

***Gradungula brindabella* (Araneae: Gradungulidae), a new species of hypochiloid spider from Eastern Australia**

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**Introduction**

The spider family Gradungulidae at present contains three described species: *Gradungula sorenseni* Forster, 1955, *G. woodwardi* Forster, 1955 and *Progradungula carraiensis* Forster & Gray, 1979. Davies (1969) subsequently described adults of *G. woodwardi*. *G. sorenseni* occurs in New Zealand, while *G. woodwardi* and *P. carraiensis* are found in eastern Australia. A number of undescribed gradungulid species are also known from New Zealand and eastern Australia (Forster & Gray, 1979).

The present paper describes a new species of *Gradungula* from eastern Australia. Specimens of *G. brindabella* sp. nov. were collected in pitfall traps during a study of cursorial arthropods in the Brindabella Range, near Canberra, ACT.

Abbreviations: ACT – Australian Capital Territory; ANIC – Australian National Insect Collection, Division of Entomology, CSIRO, Canberra; J – Juvenile; Ratio – (Carapace ratio) Calculated by dividing carapace length by respective leg length; AM – Anterior median eyes; AL – Anterior lateral eyes; PM – Posterior median eyes; PL – Posterior lateral eyes; MOQ – Median ocular quadrangle.

*Gradungula brindabella* sp. nov. (Figs. 1-7)

**Types**

Holotype ♂, Lees and Blundells Creeks, Brindabella Range, ACT, Sept. 1980, C. Dickman, in pitfall trap, deposited in ANIC (Type register No. 9997). Paratypes, same data as holotype, except as noted: ♀, March 1980, deposited in Australian Museum, Sydney, NSW; ♀, Sept. 1980, ANIC; 2 ♀, Dec. 1980, ANIC; ♀, Sept. 1981, ANIC; ♂, Mt. Gingera, Brindabella Range, ACT, 25 Oct. 1979, D. Rentz and J. Balderson, in guttertrap, ANIC; 3 ♂, Aug. 1980, ANIC; ♂, Oct. 1980, deposited in Australian Museum;

Sydney, NSW; ♂, Nov. 1980, ANIC; ♂, Aug. 1981, ANIC; J ♂, May 1980, ANIC; J ♂, May 1981, ANIC; J, Dec. 1979, ANIC; 3 J, Mar. 1980, ANIC; J, Jan. 1981, ANIC; 2 J, Feb. 1981, ANIC.

**Diagnosis**

*G. brindabella* can be distinguished from *G. sorenseni* and *G. woodwardi* by the following characters:

1. The presence of teeth on the distal part of the embolus of the male palpal organ in *G. brindabella* (Fig. 6).
2. The proportionately longer legs of *G. brindabella*.
3. The characteristic dorsal abdominal pattern of *G. brindabella* (Fig. 1).
4. Both *G. brindabella* and *G. woodwardi* have trichobothria on all metatarsi; such trichobothria are absent on metatarsi 2 and 3 of *G. sorenseni*.
5. The female internal genitalia of *G. brindabella* (Fig. 5) are distinct from those of *G. sorenseni* as described by Forster (1980).

**Holotype male** (Figs. 1, 3, 4, 6)

**Measurements** (mm): Carapace length 6.8; carapace width 5.0; caput width 2.8; abdomen length 6.7; abdomen width 4.5.

	Fem.	Pat.	Tib.	Met.	Tars.	Total	Ratio
Leg I	8.5	3.1	7.5	7.3	2.7	29.1	4.3
Leg II	8.0	3.1	6.5	6.6	2.6	26.8	3.9
Leg III	7.2	2.7	5.3	6.5	2.1	23.8	3.5
Leg IV	8.7	2.7	7.8	8.9	2.6	30.7	4.5
Palp	5.2	1.9	3.4	–	2.8	13.3	1.9

**Colour** (in alcohol): Carapace, coxae, legs and cymbium yellow. Carapace darker around eyes and at anterior end of fovea. Chelicerae and precymbial palpal segments red-brown, legs I and II darkening to orange distally. Labium and maxillae orange-brown. Abdomen pale grey overlaid with dark mottling, which forms a central longitudinal band dorsally with 4-6 chevrons to the rear. Integument pale yellow over lung books and between spinnerets and epigastrium, darker yellow on spinnerets.

**Carapace** (Fig. 1): Slightly arched, with cephalic region not greatly elevated over thoracic region. Longer than wide, widest between coxae II and III. Clypeus sloping. Fovea longitudinal and deep.

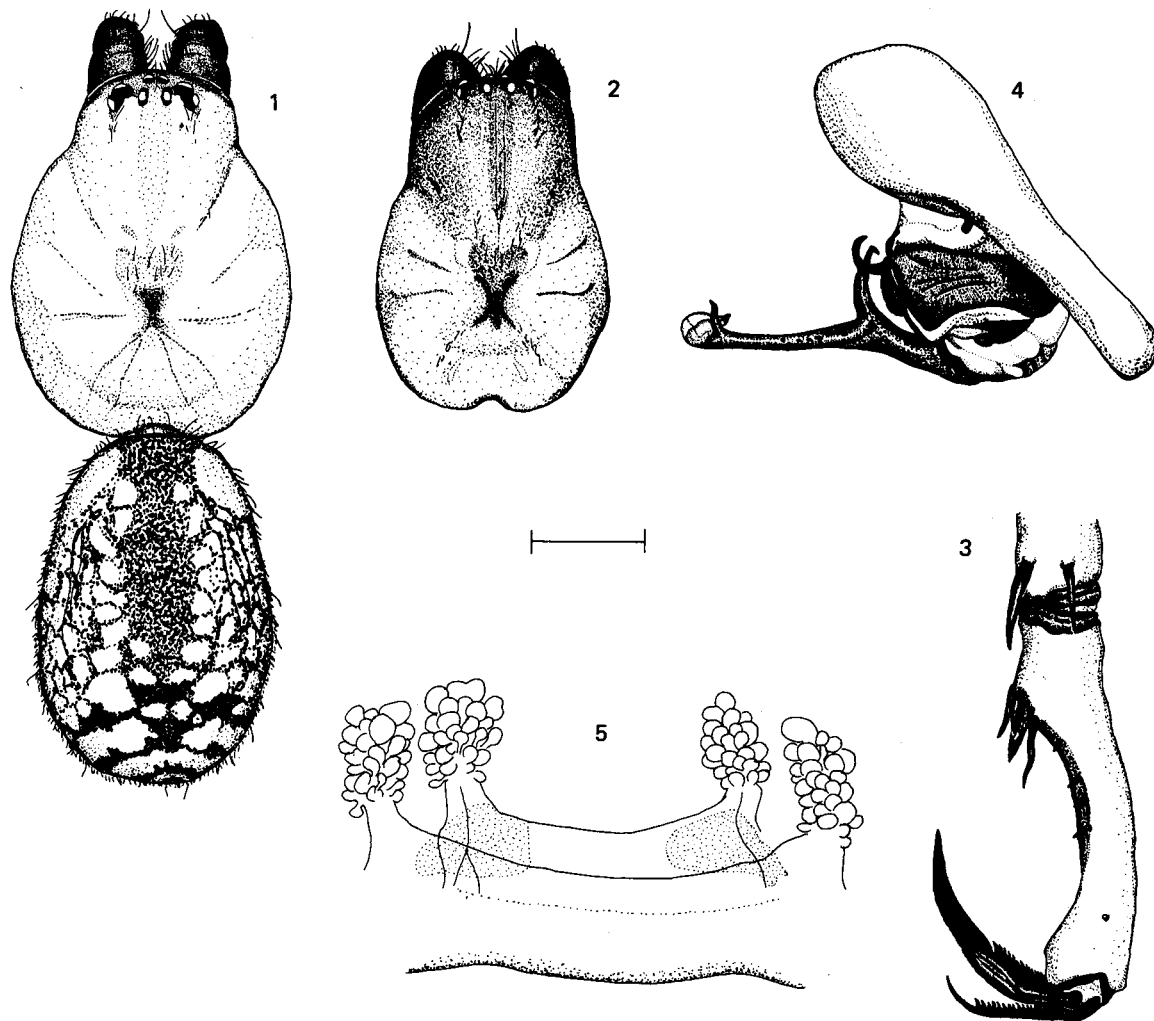
Thoracic region with a covering of short setae. A group of relatively long setae radiate from anterior end of fovea. Other long setae around eyes, on clypeus and pointing inwards along thoracic grooves.

*Eyes*: Eight eyes in two rows. From in front anterior row slightly recurved, posterior row procurved; from above anterior row recurved, posterior row slightly recurved. Lateral eyes slightly elevated. Eye group: caput width = 0.56. Ratio of eyes: AM:AL:PM:PL = 5:10:7:8. Relative distances separating eyes: AM - AM = 3; AM - AL = 7; AM - PM =

6; PM - PM = 7; PM - PL = 11; AL - PL = 2. Clypeus = 18. MOQ dimension ratio (not relative to AM): length 18; anterior width 13; posterior width 20.

*Chelicerae*: Paturon long and strong, slightly divergent, directed downwards, 5 large teeth on promargin only. Stridulatory ridges on retrolateral face. Fang long and curved.

*Maxillae*: Median constriction on retrolateral edge producing anterior and posterior lobes. Anterior end bluntly pointed. Anterior prolateral edge scopulate,



Figs. 1-5: *Gradungula brindabella*, sp. nov. 1 male, dorsal; 2 female, carapace, dorsal; 3 male, left tarsus I, dorsal; 4 male, palpal organ, antero-dorsal view, rotated prolaterally; 5 female, internal genitalia, ventral. Scale line: Figs. 1, 2 = 2.0 mm; Fig. 3 = 0.82 mm; Fig. 4 = 0.76 mm; Fig. 5 = 0.26 mm.

anterior retrolateral edge with coarse bristles. Serrula of 40-50 teeth.

**Labium:** Free. Wider than long in ratio 23:20. Anteriorly indented, with 3 long inward-curving bristles on each side.

**Sternum:** Longer than wide in ratio 30:22. Shield-shaped, with posterior end rounded and not passing between coxae IV. Coxae IV separated by 1/6 their width.

**Legs:** 4123. Trochanters notched. Superior claws of tarsi I and II enlarged and dissimilar. Ratio of proclaws I and II to tarsi I and II = 18:30. Retroclaws I and II to proclaws I and II = 14:20. Proclaws I and II with 18 teeth, retroclaws with 23-24 teeth. Median claws I and II small and hooked. Superior claws of tarsus III with 14 teeth, and tarsus IV with 16 teeth. Median claws with 1 tooth.

Tarsi I and II rotated so that ventral surfaces face semi-prolaterally (Fig. 3). Both of these segments have a distal ventral cavity occupying 7-8/10 of their length. Cavities bordered proximally by a group of 10 (tarsus I) and 8 (tarsus II) short spines. Cavity surface with numerous bristles and 4-5 short spines on pro-lateral border.

**Disposition of spines:** The leg spines of *G. brindabella* are numerous and asymmetrically distributed, as in many mygalomorph spiders. In accordance with the arguments presented by Main (1983) a simplified spine notation is adopted here. In general, spines are longer and thicker on tibiae and metatarsi. Leg I: femur, d.11, r.2, v.2; patella, r.1, p.1; tibia, d.10, r.6, v.9, p.9; metatarsus, d.8, r.7, v.9, p.4. Leg II: femur, d.12, r.2, v.4; patella, r.1, p.1; tibia, d.7, r.7, v.11, p.7; metatarsus, d.10, r.6, v.7, p.10. Leg III: femur, d.10, r.2, v.6; patella, r.1, p.1; tibia, d.5, r.4, v.8, p.2; metatarsus, d.8, r.5, v.8, p.8. Leg IV: femur, d.10, v.7, p.4; patella, r.1, p.1; tibia, d.4, r.6, v.8, p.4; metatarsus, d.8, r.7, v.9, p.6.

**Trichobothria:** One on distal part of metatarsi. Proximal parts of all tibiae with a longitudinal line of small trichobothria on dorso-prolateral face of segment - tibiae I, III and IV with 6, tibia II with 5. Tibiae I and II also with 2 small basal trichobothria on dorso-retrolateral face. Other trichobothria in basal half of segments as follows: tibia I, 9; tibia II, 9; tibia III, 5; tibia IV, 6.

**Palp** (Figs. 4, 6): Cymbium distally elongate. Palpal organ similar in form to those of *G. sorenseni*

and *G. woodwardi*. A slender lateral apophysis branching from proximal part of embolus and curving across bulb towards median apophysis. A small tooth 2/3 along lateral apophysis, with 5-7 teeth between lateral apophysis and apex of embolus. Tip of embolus divided into a slender hooked terminal apophysis, and a short blunt sub-terminal apophysis. Sperm duct opens anterior to terminal apophysis.

**Disposition of spines:** Tibia, r.7, p.4; patella, d.3, p.2; femur, d.6, r.1. A short stridulatory spine on basal prolateral face of femur.

**Trichobothria:** Tibia, d-p: 5 in a line from base to 3/8 distally, 1 median and 1 distal; d-r: 4 in a line from base to 1/4 distally, 3 in a line from median to distal.

**Tarsal organ** (Fig. 7): Tarsal organ is a blunt rod rising centrally from a shallow cup. Receptor nodes in cup and on rod. Relative positions of tarsal organs: Leg I, 0.72; Leg II, 0.70; Leg III, 0.42; Leg IV, 0.37; Palp, 0.84.

**Abdomen:** Basal width of posterior spinnerets: anterior spinnerets = 1:2. Medians smaller. Colulus a small setose mound anterior to and between anterior spinnerets. Spiracles of posterior lung books 0.4 of distance between anterior spinnerets and epigastric furrow. Posterior spiracles separate and not opening at a common furrow.

**Paratype female** (March 1980) (Figs. 2, 5, 7)

The female differs from the male in the following characters.

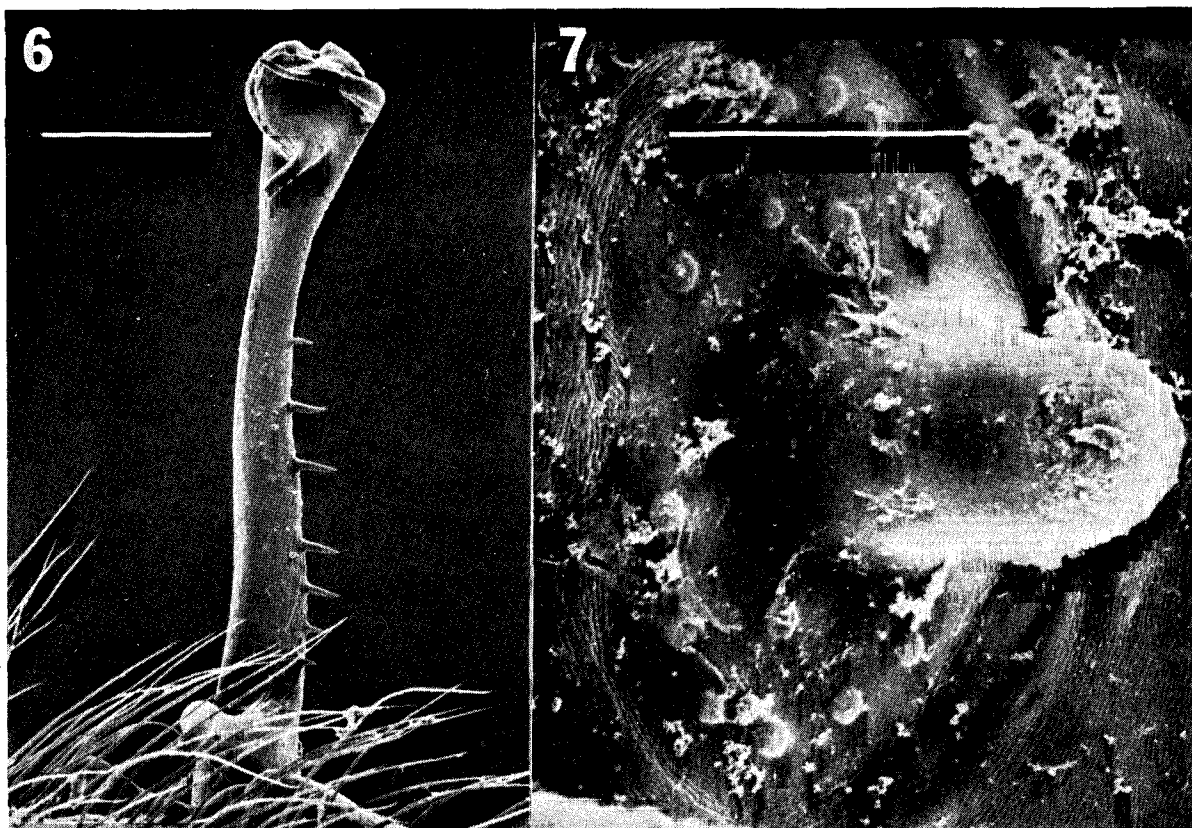
**Measurements** (mm): Carapace length 6.5; carapace width 4.5; caput width 3.2; abdomen length 8.9; abdomen width 6.8.

	Fem.	Pat.	Tib.	Met.	Tars.	Total	Ratio
Leg I	5.9	2.7	4.8	4.4	1.9	19.7	3.0
Leg II	5.5	2.3	4.2	3.9	1.9	17.8	2.7
Leg III	4.7	2.2	3.4	4.2	1.4	15.9	2.4
Leg IV	6.1	2.2	5.1	5.7	1.8	20.9	3.2
Palp	2.8	1.1	2.0	-	2.3	8.2	1.3

**Colour:** Cuticle generally darker than male. **Carapace** (Fig. 2): More arched than male. Cephalic region more elevated, clypeus vertical. **Eyes:** From in front anterior row slightly recurved, posterior row slightly procurved. From above both rows slightly recurved (posterior row more so). Eye ratio: AM:AL:PM:PL = 5:10:8:8. AM - AM = 3; AM - AL = 9;

PM – PM = 8; PM – PL = 12; AL – PL = 3. MOQ dimension ratio: length 20; anterior width 13; posterior width 23. *Chelicerae*: Promargin with 5 large teeth, 8 minute teeth on retromargin. *Legs*: Ventral cavity in tarsi I and II not as deep as in male and with a different spine distribution. Tarsus I with 38 spines in cavity, 17 sequential spines on prolateral edge. Tarsus II with 30 spines in cavity, 14 sequential spines on prolateral edge. Proclaws slightly longer than in male. 18-20 teeth on superior claws of tarsi I and II. Tarsus III superior claws with 9 teeth. Tarsus IV proclaw with 9 teeth, retroclaw with 7. Disposition of spines: Leg I: femur, d.10, p.4; tibia, r.4, v.8, p.4; metatarsus, v.6, p.4. Leg II: femur, d.9, p.5; tibia, r.4, v.8, p.4; metatarsus, r.3, v.6, p.8. Leg III: femur, d.10, p.4; tibia, d.3, r.3, v.8, p.4; metatarsus, d.5, r.4, v.8, p.8. Leg IV: femur, d.11, p.5; tibia, d.3,

r.4, v.3, p.7; metatarsus, d.5, r.5, v.5, p.8. Trichobothria: Pattern similar to male. Only 4 dorso-prolateral trichobothria on proximal tibiae. *Palp*: Disposition of spines: Femur, d.8 (distal), p.1; patella, d.3, p.1; tibia, d.2, r.1, p.4; tarsus, d.2, r.5, v.2, p.5. Trichobothria: Similar to male. Claw with 9 pectinations. *Tarsal organ*: Relative positions on tarsi: Leg I, 0.66; Leg II, 0.60; Leg III, 0.45; Leg IV, 0.30; Palp, 0.84. *Abdomen*: Spiracles of posterior lung books 0.66 of distance between anterior spinnerets and epigastric furrow, and opening at opposite ends of a common transverse groove. A lightly sclerotized mound projects out from the furrow. Internal genitalia (Fig. 5) lightly sclerotized and multireceptaculate in two paired groups, similar to those shown by Forster (1980) for an undescribed Australian *Gradungula* species.



Figs. 6-7: *Gradungula brindabella*, sp. nov., scanning electron micrographs. 6 male, embolus with teeth; 7 female, palpal tarsal organ. Scale lines: Fig. 6 = 0.25 mm; Fig. 7 = 0.002 mm.

**Remarks**

Size range (carapace length in mm): ♂ ( $n=7$ ), 5.5 – 6.8; ♀ ( $n=5$ ), 5.4 – 6.5

The tarsal organ differs from those illustrated for other gradungulids (Forster & Gray, 1979; Forster, 1980). It seems to be part-way between the cup-like form of *Progradungula carraiensis* and an undescribed New Zealand species, and the characteristic spinose form of a number of Australian species (including *Gradungula woodwardi*). Teeth on the distal part of the embolus have not been reported previously in gradungulids.

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