



## Transfer of two Indian *Idiops* spp. to the genus *Heligmomerus* Simon, 1892 (Araneae: Idiopidae) with redescription of *H. barkudensis* (Gravely, 1921)

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**Abstract:** The genus *Heligmomerus* Simon, 1892 of the trapdoor spider family Idiopidae is represented by a single species, *H. prostans* Simon, 1892 in India. *Idiops biharicus* Gravely, 1915 and *I. barkudensis* Gravely, 1921 were found to be misplaced in the genus *Idiops* and transfer to the genus *Heligmomerus* based on a dorsal saddle-shape depression on tibiae III. The *Heligmomerus barkudensis* (Gravely, 1921) was previously known only from the type locality but during the recent surveys in Orissa it was sampled from several locations on the mainland in Orissa as well as other islands of Chilika Lake. *H. barkudensis* is redescribed and natural history notes are provided based on the new specimen collections from the type locality, Barkuda Island and other new localities in Orissa.

**Keywords:** *Heligmomerus*, *Idiops*, taxonomy, trapdoor spiders.

### INTRODUCTION

The family Idiopidae is represented by 22 genera and 303 species in three subfamilies in the world (Platnick 2010). The members of the subfamily Idiopinae can be identified by having anterior lateral eyes situated close to the clypeal edge, well advanced from the rest of the eye group (Raven 1985). So far, only two genera of the Idiopidae, *Idiops* Perty, 1833 and *Heligmomerus* Simon, 1892 have been reported from India (Siliwal & Molur 2007; Platnick 2010).

The genus *Heligmomerus* is an old world genus and so far eight species are known, mainly from Africa (Dippenaar-Schoeman 2002; Platnick 2010); two species have been reported from South Asia, *H. taprobanicus* Simon, 1892 from Sri Lanka and *H. prostans* Simon, 1892 from India (Siliwal & Molur 2007; Platnick 2010). Both species are known only from the type locality. The description of both the species was based on a single specimen and a few morphological characters were described, hampering comparative work. Since Simon (1892) designated a juvenile spider as the type specimen of *H. taprobanicus*, there is a need for collection of more information on systematics of the genus *Heligmomerus* from this region.

During theraphosid spider surveys in Orissa in March-April 2007, many trapdoor spiders were collected from Dhenkanal, Puri, Sambalpur and Ganjam districts, all having a dorsal depression on tibia III with the anterior lateral eyes situated close to the clypeal edge. On closer examination, they were identified as *Heligmomerus* spp. belonging to the subfamily Idiopinae of the

Abbreviations: ALE - anterior lateral eye; AME - anterior median eye; MOQ - median ocular quadrate; PLE - posterior lateral eye; PME - posterior median eye; PLS - posterior later spinnerets; PMS - posterior median spinnerets; WILD - Wildlife Information Liaison Development Society. Abbreviations used for hair and spines count are d - dorsal; fe - femur; mt - metatarsus; p - prolateral; pa - patella; r - retrolateral; ta - tarsus; ti - tibia; v - ventral.

family Idiopidae (Cambridge 1890; Pocock 1900; Raven 1985). Initially, they were considered unidentified species as many characters did not match the description of *H. prostans*. However on reviewing the literature, it was found that Gravely (1935) had proposed the transfer of *Idiops biharicus* Gravely, 1915 and *I. barkudensis* Gravely, 1921 to the genus *Heligmomerus* based on the presence of a saddle-shaped dorsal depression on tibia III. This note was missed during compilation of various spider checklists and updates (Siliwal et al. 2005; Siliwal & Molur 2007; Platnick 2010). This necessitated comparison of specimens from the mainland with *Idiops barkudensis* from Barkuda Island as the original description of the species lacks information on spermathecae structures (Gravely 1921). One female and a few immature individuals of *Heligmomerus* spp. were collected from Barkuda Island and a few specimens from Sanakuda and Kalijai Islands in the Chilika Lake. Examination of the spermathecal structure revealed that all specimens belong to the same species. The specimens from Barkuda Island were confirmed to be *Idiops barkudensis* as noted by Gravely (1935), they had a saddle-shaped depression dorsally on tibia III. With this we validate the transfer of *Idiops barkudensis* to the genus *Heligmomerus* as previously proposed by Gravely (1935). The other specimens of *Heligmomerus* from the mainland of Orissa and other islands were confirmed to belong to *H. barkudensis* based on the spermathecal structure.

The type specimens of *Idiops biharicus* at the Zoological Survey of India, Kolkata could not be located but based on the description of Gravely (1935), *Idiops biharicus* is transferred to the genus *Heligmomerus*. However, re-examination of the type specimens for all the known species of *Idiops* is recommended to validate their taxonomic position as information about the depression on tibia III is not always provided.

In this paper, we provide additional morphological characters for *H. barkudensis* along with illustrations and natural history notes.

## METHODS

Measurements of body parts except for the eyes were taken with a Mitutoyo™ Vernier Caliper. Eye measurements were done with a calibrated ocular micrometer. All measurements are in mm. Spermathecae were dissected and cleaned in concentrated lactic acid in 100°C water bath for 15-20 minutes. All illustrations were prepared with the help of camera lucida attached to a CETII™ stereomicroscope by MS. Variations in measurements for female specimens are given as a range (Mean ± SD). All specimens are deposited at the Wildlife Information Liaison Development Society, Coimbatore, Tamil Nadu.

## *Heligmomerus* Simon, 1892

*Heligmomerus* Simon, 1892: 90-91; Pocock, 1900:164; Raven, 1985: 138

Type: *Heligmomerus taprobanicus* Simon, 1892 based on an immature individual. Not examined.

Diagnosis: This genus differs from the genus *Idiops* by having a smooth saddle-shaped depression on the basal half of tibia III (Pocock 1900; Raven 1985).

Distribution: Africa, India, Sri Lanka.

## *Heligmomerus barkudensis* (Gravely, 1921) comb. nov.

Figures 1-10, Images 1-9

*Idiops barkudensis* Gravely 1921: 399-401

**Material examined**: 1 female, 18.viii.2007, Chilika Lake, Barkuda Island, Orissa, India, 19°33'15.1"N & 85°08'45.5"E, 113m, coll. S. Behera, M. Siliwal & G. Sahu (WILD-07-ARA-191); 2 females, 2 immature, 7.iv.2007, Kapilas temple campus, Dhenkanal District, 20°40'54.6"N & 85°45'58.4"E, 568m, coll. M. Siliwal and S. Behera, (WILD-07-ARA-171, 172, 173, 174); 1 female, 1 subadult female, 17.iv.2007, near Berbera-Dhuanali Reserve Forest, Balugaon, Puri District, coll. S. Behera, S. Kumar and M. Siliwal (WILD-07-ARA-175, 176); 1 immature, 15.iv.2007, Jacum check post, periphery of Karlapat Wildlife Sanctuary, 263m, 19°44'57.5"N & 83°06'38.7"E, coll. S. Behera, S. Kumar and M. Siliwal (WILD-07-ARA-181); 2 females, 1 immature, Kalijai Island, Chilika Lake, 19°39'55.8"N & 85°12'55.2"E, 106m, coll. S. Behera, M. Siliwal and G. Sahu (WILD-07-ARA-192, 193, 194); 2 females, 6.viii.2007, Kapilas temple campus, Dhenkanal District, 19°44'39.1"N & 83°06'34.8"E, 280m, coll. S. Behera and G. Sahu, (WILD-07-ARA-199, 200); 2 immature, 25.viii.2007, Chipilima, Sambalpur District, 21°21'18.0"N & 83°55'08.4"E, 167m, coll. S. Behera and G. Sahu, (WILD-07-ARA-225,226); 1 immature, 23.viii.2007, Tara Tarini temple grove, Ganjam District, 19°29'23.0"N & 84°54'09.8"E, 24m, coll. S. Behera, M. Siliwal and G. Sahu (WILD-07-ARA-240); 1 immature, 20.viii.2007, Sanakuda Island, Chilika Lake, 19°33'12.4"N & 85°08'01.7"E, 112m, coll. S. Behera, M. Siliwal and G. Sahu (WILD-07-ARA-243).

**Diagnosis**: Female resembles *H. prostans* in having unequal bifid tooth on all leg claws and median eyes smaller than lateral eyes. It differs from *H. prostans* in having 4-17 cuspules on labium (Simon 1892; Pocock 1900).

**Description of female from Barkuda Island**: Total length, 12.72. Carapace 5.68 long, 4.0 wide; chelicerae 2.26 long; abdomen 7.04 long, 4.56 wide. Spinnerets: PMS, 0.72 long, 0.5 wide, 0.26 apart; PLS, 1.0 basal, 0.6



Image 1. *Heligmomerus barkudensis* in life



Image 2. *Heligmomerus barkudensis*, dorsal view. Scale = 1mm

middle, 0.34 distal; midwidths 0.78, 0.6, 0.44 respectively; 1.94 total length.

**Colour in life (Image 1):** Cephalothorax greenish-black with a darker band running on either side of caput emerging from fovea, legs blackish-green and abdomen uniformly grayish-dark brown.

**Colour in alcohol (Image 2):** Cephalothorax, chelicerae, maxillae and labium reddish-brown; sternum and coxae yellowish-brown. Abdomen, dorsally brown with small inconspicuous light spots running dorsally to lateral sides in curved lines; ventrally yellowish-green. Legs above brownish-green, darker towards distal segments (tibiae, metatarsi, tarsi); ventral side of legs and palp yellowish-green.

Carapace greenish-brown, glabrous, no hairs except for few bristles on caput, few lines of depression along interstitial ridges and laterally, weak crenulations on caput, more conspicuous near eye group and anteriolaterally, elsewhere absent or negligible. Caput with distinct mound between fovea and eyes, mound as high as ocular tubercle/ eyes (Fig. 2). Fovea deep, procurved, U-shaped. Bristles: one on clypeal edge, caput with four long ones and three long ones between the anterior eyes.

**Eyes (Fig. 1, Image 3):** Eight in three rows, ALE situated far away from AME on clypeal edge; posterior row procurved. Ocular group 1.2 long, 1.2 wide; MOQ square, 0.6 wide and long. Diameter AME 0.24, PME 0.16, ALE 0.48, PLE 0.34; distance between ALE-AME 0.5, AME-AME 0.05, PLE-PME 0.05, PME-PME 0.6, ALE-PLE 0.8, ALE-ALE adjacent.

**Maxillae (Fig. 3, Image 5):** 1.6 long anteriorly, 2.2 long posteriorly, 1.2 wide; cuspules ca. 70, evenly spread over maxillae length; size varies; anterior lobe distinct.

**Labium (Fig. 3, Image 5):** 1.0 long, 1.26 wide, shallow labiosternal groove present, slightly procurved, four cuspules of varying size in distal 1/3 area.

**Chelicerae (Figs. 4-5, Image 4):** Five teeth on promarginal and three teeth on retromarginal; a depression on retrolateral face where fang touches chelicerae; rastellum conspicuous, raised on a high triangular mound, consist of 19 thick, short spines at vertical face and up, many normal pointed spines present vertically and dorsally on chelicerae; two hairless bands running over length of dorsal surface of chelicerae.

**Sternum (Fig. 3, Image 6):** 3.82 long, 3.18 wide, broader between posterior coxae; yellowish-brown, elevated in center, sloping laterally, covered with long black hair; a row of long bristles present on margins, posterior angle blunt but not separating coxae IV.

**Sigilla (Fig. 3, Image 6):** Posterior sigilla absent; median pair submarginal, 2.18 apart, 0.2 from margin and anterior pair round, marginally.

**Legs:** Posterior pair of legs thicker than anterior pairs; reddish-brown above and light yellowish-green below, except tarsi of palp and metatarsi and tarsi of all legs that are blackish-brown above and brown below; femora III

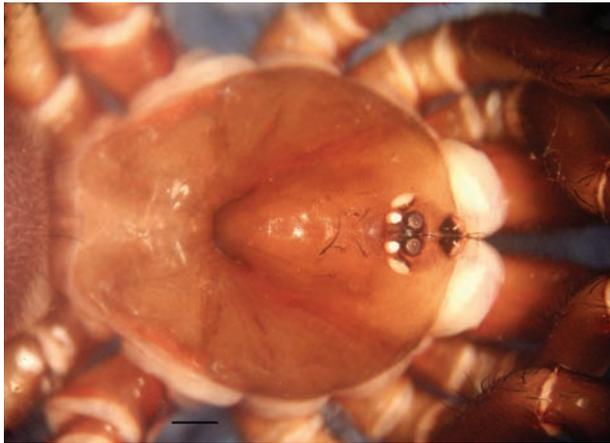


Image 3. Cephalothorax. Scale = 1.0mm

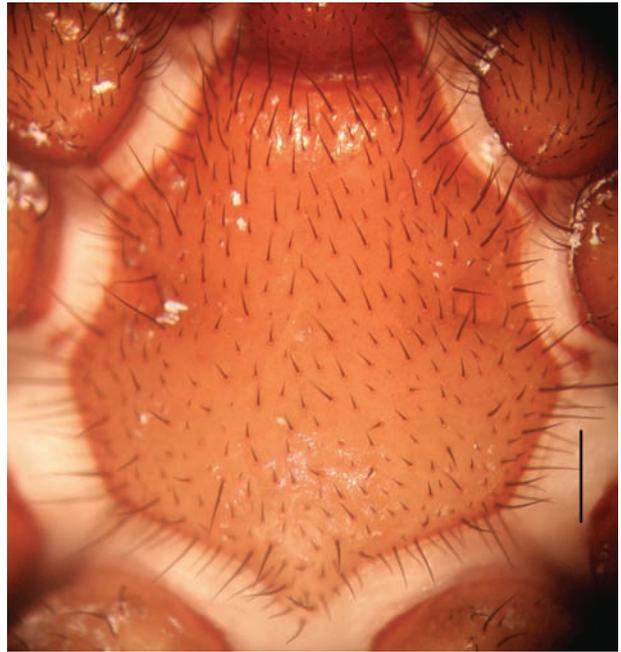


Image 6. Sternum. Scale = 1.0mm



Image 4. Chelicerae rastellum prolateral face. Scale = 1.0mm



Image 7. Tibia III. Scale = 1.0mm

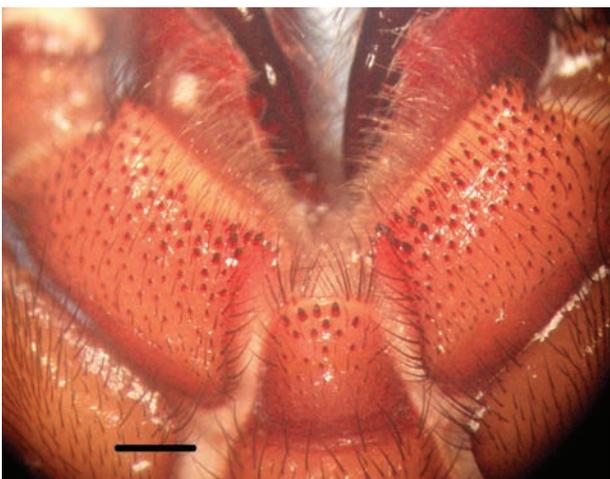


Image 5. Maxillae, labium. Scale = 1.0mm



Image 8. Spinnerets. Scale = 1.0mm

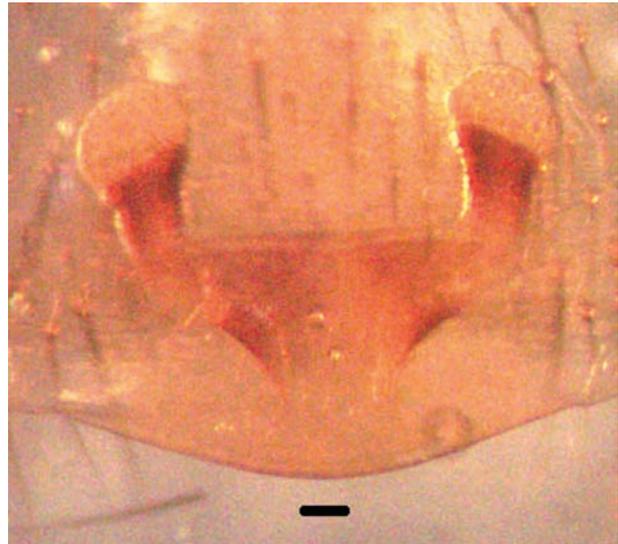


Image 9. Spermethcae. Scale = 0.1mm



Image 10. Trapdoor nest



Image 11. Open trapdoor nest

clearly wider than rest; metatarsi of all legs longer than tarsi. Tibiae III with saddle-shape depression on basal upper part (Fig. 6, Image 7). Tibiae, metatarsi and tarsi of all legs and tibiae and tarsi of palp dorsoventrally flattened. Coxae of legs yellowish-brown ventrally. Legs covered with few scattered hair, bristles and few curved thick thorn-like spines. Two conspicuous hairless bands running over length of femora, patellae and tibiae. Scopulae absent on tarsi of all legs and palp. Leg formula 4123.

**Spines:** Curved thick thorn-like spines, leg I: ti, p=9, r=12; mt, p=14, r=19, ta, p=9, r=8; leg II: ti, p=7 broken, r=5 broken, mt, p=18, r=6; ta p=8, r=4; leg III: pa, p=23, r=4; ti, p=21, r=15; mt, p=14, v=2; ta, v=7; leg IV: pa p=50;

mt, v=5; ta v=151; palp: ti, p=r=16; ta, p=23, v=3, r=19.

**Trichobotheria:** Clavate absent; ta I, 8-10 long filiform in two rows for length; ta II, 10-12 long filiform in two rows for length; ta III, 12-14 long filiform in basal two third; ta IV, 10-12 long filiform in distal three fourth. Mt I, 10-12 long filiform in distal one-fourth; mt II-IV, 5 long filiform in distal one-fourth.

**Leg coxae:** Coxa I covered with long black bristles in distal half, rest with short and long spinules. Coxa II covered with short spinules and long bristles. Coxa III with a central patch without hair or spinules, rest sparsely covered with spinules and long bristles. Coxa IV clearly broader than rest, anterior edge curved, sparsely covered with spinules and long bristles.

**Claws (Figs. 7-8):** All legs with three claws, paired claw with single unequal bifid tooth. Palp, single claw with unequal bifid tooth. Claw tufts absent.

**Abdomen (Fig. 1, Image 1-2):** Grayish brown, dorsum with many faint cream spots radiating in curved

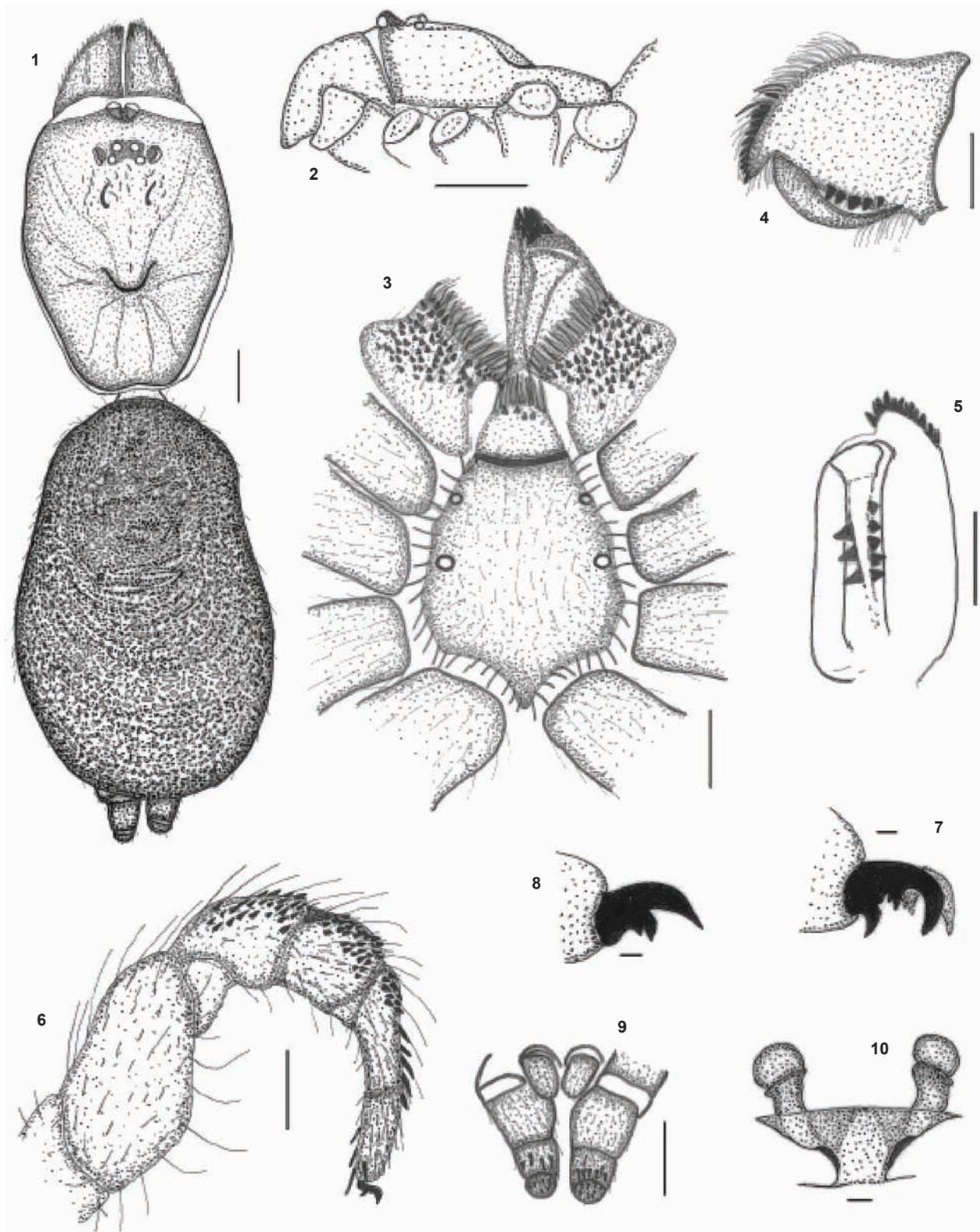


Figure 1-10. *Heligmomerus barkudensis* (Gravely, 1921), female. Scale = 1.0mm.

1 - Cephalothorax and abdomen, dorsal view; 2 - Cephalothorax, lateral view; 3 - Sternum, labium, maxillae and chelicerae; 4 - Chelicerae prolateral view; 5 - Chelicerae, marginal teeth; 6 - Leg III (Femur to Tarsus) retrolateral view; 7 - Claw of leg I (scale = 0.1mm); 8 - Claw of palp (scale = 0.1mm); 9 - Spinnerets; 10 - Spermethcae (scale = 0.1mm).

Table 1. *H. barkudensis*, measurements of legs and palp of specimen from Barkuda Island, WILD-07-ARA-191. Ranges and mean include all mature specimens collected from Orissa.

	Leg I			Leg II			Leg III			Leg IV			Palp		
	191*	Range	Mean±SD	191*	Range	Mean±SD	191*	Range	Mean±SD	191*	Range	Mean±SD	191*	Range	Mean±SD
<b>Femur</b>	3.64	3.64-6.32	4.92 ± 0.97	3.00	3.0-5.0	4.23 ± 0.75	2.86	2.86-4.82	3.85 ± 0.78	3.92	3.92-6.64	5.10 ± 1.20	3.24	3.24-6.04	4.66 ± 0.95
<b>Patella</b>	2.06	2.06-3.78	3.18 ± 0.69	1.92	1.92-3.34	2.79 ± 0.56	1.42	1.42-3.72	2.96 ± 0.83	2.56	2.56-4.36	3.48 ± 0.71	1.80	1.8-3.34	2.68 ± 0.52
<b>Tibia</b>	2.00	2.0-3.96	3.34 ± 0.73	1.84	1.84-3.24	2.63 ± 0.47	1.48	1.48-2.78	2.07 ± 0.42	2.60	2.6-5.32	3.93 ± 0.92	2.04	2.04-3.82	2.97 ± 0.61
<b>Metatarsus</b>	1.66	1.66-3.0	2.22 ± 0.52	1.12	1.12-2.82	2.07 ± 0.63	1.38	1.38-2.96	2.51 ± 0.57	2.18	2.18-4.26	3.39 ± 0.76	-	-	-
<b>Tarsus</b>	1.00	1-1.82	1.62 ± 0.42	1.38	1.38-1.86	1.58 ± 0.20	1.38	1.38-2.32	1.96 ± 0.34	1.48	1.48-3.82	2.46 ± 0.77	1.94	1.94-3.38	2.74 ± 0.52
<b>Total</b>	10.36	10.36-18.88	15.28 ± 3.10	9.26	9.26-16.22	13.30 ± 2.49	8.52	8.52-15.74	13.36 ± 2.60	12.74	12.74-22.86	18.37 ± 4.03	9.02	9.02-16.58	13.05 ± 2.56
<b>Midwidth</b>															
<b>Femur</b>	0.76	0.76-1.4	1.07 ± 0.25	0.74	0.74-1.38	1.06 ± 0.25	1.48	1.48-2.28	1.99 ± 0.29	1.12	1.12-1.62	1.41 ± 0.23	0.72	0.72-1.52	1.11 ± 0.28
<b>Tibia</b>	0.94	0.94-1.88	1.46 ± 0.33	0.94	0.94-1.6	1.30 ± 0.29	1.22	1.22-1.88	1.55 ± 0.29	1.00	1.0-1.88	1.46 ± 0.33	1.10	0.92-1.72	1.23 ± 0.29

191\* = Specimen from Barkuda Island

line; covered with short black hair with few long bristles mid dorsally, cuticle appears leathery and a little rough. Ventrally yellowish-green, uniformly covered with short and long black hairs.

**Spinnerets (Fig. 9, Image 8):** PMS digitiform covered with brown hair; PLS covered with brown hair, apical segment dome-shaped.

**Spermathecae (Fig. 10, Image 9):** A pair of spermathecae, emerging from anterior ends of a triangular plat like sclerotized structure, apical ends of spermathecae rounded like a mushroom placed on a stalk.

**Variations:** Specimen from Barkuda Island is much smaller than the specimens collected from various locations on mainland in Orissa. Total length 12.72-19.34 (17.25±2.55). Carapace 5.68-8.7 (7.37±1.05) long, 4.0-7.68 (6.34±1.34); chelicerae 2.26-4.38 (3.63±0.8) long. Sternum: 3.82-6.0 (4.8±0.87) long, 3.18-5.04 (4.17±0.7) wide. Labium: 1.0-1.52 (1.26±0.2) long, 1.26-2.0 (1.61±0.33) wide, cuspules 4-17 (12.33±4.5). Maxillae: 1.6-2.68 (1.95±0.38) long in front, 2.2-3.92 (3.03±0.57) long in back, 1.2-2.4 (1.86±0.46) wide; cuspules ca. 70-100 (80.0±12.65). Abdomen 7.04-11.8 (9.88±1.69) long, 4.56-8.02(6.74±1.42) wide. Spinnerets: PMS, 0.72-1.26 (1.0±0.18) long, 0.4-0.68 (0.53±0.11) wide, 0.26-0.7(0.45±0.18) apart; PLS, 0.98-1.82 (1.33±0.33) basal, 0.5-0.8 (0.64±0.12) middle, 0.34-0.8 (0.55±0.2) distal; midwidths, 0.78-1.82 (1.4±0.39), 0.6-1.6 (1.07±0.33), 0.6-1.1 (0.82±0.26) respectively; 1.94-2.98 (2.58±0.41) total length.

**Male:** Unknown.

**Distribution:** Orissa, India

#### Natural History

The forest from where these spiders were collected was primarily of dry or moist deciduous type. Specimens were also found in plantations and in degraded secondary scrubs as observed on the islands of Chilika. Spider burrows were mainly found on roadside bunds, either in open slopes or with partially overhanging vegetation. On the islands, burrows were also located at the base of trees or shrubs, or between rocks, and at times on termite mounds.

The spider burrows were simple, tubular, with a thick lining of silk, measuring 35-60 mm in length and 12-15 mm in diameter (Images 10-11). The entrance to the burrow had a single hinged door, which was round and measured 16-18 mm in diameter. The entrance door on the outer side was usually covered with mosses, leaf and or soil particles, while on the inner side it was lined with silk which was slightly thicker towards the center than along the edges.

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