

THE FIRST REPORT OF THE DIVERSITY OF ENSIFERA (INSECTA: ORTHOPTERA) FROM ROKAN HULU DISTRICT, RIAU PROVINCE

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ABSTRACT

The objective of this study was to determine the diversity of the suborder Ensifera in Dusun 3, Rambah Hilir Tengah, Rambah Hilir Sub-District, Rokan Hulu District, Riau Province, Indonesia. The study was conducted from September 2015 to January 2016 at six sampling locations by sweep net and hand picking at day and night hours. We recorded 17 species of the Ensifera belonging to 12 genera, 2 families, and 10 subfamilies. The diversity comprised of *Conocephalus maculatus*, *Conocephalus melaenus*, *Conocephalus* sp., *Elbenia* sp., *Elimaea* sp., *Euscirtus concinnus*, *Hexacentrus unicolor*, *Loxoblemus parabolicus*, *Mecopoda elongate*, *Mecopoda* sp., *Nisitrus vittatus*, *Orthelima* sp., *Podoscirtinae* species 1 (unidentified), *Teleogryllus emma*, *Teleogryllus* sp., *Trellius* sp. and *Xabea* sp. The *C. maculatus* and *E. concinnus* were the predominant species in this study.

KEY WORDS: crickets, katydids, grassland

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INTRODUCTION

Indonesia is a *mega-biodiversity* country which endowed rich and unique biodiversity in the tropical belt between Indomalaya dan Australasia (FWI/GFW, 2001; Rhee *et al.*, 2004). The insect is one of the most diverse groups of animals found in Indonesia (Darnaedi & Noerdjito, 2007). This group is one of the most success organism due to its abundance of more than 25 orders and one million species (Fried & Hademenos, 2006) and also has a worldwide distribution, from terrestrial to aquatic. One of the insect groups we can find easily in our environment is the Ensifera (Resh & Cardé, 2003).

Crickets and katydids (bush crickets, long-horned grasshoppers, and their relatives) constitute the suborder Ensifera. Their multisegmented antennae (more than 30 segments) characterize members of this suborder that, with few exceptions, are as long as or longer than the body. Tympanal organs, when present, are located on the fore tibiae. The ovipositor is long and used to place eggs in crevices, soft ground, or plant tissues. Eggs are laid singly or in small groups in or on stems or leaves, or in loose soil or humus. The cerci are unsegmented, and in most species of Ensifera (especially Grylloidea) they are rather long and flexible, and in males individuals of many species (especially Tettigoniodea), they are modified to form clasping structures to be used during copulation. A single spermatheca is usual, and accessory glands occur either as tubules opening at the base of the ovipositor. Most species are nocturnal and omnivorous (Resh & Cardé, 2003; Gillot, 2005; Tan & Kamaruddin, 2014).

The Ensifera live in virtually all terrestrial habitats from treetops to a meter or more beneath the ground; in or near treetops and in bushes, grasses, and other herbaceous plants; on the soil surface; in caves and shallow or deep burrows. Some excavate burrows in logs or standing trees. Some beach-dwelling species

run and jump readily on the water. Females of different groups lay eggs in stems or twigs, in wood, under bark, in the ground, or in burrows (Resh & Cardé, 2003; Gillot, 2005).

This group plays an ecological role, especially in the food web, health indicators of the terrestrial ecosystem and also for the human being. Some species are prey for larger animals such as birds while others are predators of smaller insects. Some are known to be keystone species while others may serve as good indicators of ecosystem health (Samways, 1997; Erawati *et al.*, 2004; Rentz, 2010). Some are reared and sold in large numbers as fish bait and food for laboratory animals in many parts of the world. Some act as pests and plant diseases. In Indonesia these group attacks various crops like rice, sugar cane, tobacco, tea, soy, corn, banana, bamboo, lemon grass, sugar cane, pineapple, young plant roots, beans, castor, potatoes, dadap, cassava, areca, mimosoid 'lamtoro' and other crops (OPETE, 2010).

However, data about the occurrence of the Ensifera species in Indonesia still poorly known and not up to date. Most data, mainly discuss the potential of this fauna as a pest of crops. Furthermore, data of this particular group found in Sumatra is still lacking. The early information about this fauna in Sumatra was reported by Karny (1926) and followed Ebner (1929). However, they did not provide the information from Riau Province, especially, in Dusun 3, Rambah Hilir Tengah, Rambah Hilir Sub-District, Rokan Hulu District. Information on the Ensifera species from this specific area will allow a better understanding of the overall biodiversity of this species not only to this highland area, but also Indonesia.

This study aims to record the Ensifera species including photographs which collected from Dusun 3, Rambah Hilir Tengah, Rambah Hilir Sub-District, Rokan Hulu District, Riau Province, Indonesia.

METHODS

This study was conducted from September 2015 to January 2016 in six sampling sites of Dusun 3, Rambah Hilir Tengah, Rambah Hilir Sub-District, Rokan Hulu District, Riau Province, Indonesia (Figure 1). Table 1 presented the descriptions of each sampling site. Samples were collected by using sweep net and hand picking during the day and night hours and preserved in ice box which containing ice.

We transported all collected samples to the Laboratory of Biology, University of Pasir Pengaraian, Rokan Hulu District, Indonesia, photographed, identified and dry-mounted. The photographs of specimens were taken using a Nikon D3100 digital camera. After taking the picture, all specimens were identified based on Tan (2010a; 2010b; 2011a; 2011b; 2012a; 2012b); Tan & Wang (2012); Tan *et al.* (2012); Tan (2013); Tan *et al.* (2013) and Tan & Kamaruddin (2014). Mr. Tan Ming Kain of the Department of Biological Sciences, National University of Singapore

confirmed the species identification of the Ensifera by photographs of the specimens (personal communication on January 11th 2016).

We mounted the specimens using insect pin number 1 on the insect mounting board. A long, rust-proof pin goes through the middle of the thorax of the Ensifera and put on the mounting board. Then, all specimens stored inside the MERMET oven with 25°C temperature for two days and deposited in insect specimen box.

RESULTS AND DISCUSSION

We reported a total 17 species of the suborder Ensifera belonging to 2 families (Gryllidae and Tettigoniidae), 10 subfamilies and 12 genera. Members of the family Tettigoniidae is represented 9 species, whereas 8 species represent the family Gryllidae. We provided the list of species in Table 2, and their photographs in Figure 2–6.

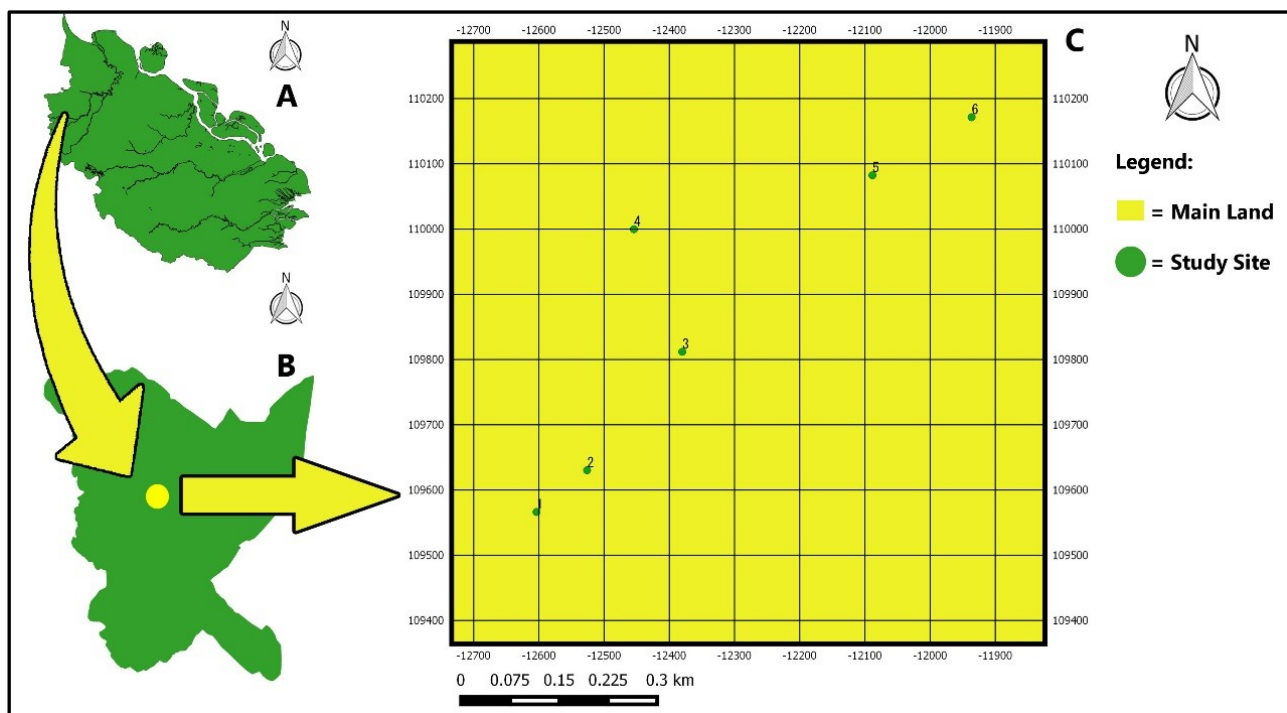


Figure 1. Study site of the Ensifera in Dusun 3, Rambah Hilir Tengah, Rokan Hulu District, Riau Province, Indonesia. A. Riau Province map, B. Rokan Hulu District map, C. Detail map of study site at Rambah Hilir Tengah.

Table 1. Sampling sites in Rambah Hilir Tengah and its characteristics.

Sites	Coordinates	Characteristics
Site 1	00°59'17.02"N 100°23'51.6"E	This location was next to the forest and full of grasses and bushes
Site 2	00°59'19.1"N 100°23'54.1"E	This place was next to the woods and complete of grasses and bushes
Site 3	00°59'25"N 100°23'58.8"E	This location was next to football field and surrounded with grasses
Site 4	00°59'31.1"N 100°23'56.4"E	This place was the rubber plantation and surrounded with grasses and bushes
Site 5	00°59'33.8"N 100°24'08.2"E	This place was the palm oil plantation and surrounded with grasses and bushes
Site 6	00°59'36.7"N 100°24'13.1"E	This place was the palm oil plantation and surrounded with grasses and bushes

Table 2. A Checklist of the Ensifera Species from 6 Station in This Study.

TAXON (SUBORDER/FAMILY/SUBFAMILY/SPECIES)}	SITES					
	1	2	3	4	5	6
SUBORDER ENSIFERA						
FAMILY GRYLLIDAE						
Subfamily Eneopterinae						
1. <i>Nisitrus vittatus</i> (de Haan, 1842)	+	+	+	-	-	-
Subfamily Euscyrtinae						
2. <i>Euscyrtus concinnus</i> (de Haan, 1842)	+	+	+	+	+	+
Subfamily Gryllinae						
3. <i>Loxoblemus parabolicus</i> (Saussure, 1877)	-	+	+	+	+	+
4. <i>Teleogryllus emma</i> (Ohmachi & Matsuura, 1951)	-	-	+	-	-	-
5. <i>Teleogryllus</i> sp.	-	-	+	-	-	-
Subfamily Oecanthinae						
6. <i>Xabea</i> sp.	+	-	+	-	-	+
Subfamily Phaloriinae						
7. <i>Trellius</i> sp.	-	-	-	+	-	-
Subfamily Podoscirtinae						
8. Podoscirtinae species 1 (unidentified)	+	+	-	-	-	+
FAMILY TETTIGONIIDAE						
Subfamily Conocephalinae						
9. <i>Conocephalus maculatus</i> (Le Guillou, 1841)	+	+	+	+	+	+
10. <i>Conocephalus melaenus</i> (Haan, 1843)	+	+	+	+	-	+
11. <i>Conocephalus</i> sp.	+	+	+	-	-	+
Subfamily Hexacentrinae						
12. <i>Hexacentrus unicolor</i> Serville, 1831	-	+	-	-	-	-
Subfamily Mecopodinae						
13. <i>Mecopoda elongata</i> Linnaeus, 1758	+	+	+	-	+	-
14. <i>Mecopoda</i> sp.	+	+	+	-	+	-
Subfamily Phaneropterinae						
15. <i>Elbenia</i> sp.	-	+	-	-	-	-
16. <i>Elimaea</i> sp.	+	+	+	-	+	+
17. <i>Orthelimaea</i> sp.	-	+	-	-	-	-

Notes: (+) = present, (-) = not present.

The majority of the Ensifera species recorded in this study are common which also inhabit outside Indonesia regions *e.g.* Malaysia, Singapore, China, Korea, and India (Muzamil & Mohamedsaid, 1998; Kim & Kim, 2002; Tan, 2010a, 2010b, 2011a, 2011b, 2012a, 2012b; Srinivasan & Prabakar, 2012; Tan & Wang, 2012; Tan *et al.*, 2012; Robillard & Tan, 2013; Tan, 2013; Tan *et al.*, 2013; Kim & Pam, 2014; Tan & Kamaruddin, 2014; Li *et al.*, 2015; Gaikwad *et al.*, 2016). In Indonesia, only some species of Ensifera were recorded by several researchers in taxonomy study, *e.g.* 10 species of Ensifera from Sulawesi (Sänger and Helfert, 1995); eight species of Elimaeini group from Sumatra and Java (Ingrisch, 1998); two species from rice ecosystem in Wonosari, Klaten, Java (Mahrub, 1998); 10 species from Gunung Kendeng and Gunung Botol, Gunung Halimun National Park (Erawati *et al.*, 2004); one species from the west of New Guinea (Gorochoy, 2005); five species from Small Islands of Karimunjawa National Park (Erniwati, 2009); 10 species from two mountainous ecosystems in Gunung Halimun-Salak National Park (Erawati and Kahono, 2010); three species *Tacca leontopetaloides* in Karimunjawa Islands, Central Java (Erniwati, 2013); four species from peatland of Lalan District, Banyuasin (Falahuddin *et al.*, 2015). Another study only focus on their role in agriculture area, *e.g.* as pest and predator, so the result only gave a little

information about the diversity of this long-horned grasshopper and its relatives group in Indonesia (Balitpalma, 2005; Darwis, 2006; OPETE, 2010; Rofidah and Tjahjaningrum, 2013; Tunggal *et al.*, 2013; Siahaya, 2014; Tauruslina *et al.*, 2015).

The most predominant species in this study were *Conocephalus maculatus* and *Euscyrtus concinnus*. *C. maculatus* is also known as one of the abundant species elsewhere and able to inhabit in all habitats which possess lowland grass (Tan, 2012; Bazelet & Naskrecki, 2014). Meanwhile, *E. concinnus* has long time been known to be widely distributed and act as a pest in a rice field (Barrion & Litsinger, 1980; Pathak & Dhaliwal, 1981; IRPI, 1983). We hope, our study could contribute to the knowledge of the biological diversity of Ensifera species in Indonesia, especially in Rokan Hulu District, Riau Province, which is relatively poorly known.

CONCLUSION

We recorded 17 species of Ensifera belonging to 2 families and 10 subfamilies. The Ensifera diversity namely *Conocephalus maculatus*, *Conocephalus melaenus*, *Conocephalus* sp., *Elbenia* sp., *Elimaea* sp., *Euscyrtus concinnus*, *Hexacentrus unicolor*, *Loxoblemus parabolicus*, *Mecopoda elongate*, *Mecopoda* sp., *Nisitrus vittatus*, *Orthelimaea* sp., Podoscirtinae species 1 (unidentified), *Teleogryllus emma*, *Teleogryllus* sp., *Trellius* sp. and *Xabea* sp.

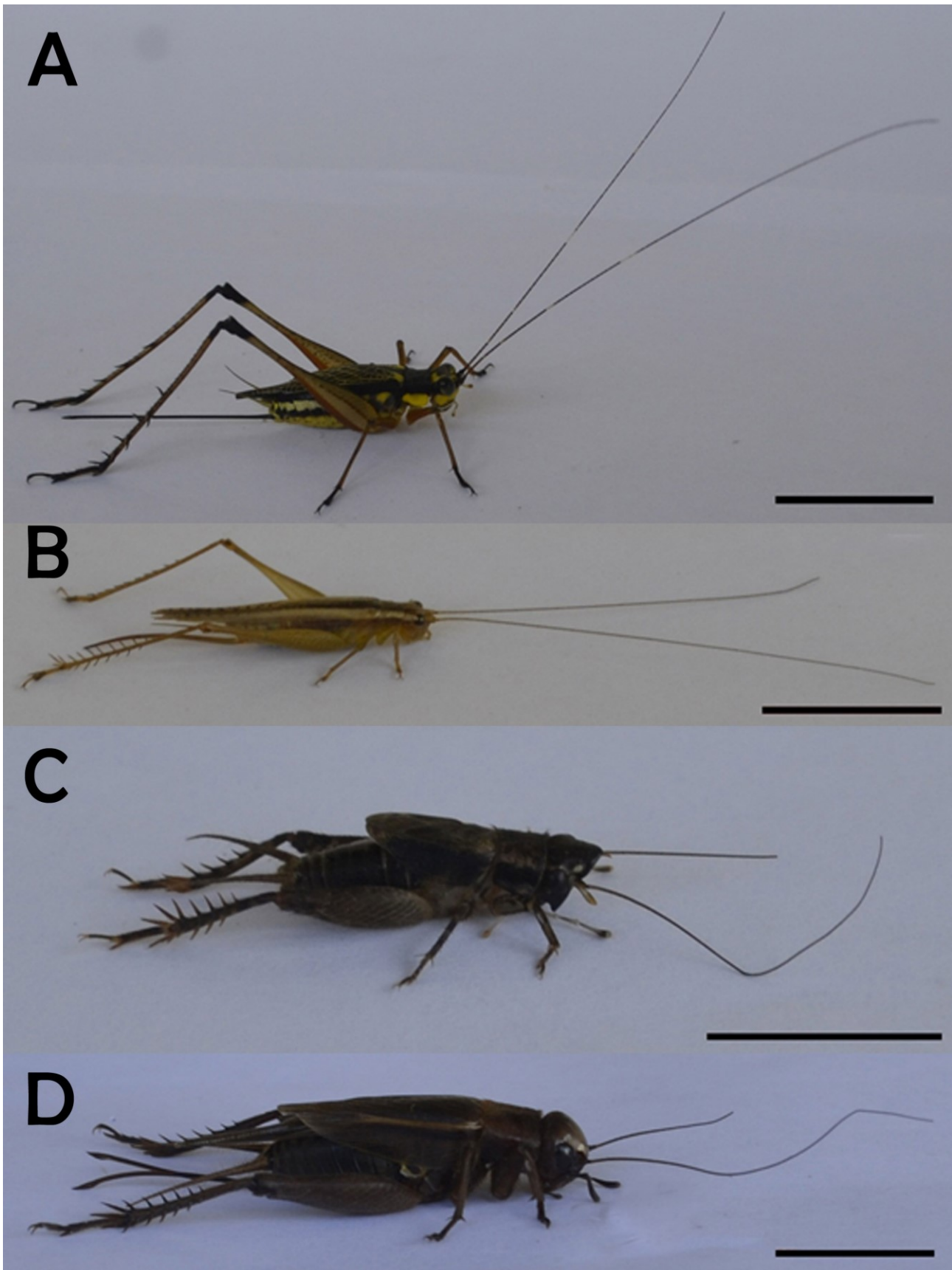


Figure 2. A. *Nisitrus vittatus* (de Haan, 1842); B. *Euscyrtus concinnus* (de Haan, 1842); C. *Loxoblemus parabolicus* (Saussure, 1877); D. *Teleogryllus emma* (Ohmachi & Matsuura, 1951).
Lateral view, scale bar = 10 mm.

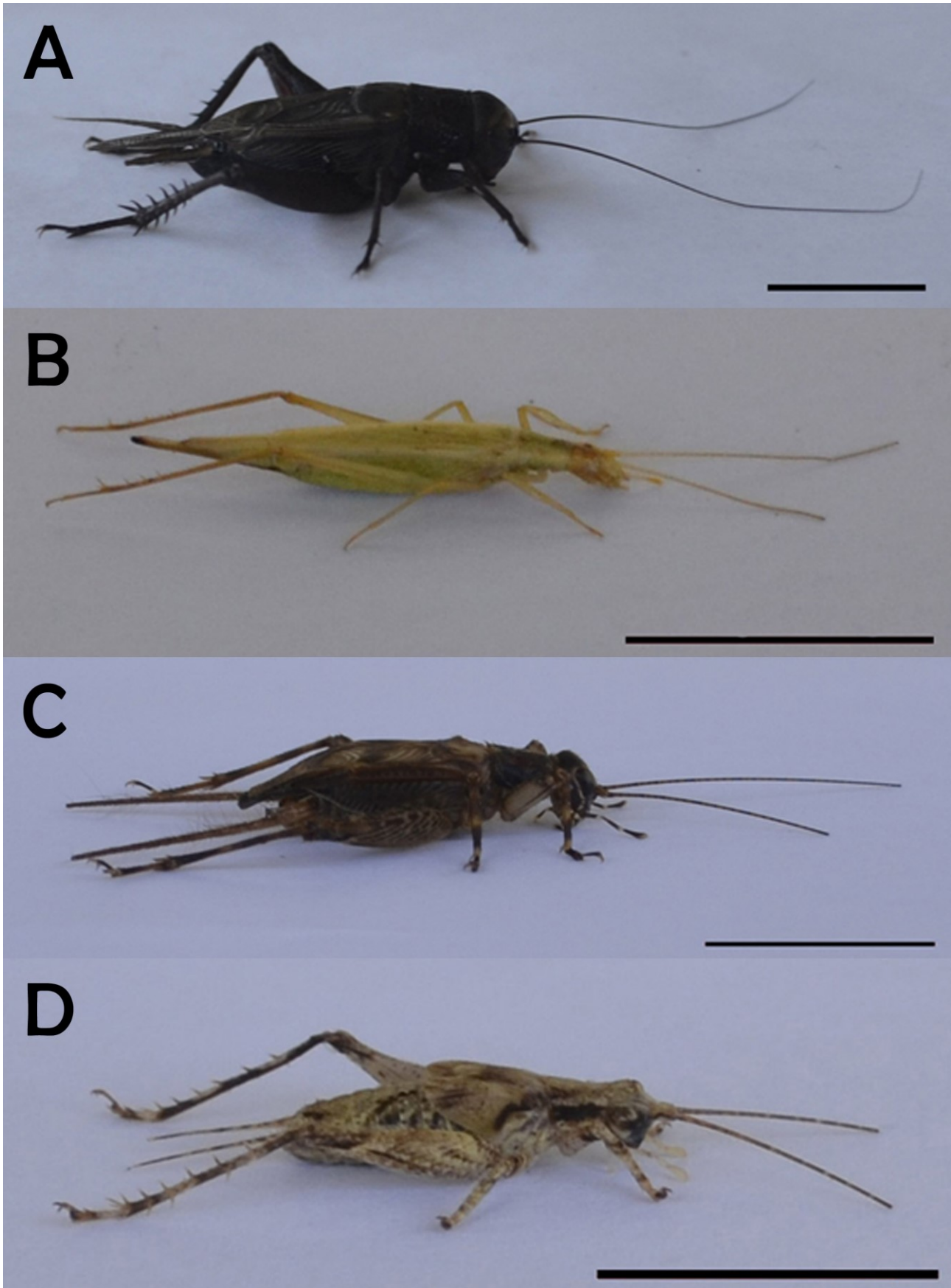


Figure 3. A. *Teleogryllus* sp.; B. *Xabea* sp.; C. *Trellius* sp.; D. Podoscirtinae spesies 1 (unidentified).
Lateral view, scale bar = 10 mm.

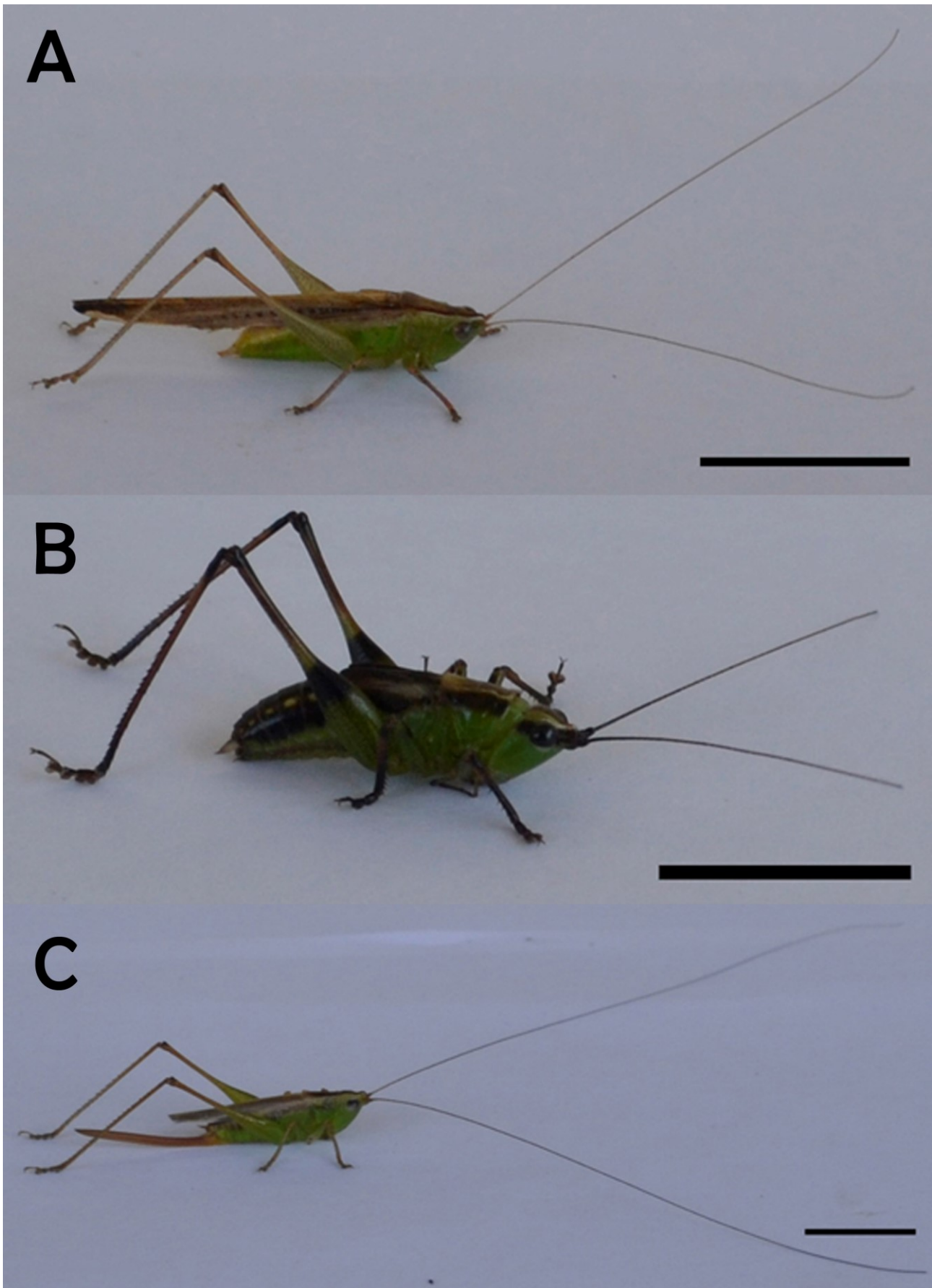


Figure 4. A. *Conocephalus maculatus* (Le Guillou, 1841); B. *Conocephalus melaenus* (Haan, 1843); C. *Conocephalus* sp. Lateral view, scale bar = 10 mm.

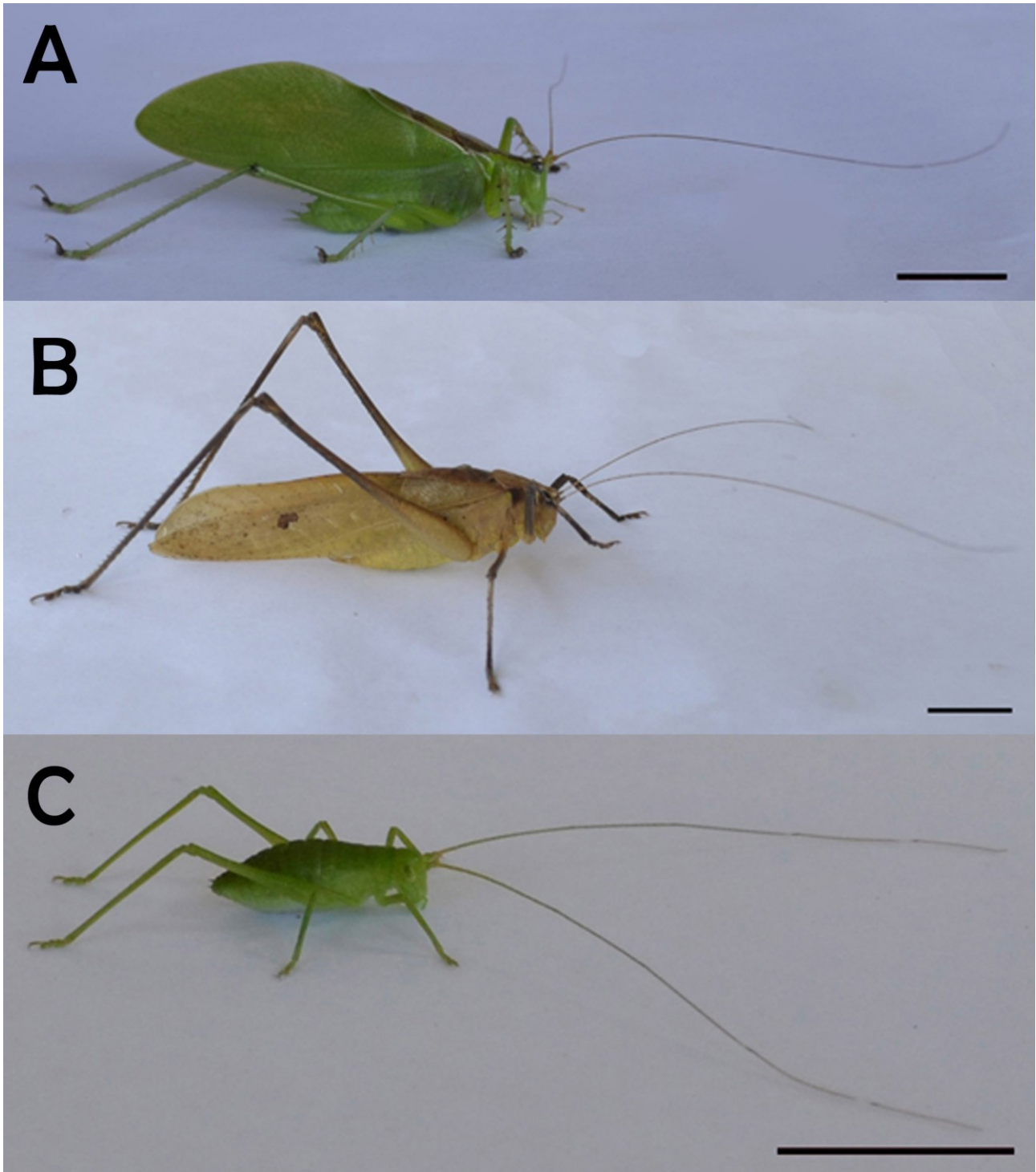


Figure 5. A. *Hexacentrus unicolor* Serville, 1831; B. *Mecopoda elongata* (Linnaeus, 1758); C. *Mecopoda* sp. Lateral view, scale bar = 10 mm.

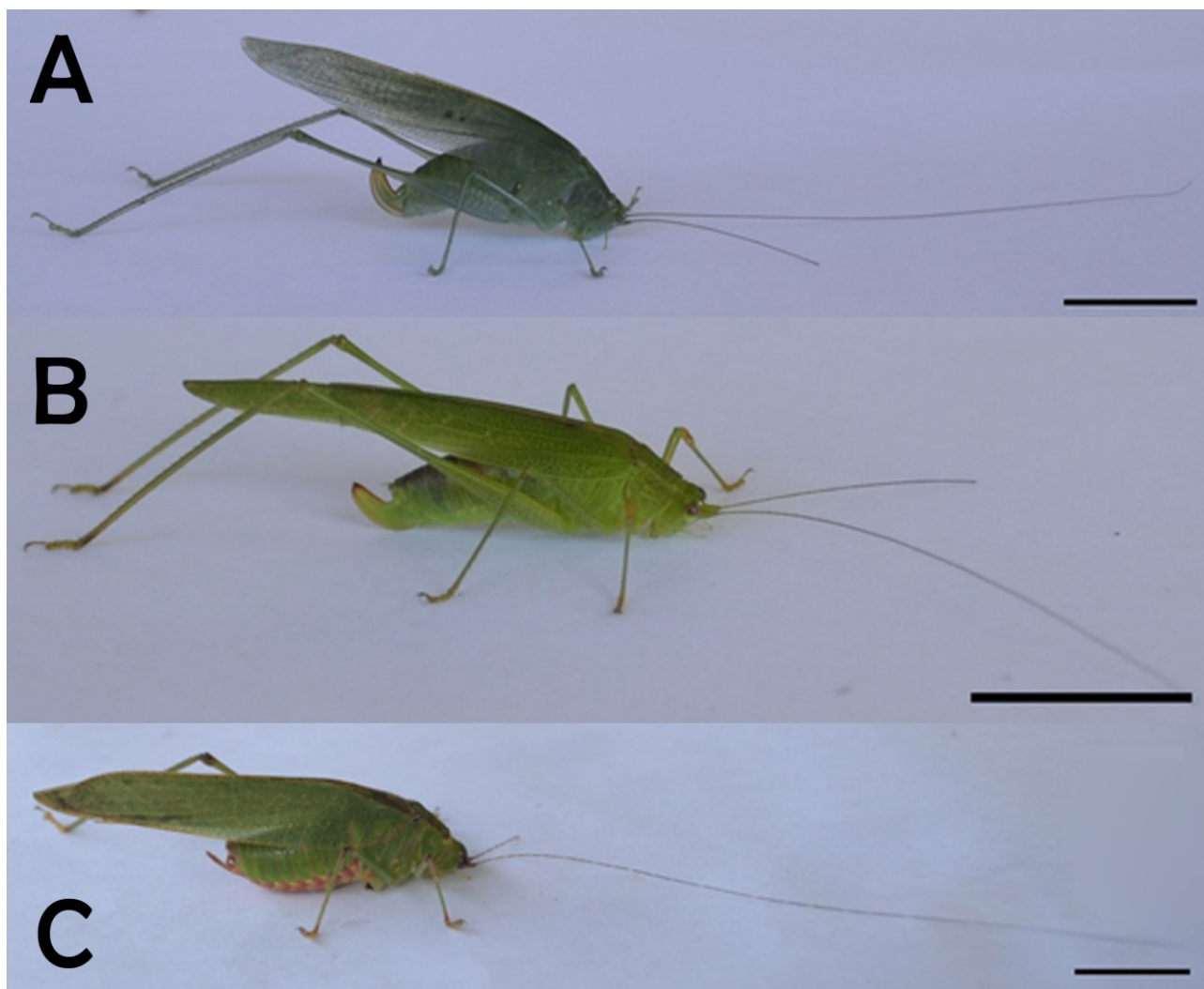


Figure 6. A. *Elbenia* sp.; B. *Elimaea* sp.; C. *Orthelimaea* sp.
Lateral view, scale bar = 10 mm.

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