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60

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PO Box 3300, South Brisbane 4101, Australia
Phone 06 7 3840 7555
Fax 06 7 3846 1226
Email qmlib@qm.qld.gov.au
Website www.qm.qld.gov.au

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Typeset at the Queensland Museum

The new endemic Australian genus *Nosterella* and a review of *Nostera* (Araneae: Zodariidae), including eight new species

Barbara C. BAEHR

Queensland Museum, PO Box 3300, South Brisbane, Qld 4101. Email: barbara.baehr@qm.qld.gov.au

Rudy JOCQUÉ

Invertebrate Section, Royal Museum for Central Africa, B-3080 Tervuren, Belgium. Email: jocque@africamuseum.be

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ABSTRACT

A new genus is created to include *Nosterella nadgee* (Jocqué, 1995), and five new species: *Nosterella cavicola*, *Nosterella christineae*, *Nosterella diabolica*, *Nosterella fitzgibboni*, *Nosterella pollardi*. Four species of the ant-eating spider genus *Nostera* Jocqué including three new species are described: *Nostera lynx* Jocqué, 1991, *Nostera geoffgarretti*, *Nostera spinata*, *Nostera trifurcata*. An identification key is provided for both genera. □ *Taxonomy, new genus, new species, ant-eating spiders, Australia.*

Like many other spider families, the Zodariidae has undergone thorough revision in the last decade. A revision of the family at genus level (Jocqué 1991) was followed by many generic revisions (e.g. Baehr & Jocqué 1996, 2001, 2002; Baehr 2004a, 2004b). However, it has become clear that the update of these large families at the level of the genera could not be done in a few efforts due to the lack of sufficient representatives in some of these taxa. For example the Afrotropical genus *Systemoplacis* Simon, 1907, originally described from juveniles, (Jocqué 1991) got synonymized with *Capheris* Simon, 1893. In a later study (Jocqué 2005), the former genus was revalidated because the study of adult specimens clearly showed that the speciose *Systemoplacis*, was sufficiently different to *Capheris*.

Something similar occurred to *Nostera* Jocqué, 1991. The genus was initially monotypic as its type species, *Nostera lynx*, did not fit in any of

the genera that had been described until then. A single species does not provide an idea of the variation within a genus. The definition of the genus had to be expanded substantially (Jocqué 1995) when the second species was added to *Nostera*, *N. nadgee* Jocqué, 1995. The present study based on many more species shows that *N. lynx* and *N. nadgee* do not belong in the same genus. We therefore create a new genus *Nosterella*.

MATERIAL AND METHODS

The spiders examined for this study included unidentified *Nostera* specimens from the collection of the Queensland Museum. The study also included one new species from New South Wales which will be lodged in the Australian Museum, Sydney (AM). The remaining specimens will remain in the Queensland Museum's collection (QM).

One of the eight new species was collected on the Australian Biological Resources Study (ABRS) Bush Blitz expedition to Carnarvon Station Queensland (conducted by the Queensland Museum in October 2014). Latitudes, longitudes and elevation were determined by GPS. Because older locality labels do not often provide accurate geographical coordinates, latitudes and longitudes from Google Earth have been used in cases where they were not mentioned.

Specimens were examined using a Leica MZ16A microscope. Images were produced using a Leica DFC 500 with AutoMontage Pro Version 5.2. Epigynes were placed for a few hours in a Pancreatin solution as described in Álvarez-Padilla & Hormiga (2007). After the enzymatic digestion, the epigynes were transferred to distilled water and then to 70% ethanol.

All measurements are in millimetres.

Abbreviations used in the text are as follows: ALE anterior lateral eyes; ALS anterior lateral spinnerets; AME anterior median eyes; C conductor; CD copulatory duct; CO copulatory opening; E embolus; FD fertilization duct; LI lateral incision at epigynal fold; MA Median apophysis; MS median septum; PLE posterior lateral eyes; PLS posterior lateral spinnerets; PME posterior median eyes; PMS posterior median spinnerets; RTA retrolateral tibial apophysis; S spermatheca; W window of epigynum. QM Queensland Museum; AM Australian Museum.

SYSTEMATICS

Family *Zodariidae* Thorell, 1881

Subfamily *Storeninae* Simon, 1893

Nostera Jocqué, 1991

Nostera lynx Jocqué, 1991: 72, figs 142–150 (type species by original designation *Nostera lynx* Jocqué).

Diagnosis. *Nostera* and *Nosterella* share a strongly procurved posterior eye row (Fig. 2B). Males of *Nostera* differ from those of *Nosterella* by having a convex cymbium on both sides (Figs 5A–D), no posterior extension of the tegulum (Figs 5A–D), a membranous conductor and a broad embolus (Figs 5A–D); females differ by having an

epigynal window anteriorly whereas females of *Nosterella* have a membranous rectangular epigynal window posteriorly (Fig. 7E).

Key to species of the genus *Nostera*

Females unknown for all species except *N. lynx*

1. Male palpal tibia with large retrolateral protuberance (Figs 2G, 5D) . . . *N. geoffgarretti*
– Palpal tibia without large retrolateral protuberance (Figs 1F, 3F, 4F) 2
2. Embolus trifurcate, tibial apophysis directed outwards (Figs 4F, 5C) *N. trifurcata*
– Embolus scoop shaped, tibial apophysis directed distad (Figs 1F, 3F) 3
3. RTA slightly indented, no separate ventral part (Figs 1D, 5A) *N. lynx*
– RTA strongly indented, ventral part a strong spine (Figs 3D–F, 5B) *N. spinata*

Nostera lynx Jocqué, 1991

(Figs 1 A–F, 5A, 17A)

Nostera lynx Jocqué, 1991: 72, figs 142–150.

Material examined. New South Wales: 1 female (QM S4237), Mt Glennie, 16 km E Woodenbong. 28°23'S, 152°46'E, rainforest 910 m, G. Monteith, D. Yeates, 25 Nov 1982, sieved litter; Queensland: 1 male (QM S12120), Bald Mtn, via Emuvalle, 28°43'S, 152°16'E, G. Monteith, 18 Aug–17 Nov 1974, pitfall; 1 male, 1 female (QM S12121), same as previous, 17 Nov–28 Dec 1974, pitfall; 1 female (QM S12190), Beechmont, Rozen's Lookout, 28°08'S, 153°12'E, rainforest 120 m, G. Monteith, 26 Oct–14 Dec 1974, pitfall; 1 female (QM S4395), Binna Burra, 28°12'S, 153°10'E, rainforest 120 m, C. Plowman, 25 Jun 1966, leaf litter; 2 female (QM S4477), same as previous, 27 Mar 1976, leaf litter; 1 female (QM S4476), same as previous, 18 May 1983, leaf litter; 1 female (QM S44569), same as previous, Monteith, Russel, 13 Mar 1997, leaf litter; 1 male (QM S12204), Mt Cainbale, via Lamington NP, 28°14'S, 153°08'E, rainforest 762 m, G. Monteith, 1975–1976, pitfall; 1 female (QM S4437), Lamington Plateau, 28°19'S, 153°04'E, R. Raven, 2 April 1975, pitfall; 1 female (QM S4409), Lamington NP, 28°14'S, 153°15'E, Microphyll fern forest, J. Stanisic, D. Potter, 17 Mar 1981, litter; 1 male (QM S4475), Lamington NP, 28°14'S, 153°15'E, microphyll fern forest, V. Davies, R. Raven, 15 Nov 1977, night coll.; 1 male (QM S81036), Lamington NP, 28°14'S, 153°15'E, site 500D, rainforest, S. Maunsell, 12–21 Oct 2006, pitfall; 1 male (QM S76336), Lamington NP, 28°18'S, 153°12'E, site 700A, rainforest, R. Mendenez, G. Monteith, 21–26 Oct 2006, dung pitfall; 1 male



FIG. 1. *Nostera lynx* Jocqué, 1991, male (QM-S81102): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.

(QM S76369), Lamington NP, 28°14'S, 153°37'E, site 300A, rainforest, R. Mendenez, G. Monteith, 21 – 26 Oct 2006, dung pitfall; 1 male (QM S81102, image, drawing), Lamington NP, 28°15'S, 153°13'E, site 300C, rainforest, K. Staunton, 11 – 21 Oct 2006, pitfall; 2 females (QM S811117), Lamington NP, 28°20'S, 153°12'E, site 700D, rainforest, K. Staunton, 11 – 20 Oct 2006, pitfall; 11 males, 1 female (QM S25737), Mt Tamborine, 27°56'S, 153°12'E, G. Monteith, Dec 1978 – Jan 1979, pitfall; 1 male (QM S12138), Mt Tamborine, Palm Grove, 27°56'S, 153°12'E, G. Monteith, 26 Oct – 14 Dec 1974, pitfall; 1 female (QM S12211), Teviot Falls via Boonah, 28°13'S, 152°28'E, rainforest 820 m, G. Monteith, 22 Feb – 8 May 1976, pitfall; 1 female (QM S12128), The Head via Killarney, 28°23'S, 152°19'E, 760 m, G. Monteith, 18 Aug – 17 Nov 1974, pitfall; 1 male (QM S12125), same as previous; 1 male (QM S12167), same as previous 17 Nov – 27 Dec 1974; 1 female (QM S12194), Toonambar SF, 28°27'S, 152°50'E, rainforest 610 m, G. Monteith, 1974 – 1975; 1 male (QM S12173), Sarabah NP, via Canungra, 28°04'S, 153°07'E, rainforest 120 m, G. Monteith, 13 Aug – 2 Dec 1977.

Distribution. This species is known from rainforest in south-east Queensland and northern New South Wales (Fig. 17A).

Nostera geoffgarretti sp. nov.
(Figs 2 A–G, 5D, 17 A)

Material examined. MALE HOLOTYPE (QM S96349), from Queensland, Mt Elliot, 19°29'S, 146°58'E, A. Graham, 13 Dec 1990; 1 male (QM S18163), same as previous; 1 male (QM S12261), Mt Elliot, 19°29'S, 146°58'E, upper north crest, 1000 m, G. Monteith, G. Thompson, S. Hamlet, 3 – 5 Dec 1996, pitfall.

Etymology. The specific name is a patronym in honour of Dr Geoff Garrett former Chief Scientist of Queensland. Dr Garrett quoted Henry Ford, at the Peter Doherty Awards for Excellence in Science and Science Education in 2011: “*Enthusiasm is the real secret of success. You can do anything if you have enthusiasm. Enthusiasm is the yeast that makes sure hope rises to the stars. Enthusiasm is a sparkling energy to execute your ideas. There is no accomplishment without it.*” These new species would not have been described without the sparkling energy of our enthusiasm for discovering nature.

Diagnosis. The males of *Nostera geoffgarretti* can be separated from males of all other *Nostera* species by the palpal tibia with a large retrobasal protuberance (Figs 2G, 5D).

Description. Male (Holotype, QM S96349). Total length 8.31. Prosoma 4.70 long, 3.12 wide, pl/pw 1.50; sternum 2.02 long, 1.61 wide, sl/sw 1.25;

opisthosoma 3.61 long, 2.33 wide. Eyes, both eye rows strongly procurved, ALE largest; ALE 0.17; AME 0.13; PLE 0.16; PME 0.14; ALE–ALE 0.41; ALE–AME 0.13; AME–AME 0.02; ALE–PLE 0.05; PLE–PME 0.18; PME–PME 0.09. Clypeus 0.50 high. Prosoma orange brown, oval, reticulated, posteriorly straight, sides rebordered, fovea short. Chelicerae orange brown; paturon twice as long as wide with lateral condyles. Endites, labium and sternum orange; opisthosoma dark brown with five pairs of pale spots dorsally enclosing four pale transverse bands; venter pale with two triangular dark brown stripes medially and one longitudinal pair of stripes laterally. Legs light orange brown.

Male palp (Figs 2 E – G, 5D): Cymbium oval, longer than wide, covered with black setae and 7 thick spines in distal third; tegulum oval, conductor membranous originating prolaterally, broad, with hood-like distal part; sperm duct strongly s-shaped; embolus straight, finger-shaped; tibia with large retrobasal protuberance, retrolateral tibial apophysis short, conical.

Female unknown.

Distribution. Known only from Mt Elliot in northern Queensland (Fig. 17A).

Nostera spinata sp. nov.
(Figs 3 A–F, 5B, 17A)

Material examined. MALE HOLOTYPE (QM S96350), from New South Wales, Never Never, Dorrigo, 31°22'S, 152°45'E, G. Monteith, 22 Mar–12 Nov 1980, pitfall; 1 male (QM S4245), same as previous; 1 male (QM S3768), Dorrigo NP, 31°22'S, 152°45'E, rainforest, The Glade, 800 m, G. Monteith, 1980–1981, pitfall; 1 male (QM S4243), Never Never, Dorrigo NP, 31°22'S, 152°45'E, rainforest 700 m, G. Monteith, 12 Dec 1980 –16 Mar 1981, pitfall.

Etymology. The specific name is an adjective referring to the spine-shaped tibial apophysis (Fig. 5B).

Diagnosis. Males of *Nostera spinata* can be separated from males of other *Nostera* species by the pale opisthosoma with dark brown chevrons and a strongly indented retrolateral tibial apophysis with a strong spine at the base (Figs 3D–F, 5B).

Description. Male (Holotype, QM S96350). Total length 4.87. Prosoma 2.66 long, 1.80 wide, pl/

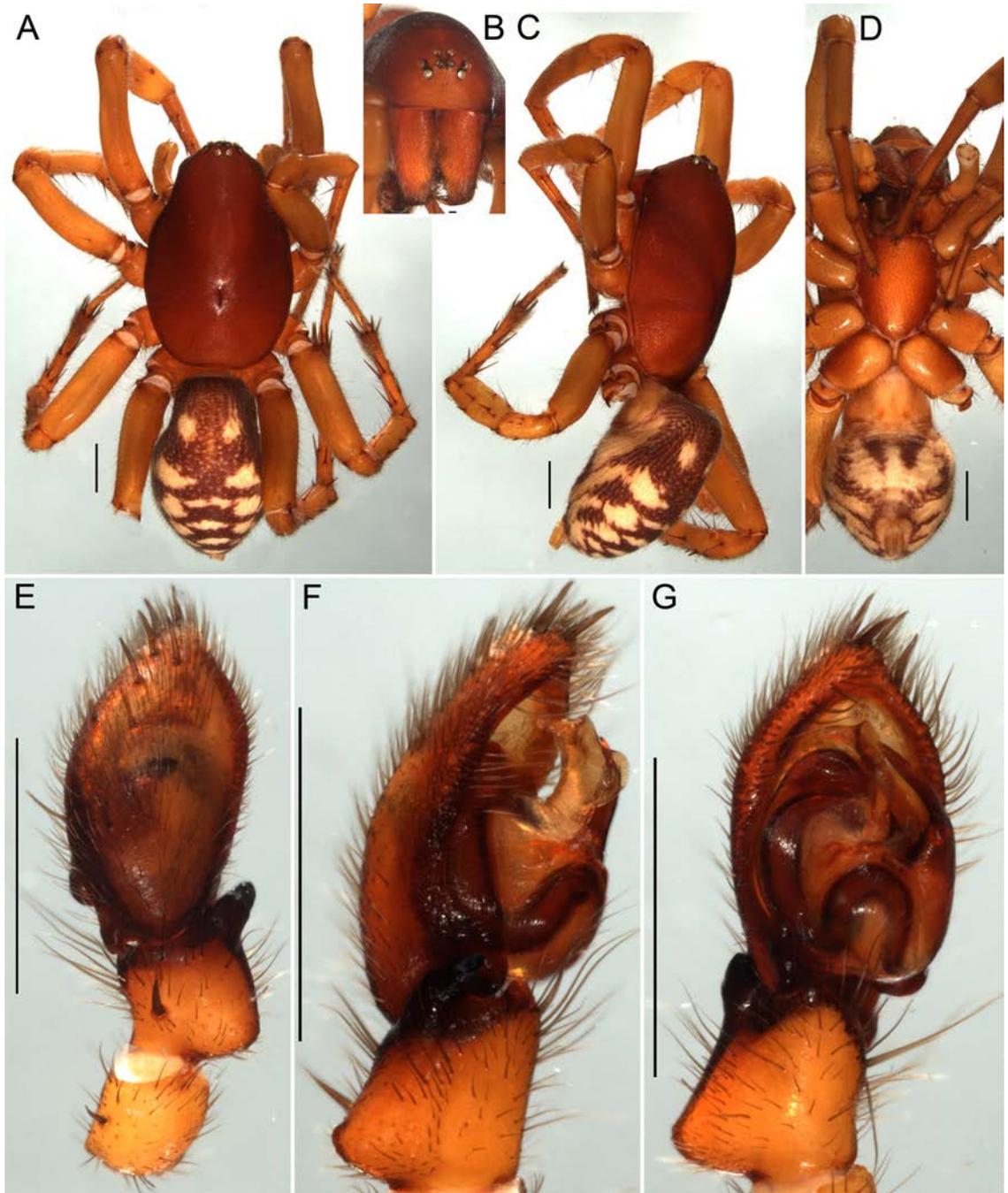


FIG. 2. *Nostera geoffgarretti* sp. nov. male holotype (QM-S96349): **A**, habitus, dorsal view; **B**, chelicerae, frontal view; **C**, habitus, lateral view; **D**, habitus, ventral view; **E**, male palp, dorsal view; **F**, same, retrolateral view; **G**, same, ventral view. Scale bars: 1.0 mm.



FIG. 3. *Nostera spinata* sp. nov. male holotype (QM-S96350): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.

pw 1.48; sternum 1.15 long, 1.04 wide, sl/sw 1.11; opisthosoma 2.21 long, 1.50 wide. Eyes, both eye rows strongly procurved, ALE largest; ALE 0.13; AME 0.11; PLE 0.12; PME 0.12; ALE-ALE 0.20; ALE-AME 0.05; AME-AME 0.03; ALE-PLE 0.03; PLE-PME 0.11; PME-PME 0.02. Clypeus 0.23 high. Prosoma orange, oval, reticulated, posteriorly straight, sides rebordered, fovea short. Chelicerae orange; paturon twice as long as wide with lateral condyles. Endites, labium and sternum orange, tips of endites and labium pale; opisthosoma pale with dark brown chevrons; venter pale with one pair of dark brown spots. Legs pale orange, femur I slightly darker.

Male palp (Figs 3 D – F, 5B): cymbium oval, longer than wide, covered with black setae and 6 thick spines in distal third; tegulum oval, distally with a spatulate membranous conductor a small S-shaped sclerotized MA and a finger shaped embolus; retrolateral tibial apophysis strongly indented with a strong spine at the base.

Female unknown.

Distribution. This species is known only from Dorrigo in New South Wales (Fig. 17A).

***Nostera trifurcata* sp. nov.**
(Figs 4 A–F, 5C, 17A)

Material examined. MALE HOLOTYPE (QM S15740), from Queensland, Lake Broadwater via Dalby, 27°21'S, 151°05'E, open forest, V. Davies, M. Bennie, 17 May – 24 Nov 1985, pitfall.

Etymology. The specific name is an adjective referring to the shape of the embolus.

Diagnosis. Males of *Nostera trifurcata* can be separated from males of other *Nostera* species by the large AME, the outward directed retrolateral tibial apophysis and the broad trifurcate embolus (Figs 4 D – F, 5C).

Description. Male (Holotype, QM S15740). Total length 8.24. Prosoma 4.37 long, 3.77 wide, pl/pw 1.58; sternum 1.69 long, 1.59 wide, sl/sw 1.06; opisthosoma 3.86 long, 2.58 wide. Eyes, both eye rows strongly procurved, AME largest; ALE 0.17; AME 0.23; PLE 0.16; PME 0.15; ALE-ALE 0.45; ALE-AME 0.07; AME-AME 0.03; ALE-PLE 0.03; PLE-PME 0.19; PME-PME 0.11. Clypeus

0.50 high. Prosoma orange brown, margin and sides of cephalic area darker, oval, reticulated, posteriorly straight, sides rebordered, fovea short. Chelicerae orange brown; paturon 2.5 times as long as wide with lateral condyles. Endites, labium and sternum orange, tips of endites and labium pale; opisthosoma dark brown with five pairs of small pale spots dorsally, followed by two thin transverse bands, enclosed by a pair of longitudinal pale bands; venter pale. Legs light orange brown, femora slightly darker.

Male palp (Figs 4D–F, 5C): cymbium oval, longer than wide, covered with black setae and 6 thick spines at distal third; tegulum oval, membranous conductor spatulate, MA sclerotized with sickle-shaped tip embolus broad trifurcate originating distally of tegulum; retrolateral tibial apophysis finger-shaped, directed outwards.

Female unknown.

Distribution. This species is known only from the vicinity of Lake Broadwater in southern Queensland. (Fig. 17A).

***Nosterella* new genus**

Type Species. *Nostera nadgee* Jocqué, 1995.

Etymology. The generic name is an arbitrary combination of letters considered feminine in gender.

Diagnosis. Males of this genus can easily be recognised by the concave retrolateral shape of the cymbium (Figs 16 A–F), the posterior tegular extension reaching at least as far as the centre of the tibia, conductor and sclerotized median apophysis directed disto-retrolaterally, supporting the embolus on the ventral and the dorsal side, respectively (Figs 16 A–F). In *Nostera*, the cymbium is convex on both sides and there is no posterior extension of the tegulum.

Description. Medium size spiders (5.0 – 8.0 mm), with smooth tegument. Prosoma longer than wide (L/W: 1.42 – 1.71), finely reticulated, sides rebordered and slightly undulated; fovea short. Prosoma widest at level of coxae II-III narrowed to about 0.41 – 0.52 x maximum width in males and 0.55 – 0.64 x maximum width in females (cephalic width measured on posterior tangent of PME). Cervical grooves



FIG. 4. *Nostera trifurcata* sp. nov. male holotype (QM-S15740): A, habitus, dorsal view; B, habitus, lateral view; C, habitus, ventral view; D, male palp, dorsal view; E, same, retrolateral view; F, same, ventral view. Scale bars: 1.0 mm.

clearly indicated. Profile highest between PME and fovea.

Colour: prosoma pale to reddish brown; chelicerae, legs, mouthparts and sternum pale to orange brown; opisthosoma dorsum medium to dark brown with fairly complex pale pattern of dots and chevrons, sides with oblique stripes; venter uniform pale or with darker longitudinal lines.

Eyes in two strongly procurved rows: PLE at level of AME. All eyes pale. Clypeus straight, height 1.4 – 2.7 times diameter of ALE. Chilum single, approximately twice as wide as height, with few setae. Chelicerae paturon twice as long as width, conical with weak lateral condyles and many evenly dispersed setae; fangs short. Labium is about 1.5 x longer than width, distally narrowed. Endites roughly triangular, converging, with basolateral extension accommodating palpal trochanters. Sternum shield-shaped, widest in the middle; anterior margin straight, lateral margins slightly sinuous.

Legs: fairly robust. Formula 1423. Spination reduced on legs I and II, well developed on III and IV. Most spines fairly short and slender.

Female palp with prolateral spines; palpal claw with some small teeth at base; without distal patch of chemosensitive setae.

Opisthosoma oval; tracheal spiracle fairly small, somewhat advanced and provided with small rectangular scutum. Both sexes with six spinnerets. ALS large, conical, biarticulate. PLS and PMS provided with 1 and 4 cylindrical gland spigots, respectively. Colulus represented by hairy field.

Male palp (Figs 16A-F): Cymbium with concave retrolateral side and retrolateral flange; a series of five or six distal spines but without distal claw; tegulum with large posterior extension reaching centre of tibia or further towards the base of the segment; subtegulum hidden by tegulum, conductor (C), and sclerotized median apophysis (MA), directed disto-retrolaterally, supporting the embolus on the ventral and the dorsal side, respectively; tibia with a bunch of setae on a slight ventro-lateral protrusion; RTA a parallel-sided, truncated prong.

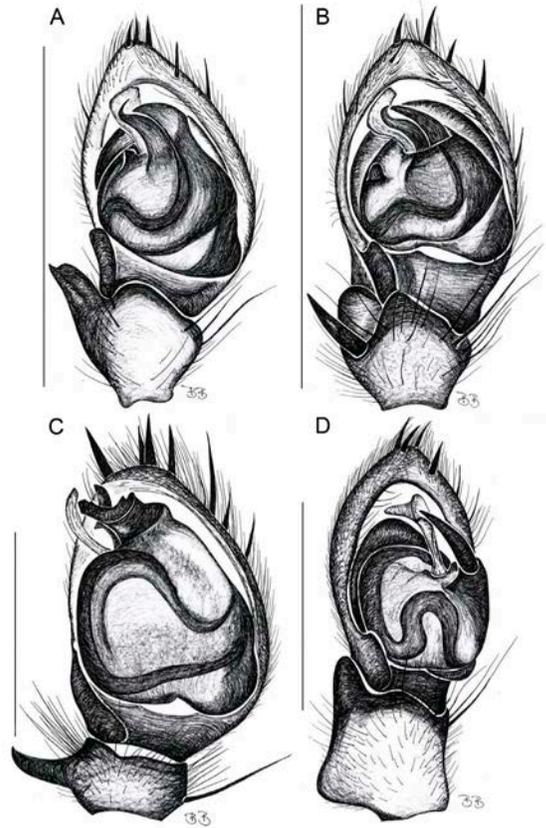


FIG. 5. Male palps for the genus *Nostera*, ventral view. A, *N. lynx*; B, *N. spinata*; C, *N. trifurcata*; D, *N. geoffgarretti*. Scale bars: 1.0 mm.

Epigyne (Fig. 7E, F), much wider than long with short rounded or triangular median septum (MS); with a posterior, membranous, rectangular epigynal window (W); copulatory openings (CO), just beside median septum; copulatory ducts (CD), thick convoluted ending in egg-shaped spermathecae; fertilisation duct (FD), at posterior end of spermatheca.

KEY TO SPECIES OF THE GENUS *NOSTERELLA*

1. Males 2
 - Females (unknown for *N. christineae*, *N. fitzgibboni*) 7
2. All eyes reduced to tiny dots (Figs 8A) *N. cavicola*

- Eyes normal (Fig. 6A) 3
- 3. Palpal conductor (C) slender; MA tip without hood (Fig. 16C, E) 4
- Palpal conductor (C) broad; MA tip with hood (Fig. 16D, F) 5
- 4. Tip of MA straight (Figs 13F, 16E) *N. fitzgibboni*
- Tip of MA curved (Figs 10F, 16C) *N. christineae*
- 5. RTA strongly recurved from ventral view (Figs 14F, 16F) *N. pollardi* (NSW)
- RTA slightly recurved from ventral view (Figs 6F, 11F, 16A, D) 6
- 6. Seminal duct clearly s-curved (Figs 11 F, 16D) *N. diabolica* (NSW)
- Seminal duct with straight retrolateral section (Figs 6F, 16A) *N. nadgee*
- 7. All eyes reduced to tiny dots (Fig. 9A) *N. cavicola*
- Eyes normal (Fig. 7A, D) 8
- 8. Epigastric fold without LI; MS widely triangular (Fig. 12 E) . . *N. diabolica* (NSW)
- Epigastric fold with LI (Figs 7 E, 15 E) . . . 9
- 9. Epigastric fold with deep LI, MS rounded (Fig. 15 E) *N. pollardi* (NSW),
- Epigastric fold with shallow LI, MS triangular (Fig. 7 E) *N. nadgee*

***Nosterella nadgee* (Jocqué, 1995)**
(Figs 6A–F, 7A–F, 16A, 17B)

Nostera nadgee Jocqué, 1995: 154, figs 8b–d.

Material examined. New South Wales: 1 female (AM KS59651), Booti Booti NP, south of Foster - opposite Great Lakes Yacht Club, 32°16'S, 152°31'E, L. Wilkie, 13 Nov 1996, pitfall. Queensland: 1 male (QM S12193), Archookoora SF, via Nanago, 26°43'S, 151°46'E, rainforest 110 m, G. Monteith, 1975 -1976, pitfall; 1 male, 1 female (QM S4282), Braemar State Forest via Kogan, 27°13'S, 150°50'E, open woodland, G. Monteith, 18 Oct 1979, berlesate; 2 males, 2 females (QM S96337), Brisbane, 32 Kingfisher Street, Albany Creek, 27°21'S, 152°58'E, in mud wasp nest, J. Stanisic, Nov 2015; 1 male (QM S12197), Brookfield, 27°30'S, 152°55'E rainforest 110 m, G. Monteith, 1975 -1976, pitfall; 1 male (QM S65594), Buhot Creek, Burbank, 27°35'S, 153°10'E, 50 m, riparian forest, R. Raven, 6 Nov 2003, day hand coll.; 1 male (QM S96347), Cold Ck., 28°28'S, 152°40'E, 122m, G. Monteith, 9 Nov - 31 Dec 1974, pitfall; 1 female (QM S96348), same as previous; 1 male (QM S12100), same as previous; 1 female (QM S57245), Cooran Tableland (barracks), 26°17'S,

152°50'E wet sclerophyll 400 m, G. Thompson, 12 Apr 1995, berlesate; 1 male (QM S96354), Crystal Cascades, carpark, 16°58'S, 145°40'E, R. Raven, P. Lawless, M. Shaw, 23 Jul - 26 Nov 1992, pitfall; 1 male (QM S19993), same as previous; 1 male (QM S12103), Dingo Ck via Traveston, 26°20'S, 151°52'E, rainforest 30 m, G. Monteith, 1974 -1975, pitfall; 1 male (QM S12104), same as previous; 1 male (QM S96353), Enoggera Reserve, 27°27'S, 152°54'E, 150 m, G. Monteith, J. Holt, 21 Dec 1999 - 27 Jan 2000, pitfall; 1 male (QM S12111), Gallangowan, 26°26'S, 152°17'E rainforest 487 m, G. Monteith, 1974 -1975, pitfall; 1 male (QM S4329), Gold Ck Reservoir, Brookfield, 27°30'S, 152°55'E, closed forest, V. Davies, R. Raven, 16 Dec 1980, pitfall; 1 female (QM S4306), same as previous, 18 Mar - 8 Apr 1981, pitfall; 1 male (QM S96338, image), Lake Broadwater via Dalby, 27°21'S, 151°05'E, V. Davies, 16 May - 23 Nov 1985, pitfall; 1 female (QM S96343, image), same as previous except M. Bennie, 3 Jan - 25 Feb 1986; 1 m, 3 females (QM S47401), same as previous; 11 males (QM S47397), same data as previous; 2 males, (QM S47609), same as previous except 24 Nov 1985 - 3 Jan 1986; 1 male, (QM S47610), same as previous; 4 males, 2 females (QM S47400), same as previous; 1 male, (QM S47404), same as previous; 1 female, (QM S47399), same as previous except 25 Feb - 22 Apr 1986; 3 males, 2 females (QM S35287), same as previous except 23 Apr - 11 Jun 1986; 1 male, 1 female (QM S47409), same as previous except 22 Apr - 12 Jun 1986; 1 male, 1 female, (QM S47611), same as previous; 3 females, (QM S47408), same as previous except 26 Jan -19 Feb 1985; 2 females, (QM S47405), same as previous except 19 Feb -26 Mar 1985; 1 female, (QM S47406), same as previous except 26 Mar -17 May 1985; 1 male, (QM S47402), same as previous except 17 May -24 Nov 1985; 2 females (QM S47395), same as previous except 18 Feb-25 Mar 1985; 1 male, (QM S47407), same as previous except 17 May -24 Nov 1985; 2 males, (QM S47612), same as previous; 5 males (QM S12109), Marys Ck SF, via Gympie, 26°15'S, 152°35'E rainforest 183 m, G. Monteith, 1974 -1975, pitfall; 2 males (QM S12110), same as previous; 10 males (QM S96339), Mt Roberts 2 km NNW, 21°21'S, 148°29'E, softwood scrub 360 m, D. Cook & G. Monteith, 23 Oct - 18 Dec 2000, pitfall; 1 male (QM S47403) Stockhaven 3 km SE, 25°48'S, 151°59'E, 450 m, rainforest, G. Monteith & C. Gough, 10 Oct - 19 Dec 1998, intercept trap; 12 males (QM S47515), same as previous; 1 male (QM S12191), Yarraman 3 km E, 26°50'S, 152°03'E, rainforest 518 m, G. Monteith, 1974 -1975, pitfall; 1 male (QM S4259), same as previous.

Distribution. This species is known from New South Wales and Queensland (Fig. 17B).



FIG. 6. *Nosterella nadgee* (Jocqué, 1995) male (QM-S96338): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.

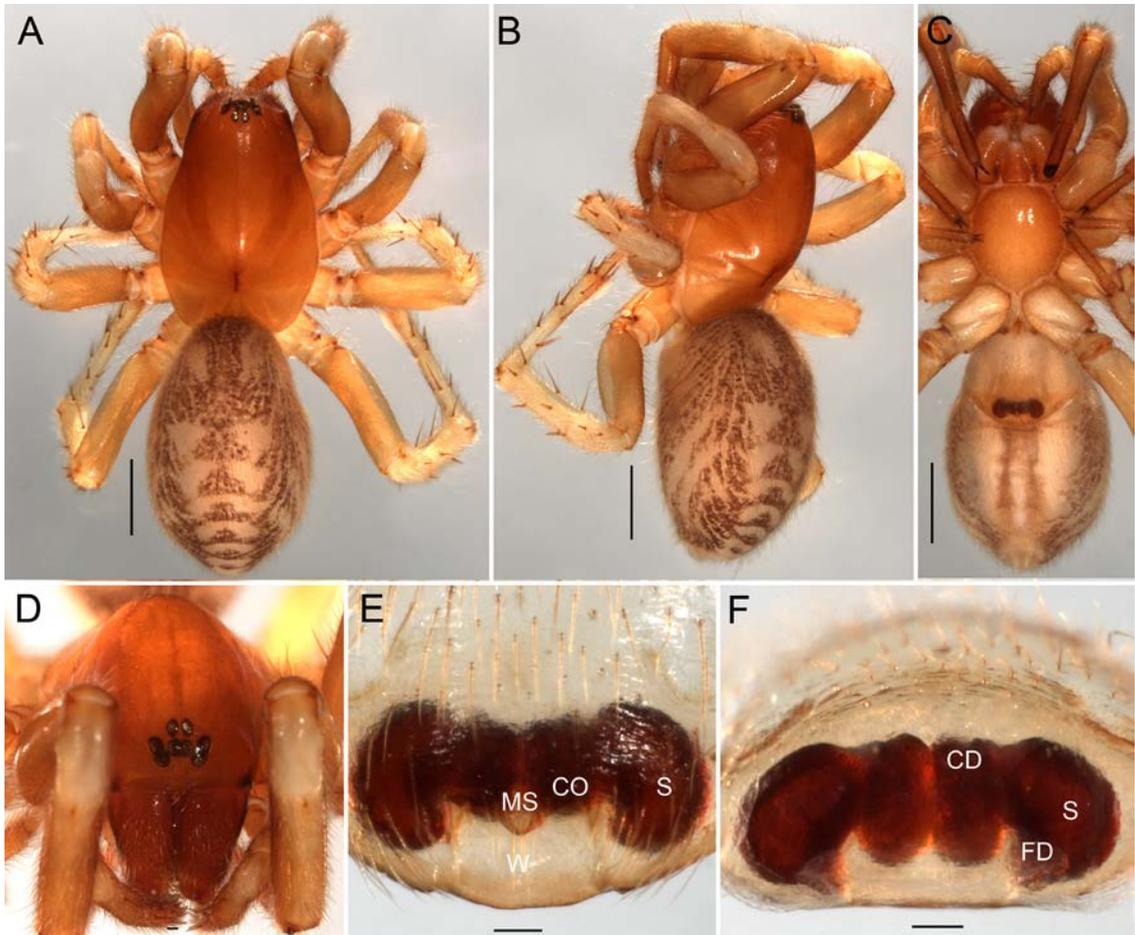


FIG. 7. *Nosterella nadgee* (Jocqué, 1995) female (QM-S96343): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, prosoma, anterior view; **E**, epigyne, ventral view; **F**, epigyne, dorsal view. CD copulatory duct; CO copulatory opening; FD fertilization duct; MS, median septum; S spermatheca; W window of epigynum. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

Nosterella cavicola sp. nov.
(Figs 8 A–F, 9 A–F, 16B, 17C)

Material examined. MALE HOLOTYPE (QM S96355), from Queensland, Mt Surprise, Bayliss Cave, Stn 6, 18°25'S, 144°28'E, F.G. Howarth, S. Robinson, 13 Jun 1986, hand coll.; FEMALE ALLOTYPE (QM S25706), same as previous.

Remarks. Female in burrow with elevated turret and small opening, male on mud at burrow opening.

Etymology. The specific name is an adjective referring to the habitat of the species.

Diagnosis. *Nosterella cavicola* can be separated from all other species by the pale opisthosoma without any pattern except a darker lanceolate dorsal stripe and the strongly reduced eyes (Figs 8A, 9A, D).

Description. Male (Holotype, QM S96355). Total length 7.91. Prosoma 4.21 long, 2.59 wide, pl/pw 1.62; sternum 1.61 long, 1.45 wide, sl/sw 1.11; opisthosoma 3.7 long, 2.36 wide. Eyes strongly reduced, tiny, both eye rows strongly procurved, ALE largest; ALE 0.08; AME 0.08; PLE 0.06; PME 0.06; ALE-ALE 0.36; ALE-AME 0.11;

AME-AME 0.07; ALE-PLE 0.09; PLE-PME 0.25; PME-PME 0.06. Clypeus 0.48 high. Prosoma dark brown, long oval, slightly reticulated, posteriorly straight, sides rebordered and slightly undulated, fovea short. Chelicerae dark brown; paturon twice as long as wide with weak lateral condyles. Endites, labium and sternum brown, tips of endites and labium pale; opisthosoma pale with darker lanceolate stripe; venter pale anterior to epigastric fold darker. Legs medium brown, coxae, trochantera and femora darker.

Male palp (Figs 8 D - F, 16B): cymbium dorsally covered with black setae and 10 thick spines in distal third; C slender straight, distally deeply excavated, MA narrow, straight, tip with flat hood; tibia with 2 strong, long macrosetae, RTA straight, distally incised.

Female allotype (QM S25706). Total length 8.00. Prosoma 4.04 long, 2.36 wide, pl/pw 1.71; sternum 1.50 long, 1.33 wide, sl/sw 1.13; opisthosoma 3.96 long, 2.54 wide. Colour as in male, except no lanceolate stripe dorsally. Eyes strongly reduced even more than in male, only front row visible, strongly procurved; ALE 0.07; AME 0.07; ALE-ALE 0.36; ALE-AME 0.13; AME-AME 0.04. Clypeus 0.50 high. Epigyne (Figs 9 E, F): Epigastric fold sinuous, with strong lateral incision, MS rounded.

Distribution. This nearly blind species is known only from Bayliss Cave in north-east Queensland (Fig. 17C).

***Nosterella christineae* sp. nov.**
(Figs 10 A-F, 16C, 17C)

Material examined. MALE HOLOTYPE (QM S55170), from Queensland, Rochedale State Forest, 27°37'S, 153°09'E, V. Davies, R. Raven, 25 - 28 May 1980.

Etymology: The specific name is a patronym in honour of Christine Robertson, the Senior Media Officer of the Queensland Museum, who loves spiders and always finds ways to create public attention for our newly discovered spider species.

Diagnosis. *Nosterella christineae* can be separated from the other *Nosterella* species by the presence of two prolateral macrosetae on the palpal tibia, and the tapered and curved MA (Figs 10 D - F).

Description. Male (Holotype, QM S55170). Total length 5.66. Prosoma 3.25 long, 2.22 wide, pl/pw 1.46; sternum 1.54 long, 1.28 wide, sl/sw 1.20; opisthosoma 2.41 long, 1.63 wide. Eyes; both eye rows strongly procurved, AME largest; ALE 0.15; AME 0.16; PLE 0.15; PME 0.13; ALE-ALE 0.24; ALE-AME 0.04; AME-AME 0.03; ALE-PLE 0.02; PLE-PME 0.13; PME-PME 0.05. Clypeus 0.24 high. Prosoma entirely yellow orange, oval, reticulated, posteriorly straight, sides rebordered and slightly undulating, fovea short. Chelicerae light brown; paturon twice as long as wide with weak lateral condyles. Endites, labium and sternum yellow orange, tips of endites and labium white; opisthosoma pale brown with lighter lanceolate stripe followed by one pair of pale spots and four transverse pale bands; venter pale. Legs yellow, femora slightly darker.

Male palp (Figs 10 D - F, 16C): cymbium kidney-shaped, longer than wide, covered with black setae and 7 thick spines in distal third; C slender, straight, distally slightly excavated, MA slender, straight, tip without hood; sperm duct slightly s-shaped, distally hidden behind C and MA; palpal tibia with two prolateral macrosetae, RTA broad straight (dorsal view), ventrally excavated.

Female unknown.

Distribution. Known only from the Brisbane area in southern Queensland (Fig. 17C).

***Nosterella diabolica* sp. nov.**
(Figs 11 A-F, 12 A-F, 16D, 17C)

Material examined. MALE HOLOTYPE (AM KS99595), from New South Wales, 4 km NE of Mt Wog Wog (Mountain), 17 km SE Bombala, 37° 04' 30" S, 149° 28' 00" E, 37°04'S, 149°28'E, C.R. Margules, Apr 1994, pitfall; FEMALE ALLOTYPE (AM KS59656), Wyrabalong NP, 33°16'48"S, 151°32'45"E, L. Wilkie, 15 Apr 1998, pitfall; 3 males same as previous; 1male (AM KS59668), Booti Booti NP, south of Foster - opposite Great Lakes Yacht Club, 32° 16' 16" S, 152° 31' 43" E, L. Wilkie, 15 May 1998, pitfall; 2 males (AM KS59664), Myall Lakes NP, 3.8km south of Mungo Brush campsite, 32° 34' S, 152° 17' E, L. Wilkie, 24 May 1998, pitfall; 2 males (AM KS59673), same as previous; 1 male (AM KS99660), same as holotype but May 1991; 1 female (AM KS99606), same as holotype; 1 male (AM KS99599), same as holotype but May 1998.

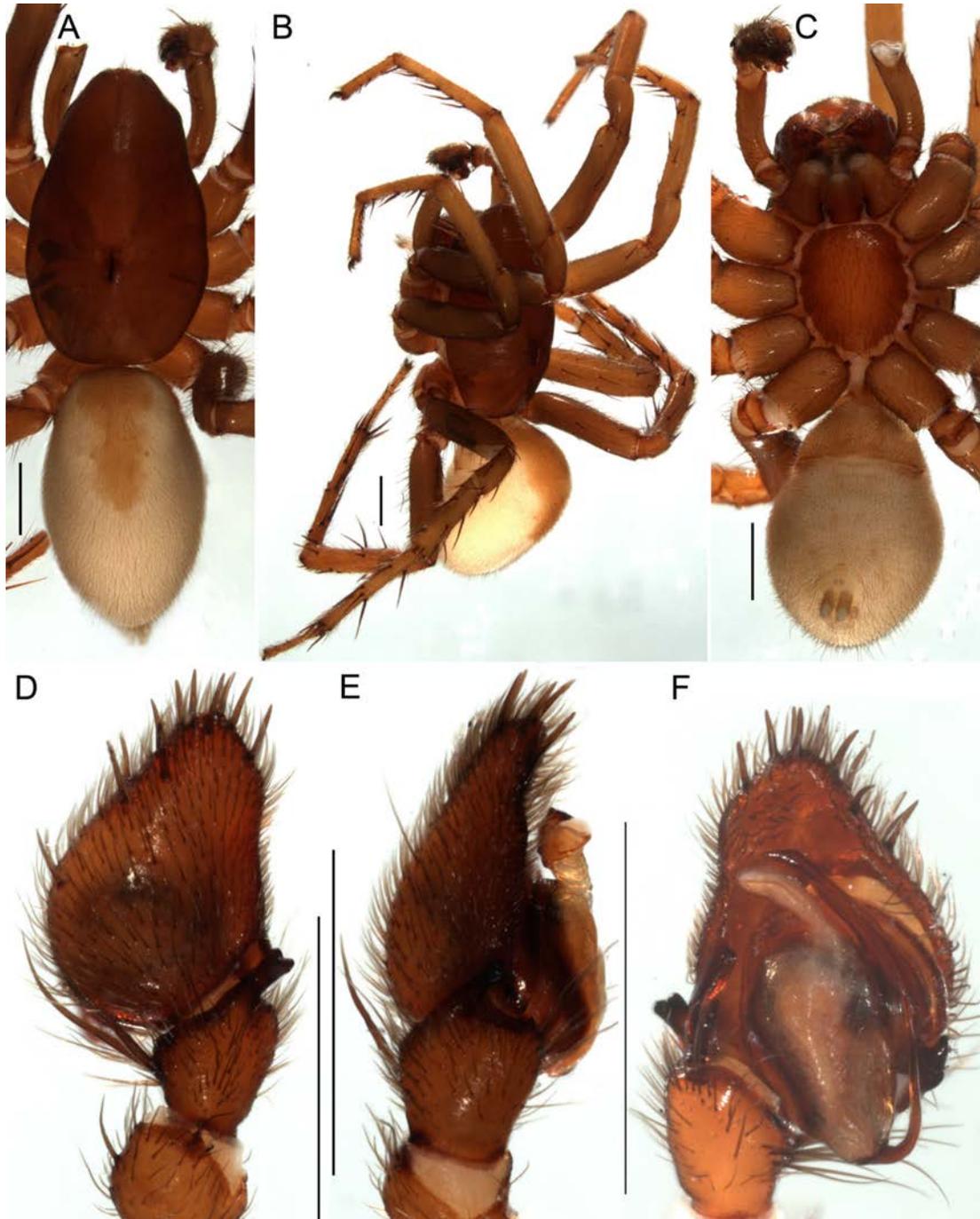


FIG. 8. *Nosterella cavicola* sp. nov. male holotype (QM-S96355): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.

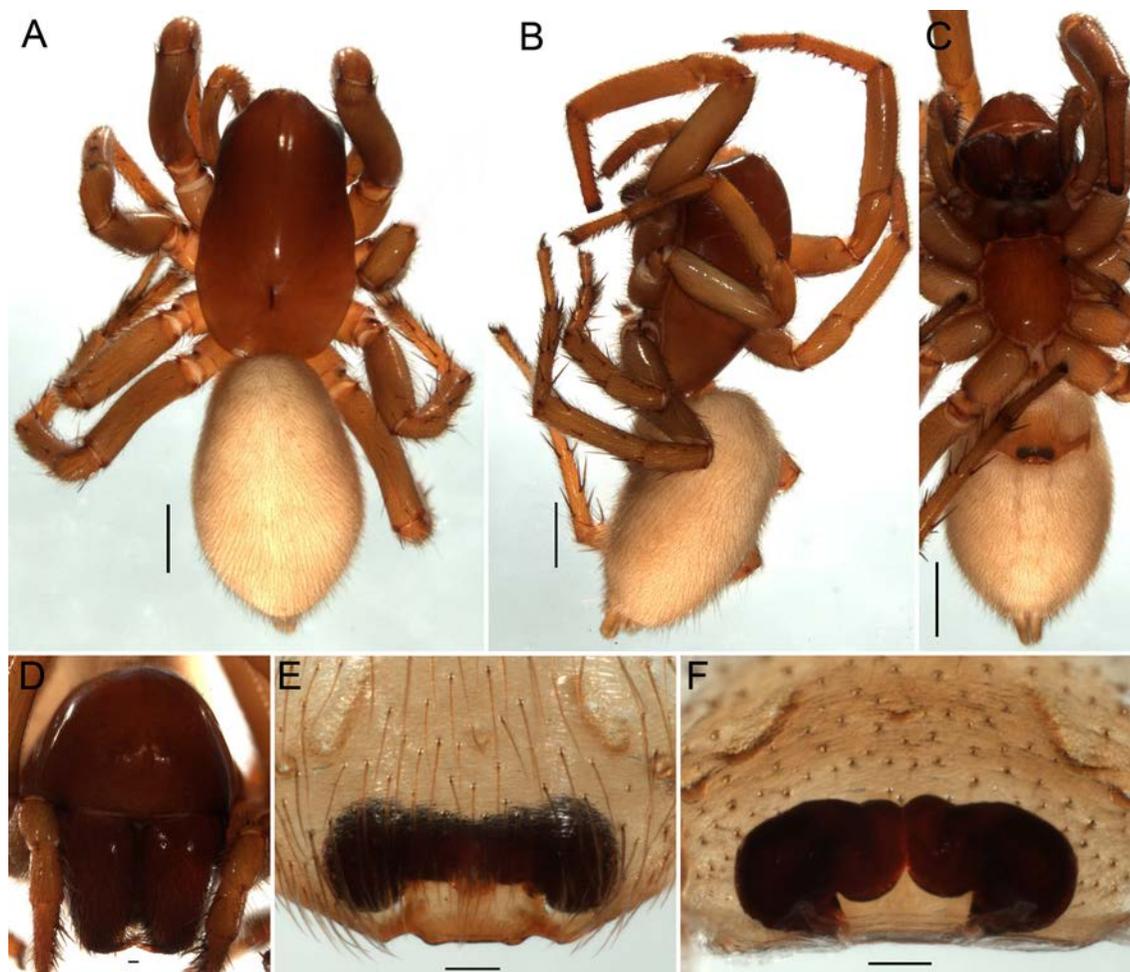


FIG. 9. *Nosterella cavicola* sp. nov. female allotype (QM-S25706): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, prosoma, anterior view; **E**, epigyne, ventral view; **F**, epigyne, dorsal view. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

Etymology: The specific name is an adjective referring to the dark colour of the species.

Diagnosis. Males of *Nosterella diabolica* can be separated from males of other *Nosterella* species, by the dark brown femora contrasting with the orange coxae and trochanters; the seminal duct in the tegulum is strongly S-curved (Fig. 11 F).

Description. Male (Holotype, AM-KS99595). Total length 5.71. Prosoma 3.06 long, 2.07 wide, pl/pw 1.48; sternum 1.32 long, 1.05 wide, sl/sw 1.25; opisthosoma 2.65 long, 1.74 wide. Eyes, both eye rows strongly procurved, ALE and PLE largest; ALE 0.14; AME 0.12; PLE 0.14; PME

0.11; ALE-ALE 0.21; ALE-AME 0.05; AME-AME 0.02; ALE-PLE 0.02; PLE-PME 0.12; PME-PME 0.05. Clypeus 0.21 high. Prosoma dark brown, oval, reticulated, posteriorly straight, sides rebordered and slightly undulating, fovea short. Chelicerae dark brown; paturon twice as long as wide with weak lateral condyles. Endites, labium and sternum medium brown, tips of endites and labium pale; opisthosoma dark brown with paler lanceolate medium stripe and two pairs of pale spots dorsally, followed by five transverse pale bands; venter dark brown with one big

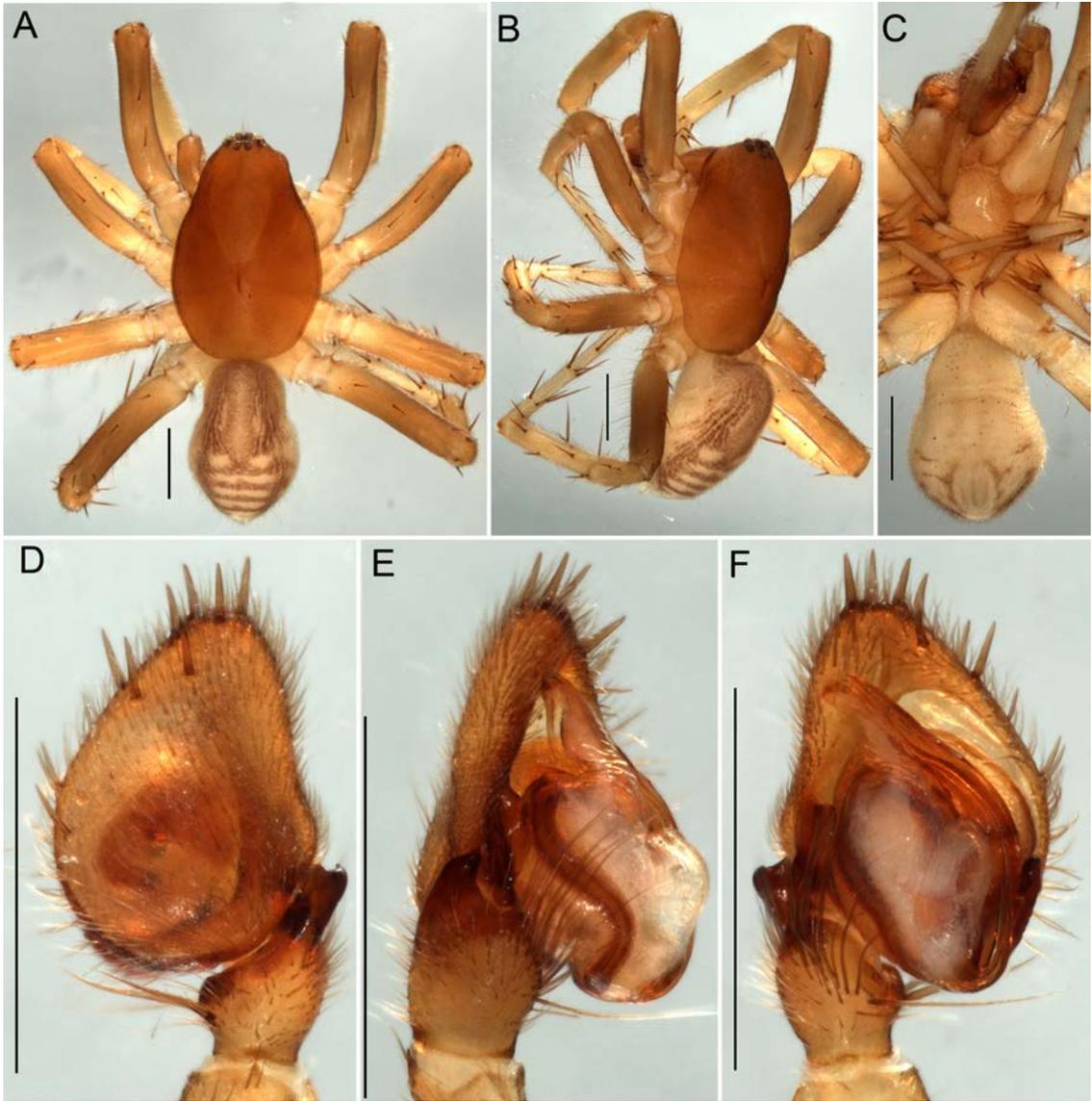


FIG. 10. *Nosterella christineae* sp. nov. male holotype (QM-S55170): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.

pair of pale spots. Legs orange brown, coxae, trochantera orange, femora dark brown.

Male palp (Figs 11 D - F, 16D): Cymbium covered with black setae and 6 thick spines in distal third; C curved, with median ridge, MA base widened, tip with well-developed hood;

sperm duct strongly s-shaped; palpal tibia with a single short, thick macroseta, RTA slightly recurved at the tip.

Female allotype (AM KS59656). Total length 6.39. Prosoma 3.31 long, 2.19 wide, pl/pw 1.51; sternum 1.41 long, 1.33 wide, sl/sw 1.06;



FIG. 11. *Nosterella diabolica* sp. nov. male holotype (AM-KS099595): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.



FIG. 12. *Nosterella diabolica* sp. nov. female allotype (AM-KS59656): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, prosoma, anterior view; **E**, epigyne, ventral view; **F**, epigyne, dorsal view. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

opisthosoma 3.08 long, 2.06 wide. Colour as in male. Eyes, both eye rows strongly procurved, AME, ALE and PLE largest; ALE 0.15; AME 0.15; PLE 0.15; PME 0.13; ALE-ALE 0.24; ALE-AME 0.04; AME-AME 0.03; ALE-PLE 0.01; PLE-PME 0.16; PME-PME 0.05. Clypeus 0.27 high. Epigyne (Figs 12E, F): Epigastric fold without lateral incision, MS widely triangular.

Distribution. This species is known only from New South Wales (Fig. 17C).

Nosterella fitzgibboni sp. nov.
(Figs 13 A-F, 16E, 17C)

Material examined. MALE HOLOTYPE (QM S96336), from Queensland, Carnarvon Station, Brigalow (*Acacia*

harpophylla), 24°49'S, 147°44'E, 741 m, Bush Blitz, B. Baehr, 9-16 Oct 2014, pitfall.

Etymology. The specific name is a patronym in honour of Paralympian Daniel Fitzgibbon who has not let his injuries get in the way of pursuing his passion of sailing and competing in the Olympics winning a gold medal in London (2012) and Brasil (2016).

Diagnosis. Males of *Nosterella fitzgibboni* can be separated from males of other *Nosterella* species, by the two macrosetae on the prolateral side of the tibia, and the straight MA (Figs 13 F, 16E).

Description. Male (Holotype, QM S96336). Total length 6.02. Prosoma 3.23 long, 2.13 wide, pl/pw 1.52; sternum 1.54 long, 1.30 wide, sl/sw 1.30; opisthosoma 2.79 long, 1.97 wide. Eyes, both

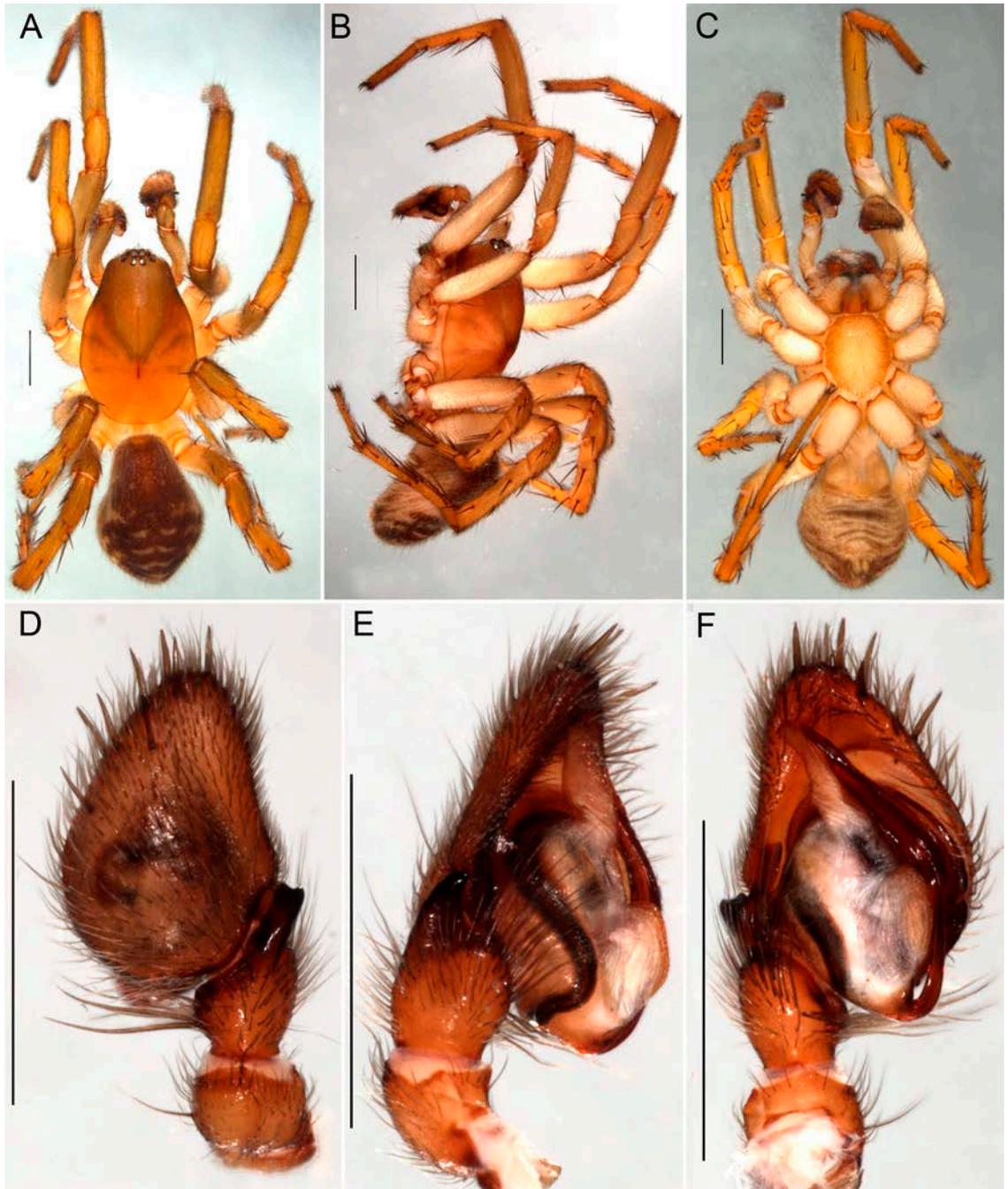


FIG. 13. *Nosterella fitzgibboni* sp. nov. male holotype (QM-S96336): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.

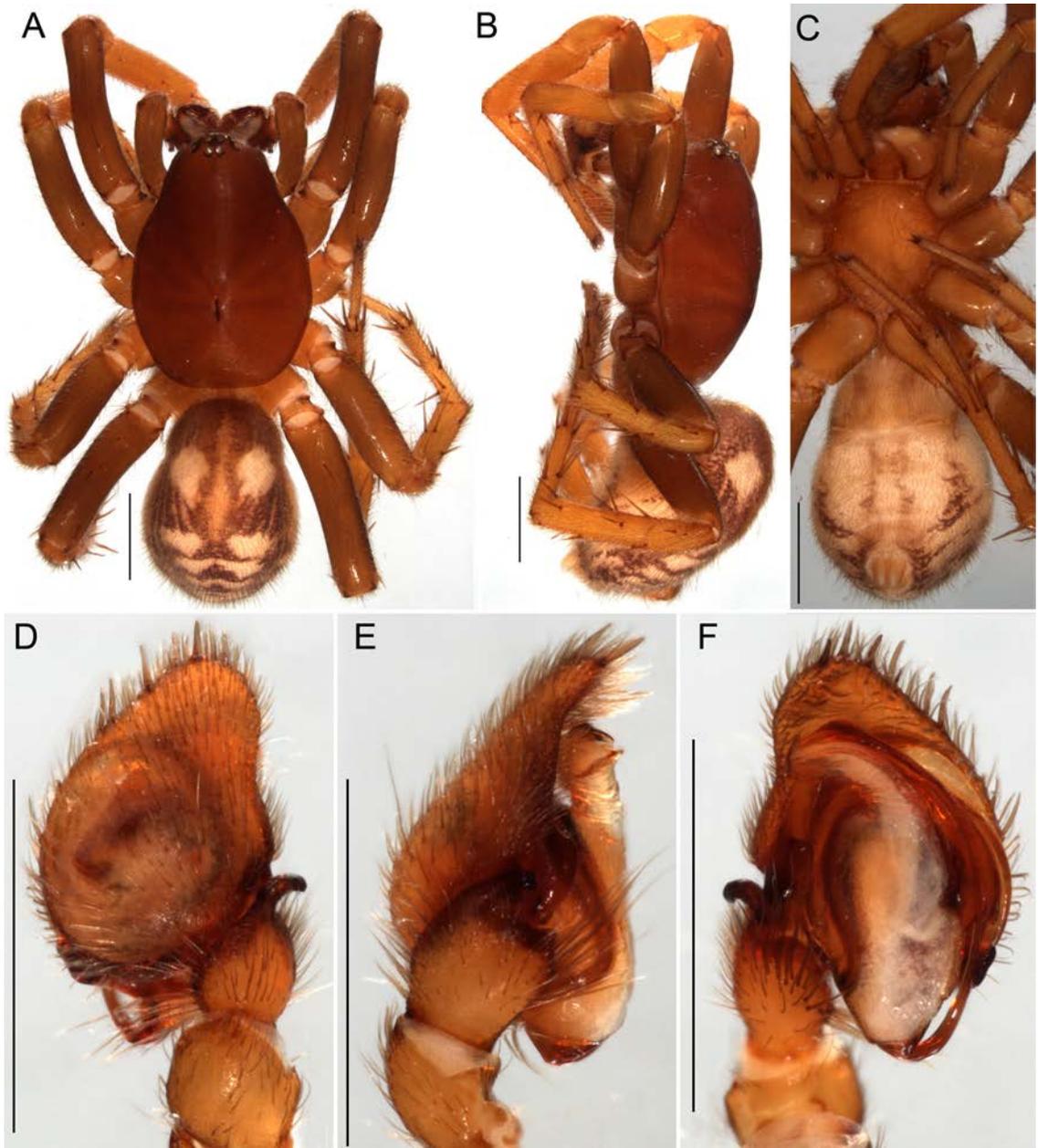


FIG. 14. *Nosterella pollardi* sp. nov. male holotype (QM-S96344): **A**, habitus, dorsal view; **B**, habitus, lateral view; **C**, habitus, ventral view; **D**, male palp, dorsal view; **E**, same, retrolateral view; **F**, same, ventral view. Scale bars: 1.0 mm.



FIG. 15. *Nosterella pollardi* sp. nov. female allotype (QM-S47398): A, habitus, dorsal view; B, habitus, lateral view; C, habitus, ventral view; D, prosoma, anterior view; E, epigyne, ventral view; F, epigyne, dorsal view. LI lateral incision at epigynal fold. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

eye rows strongly procurved, AME largest; ALE 0.15; AME 0.17; PLE 0.15; PME 0.13; ALE-ALE 0.25; ALE-AME 0.05; AME-AME 0.02; ALE-PLE 0.03; PLE-PME 0.12; PME-PME 0.06. Clypeus 0.21 high.

Prosoma yellow orange with a darker brown cephalic area, oval, reticulated, posteriorly straight, sides rebordered and slightly undulating, fovea short. Chelicerae medium brown; paturon twice as long as wide with weak lateral condyles. Endites, labium and sternum yellow orange, tips of endites and labium white; opisthosoma dark brown with two pairs of tiny pale dots dorsally

followed by four thin transverse pale bands; venter pale. Legs yellow, femora pale brown.

Male palp (Figs 13D-F, 16E): Cymbium covered with black setae and 7 thick spines in distal third; C slender, straight, distally slightly excavated, MA slender, straight, tip without hood; sperm duct slightly s-shaped, distally hidden behind C and MA; palpal tibia with two prolateral macrosetae, RTA straight (dorsal view), tip slightly indented.

Female unknown.

Distribution. Known only from Carnarvon Station, Queensland (Fig. 17C).

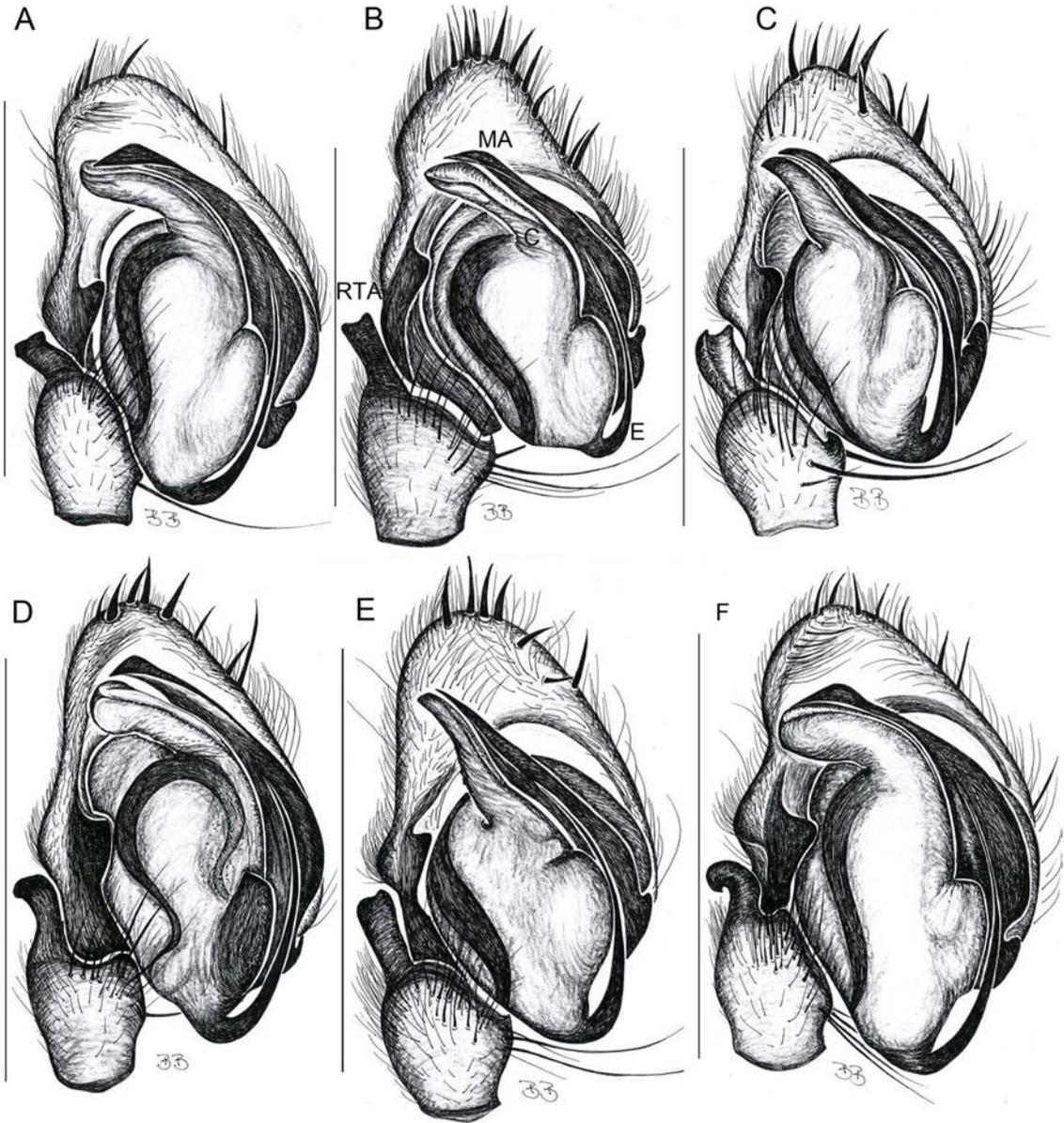


FIG. 16. Male palps for the genus *Nosterella*, ventral view. A, *N. nadgee*; B, *N. cavicola*; C, *N. christineae*; D, *N. diabolica*; E, *N. fitzgibboni*; F, *N. pollardi*. C conductor; E embolus; MA Median apophysis; RTA retrolateral tibial apophysis. Scale bars: 1.0 mm.

Nosterella pollardi sp. nov.
(Figs 14 A–F, 15 A–F, 16F, 17C)

Material examined. MALE HOLOTYPE (QM S96344), from New South Wales, Lord Howe Island, 31°33'S, 159°05'E, 40 m, G. Monteith, 22 Nov 1979, sieved litter; FEMALE ALLOTYPE (QM S47398), same as previous; 1 male (QM S47394), same as previous except south end, 16 Nov 1979.

Etymology. The specific name is a patronym in honour of Peter Pollard, Associate Professor at the Australian Rivers Institute, Griffith University; Peter is a Microbial Ecologist with a PhD in Chemical Engineering and Microbiology from the University of Queensland and his marine and freshwater research has changed the way we see the relationships between microbes and their role in coastal zones, rivers, lakes, and wetlands. The ant-eating spider *Nosterella pollardi*, which lives only on Lord Howe Island surrounded by water, is named to honour Peter Pollard's achievements in marine and freshwater research.

Diagnosis. Males of *Nosterella pollardi* can be separated from the other *Nosterella* species, by the MA tip with well developed hood, by one poorly developed prolateral macroseta and the tibial apophysis strongly curved retrolaterally (Figs 14F, 16F).

Description. Male (Holotype, QM S96344). Total length 5.77. Prosoma 3.10 long, 2.19 wide, pl/pw 1.42; sternum 1.39 long, 1.11 wide, sl/sw 1.25; opisthosoma 1.67 long, 1.91 wide. Eyes, both eye rows strongly procurved, PLE largest; ALE 0.15; AME 0.14; PLE 0.16; PME 0.13; ALE-ALE 0.24; ALE-AME 0.03; AME-AME 0.03; ALE-PLE 0.03; PLE-PME 0.14; PME-PME 0.03. Clypeus 0.24 high. Prosoma dark brown, oval, reticulated, posteriorly straight, sides rebordered and slightly undulating, fovea short. Chelicerae medium brown; paturon twice as long as wide with weak lateral condyles. Endites, labium and sternum medium brown, tips of endites and labium pale; opisthosoma dark brown with pale lanceolate medium stripe and two pairs of pale spots dorsally, followed by five transverse pale bands; venter pale with 2 fainted brown stripes medially. Legs medium brown.

Male palp (Figs 14D–F, 16F): Cymbium covered with black setae and 6 thick spines in distal third; C broad, curved, with slightly excavate tip, MA base widened, tip with well-developed hood; sperm duct slightly s-shaped;

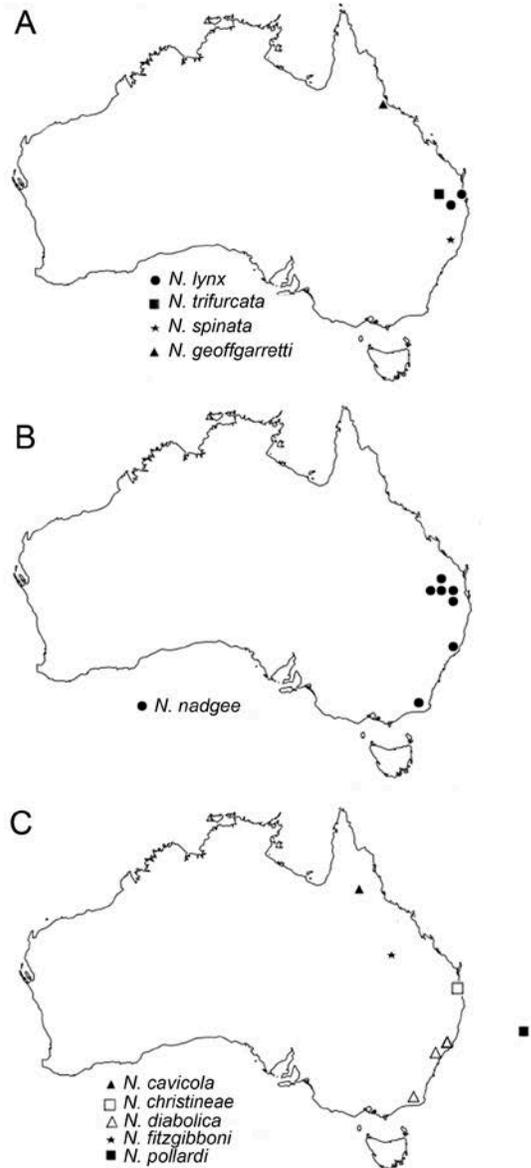


FIG. 17. Distribution Maps: **A**, species of the genus *Nostera*; **B**, *Nosterella nadgee*; **C**, species of the new genus *Nosterella*.

palpal tibia with a single poorly developed prolateral macroseta, RTA strongly curved retrolaterally.

Female allotype (QM S47398). Total length 6.83. Prosoma 3.31 long, 2.09 wide, pl/pw 1.58; sternum 1.52 long, 1.27 wide, sl/sw 1.20; opisthosoma 3.52 long, 2.28 wide. Colour as in male. Eyes, both eye rows strongly procurved, AME, ALE and PLE largest; ALE 0.14; AME 0.14; PLE 0.14; PME 0.12; ALE-ALE 0.25; ALE-AME 0.05; AME-AME 0.05; ALE-PLE 0.02; PLE-PME 0.14; PME-PME 0.05. Clypeus 0.36 high. Epigyne (Figs 15 E, F): Epigastric fold with deep lateral incision, MS rounded.

Distribution. This species is known only from Lord Howe Island (Fig. 17C).

DISCUSSION

The new genus *Nosterella* is quite homogeneous. There are only slight differences between the male and female genitalia of the different species. This might indicate that these species are the result of clear allopatric speciation. Jocqué (2009) discussed this issue in the genera *Systemoplacis* and *Capheris* and concluded that the increased complexity is more common in sympatric speciation.

The reduction of the eyes in *N. cavicola* supports this hypothesis because the genitalia are still very similar to the general pattern found in the genus. The species clearly belongs to *Nosterella* and the eye reduction character does certainly not warrant the creation of a separate genus. In those cases where eye reduction was used as an argument to create a separate genus, it was always in combination with a number of other characters, either somatic or genital. Examples of such troglophile genera are *Plutonodomus* Cooke, 1964 (Cooke, 1964) in the Prodidomidae, and *Ciba* Bloom *et al.*, 2014 (Bloom *et al.*, 2014), in the Ctenidae.

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