

The status of the pseudoscorpion genus *Indogarypus* Beier, 1957 with new descriptions of three species of *Geogarypus* Chamberlin, 1930 (Arachnida: Pseudoscorpiones: Geogarypidae)

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Abstract. The pseudoscorpion genus *Indogarypus* Beier, 1957 is reviewed and its characters are discussed. Based on the review of these characteristics *Indogarypus* is synonymized with *Geogarypus* Chamberlin, 1930. New descriptions of *Geogarypus indicus* (Beier, 1930), *G. ceylonicus* Beier, 1973 and *G. nepalensis* Beier, 1974 are provided.

Keywords: New synonymy, taxonomy, morphology, redescription.

The pseudoscorpion subgenus *Indogarypus* Beier, 1957 was established by Beier (1957) as a subgenus of the genus *Geogarypus* Chamberlin, 1930. The following characters were used to distinguish *Indogarypus* from *Geogarypus* and the subgenus *Geogarypus* (*Afrogarypus*) Beier, 1931: the posterior transverse furrow of the carapace near the base, with the sides bent orally and flattened laterally; the vestitural bristles of the pedipalps short but relatively distinct, the medial ones slightly clavate; the pedipalps with several larger bristle-bearing granules besides the dense granulation; chela more or less precipitously narrowed medially at the base of the fingers; the legs stouter than in *Geogarypus* s. s. and the tarsal joints not so well defined; and the femur of the fourth pair of legs steeply broadened basally (Beier 1957). Beier nominated *Garypus indicus* Beier, 1930 from India as the type species of the new subgenus, described a new species, *G. (I.) palauanus* Beier, 1957 from Palau, and transferred *G. angulatus* Chamberlin, 1930 from India to *Geogarypus (Indogarypus)*. Additional new species have since been described: *G. (I.) sagittatus* Beier, 1965 from New Guinea (Beier, 1965); *G. (I.) asiaticus* Murthy & Ananthkrishnan, 1977, *G. (I.) heterodentatus* Murthy & Ananthkrishnan, 1977, and *G. (I.) globulus* Sivaraman, 1980 from India (Murthy & Ananthkrishnan 1977; Sivaraman 1980). Later Harvey (1986) elevated *Indogarypus* to full generic level, along with *Afrogarypus*, concluding that the only useful character delimiting *Indogarypus* from *Geogarypus* is the strong constriction of the chelal hand at the base of the finger, and rejected the remaining characters (Harvey 1986). Only the type species of the genus, *I. indicus* was retained in *Indogarypus*, with all others transferred to *Geogarypus*. Later, a further species, *G. ceylonicus* was moved to *Indogarypus*, as this species also possess a strong constriction of the chelal hand at the base of the finger (Batuwita & Benjamin 2014). Now it has become clear that clarifying the status of the former *Indogarypus* species requires further investigations (Harvey 2010).

METHODS

The material examined here originates from the Natural History Museum of Vienna (Naturhistorisches Museum Wien, NHMW). The samples are stored in 70% ethanol. The specimens were cleared in a 3:1 mixture of lactic acid and

gelatine, and examined with a Zeiss Stemi 2000-c stereomicroscope and a Zeiss Axioskop 2 light compound microscope. Drawings and photos were made with the aid of a Zeiss Axioskop 2 microscope. Measurement data were taken using Olympus Soft Imaging analySIS work 5.0 software.

Terminology and measurements follow Chamberlin (1931), Harvey (1992) and Judson (2007). The use of “prolateral” and “retrolateral” follows Harvey et al. (2012).

RESULTS

Family Geogarypidae Chamberlin, 1930 *Geogarypus* Chamberlin, 1930

Geogarypus Chamberlin, 1930: 609. Type species: *Garypus minor* L. Koch, 1873, by original designation.

Geogarypus (Indogarypus) Beier, 1957: 25. Type species: *Garypus indicus* Beier, 1930, by original designation.
New synonymy.

Remarks.—Most of the characters used by Beier (1957) to define *Indogarypus* have proved not to be suitable for separating the species of the genus from *Geogarypus* (Harvey 1986). The vestitural bristles of the pedipalps are not different from those in the genus *Geogarypus* (Novák & Harvey 2018). The larger bristle-bearing granules of the pedipalpal femur seem to be a unique character of *I. indicus* within the genus, although similar granules are also present in *G. italicus* Gardini, Galli & Zinni, 2017 (Gardini et al. 2017). The posterior transverse furrow of the carapace is not as distinct as implied by Beier (1957), and the stoutness of the walking legs does not appear to be substantially different from *Geogarypus*.

As noted by Harvey (1986), species earlier assigned to *Indogarypus* based on these characters and on the slight constriction of the chelal hand, like *G. palauanus* Beier, 1957 and *G. sagittatus* Beier, 1965, were previously excluded from the genus *Indogarypus*. The only reliable character of the genus was the strong prolateral constriction at the base of the chelal fingers (Harvey 1986). While this feature is rather obvious in the three species treated in this work, it is also apparent in other species formerly included in *Geogarypus (Indogarypus)* (Harvey 1986), as well as some species included in *Geogarypus*, e.g., *G. modjadji* Neethling & Haddad, 2017 and in *Afrogar-*

ypus, e.g., *Afrogarypus purcelli* (Ellingsen, 1912) (see Neethling & Haddad 2017). As there are no further reliable characters to distinguish *Indogarypus* from *Geogarypus*, we newly synonymize *Indogarypus* with *Geogarypus*.

Geogarypus indicus (Beier, 1930)

Fig. 1A–I

Garypus indicus Beier 1930: 290–291, figs. 3, 4a–b. Full synonymy in Harvey (2013).

Material examined.—INDIA: *Tamil Nadu*: 6 ♂, 2 ♀, Nilgiris District, Nilgiri [hills], Hulicar [Huligal?] at Coonoor [city] [Huligal, 11°18', 76°47'], 22 November 1972, C. Besuchet (det. M. Beier) (NHMW-22295).

Supplementary description.—General appearance as in Fig. 1A. Carapace mostly dark brown, posterior to the anterior furrow yellowish-brown, with the exception of the sides. Pedipalpal segments dark brown. Legs yellowish-brown. Tergites generally yellowish-brown, with dark brown pattern; all tergites with 2 lateral brown spots; tergites I–II with a larger and elongated medial dark spot; tergite III without medial spot. Sternites yellowish-brown, IV–IX with 2 dark brown medial spots.

Carapace: Sub-triangular, with 4 corneate eyes and cucullus. Finely granulated and covered with small clavate setae (Fig. 1B), including 8–10 near posterior margin, and 3+3 large clavate setae near anterior margin, where the lateral one with two and the medial two with three terminal denticles (Fig. 1C). Two pair of slit-like lyrifissures in posterior third and two pairs in ocular region. Anterior transverse furrow well-developed, posterior furrow weak and situated sub-basally.

Chelicera (Fig. 1D): Hand with 2 lyrifissures, 5 acuminate setae and movable finger with 1 acuminate subdistal seta. Fixed finger with 3–4 subapical teeth, subapical teeth of movable finger not clearly discernible. Galea without rami in males and with 5–6 rami in females. Rallum composed of 1 smooth blade. Serrula exterior with 16–18 blades, the distal one enlarged, straight and pointed, the basal 2 enlarged and hooked (Fig. 1E).

Pedipalp (Fig. 1F): All pedipalpal segments granulate, except the movable chelal finger and the distal three-fourth of fixed finger. Vestitural setae short, most of them clavate, some acuminate and terminally bifurcate (Figs 1G–H). Prolateral face of femur with some greater bristle-bearing granules besides the normal granulation. Dorsal face of patella with 4 lyrifissures near pedicel and one at distal margin. Prolateral face of trochanter rounded. Fixed chelal finger (Fig. 1I) with 31–37 slightly separated, pointed-triangular teeth, 4–6 of them are greater than others and situated somewhat lateral of the line, accompanied by 10–11 accessory teeth on prolateral side. Retrolateral face of fixed finger with 3 pit-like structures between *isb* and *esb*. Movable finger with 24–30 slightly separated teeth, which are pointed-triangular distal to *t*, and rounded proximal to *t*. Dental line on movable finger ending between *st* and *sb*. Nodus ramosus not discernible. Prolateral face of hand near base of fixed finger with 1 long, straight spine. Fixed finger approximately as long as the hand with pedicel. Hand with strong prolateral constriction at the base of fingers. Fixed finger with 8 trichobothria, movable finger with

4 trichobothria; *it* closer to *et* than to *ist*; *st* midway between *t* and *b*.

Opisthosoma: Pleural membrane striate with sporadic vestitural setae. Chaetotaxy of tergites I–XI (number of lyrifissures in parentheses): 10–12 (4–6); 10–12 (4–6); 10–12 (6–8); 12–14 (8–10); 12–14 (6–8); 12–14 (6–8); 10–12 (6–8); 10–12 (4–6); 8–10 (4–8); 8–10 (4–8); 4–6. Chaetotaxy of sternites IV–XI (number of lyrifissures in parentheses): 18–20 (4); 18–30 (4); 14–20 (6); 10–14 (6); 10–18 (4–8); 10–18 (6–8); 6–8 (4); 4–6. Tergite XII with 2 small setae, sternite XII without setae. Vestitural setae clavate on tergites and acuminate on sternites. Surface of tergites granulated, sternites smooth. Male genital region: sternite II with 8+8 microsetae and two lyrifissures, sternite III with 8 microsetae and 2 lyrifissures around genital opening. Structure of ejaculatory canal atrium, lateral apodeme and lateral rod typical for the family. Female genital region: sternite II with 6+6 microsetae and four lyrifissures, sternite III with 2+2 microsetae and 2+2 lyrifissures around genital opening. One pair of elongated lateral cribriform plates and a medial cribriform plate present.

Coxal region: Pedipalpal coxa with 1 long and 1 short setae on anterior face, plus further 25–30 small setae. Coxae I–IV with setal formula 14–16: 20–24: 29–35: 34–40.

Legs: Diplotarsate and without tactile setae. Surface mostly granulate. Claws simple. Arolia slightly longer than claws.

Dimensions (in mm, ratios in parentheses): Males. Body 1.90–2.23; carapace 0.75–0.77/0.86 (0.87–0.90 ×). Chelicera 0.21–0.23/0.13 (1.62–1.77 ×), movable finger 0.15. Pedipalpal trochanter 0.27–0.31/0.21–0.25 (1.24–1.29 ×); femur 0.64–0.77/0.20–0.26 (2.96–3.21 ×); patella 0.50–0.61/0.21–0.26 (2.35–2.38 ×). Chela (with pedicel) 1.17–1.30/0.32–0.39 (3.33–3.65 ×); chela (without pedicel) 1.12–1.22; hand (with pedicel) 0.52–0.66 (1.69–1.79 ×); hand (without pedicel) 0.47–0.58 (1.49–1.62 ×); fingers 0.62–0.70. Leg I. trochanter 0.18/0.14–0.15 (1.20–1.29 ×); femur 0.31–0.32/0.10–0.11 (2.91–3.10 ×); patella 0.17–0.19/0.12–0.13 (1.42–1.46 ×); tibia 0.25–0.26/0.09 (2.78–2.89 ×); metatarsus 0.16–0.18/0.06–0.07 (2.57–2.67 ×); tarsus 0.17–0.18/0.04–0.06 (3.00–4.25 ×). Leg IV. trochanter 0.25–0.28/0.15–0.18 (1.55–1.67 ×); femur 0.16–0.19/0.10–0.12 (1.58–1.60 ×); patella 0.44–0.52/0.15–0.18 (2.89–2.93 ×); tibia 0.40–0.45/0.10–0.12 (3.75–4.00 ×); metatarsus 0.20–0.22/0.06–0.07 (3.14–3.33 ×); tarsus 0.22–0.24/0.05–0.06 (4.00–4.40 ×).

Females: Body 2.38–2.71; carapace 0.80–0.82/0.91–0.98 (0.84–0.88 ×). Chelicera 0.21–0.23/0.13 (1.62–1.77 ×), movable finger 0.15. Pedipalpal trochanter 0.30–0.31/0.23–0.25 (1.24–1.30 ×); femur 0.81–0.86/0.26–0.27 (3.12–3.19 ×); patella 0.60–0.61/0.24–0.27 (2.26–2.50 ×). Chela (with pedicel) 1.40–1.42/0.39–0.40 (3.55–3.59 ×); chela (without pedicel) 1.34; hand (with pedicel) 0.60–0.67 (1.54–1.68 ×); hand (without pedicel) 0.54–0.59 (1.38–1.48 ×); fingers 0.77–0.78. Leg I. trochanter 0.19–0.20/0.15 (1.27–1.33 ×); femur 0.32–0.36/0.10–0.12 (3.00–3.20 ×); patella 0.20–0.22/0.12 (1.67–1.83 ×); tibia 0.28–0.29/0.08–0.09 (3.22–3.50 ×); metatarsus 0.16–0.18/0.06 (2.67–3.00 ×); tarsus 0.17–0.18/0.05 (3.40–3.60 ×). Leg IV. trochanter 0.27–0.29/0.16–0.17 (1.69–1.71 ×); femur 0.19–0.20/0.11–0.13 (1.54–1.73 ×); patella 0.53–0.55/0.14–0.15 (3.67–3.79 ×); tibia 0.43–0.45/0.10–0.11 (4.09–4.30 ×); metatarsus 0.23/0.06–0.07 (3.29–3.83 ×); tarsus 0.23–0.24/0.07 (3.29–3.43 ×).

Remarks.—*Garypus indicus* was described from Travancore, southern India based on a single female holotype (Beier 1930).

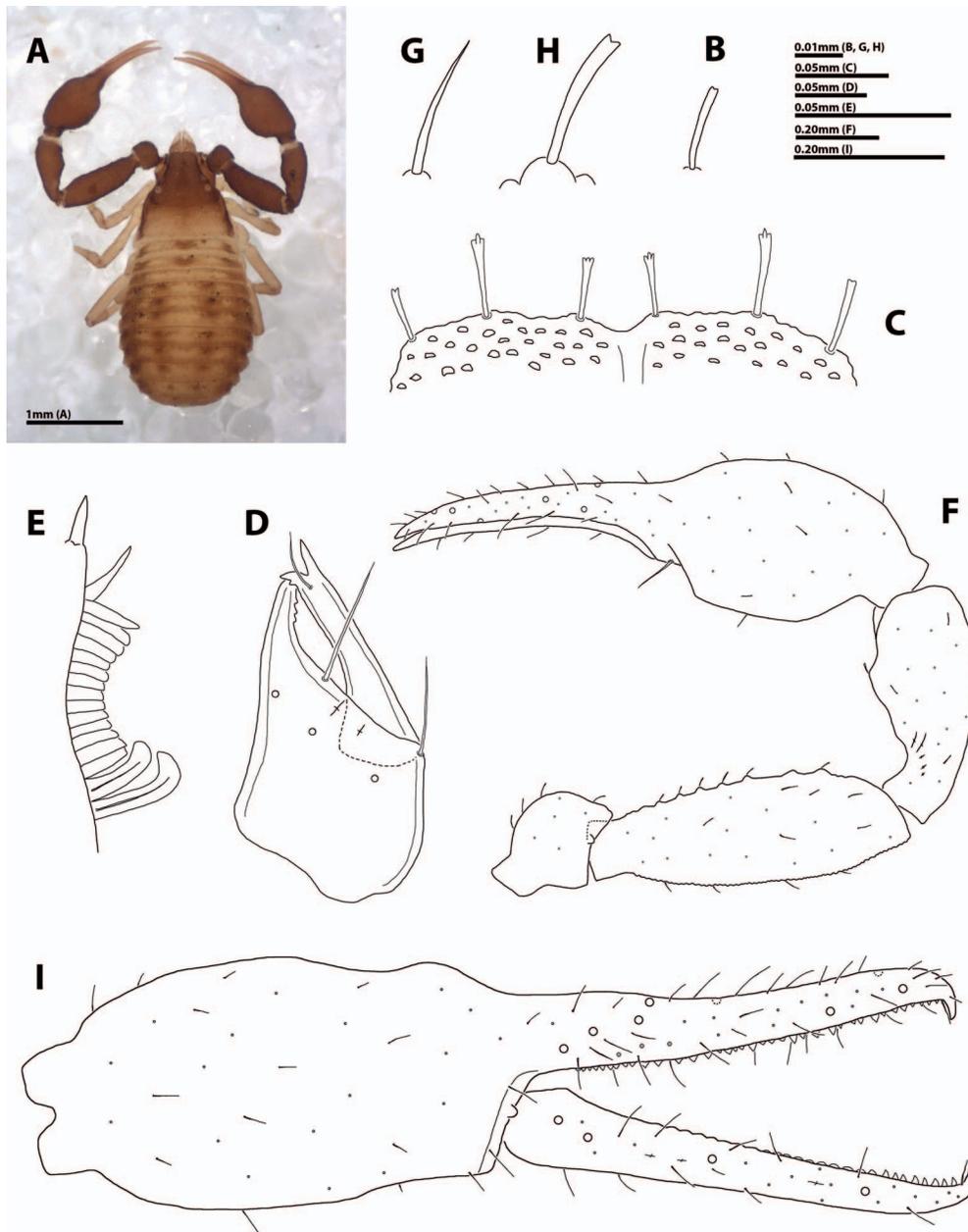


Figure 1.—*Geogarypus indicus* (Beier, 1930) (NHMW-22295): A, female; B, clavate seta of carapace, male; C, anterior margin of carapace, female; D, right chelicera of male; E, serrula exterior of male; F, right pedipalp of male; G, acuminate seta of pedipalpal femur, male; H, clavate seta of pedipalpal femur, male; I, right chela of male.

It was later transferred to the genus *Geogarypus* (Beier 1932) and then to the subgenus *Indogarypus*, where it was designated as the type species (Beier 1957). The species is known from southern India (Beier 1974a; Murthy & Ananthkrishnan 1977) and Sri Lanka (Beier 1973; Batuwita & Benjamin 2014).

We have examined several non-type specimens collected in Tamil Nadu state, India, which were reported by Beier (1974a). As the description of the species was based on a single specimen and thus provides no data on intraspecific variation of the characters, and also lacks some of the characters that are routinely studied in pseudoscorpions (e.g.,

chelar dentition, position of chelar trichobothria, genital region, and number and shape of vestitural setae at anterior and posterior margin of carapace), we provide a supplementary description based on these further specimens.

The characters of the specimens studied here correspond well with the original description of Beier (1930). As a consequence of the synonymy of *Indogarypus* with *Geogarypus*, we propose the name *Geogarypus indicus* (Beier, 1930).

As Neethling & Haddad (2017) have reported, some species of *Afrogarypus*, e.g., *A. purcelli*, also possess a strong

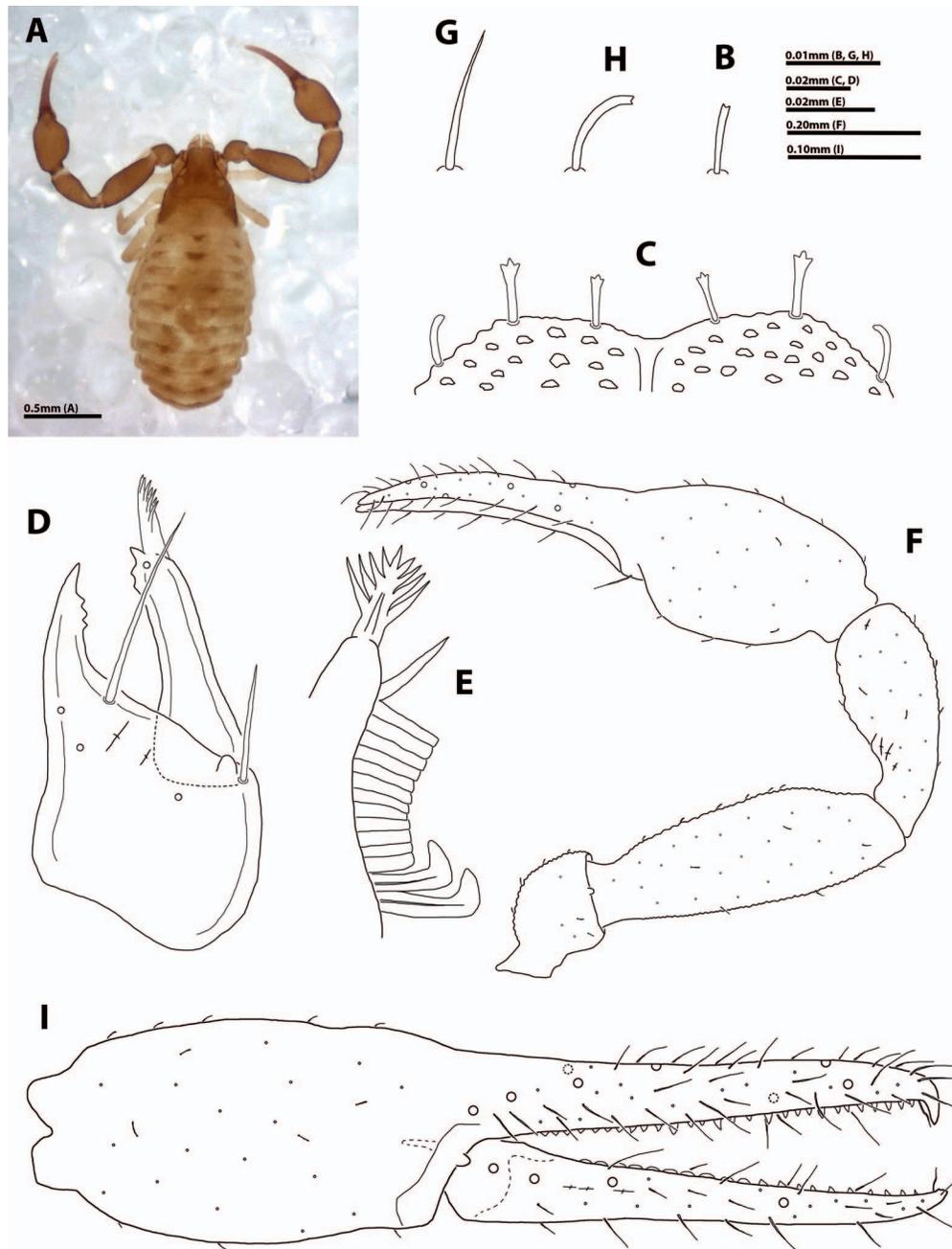


Figure 2.—*Geogarypus ceylonicus* Beier, 1973, syntypes (NHMW-22171): A, female; B, clavate seta of carapace, female; C, anterior margin of carapace, female; D, right chelicera of female; E, serrula exterior of female; F, right pedipalp of female; G, acuminate seta of pedipalpal femur, female; H, clavate seta of pedipalpal femur, female; I, right chela of male.

prolateral constriction at the base of the chelal fingers. Furthermore, some other species in the genus, like *A. excelsus* (Beier, 1964) even have an accessory tooth at the end of the fixed chelal finger. Considering the presence of a dorsal sulcus on the chelal hands of *G. indicus*, we can notice some similarities between the species and the genus *Afrogarypus*. Nevertheless, the larger number of accessory teeth (10–11) suggest retaining *G. indicus* in *Geogarypus*.

Geogarypus ceylonicus Beier, 1973

Fig. 2A–I

Geogarypus ceylonicus Beier 1973:46, fig. 10. Full synonymy in Harvey (2013).

Type material.—*Syntypes*: SRI LANKA: *Western Province*: 1 ♂, 1 ♀, Gampha district, Yakkala (18 miles NE of

Colombo [7°05'N, 80°02'E], from dry saline in a marshland, 6 February 1962, P. Brinck (det. M. Beier) (NHMW-22171).

Description.—General appearance as in Fig. 2A. Carapace mostly brown, posteriorly to the anterior furrow with a white, trapezoid area. Pedipalpal segments with the same color as the anterior part of the carapace. Legs yellowish-brown. Tergites generally yellowish-brown, with dark brown pattern; all tergites with 2 lateral brown spots; tergites I–II with a larger and elongated medial dark spot; tergite III without medial spot; tergites X–XI entirely brown. Sternites yellowish-brown, IV–IX with 2 small, dark brown medial spots.

Carapace: Sub-triangular, with 4 corneate eyes and cuculus. Finely granulated and covered with small clavate setae (Fig. 2B), including 10 near posterior margin, and 3+3 large clavate setae near anterior margin, where the middle one in each group is the longest, and with the exception of the lateral ones, they have three terminal denticles (Fig. 2C). Two pair of slit-like lyrifissures posterior to the anterior furrow and one pair in ocular region. Anterior transverse furrow well-developed, posterior furrow weak and situated sub-basally.

Chelicera (Fig. 2D): Hand with 2 lyrifissures, 5 acuminate setae and movable finger with 1 acuminate subdistal seta. Fixed finger with one subapical tooth, subapical teeth of movable finger not clearly discernible. Galea without rami in male and in female with 7–8 rami situated on the ventral and dorsal face of the distal third of galea. Rallum composed of 1 smooth blade. Serrula exterior with 14–15 blades, the distal one enlarged, straight and pointed, the basal 2 enlarged and hooked (Fig. 1E).

Pedipalp (Fig. 2F): All pedipalpal segments granulate, except the movable chelal finger and the distal three-fourth of fixed finger. Vestitural setae short, most of them clavate, some acuminate and terminally bifurcate (Figs 2G–H). Dorsal face of patella with 4 lyrifissures near pedicel and one at distal margin. Prolateral face of trochanter rounded. Fixed chelal finger (Fig. 2I) with 27–29 separated teeth, which are pointed-triangular, 4–5 of them are greater than others and situated somewhat lateral of the line; accessory teeth absent. Pit-like structures could not be clearly observed. Movable finger with 19–22 slightly separated teeth, which are pointed triangular in distal half, then turning into rounded and flattened. Dental line on movable finger reaching somewhat proximal to *st*. Nodus ramosus not discernible. Prolateral face of hand near base of fixed finger with 1 long, straight spine. Hand with strong prolateral constriction at the base of fingers. Fixed finger with 8 trichobothria, movable finger with 4 trichobothria; *ib* almost at the same level as *est*; *it* closer to *ist* than to *et*; *st* closer to *b* than *t*, and situated at the proximal one-third of the movable finger.

Opisthosoma: Pleural membrane striate with sporadic vestitural setae. Chaetotaxy of tergites I–XI (number of lyrifissures in parentheses): 8–10 (4–6): 8–10 (4–8): 8–10 (4–6): 10–12 (6–8): 6–10 (4–6): 8 (4–6): 8 (4–6): 8 (4): 6 (2): 4–6 (2–4): 6. Chaetotaxy of sternites IV–XI (number of lyrifissures in parentheses): ? (?): 18–24 (2): 10–14 (2–4): 10–14 (4–6): 10–12 (4–6): 8–12 (4): 6 (4): 2. Tergite XII with 2 small setae, sternite XII without setae. Vestitural setae clavate on tergites and acuminate on sternites. Surface of tergites granulated, sternites smooth. Sternites II and III and the inner genitalia could not be clearly observed in the types.

Coxal region: Pedipalpal coxa with 1 long and 1 short setae on anterior face, plus further 25–30 small setae. Coxae I–IV with setal formula 14–16: 20–24: 29–35: 34–40.

Legs: Diplotarsate and without tactile setae. Surface mostly granulate. Claws simple. Arolia slightly longer than claws.

Dimensions (in mm, ratios in parentheses): Male. Body 1.40; carapace 0.51/0.51 (1.00 ×). Chelicera 0.15/0.08 (1.88 ×), movable finger 0.09. Pedipalpal trochanter 0.18/0.14 (1.29 ×); femur 0.44/0.15 (2.93 ×); patella 0.34/0.13 (2.62 ×). Chela (with pedicel) 0.69/0.20 (3.45 ×); chela (without pedicel) 0.66; hand (with pedicel) 0.32 (1.60 ×); hand (without pedicel) 0.29; fingers 0.40. Leg I. trochanter 0.11/0.08 (1.38 ×); femur 0.20/0.06 (3.33 ×); patella 0.12/0.07 (1.71 ×); tibia 0.14/0.06 (2.33 ×); metatarsus 0.07/0.04 (1.75 ×); tarsus 0.10/0.03 (3.33 ×). Leg IV. trochanter 0.18/0.19 (0.95 ×); femur 0.10/0.05 (2.00 ×); patella 0.26/0.10 (2.60 ×); tibia 0.21/0.07 (3.00 ×); metatarsus 0.13/0.04 (3.25 ×); tarsus 0.14/0.03 (4.67 ×).

Female: Body 1.70; carapace 0.54/0.57 (0.95 ×). Chelicera 0.17/0.09 (1.89 ×), movable finger 0.10. Pedipalpal trochanter 0.20/0.15 (1.33 ×); femur 0.49/0.17 (2.88 ×); patella 0.11/0.09 (1.22 ×). Chela (with pedicel) 0.80/0.23 (3.47 ×); chela (without pedicel) 0.76; hand (with pedicel) 0.38 (1.65 ×); hand (without pedicel) 0.34; fingers 0.45. Leg I. trochanter 0.12/0.09 (1.33 ×); femur 0.24/0.06 (4.00 ×); patella 0.11/0.09 (1.22 ×); tibia 0.15/0.06 (2.50 ×); metatarsus 0.09/0.04 (2.25 ×); tarsus 0.11/0.04 (2.75 ×). Leg IV. trochanter 0.20/0.11 (1.82 ×); femur 0.11/0.05 (2.20 ×); patella 0.28/0.11 (2.55 ×); tibia 0.26/0.07 (3.71 ×); metatarsus 0.15/0.05 (3.00 ×); tarsus 0.16/0.04 (4.00 ×).

Remarks.—*Geogarypus ceylonicus* was described by Beier (1973) from Sri Lanka, based on numerous male and female types, including a male and female from Yakkala (“Typen”) and many paratypes. It was later reported by Murthy & Ananthakrishnan (1977) from southern India (Tamil Nadu state), who included it in the subgenus *Indogarypus*. When Harvey (1986) elevated *Indogarypus* to full genus rank, he left the species within *Geogarypus*. Recently, Batuwita & Benjamin (2014) reported new occurrences of the species from Sri Lanka, and as it possesses the constriction of the chelal hand at the base of fingers, they included it in *Indogarypus*. As a consequence of the synonymy of *Indogarypus* with *Geogarypus*, *G. ceylonicus* is once again referred to *Geogarypus*.

Only the male and female syntypes (“Typen” in the original description) are referred to *G. ceylonicus*, as some of the other specimens (“Paratypen” in Beier’s paper) stored in the NHMW (NHMW-22172: 4 specimens, Sri Lanka, Central Province, Hassalaka; NHMW-22173: 2 specimens, Sri Lanka, North Central Province, Mihintale) are not conspecific with the “types” in Beier’s description (Beier 1973): they also have a strong retrolateral sulcus on chelal hand, but differ in the color pattern of the cephalothorax and possess an enlarged basal tooth on the fixed chelal finger like that found in *G. nepalensis*.

The absence of accessory teeth and the presence of a weak dorsal sulcus on the chelal hands implies a possible taxonomic relationship between *G. ceylonicus* and the genus *Afrogarypus*. However, due to the weak grade of the dorsal sulcus, we suggest retaining *G. ceylonicus* in *Geogarypus*, until molecular data can be used to test each hypothesis.

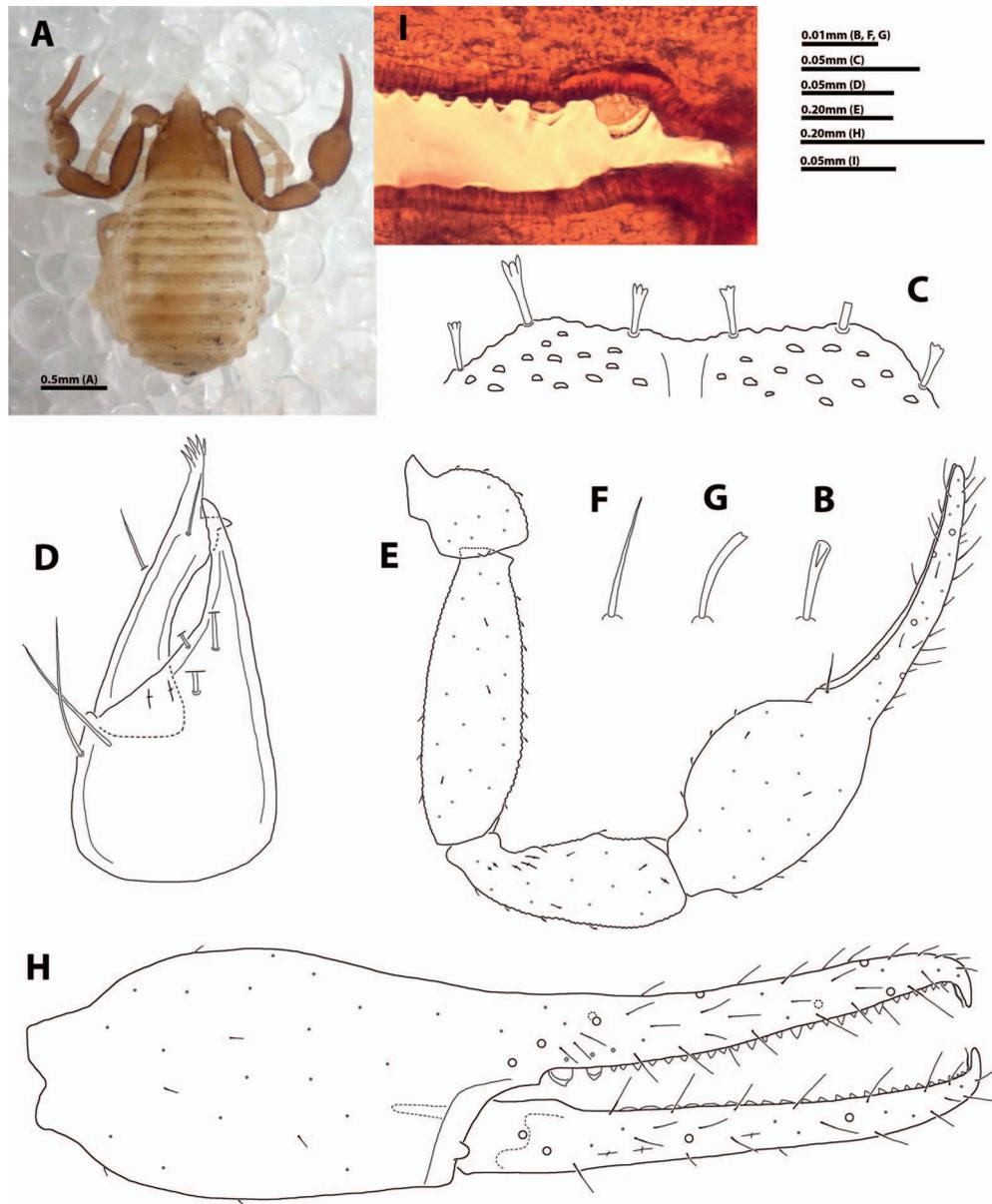


Figure 3.—*Geogarypus nepalensis* Beier, 1974 (NHMW-22200): A, female holotype; B, clavate seta of carapace; C, anterior margin of carapace; D, left chelicera; E, right pedipalp; F, acuminate seta of pedipalpal femur; G, clavate seta of pedipalpal femur; H, right chela; I, basal teeth of fixed finger of right pedipalp.

Geogarypus nepalensis Beier, 1974

Fig. 3A–I

Geogarypus nepalensis Beier 1974b: 268–269, fig. 5. Full synonymy in Harvey (2013).

Type material.—*Holotype female*: NEPAL: Karnali District: Karnali añcal region, Mugu jillā district, height between Pina [village, 2400 m] and Rara lake [3060 m] [ca. 29°30'N, 82°07'E], from leaf litter in pinewood, 3200 m, 31 September 1972, H. Franz (det. M. Beier) (NHMW-22200).

Description.—General appearance as in Fig. 3A. Carapace mostly dark brown, posterior third with two white spots at the posterior edge. Pedipalpal segments with the same color as the anterior part of the carapace. Legs yellowish-brown. Tergites

generally yellowish-brown, with dark brown pattern; all tergites with 2 lateral brown spots; tergites I–II with a larger and elongated medial dark spot; tergite III without medial spot; tergites X–XI entirely brown. Sternites yellowish-brown, IV–IX with 2 small, dark brown medial spots.

Carapace: Sub-triangular, with 4 corneate eyes and cucullus. Finely granulated and covered with small clavate setae (Fig. 3B), including 8 near posterior margin, and 3+3 large clavate setae with three terminal denticles near anterior margin, where the middle one in each group is the longest (Fig. 3C). Two pairs of slit-like lyrifissures posterior to the anterior furrow and one pair in ocular region. Anterior transverse furrow well-developed, posterior furrow weak and situated sub-basally.

Chelicera (Fig. 3D): Hand with 2 lyrifissures, 5 acuminate setae and movable finger with 1 acuminate subdistal seta. Fixed finger with one subapical tooth, subapical teeth of movable finger not clearly discernible. Galea in female with 4+4 rami situated on the ventral and dorsal face of the distal third of galea. Rallum composed of 1 smooth blade. Serrula exterior with 17 blades, the distal one enlarged, straight and pointed, the basal 2 could not be clearly observed.

Pedipalp (Fig. 3E): All pedipalpal segments granulate, except the movable chelal finger and the distal three-fourth of fixed finger. Vestitural setae short, most of them clavate, some acuminate and terminally bifurcate (Figs 3F–G). Dorsal face of patella with 4 lyrifissures near pedicel and one at distal margin. Prolateral face of trochanter rounded. Fixed chelal finger (Fig. 3H) with 28 separated teeth, which are pointed-triangular, 4–5 of them are greater than others and situated somewhat lateral of the line, accompanied by 3 accessory teeth on prolateral side. The basal 2 teeth of fixed finger are enlarged (Fig. 3I). Retrolateral face of fixed finger with 3 pit-like structures between *ib* and *esb*. Movable finger with 23 slightly separated teeth, which are pointed-triangular in distal half, then turning into rounded and flattened. Dental line on movable finger reaching between *sb* and *st*. Nodus ramosus not discernible. Prolateral face of hand near base of fixed finger with 1 long, straight spine. Hand with strong prolateral constriction at the base of fingers. Fixed finger with 8 trichobothria, movable finger with 4 trichobothria; *ib* almost at the same level as *est*; *it* closer to *ist* than to *et*; *st* closer to *b* than to *t*, and situated at the proximal one-third of the movable finger.

Opisthosoma: Pleural membrane striate with sporadic vestitural setae. Chaetotaxy of tergites I–XI (number of lyrifissures in parentheses): 8 (2): 10 (4): 12 (4): 12 (6): 10 (4): 10 (4): 10 (4): 8 (4): 8 (4): 6 (4): 6. Chaetotaxy of sternites IV–XI (number of lyrifissures in parentheses): 18 (4): 22 (4): 22 (4): 14 (4): 10 (6): 8 (4): 6 (4): 6. Tergite XII with 2 small setae, sternite XII without setae. Vestitural setae clavate on tergites and acuminate on sternites. Surface of tergites granulated, sternites smooth. Female genital region: sternite II with 4+4 microsetae and lyrifissures, sternite III with 2+2 microsetae and 2+2 lyrifissures around genital opening. Cribriform plates could not be clearly observed.

Coxal region: Pedipalpal coxa with 1 long and 1 short setae on anterior face, plus further 16 small setae. Coxae I–IV with setal formula 10: 15: 22: 43.

Legs: Diplo-tarsate and without tactile setae. Surface mostly granulate. Claws simple. Arolia slightly longer than claws.

Dimensions (in mm, ratios in parentheses): Female. Body 2.1; carapace 0.68/74 (0.92 ×). Chelicera 0.21/0.11 (1.91 ×), movable finger 0.13. Pedipalp: trochanter 0.25/0.19 (1.32 ×); femur 0.65/0.20 (3.25 ×); patella 0.50/0.19 (2.63 ×). Chela (with pedicel) 1.03/0.30 (3.43 ×); chela (without pedicel) 0.97; hand (with pedicel) 0.51 (1.70 ×); hand (without pedicel) 0.45 (1.50 ×); fingers 0.57. Leg I. trochanter 0.14/0.12 (1.17 ×); femur 0.28/0.07 (4.00 ×); patella 0.19/0.10 (1.90 ×); tibia 0.21/0.08 (2.63 ×); metatarsus 0.14/0.06 (2.33 ×); tarsus 0.13/0.04 (3.25 ×). Leg IV. trochanter 0.23/0.15 (1.53 ×); femur 0.16/0.09 (1.78 ×); patella 0.38/0.14 (2.71 ×); tibia 0.36/0.09 (4.00 ×); metatarsus 0.21/0.06 (3.50 ×); tarsus 0.18/0.05 (3.60 ×).

Remarks.—*Geogarypus nepalensis* was described by Beier (1974b) from a sub-alpine habitat in western Nepal. Further specimens were reported by Schawaller (1987, 1991) from different regions of Nepal with greater variation in characters, but he did not provide any figures or descriptions of the characters; furthermore, he noted that the identity of these specimens required further clarification.

The new measurement data show minor differences to those in the original description (Beier 1974b). Furthermore, the carapace of the holotype is not entirely brown, as stated in the original description, the chelal hand has a deeper sulcus at the base of fixed finger, and there are 25 teeth on the movable chelal finger, not 10, as stated in the original description (Beier 1974b). However, the most important new character is the presence of enlarged teeth at the base of the movable finger, which is a unique character amongst the known species of the family. *Afrogarypus megamolaris* Neethling & Haddad, 2017 from South Africa also possesses enlarged teeth at the base of both chelal fingers, but these teeth are divided (Neethling & Haddad 2017). The presence of a strong prolateral sulcus on the chelal hand implies that *G. nepalensis* is closely related to the species previously included in the genus *Indogarypus*.

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LITERATURE CITED

- Batuwita, S. & S.P Benjamin. 2014. An annotated checklist and a family key to the pseudoscorpion fauna (Arachnida: Pseudoscorpiones) of Sri Lanka. *Zootaxa* 3814:37–67. Online at <http://dx.doi.org/10.11646/zootaxa.3814.1.2>
- Beier, M. 1930. Die Pseudoscorpione der Sammlung Roewer. *Zoologischer Anzeiger* 91:284–300.
- Beier, M. 1932. Pseudoscorpionidea I. Subord. Chthoniinea et Neobisiinea. *Tierreich* 57:i–xx, 1–258. Online at <https://doi.org/10.1515/9783111435107>
- Beier, M. 1957. Pseudoscorpionida. *Insects of Micronesia* 3:1–64.
- Beier, M. 1965. Die Pseudoscorpioniden Neu-Guineas und der benachbarten Inseln. *Pacific Insects* 7: 749–796.
- Beier, M. 1973. Pseudoscorpionidea von Ceylon. *Entomologica Scandinavica* 4(suppl.):39–55.
- Beier, M. 1974a. Pseudoscorpione aus Südindien des Naturhistorischen Museums in Genf. *Revue suisse de Zoologie* 81:999–1017.
- Beier, M. 1974b. Pseudoscorpione aus Nepal. *Senckenbergiana Biologica* 55:261–280.
- Chamberlin, J.C. 1931. The arachnid order Chelonethida. Stanford University Publications, Biological Sciences 7(1):1–284.
- Gardini, G., L. Galli & M. Zinni. 2017. Redescription of *Geogarypus minor*, type species of the genus *Geogarypus*, and description of a new species from Italy (Pseudoscorpiones: Geogarypidae). *Journal of Arachnology* 45:424–443. Online at <https://doi.org/10.1636/JoA-S-17-019.1>
- Harvey, M.S. 1986. The Australian Geogarypidae, new status, with a review of the generic classification (Arachnida: Pseudoscorpionida). *Australian Journal of Zoology* 34:753–778. Online at <http://dx.doi.org/10.1071/ZO9860753>

- Harvey, M.S. 1992. The phylogeny and classification of the Pseudoscorpionida (Chelicerata: Arachnida). *Invertebrate Taxonomy* 6:1373–1435. Online at <https://doi.org/10.1071/IT9921373>
- Harvey, M.S. 2010. Redescription of *Geogarypus irrugatus* from Sumatra (Pseudoscorpiones: Geogarypidae). *Journal of Arachnology* 38:383–386. Online at <https://doi.org/10.1636/A08-101SC.1>
- Harvey, M.S. 2013. Pseudoscorpions of the World, version 3.0. Western Australian Museum, Perth. Online at <http://museum.wa.gov.au/catalogues-beta/pseudoscorpions> Accessed on 25 February 2018.
- Harvey, M.S., P.B. Ratnaweera, P.V. Udagama & M.R. Wijesinghe. 2012. A new species of the pseudoscorpion genus *Megachernes* (Pseudoscorpiones: Chernetidae) associated with a threatened Sri Lankan rainforest rodent, with a review of host associations of *Megachernes*. *Journal of Natural History* 46:2519–2535. Online at <http://dx.doi.org/10.1080/00222933.2012.707251>
- Judson, M.L.I. 2007. A new and endangered species of the pseudoscorpion genus *Lagynochthonius* from a cave in Vietnam, with notes on chelal morphology and the composition of the Tyrannochthoniini (Arachnida, Chelonethi, Chthoniidae). *Zootaxa* 1627:53–68. Online at <http://dx.doi.org/10.11646/zootaxa.1627.1.4>
- Murthy, V.A. & T.N. Ananthkrishnan. 1977. Indian Chelonethi. *Oriental Insects Monographs* 4:1–210.
- Neethling, J.A. & C.R. Haddad. 2017. A systematic revision of the South African pseudoscorpions of the family Geogarypidae (Arachnida: Pseudoscorpiones). *Indago* 32:1–80. [2016]
- Novák, J. & M.S. Harvey. 2018. New species and records of the pseudoscorpion genus *Geogarypus* (Pseudoscorpiones: Geogarypidae) from India, Sri Lanka and New Guinea. *Zootaxa* 4394:417–427. Online at <https://doi.org/10.11646/zootaxa.4394.3.7>
- Schawaller, W. 1987. Neue Pseudoskorpion-Funde aus dem Nepal-Himalaya, II (Arachnida: Pseudoscorpiones). *Senckenbergiana Biologica* 68:199–221.
- Schawaller, W. 1991. Neue Pseudoskorpion-Funde aus dem Nepal-Himalaya, III (Arachnida: Pseudoscorpiones). *Revue suisse de Zoologie* 98(4):769–798.
- Sivaraman, S. 1980. Pseudoscorpions from South India: a new genus and some new species of the super-family Garypoidea Chamberlin (Pseudoscorpionida: Diplosphyronida). *Oriental Insects* 14:325–343.

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