lonchodinae is difficult to define. Several features, such as the tectiform dorsal body surface and mesosternum; posteromedian tubercle of the dorsal body segment; tuberculate body surface and shape of the head indicate relation to *Mithrenes* STÅL, 1877. However, in this genus ♀♀ lack a beak-like ovipositor and ♂♂ have rather distinctively structured genitalia. The eggs are very distinct, lacking the hollow extension of the polar-area and moss-like structures of the capsule, having the operculum flat with stalked central capitulum and the micropylar plate much shorter and not lanceolate. The short and slender tarsi and general appearance shows similarity to certain members of *Stheneboea* STÅL, 1875 (Type-species: *Stheneboea malaya* STÅL, 1875: 68), but this genus has rather differently structured genitalia, ♀♀ lacking an elongated supraanal plate and having the subgenital plate cup-shaped and not keeled. Furthermore, the eggs are very distinct, being laterally compressed, with a ± distinct longitudinal keel on the dorsal and ventral surfaces of the capsule, lacking distinct opercular structures and having a considerably shorter, not lanceolate micropylar plate.

#### Distribution:

Philippines (endemic). So far only recorded from the islands of Mindoro and Panay.

#### Species included:

- |  |               |
|--|---------------|
| 1. <i>Manduria halconensis</i> HENNEMANN & CONLE, 1997: 343, figs 1-7. | [Mindoro Id.] |
| 2. <i>Lonchodes systropedon</i> WESTWOOD, 1859: 44, pl. 3: 8 & 8a (♀). | [Panay Id.]   |

#### Key to distinguish ♀♀ of *Manduria* STÅL

1. Very slender species, mesothorax > 2x longer than head and pronotum combined; mid legs unarmed; praepopercular organ formed by three spines on a common base (Fig. 132) Panay Id ..... *M. systropedon*
- More robust species, mesothorax < 2x longer than head and pronotum combined; mid legs with dorsal lobes; praepopercular organ formed by a broad semi-circular elevation with a single terminal hook (Fig. 131); Mindoro Id ..... *M. halconensis*

#### *Manduria halconensis* HENNEMANN & CONLE, 1997

(Figs 128-129, 131 & 133-134)

*Manduria halconensis* HENNEMANN & CONLE, 1997: 343, figs 1-7. **HT**, ♂: Philippinen, Mindoro Island, Mt. Halcon 1500 m, leg. Mohagan VI. 1996 (ZMUH); **AT**, ♀: same data as HT (ZMUH); **PT**, 16 ♂♂, 16 ♀♀, 1 ♂, 1 ♀ (penultimate instar nymphs): Philippinen, Mindoro Island, Mt. Halcon 1500 m, leg. Mohagan VI. 1996 (coll. FH, No's 0307-1 to 34); **PT**, 25 ♂♂, 25 ♀♀: Philippinen, Mindoro Island, Mt. Halcon 1500 m, leg. Mohagan VI. 1996 (coll. OC); **PT**, 2 ♂♂, 2 ♀♀: Philippinen, Mindoro Island, Mt. Halcon 1500 m, leg. Mohagan VI. 1996 (coll. OZ).  
ZOMPRO, 2002: 189.  
OTTE & BROCK, 2005: 190.

#### Material:

1 egg: Philippinen, Mindoro Island, Mt. Halcon 1500 m, leg. Mohagan VI. 1996, ex Abdomen of PT ♀ [mounted with AT] (ZMUH); 4 eggs: Philippinen, Mindoro Island, Mt. Halcon 1500 m, leg. Mohagan VI. 1996, ex Abdomen PT ♀♀ (coll. FH, No. 0307-E).

The large type-series (90 specimens) shows this species is rather abundant on Mount Halcon. ♀♀ show considerable variation concerning to the armature of the mid legs. Body lengths of the type-specimens: ♂♂ 52.0-61.0 mm, ♀♀ 65.5-75.0 mm.

***Manduria systropedon* (WESTWOOD, 1859)**

(Figs 130 & 132)

*Lonchodes systropedon* WESTWOOD, 1859: 44, pl. 3: 8 & 8a (♀). LT, ♀: Phil. Isl. 42-22; *Systropedon* ♀ (BMNH). [Not: PLT, ♀: Phil. Isl. 42-22; *Systropedon* Westw ♀ var.; *Lonchodes Systropedon* Westw. Philippine Islands (BMNH) → *M. bilobatus* BRUNNER V. WATTENWYL, 1907]

*Manduria systropedon*, STÅL, 1877: 40. [Designation of LT]

KIRBY, 1904: 341.

BRUNNER V. WATTENWYL, 1907: 300.

HENNEMANN & CONLE, 1997: 346.

OTTE & BROCK, 2005: 190.

**Material:**

1 ♀: Philippinen, Panay Island, Mount Nangtud 1500 m, leg. N. Mohagan VII.1997 (coll. FH, No. 0232-1).

WESTWOOD (1859: 44) originally described *Lonchodes systropedon* based on two ♀♀ in BMNH which clearly represent two distinct species and even belong in two different genera. There has however been quite some confusion about the identity and sex of one of the specimens, which is clarified below.

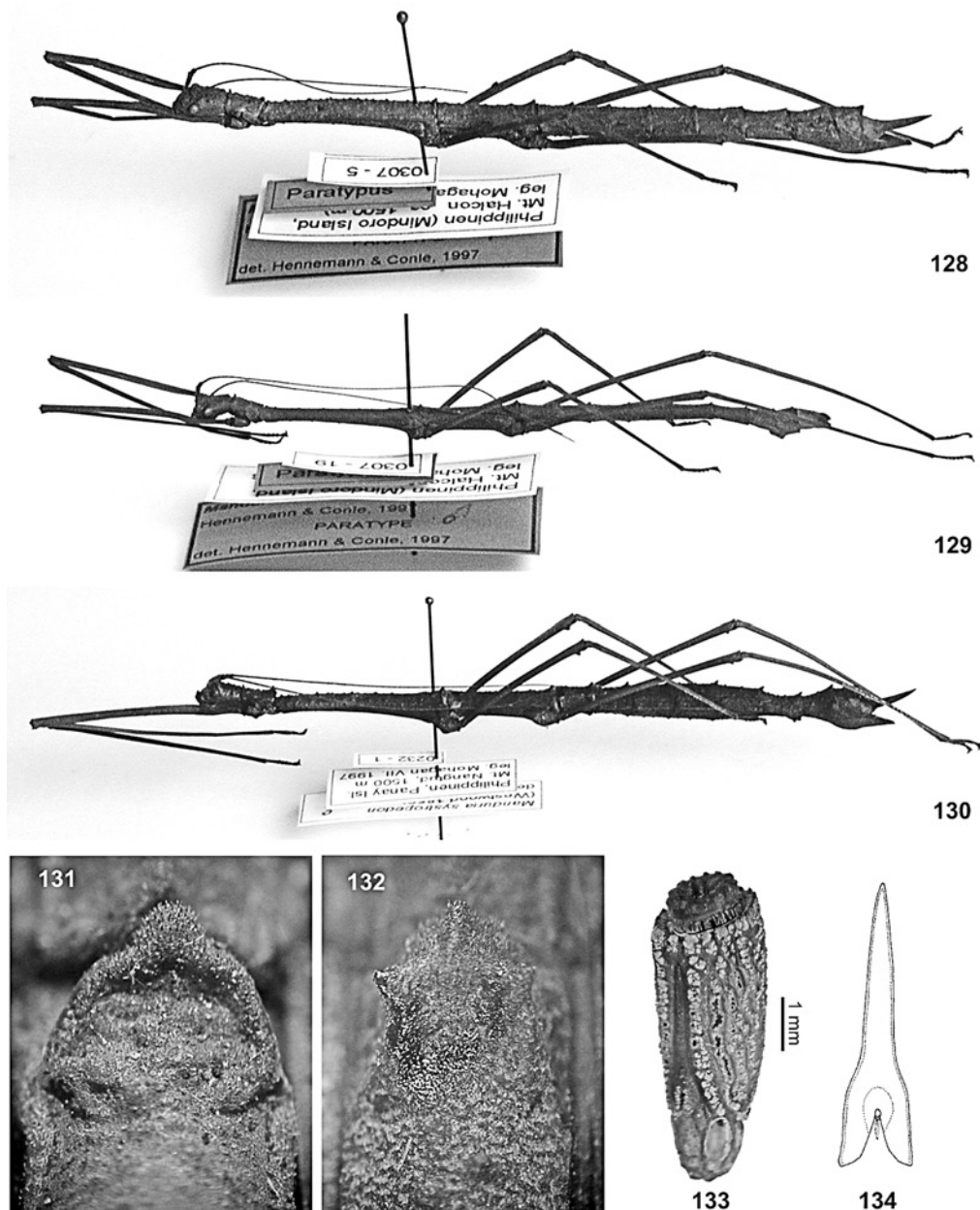
A lectotype for *Lonchodes systropedon* WESTWOOD was designated by STÅL (1877: 40) by describing the specimen with "laminisque supraanali et subgenitali longissime productis...", based on the illustrations provided by WESTWOOD (Pl. 3: 8 & 8a). This concerned specimen exhibits an elongated anal segment and subgenital plate together forming a beak-like ovipositor and is the specimen on which STÅL based the genus *Manduria*. In addition to the data labels attached to the LT a register entry for the number "42-22" in BMNH states: "121, Orthoptera. Philippine Islds. Purchased of Mr Cuming" (pers. communication J. MARSHALL).

The second specimen (PLT) was first believed to be a ♂ and is indicated as such in the original illustrations, but WESTWOOD (1859: 45) stated: "The difference in the structure of the terminal segments of the abdomen in the two specimens of this species in the British Museum Collection, led me at first to suppose and indicate in the lettering of the figures that the narrow one was a male and the other a female. I feel, however, now satisfied that both are females; the terminal appendage in the narrower specimen having been subjected to an arrest of development, and the width of the broader specimen being probably caused by its having been impregnated.". Certainly, the shape of the anal segment is not an individual trait or artifact, but a feature of great taxonomic importance.

BRUNNER V. WATTENWYL (1907: 214) listed this second specimen in the genus *Parapachymorpha* GRAY, 1835, under the name "*Parapachymorpha systropedon* WESTWOOD" and on p. 300 stated for *M. systropedon* WESTWOOD "excludenda Fig. 8 ♂, probabiliter *Pachymorpha darnis* ♀". Examination of the specimen confirms BRUNNER V. WATTENWYL's interpretation and shows the specimen to belong in the genus *Mithrenes* STÅL, 1877, being identical to *M. bilobatus* (BRUNNER V. WATTENWYL, 1907).

The false attribution to *Parapachymorpha* GRAY by BRUNNER V. WATTENWYL is explained by the fact that the LT of *Lonchodes systropedon* lacks the antennae, and BRUNNER V. WATTENWYL supposed them to be short in the other specimen, which is not the case. However, BRUNNER V. WATTENWYL (1907: 300) commented that he had included *Manduria* STÅL in his tribe Lonchodini because STÅL (1877: 40) had stated the antennae to be long and filiform.

The ♀ in the first author's collection (FH No. 0232-1) from Panay Island (Mount Nangtud) is the first precise record of this rarely known species. The ♂♂ and eggs have so far remained unknown.



**Figs 128-134: *Manduria* spp.:** **128.** *M. halconensis* HENNEMANN & CONLE, 1997 ♀, PT (coll. FH, Mindoro Id.); **129.** *M. halconensis* HENNEMANN & CONLE, 1997 ♂, PT (coll. FH, Mindoro Id.); **130.** *M. systropedon* WESTWOOD, 1859 ♀ (coll. FH, Mindoro Id.); **131.** *M. halconensis* HENNEMANN & CONLE, 1997, ♀, PT, praeopercular organ (coll. FH, Mindoro Id.); **132.** *M. systropedon* WESTWOOD, 1859 ♀ praeopercular organ (coll. FH, Mindoro Id.); **133.** *M. halconensis* HENNEMANN & CONLE, 1997 egg, dorsolateral view (coll. FH, Mindoro Id.); **134.** *M. halconensis* HENNEMANN & CONLE, 1997 internal micropylar plate (coll. FH, Mindoro Id.)



	♀ HT (BMNH)	♀ (coll. FH)
Body:	80.5	89.2
Head:	5.2	5.3
Pronotum:	3.9	4.2
Mesonotum	18.2	20.5
Metanotum:	9.8	10.0
Median segment:	2.0	2.4
Profemora:	23.0	25.3
Mesofemora:	16.5	18.1
Metafemora:	20.1	22.8
Protibiae:	24.5	29.9
Mesotibiae:	20.3	21.0
Metatibiae:	26.8	29.7
Antennae:	-	> 51.0

**Table 17:** Measurements of *Manduria systropedon* (WESTWOOD) [mm]

### Checklist of Philippine Lonchodinae

The following is an alphabetical list of genera and species of the subfamily Lonchodinae so far recorded from the Philippine Islands. The known distribution given in square brackets is based on literature sources and material in the author's collections.

Only 28 species have so far been described which belong to nine distinct genera. Certainly, numerous new species will be discovered once extensive new collections are conducted, and at the point of writing this paper the authors already knew about at least five further so far undescribed Lonchodinae.

#### Genus *Diangelus* BRUNNER V. WATTENWYL, 1907

1. *Diangelus helleri* BRUNNER V. WATTENWYL, 1907: 256.  
[Dapitan]

#### Genus *Lonchodes* GRAY, 1853

1. *Lonchodes philippinicus* **sp. n.**  
[Panay Id.: Mount Nangtud 1500 m]
2. *Lonchodes* (?) *dalawangsungay* ZOMPRO, 2003: 27, figs 43-44.  
[Luzon Id.: Imugan]

#### Genus *Lonchodiodes* **gen. n.**

1. *Lonchodiodes atrovirens* **sp. n.**  
[Mindoro Id.: Mount Halcon]
2. *Lonchodiodes babuyanensis* **sp. n.**  
[Babuyan Islands: Calayan Id.]
3. *Lonchodiodes eurycanthoides* **sp. n.**  
[Mindoro Id.: Mount Halcon]
4. *Lonchodiodes grandis* **sp. n.**  
[Panay Id.: Mount Nangtud 1500 m]
5. *Lonchodiodes putingmantsa* (ZOMPRO, 2003: 29, figs 37-40, 54-55) [*Lonchodes*]. **comb. n.**  
[Aroroy]
6. *Lonchodiodes samarensis* **sp. n.**  
[Samar Id.: Bobon]
7. *Lonchodiodes tagalicus* (STÅL, 1877: 39) [*Lonchodes*]. **comb. n.**  
[“Philippines”]
8. *Lonchodiodes trollius* (WESTWOOD, 1859: 40, pl. 23: 1) [*Lonchodes*]. **comb. n.**  
[Luzon Id.: Mountain Province, Nueva Viscaya, Balite]



**Figs 135-138, Live insects:** 135. *Mithrenes panayensis* sp. n., ♂ & ♀ in copula; 136. *Mithrenes panayensis* sp. n., ♀, PT (striped colour-form); 137. *Lonchodiodes samarensis* sp. n., ♂ & ♀ in copula; 138. *Lonchodes philippinicus* sp. n., ♂ & ♀.

Genus *Manduria* STÅL, 1877

1. *Manduria halconensis* HENNEMANN & CONLE, 1997: 343, figs 1-7.  
[Mindoro Id.: Mount Halcon]
2. *Manduria systropeodon* (WESTWOOD, 1859: 44, pl. 3: 8) [*Lonchodes*].  
[Mindoro Id.: Mount Halcon]

Genus *Matutumetes* gen. n.

1. *Matutumetes amoenus* **sp. n.**  
[Mindanao Id.: Mount Matutum]
2. *Matutumetes mindanaensis* **sp. n.**  
[Mindanao Id.: Mount Matutum]

Genus *Mithrenes* STÅL, 1877

1. *Mithrenes asperulus* STÅL, 1877: 39.  
[“Philippines”]
2. *Mithrenes mindorensis* **sp. n.**  
[Mindoro Id.: Mount Halcon]
3. *Mithrenes panayensis* **sp. n.**  
[Panay Id.: Mt. Nangtud 1500 m]
4. *Mithrenes whiteheadi* (KIRBY, 1896: 450) [*Lonchodes*].  
= *Dixippus bilobatus* BRUNNER V. WATTENWYL, 1907: 281. **syn. n.**  
= *Lonchodes nodulosus* BRUNNER V. WATTENWYL, 1907: 261. **syn. n.**  
[Luzon Id.: Albay & Manila; Sibuyan Id.]
5. *Mithrenes* sp. KLANTE, 1960: 96, figs 5-7. [*Staelonchodes*]  
[Philippines ?]

Genus *Mnesilochus* STÅL, 1877 **stat. rev.**

1. *Mnesilochus capreolus* STÅL, 1877: 39.  
[“Philippines” & SE-Luzon: Mayon]
2. *Mnesilochus haedulus* STÅL, 1877: 39.  
[Luzon Id.: Mountain Province, Nueva Viscaya, Balite]
3. *Mnesilochus mindanaense* (BRUNNER V. WATTENWYL, 1907: 286). **comb. n.**  
= *Prisomera tuberculatum* BRUNNER V. WATTENWYL, 1907. **syn. n.**  
[Mindanao Id. & Luzon Id.: Mount Makiling]
4. *Mnesilochus palawanicus* (CARL, 1913: 30). **comb. n.**  
[Palawan]

Genus *Periphetes* STÅL, 1875

1. *Periphetes graniferum* (WESTWOOD, 1859: 35, pl. 3: 4) [*Lonchodes*].  
= *Lonchodes analis* BRUNNER V. WATTENWYL, 1907.  
[Luzon Id.: Mountain Province, Nueva Viscaya, Balite & Mindanao Id.: Surigao]
2. *Periphetes magayon* (ZOMPRO, 2003: 28, figs 41-42, 56) [*Lonchodes*]. **comb. n.**  
[Luzon Id.: Mount Banahao]
3. *Periphetes quezonius* **sp. n.**  
[Luzon Id.: Quezon, Infanta, Sierra Madre]

Genus *Spinophetes* ZOMPRO & EUSEBIO, 2000

1. *Spinophetes spinotergum* ZOMPRO & EUSEBIO, 2000: 132, figs 1-6.  
[Mindanao Id.: Mount Apo ca. 1400 m, Davao City]

## Postscript

Recently, after the present study was submitted to “Mitteilungen der Münchner Entomologischen Gesellschaft” Vol. 97 for publication, a new species of Lonchodinae from the Philippine island of Panaon was described by ZOMPRO in “Arthropoda” Vol. 14(3/4). The ♂ HT and ♂ PT of *Lonchodes jenswilhelmjanzeni* ZOMPRO, 2007 are deposited in UPPC and the collection of O. ZOMPRO, both originating from the Anislagon River, San Francisco. ZOMPRO (2007: 12, figs 1-8) provided prolific colour photographs including detail shots of the head, anal segment and extremities. The ♀♀ and eggs are unknown. The lamellate protibiae, shape of the head, strongly granulose body surface and legs, as well as structures of the genitalia place this species in *Mnesilochus* Stål, 1877. The valid name therefore is *Mnesilochus jenswilhelmjanzeni* (ZOMPRO, 2007) **comb. n.** This species raises the number of known species of Lonchodinae in the Philippines to 29.

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