



The Genus *Hyboella* Hancock in Thailand (Orthoptera: Tetrigidae: Metrodorinae)

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ABSTRACT

An updated description of the genus *Hyboella* Hancock is provided. One new species, *Hyboella heteroptera* n. sp., from northern Thailand is described and documented by photographs. A key to the species of *Hyboella* so far found in Thailand is given.

Keywords: diversity, distribution, taxonomy, taxon list, new species, Chiang Rai

1. INTRODUCTION

The genus *Hyboella* was erected by Hancock in 1915 [1]. It belongs to Metrodorinae, Tetrigidae, Orthoptera. Currently it includes 33 known species (Table 1). Among them only 2 species, *H. angulifrons* Hancock, 1915 [1] and *H. heinrichi* Günther, 1939 [2], have ever been recorded in Thailand [3, 4].

In a series of pygmy locusts collected in Northern Thailand 2014, we found one new species of the genus here described as *Hyboella heteroptera* n. sp., and documented by photographs. Furthermore we give a systematic review to the genus *Hyboella* Hancock and a key to the species of *Hyboella* in Thailand is provided.

2. MATERIALS AND METHODS

Specimens were examined and

photographed using a stereo microscope (Olympus Corporation, SZX16, Tokyo, Japan). Morphological terminology and measurement landmarks follow Zheng [5]. Measurements are given in millimeters (mm). The holotype of the new species is deposited in the herbarium of Mae Fah Luang University, Chiang Rai, Thailand (MFLU), paratypes in both MFLU and HNU (the Specimen Room of the School of Life Sciences, Huaibei Normal University, Huaibei, Anhui, China).

3. RESULTS

3.1 *Hyboella* Hancock, 1915

Hyboella Hancock, 1915, Rec. Ind. Mus. (Ent.), 11: 104 [1]; Günther, 1939, Revision der Acrydiinae (Orthoptera). III. Sectio Amorphopi (Metrodora Bol. 1887, Aut.):

205 [2]; Kevan, 1966, Entomologiske Meddelelser, 34: 382 [6]; Shishodia, 1991, Rec. Zool. Surv. India. Occ. Paper, 140: 105 [7]; Liang & Zheng, 1998, Fauna Sinica, Insecta.12: 111 [8]; Zheng, 2005, Fauna of Tetrigoidea from Western China: 165 [5]; Deng, Zheng & Wei, 2007, Fauna of the Tetrigoidea from Yunnan and Guangxi, 153 [9]; Deng, Zheng & Wei, 2008, Acta zoologica cracoviensia, 51B(1-2): 1 [10]; Deng, Zheng & Wei, 2009, Zootaxa, 2064: 57 [3]; Zheng, 2013, J. Shangqiu Normal Univ., 29(12): 2 [11].

Type species: *H. tentata* Hancock, 1915

Generic characteristics (updated). Body size generally moderate (5-17 mm in length). Head very short, not exerted over the level of pronotal surface; vertex generally equal to or wider than one eye, median keel visible; eyes not exerted above level of pronotal surface, ovate in frontal view; lateral ocellus located about in middle of anterior margin of eye. Antennae filiform, inserted about at level of lower anterior margins of eyes. Pronotum generally very coarse, anterior margin straight or slightly protuberant in middle; anterior part strongly widened, arched; hind process wedge-like, not reaching or slightly surpassing beyond apex of hind femur; median keel complete or interrupted; posterior angle of lateral lobe of pronotum

laminated and extended outwards, apex truncate. Hind wings normal or degenerated or absent. Lower margins of fore and median femora straight or wavy; hind femur stout, first segment of hind tarsus generally longer than third.

Relationship to other genera.

The genus *Hyboella* Hancock was placed into Metrodorinae (Orthoptera: Tetrigidae) based on: 1) liform antenna; 2) in profile frontal ridge archedly protruding between bases of antennae; 3) posterior angle of lateral lobe of pronotum extended outwards, apex truncate.

Hyboella

Hancock is closely related to *Bolivaritettix* Günther, but differs mainly in 1) head very short, eyes ovate in frontal view; 2) anterior part of pronotum strongly widened.

Biology and ecology.

Typical habitats are moist places of tropical rainforests, such as marshes or moist stony ground. These pygmy locusts feed on mosses and other forms of humus, and generally overwinter as adults. [3]

Species and distributions. See in Table 1.

Table 1. Species of the genus *Hyboella* Hancock, 1915 and their distributions [3, 4, 10-14].

Species (34 species in all)	Distributions
<i>H. aberrans</i> Ichikawa, 1994	Japan: Okinawa
<i>H. aelytra</i> Zheng Li & Shi, 2002	China: Guizhou (Chishui)
<i>H. angulifrons</i> Hancock, 1915	India: Assam; Burma: Karan State (Dawna Hills); Thailand
<i>H. badagongshanensis</i> Zheng, 2013	China: Hunan (Sangzhi)
<i>H. brevipennis</i> Deng, Zheng & Wei, 2008	China: Yunnan, Guangxi
<i>H. conioptica</i> Hancock, 1915	India (Assam)
<i>H. curvimarginus</i> Zheng & Xu, 2010	China: Yunnan (Menglian)

Table 1. Continued.

Species (34 species in all)	Distributions
<i>H. dilatata</i> (De Haan, 1842)	India: Assam, Arunachal Pradesh; Indonesia: Java
<i>H. guangxiensis</i> Zheng & Jiang, 1994	China: Guangxi
<i>H. guizhouensis</i> Zheng Li & Shi, 2002	China: Guizhou (Chishui)
<i>H. hainanensis</i> Liang, 2002	China: Hainan
<i>H. heinrichi</i> Günther, 1939	India: Assam; Thailand: Chiang Rai
<i>H. heteroptera</i> n. sp.	Thailand: Chiang Rai
<i>H. interrupta</i> Zheng & Deng, 2006	China: Guangxi (Yizhou)
<i>H. jinxiensis</i> Deng, Zheng & Wei, 2008	China: Guangxi (Jinxi)
<i>H. juwanshanensis</i> Deng, Zheng & Wei, 2009	China: Guangxi (Huangjiang), Guizhou (Libo)
<i>H. keyensis</i> Günther, 1935	Malaysia: Key Island; Indonesia: Java
<i>H. longinota</i> Zheng & Jiang, 2002	China: Guangxi
<i>H. longipennis</i> Zheng, 2005	China: Xizang (Motuo)
<i>H. nullipennis</i> (Hancock, 1913)	India: Arunachal Pradesh
<i>H. obesa</i> Hancock, 1915	China: Xizang (Motuo); India: West Bengal (Darjeeling Distt.)
<i>H. overbecki</i> Günther, 1939	Malaysia: Malacca; Indonesia: Java
<i>H. perakensis</i> Günther, 1939	Malaysia: Malacca
<i>H. problematica</i> (Bolivar, 1909)	India: Assam
<i>H. puerensis</i> Zheng, 2014	China: Yunnan (Puer)
<i>H. similis</i> Günther, 1939	Malaysia: Malacca; Indonesia: Java
<i>H. strictvertex</i> Liang, 2002	China: Guangdong, Hainan
<i>H. taiwanensis</i> Liang, 2000	China: Taiwan
<i>H. tentata</i> Hancock, 1915	India: Assam
<i>H. tibetana</i> Uvarov, 1925	Mount Qomolangma regions (China; India; Nepal)
<i>H. tuberdoralis</i> Deng, Zheng & Wei, 2009	China: Guangxi (Wuzhou, Fuchuan)
<i>H. tumida</i> (Hancock, 1913)	India: Assam
<i>H. undatifemura</i> Deng, Zheng & Wei, 2007	China: Guangxi (Fengshan, Tianyang)
<i>H. yunnana</i> Zheng, 1998	China: Yunnan (Jingdong)

3.2 Key to species of *Hyboella* Hancock, 1915 in Thailand

absent.....	2
1. Hind process of pronotum extended beyond hind femoral apices, hind wings reaching apex of hind process.....	2. Vertex 2.4 times the width of one eye; hind wings absent.....
<i>H. angulifrons</i> Hancock	<i>H. heinrichi</i> Günther
- Hind process of pronotum not reaching hind femoral apices, hind wings shortened or	- Vertex 1.1-1.2 times the width of one eye; hind wings shortened, not reaching apices of hind femora.....
	<i>H. heteroptera</i> n. sp.

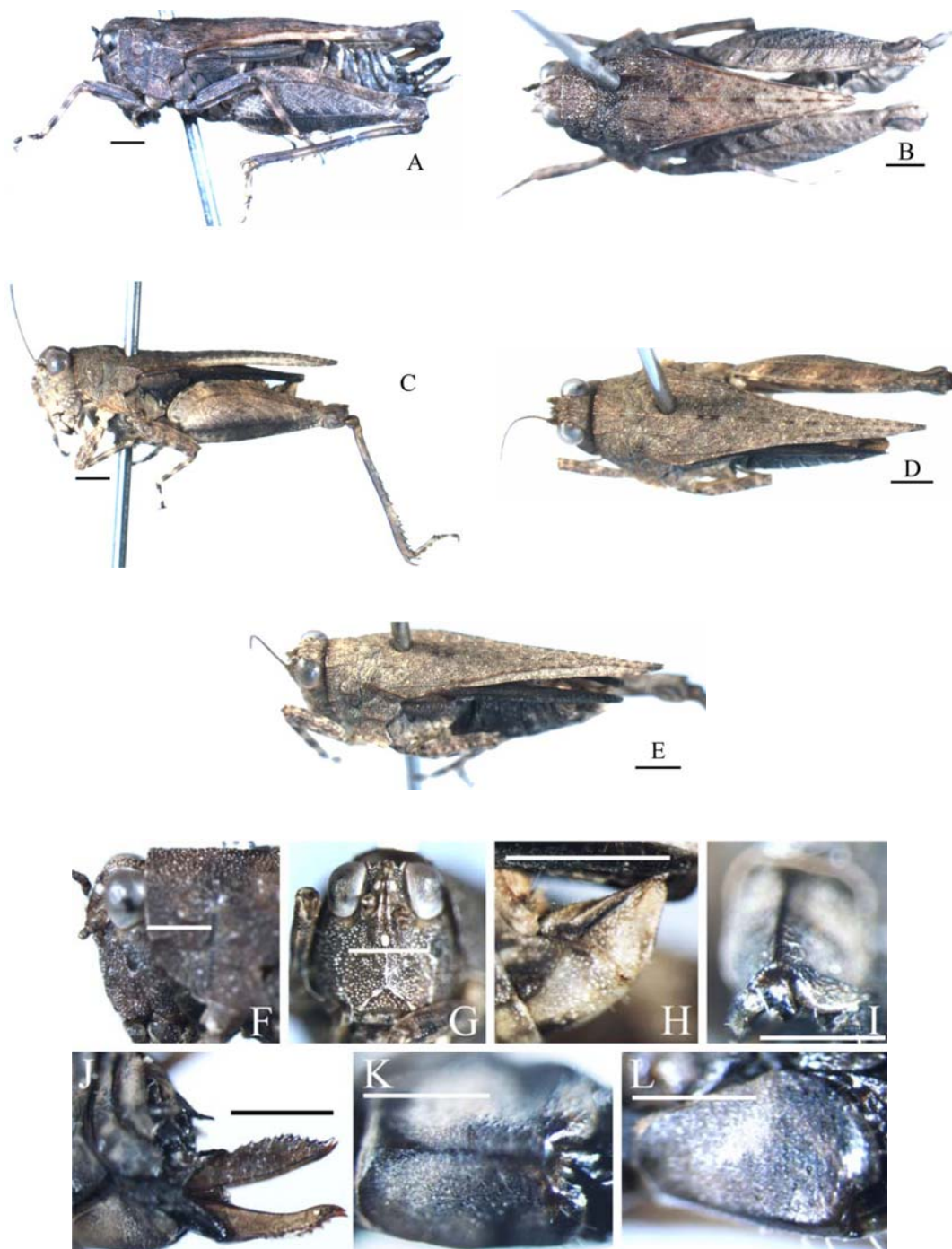
3.3 *Hyboella heteroptera* Zha, Wen, Kang & Hyde n. sp. (Figures A-H)

Female. Body size small. Head not protruding over level of pronotal disc; width of vertex 1.1-1.2 times width of an eye, anterior part narrow and posterior part broad; anterior margin of vertex straight and depressed, protruding forwards to level of anterior margins of eyes, lateral margin slightly folded upwards; median carina conspicuous and slightly protruding beyond anterior margin; vertex and frontal ridge obtuse angled, visible before eyes in profile; frontal ridge not concave between lateral ocelli, roundly protruding between base of antennae; longitudinal furrow narrower than width of first segment of antenna. Antenna filiform, 16-segmented, length of a segment in middle about 6 times its width, inserted slightly above level of lower anterior margins of eyes. Eyes ovate in frontal view, nearly hemispherical in dorsal view and globose in lateral view, protruding but not above level of pronotal disc, lateral ocellus situated slightly above middle of anterior margin of eye. Anterior margin of pronotum straight, midkeel of pronotum interrupted several times; pronotal disc flat, with some small coarse tubercles, a very low protrusion present before shoulders, middle of this protrusion not depressed, in profile upper margin of pronotum slightly undulated; lateral keels of prozona slightly constricted backward; shoulders broad, gradually constricted backward, with a pair of short longitudinal keels between shoulders; humeral angle slightly depressed, obtuse angled; hind process of pronotum short cone-shaped, not reaching knees of hind femora; posterior angle of lateral lobe

of pronotum extended outwards, apex truncate; posterior margin of lateral lobe with two concavities. Tegmina long oval, wings reaching about middle of hind femora. Upper margins of fore and mid femora nearly straight, lower margins of fore and mid femora slightly undulated; mid femur distinctly wider than visible part of tegmen; length of hind femur about 3.0 times its width; antegenicular denticles triangulate, genicular denticles digitiform, extending backward and apex triangular, outer side of hind tibia with 6-8 spines, inner side with 6 spines; first hind tarsal segment about 1.5 times longer than third, third pulvillus longer than first and second, apices of first and second pulvilli sharp, apex of third nearly right angled. Ovipositor narrow and long, outer margins of upper and lower valvulae with small saw-like teeth. Subgenital plate: basal part narrower than terminal part, posterior margin arched, center of posterior margin concave inward.

Body dark brown. Antenna yellowish brown; all femora, tibiae and wings of same color as body; lower outside of hind femur black; fore and mid tibiae with 3 yellowish brown bands, hind tibiae with 2 yellowish brown bands.

Male. Body slightly smaller than female. Antenna 15-segmented; hind process of pronotum elongate, nearly reaching top of hind femora; hind wings elongate, reaching near knees of hind femora; length of hind femur about 2.5 times its width; mid femur slightly narrowed from basal to terminal side, basal part slightly thicker than terminal part; subgenital plate briefly cone-shaped, apex bifurcate. Other characters same as female.



Figures A-L. *Hyboella heteroptera* n. sp.. (A and B) lateral and dorsal views of female body; (C, D, E) lateral, dorsal and oblique-lateral views of male body; (F) lateral view of female head and anterior pronotum; (G) frontal view of female head; (H) lateral view of male subgenital plate; (I) hind-ventral view of female subgenital plate; (J) lateral view of female ovipositor; (K) ventral view of female subgenital plate; (L) oblique-lateral view of female subgenital plate (scale bar A-H, J 1 mm; I, K, L 0.5 mm).

Measurements.

Length of body (mm): ♂ 8.0, ♀ 10.5-11.0; length of pronotum: ♂ 8.0, ♀ 7.5-8.0; length of hind femur: ♂ 5.3, ♀ 6.0-6.5.

Type Material.

Holotype (No. 15-0622, MFLU): ♀, Thailand, Chiang Rai, Doi Thong (19°47'52"N, 99°33'9"E, 1230.3 m altitude), 8 Nov. 2014, collected by ZHA Ling-Sheng. Paratypes: 1B& (No. 15-0623, MFLU) 1♀ (HNU), same data as holotype.

Diagnosis.

Hyboella heteroptera n. sp. is similar to *H. interrupta* Zheng & Deng, 2006 [15], the former differs from the latter as: 1) antenna inserted above lower anterior margins of eyes; lateral ocellus situated above the middle of anterior margin of eye; 2) hind process of female distinctly shortened, hind wings of male distinctly elongate; 3) hind femur stout, only 2.5 times (♂) or 3.0 times (♀) its width; 4) center of posterior margin of female subgenital plate concave inward, not triangularly protruding.

Etymology.

This new species name means lengths of hind wings are different between male and female.

Biology and ecology.

The new species had been caught up a long-stinging shrub in moist places of tropical rainforests. They overwinter as adults.

Distribution.

Thailand (Chiang Rai).

4. DISCUSSION

Generally, rainy season in Thailand lasts from May to end of October every year.

Under such condition these pygmy locusts may evolve into some special instincts to survive, such as swimming or climbing. Subcylindrical pronotum, flattened fore and mid femora and paddle-shape of terminal part of hind tibia of the new species, all these characteristics develop and adapt to their swimming [16]. Even more interesting is the new species were collected up a shrub which is about 1 meter from the ground, we think it is also closely associated with the long rainy season of Thailand, they need jumping up trees to escape from running water.

Unfortunately for the genus *Hyboella*, there is no nucleotide sequence submitted in NCBI databases up to now, so about the phylogeny of the genus *Hyboella* species, more studies on molecular systematics need be carry out in next future.

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