

## A new species of *Ischnothyreus* (Araneae: Oonopidae) from monsoon rainforest of northern Australia

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**Abstract** - The first Australian species of the goblin spider genus *Ischnothyreus* Simon, is described from the Northern Territory, Australia: *Ischnothyreus darwini* sp. nov. This species is recorded from several different localities within monsoonal forest habitats.

### INTRODUCTION

Spiders belonging to the family Oonopidae, commonly known as goblin spiders or dwarf hunting spiders, are incredibly diverse, are known to occur on almost all continents, and have the ability to live in a variety of habitats. They may be found in leaf litter, decaying substratum, under bark and stones, in foliage, and among lower vegetation (Saaristo 2001). Although worldwide in distribution, much of the species diversity can be seen in the tropical areas of the world (Murphy and Murphy 2000).

Particularly abundant throughout the world's tropics and subtropics are species belonging to the genus *Ischnothyreus* Simon, 1891. Currently only 23 species are described to date (Platnick 2009), including species from Asia and islands in the Indian and Pacific Oceans (Saaristo and Harten 2002; Saaristo 2001; Murphy and Murphy 2000; Tong and Li 2008; Simon 1893; Marples 1955; Oi 1958), and the Caribbean region of the New World (Chickering 1968). The Australian fauna has been largely neglected and at present no species of *Ischnothyreus* have been described despite large collections present in Australian museums. *Ischnothyreus*, like other goblin spiders, are haplogyne, usually have six eyes, are considered to be small, free living, nocturnal ground hunters that do not build webs, and generally move using short jerky motions (Ubick 2005; Jocqué and Dippenaar-Schoeman 2006). Species of this genus are more or less scutate and can be characterised by an almost circular eye pattern, heavily sclerotised, tiny male palps with well-separated cymbium and bulbus, and long, stout spines on the first and second legs (Chickering 1968; Saaristo 2001).

During a collecting trip to the Northern Territory,

Australia, several undescribed oonopid species were collected from monsoonal rainforest patches associated with natural springs, creek lines and sandstone outcrops. One of these species belongs to the genus *Ischnothyreus* and is here described formally as *Ischnothyreus darwini* in honour of Charles Darwin in commemoration of the 150<sup>th</sup> anniversary of his famous publication *On the Origin of Species*, and the 200<sup>th</sup> anniversary of his birth in 1809. *Ischnothyreus darwini* represents the first species of *Ischnothyreus* to be described from Australia and forms part of a large-scale revision of the genus associated with a Plantetary Biodiversity Inventory Project that aims to document the worldwide diversity of the spider family Oonopidae (<http://research.amnh.org/oonopidae>).

### MATERIALS AND METHODS

The majority of specimens were collected during an expedition to the Northern Territory to collect oonopid spiders specimens were most collected by hand using a soil sieve (5 mm grid size) and collecting tray to sieve moist rainforest leaf litter. Other museum specimens available were collected using berlese funnels in the late 1970s.

Specimens examined in this study are lodged in the Northern Territory Museum, Darwin (NTM), the Queensland Museum, Brisbane (QM) and the Western Australian Museum, Perth (WAM). Whole specimens were examined using Leica MZ16A and Olympus SZX7 binocular microscopes. Digital images were composed from multiple images taken with a Leica DFC 500 digital camera attached to the Leica MZ16A using the software program AutoMontage Pro version 5.02 (p). Temporary slide mounts were made by placing specimens in a 20% lactic acid/glycerol solution or clove oil at room

temperature for at least 24 hours and mounting them on microscope slides with 10 mm cover slips supported by small sections of 0.25 mm or 0.5 mm diameter nylon fishing line. Preparations were examined with an Olympus BX41 compound microscope and illustrated with the use of a drawing tube. After study specimens were returned to 75% ethanol and dissected parts placed in 12 x 3 mm glass genitalia micovials (BioQuip Products, Inc.).

Measurements were taken at the highest possible magnification using an ocular graticule, and are in millimetres (mm). Leg spines were documented by dividing each leg segment into four aspects: pro lateral (p), retrolateral (r), ventral (v) and dorsal (d) and dividing each aspect into basal, middle, and distal sections separated by a dash: (eg. p1–1–0). The species description of the legs includes only segments and positions where spines were present. Colour was described from freshly collected specimens preserved in 75% ethanol. Descriptions were generated with the aid of the PBI descriptive Goblin Spider database and modified where appropriate (<http://research.amnh.org/oonopidae>).

The following abbreviations were used in the manuscript: ALE, anterior lateral eyes; PLE, posterior lateral eyes; PME, posterior median eyes.

## SYSTEMATICS

### Family Oonopidae Simon, 1890

### Genus *Ischnothyreus* Simon, 1891

*Ischnaspis* Simon, 1891: 562 (preoccupied by *Ischnaspis* Douglas, 1887; Hemiptera).

*Ischnothyreus* Simon, 1893: 298 (replacement name for *Ischnaspis*)

#### Type species

*Ischnaspis peltifer* Simon, 1891, by original designation.

#### Diagnosis

*Ischnothyreus* are small to medium sized (1.4–3.5) scutate oonopids. *Ischnothyreus* species differ from all other oonopid genera by a combination of the following characters (Chickering 1968; Saaristo 2001; Saaristo and Harten 2002): legs I and II with strong spines on femora, tibiae, and metatarsi. Eyes relatively large, mostly touching each other, forming a ring. Male palps heavily sclerotised with clearly separated cymbium and bulb. Bulb usually elongated and gradually tapering to an obtusely bent, relatively stout embolic part. Female genitalia with a median convoluted duct starting from the

epigastric furrow, winding posteriorly to end in a funnel-like atrium. The body and appendages of *Ischnothyreus* species are only moderately chitinized with the exception of the male palps which are usually dark and heavily sclerotised.

### *Ischnothyreus darwini* sp. nov.

Figures 1–11

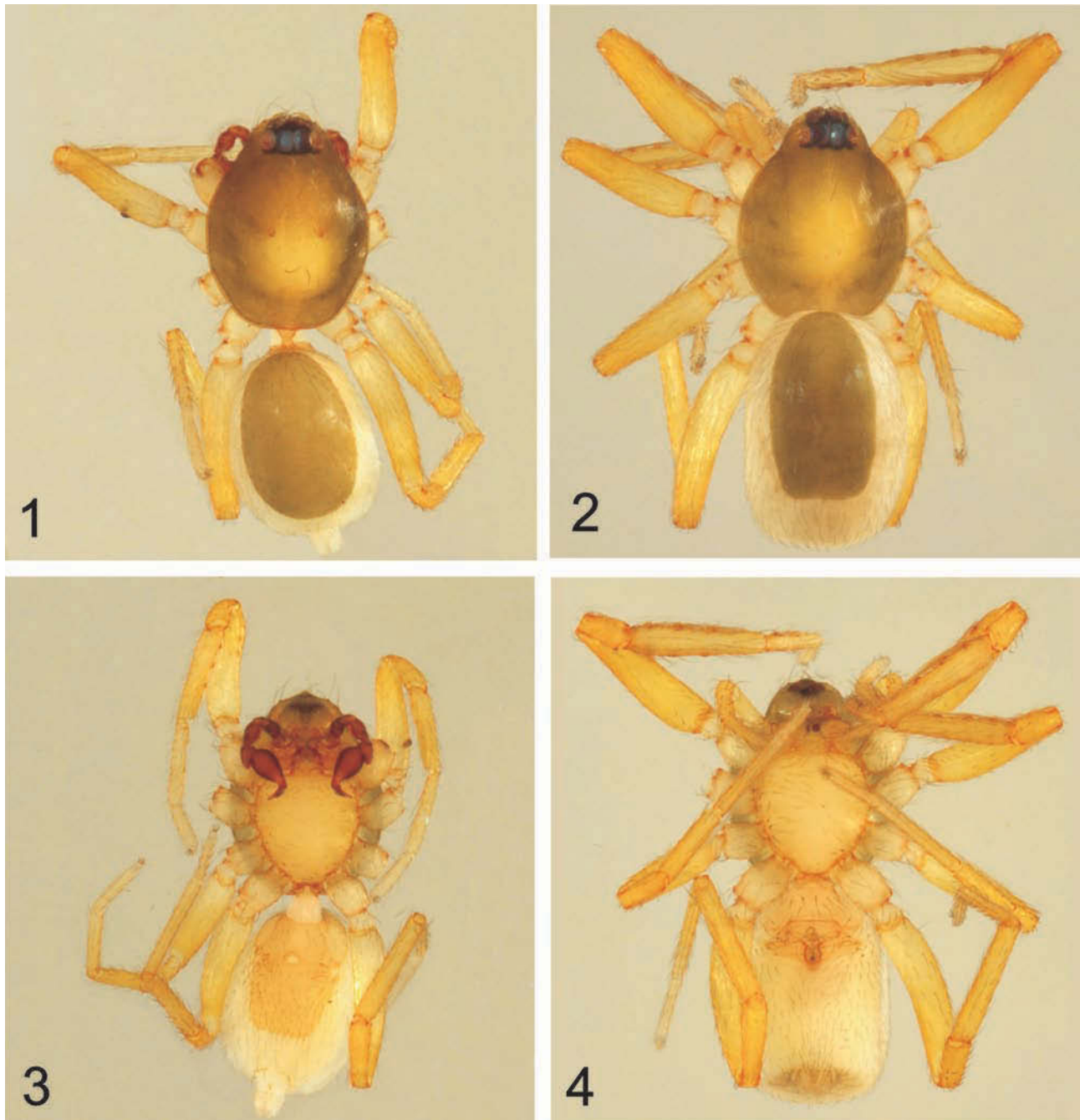
#### Material examined

##### Holotype

**Australia: Northern Territory:** ♂, Mary River National Park, Bryan Creek Monsoon Rainforest Patch, 12°39'40"S, 131°46'55"E, 25 April 2008, in rainforest leaf litter under rotting log, K. Edward and P. Cullen (NTM A004398, PBI-OON 00005889)

##### Paratypes

**Australia: Northern Territory:** allotype ♀, same data as holotype (NTM A004399, PBI-OON 00005892); 2 ♂, 1 ♀, 1 juvenile, same data as holotype (NTM A004400, PBI-OON 0000 5968); 1 ♂, 1 ♀, same data as holotype (WAM T85191, PBI-OON 00025692 & 00025693); 1 ♂, 1 ♀, 4 juveniles, Howard Springs Nature Park, forest walk trail, 12°27'27"S, 131°03'07"E, 9 May 2008, lowland monsoon vine-forest, leaf litter at edge of spring fed pool, K. Edward and P. Cullen (NTM A004401, PBI-OON 00005969); 1 ♂, 1 ♀, Howard Springs Nature Park, forest walk trail, 12°27'27"S, 131°03'07"E, 9 May 2008, lowland monsoon vine-forest, leaf litter at edge of spring fed pool, K. Edward and P. Cullen (WAM T85192, PBI-OON 00025703 & 00025704); 1 ♀, Litchfield National Park, Wangi Falls, 13°09'10"S, 130°41'04"E, 7 May 2008; leaf litter next to spring fed waterfall below *Carpentaria* palms and ferns, K. Edward and P. Cullen (NTM A004402, PBI-OON 00025702); 1 ♂, 3 ♀, 2 juveniles, Umbrawarra Gorge Nature Park, gorge walk, 13°57'58"S, 131°41'38"E, 3 May 2008, spring fed *Melaleuca* creek line, moist humus and leaf litter, K. Edward and P. Cullen (NTM A004403, PBI-OON 00025699 & 00025700); 2 ♀, Kakadu National Park, South Alligator River area, Gu-ngarre monsoon forest walk, 12°40'40"S, 132°28'56"E, 24 April 2008, rainforest leaf litter, K. Edward and P. Cullen (NTM A004404, PBI-OON 00005970); 1 ♀, Kakadu National Park, South Alligator River area, Gu-ngarre monsoon forest walk, 12°40'40"S, 132°28'56"E, 24 April 2008, rainforest leaf litter, K. Edward and P. Cullen (NTM A004405, PBI-OON 00025691); 3 ♂, 1 ♀, 5 juveniles, Kakadu National Park, Mary River Area, Boulder Creek Walk, 13°31'31"S, 132°27'14"E, 1 May 2008, small monsoonal rainforest patch down spring fed gully, moist humus and leaf litter, K. Edward and P. Cullen (NTM A004406, PBI-OON 00005971); 1 ♂, 1 ♀, Kakadu National Park, Mary River Area,



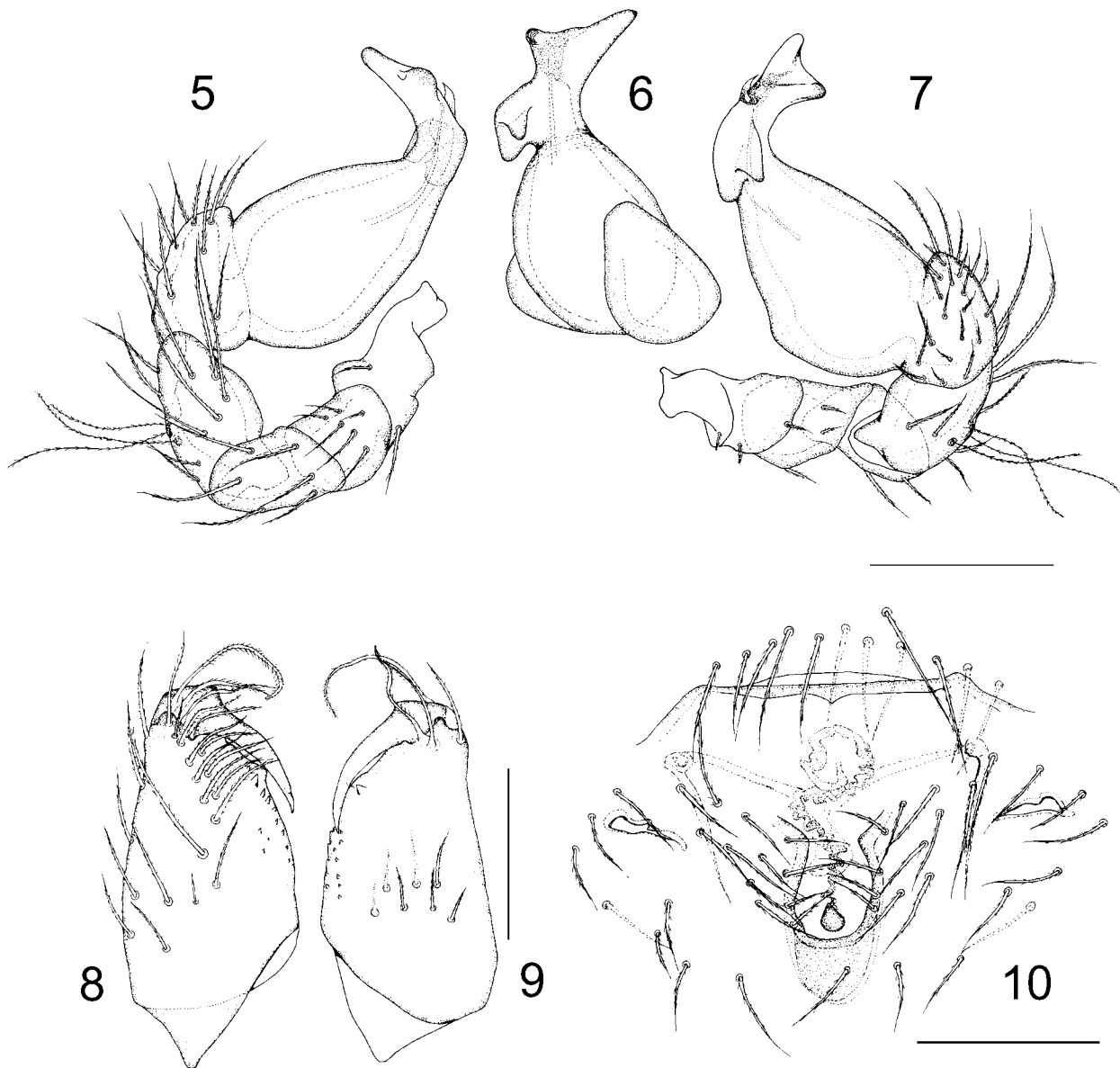
**Figures 1–4** *Ischnothyreus darwini*, sp. nov., holotype male and allotype female from Mary River National Park, Northern Territory: 1, male habitus, dorsal view; 2, female habitus, dorsal view; 3, male habitus, ventral view; 4, female habitus, ventral view.

Boulder Creek Walk, 13°31'31"S, 132°27'14"E, 1 May 2008, small monsoonal rainforest patch down spring fed gully, moist humus and leaf litter, K. Edward and P. Cullen (WAM T85193, PBI-OON 00025695 & 00025696); 2 ♂, 3 ♀, 1 juvenile, Kakadu National Park, Mary River Area, natural spring between Kambolgie and Yirimikmik, 13°30'31"S, 132°25'31"E, 2 May 2008, spring fed monsoonal vegetation along moist gully and flowing creek, thick leaf litter and peaty humus, K. Edward and P. Cullen (NTM A004407, PBI-OON 00025697 &

00025698).

*Other material examined*

**Australia: Northern Territory:** 1 ♂, South Alligator Inn, 12°40'S, 132°30'E, 1 November 1979, rainforest, under logs, R. Raven (QM S16128; PBI-OON 00005885); 1 ♂, 2 ♀, South Alligator Inn, 12°40'S, 132°30'E, 10 November 1979, rainforest, Berlesate trap, R. Raven (QM S16129; PBI-OON 00005884); 1 ♀, Radon Creek, Mt Brockman,



**Figures 5–10** *Ischnothyreus darwini*, sp. nov., male holotype from Mary River National Park, Northern Territory (PBI-OON 00005889): 5, left male palp, prolateral view; 6, left male palpal bulb, dorsal view; 7, left male palp, retrolateral view; 8, left male chelicerae, anterior view; 9, left male chelicerae, posterior view. Female allotype (PBI-OON 00005892): 10, genital area of female, ventral view. Scale lines = 0.1 mm.

12°45'S, 132°53'E, 14 November 1979, dry rainforest, Berlesate trap, R. Raven (QM S16120; PBI-OON 00005992); 1 ♀, Radon Creek, Mt Brockman, 12°45'S, 132°53'E, 14 November 1979, wet rainforest, Berlesate trap, G.B. Monteith (QM S16117; PBI-OON 00005965); 1 ♂, Radon Creek, Mt Brockman, 12°45'S, 132°53'E, 14 November 1979, dry rainforest, Berlesate trap, G.B. Monteith (QM S16098; PBI-OON 00005966); 2 juveniles, Kapalga, North Point, 12°25'S, 132°22'E, 11 November 1979, Berlesate trap, R. Raven (QM S79316; PBI-OON 00005967).

#### Diagnosis

The male of *I. darwini* can easily be recognised by the unique shape of the embolic region of the

papal bulb which divides roughly into 2 lobes (Figures 5–7). Males do not have a distinct knob or modification on the basal part of the fang, but it is slightly flattened. The chelicera have a series of denticles along the fang groove but are otherwise unmodified (Figures 8, 9). The female epigynum region has a dark coloured, thin, convoluted duct that ends posteriorly in an omega-shaped atrium that is darkly sclerotised (Figure 10).

#### Description

##### *Holotype male*

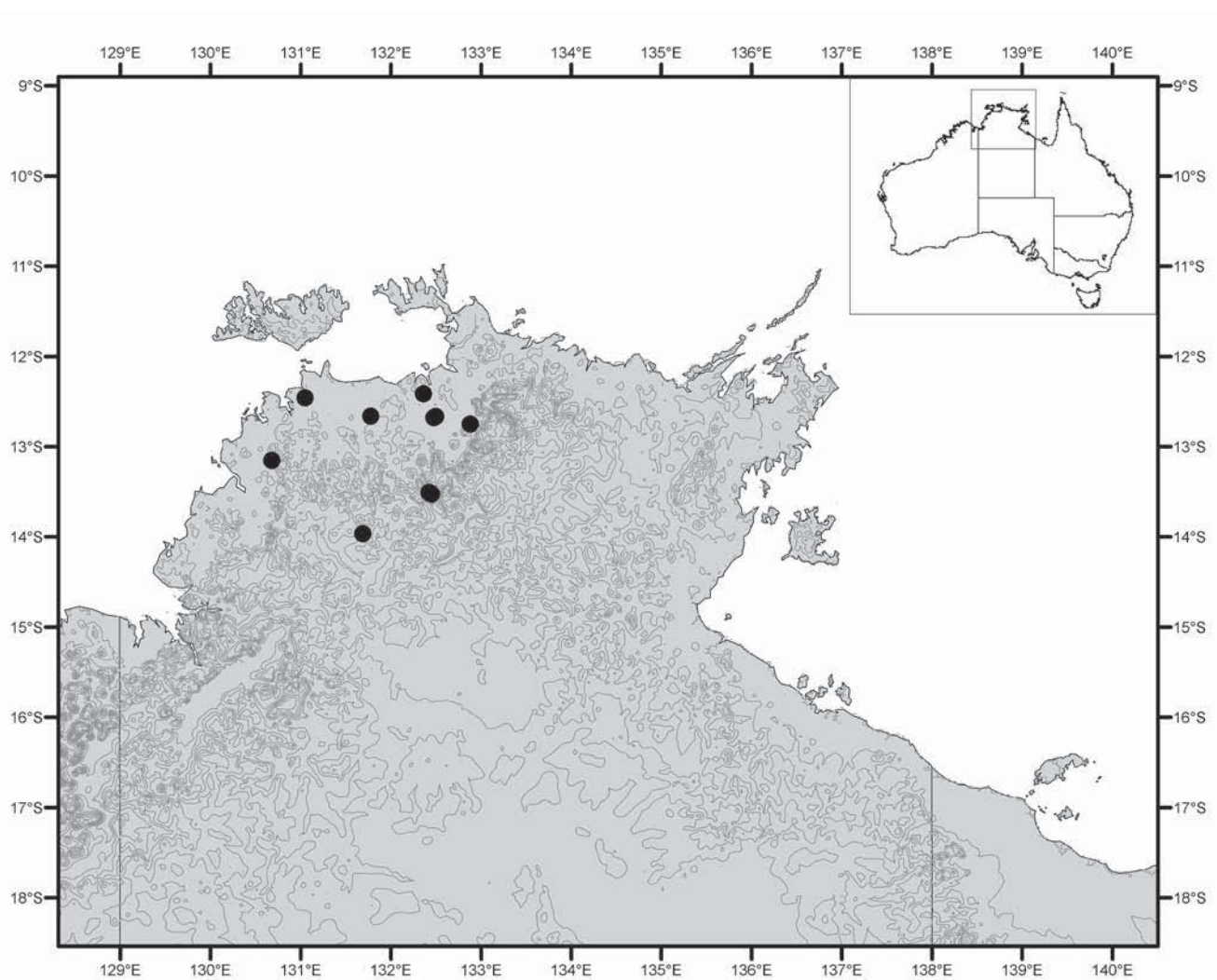
*Cephalothorax*: carapace olive-green, with light brown egg-shaped patches behind eyes, ovoid in

dorsal view, pars cephalica strongly elevated in lateral view, anteriorly narrowed to between 0.5 and 0.75 times its maximum width, anterolateral corners without extension or projections, surface of elevated portion of pars cephalica smooth to finely reticulate, sides strongly reticulate, fovea absent; non-marginal pars cephalica setae present, scattered; non-marginal pars thoracica setae absent; marginal setae needle-like. Clypeus straight in front view, low, ALE separated from edge of carapace by less than their radius. Eyes posterior eye row from above very slightly procurved but mostly straight, ALE largest, PME ovoid, PLE circular; ALE touching, ALE-PLE touching, PLE-PME touching. Sternum as long as wide, yellow, without radial furrows between coxae I-II, II-III, III-IV, posterior margin not extending posteriorly of coxae IV, distance between coxae approximately equal; setae sparse. Chelicerae, endites and labium yellow, directed medially. Chelicerae: base of fang flat and straight but without prominent process or modification; promargin of chelicerae with small

tooth-like projections (denticles). Labium elongated hexagon, not fused to sternum, anterior margin indented at middle. Endites distally not excavated, posteromedian part unmodified, same as sternum in sclerotization.

*Abdomen*: ovoid, rounded posteriorly; dorsum soft portions white. Pedicel tube short, scutum extending far dorsal of pedicel. Dorsal scutum weakly sclerotized, olive-green, covering more than 3/4 of abdomen, more than 1/2 to most of abdomen width, not fused to epigastric scutum, middle surface smooth, sides smooth. Epigastric scutum surrounding pedicel, not protruding, small lateral sclerites absent. Postepigastric scutum yellow, almost rectangular, covering about 2/3 of abdominal length, fused to epigastric scutum, anterior margin unmodified, without posteriorly directed lateral apodemes.

*Legs*: pale orange; patella plus tibia I near as long as carapace; femur IV not thickened, similar size as femora I-III; Leg I spines present, longer than leg segment width, formula: femur p0-0-2; tibia p2-2-



**Figure 11** Distribution of *Ischnothyreus darwini*, sp. nov. (●) in the Northern Territory, Australia.

0, v2-2-0; metatarsus p1-1-0, v1-1-0; leg II spines present, longer than leg segment width, formula: femur p0-0-2; tibia p2-1-1, v2-1-1; metatarsus p1-1-0, v1-1-0; legs III - IV spines absent. Trichobothria dorsally positioned; leg I-IV with 1 basal, 2 distal trichobothria on tibia, 1 distal trichobothria on metatarsus.

*Palp*: proximal segments dark red-brown; embolus dark; trochanter with ventral projection; femur shorter than trochanter; patella about as long as femur; tibia with 3 medial trichobothrium on dorsal surface; cymbium dark red-brown, fused with bulb but with clearly defined seam between, with distal patch of setae; bulb dark red-brown, more than 2 times as long as cymbium, stout. Embolic part of palpal bulb divided into two distinct processes or lobes, each slightly bifurcated with rounded tips. Short, thin sperm duct visible beneath chitin starting posterior to obtusely bent tip. Duct appears to end at darkly coloured region on ventral surface of medial lobe above a small transparent triangular pointed structure.

*Genitalia*: epigastric region with large rounded sperm pore situated at level of anterior spiracles, unmodified.

#### *Allotype female*

As for male except as follows:

*Cephalothorax*: carapace without any pattern, broadly oval in dorsal view, pars cephalica slightly elevated in lateral view, anteriorly narrowed to 0.49 times its maximum width or less, surface of elevated portion of pars cephalica smooth; non-marginal pars cephalica setae dark; marginal setae dark.

*Abdomen*: cylindrical, rounded posteriorly; dorsum soft portions pale. Pedicel scutum not extending far dorsal of pedicel. Dorsal scutum covering 1/2 to 3/4 of abdomen, between 1/4 and 1/2 abdomen width, almost rectangular at posterior end. Epigastric scutum without lateral joints. Postepigastric scutum pale orange, widely hexagonal, covering less than 1/3 of abdominal length, not fused to epigastric scutum. Dorsum setae serrate. Epigastric area frontal setae thickened, serrate. Postepigastric area setae serrate. Dense patch of setae anterior to spinnerets present.

*Legs*: female palp tarsus unmodified. Leg I spines present, longer than leg segment width, formula: femur p0-0-2; tibia p2-2-0, r2-2-0; metatarsus p1-1-0, r1-1-0; leg II spines present, longer than leg segment width, formula: femur p0-0-1; tibia p2-1-0, r2-1-0; metatarsus p1-1-0, r1-1-0; t; legs III -IV spines absent. Trichobothria dorsally positioned.

*Genitalia*: postepigastric scutum widely hexagonal. A thin, darkly coloured convoluted tube visible through cuticle, originating posterior

to middle of epigastric furrow and extending to a darkly coloured tear-drop shaped process in base of omega-shaped atrium or depression. Omega-shaped depression heavily sclerotised posteriorly. Posteriorly directed apodemes present.

#### Dimensions (mm)

*Holotype* ♂ (*allotype* ♀): total length 1.26 (1.34). Carapace length 0.66 (0.64), width 0.50 (0.53), height 0.23 (0.24). Eye group width 0.19 (0.19). Sternum length 0.36 (0.38), width 0.34 (0.37). Opisthosoma length 0.55 (0.76), width 0.38 (0.49). Pedipalp: femur 0.06, patella 0.07, tibia 0.09, tarsus 0.2, total 0.42. Leg I: femur 0.46/0.14 (0.51/0.16), patella 0.19 (0.23), tibia 0.38 (0.48), metatarsus 0.30 (0.36), tarsus 0.20 (0.21), total 1.53 (1.78). Leg II: femur 0.42/0.13 (0.47/0.15), patella 0.19 (0.21), tibia 0.33 (0.40), metatarsus 0.29 (0.35), tarsus 0.20 (0.21), total 1.43 (1.64). Leg III: femur 0.38/0.11 (0.37/0.12), patella 0.16 (0.21), tibia 0.24 (0.30), metatarsus 0.27 (0.30), tarsus 0.20 (0.18), total 1.24 (1.35). Leg IV: femur 0.54/0.13 (0.60/0.13), patella 0.20 (0.27), tibia 0.33 (0.48), metatarsus 0.34 (0.31), tarsus 0.16 (0.26), total 1.56 (1.92).

#### Remarks

*Ischnothyreus darwini* is currently only known from the north-western region of the Northern Territory ranging from Darwin, east to Kakadu National Park, and south to Umbrawarra Gorge Nature Park (Figure 11). However, further collecting in Arnhemland may uncover new populations of this particular species. *Ischnothyreus darwini* is known to occur in areas of monsoonal rainforest, associated with vine thickets, sandstone outcrops, creek lines and natural springs and was collected from moist leaf litter and fallen logs.

#### Etymology

This specific epithet is a patronym in honour of Charles Darwin (1809-1882), on the 150<sup>th</sup> anniversary of his influential publication *On the Origin of Species*, and the 200<sup>th</sup> anniversary of his birth.

#### ACKNOWLEDGEMENTS

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