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A new species of *Garypus* (Pseudoscorpiones: Garypidae) from southern Thailand

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Abstract: A new pseudoscorpion species of the genus *Garypus*, *G. schwendingeri*, is described from a seashore habitat in southern Thailand.

Keywords: Taxonomy - description - seashore.

INTRODUCTION

The pseudoscorpion genus *Garypus* L. Koch, 1873 is widely distributed around the world, with 34 species occurring in seashore habitats (e.g. Beier, 1932, 1963; Chamberlin, 1921; Harvey *et al.*, 2020; Hummelinck, 1948; Lee, 1979; Muchmore, 1991). A recent taxonomic review of the genus *Garypus* in the Indo-West Pacific region by Harvey *et al.* (2020) recognised 14 species, including nine new ones. Many of these species are known from only single locations, suggesting that further species occur in the region.

Among the rich collection of pseudoscorpions from South-East Asia collected by Peter Schwendinger and his colleagues was a female *Garypus* specimen (Fig. 1) that did not match any of the previously described species. The opportunity is taken here to describe this new species, which represents the first *Garypus* species reported from mainland South-East Asia.

MATERIAL AND METHODS

The specimen examined for this study is lodged in the Muséum d'histoire naturelle, Geneva (MHNG). It was studied using a temporary slide mount prepared by immersion of the specimen in lactic acid at room temperature for two days, and then mounting it on a microscope slide with 10 mm coverslips supported by small sections of 0.25, 0.35 or 0.5 mm diameter nylon fishing line. After study, the specimen was rinsed in distilled water and returned to 75% ethanol, with the dissected portions placed in 12 × 3 mm glass genitalia microvials (BioQuip Products, Inc.). The specimen was examined with a Leica MZ-16A dissecting microscope

and an Olympus BH-2 compound microscope and illustrated with the aid of a drawing tube attached to the compound microscope. Measurements were taken at the highest possible magnification using an ocular graticule. Terminology and mensuration mostly follow Chamberlin (1931), with the exception of the nomenclature of the pedipalps and legs, and with some minor modifications to the terminology of the trichobothria (Harvey, 1992), chelicera (Judson, 2007) and faces of the appendages (Harvey *et al.*, 2012). When expressed as a fraction, the numerator denotes the length and the denominator the width for all structures except for the legs where the denominator refers to the depth.

The following abbreviations are used for chelal trichobothria: FIXED FINGER: *eb*, externo-basal trichobothrium; *esb*, externo-subbasal trichobothrium; *est*, externo-subterminal trichobothrium; *et*, externo-terminal trichobothrium; *ib*, interno-basal trichobothrium; *isb*, interno-subbasal trichobothrium; *ist*, interno-subterminal trichobothrium; *it*, interno-terminal trichobothrium. MOVABLE FINGER: *b*, basal trichobothrium; *sb*, subbasal trichobothrium; *st*, subterminal trichobothrium; *t*, terminal trichobothrium.

TAXONOMY

Family Garypidae Simon, 1879
Subfamily Garypinae Simon, 1879
Genus *Garypus* L. Koch, 1873

Type species: *Garypus litoralis* L. Koch, 1873 (junior synonym of *Chelififer beauvoisii* Audouin, 1826), by subsequent designation of Simon (1879).

Diagnosis: Species of *Garypus* differ from those of *Anchigarypus* Harvey in Harvey *et al.*, 2020, the only other genus of Garypinae, by the transverse or only slightly oblique suture between the metatarsi and tarsi of all legs (Fig. 9) (oblique in *Anchigarypus*), the absence of setae inserted within the pleural membrane (present in *Anchigarypus*), the presence of lateral spinules on the blades of the cheliceral rallum (absent in *Anchigarypus*), and the presence of microsetae near trichobothrium *b* (Fig. 8) (absent in *Anchigarypus*) (see Harvey *et al.*, 2020).

***Garypus schwendingeri* sp. nov.**

Figs 1-10

Holotype: MHNG; female; THAILAND, Phuket Province, Siray Island, Cape Nga, 7°54'42.2"N, 98°26'06.7"E, 0 m (sea shore); 20-23.MAY.2003; leg. P. Schwendinger.

Etymology: This species is named in honour of Peter Schwendinger, collector of the holotype, and in recognition of his retirement as Curator of Arachnids at the Muséum d'histoire naturelle, Geneva.

Diagnosis: *Garypus schwendingeri* sp. nov. most closely resembles *G. dissitus* Harvey in Harvey *et al.*, 2020 in the following combination of character states: trichobothrium *st* closer to *sb* than to *t* (Fig. 6); tergites mostly pale yellow, with medial and lateral brown spots, and tergites III and IV mostly pale, with brown patches (Fig. 1); chelal fingers slightly curved in lateral view (Figs 4, 6); cucullus brown (Fig. 3). *Garypus schwendingeri* sp. nov. differs from *G. dissitus* by the rounded chelal hand which is only 1.05 times longer than broad (Fig. 5) (1.39 times in *G. dissitus*).

Description of female holotype

Color: Generally pale (Figs 1-3); carapace with anterior half brown, with brown lateral and medial markings; tergites pale yellow-brown, with brown lateral and medial markings; pedipalps yellow-brown, with dark brown chelae.

Setae and cuticle: Setae very small and straight; epicuticle waxy.

Chelicera: Surface slightly roughened; cheliceral hand with 5 setae; movable finger with 1 sub-distal seta; all setae acuminate; galea present, long, with 6 distal rami (Fig. 10); fixed finger with 6 small teeth, each approximately of same size; movable finger with 1 dorsal tooth and with 2 dorsal and 1 ventral lyrifissures; serrula exterior connected to chelicera finger for entire length, modified to form velum; serrula interior with 24 blades; lamina exterior present; rallum with 3 blades, each with anterior spinules; rallum with progressively shorter blades.

Pedipalp (Fig. 5): Long and slender, its surface very lightly granular; fixed chelal finger coarsely granular,

movable chelal finger granular basally, remainder smooth; setae very small and slightly curved; trochanter with prolateral margin rounded, 1.67 times longer than broad; femur cylindrical, without dorsal tactile seta, 4.30 times longer than broad; patella cylindrical, pedicel not strongly pronounced but basal portion slimmer than distal portion, with several small lyrifissures situated basally on dorsal surface, 3.36 times longer than broad; chelal hand ovoid, retrolateral chelal condyle small and rounded, chela with pedicel 3.48 times longer than broad, chela without pedicel 3.34 times longer than broad, hand without pedicel 1.05 times longer than broad, movable finger 1.96 times longer than hand. Fixed finger with 8 trichobothria, movable finger with 4 trichobothria (Fig. 6): *eb*, *esb* and *isb* in straight row at base of fixed finger, *ib* and *ist* situated above and below that row, *it* closer to *et* than to *est*, *et* distal to *it*; *sb* on movable finger much closer to *b* than to *st*, *st* closer to *sb* than to *t*; both fingers curved in lateral view (Figs 4, 6). Surface of fixed finger granular, that of movable finger mostly smooth but granular basally. Chelal teeth juxtadentate; fixed finger with 81 triangular, retrorse teeth; movable finger with 78 triangular, retrorse teeth; accessory chelal teeth absent. Venom apparatus present in both chelal fingers, venom duct of medium length, terminating midway between *it* and *est* in fixed finger and basal to *t* in movable finger; nodus ramosus not inflated; without microsetae near *et*; with several microsetae near *b* and *t* (Figs 7-8).

Cephalothorax: Carapace (Fig. 3) sub-triangular; anterior margin medially indented; epistome absent; 0.98 times longer than broad; anterior and posterior furrows present; with two pairs of large, corneate eyes removed well back from anterior margin of carapace and situated on tubercle. Manducatory process with 4 apical setae and 22 additional setae; suboral seta absent; maxillary shoulder absent; median maxillary lyrifissure situated medially. Coxa I much wider than coxa IV; setae of coxae I-IV arranged 11: 10: 12: 27.

Legs: Femora I and II much longer than patellae I and II, respectively; femora I and II with primary slit sensillum directed transversely; junction between anterior femora and patellae perpendicular; junction between femur and patella of posterior legs strongly oblique (Fig. 9); femora III and IV much smaller than patellae III and IV, respectively; femur + patella IV 5.00 times longer than broad; tibiae, metatarsi and tarsi III and IV without tactile seta; metatarsi and tarsi of all legs not fused; metatarsi longer than tarsi; subterminal tarsal seta arcuate, acute; claws smooth; arolium shorter than claws, not divided.

Abdomen: Tergites straight, divided; setal formula of tergites I-XII: 8: 10: 12: 14: 16: 16: 17: 15: 15: 12: 8: 2; setae arranged in single rows; setal formula of sternites II-XII: 20: (0) 7 (0): (0) 10 (0): 14: 16: 16: 15: 15: 12: 4: 2; setae of anterior genital operculum (sternite II) approximately same size as other sternal setae; posterior tergites and sternites without tactile setae; glandular setae absent; pleural membrane uniformly wrinkled plicate,

without setae; stigmatic sclerites without setae; stigmatic helix absent; anal ring (tergite XII and sternite XII) with raised rim, surrounded by sternite XI.

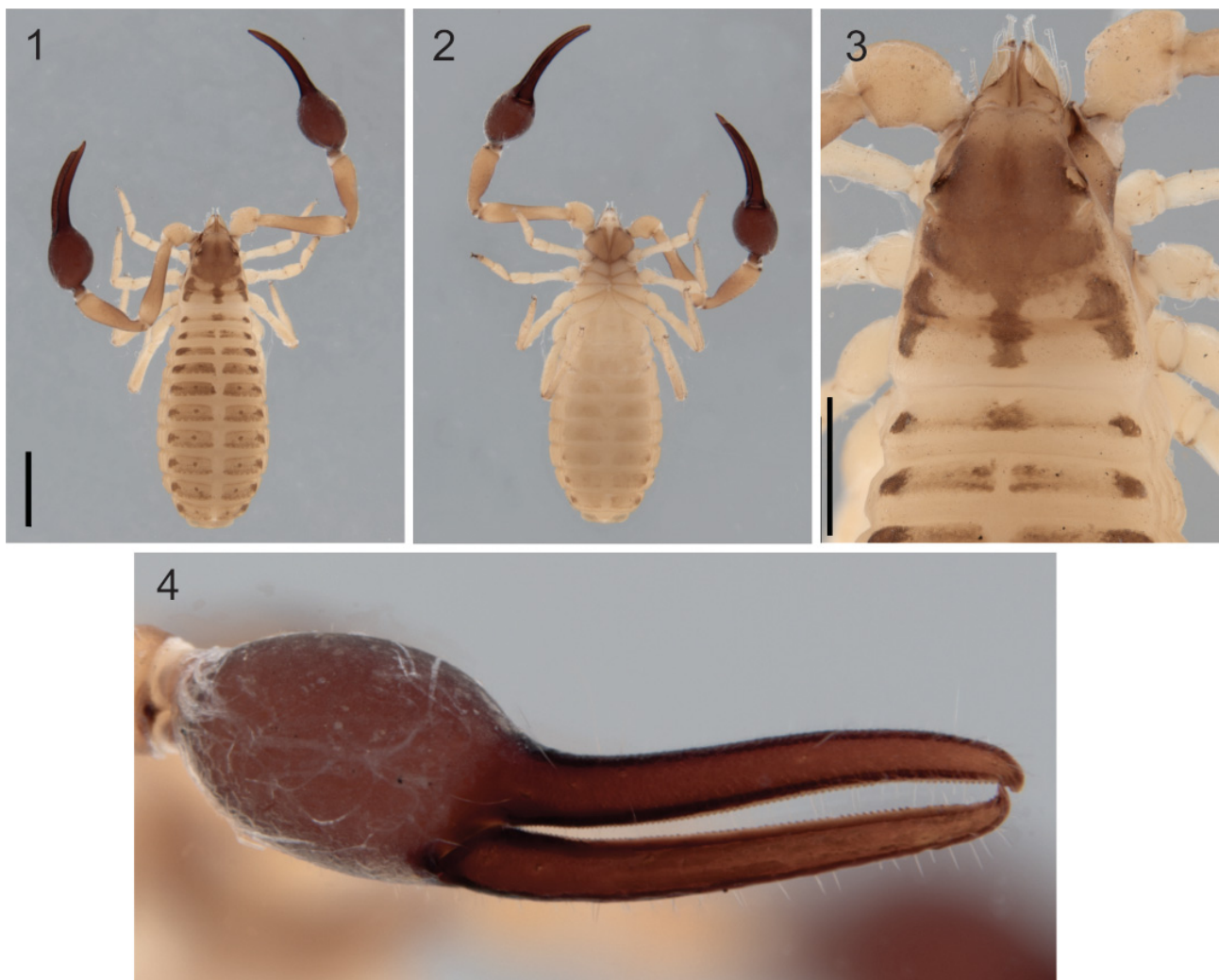
Genitalia: With 1 pair of lateral cribriform plates and 1 median cribriform plate divided into several smaller platelets.

Dimensions (in mm): Body length (excluding chelicerae) 6.34. Chelicera 0.555/0.265; movable finger length 0.325. Pedipalp: trochanter 0.825/0.495; femur 1.935/0.450; patella 1.615/0.480; chela with pedicel 3.375/0.970; chela without pedicel 3.240 long; hand without pedicel 1.105 long; movable finger length 2.170. Carapace 1.615/1.655; anterior eye 0.185; posterior eye 0.155. Leg I: femur 0.785/0.245; patella 0.520/0.250; tibia 0.655/0.180; metatarsus 0.460/0.130; tarsus 0.365/0.120. Leg IV: femur + patella 1.600/0.320; tibia 1.210/0.195; metatarsus 0.600/0.160; tarsus 0.430/0.140.

Remarks: The holotype and only known specimen of *G. schwendingeri* sp. nov. was collected on the seashore

on Koh Siray in southern Thailand. The collector, Peter Schwendinger, informed me that although his field notes did not refer to the pseudoscorpion, the main collecting technique he used at the site was searching for arboreal trapdoor spiders on tree trunks. Therefore, the specimen was most likely collected from the bark of one of the trees. The habitat was a tiny beach (only about 100 m long) with a few scattered mangrove trees in the water at high tide and a few coconut palms behind the narrow sandy beach.

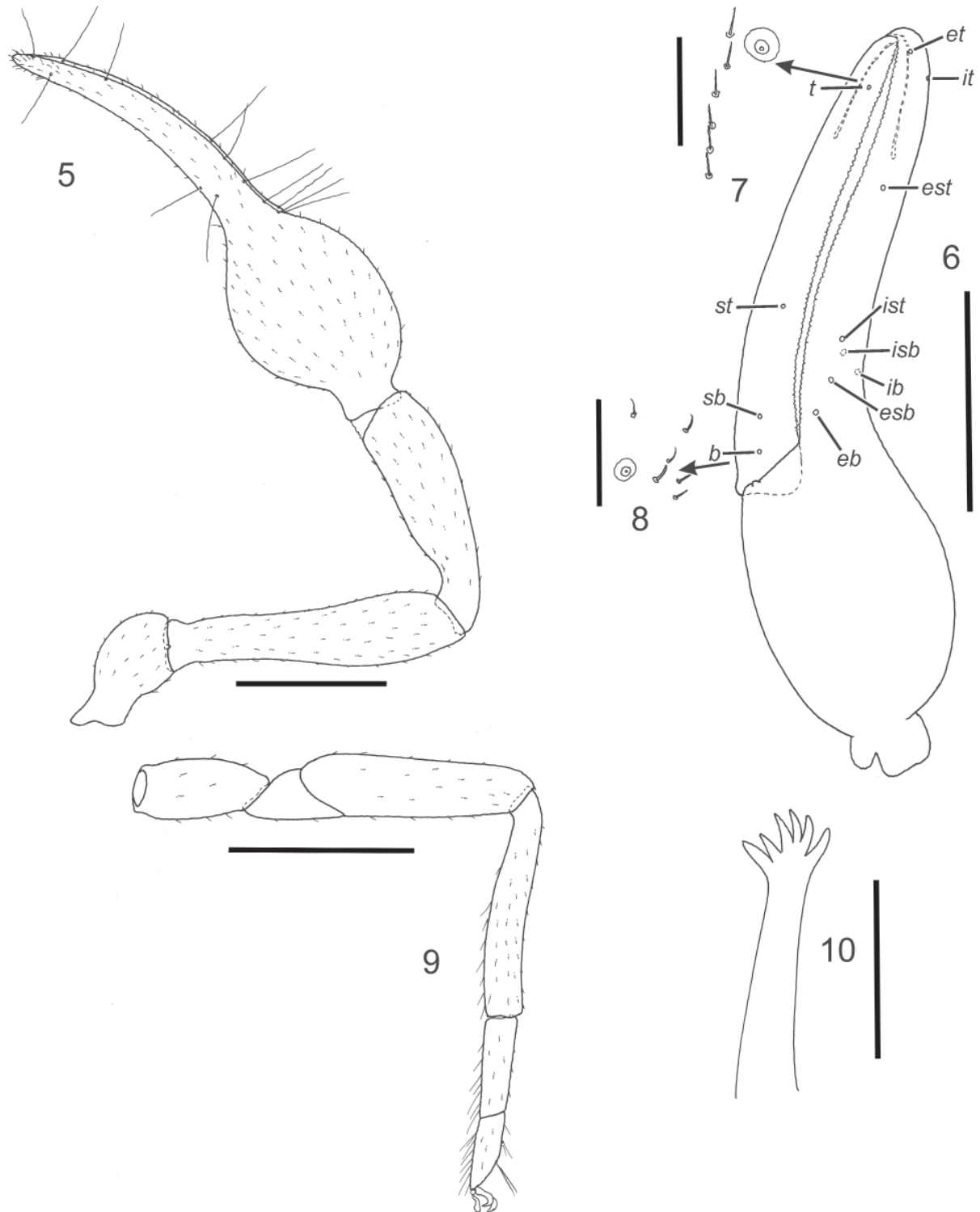
The close morphological similarity between *G. schwendingeri* sp. nov. and *G. dissitus* highlights the possible origin of *G. dissitus* on Cocos (Keeling) Islands, assuming that the ancestor of *G. dissitus* had a South-East Asian origin. The Cocos (Keeling) Islands consist of a series of low coral islands with a maximum height of only five metres above sea level. They have only been above sea level for the past few thousand years when the sea approached its current level (Woodroffe *et al.*,



Figs 1-4. *Garypus schwendingeri* sp. nov., female holotype (before dissection). (1) Body, dorsal view. (2) Body, ventral view. (3) Cephalothorax, dorsal view. (4) Left palpal chela, lateral view.

1999). Therefore, the population of *G. dissitus* must have migrated from another landmass, of which the most likely candidates are the closest permanent islands, Sumatra and Java, some 1000 km away. The only *Garypus* species occurring in the vicinity of *G. schwendingeri*

sp. nov. are *G. nicobarensis* Beier, 1930 on the Nicobar Islands and *G. yeni* Harvey in Harvey *et al.*, 2020 on the Krakatau Islands. However, *G. schwendingeri* sp. nov. and *G. dissitus* are quite dissimilar to these species, and most likely represent a different radiation.



Figs 5-10. *Garypus schwendingeri* sp. nov., female holotype. (5) Right pedipalp, dorsal view. (6) Left chela, lateral view, setae omitted. (7) Detail of *t* region, lateral view. (8) Detail of *b* region, lateral view. (9) Left leg IV, prolateral view. (10) Left galea, lateral view. Scale lines = 1.0 mm (Figs 5-6, 9); 0.5 mm (Figs 7-8); 0.1 mm (Fig. 10).

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Appendix

ZooBank registration of new name:
 urn:lsid:zoobank.org:act:E94A79FC-D617-4248-8D53-E38A7F01B7F4