

SHORT COMMUNICATION

Redescription of *Geogarypus irrugatus* from Sumatra (Pseudoscorpiones: Geogarypidae)

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Abstract. The geogarypid pseudoscorpion *Geogarypus irrugatus* (Simon 1899) is redescribed based upon the syntype series from Sumatra. All subsequent records of this species from Asia are shown to be misidentifications.

Keywords: Taxonomy, morphology, Asia

The pseudoscorpion *Garypus irrugatus* Simon 1899 was described from an unspecified number of specimens collected from the Indonesian island of Sumatra by J.-L. Weyers. Simon's (1899) description was relatively brief and without figures (which was quite standard for the era). It was transferred to *Geogarypus* Chamberlin 1930 when the genus was formed by Chamberlin (1930). Subsequent literature records of *G. irrugatus* all appear to be based upon misidentifications, which began with the attribution by With (1906) of specimens collected from Thailand to *Garypus irrugatus*. Later, Chamberlin (1930) reported specimens from the Philippines, China and Indonesia under this name, following the concept of the species portrayed by With (1906). Many of the specimens examined by With (1906) and Chamberlin (1930) were reexamined by Harvey (2000) who found that all represent *G. longidigitatus* (Rainbow 1897), a distinct species with long chelal fingers and a distinct colored carapace. In addition, Harvey (2000) found a further seven species or subspecies to be synonyms of *G. longidigitatus*: *Garypus personatus* Simon 1900 from Hawaii (Simon 1900), *G. javanus* Tullgren 1905 from Java (Tullgren 1905), *Geogarypus formosanus* Beier 1931 from Taiwan (Beier 1931), *G. (G.) marquesianus* Chamberlin 1939 from Îles Marquises (Chamberlin 1939), *G. audyi* Beier 1952 from Malaysia (Beier 1952), *G. (G.) micronesiensis* Morikawa 1952 from Japan (Morikawa 1952), and *G. (G.) javanus takensis* Beier 1967 from Thailand (Beier 1967).

In addition, several other literature records of *G. irrugatus* were based upon other species. Beier (1976) reported three adults and four nymphs from Bhutan, which are lodged in Naturhistorisches Museum, Basel and have been examined during this study. Although similar to *G. irrugatus*, they are certainly not referable to this species but their identity is currently uncertain. Mahnert (1977) listed several specimens from Kirghizia (Tien-Shan: Terskey-Ala-Too), but Schawaller (1985) noted that these specimens were referable to *G. continentalis*, a correction that was overlooked by Harvey (1991). Schawaller (1994, 1995), using the traditional redescrptions of *G. irrugatus* (e.g., With 1906; Chamberlin 1930), tentatively suggested that *G. irrugatus* may be a synonym of *G. javanus* (Tullgren 1905), which is now a junior synonym of *G. longidigitatus* (Harvey 2000).

Thus, it appears that all subsequent specimens that have been referred to *G. irrugatus* represent other species and that only the type specimens can be unequivocally referred to *G. irrugatus*. To clarify the status of this species, a redescription of *G. irrugatus* is presented, based upon the type series.

METHODS

The material examined for this study is lodged in the Muséum National d'Histoire Naturelle, Paris (MNHN) and Naturhistorisches Museum, Basel (NMB). The terminology and mensuration mostly follow Chamberlin (1931), with the exception of the nomenclature of the pedipalps, legs and with some minor modifications to the

terminology of the trichobothria (Harvey 1992) and chelicera (Judson 2007). Simon's (1899) description was translated from Latin with the assistance of the online translation service Translation Guide (http://www.translation-guide.com/free_online_translators.php) and Brown (1956).

The specimens were examined with an Olympus BH-2 compound microscope and illustrated with the aid of a drawing tube. Measurements were taken at the highest possible magnification using an ocular graticule and are presented in mm. The specimens were examined using temporary slide mounts by immersing the specimens in a mixture of 90% glycerol and 10% lactic acid, and mounting them on microscope slides with 10 mm coverslips supported by small sections of 0.25 mm diameter nylon fishing line.

SYSTEMATICS

Family Geogarypidae Chamberlin 1930

Genus *Geogarypus* Chamberlin 1930

Type species.—*Geogarypus minor* L. Koch 1873, by original designation.

Remarks.—The genus *Geogarypus* was segregated by Harvey (1986) from *Afrogarypus* Beier 1931 and *Indogarypus* Beier 1957 by the lack of obvious sulci on the dorsal (*Afrogarypus*) or internal (*Indogarypus*) margins of the chelal hand. The clade *Geogarypus* + *Indogarypus* was defined by the presence of accessory chelal teeth on the fixed chelal finger (Harvey 1986), but this leaves *Geogarypus* without any discernible synapomorphies. Because *Geogarypus irrugatus* lacks a dorsal sulcus and has accessory chelal teeth, it is retained in *Geogarypus*.

Geogarypus irrugatus (Simon 1899)

Figs. 1–5

Garypus irrugatus Simon 1899:122.

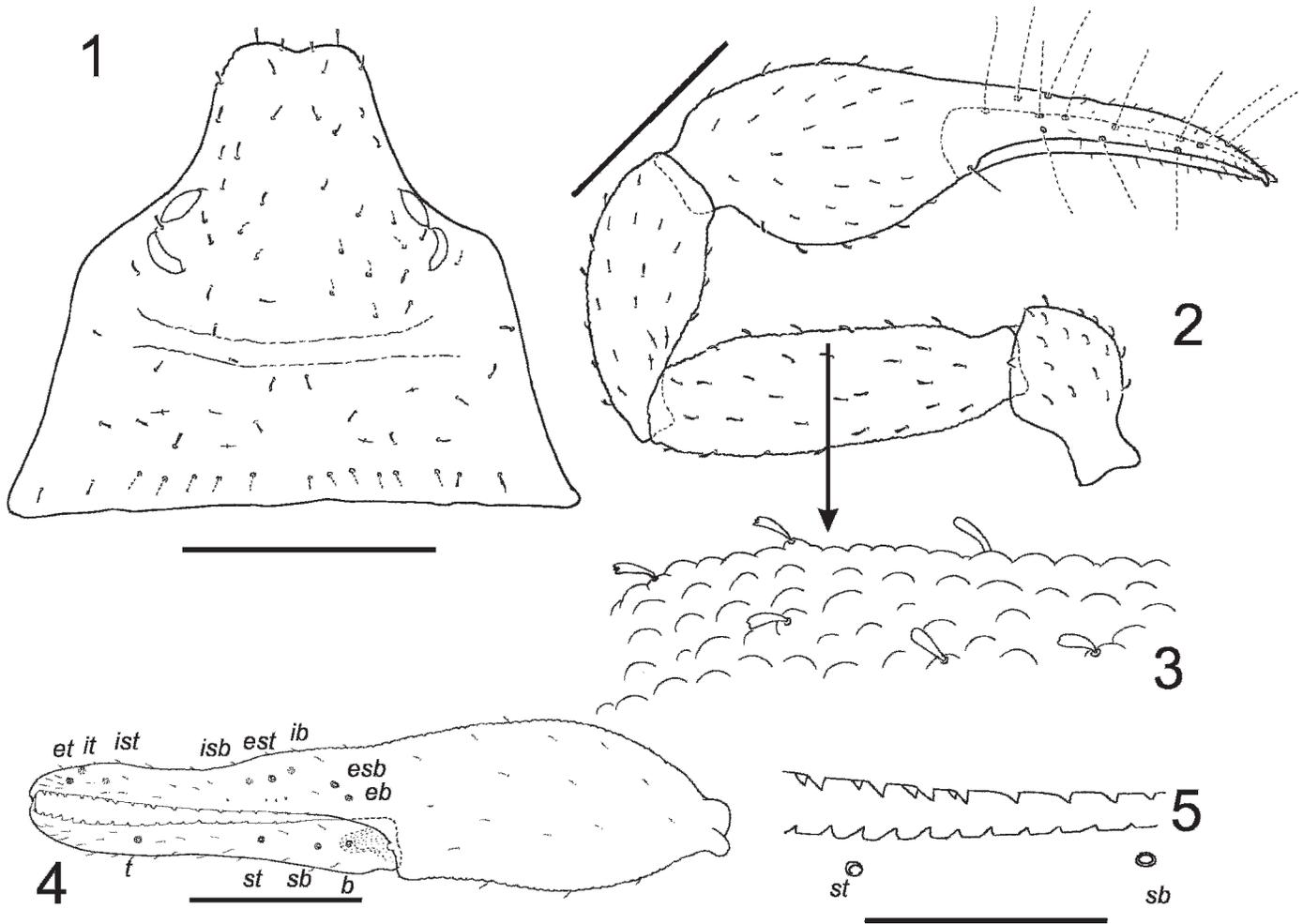
Geogarypus (Geogarypus) irrugatus (Simon): Beier 1932:233 (in part); Roewer 1937:270, fig. 221 (in part).

Geogarypus irrugatus (Simon): Roewer 1936:figs. 40a, b, 42c, d (in part); Harvey 1986:760 (in part); Harvey 1991:255 (in part); Beron 2002:34 (in part); Harvey 2009 (in part).

Not *Garypus irrugatus* Simon: With 1906:28–29, 104–107, figs. 8a, b, plate 1 figs. 6a–d, plate 2 figs. 1a–d [misidentification; *G. longidigitatus* (Rainbow 1897)]

Not *Geogarypus irrugatus* (Simon): Chamberlin 1930:611 [misidentification; *G. longidigitatus*]; Chamberlin 1931:114, figs. 9m, 15o, 16g, 17z, 32k, l, 37w [misidentification; *G. longidigitatus*]; Beier 1976:99–100 [misidentification; true identity uncertain]; Mahnert 1977:94 [misidentification; *G. continentalis* (Redikorzev 1934)].

Material examined.—*Lectotype (present designation)*: 1 female, INDONESIA: Sumatra, J.-L. Weyers (MNHN 21313). *Paralecto-*



Figures 1–5.—*Geogarypus irrugatus* (Simon), female lectotype from Sumatra: 1. Carapace, dorsal aspect; 2. Left pedipalp, dorsal aspect; 3. Detail of pedipalpal femur, dorsal aspect; 4. Left chela, lateral aspect; 5. Detail of chelal teeth, lateral aspect. Scale lines = 0.3 mm (Figs. 1, 2), 0.2 mm (Fig. 4), 0.1 mm (Fig. 5).

types: 6 males, 2 females, 1 tritonymph, collected with lectotype (MNHN 21313).

Diagnosis.—*Geogarypus irrugatus* is a small species [e.g., pedipalpal femur 0.442 (♂), 0.518 (♀) mm], with strongly clavate vestitural setae, and without an internal constriction on the chelal hand.

Description.—*Adults*: Color impossible to discern (all specimens very strongly bleached), but according to Simon (1899, translated from the original Latin description), “Abdomen dorsally dark tawny, cephalothorax, especially anteriorly, very dark, abdomen darkly spotted, regularly quadriseriate, marked anteriorly. Pedipalps dark, femora internally within and hand intensely dark and olive. Legs pale yellow.” Most setae clavate and with rounded tips. Surface of most cuticular regions strongly and evenly granulate.

Chelicera: with 5 setae on hand, all setae acuminate; movable finger with 1 subdistal seta; subterminal tooth of movable finger not bifurcate and not enlarged; galea of ♂ and ♀ apparently simple, without rami; rallum of 1 small blade, without serrations; serrula exterior with 14 blades (♂); lamina exterior present.

Pedipalp: All pedipalpal segments strongly granulate (Figs. 2, 3); trochanter 1.66 × (♂), 1.56 × (♀), femur 3.37 × (♂), 3.20 × (♀), patella 2.31 × (♂), 2.32 × (♀), chela (with pedicel) 3.39 × (♂), 3.39 × (♀), chela (without pedicel) 3.25 × (♂), 3.26 × (♀) longer than broad, hand rounded, bulging medially, 1.39 × (♂), 1.45 × (♀) longer than broad, movable finger 1.35 × (♂), 1.25 × (♀) longer than hand. Femur

without tactile setae (Fig. 2). Patella with three lyrifissures situated dorsally near pedicel. Hand with long straight spine on internal face, near base of fixed finger. Fixed chelal finger with 8 trichobothria, movable chelal finger with 4 trichobothria (Fig. 2); *eb*, *esb* and *est* situated on external margin of fixed finger, sub-basally; *isb* on internal margin, closer to *ib* than to *ist*; *it*, *ist* and *et* grouped distally on fixed finger; trichobothria of movable finger arranged with *b* and *sb* situated basally, and *sb* midway between *b* and *st*. Venom apparatus present in both chelal fingers, venom ducts and nodus ramosus not discernible. Chelal teeth acute, retrorse and widely spaced (Fig. 5); fixed finger with ca. 17 (♂, ♀) teeth plus ca. 8 accessory teeth; movable finger with ca. 16 (♂) or 15 (♀) teeth. Fixed chelal fingers undulate in lateral view with noticeable dorsal constriction near middle of finger (Fig. 4); fixed finger with a row of 4 pit-like sensillae on external margin (Fig. 4).

Cephalothorax: carapace (Fig. 1) strongly sub-triangular, 0.83 × (♂), 0.78 × (♀) longer than broad; with 2 pairs of corneate eyes situated away from the anterior margin of carapace; with numerous setae, including 4 (♂, ♀) near anterior margin and 17 (♂) or 18 (♀) near posterior margin; with single medial furrow. Pedipalpal coxa with distinct coxal shoulder; medial maxillary lyrifissure situated distally.

Abdomen: pleural membrane wrinkled-plicate, with investing setae. Tergal chaetotaxy: ♂, 10: 12: 13: 11: 13: 12: 14: 11: 8: 8: 7: 2; ♀, 8: 12: 12: 11: 14: 13: 12: 11: 9: 8: 7: 6: 2; setae uniseriate and clavate. Sternal

chaetotaxy: ♂, 10: (0) 9 (0): (0) 8 (0): 8: 9: 10: 9: 10: 7: 7: 0; ♀, 7: (0) 8 (0): (0) 8 (0): 8: 11: 12: 10: 9: 7: 6: 0; setae uniseriate and acuminate; glandular setae absent; anus not surrounded by sternite XI.

Genitalia: not discernible.

Legs: femora of legs I and II much longer than patellae I and II, respectively; femur + patella of leg IV $3.06 \times$ (♂) longer than broad; metatarsi and tarsi not fused; legs without tactile setae; subterminal tarsal setae arcuate and acute; arolium much longer than claws, not divided.

Tritonymph: Generally as for adults except:

Chelicera: galea with 4–5 distal rami.

Pedipalp: trochanter $1.59 \times$, femur $3.16 \times$, patella $2.59 \times$, chela (with pedicel) $3.73 \times$, chela (without pedicel) $3.60 \times$, hand $1.54 \times$ longer than broad, movable finger $1.32 \times$ longer than hand. Fixed chelal finger with 7 trichobothria, movable chelal finger with 3 trichobothria, *isb* and *sb* absent. Fixed finger with ca. 16 plus 6 accessory teeth; movable finger with ca. 18 teeth.

Cephalothorax: carapace $0.81 \times$ longer than broad.

Legs: metatarsi and tarsi not fused.

Dimensions (mm).—*Male paralectotype*: Body length 1.18. Pedipalps: trochanter 0.234/0.141, femur 0.442/0.131, patella 0.314/0.136, chela (with pedicel) 0.672/0.198, chela (without pedicel) 0.644, hand length 0.275, movable finger length 0.371. Carapace 0.464/0.562; anterior eye diameter 0.48, posterior eye diameter 0.41. Leg IV: femur + patella 0.352/0.115, tibia 0.255/0.080, metatarsus 0.128/0.052, tarsus 0.141/0.040.

Female lectotype: Body length 1.41. Pedipalps: trochanter 0.262/0.168, femur 0.518/0.162, patella 0.571/0.160, chela (with pedicel) 0.837/0.247, chela (without pedicel) 0.805, hand length 0.358, movable finger length 0.448. Carapace 0.538/0.691; anterior eye diameter 0.058, posterior eye diameter 0.060.

Tritonymph paralectotype: Body length 0.992. Pedipalps: trochanter 0.173/0.109, femur 0.325/0.103, patella 0.262/0.101, chela (with pedicel) 0.575/0.154, chela (without pedicel) 0.554, hand length 0.237, movable finger length 0.314. Carapace 0.324/0.400.

Remarks.—The small size of *Geogarypus irrugatus* [e.g., pedipalpal femur 0.442 (♂), 0.518 (♀) mm] renders it most similar to several other Asian species such as *G. asiaticus* Murthy and Ananthkrishnan 1977 from India [e.g., pedipalpal femur 0.52 (♀) mm (Murthy & Ananthkrishnan 1977)], *G. ceylonicus* Beier 1973 from Sri Lanka [e.g., pedipalpal femur 0.40 (♂), 0.49 (♀) mm (Beier 1973)], *G. globulus* Sivaraman 1980 from India [e.g., pedipalpal femur 0.456 (♂) mm (Sivaraman 1980)], *G. granulatus* Murthy and Ananthkrishnan 1977 from India [e.g., pedipalpal femur 0.46 (♀) mm (Murthy & Ananthkrishnan 1977)], *G. palauanus* Beier 1957 from Palau [e.g., pedipalpal femur 0.59 (♂), 0.51 (♀) mm (Beier 1957)], *G. pisinnus* Harvey 1986 from Australia [e.g., pedipalpal femur 0.45–0.50 (♂), 0.54–0.585 (♀) mm (Harvey 1986)], and *G. sagittatus* Beier 1965 from Papua New Guinea and West Papua [e.g., pedipalpal femur 0.52–0.67 (♀) mm (Beier 1965)]. Many of these small species have been included in the subgenus *Indogarypus* Beier 1957 (Beier 1957, 1965; Murthy & Ananthkrishnan 1977; Sivaraman 1980), which was based on the posterior transverse carapaceal furrow situated basally with the sides directed anteriorly and flattened laterally; the pedipalpal vestitular setae short but distinct, the medial setae slightly clavate; the pedipalps with some seta-bearing granules; the presence of a internal constriction of the chelal hand at the base of the fingers; stouter legs with the metatarsal and tarsal suture less distinct (Beier 1957). *Geogarypus irrugatus* mostly fits this diagnosis, but appears to lack the internal constriction on the chelal hand, and does not bear any enlarged seta-bearing granules on the pedipalps. The description of *G. pisinnus* by Harvey (1986) partly conforms to this diagnosis, but it too does not possess any larger seta-bearing granules. Harvey (1986) restricted *Indogarypus*, which was recognised as a distinct genus of Geogarypidae, to just the type species *G. indicus* (Beier 1930), but it is

clear that the status and composition of *Indogarypus* requires further research after a more comprehensive review of these small Australasian geogarypids.

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